

ELECTRONIC INDUSTRIES



IN THIS ISSUE

ELECTRONIC ENGINEERING DIRECTORY

SECTION

Containing 20,000 names,
addresses, and
products

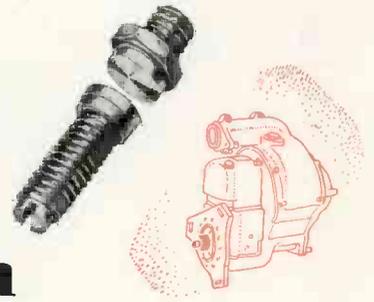
- ★ Radio on Big Construction Jobs
- ★ Tubes Behind the Fighting Fronts
- ★ Short Cuts. Anti-Sabotage Protection

MARCH

Caldwell-Clements

The Case of the Ailing Magneto . . .

Showing That Cooperation Can Lick Almost Any Contact Problem



When you add eagerness to cooperate to engineering experience and "know how," you will understand in some measure why such incredible production results are coming from industry's team work in the war effort. And that goes for any part—from gigantic casting to tiny contact point.

Nowadays, contact production ills demand quick action from the specialist, especially when the prescription must be virtually instantaneous.

Recently, Mallory had a hurry call for help with ailing aircraft magnetos. Combat planes were grounded by faulty magneto operation. Tests traced the trouble to contact "pitting" which caused the airplane engine to misfire.

Mallory contact engineers sought a better material. Speedy experiments indicated a standard Mallory alloy. Suitable contacts were designed, attached to proper backing and put on test. In a few days, the magneto manufacturer's contact troubles were over. The new contacts were incorporated in the magneto production line and magnetos no longer held up efficient combat plane production.

Some folk might hail this example of Mallory contact development as a success story. We prefer to regard it as an example of eager cooperation—the application of years of experience and "know how" that is merely part of the day's work for war effort.

We think we have learned a lot about contacts over the years—and we know we are adding to that knowledge with every development we make. Consult us when your designs involve contacts and complete contact assemblies.

While the design is still in blueprint form



CALL IN MALLORY
for Contacts and
Contact Assemblies

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

Cable Address—PELMALLO



P. R. MALLORY & CO., Inc.
MALLORY
ELECTRICAL CONTACTS AND
CONTACT ASSEMBLIES
NON FERROUS ALLOYS
POWDERED METAL ALLOYS



LONG LIFE ASSURED!

The single most important quality you seek in any condenser is...a *guarantee of long life.*

And this guarantee is built into Tobe Capacitors—built in by persistence in research, soundness in engineering, excellence in production, plus 20 years of condenser experience.

One of the Tobe Capacitors is Type SIC-510M-6 illustrated above. It is doing a vital war job as a filter condenser in secret equipment. Impregnated and filled with mineral oil, it is typical of the careful manufacture and conservative rating which characterize Tobe Capacitors. Ask us about your condenser problems.

TOBE CAPACITOR — TYPE SIC-510M-6-EU

CAPACITY . . . 3 x .2 mfd.	SHUNT RESISTANCE . . . 15,000 megohms or greater
TEST VOLTAGE . . . 8,000 volts DC	POWER FACTOR . . . At 1,000 cycles—less than .004
WORKING VOLTAGE . . . 4,000 volts DC	MINERAL OIL IMPREGNATED—MINERAL OIL FILLED

A SMALL PART IN VICTORY TODAY



A BIG PART IN INDUSTRY TOMORROW





More tube hours are going into battle



Through a series of design and construction developments tending to prolong normal operating life, we have increased the length of actual service that is being derived from each AMPEREX tube. Basically, our facilities are of laboratory type. And any measure of our war production, computed solely on the number of tubes manufactured, would not be a true indication of our total effort.

We, at AMPEREX, have kept pace with numerical production increases being registered throughout the nation. But we are infinitely more proud of our attainments in building longer life into our transmitting and rectifying tube designs. Each AMPEREX radio and radar tube is bringing extra hours of performance to equipment at the front.

AMPEREX ELECTRONIC PRODUCTS

79 WASHINGTON STREET

BROOKLYN, NEW YORK

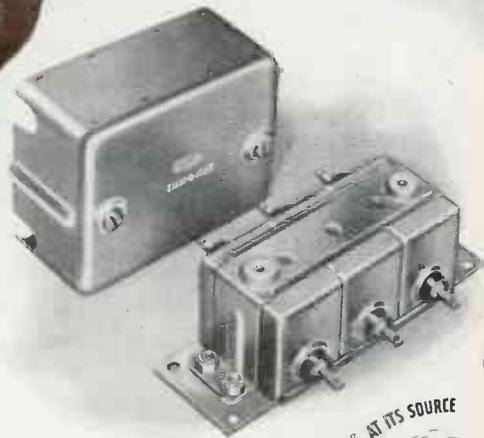


Radio Noise SABOTAGES COMMUNICATIONS unless...

Like so many demors, the crashes and crackles of unwanted radio noise can play havoc with communications. They blot out words—vital words broadcast from plane to plane, from ship to ship, from command car to jeep or tank. They endanger the lives of fighting men—they sabotage communications—unless the proper suppression filter system is installed.

Solar Elim-O-Stats suppress interference *right where it starts*. They absorb interference from generators, motors, contacts and other sources. Thousands of these compact filters protect the lives of our land, sea and air fighters. They prevent the blotting out of vital communications in radio-directed combat.

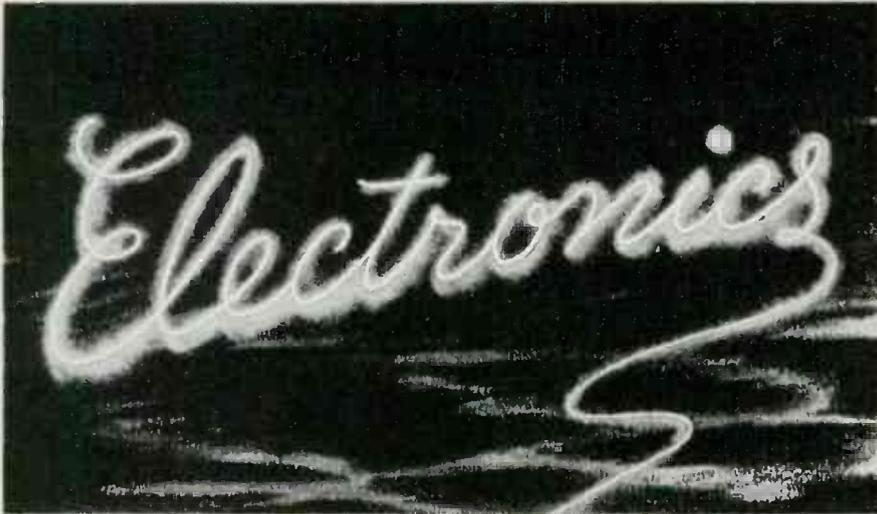
Pioneers in capacitor manufacture and electronic research, Solar engineers probe the rapidly-expanding future of radio development. In post-victory cars, ships and planes, Solar war-proven Capacitors and Elim-O-Stats will safeguard civilian communications, just as they are safeguarding military operations today. Solar Manufacturing Corporation, Bayonne, New Jersey.



Solar **SOLAR** — **ELIM-O-STAT** —



MAKERS OF RADIO NOISE SUPPRESSION FILTERS AND CAPACITORS



*Written
in the Sky*

A new world of wonders, through
ELECTRONICS

From the very beginning, Thordarson engineers recognized this amazing industry as a new challenge to their imaginations and a new opportunity to achieve.

As a result, Thordarson developments in the field of electronics are today far advanced . . . and they bear the same hall-mark of superiority which is a part of every Thordarson accomplishment...

When the propitious moment arrives, the tremendous scope of our research in electronics will be self evident!



THORDARSON
ELECTRIC MFG. COMPANY
500 WEST HURON STREET, CHICAGO, ILL.

Transformer Specialists Since 1895

**ELECTRONIC
INDUSTRIES**

MARCH 1943

In this Issue

	Page
FRONT COVER—Building the Great Douglass Dam. Photo by Palmer of OWI	
Editorial	57
Tubes Behind the Guns	58
Electronics vs Sabotage	60
War Standard for Mica Capacitors	62
Radio on Big Construction Jobs	64
Factory Short Cuts	66
Relays for Electronic Circuits	68
Rebuilding BC Tubes	71
British Radio Engineer	72
Electronic Engineering Directory	80
Wide Reading	118
Washington News	121
What's New	128
New Patents Issued	134
New Books	146
New Literature	148
Association News	156

Electronic Industries, March, 1943, Vol. II, No. 3. 35 cents a copy. Published monthly by Caldwell-Clements, Inc., 480 Lexington Avenue, New York, N. Y. M. Clements, President; Orestes H. Caldwell, Treasurer.

Subscriptions: Continental United States only, \$3 for one year; \$5 for two years. Printed in U.S.A. Acceptance under the Act of June, 1934, authorized November 10, 1942. Copyright by Caldwell-Clements, Inc., 1943.—Printed in U.S.A.

ORESTES H. CALDWELL
Editor

M. CLEMENTS
Publisher

EDITORIAL STAFF

William Moulie	Gilbert R. Sonbergh
Frank E. Butler	Joseph Zentner
Jean Mayer	Charles F. Dreyer
Ralph R. Batchler, Consulting Editor	
Roland C. Davies, Washington Editor	

BUSINESS STAFF

M. H. Newton	John A. Samborn
B. V. Spinetta	W. W. Swigert
N. McAllister	J. E. Cochran

R. Y. Fitzpatrick, Chicago, 201 N. Wells St.
Telephone RANdolph 9225

Editorial and Executive Offices

Telephone PLaza 3-1340
480 Lexington Avenue
NEW YORK



If you believe in the future of America as we do, then we're asking for an appointment immediately after the victory has been won . . . when a bright new era awaits us all.

Perhaps we can talk about a coil problem . . . how thoroughly we're organized to help you on such a problem only military censorship forbids telling now. Or it may be that you manufacture your own coils and will be interested in discussing magnet wire—any shape—any insulation that your operations require.

As a matter of fact, perhaps we can get together now, but if it happens we can't, remember we have a date in and for the future. When we both can keep it, you can again take advantage of Anaconda service and the benefits derived from the single product control "from mine to consumer" backed by years of continuous metallurgical experience.

ANACONDA WIRE & CABLE COMPANY
 General Offices: 25 Broadway, New York
 Chicago Office: 20 North Wacker Drive
 Subsidiary of Anaconda Copper Mining Co.
 Sales Offices in Principal Cities



 *Magnet wire and coils*

ANACONDA WIRE & CABLE COMPANY

Amazing NEW GLASS

mail coupon today for

NEW CORNING MULTIFORM GLASS INSULATION

REPLACES STEATITE, PORCELAIN AND
OTHER ELECTRICAL INSULATION MATERIALS

A QUICK CHECK LIST
FOR ENGINEERS!

ENGINEERING PROPERTIES OF PYREX MULTIFORM GLASS VS. OTHER INSULATING MATERIALS

GLASS CODE		790	7761	707	774	Steatites*	Electrical Porcelains*
GLASS TYPE		Multiform Glass	Multiform Glass	Multiform Glass	Conventional Glass		
ENGINEERING PROPERTIES	UNIT						
DENSITY	—	2.15	—	2.10	2.23	2.5—2.8	2.3—2.5
SOFTENING TEMPERATURE	°C	—	—	—	820	1250—1400	1500—1600
MAX. OPERATING TEMPERATURE	°C	800	500	425	500	60—90	30—50
LINEAR EXPANSION (0-300°C)	per °C X 10 ⁻⁷	8.5	—	32	32	0—0.1	0—2.0
WATER ABSORPTION—24 HRS.	%	<.01	<.01	<.01	NONE	—	6—12
MODULUS OF RUPTURE —ANNEALED GLASS	LBS./IN. ² X 10 ³	5	7	7	10	17—24	—
MODULUS OF RUPTURE —SPECIAL PROCESS	LBS./IN. ² X 10 ³	—	—	12	18	—	12—14
VOLUME RESISTIVITY					14.7	14	7—10
LOG R AT 20°C	OHMS PER CM. CUBE	9.3	—	—	8.1	9—14	6—8
LOG R AT 250°C	—	7.8	—	—	6.7	8—13	5.0—7.5
LOG R AT 350°C	—	4.0	4.0	4.0	4.65	5.5—7.5	0.70—1.2
S. I. C.—20°C—1 MEG.	%	0.18	0.11	0.10	0.42	0.03—0.20	3.5—9.0
P. F.—20°C—1 MEG.	%	0.72	0.44	0.40	1.95	0.15—1.24	200—280
L. F.—20°C—1 MEG.	VOLTS/MIL	>500	>500	>500	HIGH	200—300	—

*Data from Rigterink, M.D., Review of Scientific Instruments, vol. 12, no. 11, 527-534 (1941).

INSULATORS . . .

free sample and data!



**NO SHORTAGE OF GLASS!
YOUR PROBLEMS GIVEN
PROMPT ATTENTION!**

ALMOST NO LIMITS ON SIZE OR SHAPE

IF you need insulators, here's what you've been waiting for! Corning Glass Research announces new types of electrical insulators—Pyrex brand Multiform Glassware. Its general characteristics include low loss factor, high dielectric strength, negligible water absorption, adequate mechanical strength. For example, Multiform glass Number 790 (see chart on opposite page) meets requirements of U. S. Navy Standard RE-13A-317F. And all Multiform glasses comply with the proposed A.S.A. American War Standard on Radio Insulation Materials of Low Dielectric Constant.

The characteristics of these glasses plus Corning's new fabrication methods make possible an extremely wide range of shapes and sizes. General dimensional tolerances are: large or heavy pieces, intricate shapes, hollow cylindrical sections— $\pm 2.0\%$ or 0.010"; flat plates, solid rods, discs, beads, bushings— $\pm 1.0\%$ or 0.005", except thickness which should be $\pm 4\%$ or 0.005".

Best of all, glass-making materials are still fairly plentiful. Pyrex brand Multiform Insulators are available NOW! Mail the coupon today for a free sample and a descriptive booklet just off the press.

* * *

Pyrex brand Multiform Glassware is particularly adapted to manufacture in such shapes as solid cylinders, plates with one or many holes, large heavy-walled articles, coil forms, hollow cylindrical beads, and many other articles in a wide variety of shapes. In size and weight, these insulators run the gamut from small beads, several thousand to the pound, to large pieces with maximum dimensions up to 15", weighing 25 pounds each or more.



MAIL COUPON TODAY!



Corning Glass Works, Corning, N. Y.
Insulation Division, Dept. EI-6
Please send me immediately, without charge,
sample and descriptive booklet on new Pyrex
brand Multiform Insulators.

Name.....

Company.....

Street Address.....

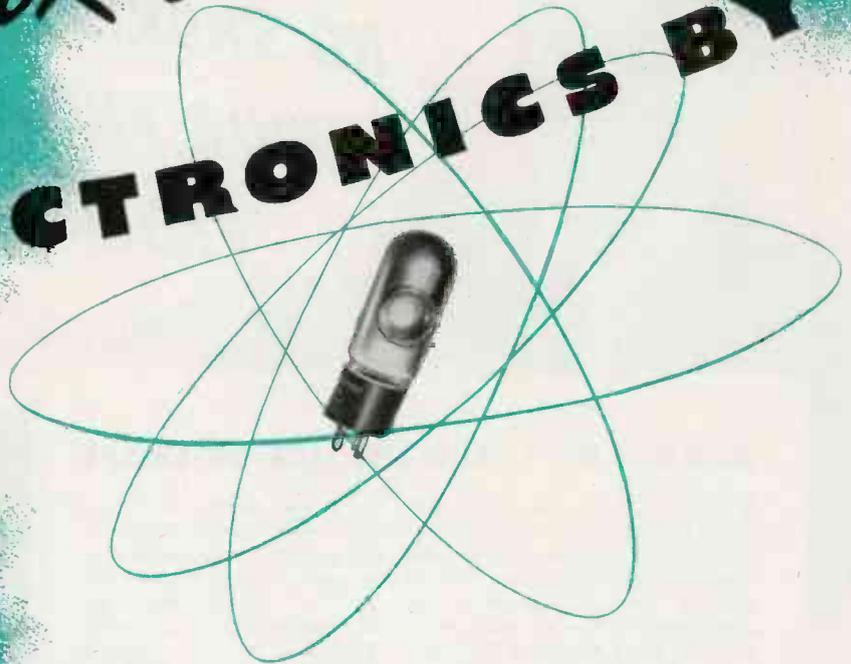
City..... State.....

Pyrex Insulators

BRAND

"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works

a Look Ahead AT ELECTRONICS BY



and
a Directory of
G-E
Electronic
Products

RADIO, TELEVISION, AND COMMUNICATION EQUIPMENT



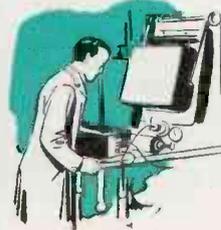
AM broadcast transmitters	Measurement equipment
AM broadcast receivers	Military equipment
Carrier current	Monitors
Electronic tubes	Studio equipment
FM broadcast transmitters	Television transmitters
FM broadcast receivers	Television receivers
FM police and emergency radio	Transmitting antennas

INDUSTRIAL ELECTRONIC DEVICES



Amplifiers	Photoelectric control for: blackout, sabotage prevention, inspection, printing and web register, lighting
Arc-welding-control	Photoelectric relays
Atomic-hydrogen welding control	Photoelectric pyrometers
Battery chargers	Power rectifiers
Cable-fault locator	Resistance-welding control
Electric-furnace control	Synchronous-motor exciters
Electronic timers	Theater-lighting control
High-frequency power oscillators	Variable-speed motor drive
High-voltage rectifiers	Voltage and current regulators
Industrial X-ray	
Magnetizers	

ELECTRONIC MEASURING EQUIPMENT



Cathode-ray oscilloscopes	Devices to measure:
Electron microscopes	resistance, capacitance, induc-
Power bridges	tance, impulse voltages, trans-
Regulated power supplies	ients, coil turns, short circuited
Servo-sweep generators	turns, thickness, pressure, strain,
Signal-to-noise ratio meters	color, vibration, sound level,
Square-wave generators	reflectance, light transmission
X-ray diffraction camera	acceleration, rotational speed

GENERAL ELECTRIC

● One year ago General Electric began the first educational program designed to tell Mr. and Mrs. America about the wonders of electronics. Electronics was a new word to them then. It is a news word to them today. Across the nation, people are learning to expect great things of this far-reaching science in our bright new world of the future.

Public acceptance of any new science speeds the growth of that science. The part G.E. is playing in building public appreciation and understanding of electronics will hasten the introduction of new electronic products.

Already, in industry, electronic production-aids are simplifying processes, conserving materials, increasing output, and decreasing production and maintenance costs. And industry has only begun to taste the benefits.

In our post-war world there must be no idle hands, no slackening in the rise of the standard of living.

In electronics lies one of our very real opportunities to keep those hands from becoming idle, to push living standards ever higher—for America and for all the world.

FM, television, aircraft radio, the communications industry; new electronic devices for the home; industrial control, resistance welding, induction heating; power conversion; the X-ray; electronic therapy; the electron microscope—all point toward human progress along the road to a better world of free people.

The task and the opportunity of the entire electronics industry is limited, perhaps, only by the human ability to span the vastness between the electron and its potentialities.



MEDICAL EQUIPMENT

Radiography
X-ray for therapy
Inductotherm

Electron microscope
Electrocardiograph



WRITE FOR
THIS FREE BOOK

ELECTRON TUBES FOR ALL APPLICATIONS

Ballast tubes
Cathode-ray tubes
Glow tubes
Ignitrons
Kenotrons
Magnetrons
Military types

Phanotrons
Phototubes
Pliotrons
Radio transmitting tubes
Radio receiving tubes
Thyratrons

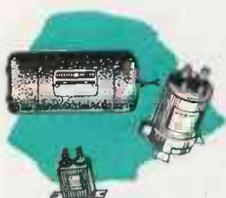


"Electronics—A New Science for a New World" is a 32-page book prepared by General Electric to give the layman an appreciation of electronics. For a copy, write to General Electric Company, Sec. 676-108, Schenectady, N. Y.

PARTS FOR ELECTRONIC EQUIPMENT

Capacitors
Copper-oxide rectifiers
Dri-film (water-repellent)
Dynamotors
Instruments
Lamps
Molded plastics
Motors and control

Mycalex
Quartz crystals
Sensitive relays
Transformers
Tube parts
Voltage stabilizers
Wire and cable



GENERAL ELECTRIC

ORDER YOUR ELECTRONIC TUBES FROM THESE GENERAL ELECTRIC DISTRIBUTORS

• The best known names in the field of radio and industrial distribution are ready to give careful attention to your immediate needs for electronic tubes for replacement purposes.

**THE GENERAL ELECTRIC
SUPPLY CORPORATION
AND MANY OTHER OUTSTANDING
DISTRIBUTING ORGANIZATIONS**



• These alert distributors are conveniently located from coast to coast. They are organized to give you quick action—to expedite your priority-covered orders. Wire, write or phone your nearest local source of supply.

ALABAMA

Birmingham
Mathews Electric Supply Co.
James Clary Co.

Cullman
Deerr Electric Co.

Mobile
Mathews Electric Supply Co.
Nelson Radio & Supply Co.

Montgomery
Mathews Electric Supply Co.

ARIZONA

Phoenix
General Electric Supply Corp.
W-6 Radio Shop
Radio Specialties Co.

ARKANSAS

Little Rock
General Electric Supply Corp.

Fort Smith
Interstate Electric Co.

Texarkana
Mims Radio

CALIFORNIA

Fresno
General Electric Supply Corp.
Spitler, Short & Griffith
De Jarnatt Whise. Radio Co.

Hollywood
Radio Specialties Co.

Los Angeles
General Electric Supply Corp.
E. W. Reynolds Company
Radio Television Sy. Co., Inc.
Radio Specialties Co.
Radio Product Sales Co.

Pasadena
Dow Radio Supply Co.

Oakland
General Electric Supply Corp.
W. D. Brill Co.
E. C. Wenger Company

Sacramento
General Electric Supply Corp.

Santa Barbara
Channel Radio Supply Co.

San Bernardino
Inland Radio Supply Co.

San Diego
General Electric Supply Corp.
Coast Electric Company

San Francisco
General Electric Supply Corp.
San Francisco Radio Sy. Co.

San Jose
Frank Quement Company

Stockton
De Jarnatt Whise. Radio Co.

COLORADO

Denver
General Electric Supply Corp.

CONNECTICUT

Bridgeport
General Electric Supply Corp.
Hatry & Young

Greenwich
Greenwich Electrical Co.

Hartford
General Electric Supply Corp.
Hatry & Young

New Haven
General Electric Supply Corp.
Hatry & Young
Congress Radio Company

DELAWARE

Wilmington
General Electric Supply Corp.
Delaware Radio Sales Co.

DIST. OF COLUMBIA

Washington
General Electric Supply Corp.

FLORIDA

Jacksonville
General Electric Supply Corp.

Miami
General Electric Supply Corp.
Electric Radio Eng. & Sy. Co.

St. Petersburg
Radio Hospital & Parts Store

Tampa
General Electric Supply Corp.

GEORGIA

Atlanta
General Electric Supply Corp.
Lafayette Radio Corp.

Savannah
General Electric Supply Corp.

IDAHO

Boise
General Electric Supply Corp.

ILLINOIS

Chicago
General Electric Supply Corp.
R. Cooper, Jr., Inc.
Allied Radio Corp.
Chicago Radio Apparatus Co.
Newark Electric Co.
Lafayette Radio Corp.

Quincy
Crescent Elec. Supply Co.

Rockford
General Electric Supply Corp.

Rock Island
Tri-City Radio Sy. Co.

Springfield
General Electric Supply Corp.

INDIANA

Evansville
General Electric Supply Corp.

Fort Wayne
Protective Elec. Sy. Co.
Pemberton Laboratories
Radio Parts Co.

Indianapolis
General Electric Supply Corp.
Van Sickle Radio Co.

Muncie
General Electric Supply Corp.

South Bend
South Bend Electric Co.

Terre Haute
Advance Electric Co.

IOWA

Burlington
Crescent Elec. Supply Co.

Davenport
Crescent Elec. Supply Co.

Des Moines
General Electric Supply Corp.

Dubuque
Crescent Elec. Supply Corp.

Mason City
Crescent Elec. Supply Corp.

Sioux City
Crescent Elec. Supply Corp.

Waterloo
Crescent Elec. Supply Corp.

KANSAS

Wichita
General Electric Supply Corp.
Radio Laboratories

Topeka
Radio Laboratories

KENTUCKY

Louisville
General Electric Supply Corp.
Universal Radio Supply Co.

LOUISIANA

New Orleans
General Electric Supply Corp.

Shreveport
General Electric Supply Corp.

MAINE

Bangor
General Electric Supply Corp.
Rice & Tyler

Portland
General Electric Supply Corp.
Bartlett Radio Company

MARYLAND

Baltimore
General Electric Supply Corp.
Radio Electric Service Co.

Cumberland
Morrisey's Radio Sy. Co.

Hagerstown
Zimmerman Wholesalers

MASSACHUSETTS

Boston
General Electric Supply Corp.
Brattle Radio Co.
Radio Wire Television, Inc.
The Radio Shack Corp.

Springfield
General Electric Supply Corp.
T. F. Cushing Co.
Springfield Radio Co.

Worcester
Cochlin Electric Company
General Electric Supply Corp.
Radio Maintenance Sy. Co.

MICHIGAN

Ann Arbor
Purchase Radio
Wedemeyer Radio Co.

Battle Creek
Wedemeyer Radio Co.

Detroit
General Electric Supply Corp.
M. N. Duffy & Co.
Radio Specialties Corp.

Grand Rapids
General Electric Supply Corp.

Jackson
Fulton Radio Sy. Co.

Kalamazoo
General Electric Supply Corp.

Lansing
General Electric Supply Corp.
Knight Elec. Co.

Muskegon
Fitzpatrick Elec. Supply Co.

Saginaw
General Electric Supply Corp.

St. Joseph
St. Joe Radio Co.

MINNESOTA

Duluth
General Electric Supply Corp.
Northwest Radio

Minneapolis
General Electric Supply Corp.

St. Paul
General Electric Supply Corp.
Hall Electric Company

MISSISSIPPI

Jackson
General Electric Supply Corp.

MISSOURI

Joplin
General Electric Supply Corp.

Kansas City
General Electric Supply Corp.
Radio Laboratories

St. Louis
General Electric Supply Corp.
Van Sickle Radio Co.
Gordon Radio Company
Walter Ashe Radio Company

MONTANA

Butte
General Electric Supply Corp.

NEBRASKA

Omaha
General Electric Supply Corp.
Radio Equipment Corp.

NEW HAMPSHIRE

Concord
Carl B. Evans

NEW JERSEY

Jersey City
General Electric Supply Corp.

Newark
General Electric Supply Corp.
Aaron Lippman & Co.
Radio Wire Television, Inc.

New Brunswick
Aaron Lippman & Co.

Paterson
General Electric Supply Corp.
Aaron Lippman & Co.

NEW YORK

Albany
Havens Electric Co. Inc.
Fort Orange Radio Dist. Co.

Binghamton
So. Tier Electric Sy. Co.

Brooklyn
General Electric Supply Corp.

Buffalo
General Electric Supply Corp.
Dymac Radio Co.

Elmira
So. Tier Electric Sy. Co.
Barker, Rose & Kimball, Inc.

Ithaca
Stallman of Ithaca

New York City
Metropolitan Dist. Branch.
General Electric Company
General Electric Supply Corp.
Harrison Radio Co.
Harvey's Radio Shop
Radio Wire Television, Inc.
Sanford Samuel Corp.
Sun Radio Company
Terminal Radio Corp.
Service Radio Engineers

Niagara Falls
General Electric Supply Corp.

Pittsburg
Bragg Bros.

Poughkeepsie
Electra Supply Co., Inc.

Rochester
General Electric Supply Corp.
Beucaire, Inc.
Radio Parts & Equip. Co.
Brown Radio Service & Lab.
Masline Radio Parts

Rome
Radio Service Lab.

Syracuse
Gould-Farmer Co., Inc.
W. E. Berndt

Utica
Langdon & Hughes Elec. Co.
Vaeth Electric Company

NORTH CAROLINA

Asheville
Freck Radio & Supply Co.

Charlotte
General Electric Supply Corp.
Shaw Distributing Co.

Greensboro
Johannesen Electric Co.

NORTH DAKOTA

Fargo
Dakota Electric Supply Co.

OHIO

Akron
General Electric Supply Corp.
Brighton Sporting Goods Co.

Canton
Furbay-Sommer Company
Burroughs Radio Company

Cincinnati
General Electric Supply Corp.
Jos. N. Davies
United Radio, Inc.

Cleveland
General Electric Supply Corp.
Progress Radio Supply Co.
Radio Serviceman's Sy. Co.

Columbus
General Electric Supply Corp.

Dayton
General Electric Supply Corp.
Crosley Distributing Corp.

Kent
Kladag Radio Labs.

Lima
Lima Radio Parts Co.

Toledo
General Electric Supply Corp.

Youngstown
General Electric Supply Corp.

OKLAHOMA

Oklahoma City
General Electric Supply Corp.
Southern Sales Co.

Tulsa
General Electric Supply Corp.
Radio, Inc.

OREGON

Portland
General Electric Supply Corp.
Radio Supply Co.

PENNSYLVANIA

Allentown
General Electric Supply Corp.

Erie
General Electric Supply Corp.
Warren Radio Co.

Harrisburg
Raub Supply Company

Lancaster
Raub Supply Company
George D. Barbey Co.

Philadelphia
General Electric Supply Corp.
Elliott Lewis Electrical Co.
Consolidated Radio Corp.
Radio Elec. Serv. Co., Inc.
M & H Sporting Goods Co.
Eugene G. Wile Company

Pittsburgh
Ochiltree Electric Company
General Electric Supply Corp.
Cameradio Co.

Reading
General Electric Supply Corp.
Geo. D. Barbey Co.

Seranton
General Electric Supply Corp.
Fred P. Pursell Company

Uniontown
Zimmerman Wholesalers

Williamsport
Lowry Electric Co., Inc.

RHODE ISLAND

Providence
General Electric Supply Corp.
Kraus & Co.

SOUTH CAROLINA

Charleston
Perry-Mann Elec. Co., Inc.

Columbia
Perry-Mann Elec. Co., Inc.
Dixie Radio Supply Co.

SOUTH DAKOTA

Sioux Falls
Crescent Elec. Supply Co.

TENNESSEE

Chattanooga
General Electric Supply Corp.
Jones-Sylar Supply Co.

Knoxville
General Electric Supply Corp.

Memphis
General Electric Supply Corp.
Bluff City Distributing Co.

Nashville
General Electric Supply Corp.

TEXAS

Abilene
General Electric Supply Corp.

Amarillo
General Electric Supply Corp.

Austin
The Hargis Co.
Corpus Christi
Strauss-Frank Co.

Dallas
General Electric Supply Corp.
Southwest Radio Service
Wilkinson Bros.

Denison
Denison Radio Lab.

El Paso
General Electric Supply Corp.
C. C. McNicol

Fort Worth
General Electric Supply Corp.
Fort Worth Radio Supply Co.

Houston
General Electric Supply Corp.
Strauss-Frank Co.

San Antonio
General Electric Supply Corp.
Strauss-Frank Co.

UTAH

Salt Lake City
General Electric Supply Corp.
Radio Supply, Inc.

VIRGINIA

Norfolk
General Electric Supply Corp.
Radio Supply Co.

Richmond
General Electric Supply Corp.

WASHINGTON

Seattle
General Electric Supply Corp.

Spokane
General Electric Supply Corp.

WEST VIRGINIA

Charleston
Virginian Electric Co., Inc.
Hicks Radio Supply Co.
Sigmon Radio Supply Co.

Wheeling
Cameradio Co.

WISCONSIN

Appleton
General Electric Supply Corp.
Valley Radio Distributors

La Crosse
General Electric Supply Corp.

Madison
Crescent Elec. Supply Co.

Milwaukee
General Electric Supply Corp.

TERRITORY OF HAWAII

Honolulu
W. A. Ramsay Ltd.

ASK FOR THIS G-E ELECTRONIC TUBE HANDBOOK

• Ask your nearest distributor for a copy of this quick reference handbook. You will find it invaluable for specifying and selecting the electronic tubes you need.



THERE'S A G-E TUBE FOR EVERY ELECTRONIC PURPOSE

GENERAL ELECTRIC

176-L

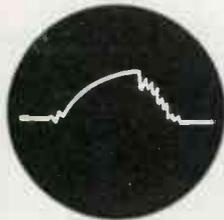


Crystal Gazing

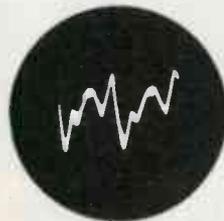
IN THIS ELECTRONIC AGE



Two batches of different steel alloys became mixed. They had to be sorted quickly, positively, economically. This oscillograph pattern served to identify one alloy from the other.



A manufacturer of ignition equipment wanted to check operating conditions. This is what he saw when a defective condenser was across breaker points.



A musical instrument manufacturer wanted an "electronic blueprint" of good tone. This oscillograph gave him the wave form to be matched for good-tone accordions.

★ Knobs are adjusted; a green dot gyrates to weave a weird pattern; the operator is fascinated by the graphic story unfolding before his eyes. Truly *crystal gazing*, in this electronic age. And dealing with the past, present and future of a host of details encountered in research, production, servicing—*scientifically*.

A decade ago the cathode-ray oscillograph was a scientific curiosity. A dozen or two such costly instruments existed in this country, mainly in lavishly equipped laboratories. But Allen B. DuMont pioneered the commercial cathode-ray tube and oscillograph. With advanced engineering and economical production methods, he brought such equipment within reach of everyone. Today DuMont equipment is standard in laboratories, engineering departments, plants, maintenance routine—and in military operations, of course.

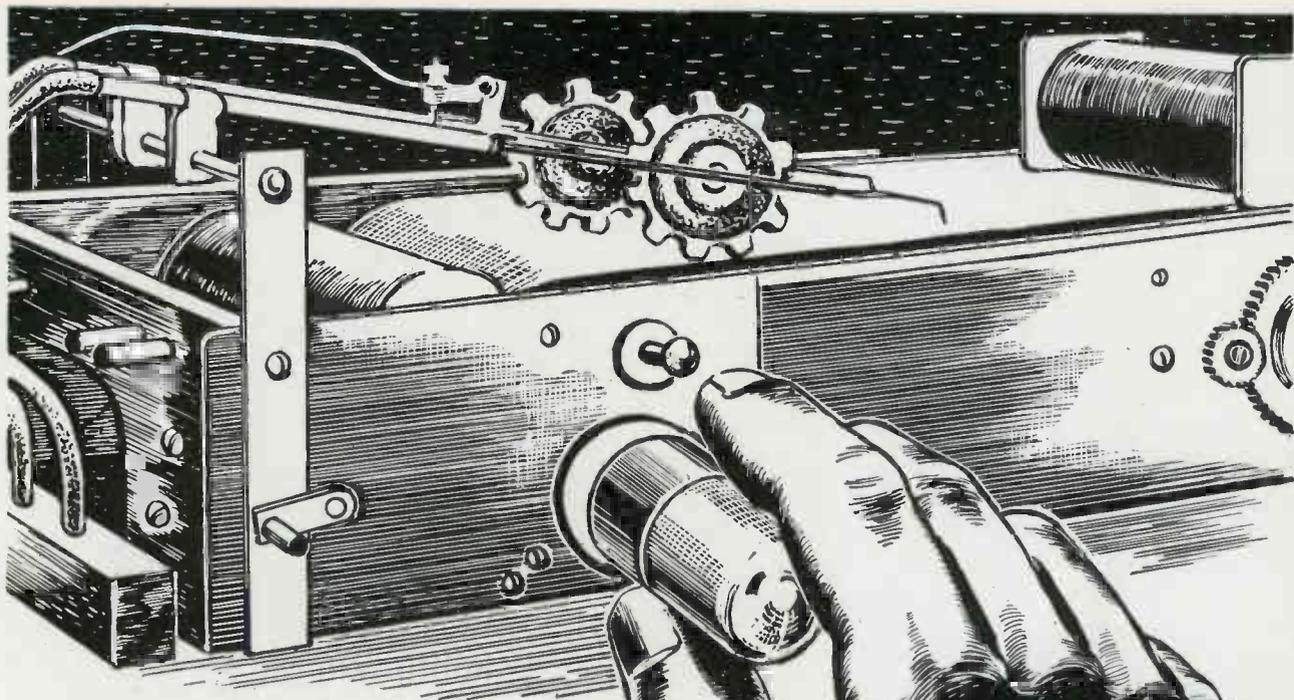
Regardless what your job may be or what industry or war effort you serve, it can be done better, quicker, cheaper, if you resort to this *electronic crystal gazing*, with DuMont equipment.

◆ Write for Literature . . .

DUMONT

**ALLEN B. DU MONT
LABORATORIES, Inc.**

Passaic • New Jersey
Cable Address: Wespexlin, New York



A BOON TO **Radionics**

*... but it will
not work without
a tube!*

Another radionic development that has an important future use is a device which gathers data from time displacement sheets . . . used in clinics for the study of respiratory and diadochokinetic movements. A boon to radionics, but it will not work without tubes.

Just how well RAYTHEON has succeeded in developing and producing special tubes that have large potential wartime vital needs, as well as postwar industrial applications, is evidenced by RAYTHEON'S outstanding record of production.

This has enabled RAYTHEON to become a greatly increased factor in secret tubes and equipment for global warfare.

When these developments can be released for general domestic use they will be an important factor in the new industrial art of radionics, maintaining RAYTHEON'S leadership and ability in keeping ahead with the most advanced tube designs.

RAYTHEON

Raytheon Manufacturing Company

WALTHAM AND NEWTON, MASSACHUSETTS

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

VISION



**A VITAL THING IN THE
DEVELOPMENT OF TRANSFORMERS
FOR WAR OR INDUSTRY**

*Now or in the future
— whether your
problem is a fin-
ished product ready
for use or a compo-
nent for your own
assemblies—you are
invited to make use
of AMERTRAN'S
engineering cooper-
ation.*

*This advertisement con-
forms with the govern-
ment recommendation
of simplicity in engrav-
ing to conserve critical
materials.*

Thru AMERTRAN'S four decades of radio, continuous re-
search has been a definite engineering policy that has
resulted in many product improvements and a steady
enlargement of its field of service.

In the very early days of radio, AMERTRAN engineers saw
that electronics would some day establish a trend of its own.
An unbroken period of research, then begun, has kept
AMERTRAN in the forefront of electronic development,
especially in reference to the use of transformers, reactors
and rectifiers.

While this background has naturally benefitted AMER-
TRAN customers, it has also enabled the company to meet
engineering requirements of ever-growing importance and
complexity.

The same vision and research are today a definite service to
the war effort. AMERTRAN'S products are consistently
specified for vital war applications.

AMERTRAN

Manufacturing since 1901 at Newark, N. J.

AMERICAN TRANSFORMER COMPANY, 178 EMMET ST., NEWARK, N. J.

YOURS FOR THE ASKING . . .



NEW, TIME-SAVING CATALOGS

on Small Pyranol Capacitors
for Built-in Applications

THESE publications make it easy for you to select Pyranol* capacitors for applications such as electronic devices, communications equipment, control, motors, and transformers.

This technical information is up to the minute, easy to use. Covers all the standard types and sizes generally required—all those that have been found most desirable with respect to ratings and dimensions.

You'll find it's easy to design with G-E capacitors, because: (1) Pyranol, the treating material, makes these units small and compact—often you can reduce the size of your equipment and save critical material; (2) many of the ratings are available in cylindrical, oval, or rectangular cases; and (3) they can be operated in any position.

Get your copies of these comprehensive, time-saving publications.

*Pyranol is the G-E trade name for askarel—a synthetic, noninflammable liquid.

VALUABLE FOR ENGINEERING, DRAFTING,
OR PURCHASING DEPARTMENTS

- ★ More than 350 standard ratings to choose from
- ★ Easy-to-read, easy-to-use tables and diagrams
- ★ Large photographs of representative types
- ★ Handy thumb index for quick reference

General Electric Company, Section D 407-49
Schenectady, N. Y.

Please send me complete information on small Pyranol capacitors for built-in applications.

- For D-c Applications (GEA-2621A)
 For A-c Applications (GEA-2027B)

Name.....
Company.....
Address.....
City..... State.....

GENERAL  ELECTRIC

Ready Room



A laugh. A smoke. A last lingering look at the chart. It won't be long now.

You're rarin' to go, Tom. It isn't easy to sit back and tell funny stories . . . waiting for the call.

Maybe you're a little scared. Who wouldn't be? But you're ready.

You're ready because you're a fighter pilot with the best training, the best equipment and the best cause on earth.

There she goes, Tom! Good luck . . . and God bless you!

Overnight we changed at ALCO to the sort of setup that would get things ready for Tom. That meant going on a 24-hour basis, developing the speed, facilities, personnel for insuring maximum wartime production to the extent of ten times 1939 production. Unhappily, too, it meant deserting the ALSiMag needs of long-time ALCO friends of 40 years standing. We're geared to the war job now . . . and it's full speed ahead and all of it financed without government participation!

The ALCO plant was on the first list of 43 awards for excellence in quality and quantity of war production.

ALSiMAG

TRADE MARK REGISTERED U. S. PATENT OFFICE

ARMY E NAVY

AMERICAN LAVA CORPORATION
CHATTANOOGA, TENNESSEE

WE WANT
TO SEE
YOU



EVERY ONE connected with the electronics industry can be proud that television is destined to be the big new industry of the post-war years. Business leaders and economists expect it to rival the growth of the automobile industry after the last war. It should help America "take up the slack" when Peace comes — enlist piled-up savings — make thousands of new jobs.

Farnsworth, pioneer and natural leader in television manufacture, is already enlarging that opportunity. Our advertising, right now, is telling America about the television to come — when the war is finally won.

Farnsworth production, today, goes entirely to the armed forces . . . fine precision equipment that will help United Nations win. When the war

job is done, we'll be ready to supply the most advanced and most complete studio and station television equipment — the fruit of 16 years of research and invention in this field.

Television has always been Farnsworth's primary interest. And for the precision manufacture necessary, we have the plant and people who have built the superb Capehart Phonograph-Radio.

Farnsworth research made electronic television a reality . . . Farnsworth equipment will bring it — at its best — to America.

• PREPARING THE COUNTRY for television is the job of Farnsworth advertising. Read the current advertisement in March 22 *Time*, March 27 *New Yorker*, March 29 *Life*, April 3 *Collier's*, and April 5 *Newsweek*.

FARNSWORTH TELEVISION

• Farnsworth Television & Radio Corporation, Fort Wayne, Indiana. Manufacturers of Television and Radio Transmitters and Receivers; Aircraft Warning Equipment; the Farnsworth Dissector Tube; the Capehart, the Capehart-Panamuse and the Farnsworth Phonograph-Radios.

Two ways of PUTTING THE



THE TUBING WITHIN THE TUBE . . .

SUPERIOR'S Products in tubing have been developed with Engineers in the Electronics Industry and are now in constant production. This list is complete insofar as standardized materials are concerned. Specialties for experimental and development research work in other metals can be supplied.

SEAMLESS— Nickel of electronic quality in Random lengths, or Nickel Cathode Sleeves to exact lengths. Plain or Beaded (embossed), and also to *Shaped* specifications.

LOCKSEAM*— Nickel Cathode Sleeves, Round or Special Shapes, to specified lengths. Plain, or Beaded as specified.

LAPSEAM— Nickel Sleeves produced mechanically for special purposes.

ANODES— Stainless Steel—Nickel of electronic quality — Monel — Inconel. For Cathode Ray Tubes and Power Tubes. In random lengths or to exact specifications.

ANTENNAS— Brawn Monel.** For transmitting and receiving purposes. Especially adapted to Marine use.

EXHAUST TUBES— Coppered Steel. To exact specifications.

TUBING IN STEEL and IRON can be produced on short notice in sizes from $\frac{5}{8}$ " OD down to .010" OD and smaller.

TUBING with special magnetic and sealing properties can be handled.

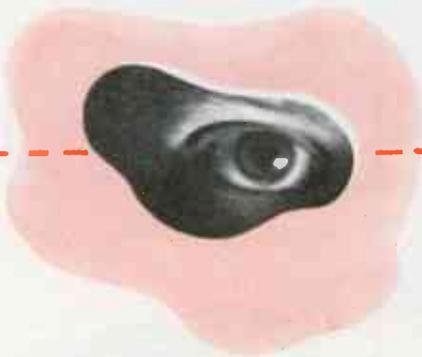
* Produced under Superior's Patents

** Trade-marked



SUPERIOR

GLEAM IN YOUR EYE *to work*



SUPERIOR TUBING WITHIN THE TUBES TO BE...

That "gleam in your eye" may be a new electronic tube for facsimile, electronic motor control, FM, a Signal Corps development, or for an entirely new principle of high frequency location.

What of the *Anode* or *Cathode Sleeve* to make that "gleam in your eye" a reality — first as a successful development project, and then as a design adaptable to economical production in quantity?

When you come to the "tubing within the tube" in your experimental planning, take advantage of the highly specialized facilities centered at Superior Tube Company. Here your blue prints will be transformed into a metal sleeve — perhaps Seamless, perhaps Lockseam, or perhaps Lapseam — a sleeve that is the metallurgical and physical counterpart of your electronic expectations.

Superior is keenly aware of the needs of an Electronic Industry which is already looking to tomorrow's horizon. Even as these words are being written, the walls of a new, enlarged Engineering and Research Laboratory are taking shape here at Superior. This Laboratory will be the crossroads where the electronic engineer will find assembled for his convenience a staff of experienced research men, and Superior's production line — with special equipment, mostly designed and built by our own engineers, making low costs possible.

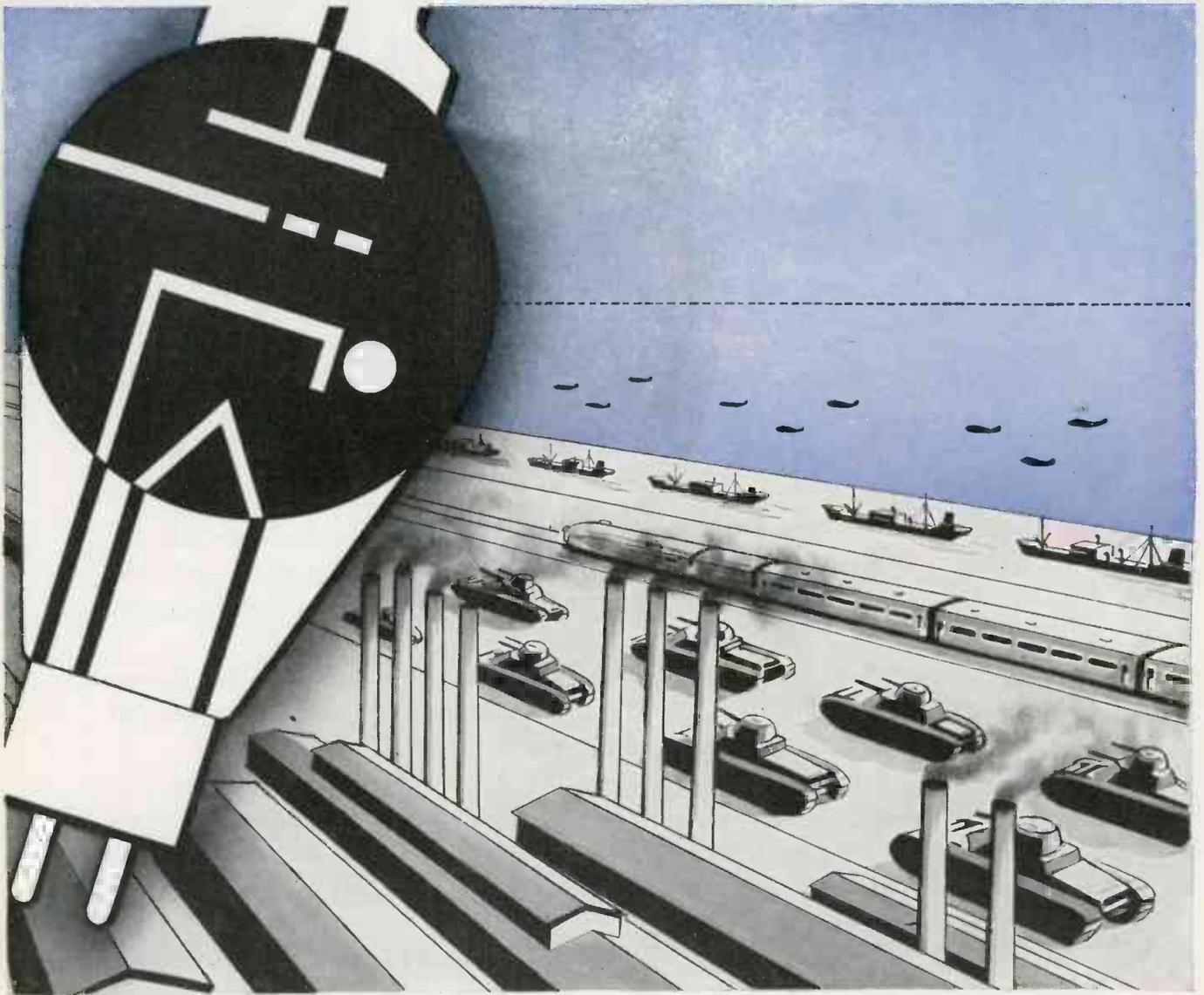
So, when you are ready to put that "gleam in your eye" to work, come to Superior for the *Anode* or *Cathode Sleeve* to do your particular job. If it hasn't been made, Superior is the place to start; if it is a standard sleeve, we are probably making it.



R TUBE CO.

N O R R I S T O W N , P E N N S Y L V A N I A

The big name in
SMALL TUBING
for Uncle Sam!



Today Westinghouse electronic tubes are at work, doing a thousand and one important war jobs. They are cleaning the air in precision manufacturing operations, where even a speck of dirt is a saboteur. They are controlling the flow of tin for cans and thus helping maintain vital food supply lines. And they are nerve centers in military operations on land, on sea, and in the air.

Westinghouse manufactures a line of tubes which are winning new high honors for dependability,

accuracy, advanced design. Tasks which were unheard of a few years ago are now ordinary jobs for Westinghouse tubes. Tomorrow new types of tubes will be coming off the production lines for the service of industry.

In your thinking and planning for today and tomorrow, include the use of electronic tubes. Westinghouse—pioneers in electronic “know-how” will be at your service. Westinghouse Electric and Manufacturing Company, Bloomfield, N. J.

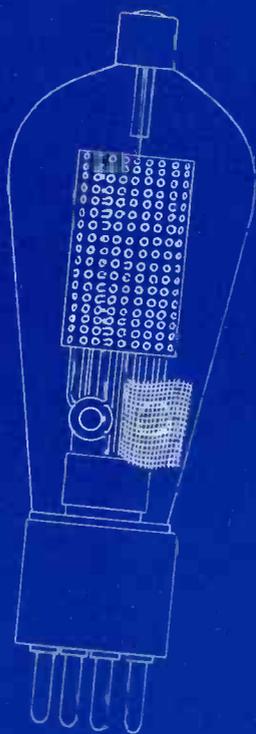
Westinghouse



Electronic Tubes *AT WORK*

Electronic Tubes for Today's Jobs

A FEW OF THE WESTINGHOUSE TUBES NOW SERVING INDUSTRY



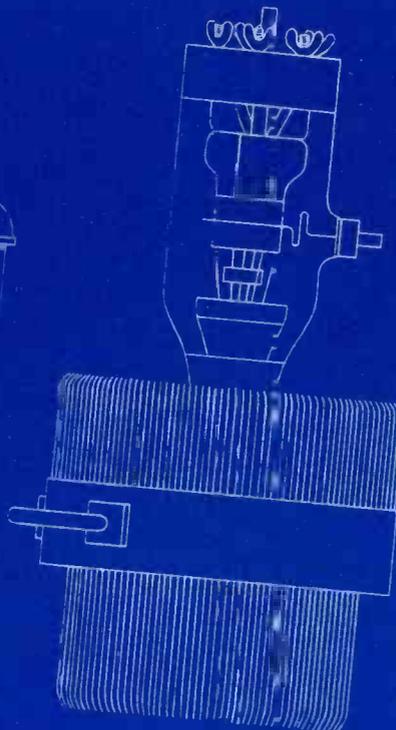
Thyatrions

Used for high speed sensitive relays, and controlled rectifiers for such purposes as welding control and motor speed control. Made in both mercury vapor and gas filled types. Ask for bulletins TD-81, TD-79.



Ignitrons

An outstanding Westinghouse development, used for resistance welding control, high power rectification or in any application where large amounts of power must be accurately controlled. Ask for Bulletins: TD-80, TD-91, B-3102.



Transmitting Tubes

Westinghouse provides a complete line of transmitting tubes for military and civilian radio purposes.



the order
must get
through
QUICKLY!

Today, time isn't the methodical ticking away of the minutes and hours. Today, time is LIFE — life which is often absolutely dependent on the split-second accuracy and unfailing reliability of communications in action. We have made it our responsibility to provide capacitors that you can depend on, no matter how tough the operating conditions might be. We can do this because 33 years of invaluable experience goes into the making of every C-D capacitor. Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey.

MORE IN USE TODAY THAN ANY OTHER MAKE

Cornell-Dubilier
capacitors

Mica • Dykanol • Paper • Wet & Dry Electrolytics



**CYLINDRICAL FILTER CAPACITORS
TYPE TQ**

The type TQ Dykanol Filter Capacitors are supplied with two insulated terminals and universal mounting bracket for mounting either above or below subpanel assembly. These units are ideally suited for high power amplifying systems, where utmost dependability is essential and space limitations are severe. Check these unusual features.

Impregnated and filled with Dykanol, the non-inflammable chlorinated diphenyl impregnant, of outstanding dielectric characteristics.

Dried, impregnated and filled under continuous vacuum and then hermetically sealed.

Glazed porcelain or bakelite terminal insulators—according voltage rating of unit.

Rigidly tested and conservatively rated. Will safely operate at 10% overloading.

The type TQ Dykanol capacitors and others in the complete C-D line are described in Catalog No. 160T now available.



On Time!

QUICKER DELIVERY FOR STEATITE INSULATORS



Not so long ago, an order for Steatite Insulators brought a sympathetic shrug of the shoulders and a "Sorry, five to six months delivery." We did not like to tell our customers that. We did not like it because we knew how badly Steatite was needed for the war effort.

This is what we did to quicken deliveries of Steatite Insulators.

- Expanded our plant facilities.
- Enlarged our staff of engineers and technicians.
- Devised improved methods of production.

As a result, there rolls from our kilns every month increasing quantities of insulators. Gradually, but surely the backlog of orders was reduced. Now we can promise our customers deliveries on standard parts from stock in a reasonably short time.

If you have any insulator problem—whether specialized or standard—we would like a shot at it. You can rest assured that your requirements will receive prompt, individual attention.

Above . . . stock insulators such as these are now available in quantity for prompt delivery. Write for data concerning the many different types of Steatite Insulators.

Left . . . these coil forms and insulators were designed and pressed for special applications where stock insulators would not serve. They are working examples of the engineering skill available for your special insulator problem.



Ⓢ 3575

General Ceramics



AND STEATITE CORP.
KEASBEY NEW JERSEY

Manufacturers of quality electronic components for 10 years

THE ANSWER TO BAND-SWITCHING PROBLEMS

Over 30% of our inquiries on band-switching problems can be solved by standard B & W Turret Coils—*better, and more efficiently than by any other means!* For greatest efficiency in the selection and use of Turret Coils, we suggest that you consult B & W engineers on your basic equipment design. A wealth of specialized engineering experience is freely at your disposal.



A typical B & W Turret Coil Assembly



B & W

AIR INDUCTORS and VARIABLE CONDENSERS

Big ones — little ones — standard units — specials — and "super specials" for the nation's "fightness" services! . . . that, in brief, is the story of B & W Air Inductor Coils.

If it's a Coil, chances are, we can supply it—built with well-known B & W precision—and produced promptly, thanks to the fact that B & W engineers were the first to produce Coils by modern line production methods. Literature and full details of any type on request. Samples to your specifications. Write, wire, or 'phone today!

VARIABLE CONDENSERS FOR HIGH-POWER USES

Shorter than conventional units, and having built-in neutralizers and coil-mounting feature, B & W Variable Air Condensers meet the highest performance standards. Other features include perfect electrical symmetry; Alsmag 196 insulation throughout; low distributed inductance; low minimum capacities; and many more. Technical Data Sheet upon request.

BARKER & WILLIAMSON • 235 Fairfield Ave., Upper Darby, Pa.



**CAPACITY AVAILABLE FOR
QUANTITY PRODUCTION OF
STEATITE PARTS LIKE THESE!**

If you need reasonably prompt delivery on high production orders for steatite parts formed by turning operations, bring your requirements to Isolantite Inc.

As a result of comprehensive expansion of its manufacturing facilities, Isolantite is in an excellent position to accept additional orders for *large* quantities of parts of the type illustrated—and of many other shapes fabricated by machining operations. Unusually quick deliveries for these unusual times can be made, particularly where special tools are not required.

When close tolerances are required on parts like these, you can benefit by Isolantite's manufacturing processes, which permit certain critical dimensions to be fabricated after firing...resulting in exceptional dimensional accuracy, compared with general ceramic requirements. And in *all* types of ceramic parts, you

benefit by the outstanding advantages offered by Isolantite*—uniformity of product, nonabsorption of moisture, electrical efficiency, high mechanical strength.

If you need machined steatite parts that meet exacting specifications—and need them promptly—write, wire, or phone your requirements.

ISOLANTITE

CERAMIC INSULATORS
ISOLANTITE INC., BELLEVILLE, NEW JERSEY

**Registered trade-name for the products of Isolantite Inc.*



NEW MAGNETIC STEEL CORE FOR RADIO AND OTHER ELECTROMAGNETIC APPARATUS

Westinghouse now offers manufacturers of electrical equipment the key to a wide range of product improvements.

This key is the Hipersil core, made from an electrical steel which increases flux-carrying capacity as much as 35%.

The Hipersil core was originally developed in Westinghouse laboratories. It has been used in power and distribution transformers, and during the past five years has completely revolutionized transformer design.

At present, the Hipersil core is used in a steadily increasing number of applications in the communications field... in radio transformers, chokes, relays, reactors and loading coils...

And, by asking your local Westinghouse representative to give you the Hipersil facts today, you can move toward the improvement of your product.

J-70404

*Registered Trade-mark, Westinghouse Electric & Mfg. Co., for High PERmeability SILicon Steel.

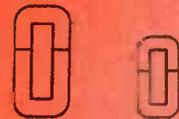
Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE



HIPERSIL

Design Improvements Made Possible by HIPERSIL



SMALLER SIZE. Hipersil makes possible smaller core cross sections and coils. It is ideal for tanks, submarines, "walkie-talkie" sets and other applications where space is of paramount importance.



LIGHTER WEIGHT. Hipersil saves weight. One manufacturer of radio transformers has reported weight savings of from 30% to 50%. It is ideal for aircraft use.



WIDER RANGE OF LINEAR RESPONSE. Knee of the saturation curve for Hipersil is higher than for ordinary silicon steel. It gives approximately $\frac{1}{3}$ greater straight-line response for winding and core cross section.

PLUS

GREATLY SIMPLIFIED CONSTRUCTION that saves man-hours—no laminations—just two or four pieces to handle.

SAVINGS

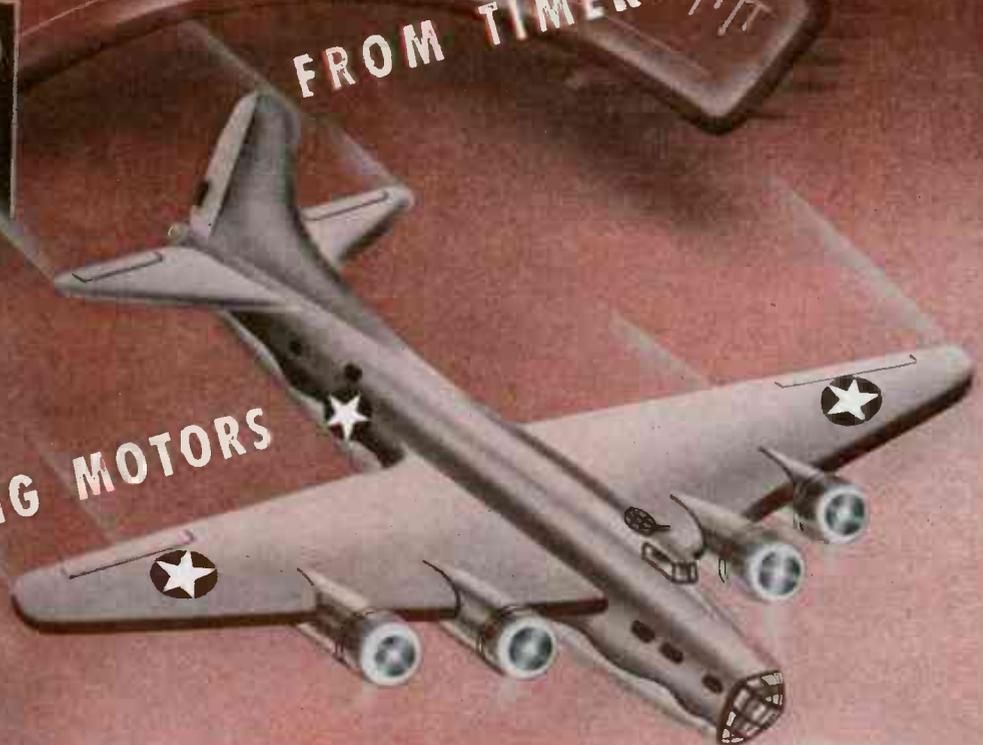
WITH HIPERSIL CORES

Because of the Hipersil core's excellent magnetic properties, it is possible to save at least 10% of the copper now being used in radio transformers... at least 50% of nickel now being used in nickel alloys for transformer laminations. Consequently, there are appreciable savings in the weight of the finished apparatus.

GET THE FACTS ABOUT HIPERSIL

Write for B-3223, a data book crammed with interesting Hipersil information. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N.

FROM TIMER CONTROL
TO STARTING MOTORS



RELAYS by GUARDIAN



Giving split-second accuracy to timing devices, "Relays by Guardian" are widely used in Thermatrols . . . Pyrometers . . . and dozens of other electrically operated instruments. But the war has brought thousands of new uses, calling for greater precision than ever . . . for firing and timing guns . . . for controlling battle radios . . . for swiveling "Fortress" turrets . . . for doing hundreds of war control jobs. One of the newest Guardian developments is . . .

B-8 . . . NEW LIGHTWEIGHT SOLENOID CONTACTOR

Built to U. S. Army Air Force specifications for aircraft engine starting motors. With variations in mounting brackets and terminals the B-8 will meet intermittent duty specifications of the B-4, B-6A and B-7A Contactors. Contacts are rated at 200 amperes and will not chatter on voltage drops caused by starting current surges. "Pull-in" voltage is 6 volts as compared to 18 volts on contactors with which the B-8 is interchangeable.

Write for B-8 Bulletin for further information. O- for SC-25 Bulletin for technical data on continuous duty contactors.



B-8 SOLENOID CONTACTOR

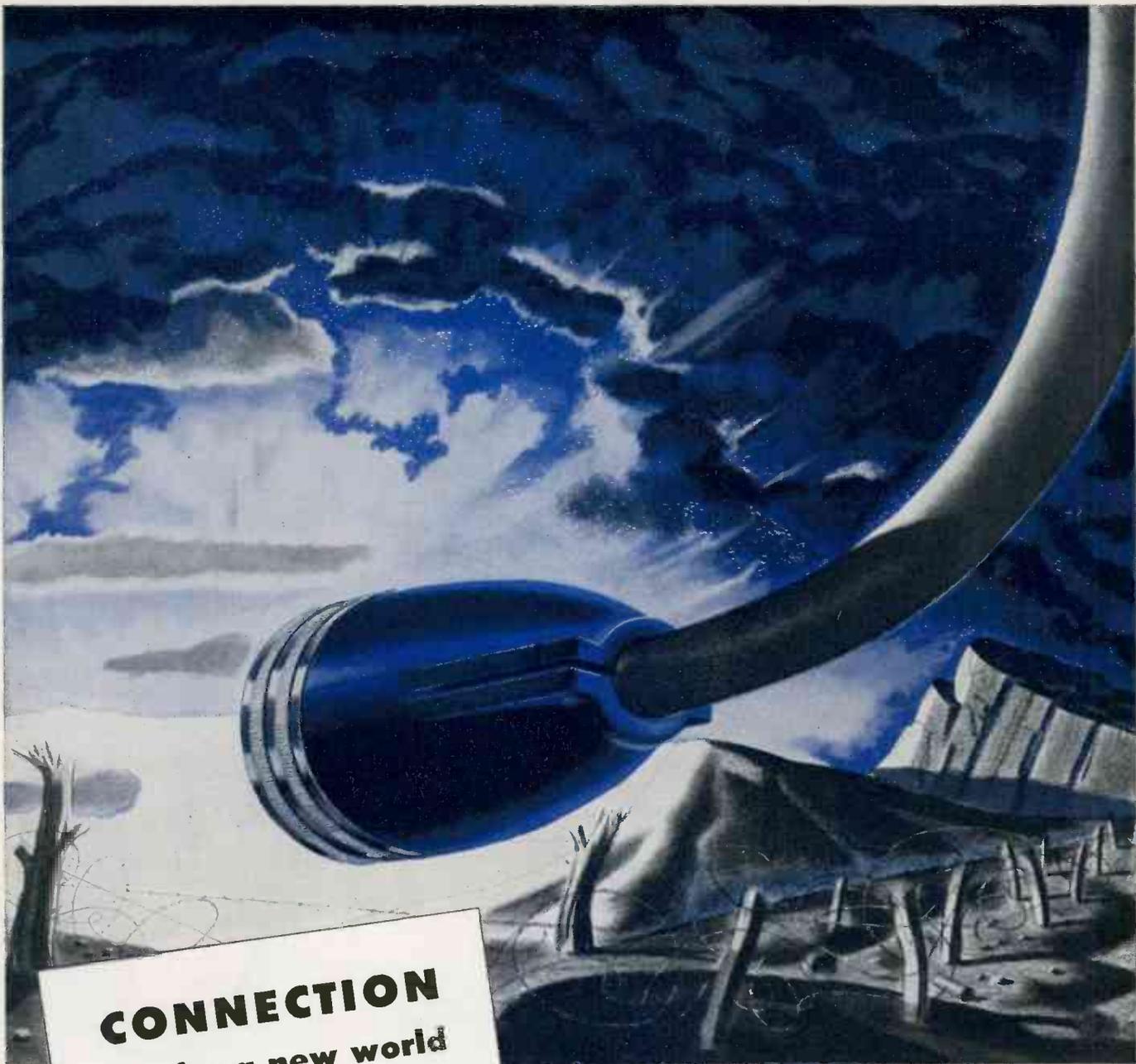
On ten thousand units this new design saves over three tons of critical materials.

GUARDIAN ELECTRIC

1622-C WEST WALNUT STREET

CHICAGO, ILLINOIS

A COMPLETE LINE OF RELAYS SERVING AMERICAN WAR INDUSTRY



CONNECTION
....for a new world

Cannon Connectors, used wherever electrical connections must be made quickly, safely and securely, now serve as the means for connecting the many electrical circuits used in the control and operation of the weapons of war.

When the war is won, these same Cannon

Connectors will again be available for peacetime consumers on a host of electrical devices not even dreamed of now. And, having passed the rigorous tests of war, they will assure even a higher degree of dependable performance under the less strenuous demands of peaceful living.



FOR VICTORY BUY WAR BONDS AND STAMPS



CANNON ELECTRIC

Cannon Electric Development Company, Los Angeles, California

Canadian Factory and Engineering Office: Cannon Electric Company, Limited, Toronto, Canada

Representatives in principal cities — consult your local telephone book

A FRIENDLY HAND *to the Engineer*



HERE'S some friendly help to the engineer in his own personal work. By using Formica for numerous purposes in the machines they design engineers have often found the going easier, the product better. Now this same modern, laminated plastic material is offered in the form of T squares and other drawing instruments for use in the draughtsman's work—instruments that wear like iron, hold together and endure for years, never change in dimensions or appearance. They are beautiful instruments when you get them and they remain that way.

They are manufactured from Formica materials by the Engineering Sales Company, Sheboygan, Wisc.

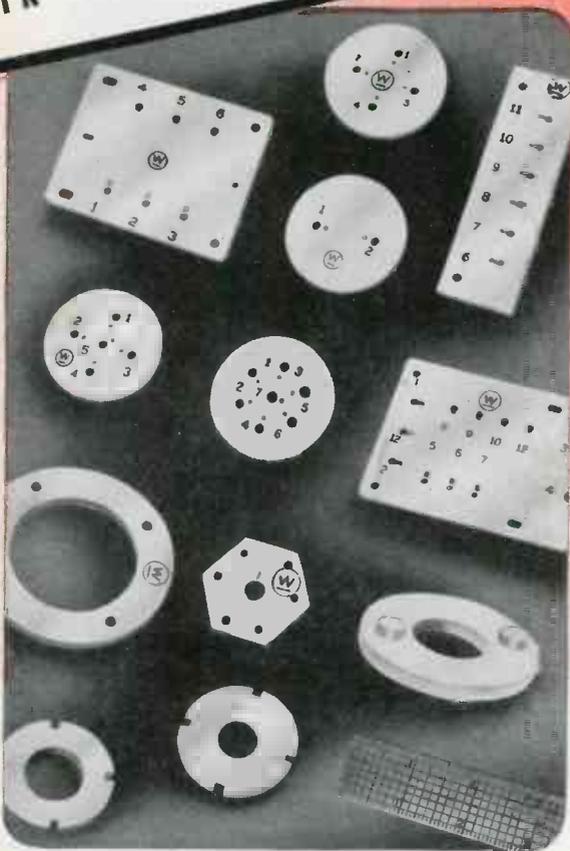


Formica has received the Army-Navy "E" Award for Excellence in Production.

THE FORMICA INSULATION CO. • 4647 SPRING GROVE AVE. • CINCINNATI, O.

Solder-sealed

NOW AVAILABLE...
IN **PRESTITE**



STANDARD INSULATING PARTS LIKE THESE MEET MANY IMMEDIATE REQUIREMENTS

Here's a quick, available—and in many cases a better or lower-cost—answer to your needs for standard or semistandard insulating parts!

PRESTITE—a superior, high-dielectric, high-strength porcelain is nonporous and combines high insulating qualities with exceptional mechanical strength. As can be seen, PRESTITE can be molded into intricate shapes and held to close dimensional tolerances.

Standard parts like those shown, and many others, are in production or can be produced quickly.

Investigate the advantages of PRESTITE. Address Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



Solder-sealed entrance bushing used for larger type capacitors. Lower ring is soldered to bushing and to metal container. Upper ring is soldered to bushing and to lead brought up through bushing and hollow stud.

* * *

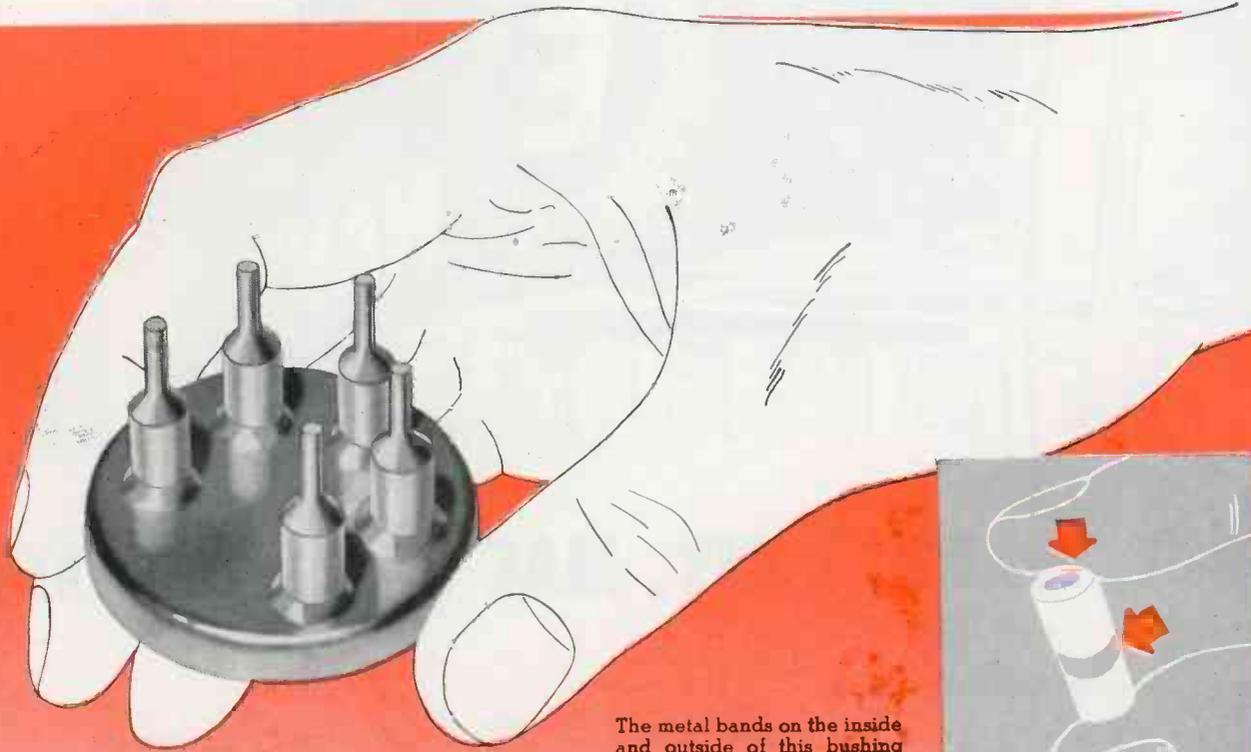
PRESTITE terminal boards with hermetically-sealed studs can be soldered to metal containers for capacitors or transformers. Note metallic band which may be applied either on rim or top of terminal board. Westinghouse will solder-seal your terminals in PRESTITE terminal boards or bushings—leaving only one assembly operation for the manufacturer.



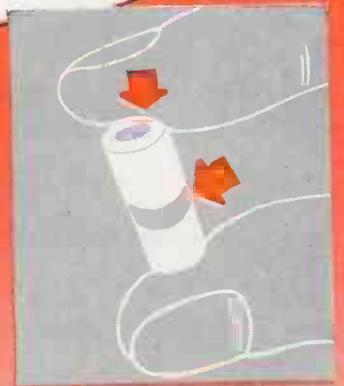
Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

...porcelain-to-metal!



The metal bands on the inside and outside of this bushing are integral parts of the PRESTITE porcelain. They permit soldering the porcelain bushing directly to metal.



Solder-sealed entrance bushings of PRESTITE—the new porcelain—simplify assemblies...permit hermetically-sealed joints...PRESTITE-to-metal!

These standard PRESTITE entrance bushings greatly simplify the problem of protecting electrical equipment against immersion, high altitude and humidity. Capacitors, transformers and other apparatus can be hermetically-sealed, quickly and inexpensively, because PRESTITE can be joined to metal. Each lead is soldered to the inside of the PRESTITE bushing, and the outside of the bushing itself is then soldered to the metal case.

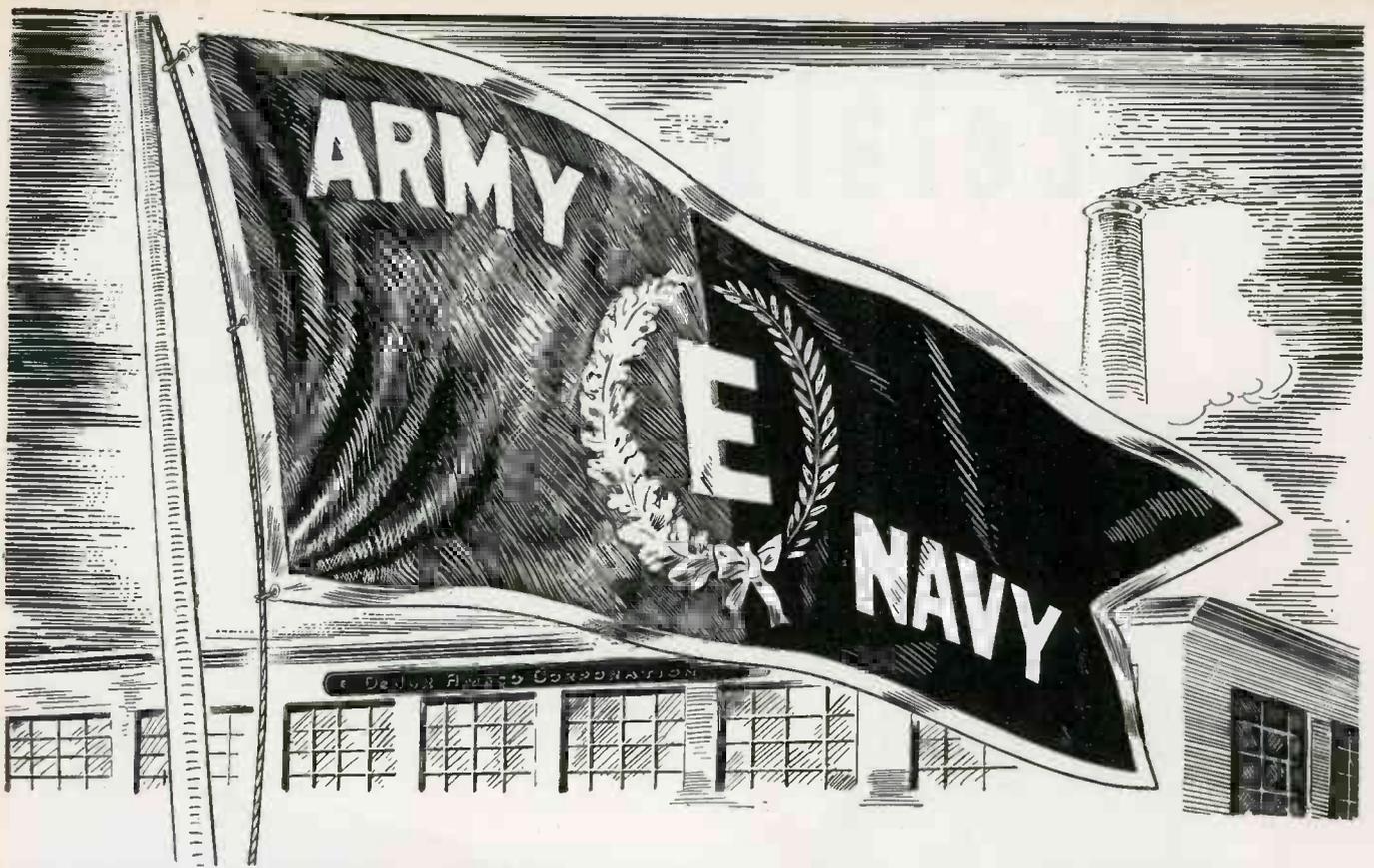
Your specific engineering problems can be worked out. For example, caps or terminals, as required, can be assembled complete as shown here. Terminal boards can also be assembled with leads soldered in. Containers can then be crimped and soldered to the terminal board.

Westinghouse engineers will be glad to discuss your problems with you. Wire, write or phone Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

J-05136

PORCELAIN





JOE, MARY, TONY, MAC *You've* WON IT!

Dear Employees:

You've earned the Army-Navy . . . "E" . . . And yet, we knew you would . . .

Not many months ago, you, of the DeJur Amsco Corporation served a peacetime market in a peacetime world . . . Today you work with fervor . . . hurdling all obstacles to produce for the Armed Forces . . . Your time, your labor have been diverted to PRODUCTION FOR WAR . . . PRODUCTION OF MATERIALS TO WIN THIS WAR . . .

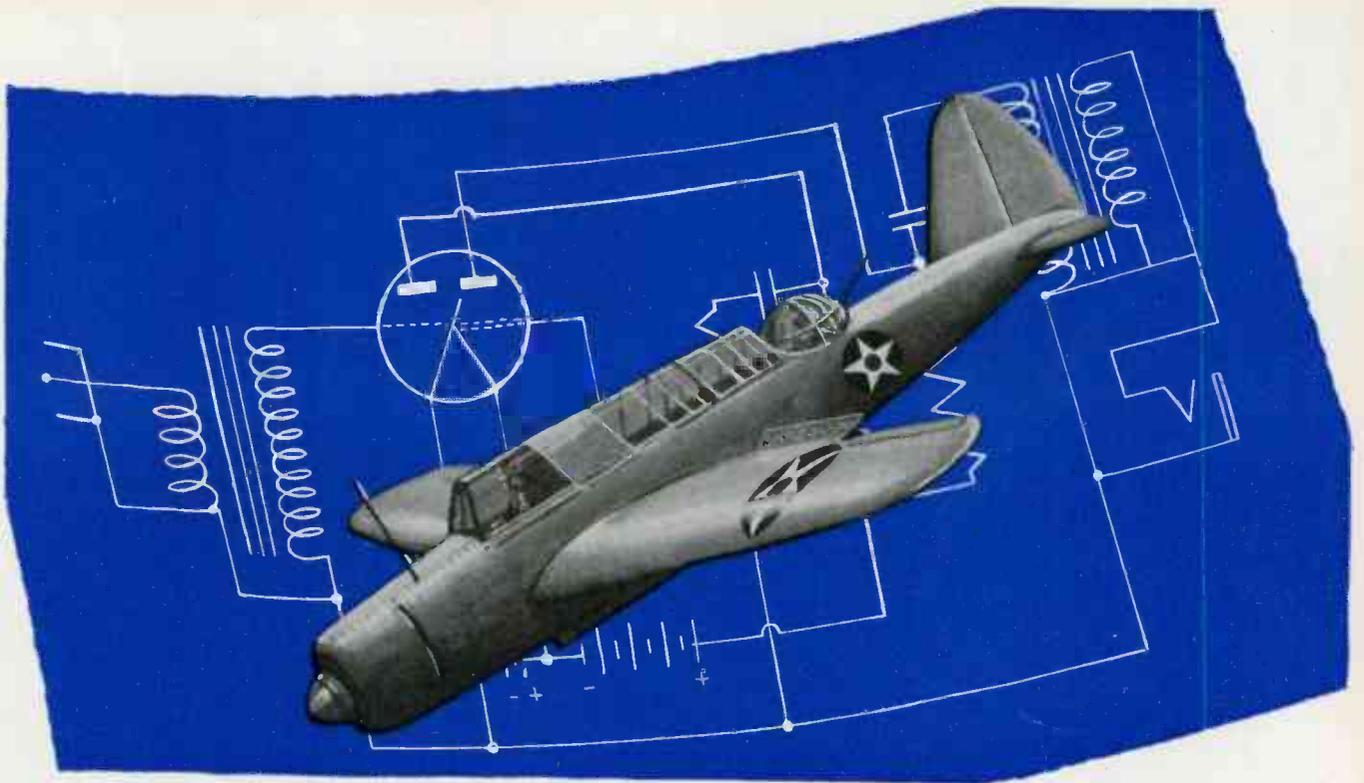
Today DeJur Instruments, Potentiometers, and Meters have joined the fighting fronts . . . to serve America . . . and the World.


RALPH A. DeJUR President

DeJUR-AMSCO CORPORATION

Shelton, Connecticut

ELECTRONIC INDUSTRIES • March, 1943



Our responsibility

To safeguard the lives of our men, each component part or assembled mechanism that is incorporated in our war machine must perform at maximum efficiency under favorable or adverse circumstances. There can be no compromise on that score.

MYCALEX

THE INSULATOR

"... is the most nearly perfect electrical insulator known today."

—an opinion subscribed to by leading engineers in radio, television and industry.

★ MYCALEX is the only mica base ceramic insulating material that is leadless.
★ Leadless MYCALEX is the low loss ceramic insulating material that is rated highest. ★ MYCALEX can be machined more easily, more rapidly and more accurately. ★ Full sheets of MYCALEX, large or small quantities, can be furnished immediately. ★ Authorized MYCALEX fabricators now can supply your machined part needs to accommodate almost any production and delivery schedules.

Comparable in cost . . . Incomparable in quality

MYCALEX
THE INSULATOR

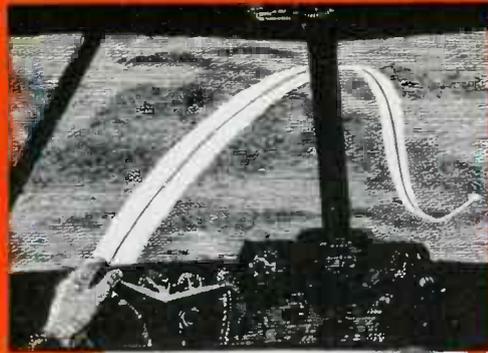
Trade Mark Reg. U.S. Pat. Off.

MYCALEX CORPORATION OF AMERICA

Exclusive Licensee under all patents of MYCALEX (parent) Co., Ltd.

60 CLIFTON BOULEVARD

CLIFTON, NEW JERSEY



elec



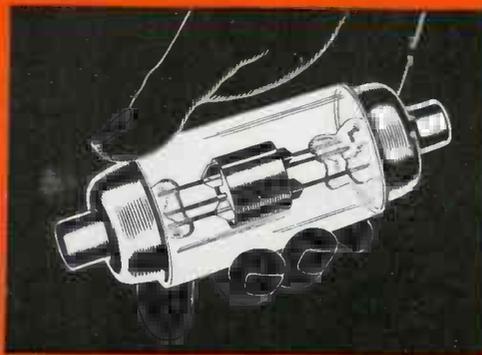
Eimac

ENGINEERING

The cornerstone in Eimac's existence has been their advanced electronic engineering. The development of the gas-free tube, pioneering in the use of new materials, radical changes in existing tube design... all these things are the results of their research. During today's accelerated business situation Eimac engineers have developed and put to work many outstanding innovations. Number one on this list is the actual achievement of mass production of a product that heretofore was hand-made in a scientific laboratory. Today the most interesting of the other developments must be kept secret but the heads-up engineering is going forward apace. The services of this organization are available only for war problems now but will be offered to industry at large when peace comes. If you have a problem, the solution to which might involve vacuum tubes, write direct to factory.

EITEL - McCULLOUGH, INC. • SAN BRUNO, CALIFORNIA

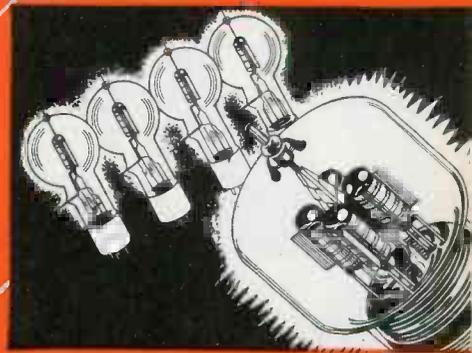
www.americanradiohistory.com



tronic telesis*

* Progress consciously planned and produced by intelligently directed effort.

— Century Dictionary and Cyclopedia



● **Eimac Tubes in the Ground Stations of the Major Airlines.** The economy, stamina and superior performance capabilities of Eimac tubes helped make the operation of complex multi-frequency transmitters practical for aircraft ground stations. Eimac 450.T tubes are in use by practically every major airline today.

● **Eimac Tubes in Instrument Landing Equipment.** Airline pilots no longer need to "fly by the seat of their pants" for blind landing equipment is in regular service. There are several of these systems in existence which use Eimac tubes.

● **Eimac Tubes and Frequency Modulation.** Close cooperation between Eimac and the leading engineers throughout the world has made Eimac first choice in the important new development in radio. FM and Eimac tubes have been close companions from the very start of Major Armstrong's experiments.

● **Eimac Tubes in Police Radio Communications.** Where dependability, stamina and superior performance are extremely vital you'll find Eimac tubes every time. Police radio engineers from Connecticut to California are loud in their praise of the service of Eimac tubes.

● **Eimac Engineered the Vacuum Condenser.** Small, compact tank circuits, made possible with the Eimac vacuum condensers helped increase the efficiency of many types of radio transmitters. Since plate spacing is determined by mechanical rather than voltage limitations, actual plate area is reduced to the very minimum.

● **Eimac Developed the Vacuum Relay.** Over two years ago Eimac developed this single pole double throw vacuum relay. It handles 20,000 volts of RF potential without internal breakdown. Air pressure and humidity have no effect on it. Actually flashover will occur across outside terminals first even though contact spacing is but .015". A tribute to Eimac engineering.

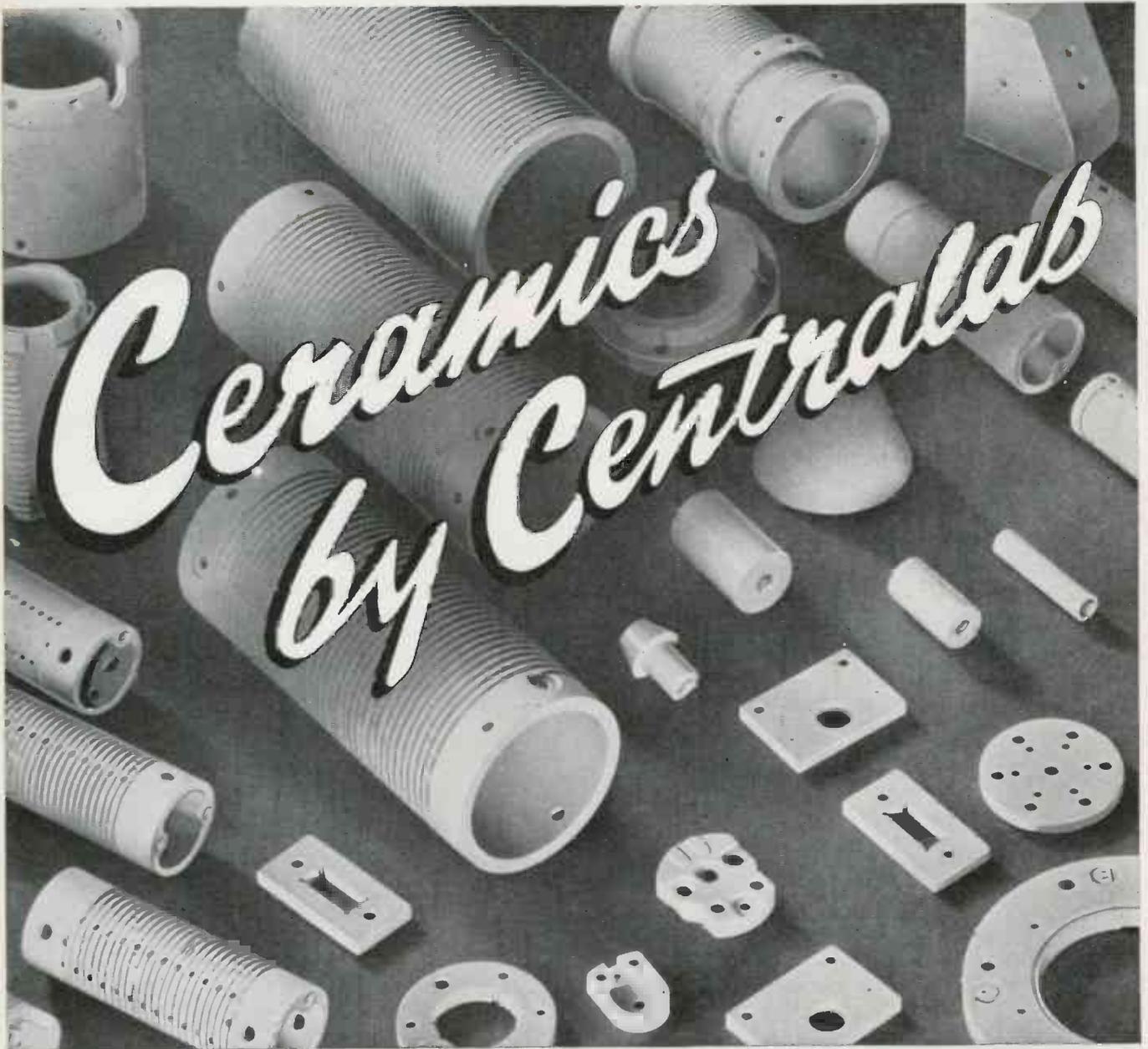
● **Eimac Developed the Multi-Unit Tube.** Triode units so nearly perfect that two or more can be placed in a single envelope. Power capabilities are determined by multiplying the capabilities of the single triode unit by the number of units employed in the tube. A revolutionary vacuum tube typical of Eimac's engineering leadership.

● **Power Transmission with Vacuum Tubes?** In the days to come many new uses for Eimac tubes will be announced. The use of vacuum tubes for power transmission may be one of them. Of one thing you can be sure, Eimac engineering and development will be in the forefront.

● **Eimac Tubes have gone to War.** With almost machine gun rapidity, Eimac tubes have been adopted by one after another of the peacetime services. Naturally Eimac was among the first to be drafted into war. The important job they are accomplishing today must remain secret for the duration. When the shooting is over, you'll find out why the armed services turned to Eimac so quickly.

● Coveted Army-Navy "E" award for high achievement in production for war.





Ceramics by Centralab

Serving the Industry with **STEATITE!**

1930 Centralab pioneered a fixed resistor of "hard-as-stone" ceramic material.



1936 Centralab added a temperature compensating fixed condenser of ceramic material.



1940 Centralab added a trimmer condenser with temperature compensating characteristics.



Centralab

DIV. OF GLOBE-UNION INC., MILWAUKEE WIS.

1941 Centralab added a STEATITE plant to take care of its own needs and, NOW, those of the industry.



*PARTS BY
Centralab*

*Serving the Electronic Industry
Since 1922!*

FOR more than two decades CENTRALAB has been indelibly connected with the radio industry. Since the first "battery" and "loud speaker" sets, practically every radio of importance to this day contains CENTRALAB parts.

NOW . . . more than ever before . . . CENTRALAB is a definite part of the radio and electronic picture. While to a very limited extent we are still taking care of the civilian needs, we are putting our main effort into supplying the armed forces with vitally needed equipment.

We are proud to be able to contribute our pioneer experience as well as our extensive facilities at this crucial time.

CENTRALAB PARTS INCLUDE:

- | | |
|---------------------------------|---------------------------|
| Steatite Insulators | Volume Controls |
| Ceramic Trimmers | Ceramic Capacitors |
| High Frequency Circuit Switches | Wire Wound Controls |
| | Sound Projection Controls |

Centralab

DIV. OF GLOBE-UNION INC., MILWAUKEE, WIS.

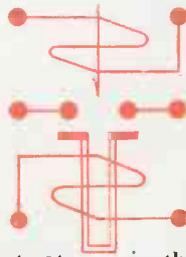
DUNCO "MEMORY" RELAYS

MECHANICAL LATCH-IN

A Dunco Mechanical Latch-in, Electrical Reset Relay never forgets!

Energizing the lower coil closes the armature which is automatically latched in place until it is re-opened by energizing the upper coil. Thus, the contact "remembers" unfailingly which coil was last energized, and remains in position until it is released by energizing the other coil.

These units are made in both the large (Series

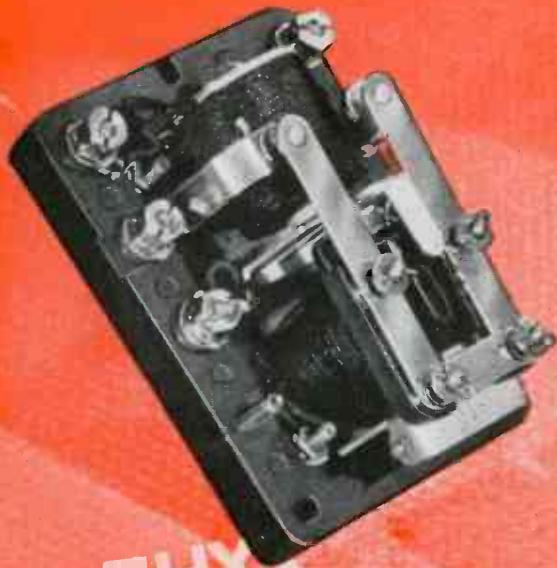


ELECTRICAL RESET

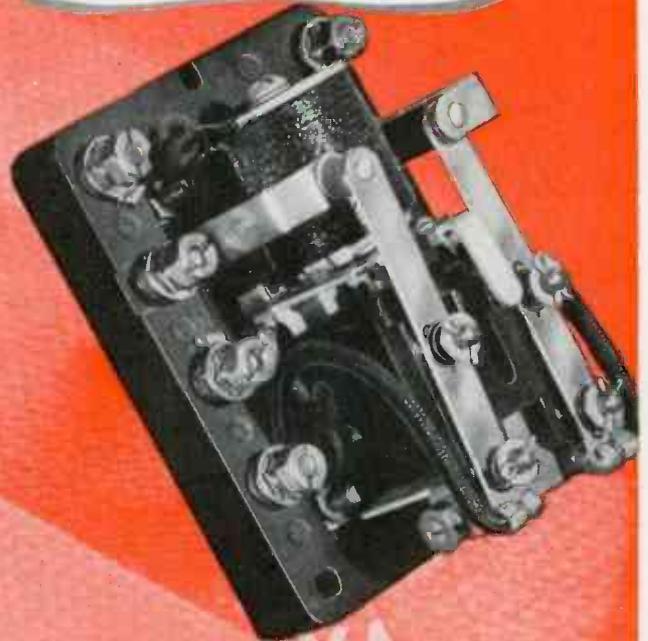
5) and "midget" (Series 51) sizes and with practically any contact arrangement that may be required. Together with hundreds of other Relays and Timers for a wide variety of uses, they are described in the 48-page Dunco Catalog and Relay Data Book. Copy gladly sent upon request. Please mention company connection.

Relay-Timer Specialists

As with anything else, it pays to buy Relays and Timers from a concern which, for years, has specialized on such production exclusively. Dunco offers relay-timer users a complete line covering almost every quality application PLUS a broad engineering background in relay selection and use. Our engineers will gladly cooperate in solving your problems.



5HXX



5AXA



51BXX

STRUTHERS DUNN, Inc.

1321 ARCH STREET

PHILADELPHIA, PA.

LET DUNCO DISTRICT ENGINEERS IN 28 CITIES HELP SOLVE YOUR RELAY-TIMER PROBLEMS



2 NEW SHAPES IN FORMEX

M A G N E T W I R E

S Q U A R E and R E C T A N G U L A R

They save space 2 ways

SQUARE and rectangular Formex* is a new answer to the old problem of obtaining compact, easy-to-wind coils. Here are Formex magnet wires that save even more space than round Formex because the corners, like building blocks, fit tightly and accurately together—filling all the waste triangles of space that are unavoidable with round wire.

To the space-saving advantage of round Formex magnet wire is now added this new space-saving factor of square and rectangular Formex. Like round Formex, square and rectangular Formex is flexible, smooth, and capable of being wound at high speeds without danger that the insulation will crack or pull away from the conductor.

Formex magnet wire, as proved by years of outstanding service in the field, saves time because the insulation is tough, and flexible. It stands up under all kinds of treatment, and needs fewer repairs and replacements than conventional wire.

For further information on the use and selection of magnet wire, ask your G-E office for Bulletin GEA-3911, or write General Electric, Schenectady, N.Y.

* Reg. U. S. Pat. Off.

GENERAL  **ELECTRIC**
503-13-1200



Announcing a change of name

HAZELTINE SERVICE CORPORATION

Becomes . . .

HAZELTINE *Electronics* **CORPORATION**



TO meet the constantly heavier responsibility entrusted to us by the Army and Navy — and ultimately to serve industry better — we at Hazeltine have enlarged all facilities for research and development in electronics.

With the completion of this project it is fitting that we take the new name — HAZELTINE ELECTRONICS CORPORATION. For we are equipped in plant and personnel to undertake solution of the most complex problems in electronics.

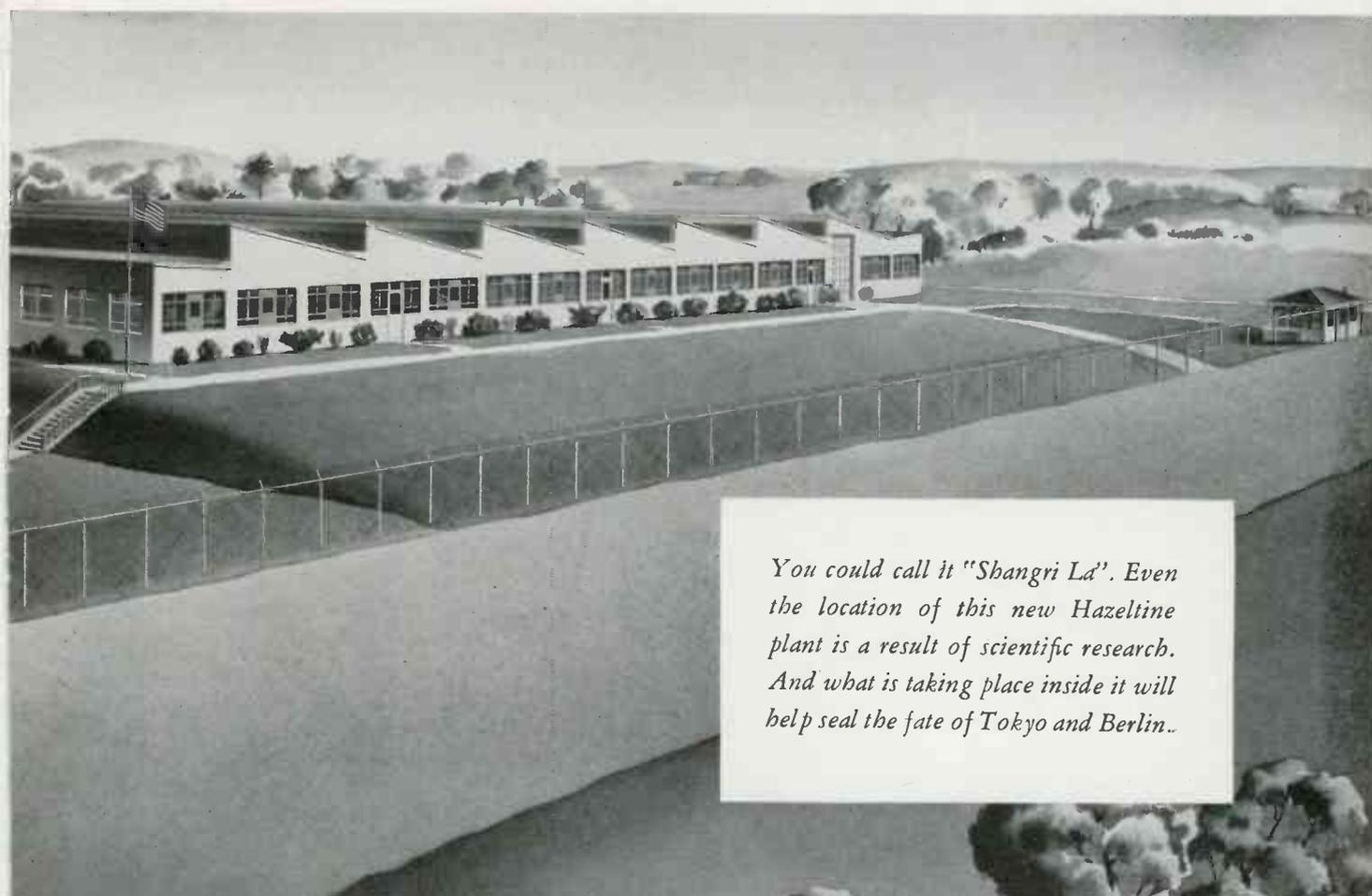
Since the infancy of radio broadcast-

ing we have been supplying new principles, circuits, techniques and equipment. Today, Hazeltine developments are playing a vital part in keeping the United Nations superior to the enemy.

Under the stress of war we are concentrating years of research into the space of months. When our facilities once again can be turned to peace-time use, there will be at Hazeltine a deep reservoir of knowledge and experience that can be invaluable in tomorrow's world of electronics.

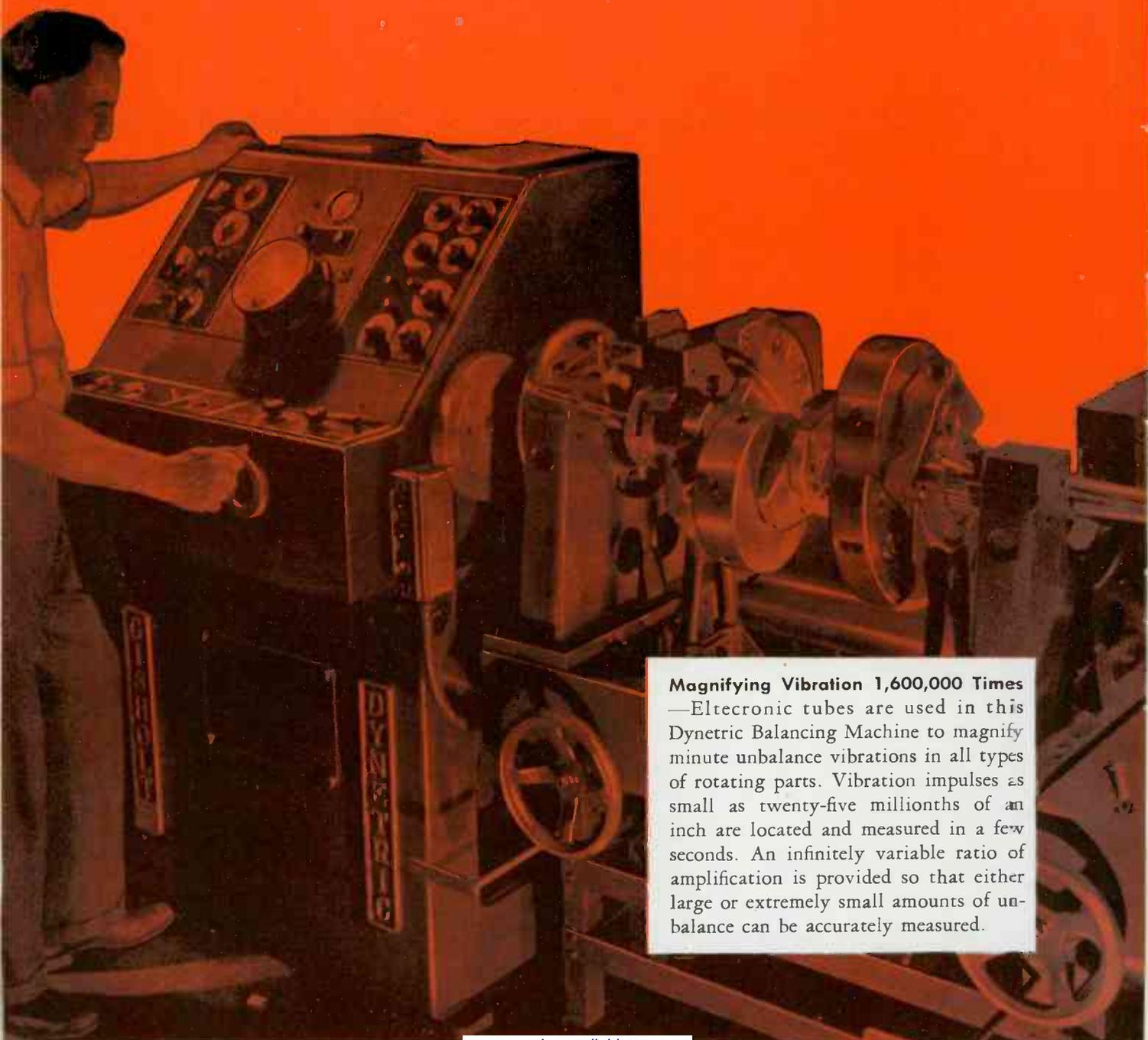
HAZELTINE ELECTRONICS CORPORATION

A WHOLLY OWNED SUBSIDIARY OF THE HAZELTINE CORPORATION • 1775 BROADWAY, NEW YORK



You could call it "Shangri La". Even the location of this new Hazeltine plant is a result of scientific research. And what is taking place inside it will help seal the fate of Tokyo and Berlin..

Electronics

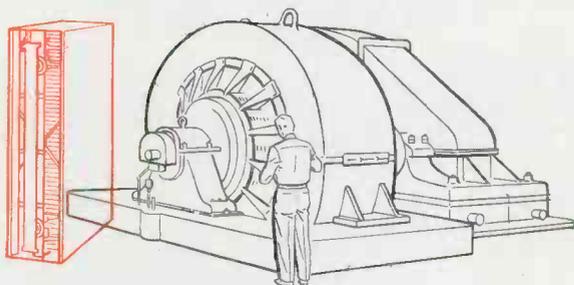


Magnifying Vibration 1,600,000 Times

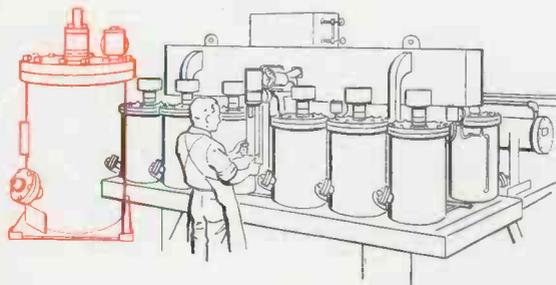
—Eltecronic tubes are used in this Dynetric Balancing Machine to magnify minute unbalance vibrations in all types of rotating parts. Vibration impulses as small as twenty-five millionths of an inch are located and measured in a few seconds. An infinitely variable ratio of amplification is provided so that either large or extremely small amounts of unbalance can be accurately measured.

at Work

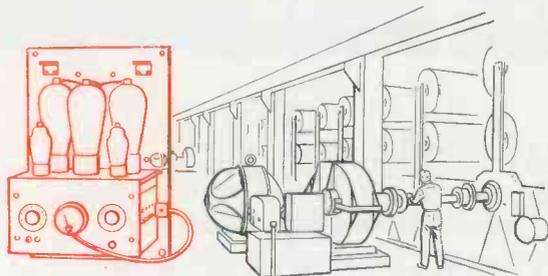
Westinghouse electronic devices are at work today in practically every war industry. They are helping to roll back old limits on production capacity—saving time, cutting costs, improving products. Here are typical examples from a long list of practical applications—showing Westinghouse “Electronics at Work.”



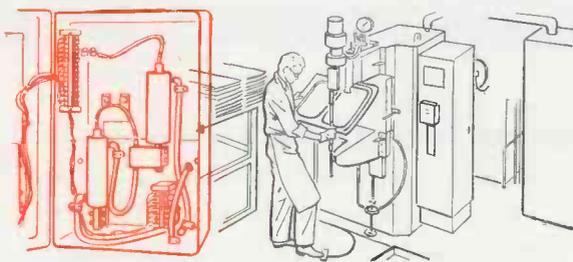
Cleaning the Air to protect rotating electrical machinery against damage from air-borne dust, dirt and soot is a maintenance-saving job performed by the Westinghouse PRECIPITRON. Electronic tubes in the Precipitron power pack transform electricity for a strong (12,000-volt) electrostatic field. As dust-bearing air is channeled through this field, every particle is given an electrostatic charge. Dust particles are drawn irresistibly to the collector plates.



More Efficient D-C Power is being supplied to scores of aluminum plants, steel mills, mines and factories by the Ignitron Rectifier. Each tank in the Ignitron Rectifier is an electronic tube. Each tube conducts current during the positive half-cycle of an alternating current cycle, producing a pulsating direct current. When the pulsating output currents of several tanks are co-ordinated and synchronized, the result is a smooth, continuous flow of current.



Highly Accurate Control of motor performance is essential for uniformity of product in the paper and other process industries. By Electronic means, more precise control of speed, voltage, acceleration and other characteristics can be obtained. Absence of moving parts permits high sensitivity with low maintenance.



Electronic Resistance Welding Control is largely responsible for the development of mass-production methods in metal-working industries. By means of Ignitron tubes, Westinghouse Electronic Timers provide precision control of current and time (to within one cycle) to deliver high quality, uniform welds. J-91007-A

For further information on practical applications of Westinghouse Electronic devices, write or phone your nearest Westinghouse office. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Penna.



Westinghouse ELECTRONICS
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



Wherever man goes...after the war he will encounter the two-way radiotelephone! Thanks to the science of electronics, this amazing medium of communication will find many more useful applications in the business, industrial, governmental

and social life of all countries. At the moment, Jefferson-Travis equipment, with its many exclusive developments, is being used by United Nations throughout the world. With peace, it will be yours to know and enjoy—*thanks to electronics!*



JEFFERSON-TRAVIS

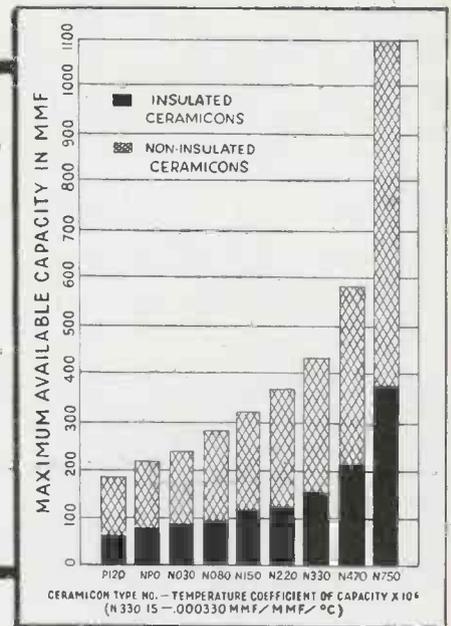
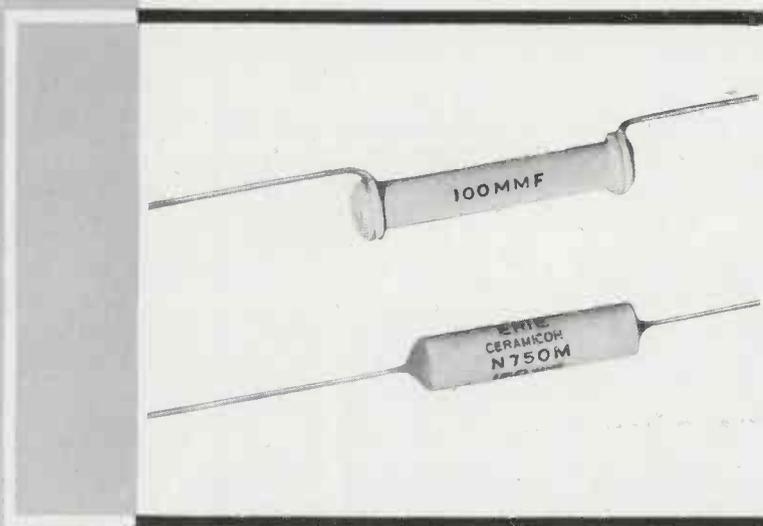
RADIOTELEPHONE EQUIPMENT

NEW YORK · BOSTON · WASHINGTON, D. C.

USE *Erie Ceramicons*

REG. U. S. PAT. OFF.

FOR MICA CONDENSER REPLACEMENTS



THE scarcity of high grade mica makes it essential for manufacturers of electronic equipment to switch to other types of condensers.

The dependability of the silvered-ceramic construction of Erie Ceramicons has been definitely proved by their use in many types of installations over 6 years.

In using Ceramicons for mica replacements, the function of the capacitor in question should be considered in selecting the proper type. When practically no change of capacity with temperature is permissible, zero coefficient (type NPO) should be specified. Where moderate variations are allowable, maximum negative coefficient (type N750) or some intermediate value should be used to take advantage of the smaller size of Ceramicons available in the higher negative coefficients.

Where rather large variations are allowable, and where power factor is not critical, a new series of high dielectric constant Ceramicons, which will be available shortly, should be specified, since very high capacities will be available in this type of unit.

The chart reproduced above shows the range of standard Ceramicons. The new high dielectric constant Ceramicons will be available up to approximately 5,600MMF in the insulated style and to approximately 16,000MMF in the non-insulated style.

Write for literature that fully describes the operating characteristics of standard Erie Ceramicons.

ERIE RESISTOR CORP., ERIE, PA. LONDON, ENGLAND · TORONTO, CANADA.



Something is coming into our lives
in a big *electronic* way!



R THE SAMPLE DEPARTMENT
AT N-Y-T IS NOW FORMULATING
THE PLANS FOR THE MANY
BETTERMENTS TO COME

Just as the war has affected the private and public activities of every American, so will the 'shape of things to come'—electronically—have a direct bearing on our future well-being.

If the planning, designing and research now under way at N-Y-T is a criterion—

then the present and future generations are due pleasant surprises.

Engineers, designers and technicians will find it worthwhile to investigate our highly specialized Sample Department—where difficult transformer problems are being solved—quickly. Send us your inquiries.

NEW YORK TRANSFORMER COMPANY



22-26 WAVERLY PLACE

NEW YORK, N. Y.

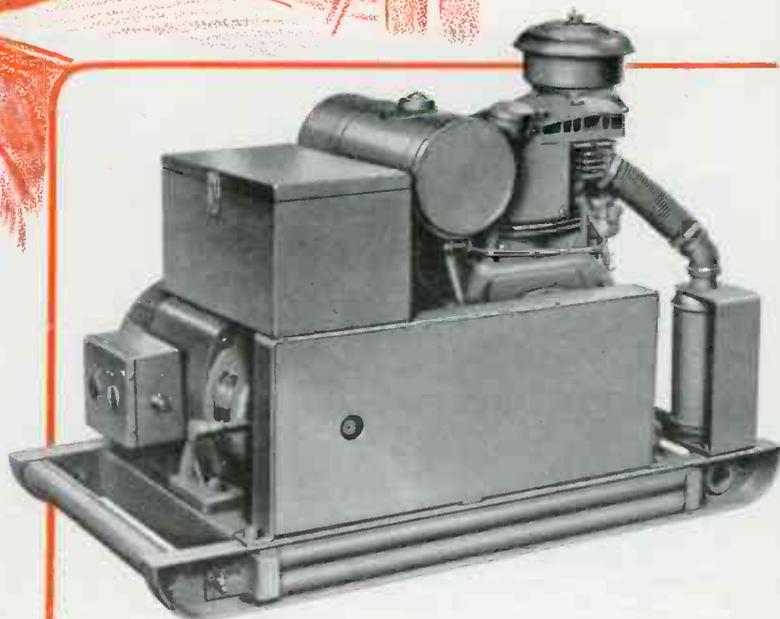
No BATTALIONS



Not when they are equipped with portable gasoline driven power plants for field radio and field service phones. Not when competent sending and receiving equipment is Leland powered.

Here is motor dependability on a life or death assignment, and Leland is proud to be the designer and producer of such critical equipment, just as Leland employees are proud to be the "soldiers" at the machines "in step" with the men at the battle fronts. *Neither shall fail!*

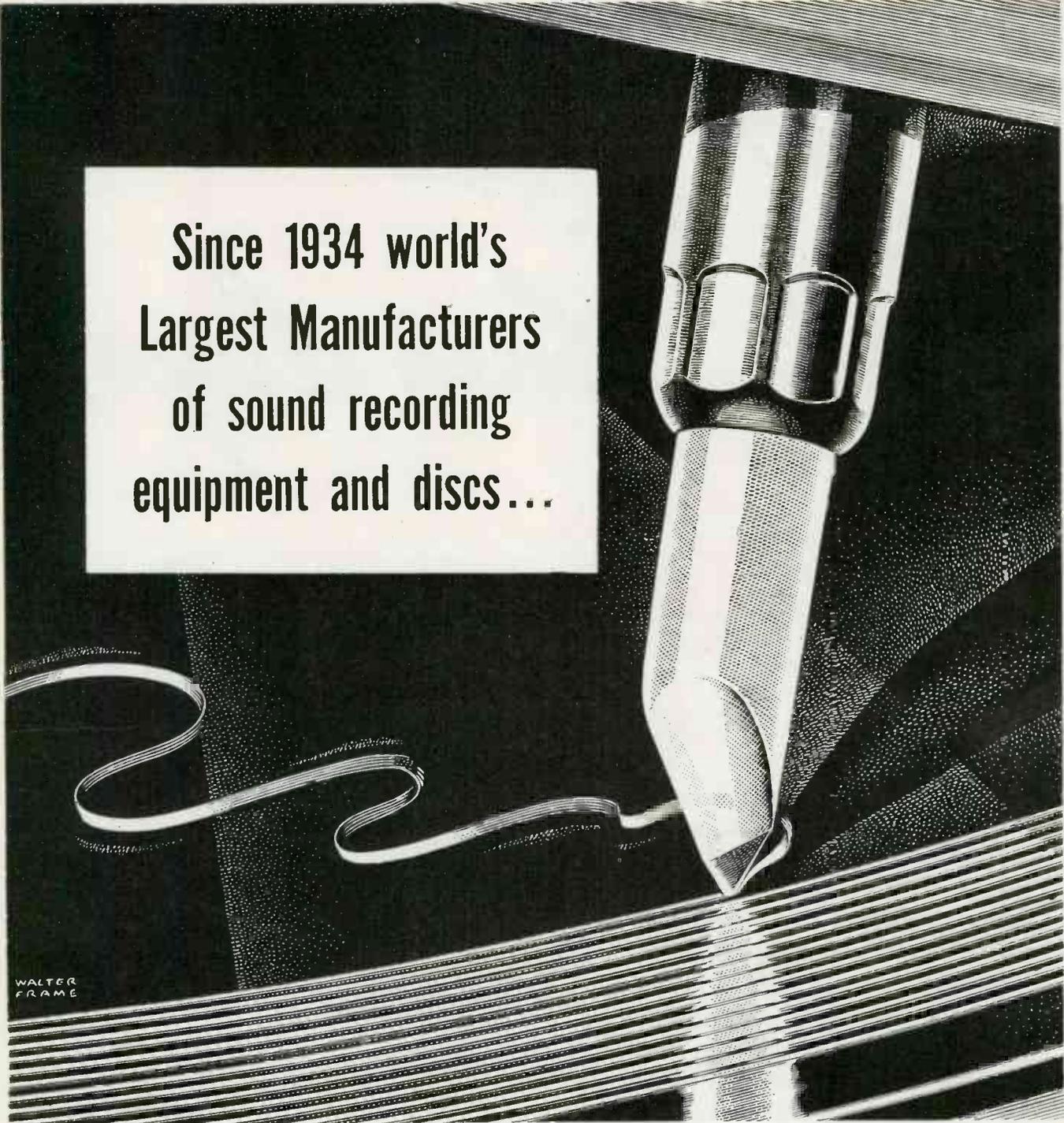
● Power units for aircraft navigation equipment, shipboard transmitters and receivers, and other electronic equipment developed for war use are available to the armed services and essential industries.



Leland Alternator on Portable Gasoline Field Radio Power Plant. Built for U. S. Signal Corps.

Leland
WAR DUTY MOTORS

THE LELAND ELECTRIC COMPANY • DAYTON, OHIO



Since 1934 world's
Largest Manufacturers
of sound recording
equipment and discs...

..... now becoming a major supplier of
Electronic Equipment for the Armed Forces

Presto Recording Corporation

NEW YORK, N. Y., U. S. A.

With More than 200 Engineers Piling Up
Accomplishments in Electronic Development

Emerson

Uses Its Vastly Increased Facilities to
Achieve Production Records

IN the "modern-to-the-minute" laboratories of Emerson — in process and on blue-print — new wonders of Electronics take shape daily, and rapidly move on to war production.

The skills and facilities which turned out more than a million, two hundred thousand radios per year in peacetime have been stepped up to meet and surpass schedules — *and they are doing it!*

New ideas, new techniques, new



HOME OF EMERSON RADIO

On three floors of this modern 2,500,000-square-foot building, Emerson, in peacetime, produced 1,200,000 home radios per year. Today, fully converted for war work, with accommodations for large expansion, Emerson is prepared for even greater responsibilities.



war effort will come scientific wonders which will give all Emerson associates a high place in the Age of Electronics.

equipment and a grim determination to achieve ever higher quality and greater volume have been combined in a fashion which has won the praise of our government, our fighting men and our manufacturing and service associates.

From the experience and resources which are now devoted solely to the

EMERSON RADIO AND PHONOGRAPH CORPORATION
NEW YORK, N. Y.

Electronic

PRECISION PARTS

TUBE PARTS METAL STAMPINGS
WIRE FORMS

Machined for Accuracy

BURNER TIPS FOR ALL APPLICATIONS



● *Perhaps You Have a Problem
Where Haydu Brothers Can Help.
Let Us Know Your Requirements.*

HAYDU Brothers began to serve the electronic industries as early as 1930, when the company was originally established in Newark, N. J.

After eight years of growth and expanding service, we moved to Plainfield, N. J., where we built our present factory five years ago.

Our electronic service is not restricted to the furnishing of parts and stampings. Our special engineering background and superior facilities enable us to be of service in designing and building machines for the manufacture of special electronic precision parts.

Our enlarged capacity is assurance of exceptionally prompt delivery.

The steady growth of Haydu Brothers is due to Quality, and the Economy of our products, which have caused Haydu Brothers to be known as "The Place of Quality and Economy."

HAYDU BROTHERS

PRECISION PRODUCTS
for ELECTRONIC INDUSTRIES

PLAINFIELD, NEW JERSEY, U.S.A.

"THE PLACE OF QUALITY AND ECONOMY"

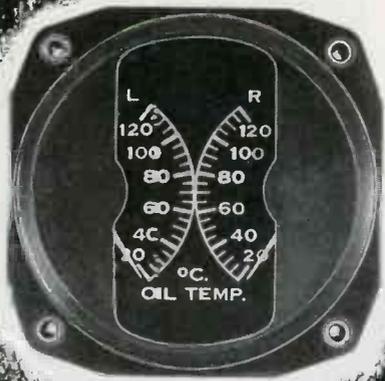
HICKOK

33 Years of Progress..

**1910..
1943..**

1 small plant
1 employee
2 styles of meters

2 large plants
Nearly 1000 employees
Hundreds of styles of meters
and test instruments



HICKOK METER



**HICKOK DYNAMIC MUTUAL
CONDUCTANCE TUBE TESTER**

From its organization in 1910 until now The Hickok Electrical Instrument Co. has always been in the forefront of those companies who have contributed most to Electrical and Radio Instrument progress.

Quality has always predominated over quantity of production—building a reputation for highest grade instruments that is now reflected in the enormous demand for Hickok Meters for Aviation and other War Time uses. The meter illustrated is typical of these War Time Instruments.

The Hickok Dynamic Mutual Conductance Tube Tester, developed soon after the advent of the 3-element radio tube, is the standard instrument for tube testing today.

New Hickok Meters and Instruments are being designed or are already in production for the use of our Armed Services. They will be available for everyone as soon as the present emergency is over.

So keep your eye on Hickok for the newest and best in indicating meters and radio service equipment.

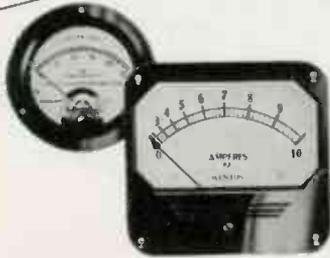
Hickok

ELECTRICAL INSTRUMENT CO.

CLEVELAND, OHIO • U. S. A.

**FOR ELECTRONICS
MEASUREMENTS, TOO,**

the Standards are Weston



Panel Meters for Electronic applications



Electronic Circuit Testers



Ultra-Sensitive Laboratory Portables



***Photronic (photo-electric) Cells**



Electronic Tube Checkers



Sensitive Relays

In the field of electronics, too, the measurement tools bear the name most familiar to you. For just as WESTON pioneered fundamental electrical measurement, as well as the special measurement needs of radio, so WESTON has provided simple, precise instruments and devices for the problems encountered in electron-

ics research, production and control. Weston Electrical Instrument Corporation, 597 Frelinghuysen Avenue, Newark, New Jersey.

**PHOTRONIC - A registered trademark designating the photoelectric cells and photoelectric devices manufactured exclusively by the Weston Electrical Instrument Corporation.*

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

WESTON

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

FOR OVER 54 YEARS LEADERS IN ELECTRICAL MEASURING INSTRUMENTS

INSULATED WITH MYKROY



Typical Applications of MYKROY

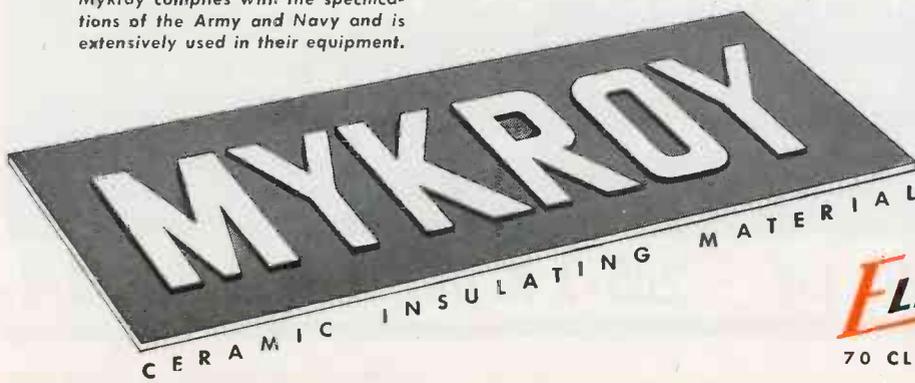
- | | |
|--|----------------------------------|
| Stand-off Insulators | Lead-in insulators |
| Mounting strips | Padding condenser supports |
| Tube and Crystal Sockets | High voltage arc shields |
| Structural supports for radio circuits | Radio frequency coil forms |
| Variable condensers | Radio frequency panel assemblies |
| Plug-in bases | Radio frequency switches |
| Antenna reel insulators | Relay bases and arms |
| Insulated couplings | Oscillator circuits |
| Motor generator brush holders | Fixed condensers |
| | Impregnated resistors |

Mykroy complies with the specifications of the Army and Navy and is extensively used in their equipment.

MYKROY! Its remarkable performance in the realm of electrical insulation has long been established and its use widespread in most exacting electrical equipment. So pressing has been the demand for this vital material—so often its applications have proved irreplaceable, that its production leaped 4,000% in two years!

These are the essential facts you should know about MYKROY. Its mechanical strength is comparable to cast iron, while its weight is equalled only by plastic materials. It binds inherently to metal and is thereby perfect insulation for those applications where bond or seal is critical. It can be moulded and machined to closest tolerances and its surface polished so that its absorption is negligible. It resists warping and mechanical shock and withstands highest temperatures without deterioration or change in its insulating characteristics. Its insulating performance is flawless through the entire range of frequencies.

If you are confronted with an insulating problem, our engineers will welcome the opportunity to acquaint you with the performance of MYKROY. It is available in ample quantities and can be supplied for war and essential production requirements.

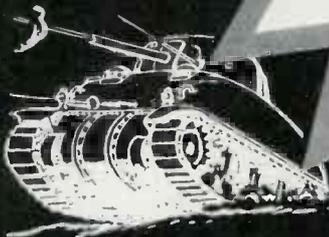


SUPPLIED IN SHEETS . . .
 MACHINED WITH PRECISION
 MOULDED TO SPECIFICATION
 . . . MADE EXCLUSIVELY BY

ELECTRONIC MECHANICS INC.
 70 CLIFTON BOULEVARD, CLIFTON, N. J.



CLAROSTAT



Controls and Resistors

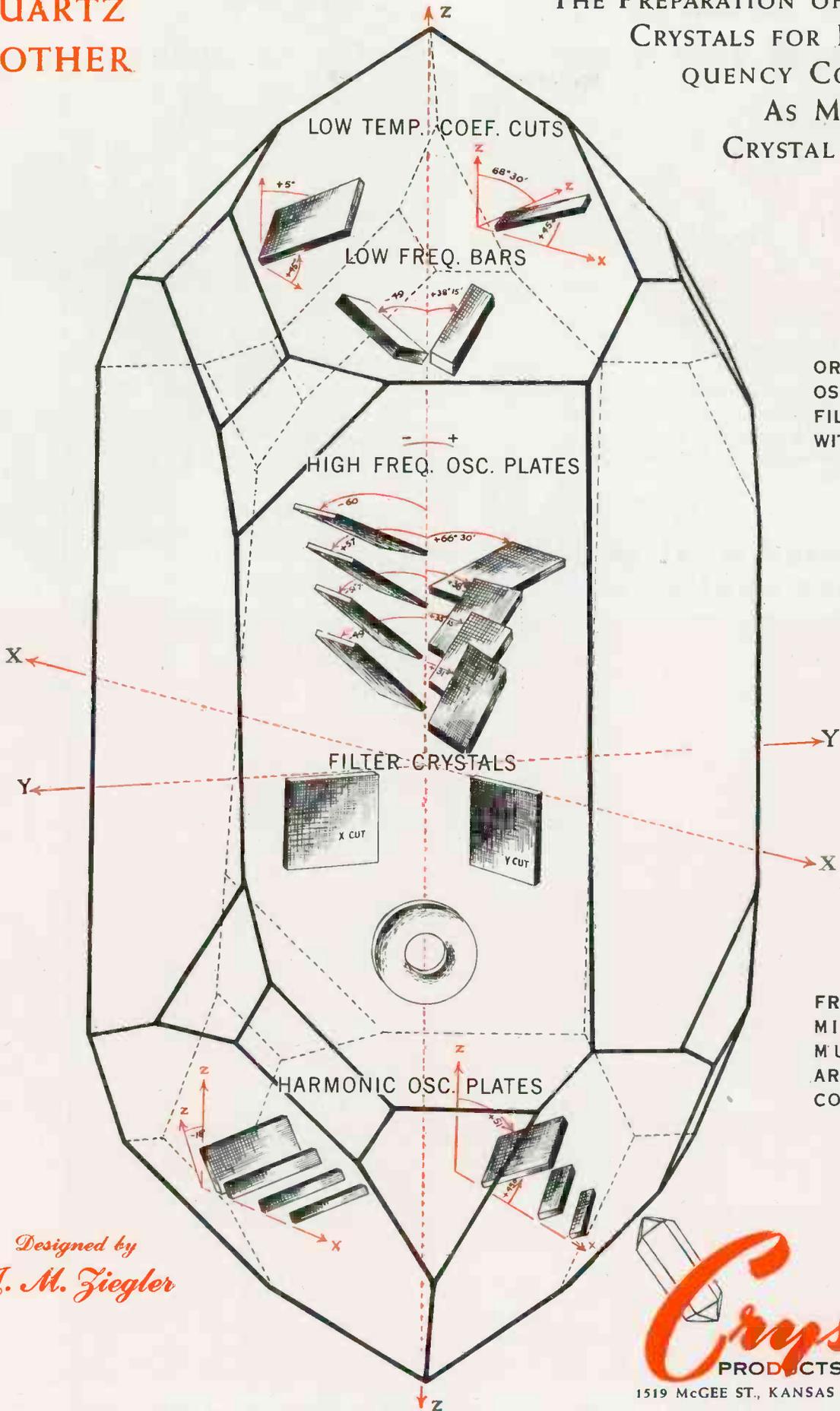
WIDEST VARIETY OF TYPES

**NOW ENGAGED 100% IN THE MOST IMPORTANT JOB OF
ALL—WINNING THE WAR—ON LAND, SEA, AND IN THE AIR**

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

QUARTZ MOTHER

THE PREPARATION OF PRECISION CRYSTALS FOR RADIO FREQUENCY CONTROL... AS MADE BY CRYSTAL PRODUCTS



ORIENTATION OF OSCILLATOR AND FILTER CRYSTALS WITH RESPECT TO MOTHER

FREQUENCIES IN MILITARY COMMUNICATIONS ARE ACCURATELY CONTROLLED BY CRYSTALS

*Designed by
J. M. Ziegler*

Crystal
PRODUCTS COMPANY
1519 MCGEE ST., KANSAS CITY, MISSOURI

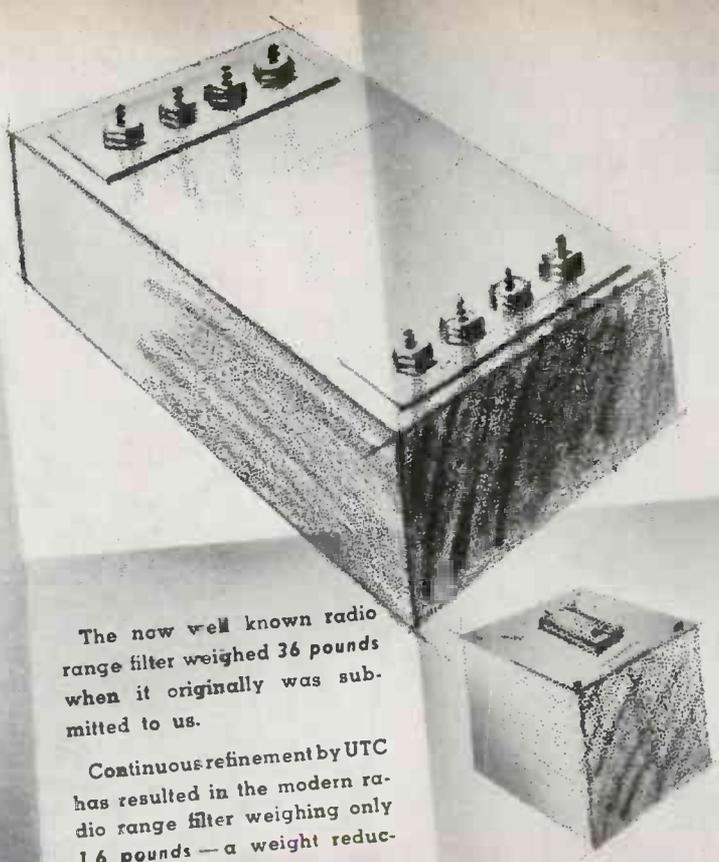
Producers of Approved Precision Crystals for Radio Frequency Control

FILTERS— Designed for war



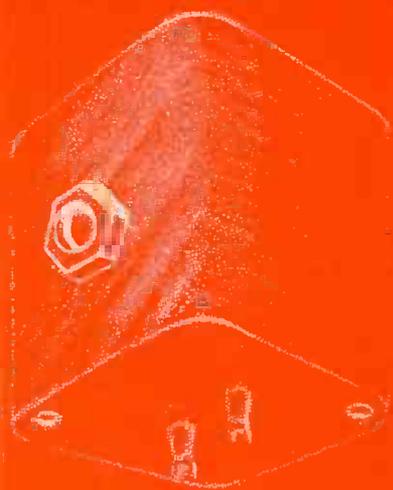
Unique characteristics of many UTC filters are the result of years of research on core materials and filter structures. We are proud of our part in the development of filters for wartime electronics. Here are a few typical elements, based on UTC design, which have led to UTC leadership in this field.

May we design a "Victory" unit to your application?



The now well known radio range filter weighed 36 pounds when it originally was submitted to us.

Continuous refinement by UTC has resulted in the modern radio range filter weighing only 1.6 pounds—a weight reduction of 95%.

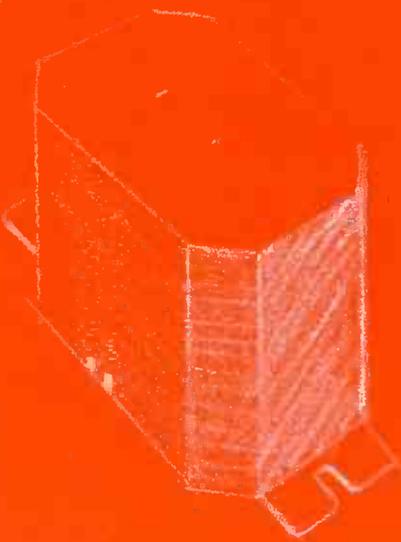


This UTC development is a tunable inductance, adjusted in the same manner as an I.F. trimmer.

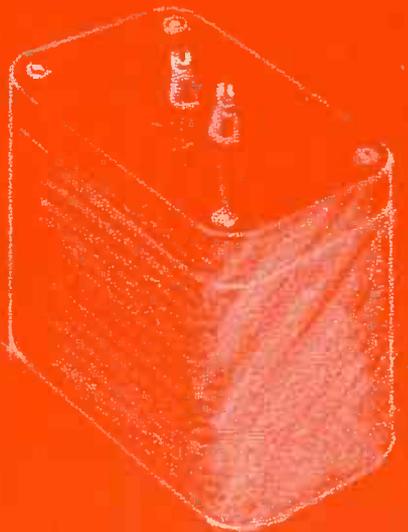


Designed for high frequencies, the Q of this coil is 300 at 20,000 cycles.

... For medium frequencies, the Q of this coil is 210 at 1,000 cycles.



... For low frequencies, the Q of this coil is 80 at 100 cycles.



UNITED TRANSFORMER CO.

150 VARICK STREET



NEW YORK, N. Y.

EXPORT DIVISION: 100 VARICK STREET, NEW YORK, N. Y. CABLES: "ARLAD"

www.americanradiohistory.com

ELECTRONIC INDUSTRIES

O. H. CALDWELL, EDITOR

M. CLEMENTS, PUBLISHER

480 LEXINGTON AVE., NEW YORK, N. Y.

Simplification in War—and Peace

Simplification and standardization of radio parts, long needed, are today being carried out under the pressure of war. But wartime standardization cannot consider the user's interests only; the prime regard must be for the most stringent economy of materials and of factory facilities, including manpower.

The units and types selected now must be few enough so that long production runs can be made without stops to change factory set-ups. For when a number of different though similar items are called for, as much as half of the factory's time may be consumed in rearranging machines for the next run.

Today's radio standardization must be made with production considerations paramount. When peace comes, the present wartime standardization will have to be revised to afford maximum service and usefulness to the users of the standardized products.

Electronic Tests for Army Officers

At Fort Monmouth, N. J., electroencephalic studies (brainwave measurements) are being made to establish objective tests for predicting capabilities of Signal Corps personnel. By this means it may be possible to segregate officers of stable personality from those unable to adjust themselves satisfactorily to new situations under pressure.

Previous electroencephalographic studies indicate that accepted standards for classifying civilians do not wholly apply for classifying military personnel. There is therefore a recognized need for standards of brainwave patterns by which individuals in a military environment can be scientifically classified. Brainwave charts will first be made from instructors in the Officers School, taken as examples of their groups, to establish preliminary standards.

The Research Merry-go-round

One of the curious facts that is to be noted about the electronic field is the number of side issues that have come out of the basic lines of research.

Television activity produced important strides in the development of fluorescent materials that are many times more efficient than natural materials. From that beginning the fluorescent-lighting industry has brought about more effective lighting systems. Another avenue of research has produced a method of inspecting castings and fabricated materials of all types for invisible fissures that might cause load failures if not discovered—using a fluorescent oil that seeks out and rattles whenever a crack or seam is present. This system uses a special wavelength ultra-violet-light source and both reduces inspection time

and increases the reliability of the inspection enormously.

To complete the circle back to the television start the principle has found one important application—that of showing up defective seals in the power vacuum tubes used in television and radio transmitters. It is so sensitive that it will show up longitudinal fissures in the crystal structure of the tungsten lead wires themselves when the tungsten has been improperly drawn. The vacuum leaks caused thereby may be slow, but ultimately will cause a tube failure.

Congress Looks at Patents

The American patent system, which has brought such rich fruit to the world in the past, seems to be in for a going-over by Congress. Two bills are now before the lawmakers on Capitol Hill. One proposed act would give the President power to grant licenses for the manufacture of any patented product. The second bill would impose similar authority in the Commissioner of Patents.

A great many other restrictions upon inventors' patent rights are included in these proposed statutes. One clause would require patentees to file with the Federal Trade Commission all the terms of a licensing agreement. Another would require that no restriction whatever be placed upon licenses to use patents.

Electronic Lullaby

In most instances sounds wake one up. But in a patent Uncle Sam has just granted to M. I. Hull, it is claimed that continual listening to a sound, the amplitude or pitch of which,—or both—vary at a rate somewhat slower than either the rate of heart-beat or respiration, will induce and sustain sleep.

Two physiological-psychological principles combine to produce the effect: The monotonous, low-pitched sound has a mild hypnotic effect causing mental relaxation or fatigue, and the threshold of audibility is raised, covering otherwise disturbing noise.

Apparatus to produce and control such a sound may be accomplished in several different ways. An efficient method is the use of an oscillator tube and ear-phones, but, evidently, various other arrangements employing electronic tubes can be constructed to produce the desired sonic lullaby.

In this Issue —

ELECTRONIC ENGINEERING DIRECTORY SECTION

Complete listings of manufacturers of all products and items entering into radio and electronic equipment (page 81)

New Feature—Alphabetical "finding list" of names of all concerns producing electronic equipment

Paper Shortage—Owing to the unexpected size of this issue and the limitations placed by WPB on paper tonnage used by publishers, it has been necessary to employ a slightly lighter weight of paper than in previous issues. Also because of paper limitations, the loose-insert marketing chart, previously announced for this issue, has been postponed to a later number



← **FLUORESCENT MAP** aids night-bombing. Military aircraft have long been equipped with fluorescent instrument dial markings excited to visibility by low-wattage ultra-violet sources. Low level illumination does not desensitize pilots' "night vision." Newest electronic aid is map pictured here. Map is printed in fluorescent "ink"; excited by u-v lamp in cabin or on pilot's helmet, map glows just enough to be studied. Light emitted is too weak to be seen by nearby enemy plane, or to desensitize pilot's retinas, the sensitivity of which has to be "built up" by wearing dark goggles half hour or more

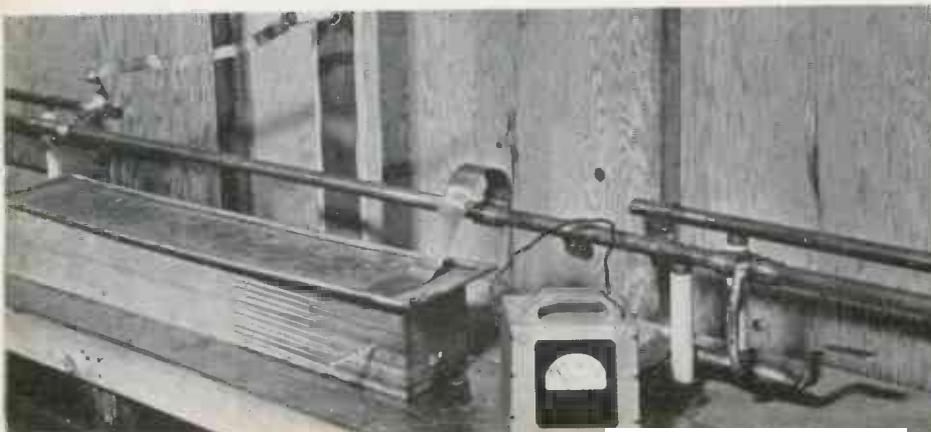
TUBES



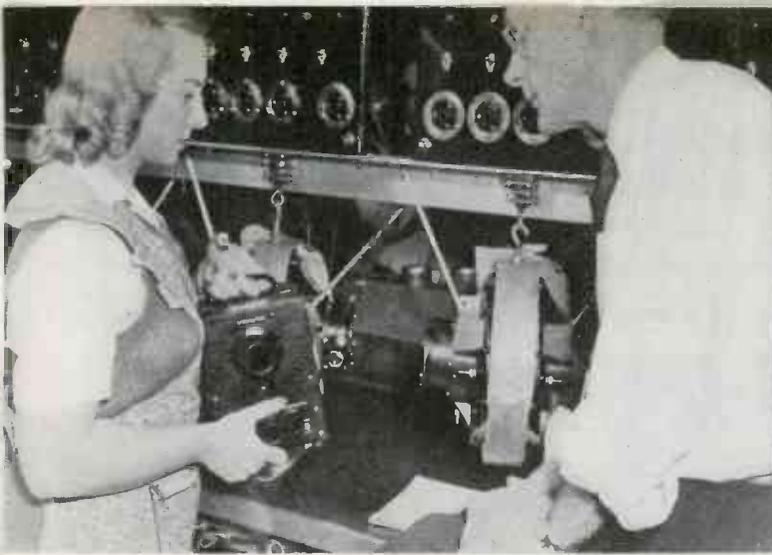
▲ **HIGH VOLTAGE** supplied by vacuum tube rectifiers clears atmosphere of dust, lint, and other air-borne dirt particles in binocular assembly room of Westinghouse, Mansfield, Ohio, plant. Girls can't wear makeup. Gun-like collimators house optical systems which check each binocular for definition of image and alignment



▲ **HIGH FREQUENCY** heating oscillator used in developmental work on laminated wing-spars and other components of plywood airplanes, at Dura-mold Division of Fairchild Aircraft and Engine Corp., New York City. Unit is a converted FM amplifier, with output of 15 kw at 10 mc



← **EXPERIMENTAL** setup for bonding wood propeller blank. Instead of hydraulic press, length of fire-hose inflated with compressed air is used here to obtain gluing pressure. Note standard fluorescent tube mounted on feeder to serve as indication that current is on



STROBOSCOPIC tachometer checks 6,000 rpm speed of rotor of Sperry gyro-compass at Dodge Division of Chrysler Corp.



SURFACE FINISH check on piston pin hole for Wright Cyclone engine using Brush surface analyzer, at Paterson, N. J.

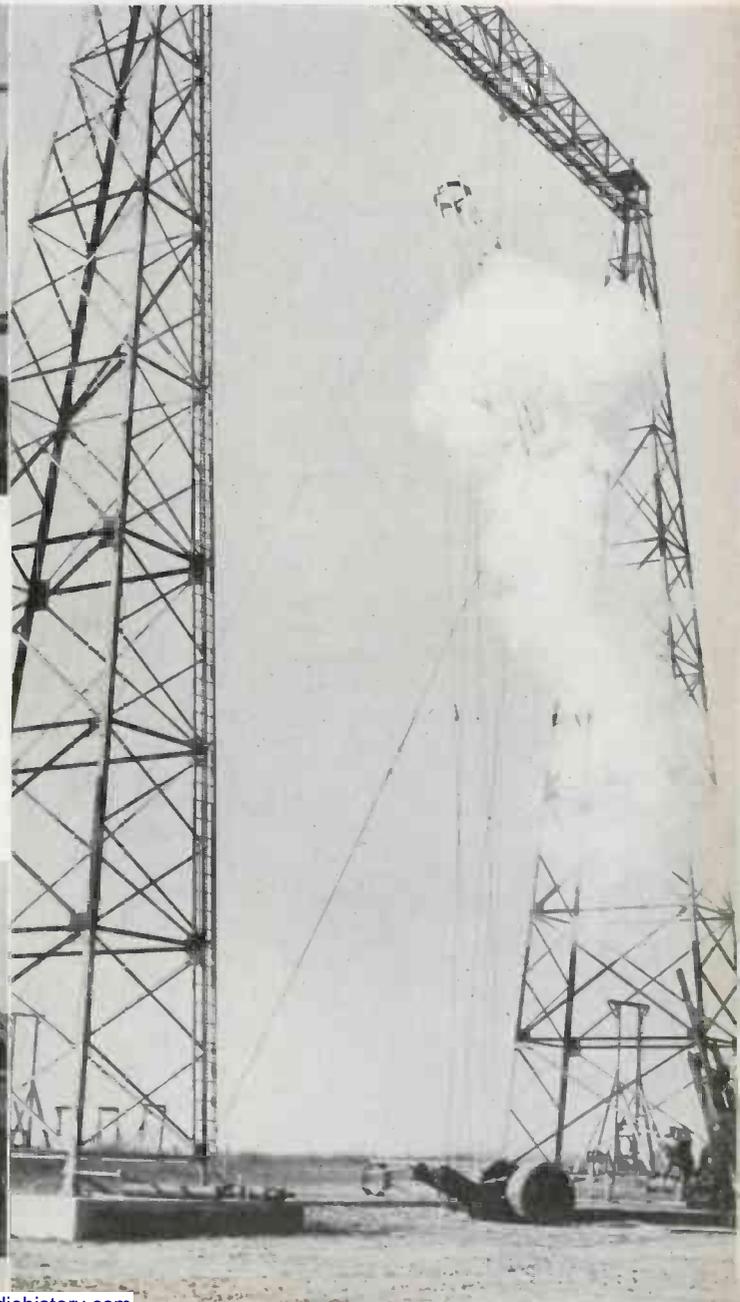
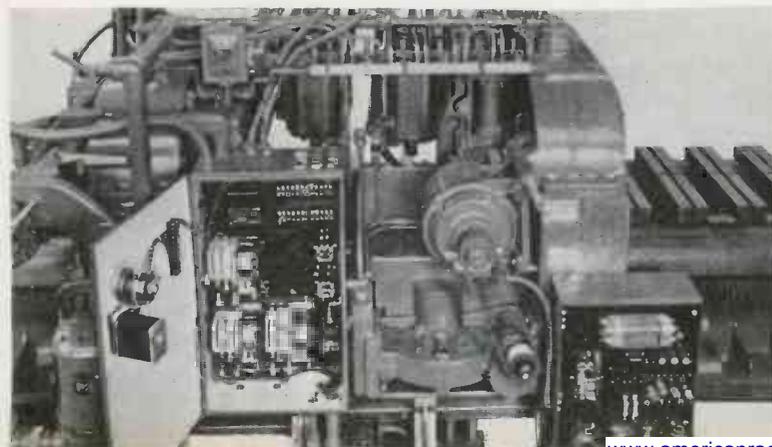
BEHIND the GUNS



↑ **PHOTOELECTRIC** tachometer measures speed of super-charger impellers in test runs at General Electric Company. Two-faced mirror on shaft-end reflects impulses to photo-tube above, and frequency meter indicates speed of rotation. Impellers weighing as much as twenty pounds are driven to 60,000 rpm in vacuum chamber

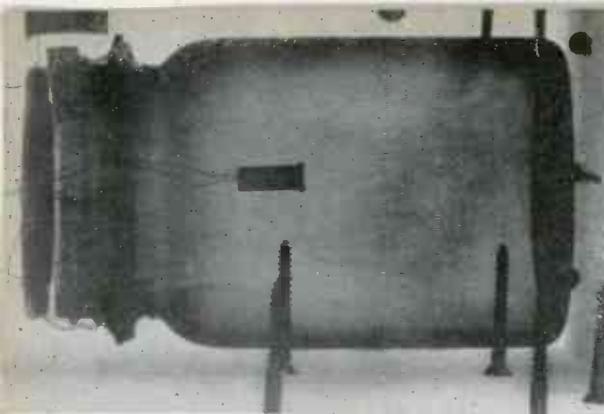
GUN AND PROJECTILE design are studied by electronic → system of measuring shell's speed. Note two "pick-up" coils. Time interval as shell passes through can be read in mph or fps on some instruments

ACCURATE CONTROL of airplane spar milling machine speed over wide range is obtained by supplying dc feed ↓ motor with rectified ac from G-E "Thymotrol" system



Electronics

Intrusion alarms, X-ray, spectrographic analysis, and many other electronic devices aid in apprehending and convicting the saboteur

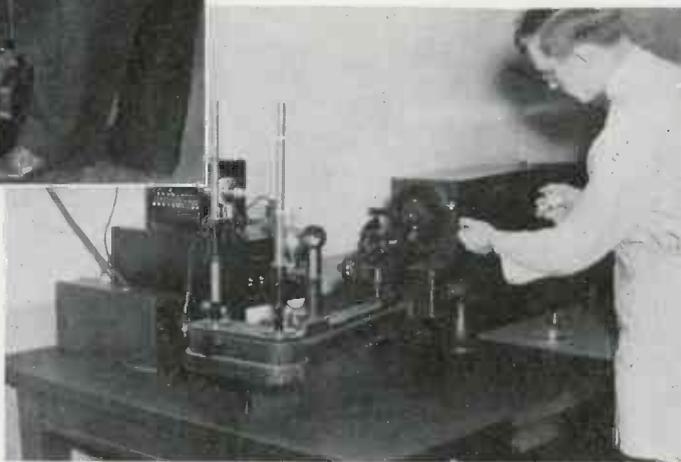


▲ **PORTRAIT** of a bomb that failed, X-rayed in wood box

FBI EXAMINES suspect → package with aid of fluoroscope



BURNING an evidence sample ↓ in arc of spectrograph



It is common knowledge that fewer acts of sabotage have been committed since the beginning of this war than were suffered during our participation in World War I. Several thousand important installations of various types of electronic intrusion alarms in and about America's war plants account, in part at least, for this improved state of affairs.

The Federal Bureau of Investigation and many other law-enforcement and detection agencies make use of numerous electronic and radio devices, some of which will be described briefly. Many others are in the "confidential" category for obvious reasons.

PHOTOELECTRIC densitometric analysis of spectrogram lines in FBI lab.



Three general types of electronic intrusion alarms are in wide use. They are the photoelectric, employing steady or "chopped" light beam, body-capacitance operated oscillating systems, and microphone-amplifier-relay or sound-operated inertia type vibration pickups.

Static beam alarm

The oldest and most popular type of intrusion alarm consists of a light source, an infra-red filter to screen out visible light, a lens system to focus the source to a more or less sharp beam, and, at the receiving end, another lens or lens system to focus the beam on the cathode of a phototube, a one or two stage amplifier, and a relay to make and break the alarm circuit. The alarm proper may consist of a visible lamp signal, bell, howler, or any other desired signal-

ing element, alone or in combination. In a small plant, it is frequently desired that the signal be received by the intruder himself, to frighten him away. Most of the more elaborate systems in plants employing guards on 24 hour duty prefer to signal the guards without signaling the intruder, thus facilitating his capture.

Light sources employed are generally of the low voltage, high amperage type. Motion picture projection lamps and automobile headlight lamps have frequently been used, although various special types of lamps have been developed for the purpose.

Since some of the effectiveness of such a system depends on the fact of the invisibility of the beam of light, the problem has been to secure an ideal filter material that will pass all of the infra-red while

vs. SABOTAGE

blocking all of the visible light. Before the war, the most satisfactory material, Jena glass, was obtained from Germany. Several adequate substitutes have since been developed. The objective which focuses the beam is generally a single double-convex element.

The receiving or detecting element for a static beam system consists usually of one stage of amplification following the phototube, which is selected for good infra-red response, stability, and life. This stage functions, of course, as an on-off dc amplifier, operating a high resistance relay in the plate circuit. The relay is of the normally open type, i.e., with contacts arranged so as to close the alarm circuit when the light beam is interrupted and the energizing current cuts off. Power supply for the detector system is usually obtained from a standard ac. Whenever possible, power to operate the alarm device is obtained from a second, independent source or from batteries, in order to give an alarm should the phototube-amplifier power fail.

Static beam types

Static beam types of intrusion alarms are generally satisfactory up to distances of approximately 200 feet between light source and phototube. Greater distances necessitate further amplification, which makes the system unstable, particularly with regard to strong ambient light, heavy fog, rain, snow, or dirt and grime accumulations on the lens elements, and liable to frequent false alarms.

Local conditions dictate many types of general arrangements for the photo-alarm systems. In outdoor service, the beam must be so adjusted to the terrain that the intruder is unable to get over it or under it. Some situations make a double-beam installation necessary.

By means of mirrors, the beam may be turned or doubled back on itself as many times as desired, so long as its total length does not ex-

ceed the maximum for the particular equipment, less losses in the reflection ability of the mirrors used. The problems of correct positioning and permanent fixing of the mirrors are more or less successfully attacked by the numerous types of mirrors and special mountings which have been put on the market.

In the pick-up unit, standard design provides a light-baffle plate between the lens and the phototube. Incoming light must pass through a hole a fraction of an inch in diameter before striking the cathode, thus reducing the danger of the unit's responding to any light other than that from the lamp filament. Nevertheless, static beam types that cannot be defeated are difficult to design.

Modulated beam alarm

If the light output be interrupted at a particular frequency and the amplifier be converted to a high-gain ac unit with band-pass filter, the limitations of length of beam, susceptibility to defeat, and response to ambient light are practically removed. Although more expensive to install and maintain, the interrupted beam system has distinct advantages. A two or three stage amplifier provides high gain of the output wave of the phototube, while almost completely disregarding the absolute level of the steady light that may be incident on the cathode.

Installed in the light source housing, a small synchronous motor drives a "chopper," which may consist of a simple disk with serrated periphery, to interrupt the beam at any frequency between 500 and 1500 cycles per second. The ac amplifier preferably is peaked to amplify the particular frequency received. A detector or rectifier following the last stage of amplification operates the relay to sound the alarm. Very much greater amplification of the light signal may be employed than with the static

(Continued on page 216)



Important two-beam modulated installation



"Telapproach" wires of capacitance system



Crystal mike in vault has own test buzzer
AAI "electronic fence" unit and pick-up



FEATURES of MICA CAPACITOR STANDARD

Signal Corps, Navy, and others of armed forces adopting new ASA War Committee recommendation

The new American War Standard—Fixed Mica-Dielectric Capacitors—C75.3-1942, first of the series of standard specifications being formulated under the direction of the ASA War Committee on Radio, has been approved for Signal Corps use by the Signal Corps Standards Agency and for Navy use by the Radio Division of the Bureau of Ships.

Since it is expected this standard will soon be controlling, as far as mica capacitors are concerned, in the design of all new electronic and communications equipment used by the Armed Forces, its content is of prime interest to the electronic industries.

Case sizes

Most important feature of the new ASA standard is the concentration of allowable case sizes to only 18. Of these, four are small molded capacitors, commonly used in receivers; five are larger molded units commonly used in low power transmitter circuits; two are molded-cased and five are ceramic-cased potted units used in higher powered circuits. It is understood that all future expansion of the mica capacitor industry will be concentrated on these 18 standard case sizes, which are deemed ample for all present design requirements.

Given in the new document are the standard capacitances, capacitance tolerances, and voltage ratings of capacitors in the standard case sizes. The standard capacitances have been chosen on a preferred number system, roughly based on the 12th root of 10, which is familiar to the electronic industries as the present standard for values of fixed composition resistors. The comprehensive range of the listed capacitances should

obviate the need for "special" values except in the most unusual instances.

The listed capacitances, tolerances and voltage ratings have been so chosen as to give the greatest overall economy of mica and of molding material. Capacitors which are wasteful of scarce mica and molding powder and which cause high production rejections consequent to "overcrowding" of capacitor elements in a case are conspicuously absent from the new specification.

Color code

Prominent in the standard is a new six-dot color code for small molded capacitors, which replaces the three, five and six-dot color codes now used and the innumerable variations of these codes with extra striping, edge dots, etc., which various equipment manufacturers have found necessary.

The upper left hand dot on all standard color coded capacitors is black and the other two upper dots signify the first two significant digits of the capacitance in micro-microfarads while the lower right-hand dot signifies the decimal multiplier which has been assigned for all standard units so as to make the upper left-hand dot black. The

center dot in the lower row indicates the capacitance tolerance and the left dot gives the "characteristic," a term used to identify a combination of the minimum allowable Q at 1 megacycle (see page 34 of December "Electronic Industries") or the allowable current rating in potted capacitors, the temperature coefficient of capacitance and drift limits allowed. See Table I, below.

Previously designers have usually specified certain capacitor constructions rather than the performance requirements actually desired. This often led to specification of more expensive constructions than actually necessary to give the required circuit characteristics.

Under the ASA specification, a capacitor manufacturer may use any construction he chooses so long as he complies with the specified performance requirements. Thus high Q receiving capacitors with a temperature coefficient of ± 100 parts per million and a maximum capacitance drift of 0.2 per cent may or may not be of silvered mica construction in low loss molding material, depending upon the particular manufacturer and the capacitance of the unit in question.

Temperature coefficients and the accompanying maximum capaci-

TABLE I

Cable No.	Color	Significant Figure	Decimal Multiplier	Tolerance	Characteristic
.....	Black	0	1		A
60113	Brown	1	10		B
60149	Red	2	100	2 per cent (G)	C
60041	Orange	3	1,000		D
60187	Yellow	4			E
60105	Green	5			F
60102	Blue	6			G
60010	Violet	7			
60034	Gray	8			
.....	White	9			
.....	Gold	.....	0.1	5 per cent (J)	
.....	Silver	.....	0.01	10 per cent (K)	
.....	Black	.....		20 per cent (M)	

tance drifts after subjection to temperature cycling which are now considered standard for mica capacitors are shown in accompanying tabulation 5C. (Table II)

D-5a. Component Designation.—Fixed mica-dielectric capacitors are identified by the symbol "CM."

D-5b. Case Designation.—The case designation is a 2-digit symbol which appears on the detailed drawing and identifies a particular combination of type and class.

D-5c. Characteristic.—The characteristic is indicated by a single letter in accordance with Table II.



A close-up of Signal Corps' transmitter BC-191-C

TABLE II

Characteristic	Q	Temperature Coefficient Parts/Million/deg. C	Maximum Capacitance Drift (F-6)	Verification of Characteristics by Production Test
A	Not specified	Not specified	Not specified	Not required
B	[As specified in D-5c (1)]	Not specified	Not specified	Not required
C	"	-200 to +200	0.5 per cent	Not required
D	"	-100 to +100	0.2 per cent	Not required
E	"	0 to +100	0.05 per cent	Not required
F	"	0 to +50	0.025 per cent	Required
G	"	0 to -50	0.025 per cent	Required

D-5c (I) Figure of merit or Q for capacitors of characteristics other than A and for which current ratings are not listed, when measured at 1 megacycle, shall be not less than the values given in chart of minimum permissible values of Q. For capacitances larger than 500 micromicrofarads, the value of Q shall be greater than 1500.

D-5d. Capacitance Value.—The nominal capacitance value in micromicrofarads is indicated by a 3-digit number. The first 2 digits are the first 2 digits of the capacitance value in micromicrofarads. The final digit specifies the number of zeros which follow the first two digits. If more than 2 significant figures are required, additional digits may be used, the last digit always indicating the number of zeros.

D-5e. Capacitance Tolerance.—The symmetrical capacitance tolerances in per cent shall be designated by a letter as shown below.

Tolerance	Designation letter
± 2 per cent	G
± 5 per cent	J
±10 per cent	K
±20 per cent	M

In no case shall the tolerance be less than one micromicrofarad.

All capacitors procured under this standard will have a common part number or "type designation" for all users, thus permitting diversion of production without any change in marking for any manufacturer or government service and also reducing the stock and replacement parts problems for the equipment manufacturer.

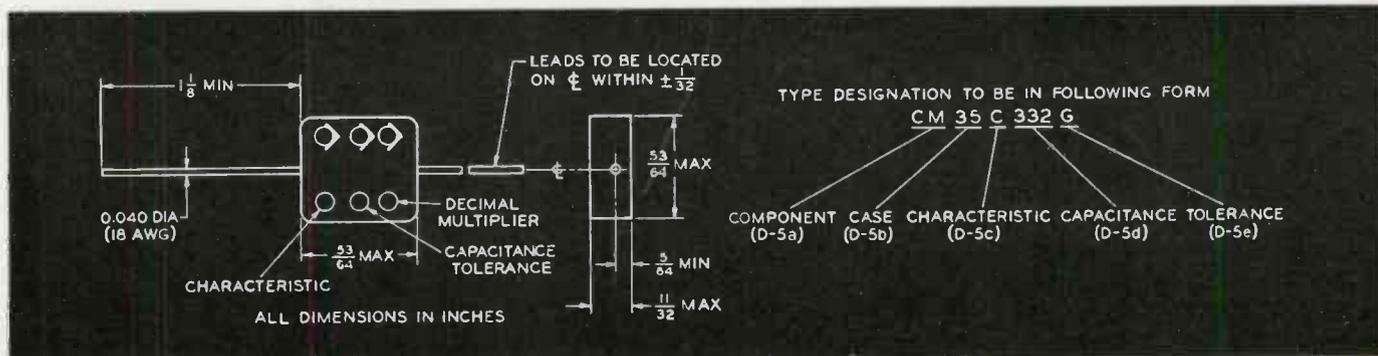
As applied to mica capacitors, the part numbering scheme developed by the ASA War Committee on Radio results in the following typical part number:

CM35C332G. The explanation of this symbol is shown in the sketch and may be interpreted as follows: CM is the code assigned to mica capacitors, 35 signifies a molded case of the familiar "postage stamp" dimensions, C is the characteristic, 332 denotes the capacitance as 3300 micromicrofarads, and G gives a ±2 per cent capacitance tolerance in accordance with a master table in the specification. It is thus possible to procure replacement molded capacitors from part numbers which can be read directly from a capacitor. Larger units, which can be marked directly without affecting the capacitor, will have the type designation engraved or branded instead of color coded.

Testing

Other points which the specification makes uniform are qualification test approval procedures and

(Continued on page 223)



ON BIG CONSTRUCTION JOBS



How radio communication and electronic aids speed up work and dispatching of men and materials. Bosses are always in touch

Just before war closed down on the American scene, a new use was being found for radio communication—on big construction jobs.

When great bridges or dams or tunnels or roadways were to be built, and it was necessary to tie together a number of separated supply points, radio proved to have its advantages.

With no telephone wires to string—or to move as work progressed and crews changed position—it soon became apparent that radio had many merits over the older phone communication systems. Not the least of these, was the fact that, with their own cars radio-equipped, the construction bosses could keep continuously in touch with the work, even as they motored from one job center to another.

For civil engineers

The Oakland - San Francisco bridge was one of the first big jobs to employ radio to link together the separate work centers across the bay, and to dispatch men and materials as needed. Later this same

radio technique was applied to railroad construction, to tunnel building, and to water reservoirs, particularly in the far west.

Meanwhile radio found other uses for reporting progress of operations and distant natural phenomena. Already carrier impulses over telephone wires had been used to report water levels and to gage reservoir heights. It was only a further step, then, to adopt radio devices in isolated places to send their robot messages without any wires at all. And now engineers

Electronic Helps for Civil Engineers

Communication between job and supply centers,—via AM and FM

Construction bosses' cars always in touch with work

Water levels and flood rises reported in advance

Radio transit that "sights" through underbrush

Tests of foundation supports

get, long in advance, automatic warnings of distant river rises far upstream, so that no longer need they be surprised or their work endangered by unexpected floods pouring down without warning.

At the same time the directional characteristics of radio short waves have placed a new tool in the hands of civil engineers required to run boundary lines or "sights" through thick forests and underbrush. From the time when George Washington surveyed lands in Virginia, virtually up to the date of Pearl Harbor it had been necessary for an axeman always to accompany the surveyor, to chop down trees and underbrush so as to give the transit glass a clear sight through the forest. But no longer is such clearing needed with the new "radio transit," which can take its bearing right through the most impenetrable underbrush—for radio waves go right on through where visible rays are stopped!

Surveys for the foundations of great dams and building structures were indefinite operations until

electronic devices were introduced which now make it possible to explore the underground conditions thoroughly, and to detect hidden geological faults and strata which might introduce dangerous shifting and even collapse of the finished structure.

Radio and electronic equipment will be back on these peacetime jobs after the present activities in Europe and the Orient are brought to a victorious conclusion.

Meanwhile radio communication is playing an important part in constructing Uncle Sam's war installations and factories.

Wartime construction

Operated by the Signal Corps, radio had a big role in the rapid construction of the great Alaskan highway through Canada. Radio communication brought supplies and men to the places needed as fast as they were required, so that construction went ahead at an unparalleled rate, thanks to radio.

Radio also has done a big job in constructing half a hundred ordinance plants for the Army and Navy. Radio has been used here for guard patrol, and has helped greatly in the actual construction work. The advantage of mobile radio, enabling superintendents while in their cars to keep in touch with all parts of the work, is a great argument for radio telephones on jobs of this kind. On one large job, the bosses can continue giving instructions while in motion anywhere within a 40-mile radius of the several plants involved. In target areas on the Pacific Coast, two-way mobile radios are being used in large numbers to safeguard cities and whole territories where it is important to have prompt communication.

The "hydrocorder" is the name of a new scientifically engineered electronic instrument which is capable of transmitting, by means of high-frequency waves from a re-

WITH ORDINARY optical surveyor's transit (above) a crew of axmen must go ahead to clear a path of sight. The new radio transit "sees right through" underbrush and dense forest

IN BUILDING the great Alaskan Highway, 1500 miles long, radio communication between various construction units was provided by the Army Signal Corps so that the whole huge job was co-ordinated and finished in record time

mote point, varying water heights and recording these levels, by the use of a newly designed radio-graphic reproducing system.

This device as employed in hydrological survey work makes possible the detection of coming floods or rise of water in reservoirs by checking hourly the conditions of streams far up in the mountains, as well as down through the river's course along the lower valleys. Every such locality, through experience, knows its own danger point of flood

stage and thus by being accurately and scientifically informed in advance by the electronic hydrocorder, can plan and prepare for any forthcoming danger.

For readers of a later issue of "Electronic Industries," Louis P. Clark, chief of the engineering division of Raymond Rosen & Co., Philadelphia, plans to prepare a detailed article with charts and photographs, describing the theory and action of this new electronic system of flood reporting.



FACTORY



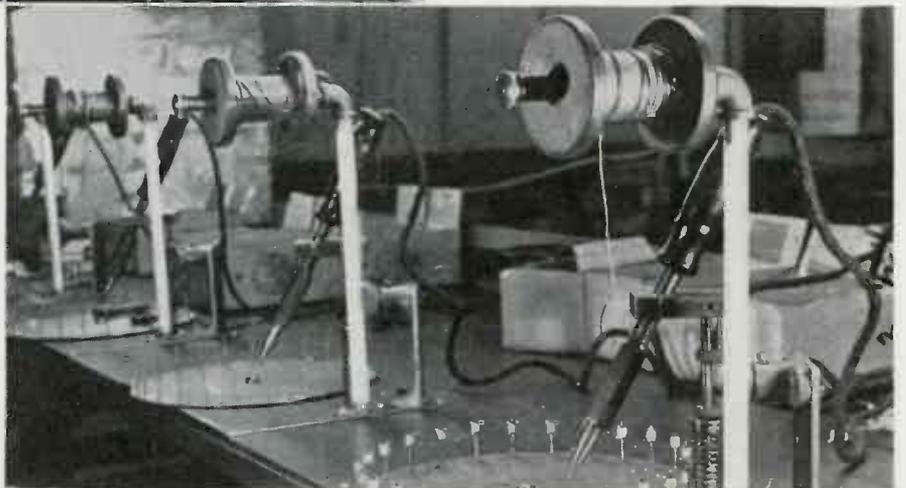
▲ "LAZY SUE" table at Newark, N. J. Weston plant speeds production instead of passing salt and pepper. Light touch on edge of top rotating table positions parts-cups in final assembly of instruments while lower table delivers sub-assemblies. Another turntable idea, top right, ups assembly of Westinghouse motors by 25%. Motor is placed on dolly over conveyor, worker rotates it to tighten all four feet before returning motor to conveyor belt

INDUCTION HEATING soldering of crystal shells with 5 kw oscillator feeding two-turn inductor coil handles up to six shells at once for General Electric. Heat is applied for three seconds; joint is cooled by air blast and wiped automatically. Method eliminated many troubles



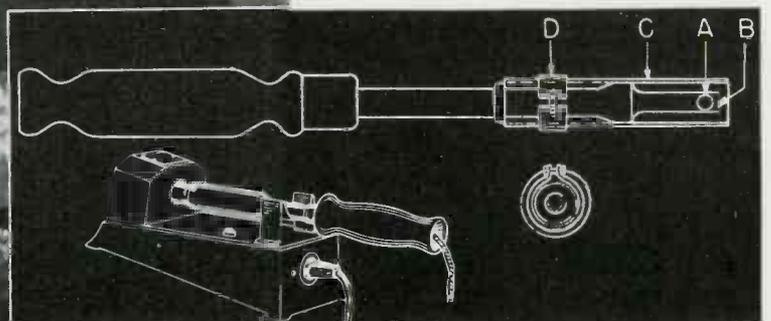
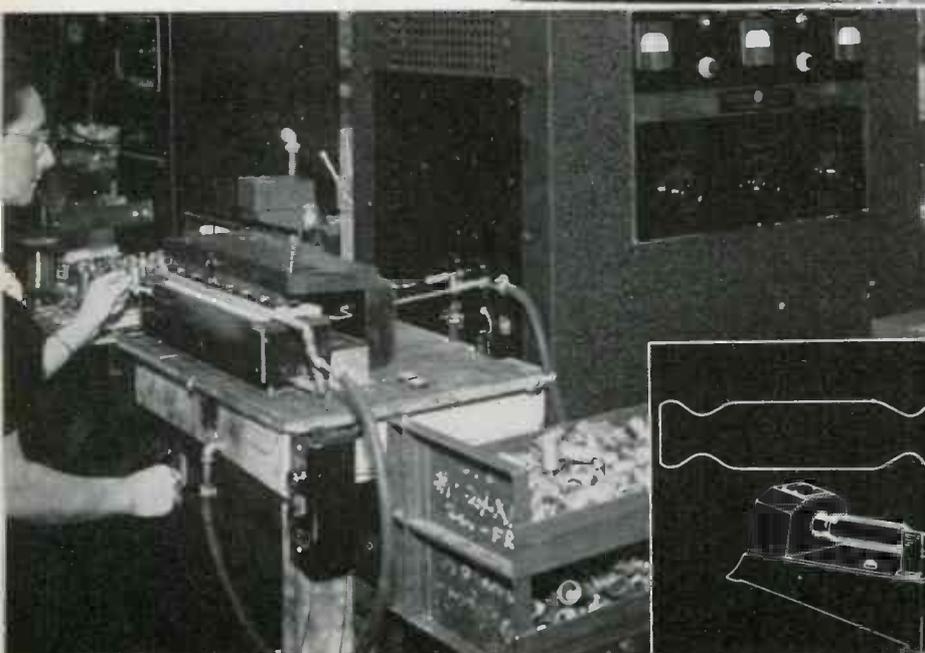
Seen on a New York drawing board: To prevent compasses, pens, etc., from getting lost under papers, draftsman keeps bar magnet on table to hold instruments ready for immediate use. Idea should have wide application, wherever induced permanent magnetism won't affect subsequent performance.

"Danger—Low Voltage" makes sense if it concerns hot-cathode fluorescents. Many plants have found 5 to 10 per cent boost in line voltage pays dividends in longer lamp life, longer starter life (less flickering), and in greater lumens-per-watt efficiency of lamps.



▲ FOOT OPERATED soldering irons speed production of resistor coils for Red Arrow Electric Corp., Irvington, N. J., in a third application of the turntable idea

MORE SOLDERING short cuts: Iron at top of "cut" has hole A in tip B, and is held stationary on splash guard C by hose-clamp D. Hole is filled with solder and small connections dipped in. Nickel steel tips last longest, says G.E. Lower iron represents Westinghouse idea—thermostat in housing

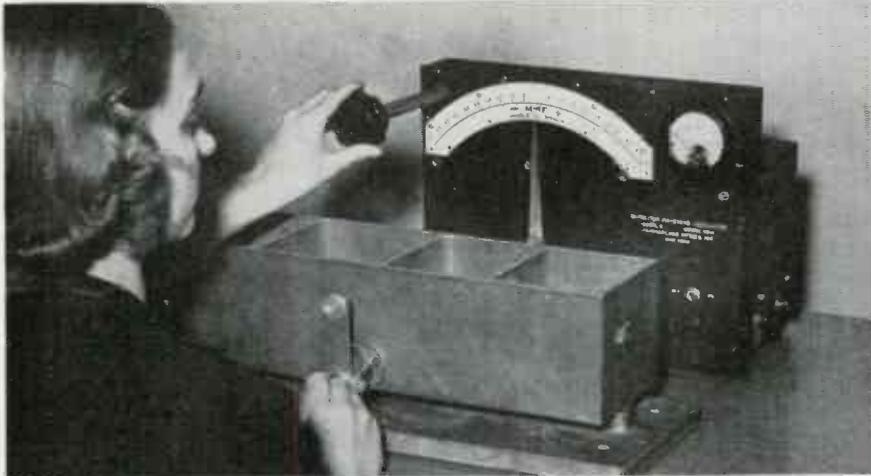


SHORT CUTS

Replacing semi-precious copper paper weights with stones now will help keep us from returning to stone-age later. **RE** editors still see many pounds of copper on desks of radio-electronic engineers, executives, because these men don't realize that Axis now has greater supplies of war materials than United Nations. and that if we don't get in the small scrap we won't stay in the big scrap. Every kind of waste and other material is vital. Philco, among others, carefully saves cartons in which component parts are received, using them later to ship out finished war goods.



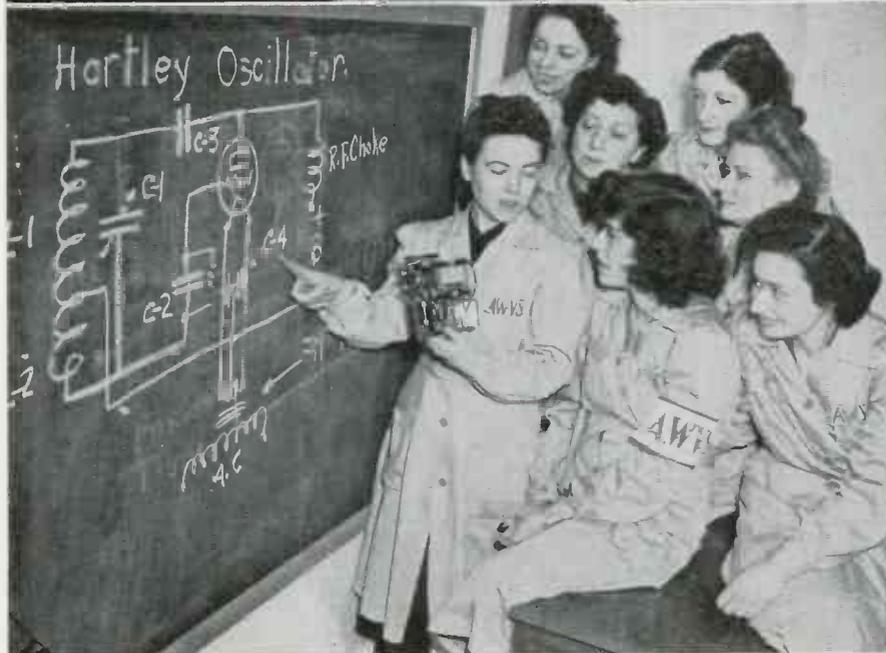
▲ **BLIND WORKER** at Link Radio Corp., N. Y., puts his delicate sense of touch to work fastening solderless connectors to intricate cable assemblies. Link has many blind workers who excel all others



◀ **TESTER** of special design enables women operators to check and calibrate banked variable condensers to within .1 mmfd at plant of Hammarlund Mfg. Co., N. Y.

MANPOWER problem may be alleviated by female trainees becoming engineering aides, repairwomen, technicians under program of AWVS

RUBBER CLOTHES afford RCA worker 100% protection in pre-grinding process of quartz crystals with acid



TELEPHONE-TYPE RELAYS in Electronic Applications

by C. J. DORR and L. N. GALTON

American Automatic Electric Sales Co.

Electrical relays provide means for carrying out processes initiated by sensitive electronic controls

This article deals with telephone-type relays, and provides information which may help the reader solve many of his problems by their use. A second article will deal with stepping-switches and will have a similar purpose.

Four conditions

The use of relays in electronic systems may be considered under four general headings: (1) when power circuits must be opened or closed as the result of minute initiating currents, (2) when many circuit actions must result from changes in current in a single circuit, (3) when controlled delays must result from current changes in an initiating circuit, (4) when complex combinations of one or more of the foregoing must be accomplished in a minimum of space and/or at a minimum of cost.

Some one of the many arrangements of the simple telephone re-

lay will meet all of the above requirements. (1) Unlike most other types of relays the telephone-type is unusually sensitive. It operates and releases on very minute currents or changes in current. While power-type relays require the maximum current possible up to the heat-dissipating capacity of the coil, telephone-type relays operate safely on 10-20 per cent of the maximum heat-dissipating capacity of their coils. (2) The telephone-type relay can be provided with one switching circuit or a dozen or more; that is, its contact arrangement can be such as to open several circuits, close several circuits or transfer still others from one source of power to another and still do all of this in a small space on a minimum of current. (3) Telephone-type relays have interchangeable coils (replaceable without disturbing the rest of the relay), which are available with widely varying

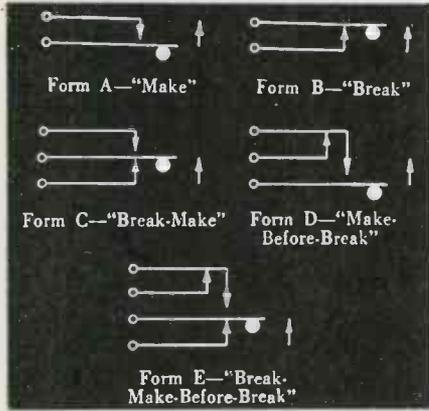


Fig. 1. Basic contact assemblies shown in unoperated (normal) position

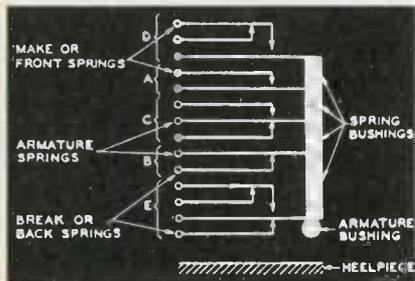


Fig. 1A. One standard arrangement of contact springs

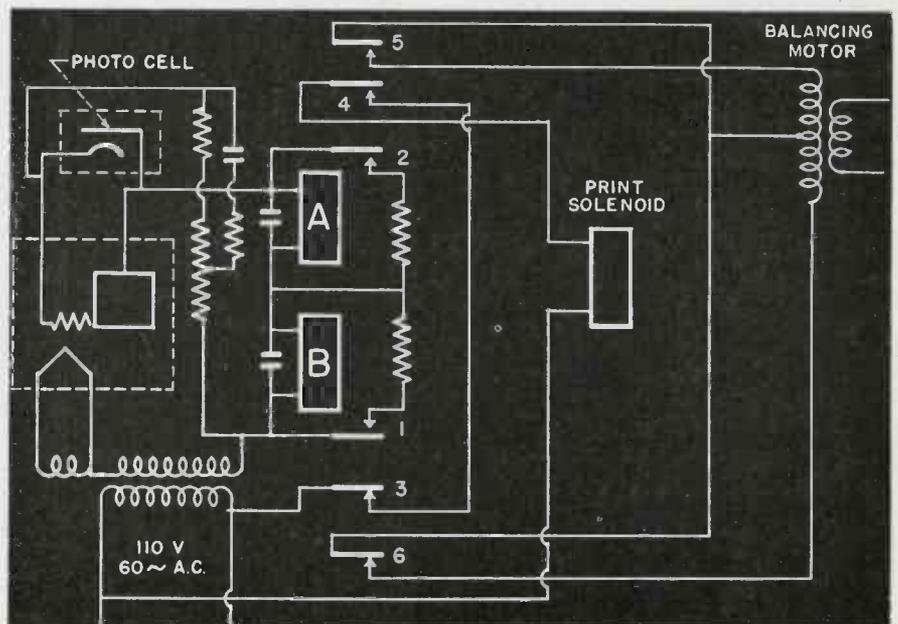
Few readers of this magazine may ever have spent much time studying or working with automatic telephone switching equipment. Telephony, at first glance, may seem entirely foreign to electronics. Yet, many of today's most useful electronic developments employ lessons learned from, and equipment used in, automatic telephony.

For one thing, there are the telephone-type relays.

Most electronic devices make use of relays. While many types of relays are on the market, few have the operating characteristics and adaptability which make telephone-type relays so well adapted to use with vacuum tubes.

Again, one of the basic parts of the "step-by-step" system of automatic telephony is the stepping switch—a simple device which now is making possible a host of ingenious electronic developments.

Fig. 2. Basic circuit of recording potentiometer using relays in plate circuit of photocell controlled electron tube



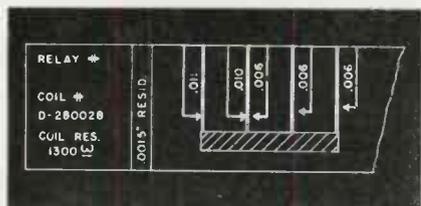


Fig. 3. Typical adjustment instructions to provide definite contact closing order

characteristics: i.e., with few turns or many for operation on small currents or large ones; or with sleeves or slugs (single turn, short-circuited windings) on the coil core which provide for operating speeds ranging from .002 seconds to .100 seconds or release speeds from .005 seconds to .500 seconds. Thus any desired timing sequence may be obtained. (4) Moreover, telephone-type relays are not only small in total volume, but are small in mounting panel area required. Additionally, all wiring terminals extend beyond the relay base. This permits the mounting of many relays on a small mounting panel with all the wiring conveniently concentrated on the back. Neatness is one result; simplified maintenance is another.

An electronic muscle

Add to the foregoing features the possibilities of many varieties of contact point materials (generally in the noble metal series) to provide for handling anything from the minute currents and voltages of a thermocouple to the high current and highly inductive circuits of an aircraft solenoid, and it is little wonder that the telephone-type relay has been called "the muscles of the electronic nerve system."

One of the simplest and probably one of the most frequently met electronic applications for the telephone relay is in the photoelectric relay unit—an example of the situation in which delicate currents must be made to activate power devices. Here a change of a few microamperes in the current in the vacuum tube circuit, resulting from light rays impinging on the screen of the photocell, must be made to open and close doors, or count objects on a conveyor belt. Relay coils having resistances of 2500 to 11,000 ohms, operating on currents from 10 milliamperes down to 2 milliamperes and releasing on currents 50 per cent to 75 per cent

ENGINEERING REFERENCE CHARTS IN DIRECTORY SECTION

In presenting to its readers a number of valuable reference charts (one accompanying each issue, from our very first number), "Electronic Industries" has had the collaboration of the engineers of leading laboratories and radio organizations. These have included the GE Electronic Laboratories, Bell Telephone Laboratories, RCA Laboratories, Massachusetts Institute of Technology, and others (whose charts are now in course of preparation).

In the issue now in the reader's hands, we present a series of engineering reference panels and basic circuit properties, which have been collected and compiled for handbook purposes by the engineers of the International Telephone and Telegraph Corporation. These reference charts appear on successive right-hand pages in the Directory Section of this issue.

of the pick-up currents, are usually employed in the plate circuits of such vacuum tubes energized from the conventional 110-volt, 60-cycle light socket. While the current in the plate circuit is half wave rectified, the connection of a very small condenser (.25 to 1 mf.) in parallel with the relay coil usually provides sufficient filtering for reliable and quiet operation.

Interlock problems

Frequently, interlocks must be provided to de-energize certain portions of a circuit or to energize several different circuits when a photo-tube beam is cut. For example, a photo-tube installation to turn on street lights when natural illumination drops below a pre-determined point must have a second circuit to change the initiating circuit's sensitivity to such an extent that, once turned on, the lights will not immediately be extinguished by a fraction of a foot candle improvement in the illumination. Here a second set of contacts on the initiating relay can change the tube bias and thus change the sensitivity. It might also be desirable to operate a counter from another independent circuit and thus a third set of contacts would be desirable. Such additional sets of contacts can easily be provided on telephone-

type relays without space or operating current difficulties.

To simplify the choice of the combinations to be specified in selecting a relay for an application such as the above, it will be well to take note at this point of a shorthand language that has been developed in the telephone field and which is now finding use in all electrical remote control and electronic work. Fig. 1 pictorially illustrates this.

Relay terms

As you will note, the Form A or "make" contact assembly indicates that, when energized, the bottom spring moves up to meet the top one, closing the circuit. The Form B or "break" has the two springs in a normally closed position. When energized the top spring moves up and away from the bottom thus breaking the circuit. In the Form C or "break-make" assembly, first the middle spring moves away from, and breaks contact with, the bottom spring, and then contacts the top spring to close a new circuit. In the Form D or "make-before-break" assembly, the bottom spring moves up to contact the top spring and pushes the top spring away from contact with the middle spring, thus making one circuit before breaking the second.

Fig. 4. Use of a slow release relay in antenna circuit control

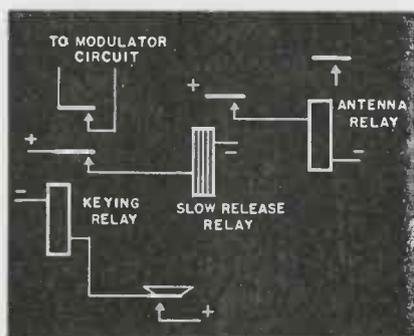
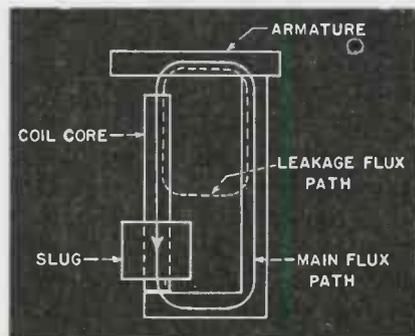


Fig. 5. Armature delay principle using retarded magnetic decay



The Form E or "break-make-before-break" assembly is a combination of Form B and D arrangements.

The combination shown in Fig. 1A is then simply described as 1E, 1B, 1C, 1A, 1D. This is also the standard arrangement of contact springs on telephone-type relays.

Closing order adjustable

While the ordinary application, even when it requires a multiplicity of spring contacts, will probably not have a contact sequence operation problem, many applications will. For example, in the problem described above, no fixed sequence of switched circuit action had to be employed. However, there may be times when such a sequence becomes essential.

What do we mean when we speak of sequence? Many times

one circuit must close ahead of a second one. Still other applications require that operation of one pair of contacts must be so closely related with relay operation that the coil circuit can be opened and closed rapidly without disturbing part of the contact circuits while rapidly opening and closing the others. The "Celectray" recording instrument circuit shown in Fig. 2 is one example where sequence of adjustment is employed.

Sequence operation

Here relays A and B are in series with each other in an electron tube plate circuit. The galvanometer in the balancing circuit carries a mirror which reflects a light beam on to the photocell screen. The unit is adjusted so that with only part of the light beam striking the cell, the instrument is in balance and the current through the two relay coils is between the operate currents of the two relays. In other words, relay A is operated and B is released. Under this condition, the rotor of the balancing motor is blocked by contacts 5 and 6 of the relays and the print solenoid is energized by contacts 3 and 4. Contacts 1 and 2 of the two relays connect shunt resistors across the relay coils once they have operated in order to change the relay sensitivity and thus permit them to release on a slight decrease in current. As the bridge approaches bal-

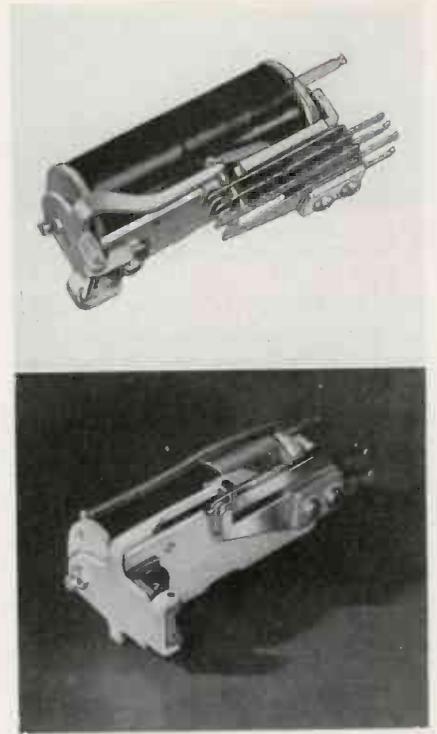
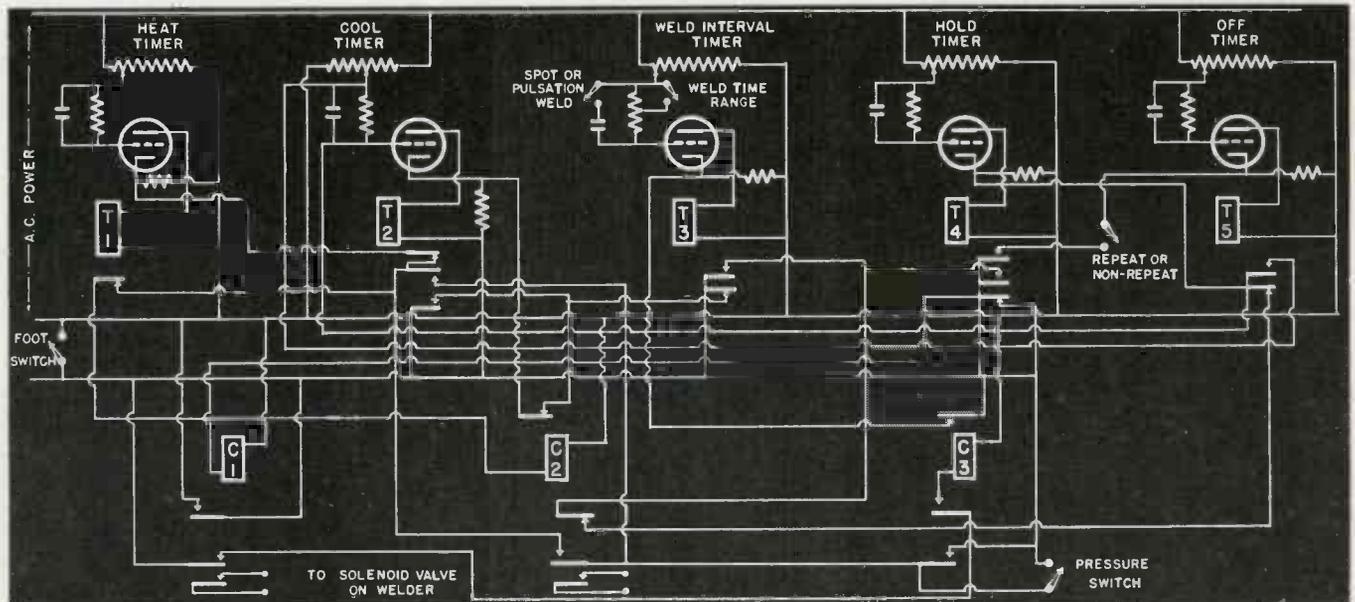
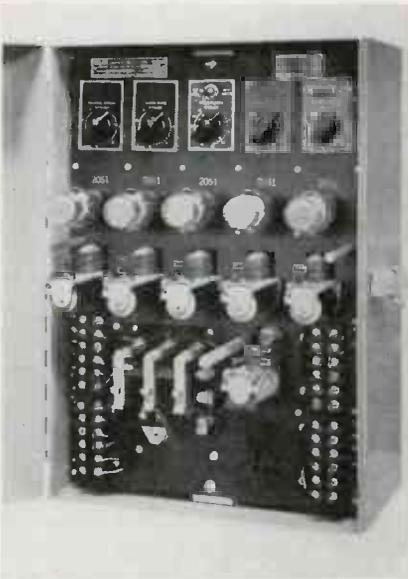


Fig. 6. Above: Typical quick acting telephone type relay with 2 1/4:1 ratio armature. Below: Typical slow release telephone type relay with 1:1 ratio armature

ance, then, it is desirable that the balancing motor advance in short steps. At the same time it is necessary that the contacts operate in proper sequence in order to provide proper relay and instrument functioning. Under a balanced operation from the opposite direction, both relays A and B are operated until the balance point is approached when relay B starts to

(Continued on page 219)

Fig. 7. Elementary circuit of sequence welding timer. Left, enclosed sequence control having cool-time and weld-period timers for pulsation welding, with thyatron spot-welding control panels





STEM-PRESS machine. Sealing tungsten filament rods to glass



CLOSE-UP of assembly work in the Freeland & Olschner plant at New Orleans. Infinite care must be taken with delicate parts

REBUILDING BROADCAST TUBES

Old parts reconstructed to keep stations on the air

WITH THE AID of the Columbia Broadcasting System, a New Orleans concern, Freeland & Olschner, Inc., has made a successful business out of rebuilding "duds" from broadcast stations, so that these rebuilt tubes are now giving dependable service during war times

CHIEF TUBE TROUBLES are break-downs of filaments and cracks in the glass envelope. This means that the glass must be cut open with extreme care, the internal parts repaired and re-adjusted, the envelope replaced or re-sealed, and the tube re-exhausted

ONE OF THE FACTORY EXPERTS at left is shown setting up operations on a 100-kw broadcast tube. Below at left are seen four pumping stations in the water-cooled tube division. Directly below is an inside view of one of the pumping stations for air-cooled tubes, showing worker sealing in a pair of air-cooled tubes prior to evacuation



THE BRITISH RADIO ENGINEER

by **GEORGE LEWIS**

International Telephone & Telegraph Corporation

Hardened by tragic mistakes, and wiser after three years of war, the Briton avoids our American "new model" tradition

Quite recently a man prominent in the American war effort accompanied me to a British plant engaged in the manufacture of radio equipment for the armed forces and, as he expressed it, was dismayed at the atmosphere of calmness and apparent unconcern that pervaded the office of the British concern. Unlike American plants with which he was familiar, he said, there was no feverish bustle, no race with time, no breathless conferences. Over tea he expressed his mystification to the American engineer we were visiting—and got this explanation:

"They've a bit different idea of how to do this thing," the engineer said. "See that poster"? He pointed to a colorful display on the wall reading "Do Not Change," and smiled. "That slogan is their secret." Then he told this story:

Stand-pat formula

The British War Production Office's advice to forego changes, he explained, expresses a terse bit of philosophy completely character-

istic of British temperament, and had proved to be the keystone of Britain's remarkable accomplishments in production, under unparalleled difficulties, for all-out war. To Americans, steeped in the "new model" tradition, but comparatively new to war production, he agreed, such an attitude is incomprehensible. British engineers, however, hardened by tragic mistakes at the beginning and wiser after more than three years of production under actual conditions of warfare, find the formula good, and stand by it.

In the field of radio engineering, as in other divisions of the British production set-up, this approach has permitted the accomplishment of an amazing job under conditions likely to throw a severe strain upon even the most resolute program. But, responding to the mysterious forces which seem to bring forth in men the moral reserves required to meet trying emergencies, the British radio technician has drawn upon his heritage of tenacity and native thoroughness to perform with a minimum of lost motion the task of turning out a quality product in adequate quantity.

Soft-spoken, easy-going

Soft-spoken, orderly and—on the surface at least—an easy-going person, the British radio engineer has worked honestly and directly toward his goal—the creation of the best radio equipment it is possible to produce, regardless of size, weight or cost, and, when its reliability has been proved, to remove every barrier in the way of the model's maximum output **without change.**



GEORGE LEWIS, widely known among American radio men, is now spending most of his time abroad

There are no obstacles placed in his path. He is not required to attend endless conferences. He is not hindered with step-by-step supervision. Instead, he is given the responsibility of following the job through to completion, and the fact that he has been so successful is a tribute to his executive qualities.

The British radio equipment, it has been pointed out by critical American engineers, is more robust, more expensive than its American counterpart. But such qualities do not constitute drawbacks, in the opinion of the British engineer, if they assure equipment that will prove entirely reliable under stress. He knows, from intimate personal experience, the value of a product that will not fail when it is needed most.

Leaning back, the engineer smiled quizzically at us and murmured, "Have another cup of tea?"

**DO
NOT
CHANGE**

**The Magic Brain of
ALL ELECTRONIC
EQUIPMENT
is a Tube...**



... and the Fountain MODERN TUBE



-head of DEVELOPMENT is RCA

Since the time when Radio itself was still a scientific novelty, RCA has led in Tube development. One after another, new or improved RCA types have met the swiftly advancing needs of electronic applications—radio, industrial, and others—often anticipating these needs far ahead of any commercial demand.

Naturally then, RCA stands today as the fountain-head of Tubes for practically all of the varied Electronic equipment now heralding the “Electronic Age” throughout industry. Years beyond the experimental stage, RCA Tubes have proved their dependability beyond doubt. Expertly engineered by men to whom “Electronics” was a by-word more than a decade ago, RCA Tubes are produced by modern quantity methods which assure high quality at low cost. Designed for present as well as future requirements, they are backed with a wealth of knowledge of tube usage unsurpassed in a great industry now facing an even greater future under its modern, more all-inclusive name—ELECTRONICS.

Receiving Tubes . . . The familiar “Radio Receiving” Tube types are basic to almost all Electronic equipment. RCA offers a full line for every requirement—both in glass and in the famous metal types perfected by RCA engineers.

Cathode Ray Tubes . . . RCA was the first to produce well-engineered Tubes of this type at low cost, thus making their use practical for Television, and for general industry. Today, in dozens of fields, RCA Cathode Ray Tubes are paving the way to higher efficiency standards in measuring and testing without mechanical movement or its limitations.

Special Tubes . . . From the scientifically-famous 931 Multiplier to types using the RCA-pioneered S4 surface for daylight and blue light sources, RCA has paced the field in Phototube development. Other “special” types include the RCA Thyatron-type 2051 with its enormous power application for contact purposes, and various others.

Power Tubes . . . From enabling broadcast stations to deliver “More Watts Per Dollar,” RCA Power Tubes have long since branched into broader Electronic fields. Included in this category are many Tubes for use in induction heating equipment.



RCA TUBE PUBLICATIONS

to help you Design . . . Buy . . . Replace



1 HB-3 ALL TYPES TUBE HANDBOOK . . . Up-to-the-minute data, curves, etc. on all RCA power, receiving, cathode ray, television, and special-purpose tubes. Supplied in two loose-leaf volumes with durable binders. Available on subscription basis. Write RCA Commercial Engineering Section, Harrison, N. J. for descriptive folder and order form.

2 RC-14 RECEIVING TUBE MANUAL . . . Tube theory, application data, circuits, and charts for the lay reader. Describes 340 different RCA tube types. 256 pages. Single copy, 25c.

3 RCA PHOTOTUBE BOOKLET . . . Describes phototube theory, construction, and operation. Gives data on 15 popular RCA Phototube types, with curves and circuits for light-operated relays, light measurements, and sound reproduction. Single copy, no charge.

4 RADIOTRON DESIGNERS' HANDBOOK . . . A 356-page book edited by F. Langford Smith. Prepared especially for radio set designers, but valuable to all interested in the fundamental principles of practical radio-electronic circuit design. Profusely illustrated. Stiff covers. Single copy, \$1.

5 RCA TRANSMITTING (POWER) TUBE GUIDE . . . 72 pages, profusely illustrated, containing data and circuits for popular RCA power tubes, u-h-f acorn and ridget types,

gas-triodes, and gas-tetrodes. Special reference chart shows air- and water-cooled tubes, transmitting and television rectifiers, cathode-ray tubes, phototubes, voltage-regulator tubes, and RCA special-purpose types. Single copy, 35c net.

6 TT-100 TRANSMITTING AND SPECIAL-PURPOSE TUBES BULLETIN . . . Illustrated catalog information on RCA air- and water-cooled transmitting tubes, rectifiers, television tubes, cathode ray tubes, phototubes, acorn and ridget tubes, gas tubes, voltage regulators, and special amplifier tubes. Phototube chart gives spectral sensitivity curves and dimensional outlines. Charts of modulator and class C amplifier operating data. 16 pages. Ask for TT-100. Single copy, no charge.

7 1275-3 RECEIVING AND SPECIAL-PURPOSE TUBES BULLETIN . . . Characteristics and socket connections of 329 receiving tube types and 38 special-purpose types. 16 pages. Single copy, no charge.

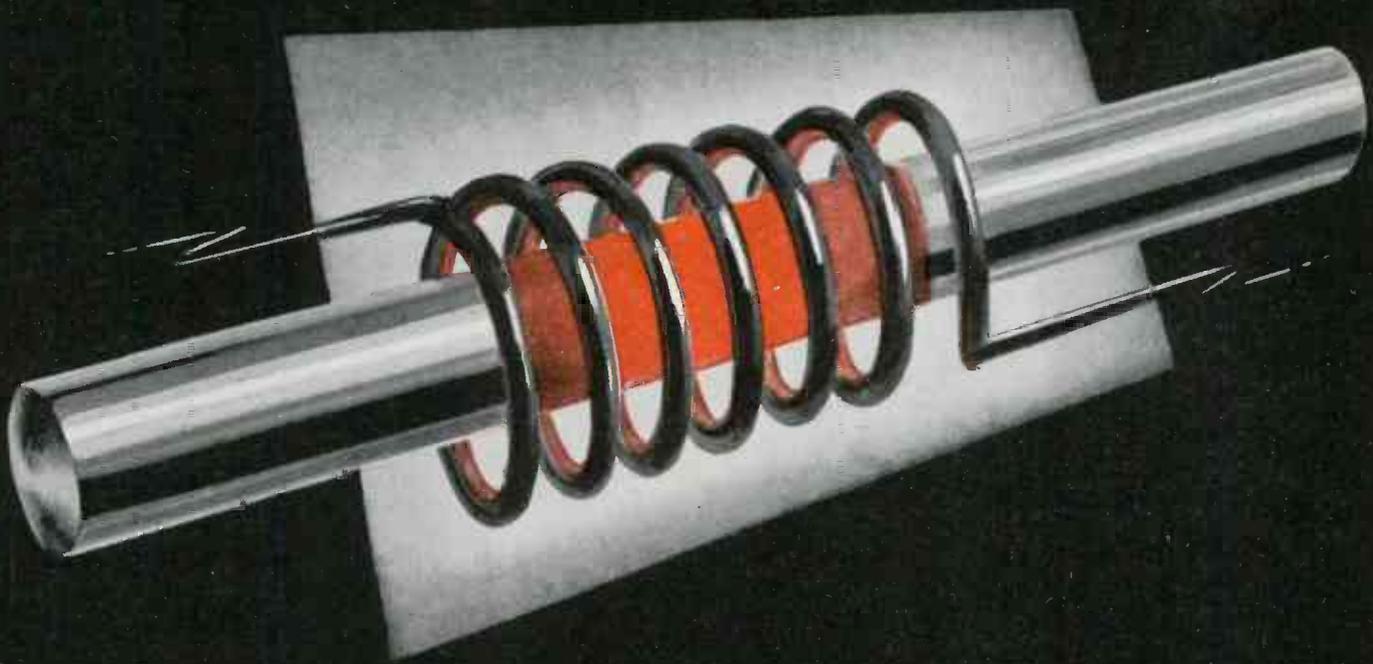
8 INSTRUCTION BOOKLETS. Complete, authorized information on RCA Transmitting and Special Tubes. Included in cartons with tubes, but available for any type upon request. Single copies, no charge.

All orders or requests for above literature should be addressed to: RCA Commercial Engineering Section, 416 South Fifth St., Harrison, N. J.



RCA RADIO TUBES

RCA Victor Division, RADIO CORPORATION OF AMERICA, Camden, N. J.



HARDENING A METAL'S SKIN!

While case hardening is one of the most useful processes in industry, it is in many cases very difficult to control.

At RCA, engineers and scientists employing high frequencies have developed new techniques for these difficult problems in case hardening. Odd shapes and thicknesses, for instance, can be case hardened to *controlled* depths. Selected portions or areas can also be handled.

The RCA radio frequency process not only simplifies the operation but saves considerable time and cost, and in some cases, is the only way to get the required results.

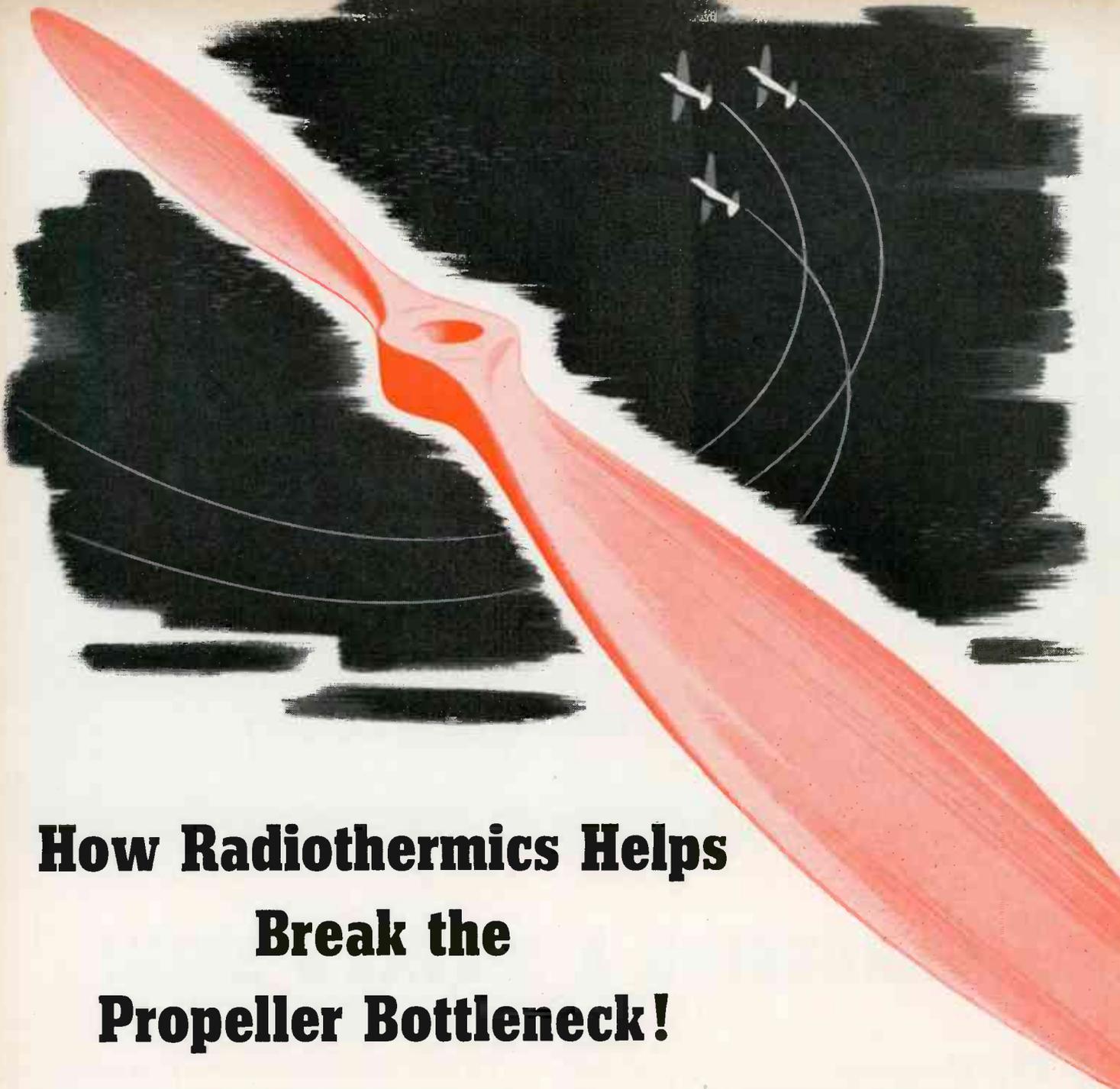
Radio frequency case hardening, as developed by RCA electronic research, can help you today in your war production program —and can be a vital part of your production process when peace returns.



RCA INDUSTRIAL PRODUCTS

SOUND • PICTURE • ELECTRONICS

RCA Victor Division • RADIO CORPORATION OF AMERICA • Camden, N. J.



How Radiothermics Helps Break the Propeller Bottleneck!

Since the development of synthetic resin glues, American industry has known that plastic-bonded plywood can supply the strength, the streamlining, and the water and fire-resistance that airplane use demands.

Only speed of production was lacking. The setting of the glue, requiring hours, tied up valuable equipment and restricted production.

Today, this process is a matter of minutes. Radio frequency heating removes this bottleneck of time, makes possible the production of plastic-bonded propellers and structural parts with

increased speed and greater precision.

With simplification in design, improvements in electronic tube construction, and other significant advances already foreseen by RCA scientists, radio frequency heating holds the promise of endless economical service for many types of industry.

The RCA radiothermic generator, a development of RCA electronic research, is a tool industry can use to help win the war today, and help build the advanced world of tomorrow.



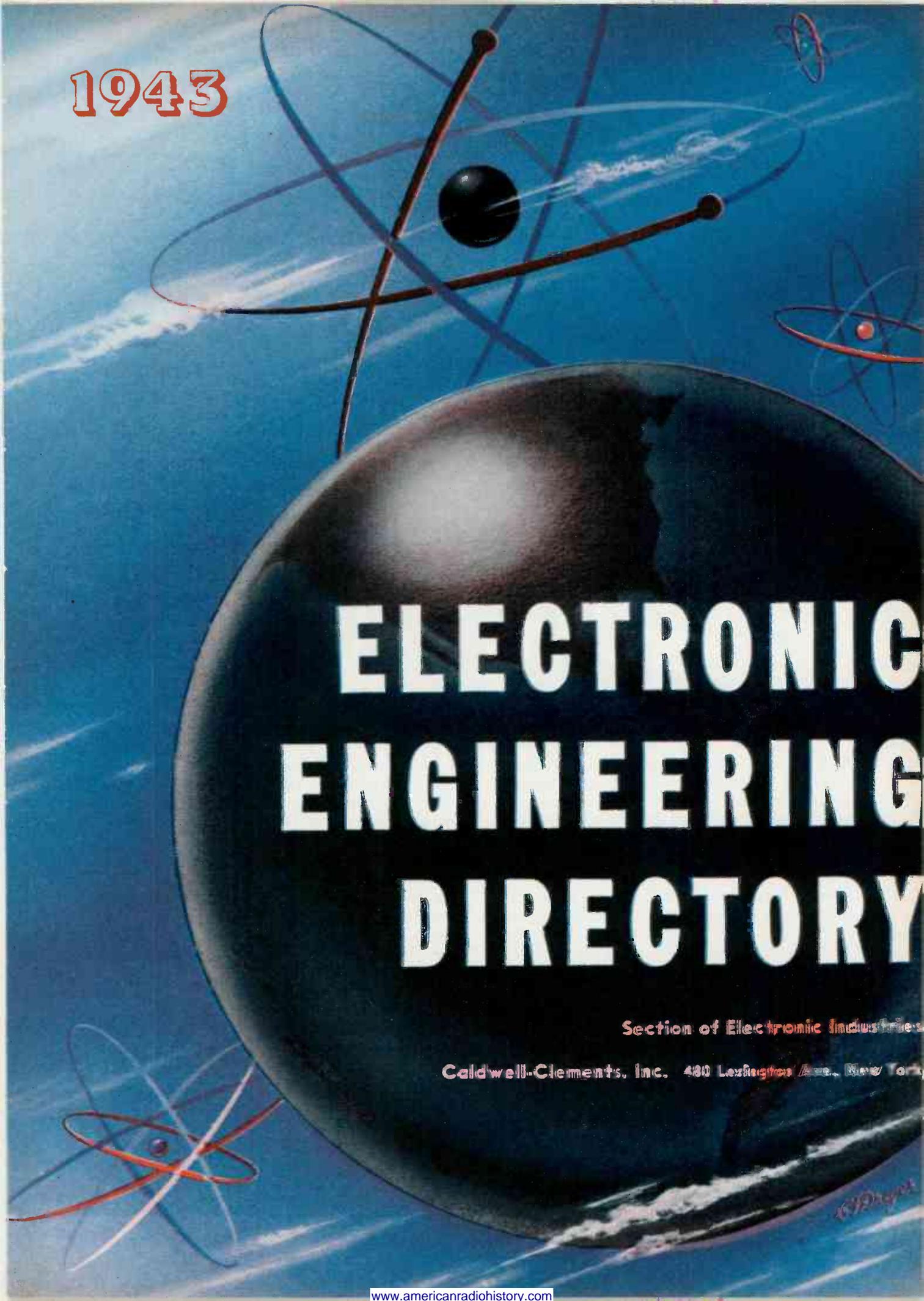
RCA INDUSTRIAL PRODUCTS

SOUND • PICTURE • ELECTRONICS

RCA Victor Division

RADIO CORPORATION OF AMERICA, Camden, N. J.

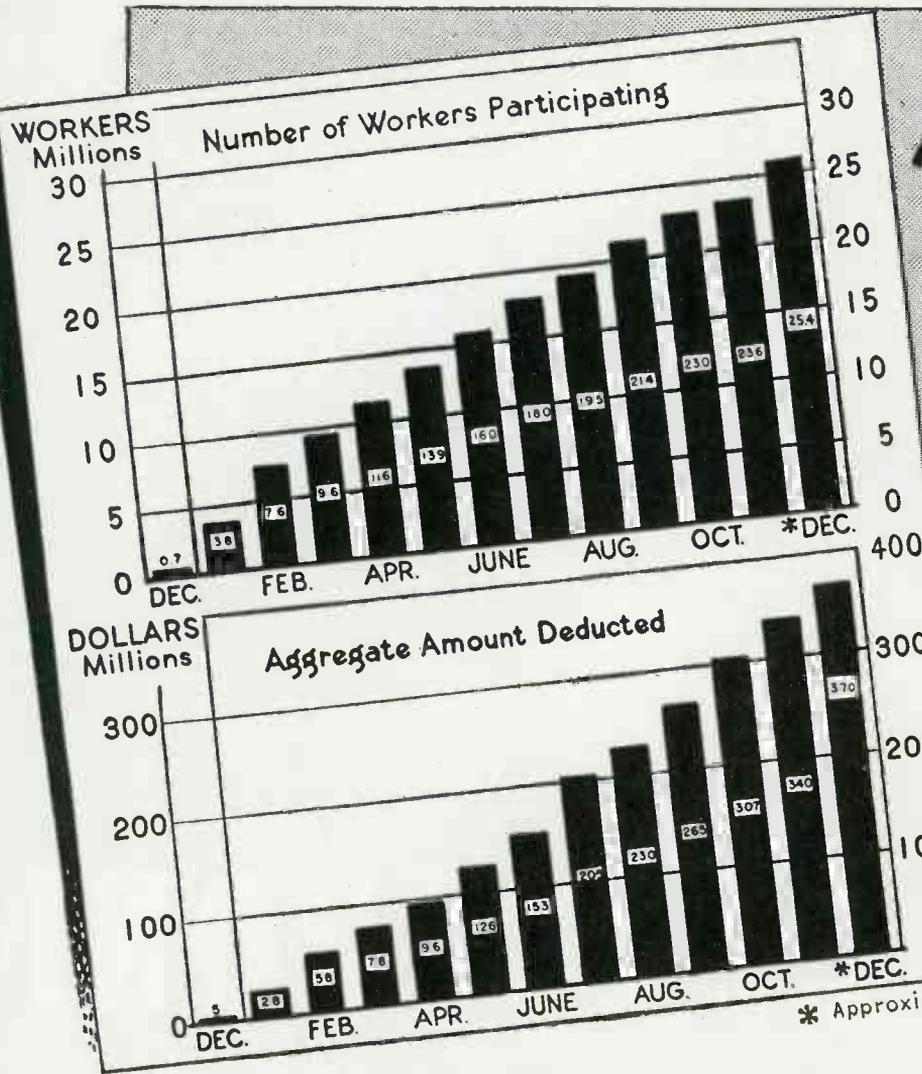
1943



ELECTRONIC ENGINEERING DIRECTORY

Section of Electronic Industries

Caldwell-Clements, Inc. 480 Lexington Ave., New York



Tomorrow's
 SALES CURVES
 ARE BEING
 PLOTTED ...
Today

THESE CHARTS SHOW ESTIMATED PARTICIPATION IN PAYROLL SAVINGS PLANS FOR WAR SAVINGS BONDS (Members of Armed Forces Included Starting August 1942)

STUDY THEM WITH AN EYE TO THE FUTURE!

There is more to these charts than meets the eye. Not seen, but clearly projected into the future, is the sales curve of tomorrow. Here is the thrilling story of over 25,000,000 American workers who are today voluntarily saving close to FOUR AND A HALF BILLION DOLLARS per year in War Bonds through the Payroll Savings Plan.

Think what this money will buy in the way of guns and tanks and planes for Victory today—and mountains of brand new consumer goods tomorrow. Remember, too, that War Bond money grows in value every year it is saved, until at maturity it returns \$4 for every \$3 invested!

Here indeed is a solid foundation for the peace-time business that will follow victory. At the same time, it is a real tribute to the voluntary American way of meeting emergencies that has seen us through every crisis in our history.

But there is still more to be done. As our armed forces continue to press the attack in all quarters of the globe, as war costs mount, so must the record of our savings keep pace.

Clearly, on charts like these, tomorrow's Victory—and tomorrow's sales curves—are being plotted today by 50,000,000 Americans who now hold WAR BONDS.



Save with
War Savings Bonds

This space is a contribution to America's all-out war effort by
ELECTRONIC INDUSTRIES

1943 ELECTRONIC ENGINEERING DIRECTORY SECTION

INDEX TO PRODUCTS, EQUIPMENT, INSTRUMENTS AND MATERIALS

Product	Page	Product	Page	Product	Page	Product	Page
A				I			
Acoustic Chambers	102	Coating Equipment	97	Electronic Equip.	90	I. F. Coils	86
Acoustic Materials	101	Coaxial Cable	107	Electronic Hygrometer	94	I. F. Crystals	87
Acrylics	98	Code Recorders	99	Electronic Switches	93	Ignition Wire	107
Adapters, Test	103	Coil Dopes	97	Electrostatic Voltmeter	94	Impedance Bridges	103
Air Cleaners	94	Coil Forms	86	Enamels	97	Impregnating Equipment	94
Air Trimmer-Capacitors	86	Coils & I. F. Transformers	86	Equalizers, Recording	99	Inductance Specialties	93
Airplane Antennas	83	Coil Shields	90	Equalizing Filters	93	Inductance Trimmer Units	83
Albums, Record	100	Coils & Windings	86	Equipment Panels	85	Induction Heating Equip.	90
Alignment Tools	104	Coil Winding Machines	94	Equipment Racks	85	Industrial Capacitors	85
All-Wave Antennas	83	Coin Record Players	100	Escutcheons	88	Industrial Resistors	100
Alternators	101	Color Analyzers	93	Extruded Shapes	98	Industrial Tubes	106
Aluminum	95	Colorimeters	93	F			
Aluminum Tubing	95	Combustion Control Equip.	89	Fabricators, Plastic	98	Insulated Cable	107
Amateur Transmitters	105	Commercial & Broadcast Trans.	105	Faces or Scales	88	Insulating Beads	91
Ammeters	94	Commercial Transmitters	105	Facsimile Transmitters	105	Insulating Compounds	97
Amplifiers and Accessories	101	Communication Equip.	87	Feeder Spreaders	83	Insulation	91
Anodes	106	Compressed Gas Capacitors	85, 86	Felt-Flock Turntables	100	Insulation Testers	94
Anoxia Photometers	90	Condenser Microphones	96	Fence Controllers	89	Insulators, Receiver & Transmitter	83
Antennas & Accessories	83	Condenser Paper	85	Fibre (Insulation)	91	Antennas	92
Antennas, Transmitting	107	Condenser Specialties	93	Fibre-Glass	91	Inter-Communicators	92
Antenna Tuners	105	Condenser Testers	103	Field Coils, Speaker	102	Interference Analyzers	96
Antenna Wire	107	Conductivity Controls	89	Field Exciters	102	Interference Locators	96
Anti-Sabotage Equipment	89	Cones, Speaker	102	Field Strength Meters	94	Inverters	107
Attenuation Meters	94	Connectors	90	Filament Wire	106	Iron (Svea Metal)	95
Attenuators (Precision)	100	Contact Cleaners	103	Film Recorders	99	J	
Audio Oscillators	103	Contact Mikes	96	Fixed Resistors	100	Jacks	90
Audio Transformers	105	Contact Points	90	Flashlight Cells	84	Jewel Pilot Lights	88
Audiometers	90	Control Heads	83	Flatwoven Cable	107	Jigs & Fixtures	94
Auto Antennas	83	Control Units (Complete)	83	Flex. Control Shafts	90	Jobbers, Electronic	107
Auto Radio Controls	83	Control Consoles	105	Flexible Shafts	83	K	
Auto Transformers	105	Converters	101	Fluorescent Ballast Capacitors	85	Keying Relays	102
Automatic Code Senders	99	Copper Tubing	95	Fluorescent Lamp Filters	96	Keys, Semi-Automatic	102
Automatic Record Changers	100	Cords (Attachment)	107	Fluorescent Lamp Starters	85	Key Switch	102
Automatic Tuning Units and Parts	83	Core Materials	95	Fluorescent Lamp Tubes	106	Keys, Telegraph	99
Aviation Transmitters	105	Counters, Electric	89	Fluorescent Reactors	105	Kits (Amplifier)	101
B				Counting Devices	89	Kits, Antenna	83
Baffles	102	Couplings	90	Fluorescent Starter	102	Knobs	88
Ballast Tubes	106	Crystals & Access.	87	Fluorescope Screens	90	Knob Pullers	104
Barium	95	Crystal Calibrators	103	Flux; Fluid, Paste	104	Knob Springs	88
Batteries	84	Crystal Cartridges	87	FM Antennas	83	L	
Battery Chargers	84	Crystals, Dial	88	Foils	95	Laboratory Equip.	93
Battery Eliminators	84	Crystals, Microphones	96	Fractional H. P. Motors	94	Lacquers	97
Battery Testers	103	Crystal Pick-ups	100	Frequency Control Equip.	105	Laminates	95
Bearings	95	Crystal Speakers	102	Frequency Measuring Devices	94	Lead, Tin Alloys	95
Beich Lathes	94	Crystal Tester	105	Frequency Measurements	105	Lenses	93
Bias Cells	84	Current Trans.	105	Frequency Meters	103	Light Intensity Meas. Instrs.	94
Binding Posts	90	Cut-off Blades	87	Frequency Records	100	Light Supplies (for Photo-Cells)	97
Blackout Control Equipment	89	Cutting Heads	99	Frequency Response Recorders	93	Lighting Controls	89
Blanks, Crystal	87	D				Lighting Equipment	89
Blanks, Recording	99	D. C. Generators	101	Lightning Arresters	83	Litzendracht Wire	107
Boiler Level Alarms	89	Decade Boxes (Capacity & Resistance)	93	Load Analyzer	94	Loop Antennas	83
Books, Engineering	99	Decalcomanias	88	M			
Brass	95	Demagnetizers	104	Machine Safety Control Equip.	89	Machinery & Equip.	94
Bridges	93	Dial Cables & Belts	88	Magnet Wire	107	Magnetic Speakers	102
Broadcast Transmitters	105	Dial Lamps	88	Magnetic Tape Recorders	99	Magnetic Wire Recorders	99
Buffers and Grinders	94	Dial Locks	88	Magnetic Tape Recorders	99	Magnetometer	94
Burglar Alarms	89	Dial Oil	103	Marine Transmitters	105	Marking & Numbering Machines	94
Burner Controls	89	Dials & Parts	88	Master Antennas	83	Measuring Instruments	94
Bushings	91	Diathermy Equip.	90	Measuring Instruments	83	Mechanical Automatic Selectors	94
C				Dies	94	Megohm Meters	106
Cabinet Molders	98	Die Castings	95	Discs (Blank)	99	Mercury Arc Rectifiers	102
Cabinets, Racks and Panels	85	Dimension Control Equip.	89	Dimension Control Equip.	107	Mercury Switches	95
Cable Clamps	90	Distributors, Electronic	107	Distortion Meters	94	Metal for Radio	85
Cable Connectors	90	Door Control Equip.	89	Drifting Room Equipment	89	Metal Cabinets	85
Cable Replacement Tools	83	Drafting Tables	89	Drawing Papers	89	Metal Detectors	90
Cable and Wire	107	Drills, Electric	89	Drill Press	94	Metal Forming Equip.	94
Cactus Needle Sharpener	100	Drive Rubbers	88	Dry Cells	84	Metal Locators	90
Call Letter Tabs	88	Dummy Antennas	93	Dynamic Microphones	96	Metal Tubing	95
Capacitors, Fixed	85	Dynamic Pick-ups	100	Dynamic Microphones	96	Metallic Rectifiers	84
Capacitors, Variable	86	Dynamotors	101	Dynamic Pick-ups	100	Mica Capacitors	85, 86
Carbon Microphones	96	E				Mica (Insulation)	91
Carbon	95	Electric Erasers	89	Mica Trimmer Capacitors	86	Micrometers	94
Carbott	101	Electric Etchers	104	Micrometers	94	Microscopy	89
Carrying Cases (Sound)	98	Electric Fence	89	Microphones & Access.	96	Microvoltmeters	89
Cast Resin	93	Electric Wave Filters	93	Microscopes	94	Mike Cable Wire	107
Cathode Ray Oscilloscopes	98	Electro-Cardiograph Equip.	90	Mike Cable Transformers	105	Miniature Tubes	106
Cathode-Ray Tubes	106	Electro-Dynamic Speakers	102	Mobile Amplifiers	101	Mobile Amplifiers	101
Cellulose Acetate	98	Electro-Encephalographs	90	H			
Cellulose Nitrate	98	Electrolytic Capacitors	85	Hacksaw Blades	104	Hand-Cranked Battery Chargers	84
Cements	97	Electroplaters	104	Hand Drills	104	Hardware & Misc. Parts	90
Ceramic Parts (Insulation)	91	Electron Multiplier	106	Harnesses (Wire)	107	Hearing Aid Batteries	84
Ceramic Trimmer Capacitors	86	Electronic Balances	93	Headphones	91	Headphones	91
Chassis	95	Electronic Control Equip.	89	Heat Treating Controls	89	H-F Antennas	83
Chassis Holders	104	Electronic Distributors	107	H-F Antennas	83	High Frequency Speakers	102
Chokes, L. F.	105	F				Holders, Crystal	87
Chokes, R. F.	86	Electric Erasers	89	Hole Cutters	104	Home Broadcasting Mikes	96
Chronograph	94	Electric Etchers	104	Home Broadcasting Mikes	96	Hook-up Wire	107
Circuit Breakers	102	Electric Fence	89	Hour Counters	93	Humidity Controls	89
Clips, Spring	90	Electric Wave Filters	93	Humidity Controls	89	I	

ELECTRONIC ENGINEERING DIRECTORY SECTION

Complete listings of all products and items entering into radio, radar, and electronic equipment

Antennas & Accessories



Airplane antenna	AA
All-wave (home)	AW
Auto	A
Feeder spreaders	FS
Frequency modulation	FM
Ground clamps	G
Grounding springs	GS
HF assemblies	HF
Insulators	I
Kits	K
Lightning arresters	L
Loop antennas	LA
Master systems	MS
Noise-reducing broadcast	N
Outlets	O
Rotary beam	RB
Television	TL
Towers & Supports (home)	T

ABC Radio Laboratories, 3334 N. New Jersey St., Indianapolis, Indiana—AW
 Acme Welding Co., Louisville, Ohio—AW, FM, LA, T
 Aircraft Accessories Corp., Fairfax & Funsten Rd., Kansas City, Kans.—AA
 Airplane & Marine Instruments, Inc., Box 92, Clearfield, Pa.—FM, LA
 The Akron Porcelain Co., Cory Ave., Akron, Ohio—I
 American Lava Corp., Cherokee Blvd., & Manufacturers Rd., Chattanooga, Tenn.—K
 American Radio Hardware Co., Inc., 478 Broadway, New York, N. Y.—G, O
 Amplex Engineering, Inc., 1620 Grand Ave., New Castle, Ind.—RB
 Amy, Aceves & King, Inc., 13 W. 42nd St., New York, N. Y.—MS
 Atlantic India Rubber Works, Inc., 1453 W. Van Buren St., Chicago, Ill.—I
 Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—I
 Belden Mfg. Co., 4047 W. Van Buren St., Chicago, Ill.—AW, FM, K, L
 Blaw-Knox Company, Blawnox, Pa.—FM, TL
 L. S. Brach Mfg. Co., 55 Dickerson St., Newark, N. J.—AW, A, G, I, K, L, MS, N, TL
 Clampipe—Mueller Electric Co.
 Consolidated Wire & Assoc. Corps., 1635 S. Clinton, Chicago, Ill.—A, AW, G, K, L, MS
 Cook Ceramic Mfg. Co., 503 Prospect St., Trenton, N. J.—I
 Cook Electric Co., 2700 Southport Ave., Chicago, Ill.—L
 Corning Glass Works, Corning, N. Y. "Pyrex"—I
 Cornish Wire Co., Inc., 15 Park Row, New York, N. Y., "Corvico", "Noise-Master"—AW, G, I, K, L, MS
 Corwico—Cornish Wire Co., Inc.
 Dossert and Co., 242-244 W. 41st St., New York, N. Y.—G
 DX Crystal Co., 1841 W. Carroll Ave., Chicago, Ill.—RB
 Fisher Research Laboratory, 1961 University Ave., Palo Alto, Calif.—A, LA
 M. M. Fleron & Sons, Inc., 113 N. Broad St., Trenton, N. J., "Fleron"—AW, G, I, K, L, N, O, TL, T
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—AW, A, FM, G, I, K, L, MS, N, TL, T
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—GS
 General Ceramics and Steatite Corp., Keasbey, N. J.—I
 General Winding Co., 420 W. 45th St., New York, N. Y., "Gen-Win"—AW, K, MS, N
 Gen-Win—General Winding Co.
 Imperial Porcelain Works, Inc., New York Ave. & Mulberry St., Trenton, N. J.—I
 Insuline Corp. of America, 3602-35th Ave., Long Island City, N. Y., "ICA"—A, LA, TL
 Isolantite Inc., 343 Cordlandt St., Belleville, N. J.—I, HF
 J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn, N. Y., "JFD"—A, FM, TL
 E. F. Johnson Co., Waseca, Minn.—FM, I
 Kaar Engineering Co., Palo Alto, Calif.—A
 Lapp Insulator Co., Inc., Le Roy, N. Y.—I, O
 Lear Avia, Inc., Piqua, Ohio—LA
 Lehigh Structural Steel Co., 17 Battery Place, New York, N. Y.—T

Fred M. Link, 125 W. 17th St., New York, N. Y.—FM
 Littelfuse, Inc., 4732 Ravenswood Ave., Chicago, Ill.—L
 Locke Insulator Corporation, S. Charles & Cromwell Sts., Baltimore, Md.—I, K
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—I, F, S
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—I
 Mueller Electric Co., 1583 E. 31st St., Cleveland, Ohio, "Universal", "Clampipe"—G
 The Mutter Co., 1255 S. Michigan Ave., Chicago, Ill.—LA
 Mycalex Corporation of America, 60 Clifton Blvd., Clifton, N. J.—I
 National Porcelain Co., 400 Southard St., Trenton, N. J.—I
 Noise-Master—Cornish Wire Co., Inc.
 Penn-Union Electric Corp., 315 State St., Erie, Pa.—G
 Philson Mfg. Co., Inc., 156 Chambers St., New York, N. Y.—A, TL, FM
 Porcelain Products, Inc., 124 W. Front St., Findlay, Ohio—I
 Premax Products Div., Chisholm-Ryder Co., Inc., Niagara Falls, N. Y., "Premax"—AW, I, T
 Radex Corp., 1322 Elston Ave., Chicago, Ill.—FM, LA
 The Radiart Corp., 3571 W. 62nd St., Cleveland, Ohio—AW, A
 Radio Frequency Labs, Inc., Boonton, N. J.—LA
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—MS
 The T. R. Routh Co., 1045 Bryant St., San Francisco, Calif.—I
 Small Motors, Inc., 1322 Elston Ave., Chicago, Ill.—K, LA
 Snyder Mfg. Co., 813 Noble St., Philadelphia, Pa.—A, G, T
 Super Electric Products Corp., 1057 Summit Ave., Jersey City, N. J.—LA
 Superior Porcelain Co., Parkersburg, W. Va.—I
 Technical Appliance Corp., 516 W. 34th St., New York, N. Y., "Taco"—AW, FM, I, L, MS, N, TL
 The R. Thomas & Sons Co., Lisbon, Ohio—I
 The Ucmite Co., 459 Watertown St., Newtonville, Mass.—TL
 Utilities Service Co., Allentown, Pa.—G, K, LA
 Victor Insulators, Inc., Maple Ave., Victor, N. Y.—I
 Ward Products Corp., 1523 E. 45th St., Cleveland, Ohio, "Ward"—AW, A, FM, G, L, LA, TL
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—I, O
 Whisk Laboratories, 145 W. 45th St., New York, N. Y.—N
 Wincharger Corp., Sioux City, Iowa—T

Crowe Name Plate & Mfg. Co., 3703 Ravenswood Ave., Chicago, Ill.—"Crowe"—CU, CH, F, FS
 Dual Remote Control Co., 31776 W. Warren St., Wayne, Mich., "Ducon"—CU, CH, F, FS
 Ducon—Dual Remote Control Co.
 Galvin Mfg. Corp., 4545 Augusta Blvd., Chicago, Ill., "Motorola"—CU, CH, F, FS
 J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn, N. Y., "JFD"—T, F, FS
 Lear Avia, Inc., Piqua, Ohio—CH, FS
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—FS
 Motorola—Galvin Mfg. Corp.
 Philco Radio & Television Corp., Tioga & C Sts., Philadelphia, Pa.—CU, CH, F, FS
 Reynolds Spring Co., Molded Plastics Division, Cambridge, Mass.—CH
 F. W. Stewart Mfg. Corp., 4311 Ravenswood Ave., Chicago, Ill., "Stewart"—CU, CH, FS
 Troy Radio & Television Co., 1144 S. Olive St., Los Angeles, Calif.—CU, CH
 Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.—FS

Automatic Tuning Units & Parts



Face plates	see ESCUTCHEONS
Geared tuning units	GC
Inductance trimmer units	IT
Mechanical automatic selectors	MS
Push button knobs	K
Push button motor operated units (complete)	PM
Push button trimmer units (complete)	PT
Remote controls	R
Station name cards	SC
Switches	S
Trimmer condenser units	CU
Tuning motors	M

Aladdin Radio Industries, Inc., 225 W. Jackson Blvd., Chicago, Ill.—IT
 Alden Products Co., 119 N. Main St., Brockton, Mass.—GC
 Alliance Manufacturing Co., Lake Park Blvd., Alliance, Ohio—M
 American Automatic Electric Sales Co., 1019 W. Van Buren, Chicago, Ill.—R
 American Insulator Corp., New Freedom, Pa.—K
 American Steel Package Co., Squire Ave., Defiance, Ohio, "Defiance"—MS
 Automatic Winding Co., 900 Passaic Ave., E. Newark, N. J.—IT, PT, CU
 Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—GC, IT, S, CU
 Centralab, 900 E. Keefe Ave., Milwaukee, Wisc., "Centralab"—S
 Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—MS, PM
 Consolidated Wire & Assoc. Corps., 1635 S. Clinton, Chicago, Ill.—MS
 Control Corp., 600 Stinson Blvd., Minneapolis, Minn.—B
 Coto-Coil Co., 71 Willard Ave., Providence, R. I.—MS, R, S
 Crowe Name Plate & Mfg. Co., 3703 Ravenswood Ave., Chicago, Ill., "Crowe"—MS, K, SC
 Harry Davies Molding Co., 1428 N. Wells St., Chicago, Ill.—K
 Defiance—American Steel Package Co.

Auto Radio Controls



Cable replacement tools	T
Control units (complete)	CU
Control heads	CH
Fittings	F
Flexible shafts	FS

Breeze Corporations, 26 S. 6th St., Newark, N. J.—FS
 Chicago Metal Hose Corp., 1315 S. 3rd Ave., Maywood, Ill.—F
 Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—CU

ALPHABETICAL "FINDING LIST"—

See Page 108

A new feature of this Engineering Directory is the alphabetical list of names of all concerns producing electronic equipment which appears following the product listings. If you know the name of a company and want to learn its principal products, address, etc., use Alphabetical "Finding List" at end of this Product Directory Section

H. C. Evans & Co., 1528 W. Adams St., Chicago, Ill.—S
 The Forest Electronic Co., 320 E. 65th St., New York, N. Y.—R
 Galvin Mfg. Corp., 4545 Augusta Blvd., Chicago, Ill., "Motorola"—K, R
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—S
 The General Industries Co., Taylor & Olive Sts., Elyria, Ohio—K
 General Instrument Corp., 829 Newark Ave., Elizabeth, N. J.—MS, PM
 General Winding Co., 420 W. 45th St., New York, N. Y., "Gen-Win"—IT, PM, PT, CU, M
 Gen-Win—General Winding Co.
 Carl Gorr Printing Co., Inc., 1801 Byron St., Chicago, Ill.—SC
 Guardian Electric Mfg. Co., 1622 W. Walnut St., Chicago, Ill.—R
 E. I. Guthman & Co., Inc., 15 S. Throop St., Chicago, Ill., "Guthman"—IT, PT, CU
 Hart Manufacturing Co., 110 Bartholomew Ave., Hartford, Conn.—R
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—GC, IT, MS, PM, PT, R
 Lear Avia, Inc., Piqua, Ohio—MS, PM, R, M
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind., "Yaxley", "Mallory"—S, CU
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—CU
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—K
 Motorola—Galvin Mfg. Corp.
 The Muter Co., 1255 S. Michigan Ave., Chicago, Ill., "Muter"—MS, PT, S
 Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill., "Oak"—GC, MS, PM, S
 Oxford-Tartak Radio Corp., 3911 South Michigan Ave., Chicago, Ill.—R
 Parisian Novelty Co., 3510 S. Western Ave., Chicago, Ill.—SC
 Philco Radio & Television Corp., Tlaga & C Sts., Philadelphia, Pa.—GC, IT, K, PM, PT, R, SC, S, CU, M
 Premier Metal Etching Co., 21-03—44th Ave., Long Island City, N. Y.—SC
 Radio Receptor Co., Inc., 251 W. 19th St., New York, N. Y.—R
 Reynolds Spring Co., Molded Plastics Division, Cambridge, Mass.—K
 The Richardson Co., Melrose Park, Ill.—"Insurok"—K
 F. A. Smith Mfg. Co., Inc., P. O. Box 509, Rochester, N. Y.—M
 Sprague Products Co., North Adams, Massachusetts—CU, PT
 Sprague Specialties Co., North Adams, Mass.—PT, CU
 Stackpole Carbon Co., St. Marys, Pa., "Stackpole"—S
 S-W Inductor Co., 1056 N. Wood St., Chicago, Ill.—IT
 Teleradio Engineering Corp., 484 Broome St., New York, N. Y., "Teleradio"—IT, PT, CU
 Trans-American Airports Corp., 271 Madison Ave., New York, N. Y.—S
 Utah Radio Products Co., 850 Orleans St., Chicago, Ill., "Utah"—M
 Yaxley—P. R. Mallory & Co.

American Transformer Co., 178 Emmet St., Newark, N. J.—VC
 ATR—American Television & Radio Co.
 The Automatic Electrical Devices Co., 324 E. Third St., Cincinnati, Ohio—MC, PH, PS
 Battery Boosters—The Benwood Linze Co.
 The Benwood Linze Co., 1815 Locust St., St. Louis, Mo., "B-L", "Battery Boosters"—MC, PH, PS
 B-L—The Benwood Linze Co.
 Briggs & Stratton Corp., 2711 N. 13th St., Milwaukee, Wis., "Briggs & Stratton"—G
 The Brown-Brockmeyer Co., 1000 S. Smithville Rd., Dayton, Ohio—MG
 Carter Motor Company, 1609 Milwaukee Ave., Chicago, Ill.—HC
 Climax Engineering Co., Clinton, Iowa—G
 Control Corp., 600 Stinson Blvd., Minneapolis, Minn.—MC
 Ecor, Inc., 1501 Congress St., Chicago, Ill., "Utilite"—G, MG
 Electrical Facilities, Inc., 4224 Holden St., Oakland, Calif.—MC
 Electrical Products Co., 6535 Russell St., Detroit, Mich.—G, PH, W
 Electrico Transformer Co., 417 Canal St., New York, N. Y.—G, VC
 Electron Equipment Corp., Palm Springs, Calif.—MC, PH, PS
 Electronic Products Co., 19 N. First St., Geneva, Ill.—MC, PH, PS, VC
 Fansteel Metalurgical Corp., North Chicago, Ill.—MC
 Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark, N. J.—MC
 General Electric Company, 1 River Road, Schenectady, N. Y.—MC, MG, PH, PS, VC
 Gould Storage Battery Corp., 35 Neoga St., Depew, N. Y.—MC
 Hy Ef—Electrical Products Mfg. Co., 1515 W. Pico Blvd., Los Angeles, Calif., "Hy Ef"—MC, VC
 Janette Mfg. Co., 536 W. Monroe, Chicago, Ill.—MG
 Kato Engineering Co., 530 N. Front St., Mansato, Minn., "Kato"—G
 Laurehk Radio Mfg. Co., 3918 Monroe Ave., Wayne, Mich., "Laurehk"—VC
 Lear Avia, Inc., Piqua, Ohio—W
 Leland Electric Co., 1501 Webster St., Dayton, Ohio—MG
 Linick, Green & Reed, Inc., 29 East Madison St., Chicago, Ill.—MC
 Fred M. Link, 125 W. 17th St., New York, N. Y.—MC
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind., "Mallory"—MC, PH, PS
 Merwin-Wilson Co., New Milford, Conn.—MC, VC
 The North Electric Mfg. Co., P. O. Box 267, Galion, Ohio—MC
 D. W. Onan & Sons, 43 Royalston Ave., Minneapolis, Minn.—G
 Pincor—Pioneer Gen-E-Motor Corp.
 Pioneer Gen-E-Motor Corp., 6841 W. Dickens St., Chicago, Ill., "Pincor"—G, MG
 Raytheon Mfg. Co., Electrical Equip. Division, Waltham, Mass., "Recticharger"—MC
 The Ready Power Company, 3826 Grand Ave., Detroit, Mich.—G
 Recticharger—Raytheon Mfg. Co.
 Small Motors, Inc., 1322 Elston Ave., Chicago, Ill.—MG
 Stancor—Standard Transformer Corp.
 Standard Transformer Corp., 1500 N. Halsted St., Chicago, Ill., "Stancor"—PS
 Taylor Tubes, Inc., 2318 Wabansia Ave., Chicago, Ill.—VC
 Technical Apparatus Co., Inc., 1171 Tremont St., Boston, Mass.—MC
 United Transformer Co., 150 Varick St., New York, N. Y.—MC, PH, VC
 Utilite—Ecor, Inc.
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—MC, MG
 Willard Storage Battery Co., 246 E. 131st St., Cleveland, Ohio, "Willard"—MC, PS, VC
 Wincharger Corp., Sioux City, Iowa—G, W
 Wind-impeller Electric Works, Ellsworth, Iowa—W

Bright Star Battery Co., 202 Crooks Ave., Clifton, N. J., "Bright Star", "Unneed-it", "Eclipse"—A, B, C, BC, DC, FL, PB
 Bryant Mfg. Co., 401 North Pauline St., Chicago, Ill.—W
 Burgess Battery Co., Freeport, Ill., "Power-House", "Multi-Ply", "Uni-Cel"—A, B, C, DC, FL, PR, HB
 Centralab, 900 E. Keefe Ave., Milwaukee, Wis.—S
 Eclipse—Bright Star Battery Co.
 Edison Storage Battery Div., Thomas A. Edison, West Orange, N. J.—DC, S
 Electric Storage Battery Co., Allegheny Ave. & 19th St., Philadelphia, Pa., "Exide"—S
 Eveready—National Carbon Co.
 Exide—Electric Storage Battery Co.
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—A, B, C, DC, PB, S, SN
 General Dry Batteries, Inc., 13000 Athens Ave., Cleveland, Ohio—A, B, C, HB, DC, FL, PB
 General Lead Batteries Co., 125 Chapel St., Newark, N. J.—S
 Gould Storage Battery Corp., 35 Neoga St., Depew, N. Y.—S, SN
 Ideal Commutator Dresser Co., 5079 Park Ave., Sycamore, Ill.—SN
 Laurehk Radio Mfg. Co., 3918 Monroe Ave., Wayne, Mich.—HB
 Layer-Bilt—National Carbon Co., Inc.
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind.—BC
 Marathon Battery Company, 840 Henrietta St., Wausau, Wis.—A, B, C, BC, HB, DC, FL, PB
 Mini-Max—National Carbon Co., Inc.
 Monark Battery Co., Inc., 1240 N. Homan Ave., Chicago, Ill., "Monark"—W
 Multi-Ply—Burgess Battery Co.
 National Battery Co., 1728 Roblyn Ave., St. Paul, Minn.—S
 National Carbon Co., Inc., 30 E. 42nd St., New York, N. Y., "Air Cell", "Eveready", "Layer-Bilt", "Mini-Max"—A, B, C, HB, DC, FL, PB
 Power-House—Burgess Battery Co.
 Prest-o-lite Battery Co., 4500 W. 16th St., Indianapolis, Ind.—S
 Ray-O-Vac Co., 2317 Winnebago, Madison, Wis., "Ray-O-Vac"—A, B, C, HB, DC, FL
 Reading Batteries, Inc., Reading, Pa.—S, SN
 Solar Corp., 944 W. Bruce St., Milwaukee, Wis.—S
 Sonotone Corp., Elmsford, N. Y.—HB
 Southern Battery Co., Appomattox, Va.—FL
 Unneed-it—Bright Star Battery Co.
 Uni-sel—Burgess Battery Co.
 United States Electric Mfg. Corp., 222 W. 14th St., New York, N. Y., "Usalite"—A, B, C, DC, FL, PB
 Universal Battery Co., 3410 S. LaSalle St., Chicago, Ill., "Universal"—S, SN
 U S L Battery Corp., Niagara Falls, N. Y., "U-S-L"—S
 Usalite—United States Electric Mfg. Co.
 Willard Storage Battery Co., 246 E. 131st St., Cleveland, Ohio, "Willard"—A, B, C, BC, DC, FL, PB, S, SN
 Wincharger Corp., Sioux City, Iowa—S
 Winchester Repeating Arms Co., New Haven, Conn.—DC

Battery Chargers



- Gas engineG
- Hand crankedHC
- Metallic rectifiersMC
- Motor generatorMG
- Power line (home)PH
- Power line (service station)PS
- Vacuum tubeVC
- VibratorsV
- Wind drivenW

Acme Electric & Mfg. Co., 54 Water St., Cuba, N. Y.—PS
 Allen Elec. & Equip. Co., 2103 N. Pitcher St., Kalamazoo, Mich.—MC, VC
 American Automatic Electric Sales Co., 1019 W. Van Buren St., Chicago, Ill.—VC
 American Battery Co., 17 S. Jefferson St., Chicago, Ill.—MC, VC
 American Communications Corp., 306 Broadway, New York, N. Y.—VC
 American Television & Radio Co., 300 E. 4th St., St. Paul, Minn., "ATR"—PH, MC

OMISSIONS

Listings have been omitted in all cases where, after three requests, a company has failed to return our directory questionnaire or otherwise verify its activity.

Batteries, Dry & Wet



- "A" blocksA
- "B"B
- "C"C
- Bias cellsBC
- Hearing aidHB
- Dry cellsDC
- Flashlight cellsFL
- Portable A & BPB
- StorageS
- Storage, non-spillSN
- Wet batteriesW

Acme Battery Co., 61 Pearl St., Brooklyn, N. Y., "Advance"—DC
 Advance—Acme Battery Co.
 Air Cell—National Carbon Co., Inc.
 Bond Electric Corp., 148 Munson St., New Haven, Conn., "Bond"—A, B, C, DC, FL, PB

Battery Eliminators & Power Supply



- Battery eliminatorsBE
- Hand crankedHC
- Metallic rectifiersMC
- Mercury arcMA
- Power units completePU
- Voltage regulatorsVR

Acme Electric & Mfg. Co., 54 Water St., Cuba, N. Y.—PU
 Aircraft Accessories Corp., Fairfax & Funsten Rd., Kansas City, Kans.—PU
 Airplane & Marine Instruments, Inc., Box 92, Clearfield, Pa.—PU
 Allen Elec. & Equip. Co., 2103 North Pitcher St., Kalamazoo, Mich.—BE, M, PU
 Altec Lansing Corp., 6902 McKinley Ave., Los Angeles, Calif.—PU
 American Automatic Electric Sales Co., 1019 W. Van Buren, Chicago, Ill.—BE
 American Communications Corp., 306 Broadway, New York, N. Y.—PU
 American Transformer Co., 178 Emmet St., Newark, N. J.—BE, M, MA, PU
 Amplifier Co. of America, 17 W. 20th St., New York, N. Y., "ACA"—PU
 The Automatic Electrical Devices Co., 324 E. Third St., Cincinnati, Ohio—M, PU
 Auto Radio Filterpac—The Benwood Linze Co.
 The Benwood Linze Co., 1815 Locust St., St. Louis, Mo., "B-L", "Auto Radio Filterpac"—BE, M
 B-L—The Benwood Linze Co.
 Carter Motor Co., 1609 Milwaukee Ave., Chicago, Ill.—HC

Conn. Telephone & Elec. Div., Great American Industries, Inc., Meriden, Conn.—PU
 Continental Electric Co., 715 Hamilton St., Geneva, Ill., "Cetron"—B, G, MA, V
 Control Corp., 600 Stinson Blvd., Minneapolis, Minn.—M
 Electrical Facilities, Inc., 4224 Holden St., Oakland Calif.—M
 Electricoil Transformer Co., 417-421 Canal St., New York, N. Y.—BE, PU
 Electron Equipment Corp., Palm Springs, Calif.—BE, M, MA, PU
 Electronic Corp. of America, 45 W. 18th St., New York, N. Y.—PU
 Electronic Laboratories, Inc., 122 W. New York St., Indianapolis, Ind.—BE, PU
 Electronic Products Co., 19 North 1st St., Geneva, Ill.—MA, PU
 Electronic Transformer Co., 515 W. 29th St., New York, N. Y.—PU
 Electro Products Laboratories, 549 W. Randolph St., Chicago, Ill.—BE, PU
 Fansteel Metallurgical Corp., North Chicago, Ill.—M, PU
 Ferranti Electric, Inc., 30 Rockefeller Plaza, New York, N. Y.—PU
 Ferris Instrument Corp., 110 Cornelia St., Boonton, N. J., "Ferris"—PU
 General Electric Company, 1 River Rd., Schenectady, N. Y.—M, MA, PU
 General Transformer Corp., 1250 W. Van Buren St., Chicago, Ill., "Porta-Power"—BE, PU
 Herbach & Rademan Co., 522 Market St., Philadelphia, Pa.—PU
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—BE, PU
 Lear Avia, Inc., Piqua, Ohio—PU
 Linick, Green & Reed, Inc., 29 E. Madison St., Chicago, Ill.—M
 Mallory Dry Disc—P. R. Mallory & Co., Inc.
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind., "Mallory Dry Disc"—M, PU
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—PU
 National Company, Inc., Malden, Mass.—PU
 The North Electric Mfg. Co., P. O. Box 267, Galion, Ohio—BE, M
 Nothelfer Winding Labs., 111 Albermarle Ave., Trenton, N. J.—MA, PU
 The Radiart Corp., 3571 W. 62nd St., Cleveland, Ohio—BE
 Radiotron—RCA Victor Div., Radio Corp. of America
 The Rauland Corporation, 4245 N. Knox Ave., Chicago, Ill.—PU
 Raytheon Mfg. Co., Electrical Equip. Division, Waltham, Mass., "Rectifier"—PU, BE
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J., "RCA", "Radiotron"—PU, VR
 The Ready Power Company, 3826 Grand River, Detroit, Mich.—PU
 Rectifier—Raytheon Mfg. Co.
 Schuttig & Company, 9th & Kearny Sts., Washington, D. C.—PU
 Selenium Corp. of America, 1800 W. Pico, Los Angeles, Calif.—M
 Silman Mfg. Corp., 305 Pennsylvania Ave., Pittsburgh, Pa.—PU
 Stancor—Standard Transformer Corp.
 Standard Transformer Corp., 1500 N. Halsted St., Chicago, Ill., "Stancor"—BE, M
 Taylor Tubes, Inc., 2818 Wabansia Ave., Chicago, Ill.—G, MA, V
 United Transformer Co., 150 Varick St., New York, N. Y.—BE, PU
 Webster-Chicago Corporation, 3825 Armitage Ave., Chicago, Ill.—VR
 Western Electric Co., 195 Broadway, New York, N. Y.—M
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—M, MA
 Weston Electrical Instrument Corp., 597 Frelinghuysen Ave., Newark, N. J.—M

Allen Elec. & Equip. Co., 2103 N. Pitcher St., Kalamazoo, Mich.—M
 Altec Lansing Corp., 6900 McKinley Ave., Los Angeles, Calif.—C
 American Communications Corp., 306 Broadway, New York, N. Y.—T
 Bell Sound Systems, Inc., 203 N. 4th St., Columbus, Ohio—CC, M, P
 A. Bitter Construction Co., 721 E. 133rd St., New York, N. Y.—RC
 Brunswick Radio Div., Mersman Bros. Corp., 244 Madison Ave., New York, N. Y.—RC
 Carb Mfg. Co., 25 Carroll St., Brooklyn, N. Y.—CB, CC
 Castlewood Mfg. Co., Inc., 12th & Burnett Sts., Louisville, Ky.—C, T, PC, RC
 Caswell-Rumyan Co., Huntington, Ind.—C, T, RC
 Chicago Sound Systems Co., 2124 S. Michigan Ave., Chicago, Ill.—RC
 Churchill Cabinet Co., 2119 W. Churchill St., Chicago, Ill.—C, T
 Cinema Engineering Co., 1508 W. Verdugo Ave., Burbank, Calif.—M, EP
 Columbia Metal Box Co., 260 E. 143rd St., New York, N. Y.—M
 C. G. Conn Ltd., Elkhart, Ind.—CB
 Crowe Name Plate & Mfg Co., 3701 Ravenswood Ave., Chicago, Ill.—EP
 Dahlstrom Metallic Door Co., Metal Specialties Division, Buffalo & E. 2nd, Jamestown, N. Y.—M, EP, ER
 DeJur Amco Corp., Bridge St., Shelton, Conn.—EP
 Erie Art Metal Co., Erie, Pa.—M
 Erie Can Co., 816 Erie St., Chicago, Ill.—M
 H. C. Evans & Co., 1528 W. Adams St., Chicago, Ill.—C, P
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—EP
 General Time Instruments Corp., Seth Thomas Clocks Division, Thomaston, Conn.—W
 ICA—Insuline Corp. of America
 Illinois Cabinet Co., Rockford, Ill.—CC, C, P, T
 Illinois Wood Products Corp., 2512 S. Damen Ave., Chicago, Ill.—C, PC, RC, T
 Ingraham Co., Bristol, Conn.—C, T
 Insuline Corp. of America, 3692—35th Ave., Long Island City, N. Y., "ICA"—M
 Kane Mfg. Corp., Kane, Pa.—M
 Karp Metal Products Co., Inc., 129—30th St., Brooklyn, N. Y.—M
 Le Februre Corp., Cedar Rapids, Iowa—M, RC
 Lewyt Metal Products Co., Inc., 60 Broadway, Brooklyn, N. Y.—M
 Littelfuse, Inc., 4732 Ravenswood Ave., Chicago, Ill.
 John Meck Industries, Liberty St., Plymouth, Ind.—CC, PC, P, RC
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—M
 Paramount Radio Co., 967—32nd St., Oakland, Calif. C, RC
 Par-Metal Products Corp., 32-62—49th St., Long Island City, N. Y., "Par-Met"—M
 Penn Union Electric Corp., 315 State St., Erie, Pa.—M
 Radiart Service, 720 Schubert Ave., Chicago, Ill.—EP, M, P, RC
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—M

The Recordit Co., 555 Bedford Ave., University City, Mo.—RC, ER
 A. E. Rittenhouse Co., Honeye Falls, N. Y.—M
 Sanders Bros. Mfg. Co., 409 W. Main St., Ottawa, Ill.—W
 Schluss Bros. Corp., 801 E. 135th St., New York, N. Y.—PC, RC, T
 Schuttig & Company, 9th & Kearny Sts., Washington, D. C.—M
 Sherron Metallic Corp., 1201 Flushing Ave., Brooklyn, N. Y.—M
 Steger Furniture Mfg. Co., Steger, Ill.—C, T
 Tonk Mfg. Co., 1912 N. Magnolia, Chicago, Ill.—RC
 Trans-American Airports Corp., 271 Madison Ave., New York, N. Y.—C, RC, T
 Trebor Radio Co., Pasadena, Calif.—CC, T
 Union Aircraft Products Corp., 330 Second Ave., New York, N. Y.—EP, M
 Wabash Cabinet Co., Wabash, Ind.—RC
 Wm. T. Wallace Mfg. Co., Chili & Madison Ave., Peru, Ind.—C, T
 Weltronic Corp., East Outer Drive, Detroit, Mich.—M
 Western Electric Co., 195 Broadway, New York, N. Y.—M
 Worcester Pressed Steel Co., Worcester, Mass.—EP, M

Capacitors, Fixed



Ceramic insulated	C
Electrolytic dry	ED
Electrolytic wet	EW
Fluorescent starter	FS
Fluorescent ballast	FB
Industrial	I
Mica receiving	M
Paper (receiving)	P
Plug-in condensers	PF
Polystyrene insulated	PO
Power factor correct	PC
Silvered mica	S
Standard	ST
Temperature compens.	TC
Transmitting	T
Compressed gas	G
Vacuum cond.	V

Aerovox Corp., 742 Belleville Ave., New Bedford, Mass.—ED, EW, FS, FB, I, M, P, PF, PO, PC, S, TC, T
 The Akron Porcelain Co., Cory Ave., Akron, Ohio—C
 American Automatic Electric Sales Co., 1019 W. Van Buren St., Chicago, Ill.—P
 American Condenser Corp., 2506 S. Michigan Ave., Chicago, Ill.—ED, P
 Atlas Condenser Products Co., 550 Westchester Ave., New York, N. Y. "Mite", "Mercury"—ED, P, FS, FB
 Atoms—Sprague Products Co.
 The Automatic Electrical Devices Co., 324 E. Third St., Cincinnati, Ohio—EW

Reference Data for Engineers

ULTRA-SHORT WAVE PROPAGATION

For propagation over a path within the range of optical visibility, the field strength is given approximately by

$$E = \frac{88 \sqrt{W} h_T h_R}{\lambda D^2} \text{ volts/metre}$$

- where W = watts radiated
- h_T = height of transmitting aerial in metres
- h_R = height of receiving aerial in metres
- λ = wavelength in metres
- D = distance in metres

Allowing for the refractive effect of the atmosphere, the "optical range" for aerial heights h_T and h_R is approximately

$$D_{opt.} = 4130 [\sqrt{h_T} + \sqrt{h_R}]$$

where all dimensions are in metres.

If the refractive effect of the atmosphere is ignored, the "optical range" is reduced to the "geometric" range given by

$$D_{geom.} = 3550 [\sqrt{h_T} + \sqrt{h_R}]$$

The above formula holds good for both vertical and horizontal polarization. It assumes that the aerials are half-wave dipoles, and both h_T and h_R are not less than a half-wavelength.

Cabinets, Racks & Panels



Carrying bags	CB
Cloth covered	CC
Console (wood)	C
Equipment panels	EP
Equipment racks	ER
Metal	M
Phonograph cabinet	PC
Plastic	sec Plastic Molders
Portable	P
Record cabinets	RC
Rawhide	R
Table (wood)	T
Wood	W

Acro Tool & Die Works, 5326 N. Kedzie Ave., Chicago, Ill.—C, M, PC, P, RC, T
 Adler Mfg. Co., 2903 W. Chestnut St., Louisville, Ky.—C, T, RC
 Airplane & Marine Instruments, Inc., Box 92, Clearfield, Pa.—M, P

Data chart on this and other Directory pages, compiled by engineers of the International Telephone & Telegraph Corp.

Automatic Winding Co., 900 Passaic Ave., East Newark, N. J.—C, M, T
The Allen D. Cardwell Mfg. Corp., 81 Prospect St., Brooklyn, N. Y.—C, PF, T
Centralab, 900 E. Keefe Ave., Milwaukee, Wis.—C, TC, T
Ceramicon—Erie Resistor Corp.
Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—I, M, S
Consolidated Wire & Assoc. Corps., 1635 S. Clinton, Chicago, Ill.—ED, P, T
Continental Carbon, Inc., 13900 Lorain Ave., Cleveland, Ohio—C
Cornell-Dubilier Elec. Corp., 1000 Hamilton Blvd., S. Plainfield, N. J.—C, ED, EW, FS, FB, I, M, P, PF, PO, PC, S, T, TC
Cosmic Radio Corp., 699 E. 135th St., New York, N. Y., "Cosmic," "Megrite"—ED, P
Henry L. Crowley & Co., Inc., 1 Central Ave., West Orange, N. J.—C
Tobe Deutschmann Corp., Canton, Mass.—ED, FR, I, P, PF, T
Domino—Solar Mfg Corp.
Dumont Electric Co., 34 Hubert St., New York, N. Y., "Dumont"—ED, EW, I, M, P, S, T
Ecco High Frequency Elec. Corp., 7020 Hudson Blvd., N. Bergen, N. J., "Ecco," "H-F"—T
Eimac—Eitel-McCullough, Inc.
Eitel-McCullough, Inc., San Bruno, Calif. "Eimac"—V
Electro Motive Mfg. Co., Inc., S. Park & John Sts., Willimantic, Conn.—M, S
Elmenco—Electro Motive Mfg. Co., Inc.
Erie Resistor Corp., 640 W. 12th St., Erie, Pa., "Ceramicon"—C, S, TC
J. E. Fast & Co., 3123 N. Pulaski Rd., Chicago, Ill.—FB, FS, I, P, PC, PO, T
General Electric Co., 1 River Rd., Schenectady, N. Y.—FB, I, P, PC, T
General Radio Co., 30 State St., Cambridge, Mass., "G-R"—ST
G-H—Girard-Hopkins
Girard-Hopkins, 1000 40th Ave., Oakland, Calif.—ED, FB, I, P, PC, T
G-R—General Radio Co.
H. R. S. Products, 5707 W. Lake St., Chicago, Ill.—ES, FB, I, P, PE, PO, PC, T
ICA—Insuline Corp. of America
Illinois Condenser Co., 1160 Howe St., Chicago, Ill., "Illinois"—ED, FS, FB, I, M, P, PC, T
Industrial Condenser Corp., 1725 W. North Ave., Chicago, Ill., "Industrial"—C, ED, FS, I, M, P, PF, PO, PC, T
Insuline Corp. of America, 3602 35th Ave., Long Island City, N. Y., "ICA"—M
E. F. Johnson Co., Waseca, Minn., "Johnson"—T, G
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.—P
Kodacap—Micamold Radio Corp.
Little Giant—Solar Mfg. Corp.
The Louthan Mfg. Co., 2000 Harvey Ave., E. Liverpool, Ohio—C
The Macallen Co., 16 Macallen St., Boston, Mass.—M
The Magnavox Co., 2131 Bueter Rd., Ft. Wayne, Ind.—ED
P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind., "Mallory"—ED, I, M, P, PF, PC, T
Megrite—Cosmic Radio Corp.
Mercury—Atlas Condenser Products Co.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y., "Kodacap"—ED, FS, FB, I, M, P, PF, PC, S, T
James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—C, S, T, PO
Minicap—Solar Mfg. Corp.
Mite—Atlas Condenser Products Co.
The Muter Co., 1255 S. Michigan Ave., Chicago, Ill., "Muter"—C, TC
New England Confectionary Co., 254 Mass. Ave., Cambridge, Mass.—I
Polymet Condenser Co., 699 E. 135th St., New York, N. Y.—I
The Potter Co., 1950 Sheridan Rd., N. Chicago, Ill.—ED, I, P, T
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—M, S, T, TC
Reynolds Spring Co., Molded Plastics Division, Cambridge, Mass.—PO
Sangamo Electric Co., Springfield, Ill., "Sangamo"—M, T
Sealdtite—Solar Mfg. Corp.
F. W. Suckles Co., Chicopee, Mass., "Silver Cap"—S
Silvercap—F. W. Suckles Co.
Solar Mfg. Corp., 586 Ave. A, Bayonne, N. J., "Solar," "Domino," "Sealdtite," "Tom Thumb," "Transoil," "Transmica," "Minicap," "Little Giant"—ED, EW, FS, FB, I, M, P, PF, PO, PC, S, TC
Sprague Products Co., N. Adams, Mass., "Sprague 600 Line," "Atoms"—ED, EW, I, M, P, PC, S, T, TC
Sprague Specialties Co., N. Adams, Mass.—ED, EW, I, M, P, T, TC, FS, FB, PF, PO, PC, S
Teleradio Engineering Corp., 484 Broome St., New York, N. Y., "Teleradio"—S, TC
Tom Thumb—Solar Mfg. Co.
Transmica—Solar Mfg. Co.
Transoil—Solar Mfg. Co.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—I, T

Capacitors, Variable



- Air trimmerA
Ceramic trimmerCT
Compressed gasCG
InstrumentI
Mica trimmerM
PrecisionP
Receiver tuningRT
Transmitting tuningTT
NeutralizingN

American Steel Package Co., Squire Ave., Defiance, Ohio. "Defiance"—A, RT
Automatic Winding Co., 900 Passaic Ave., E. Newark, N. J.—A, M
Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—TT, N
Bud Radio, Inc., 2118 E. 55th St., Cleveland, Ohio. "Bud"—A, RT, TT, N
The Allen D. Cardwell Mfg. Corp., 81 Prospect St., Brooklyn, N. Y.—N, TT
Centralab, 900 E. Keefe Ave., Milwaukee, Wisc.—CT
Ceramicon—Erie Resistor Corp.
Defiance—American Steel Package Co.
De Wald Radio Mfg. Corp., 440 Lafayette St., New York, N. Y.—A, N
DX Crystal Co., 1841 W. Carroll Ave., Chicago, Ill.—M
Electro Motive Mfg. Co., Inc., S. Park & John Sts., Willimantic, Conn., "Elmenco"—A, M
Elmenco—Electro Motive Mfg. Co., Inc.
Erie Resistor Corp., 640 W. 12th St., Erie, Pa. "Ceramicon"—CT
General Instrument Corp., 829 Newark Ave., Elizabeth, N. J. "G. I."—RT, TT, N
General Radio Co., 30 State St., Cambridge, Mass. "G-R"—P, I
General Winding Co., 420 W. 45th St., New York, N. Y. "Gen-Win"—A, M
Gen-Win—General Winding Co.
G. I.—General Instrument Corp.
G-R—General Radio Co.
Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York, N. Y.—A, M, RT, TT, N
Hy Ef Electrical Products Mfg. Co., 1515 W Pico Blvd., Los Angeles, Calif. "Hy-Ef"—RT
ICA—Insuline Corp. of America
Insuline Corp. of America, 3602—35th Ave., Long Island City, N. Y. "ICA"—M, RT, TT, N
E. F. Johnson Co., Waseca, Minn. "Johnson"—TT, N, CG
Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif.—A
Lapp Insulator Co., Inc., Le Roy, N. Y.—G
Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill., "Meissner"—A, M
James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—A, M, RT, TT, N
National Co., inc., Malden, Mass., "National"—A, RT, TT, N
Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill.—A, RT, TT
Peerless Laboratories, Inc., 115 East 23rd St., New York, N. Y.—TT
Radio Condenser Co., Davis & Copewood Sts., Camden, N. J., "R.C.C."—RT
R.C.C.—Radio Condenser Co.
F. W. Suckles Co., Chicopee, Mass.—A, M
Solar Mfg. Corp., 586 Avenue A, Bayonne, N. J., "Solar"—M
Sprague Specialties Co., North Adams, Mass.—M
Teleradio Engineering Corp., 484 Broome St., New York, N. Y., "Teleradio"—A, M, RT, TT
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—TT

Coils & I.F. Transformers



- Coil formsF
I. F. coilsIF
R. F. chokes (receiving)CH
R. F. chokes (transmitting)RT
R. F. coils (receiving)RF
TransmittingT
SolenoidsS

Acme Wire Co., New Haven, Conn., "Acme"—S
Airplane & Marine Instruments, Inc., Box 92, Clearfield, Pa.—CH, RT, T
Aladdin Radio Industries, Inc., 223 W. Jackson Blvd., Chicago, Ill., "Aladdin"—IF, CH, P, RF, T
Alden Products Co., 117 North Main St., Brockton, Mass., "Na-Ald"—F
Allied Control Co., Inc., 227 Fulton St., New York, N. Y.—S
American Automatic Electric Sales Co., 1019 W. Van Buren, Chicago, Ill.—S

American Phenolic Corp., 1830 So. 54th St., Cicero, Ill., "Amphenol"—F
Amphenol—American Phenolic Corp.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.—F, IF, CH, RF, T
Audio Development Co., 2833 13th Ave., So., Minneapolis, Minn.—CH, RT
Automatic Winding Co., 900 Passaic Ave., East Newark, N. J.—W, IF, CH, RF, T
Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—F, RT, T
Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—IF, T
Wm. W. L. Burnett Radio Lab., 4815 Idaho St., San Diego, Calif.—CH, RT
Carron Mfg. Co., 415 So. Aberdeen St., Chicago, Ill., "Carron"—IF, CH, RT, RF, T
Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—F, T
Consolidated Molded Products Co., 309 Cherry St., Scranton, Pa.—F
Cook Electric Co., 2700 Southport Ave., Chicago, Ill.—S
Corning Glass Works, Corning, N. Y.—F
Coto-Coil Co., 71 Willard Ave., Providence, R. I.—F, IF, T
Henry L. Crowley & Co., Inc., 1 Central Ave., West Orange, N. J.—F
Dean W. Davis & Co., Inc., 549 Fulton St., Chicago, Ill.—F, S
Dinon Coil Co., P. O. Drawer D, Caledonia, N. Y.—T, S
Struthers Dunn, Inc., 1321 Arch St., Philadelphia, Pa.—S
DX Crystals Co., 1841 W. Carroll Ave., Chicago, Ill. Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia, Pa.—IF, T
Eckstein Radio & Television Co., Inc., 1400 Harmon Place, Minneapolis, Minn.—CH, RT, RF
Electrical Coil Winding Co., 2733 Saunders St., Camden, N. J.—S
Electrocoil Transformer Co., 417 Canal St., New York, N. Y.—S
Electronic Transformer Co., 515 W. 29th St., New York, N. Y.—S
H. C. Evans & Co., 1528 W. Adams St., Chicago, Ill.—S
John E. Fast & Co., 3123 N. Pulaski Ave., Chicago, Ill.—CH
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York, N. Y.—F, CH, RT, S
General Communication Co., 681 Beacon St., Boston, Mass.—IF, CH, RT, RF
General Electric Co., 1 River Road, Schenectady, N. Y.—S
The General Industries Co., Taylor & Olive Sts., Elyria, Ohio—F
General Radio Co., 30 State St., Cambridge, Mass. "G-R"—CH
General Winding Co., 420 W. 45th St., New York, N. Y., "Gen-Win"—F, IF, CH, RF, T
Gen-Win—General Winding Co.
G-R—General Radio Co.
Guardian Electric Mfg. Co., 1522 Walnut St., Chicago, Ill.—S
Edwin I. Guthman & Co., 15 S. Throop St., Chicago, Ill.—IF
Hammarlund Mfg. Co., Inc., 460 West 34th St., New York, N. Y.—F, IF, CH, RT, RF
Horn Signal Mfg. Corp., 310 Hudson St. New York, N. Y.—F, S
ICA—Insuline Corp. of America
Industrial Transformer Corp., 2540 Belmont Ave., New York, N. Y.—CH, RT, T, S
Insuline Corp. of America, 3602 35th Ave., Long Island City, N. Y. "ICA"—F, CH, RT, RF, T
Isolantite, Inc., 343 Cortlandt St., Belleville, N. J.—F
Jefferson Electric Co., Bellwood, Ill.—S
E. F. Johnson Co., Waseca, Minn., "Johnson"—F, RT, T
Lapp Insulator Co., Inc., LeRoy, N. Y.—TT, N
Lectrohm, Inc., 5135 W. 25th Place, Cicero, Ill.—CH, RT
Lenoxite Div., Lenox, Inc., 65 Prince St., Trenton, N. J.—F
Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill., "Meissner"—F, IF, CH, RF, RT
Merit Coil & Transformer Corp., 311 N. Desplaines St., Chicago, Ill.—S
James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—F, IF, CH, RT, RF, T, S
J. W. Miller Co., 5917 S. Main St., Los Angeles, Calif., "Miller"—IF, CH, RT, RF, S
Music Master Mfg. Co., 508 S. Dearborn St., Chicago, Ill.—IF, CH, RF
The Muter Co., 1255 S. Michigan Ave., Chicago, Ill., "Muter"—IF, CH, RT, RF
Na-ald—Alden Products Co.
National Tile Co., 26 & Lynn Sts., Anderson, Ind.—F
N-C—National Company
National Company, Inc., Malden Mass., "National"—F, IF, CH, RF, T, S
Ohmite Mfg. Co., 4984 W. Flournoy St., Chicago, Ill.—RT
Paramount Paper Tube Co., 801 Glasgow Ave., Ft. Wayne, Ind.—F
Peerless Mfg. Corp., 1400 W. Ormsby, Louisville, Ky.—S
Potter & Brumfield Mfg. Co., Princeton, Ind.—F, IF
Precision Paper Tube Co., 2033 W. Charleston St., Chicago, Ill.—F

Printloid, Inc., 93 Mercer St., New York, N. Y.—F
Radio Frequency Labs., Inc., Boonton, N. J.—IF,
CH, RT, RF
John A. Roebbling's Sons Co., Trenton, N. J.—S
F. W. Sickles Co., Chicopee, Mass.—F, IF, CH, RT,
RF, T, S
Small Motors, Inc., 1322 Elston Ave., Chicago, Ill.—
F, IF, CH, RT, RF
Nathan R. Smith Mfg. Co., 105 Pasadena Ave.,
South Pasadena, Calif.—S
Stackpole Carbon Co., St. Marys, Pa.—F
Standard Winding Corp., Newburgh, N. Y.—S
Super Electric Products Corp., 1057 Summit Ave.,
Jersey City, N. J.—IF, CH, RT, RF
Supreme Elec. Prod. Corp., 194 Vassar St., Roches-
ter, N. Y.—S
S-W Inductor Co., 1056 N. Wood St., Chicago, Ill.—
F, IF, CH, RT, RF, T, S
Telradio Engineering Corp., 484 Broome St., New
York, N. Y., "Telradio"—IF, CH, RF, RT, T, S
The R. Thomas & Sons Co., Lisbon, Ohio—F
Weller Bros., 516 Northampton St., Easton, Pa.—S
Westinghouse Electric & Mfg. Co., East Pittsburgh,
Pa.—F, S, T
Zierick Mfg. Corp., 385 Gerard Ave., New York,
N. Y.—F

Galvin Mfg. Corp., 4545 Augusta Blvd., Chicago, Ill.,
"Motorola"
Garod Radio Corp., 70 Washington St., Brooklyn,
N. Y., "Garod"
GE—General Electric Co.
General Electric Co., 1285 Boston Ave., Bridgeport,
Conn., "GE"
General Television & Radio Corp., 1240 N. Homan
Ave., Chicago, Ill.
Giffilan Bros., Inc., 1815 Venice Blvd., Los An-
geles, Calif., "Giffilan"
Grebe Mfg. Co., Inc., 70 Washington St., Brooklyn,
N. Y., "Grebe"
The Hallicrafters Co., 2611 S. Indiana Ave., Chicago,
Ill., "Skyrider"
Hamilton Radio Corp., 510 6th Ave., New York.
Hammarlund Mfg. Co., Inc., 424 W. 33rd St., New
York, N. Y., "Super-Pro"
Harvey Machine Co., Electronics Div., Los Angeles,
Calif.
Harvey-Wells Communications, Inc., Southbridge,
Mass.
Hazeltine Electronics Corp., 1775 Broadway, New
York, N. Y.
Hetro Electrical Industries, Inc., 5819 N. Drake Ave.,
Chicago, Ill.
Howard Radio Co., 1731 Belmont Ave., Chicago,
Ill., "Howard"
International Tel. & Tel. Co., 67 Broad St., New York,
N. Y.
Jefferson-Travis Mfg. Corp., 380 Second Ave., New
York, N. Y.
Kaar Engineering Co., 619 Emerson St., Palo Alto,
Calif., "Kaar"
Karadio Corp., 1400 Harmon Pl., Minneapolis, Minn.,
"Karadio"
Lear Avia, Inc., Piqua, Ohio
Fred M. Link, 125 W. 17th St., New York, N. Y.
The Magnavox Co., Inc., 2131 Bueter Rd., Ft.
Wayne, Ind.
Majestic Radio & Television Corp., 2600 W. 50 St.,
Chicago, Ill., "Majestic"
Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel,
Ill., "Meissner"
Midwest Radio Corp., 909 Broadway, Cincinnati,
Ohio, "Midwest"
James Millen Mfg. Co., Inc., 150 Exchange St.,
Malden, Mass.
Motorola—Galvin Mfg. Corp.
National Co., Inc., Malden, Mass., "National"
Noblitt-Sparks Industries, Inc., Columbus, Ind.,
"Arvin"
Panoramic Radio Corp., 242 W. 55 St., New York,
N. Y.
Philco Radio & Television Corp., Tioga & C Sts.,
Philadelphia, Pa.
Philharmonic Radio Corp., 216 Williams St., New
York, N. Y.
Pierce Airo—DeWald Radio Mfg. Corp.
Pilot Radio Corp., 3706 36 St., Long Island City,
N. Y., "Pilot"
Radiola—RCA Victor Div., Radio Corp. of America
RCA Victor Div., Radio Corp. of America, Front &
Cooper Sts., Camden, N. J., "Radiola", "RCA",
"RCA Victor"
Remler Co., Ltd., 2101 Bryant St., San Francisco,
Calif., "Remler"
E. H. Scott Radio Labs., Inc., 4450 Ravenswood
Ave., Chicago, Ill., "Scott"
Sentinel—Electrical Research Lab., Inc.

Setchell-Carlson, Inc., 2233 University Ave., St.
Paul, Minn., "Setchell-Carlson"
Skyrider—The Hallicrafters Co.
Sonora Radio & Television Corp., 325 N. Hoyne Ave.,
Chicago, Ill.
Sparks-Withington Co., Radio Div., 2400 E. Ganson
Ave., Jackson, Mich., "Spartan"
Sperry—Sparks-Withington Co.
Sperry Gyroscope Co., Inc., 40 Flatbush Ave.,
Brooklyn, N. Y.
Stewart-Warner Corp., 1826 Diversey Pkwy., Chi-
cago, Ill., "Stewart Warner"
Stromberg-Carlson Telephone Mfg. Co., 100 Carlson
Bld., Rochester, N. Y., "Stromberg-Carlson"
Super-Pro—Hammarlund Mfg. Co.
Templetone Radio Co., Mystic, Conn.
Trav-Ler Karanola Television Corp., 1028 W. Van Buren
St., Chicago, Ill.
Trebtor Radio Co., Pasadena, Calif., "Trebtor"
Troubador—Warwick Mfg. Co.
Troy Radio & Television Co., 1144 S. Olive St., Los
Angeles, Calif.
Warwick Mfg. Corp., 4640 W. Harrison, Chicago, Ill.,
"Clarion", "Troubador", "Warwick"
Watterson Radio Mfg. Co., 2608 Ross Ave., Dallas,
Texas
Wells-Gardner & Co., 2701 N. Kildare Ave., Chi-
cago, Ill.
Western Electric Co., 195 Broadway, New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilcox Electric Co., 14th & Chestnut Sts., Kansas
City, Mo.
Wilcox-Gay Corp., Charlotte, Mich., "Wilcox-Gay"
Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.

Communication and Military Equipment

Editor's Note

Nearly all of the companies listed below are normally producers of peacetime radio who have certified their present activity and are listed under the general heading of "military equipment" without detailing the types of equipment produced. Equipment of this nature is classified as "restricted," hence no specific data can be divulged. This military listing is, in effect, a listing of radio receiver manufacturing, with the addition of some non-radio concerns now engaged in radio war production. Commercial products for communications services and electronic applications are listed under the other classifications. To find the main heading under which a particular manufacturer appears, refer to the alphabetical index beginning on page 108.



Admiral—Continental Radio & Television Corp.
Air Communications, Inc., 2233 Grand Ave., Kansas
City, Mo.
Air King Products Co., Inc., 1523 63 St., Brooklyn,
N. Y., "Air King"
Andrea Radio Corp., 43-20 34 St., Long Island City,
N. Y.
Anslay Radio Corp., 21-10 49 Ave., Long Island
City, N. Y., "Dynaphone"
Arvin—Noblitt-Sparks Industries, Inc.
Automatic Radio Mfg. Co., 122 Brookline Ave., Bos-
ton, Mass.
Bell Radio & Television, 125 E. 46 St., New York,
N. Y., "Bell"
Belmont Radio Corp., 5921 W. Dickens Ave., Chi-
cago, Ill., "Belmont"
Bendix Radio Division, Bendix Aviation Corp., 920 E.
Fort Ave., Baltimore, Md.
Berger Electronics, 109-01 72nd Rd., Forest Hills,
N. Y.
Browning Laboratories, Inc., 750 Main St., Win-
chester, Mass., "Browning"
Clarion—Warwick Mfg. Co.
Colonial Radio Corp., 254 Rano St., Buffalo, N. Y.
Continental Radio & Television Corp., 3800 W. Cort-
land St., Chicago, Ill., "Admiral"
The Crosley Corp., 1329 Arlington St., Cincinnati,
Ohio, "Crosley"
Detrola Corp., 1501 Beard Ave., Detroit, Mich.
"Detrola"
Delco Radio Division, General Motors Corp., Home
Ave., Kokomo, Ind.
De Wald Radio Mfg. Corp., 436 Lafayette St., New
York, N. Y., "Pierce Airo"
Allen B. DuMont Labs., Inc., 2 Main Ave., Passaic,
N. J., "DuMont"
Dynaphone—Anslay Radio Corp.
Eckstein Radio & Television Co., Inc., 1400 Harmon
Pl., Minneapolis, Minn.
Electrical Research Lab., Inc., 2020 Ridge Ave.,
Evanston, Ill., "Erla", "Sentinel"
Emerson Radio & Phonograph Corp., 111 8th Ave.,
New York, N. Y.
Erla—Electrical Research Lab., Inc.
Espy Mfg. Co., Inc., 305 E. 63 St., New York, N. Y.
Fada Radio & Electric Co., Inc., 30-20 Thomson
Ave., Long Island City, N. Y., "Fada"
Farnsworth Television & Radio Corp., 3700 Pontiac
St., Ft. Wayne, Ind.
Federal Telegraph & Radio Corp., 200 Mt. Pleasant
Ave., Newark, N. J.
Finch Telecommunications, Inc., Passaic, N. J.
Freed Radio Corp., 200 Hudson St., New York, N. Y.,
"Freed-Eisemann"

Crystals & Access.

Editor's Note

Many of the names listed under this heading were furnished by government services and have not been verified as to actual war production.



Amateur	A
Blanks	BL
Broadcast	B
Crystal cartridges	C
Crystal tester	CT
Cut-off blades	CO
Frequency std	F
Holders	H
I. F. Filter	I. F.
Police, marine, air	SW
Temp. control ovens	T
Quartz cutting machines	QC
Rochelle salt	R
Tourmaline	TO

Aircraft Accessories Corp., Fairfax & Funsten Rd.,
Kansas City, Kan.—BL, B, F, H, SW, T
Alden Products Co., 119 N. Main St., Brockton,
Mass.—H

H.F. FEEDERS

Characteristic Impedance $Z_0 = \sqrt{L/C}$

L = Inductance per unit length
C = Capacitance per unit length

(1) PARALLEL WIRES IN AIR

$$C = \frac{1}{4 \log_e \frac{d}{r}} \text{ e.s.u.} \quad L = 4 \log_e \frac{d}{r} \text{ e.m.u.}$$

Where d = distance between centres in cm
r = radius of wires in cm.

Whence $Z_0 = 276 \log_{10} \frac{d}{r}$ ohms.

(2) SYMMETRICAL FOUR WIRE LINE

$$Z_0 = (138 \log_{10} \frac{D}{r}) - 20.8$$

Where D is the distance between wire centres
and r the radius of the wire.

(3) CONCENTRIC TUBES

$$C = \frac{k}{2 \log_e \frac{r_2}{r_1}} \text{ e.s.u.} \quad L = 2 \log_e \frac{r_2}{r_1} \text{ e.m.u.}$$

Where r_2 = outer radius, r_1 = inner radius, k = average dielectric constant
applicable to medium between coaxial conductors.

Whence $Z_0 = \frac{138}{\sqrt{k}} \log_{10} \frac{r_2}{r_1}$ ohms

American Instrument Co., Silver Spring, Md.—VC, T
 American Jewels Corp., Attleboro, Mass.
 American Radio Hardware Co., Inc., 478 Broadway,
 New York, N. Y.—H
 Apex Industries, Inc., 1037 W. Lake St., Chicago,
 Ill.—A, BL, B, F, S, SW
 Rex Bassett, Inc., 500 S. E. Second St., Fort
 Lauderdale, Fla.—F, SW
 Bendix Radio Division, Bendix Aviation Corp., 920
 East Fort Ave., Baltimore, Md.—SW
 Bliley Electric Co., Erie, Pa.—A, B, F, H, S, SW, T
 Charles J. Bodnor, Inc., Tuckahoe, N. Y.—
 Breon Laboratories, Williamsport, Pa.—
 Brush Development Co., 3311 Perkins Ave., Cleve-
 land, Ohio—C
 Wm. W. L. Burnett Radio Laboratory, 4814 Idaho
 St., San Diego, Calif.—A, B, BL, F, H, SW, T
 Oscar Caplan & Sons, Diamond Tool Repl. Div., 207
 W. Saratoga St., Baltimore, Md.—QC
 Carlisle Crystal Corp., Carlisle, Pa.—A, BL, B, F,
 SW
 Carver Cotton Gin Co., E. Bridgewater, Mass.—
 Collins Co., 644 Landfair Ave., Westwood Village,
 Los Angeles, Calif.—A, BL, B
 Commercial Crystal Co., 112 No. Water St., Lan-
 caster, Pa.—B, SW
 Commercial Radio Equipment Co., 321 E. Gregory
 Blvd., Kansas City, Mo.—BL, B, F, H, S, SW
 Consolidated Molded Products Corp., 309 Cherry St.,
 Scranton, Pa.—H
 Crystal Mfg. Co., 1725 W. Diversey Pkwy., Chicago,
 Ill.—
 Crystal Products Co., 1519 McGee St., Kansas City,
 Mo.—A, BL, B, F, H, S, SW
 Crystal Research Laboratories, Inc., 29 Allyn St.,
 Hartford, Conn.—A, BL, B, F, S, SW
 Dallons Laboratories, 5066 Santa Monica Blvd., Los
 Angeles, Calif.—
 The Diamond Drill Carbon Co., 53 Park Row, New
 York, N. Y.—A, BL, B
 L. A. Dow, 2208 4th Ave., Seattle, Washington—SW
 DX Crystal Co., 1841 W. Carroll Ave., Chicago, Ill.—
 A, B, C, F, H, S
 Eidson's, 1309 N. Second St., Temple, Texas—A, B,
 SW, H
 Electronic Products Mfg. Corp., 7300 Huron River
 Drive, Dexter, Mich.—H
 Fether Mfg. Co., Torrance, Calif.—C0
 Fisher Research Laboratory, 1961 University Ave.,
 Palo Alto, Calif.—SW
 Foote Mineral Co., 1609 Summer St., Philadelphia,
 Pa.—BL
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—
 F, SW
 General Crystal Corp., 1776 Foster Ave., Schenec-
 tady, N. Y.—QC
 General Electric Company, 1 River Road, Schenec-
 tady, N. Y.—A, B, F, S, SW
 General Radio Co., 30 State St., Cambridge, Mass.—
 "G-R"—F
 Gentleman Products Division, Henney Motor Co., 1708
 Cuming St., Omaha, Neb.—A, SW
 Geophysical Instrument Co., 1315 Half St., S. W.,
 Washington, D. C.—CT
 Henry Radio Shop, 814 N. LaBrea Ave., Los Angeles,
 Calif.—
 Higgins Industries, Inc., 1221 Warwick Ave., Santa
 Monica, Calif.—
 Hipower Crystal Co., 2037 W. Charleston St., Chi-
 cago, Ill., "Hipower"—A
 P. R. Hoffman Co., 321 Cherry St., Carlisle, Pa.—
 BL, H
 Hollister Crystal Co., 1617 Pearl St., Boulder, Colo.—
 A, B, BL, SW
 Hollywood Electronics Co., 800 Sunset Blvd., Los
 Angeles, Calif.—A, B, SW
 Howard Mfg. Co., 15 4th St., Council Bluffs, Iowa—
 H
 G. C. Hunt & Sons, Carlisle, Pa.—H
 ICA—Insuline Corp. of America
 Insuline Corp. of America, 3602 35th Ave., Long
 Island City, N. Y., "ICA"—H
 Jefferson-Travis Radio Mfg. Corp., 380 Second Ave.,
 New York, N. Y.—H, SW
 Kaar Engineering Co., 619 Emerson St., Palo Alto,
 Calif.—H, SW
 Katz & Ogush, Inc., 33 W. 60th St., New York, N. Y.—
 BL, H
 Kemlite Laboratories, 1809 North Ashland Ave.,
 Chicago, Ill.—B, C, F
 The James Knights Co., 131 S. Wells St., Sandwich,
 Ill.—BL
 Landis & Gyr, Inc., 104 Fifth Ave., New York,
 N. Y.—T
 Lear Avia, Inc., Piqua, Ohio—SW
 Lewek Electric Co., Lincoln, Neb.—
 Majestic Radio & Television Corp., 2600 W. 50th
 St., Chicago, Ill.—
 John Meck Industries, Liberty St., Plymouth, Ind.,
 A, B, BL, C, F, H, SW
 Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel,
 Ill.—T, F, S
 James Millen Mfg. Co., Inc., 150 Exchange St.,
 Malden, Mass.—F
 August E. Miller, 9226 Hudson Blvd., North Bergen,
 N. J.—BL, B, F, SW, T
 Molded Insulation Co., 335 East Price St., Phila-
 delphia, Pa.—H
 National Scientific Products Co., 2204 West North
 St., Chicago, Ill.—
 National Tile Co., 26th & Lynn Sts., Anderson, Ind.—H
 Norclay Radio Co., Independence, Mo.—
 North American Philips Co., Inc., 145 Palisade St.,
 Dobbs Ferry, N. Y.—BL, H, SW

Pacific Radio Crystal Co., 1035 Post, San Francisco,
 Calif.—B, SW
 Petersen Radio Co., 2800 West Broadway, Council
 Bluffs, Iowa, "P. R. Crystals"—A, BL, B, F, H,
 S, SW, T
 Philco Radio & Television Corp., Tioga & C Streets,
 Philadelphia, Pa.—C, SW
 Phonette Co. of America, 7122 Melrose Ave., Los
 Angeles, Calif.—H
 Pinkham & Smith Co., 276 Boylston St., North Bos-
 ton, Mass.—
 P. R. Crystals—Petersen Radio Co.
 Precise Development Co., 1621 N. Wolcott St., Chi-
 cago, Ill.—
 Precision Instrument Mfg. Co., Inc., 57-02 Hoffman
 Dr., Elmhurst, L. I., N. Y.—A, BL, B, H, S, SW
 Premier Crystal Labs., Inc., 63 Park Row, New
 York, N. Y.—BL, H
 Radio Specialty Mfg. Co., 403 N. W. 9th Ave.,
 Portland, Ore.—BL, B, C, H, SW
 The Rauland Corp., 4245 N. Knox Ave., Chi-
 cago, Ill.—F
 RCA Victor Div., Radio Corp. of America, Front &
 Cooper Sts., Camden, N. J.—B, S, SW
 Reeves Sound Lab., Inc., 62 W. 47th St., New York,
 N. Y.—B
 Rinauld Optical Co., Webster, Mass.—
 Scientific Radio Products, Council Bluffs, Iowa—
 Scientific Radio Service, 4301 Sheridan St., University
 Park, Md.—A, B, F, H, S, SW
 Sentry Crystal Co., Portland, Ore.—
 Shideler Crystal Laboratory, Fort Dodge, Iowa—
 F. W. Sickles Co., Chicopee, Mass.—S
 Melvin L. Smith Laboratories, Kane, Pa.—
 Somerset Laboratories, Lyndhurst, N. J.—
 Standard Coil Products Co., 4910 W. Bloomingdale
 St., Chicago, Ill.—
 Standard Piezo Co., P. O. Box 164, Carlisle, Pa.—
 BL, B, F, H
 Tibbetts Laboratories, 12 Norfolk St., Cambridge,
 Mass.—R
 Trans-American Airports Corp., 271 Madison Ave.,
 New York, N. Y.—R
 The Turner Company, Cedar Rapids, Iowa—
 Universal Quartz Co., 347 W. 36th St., New York, N. Y.—
 BL
 The Valley Crystals, Box 321, Holliston, Mass.—A,
 BL, B, F, H, S, SW, T
 Vreeland Lapidary Mfg. Co., 2020 S.W. Jefferson St.,
 Portland, Ore.—BL
 Wm. T. Wallace Mfg. Co., Chilli & Madison Ave.,
 Peru, Ind.—A, BL, H, SW
 Webster Electric Co., 1900 Clark St., Racine, Wis.—C
 Wenksten Hasley Co., 305 1st St., S.W. Cedar
 Rapids, Iowa—BL
 Western Electric Co., Kearny, N. J.—B, F, H, S, T
 Westinghouse Electric & Mfg. Co., East Pittsburgh,
 Pa.—T
 Withers Gen. Co., Atlanta, Ga.—
 Wynne Precision Co., 114 1/2 North Hill St., Griffin,
 Ga.—A, BL
 Carl Zeiss, Inc., 485 Fifth Ave., New York, N. Y.—
 H, TO

Bastian Bros. Co., 1600 Clinton Ave., N., Rochester,
 N. Y.—DE, E, F, N
 Browning Labs., Inc., Winchester, Mass.—D
 Bud Radio, Inc., 2118 E. 55th St., Cleveland, Ohio,
 "Bud"—D, PL, KM
 Carlton Lamp Corp., 730 S. 13th St., Newark, N. J.—
 L
 Cinema Engineering Co., 1508 W. Verdugo Ave.,
 Burbank, Calif.—F
 Consolidated Molded Products Corp., 309 Cherry St.,
 Scranton, Pa.—KM, PB
 Crowe Name Plate & Mfg. Co., 3701 Ravenswood
 Ave., Chicago, Ill., "Crowe"—D, C, PL, E, F,
 F, KM, N
 The Daven Co., 158 Summit St., Newark, N. J.—KM
 Harry Davies Molding Co., 1428 N. Wells St., Chi-
 cago, Ill.—E, KM
 Dial Light Co. of America, Inc., 90 West St., New
 York, N. Y.—PL
 The Dickey-Grabler Co., 10302 Madison Ave., Cleve-
 land, Ohio—N
 Drake Mfg. Co., 1713 W. Hubbard St., Chicago, Ill.,
 "Drake"—PL, JL
 Eclipse Molded Products Co., 5151 N. 32nd St.,
 Milwaukee, Wis.—KM
 Enameloid-Cloisnone—Gemold Corp.
 Erie Resistor Corp., 640 West 12th St., Erie, Pa.—
 E, KM, PB
 Etched Products Corp., 39-01 Queens Blvd., Long
 Island City, N. Y.—D, E, F, N
 H. C. Evans & Co., 1528 W. Adams St., Chicago,
 Ill.—L
 Federal Saw Products Co., 224 W. Huron St., Chi-
 cago, Ill.—JL
 Flexo Wire Co., 638 W. Genesee St., Syracuse, N. Y.—
 DC
 Flock Process Co., 17 W. 31st St., New York, N. Y.—
 DE, E, F, N
 G-C—General Cement Mfg. Co.
 Gemlite—Gemold Corp.
 Gemold Corp., 7910-7930 Albion Ave., Elmhurst,
 L. I., N. Y., "Enameloid-Cloisnone," "Gemlite"—
 D, E, F, KM, N, PB
 General Cement Mfg. Co., 919 Taylor Ave., Rockford,
 Ill., "G-C"—CL, C, DC, DR, KM, KS, KW
 General Crystal Corp., 1776 Foster Ave., Schenec-
 tady, N. Y.—C
 General Radio Co., 30 State St., Cambridge, Mass.—
 D, KM
 Gits Molding Corp., 4600 W. Huron St., Chicago,
 Ill.—P, E, KM
 Gothard Mfg. Co., Springfield, Ill.—PL, JL
 L. F. Grammes & Sons, Inc., 399 Union St., Allen-
 town, Pa.—D, P, E, F
 J. Hope, P. O. Box 666, Wenonah, N. J.—DE
 ICA—Insuline Corp. of America
 Insuline Corp. of America, 3602 35th Ave., Long
 Island City, N. Y., "ICA"—D, C, KM, N
 J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy.,
 Brooklyn, N. Y.—DC
 E. F. Johnson Co., Waseca, Minn.—P
 Kellogg Switchboard & Supply Co., 6650 S. Cicero
 St., Chicago, Ill.—JL, L, PL
 J. R. Kilburn Glass Co., Inc., S. Worcester St.,
 Chertley, Mass.—JL
 H. R. Kirkland Co., Morristown, N. J.—L, PL, JL
 Linick, Green & Reed, Inc., 29 East Madison St.,
 Chicago, Ill.—C
 P. R. Mallory & Co., Inc., 3029 E. Washington St.,
 Indianapolis, Ind., "Yaxley"—L, PL, JL
 Mica Insulator Co., 200 Varick St., New York, N. Y.—
 F
 James Millen Mfg. Co., 150 Exchange St., Malden,
 Mass.—D, DL, E, KM, SL, WD
 Molded Insulation Co., 335 East Price St., Phila-
 delphia, Pa.—KM, PB
 National Company, Inc., Malden, Mass.—KM
 Norton Laboratories, Inc., 520 Mill St., Lockport,
 N. Y.—KM
 Parisian Novelty Co., 3510 S. Western Ave., Chicago,
 Ill.—D, P, F, N
 Premier Metal Etching Co., 21-03 44th Ave., Long
 Island City, N. Y.—D, E, F, N
 Radio City Products Co., 127 W. 26th St., New
 York, N. Y.—KM
 Radio Essentials, Inc., 69 Wooster St., New York,
 N. Y.—PB, PL
 Radio Specialty Mfg. Co., 403 N. W. 9th Ave., Port-
 land, Ore.—C
 Raymond Mfg. Co., Division of Associated Spring
 Corp., Cory, Pa.—KS
 Reynolds Spring Co., Molded Plastics Division, Cam-
 bridge, Mass.—KM, N, PB
 Walter L. Schott Co., 9306 Santa Monica Blvd.,
 Beverly Hills, Calif., "Walsco"—DC, KS
 Superior Tube Co., Norristown, Pa.—P
 Syracuse Ornamental Co., 581 S. Clinton St., Syra-
 cuse, N. Y., "Sycrowood," "Woodite," "Sycro"—
 E, KW
 Sycro—Syracuse Ornamental Co.
 Sycrowood—Syracuse Ornamental Co.
 Tingstol Corp., 1461 W. Grand St., Chicago, Ill.—PL
 Tungston Contact Mfg. Co., 7311 Cottage Ave., N.
 Bergen, N. J.—KM
 Tung-Sol Lamp Works, Inc., 95 Eighth Ave., New-
 ark, N. J.—L
 The Ucinite Co., 459 Watertown St., Newtonville,
 Mass.—
 Walsco—Walter L. Schott Co.
 Westinghouse Electric & Mfg. Co., East Pittsburgh,
 Pa.—E, KM, L
 Woodite—Syracuse Ornamental Co.
 Worcester Pressed Steel Co., Worcester, Mass.—E
 Yaxley—P. R. Mallory & Co., Inc.

Dials & Parts



Call letter tabs	CL
Complete dials	C
Crystals	D
Decalcomanias	DE
Dial cables & belts	DC
Dial lamps	L
Dial light assem.	PL
Dial locks	DL
Dial pointers	P
Drive rubbers	DR
Escutcheons	E
Faces or scales	F
Knobs-molded	KM
Knob springs	KS
Knobs-wooden	KW
Name plates	N
Jewel pilot lights	JL
Push button knobs	PB
Shaft locks	SL
Worm drives	WD

The Acromark Co., 9 Morrell St., Elizabeth, N. J.—N
 Airplane & Marine Instruments, Inc., Box 92, Clear-
 field, Pa.—D
 Alden Products Co., 119 N. Main St., Brockton,
 Mass.—DC, PL, KM, JL
 American Automatic Electric Sales Co., 1019 W.
 Van Buren St., Chicago, Ill.—JL
 American Emblem Co., Inc., P. O. Box 116-E, Utica,
 N. Y.—D, C, E, N
 American Insulator Corp., New Freedom, Pa.—P, E,
 F, N, KM, PB
 American Radio Hardware Co., Inc., 478 Broadway,
 New York, N. Y., "Arhco"—PL, P, JL
 Arhco—American Radio Hardware Co.
 O. Austin Co., 42 Greene St., New York, N. Y.—
 DE, F, N
 Barker and Williamson, 237 Fairfield Ave., Upper
 Darby, Pa.—D

Drafting Room Equipment



- Drafting tablesDT
- Drawing papersD
- Electric erasersEE
- Lighting equipmentL
- PencilsP
- Print making machinesBM
- ScalesS
- StoolsST
- Tracing clothTC
- TrianglesT
- T-squaresTS

Art Specialty Co., 3247 W. Lake St., Chicago, Ill.—“Flexo”—L
 Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza S., Long Island City, N. Y.—L
 Etched Products Corp., 39-01 Queens Blvd., Long Island City, N. Y.—S
 A. W. Faber Co., 41 Dickerson St., Newark, N. J.—P
 Flexo—Art Specialty Co.
 General Cement Mfg. Co., 921 Taylor Ave., Rockford, Ill.—“GC”—L, ST
 Hamilton Mfg. Co., Two Rivers, Wis.—DT
 Holliston Mills, Inc., Norwood, Mass., “Micro-weave”—TC
 Keuffel & Esser Co., 3rd & Adams St., Hoboken, N. J.—D, S, T, TC, TS
 Kliegl Bros. Universal Electric Stage Lighting Co., 321 W. 50th St., New York, N. Y.—L
 Micro-weave—Holliston Mills, Inc.
 Ozalid Products Division of General Aniline & Film Corp., Johnson City, N. Y.—BM
 The Frederick Post Co., 3562 North Avondale, Chicago, Ill.—DT, D, EE, P, S, T, TS
 Premier Metal Etching Co., 21-03 44th Ave., Long Island City, N. Y.—S
 Trans-American Airports Corp., 271 Madison Ave., New York, N. Y.—DT
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—L
 Wickes Brothers, 515 N. Washington Ave., Saginaw, Mich.—BM

Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—AS, BO, BA, C, D, HC, MS, M, TC, TI
 Berger Electronics, 109-01 72nd Rd., Forest Hills, L. I., N. Y.—BC, TC
 Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.—IC
 Brown Instrument Co., 4536 Wayne Ave., Philadelphia, Pa.—B, PI, TC, TI
 Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—AS, EF
 Bruno—New York, Inc., 460 W. 34th St., New York, N. Y.—M
 Burling Instrument Co., 253 Springfield Ave., Newark, N. J.—TC
 Burlington Instrument Co., Burlington, Iowa—MC
 The Clark Controller Co., 1146 E. 152nd St., Cleveland, Ohio—TI, WE
 Communication Measurements Lab., 131 Liberty St., New York, N. Y.—M
 Control Corp., 600 Stinson Blvd., Minneapolis, Minn.—BO, TI
 The R. W. Cramer Co., Inc., Centerbrook, Conn.—TI, TR
 Eagle Signal Corp., 202 20th St., Moline, Ill.—C, TI, TR
 Eicor, Inc., 1501 W. Congress St., Chicago, Ill.—MC
 The Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio—WE
 Electric Eye Equipment Co., 6 W. Fairchild St., Danville, Ill.—G
 Electric Sorting Machine Co., 802 Michigan Trust Bldg., Grand Rapids, Mich.—G
 Electro Products Laboratories, 549 W. Randolph St., Chicago, Ill.—IC, TC
 Electron Equipment Corp., Palm Springs, Calif.—AS, C, DC, G, M, MC, PI, PC, S, TC, TI, V, WC, WE
 Electronic Control Corp., 626 Harper, Detroit, Mich.—BA, DC, D, G, HC, MS, S, TC, TI, WE
 Electronic Corp. of America, 45 W. 18th St., New York, N. Y.—AS
 Electronic Laboratory, 306 S. Edinburg Ave., Los Angeles, Calif.—BA, D, HC, TC
 Electronic Products Co., 19 N. First St., Geneva, Ill.—B, BA, C, D, DC, G, HC, LC, PI, S, TI, TR
 Electronic Radio Alarm, Inc., 1920 Lincoln-Liberty Bldg., Philadelphia, Pa.—AS, BO, BA, EF, MS
 Engineering Laboratories, Inc., 624 E. Fourth St., Tulsa, Okla.—M, PI
 Ess Instrument Co., George Washington Bridge Plaza, Port Lee, N. J.—AS, C, P, PC, S
 The Exact Weight Scale Co., Columbus, Ohio—WC
 Fisher Research Laboratory, 1961 University Ave., Palo Alto, Calif.—M
 General Control Co., 243 Broadway, Cambridge, Mass.—LC
 General Electric Co., 1 River Road, Schenectady, N. Y.—AS, BO, B, BA, C, DC, D, G, HC, LC, MS, M, MI, MC, P, PI, PC, S, TC, TI, TR, V, WC, WE
 The Girdler Corp., 224 E. Broadway, Louisville, Ky.—I
 Gisholt Machine Co., 13 S. Baldwin St., Madison, Wis.—V, WC
 Guaranteed Products Corp., Wellington, Ohio, “Shox-Stock”—EF
 Wm. Hansen Co., R 3, Niles, Mich.—AS, BA, D, HC, LC, S, TC, V
 Hathaway Instrument Co., 1315 S. Clarkson, Denver, Colo.—DC, WC
 Haydon Mfg. Co., Inc., Forestville, Conn.—TI
 H-B Electric Co., 6122 N. 21st St., Philadelphia, Pa.—TC
 Herbach & Rademan Co., 522 Market St., Philadelphia Pa.—TI, C, V
 Hewlett-Packard Company, 395 Page Mill Rd., Palo Alto, Calif.—WE
 Horn Signal Mfg. Corp., 310 Hudson St., New York, N. Y.—AS, C, D, EF, LC, M, TI, TR
 Hy Ef Electrical Products Mfg. Co., 1515 N. Pico Blvd., Los Angeles, Calif.—“Hy-Ef”—PI
 Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J.—CC

Industrial Timer Corp., 117 Edison Pl., Newark, N. J.—TI, WE
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—AS, BO, B, BA, C, DC, D, HC, LC, MS, M, MI, MC, P, PI, PC, S, TC, TI, TR, V, WC, WE
 Kurman Electric Co., Inc., 30-30 Northern Blvd., Long Island City, N. Y.—C, DC, LC, MC, TC, TI, WC, WE
 L. A. B. Corp., P. O. Box 162, Summit, N. J.—B, V
 Lear Avia, Inc., Piqua, Ohio—MS, MC, PI, TC, TI, TR
 Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.—TC
 Lektra Laboratories, Inc., 30 E. Tenth St., New York, N. Y.—TI
 Littelfuse Inc., 4732 Ravenswood Ave., Chicago, Ill.—BO, EF, LC, V
 Lord Manufacturing Co., Erie, Pa.—V
 J. Milton Luers, 12 Pine St., Mount Clemens, Mich.—TI
 Lumenite Electric Co., 407 S. Dearborn St., Chicago, Ill.—B, D, HC, LC, TC, TI, WC, C, M, BO
 The Magnetic Gauge Co., 60 E. Bartges St., Akron, Ohio—DC, G, WC
 McDonnell & Miller, Room 1316, Wrigley Bldg., Chicago, Ill.—B
 McNeill Engineering Co., 4057 W. Van Buren St., Chicago, Ill.—S
 Megard Corp., 381 W. 38th St., Los Angeles, Calif.—AS, EF
 The Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.—B, TC
 Merwin-Wilson Co., New Milford, Conn.—HC, TC
 Minneapolis-Honeywell Regulator Co., 2712 Fourth Ave., Minneapolis, Minn.—HC, MC, TC
 Photobell Corp., 114 Nassau St., New York, N. Y.—AS, BO, B, BA, C, DC, D, EF, G, HC, LC, MS, M, MC, P, PI, PC, S, TC, TI, TR, V, WC, WE
 Photoswitch, Inc., 89 Broadway, Cambridge, Mass.—AS, BO, B, BA, C, DC, D, EF, G, LC, MS, P, PC, S, TC, TI, TR, WC
 Photovolt Corp., 95 Madison Ave., New York, N. Y.—LC, PC, S, TI, WE
 Radio Electronic Co., 1816 Villanova Dr., Oakland, Calif.—AS, BO, B, BA, C, DC, D, G, HC, LC, MS, M, MI, MC, P, PI, PC, S, TC, TI, TR, V, WC, WE
 Radiotechnical Lab., 1328 Sherman Ave., Evanston, Ill.—BC
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—AS, BA, M, MI
 Rehtron Corp., 2159 Magnolia Ave., Chicago, Ill.—BO, BA, HC, MS, P, PC, S, TI
 Richards Electro-Fence Co., 2306 Madison, Boise, Idaho—BA
 Richardson-Allen Corp., 15 W. 20th St., New York, N. Y.—LC, TI, WE
 W. C. Robinette Co., 802 Fair Oaks, S. Pasadena, Calif.—MC
 Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago, Ill.—AS, C, G, TI
 Schulmerich Electronics, Inc., 141 E. Glenside Ave., Glenside, Pa.—AS
 Seely Instrument Co., Inc., 2249 14th St., S. W., Akron, Ohio—MS, TI
 Selenium Corp. of America, 1800 W. Pico Blvd., Los Angeles, Calif.—PC
 Shox-Stock—Guaranteed Products Corp.
 Shure Brothers, 225 W. Huron St., Chicago, Ill.—V
 Small Motors, Inc., 1322 Elston Ave., Chicago, Ill.—MC
 F. A. Smith Mfg. Co., Inc., P. O. Box 509, Rochester, N. Y.—PI, TC
 Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.—TC
 Standard Electric Time Co., Springfield, Mass.—TI
 The Stanley Works, Magic Door Division, 143 Lake St., New Britain, Conn.—D
 The States Company, 19 New Park Ave., Hartford, Conn.—TI

Electronic Control Equipment

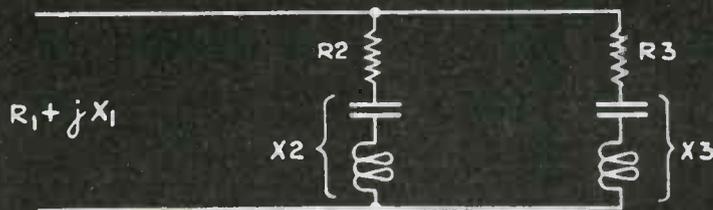


- Anti-sabotageAS
- BlackoutBO
- Boiler level alarmsB
- Burglar alarmsBA
- Burner controlBC
- CombustionIC
- Conductivity controlsCC
- Counting devicesC
- Dimension controlDC
- Door controlD
- Electric fenceEF
- Grading & sorting controlsG
- Heat treating controlsHC
- Humidity controlsH
- Lighting controlsLC
- Machine safety controlMS
- Metal detectorsM
- MicroscopyMI
- Motor & generator controlMC
- Package wrapping controlP
- Pressure indicatorsPI
- Printing controlsPC
- Smoke density controlsS
- Solenoid valvesSV
- Temperature controlsTC
- Time controlsTI
- TrafficTR
- Vibration controlV
- Weight controlWC
- Welding controlWE

American District Telegraph Co., 157 Sixth Ave., New York, N. Y.—BA, S
 American Gas Accumulator Co., 1031 Newark Ave., Elizabeth, N. J.—TI
 American Instrument Co., Silver Spring, Md.—TC
 Andrews & Perillo Mfg. Corp., 39-30 Crescent St., Long Island City, N. Y.—M
 Askania Regulator Co., 1605 S. Michigan Ave., Chicago, Ill.—PI
 The Audio-Tone Oscillator Co., 60 Walter St., Bridgeport, Conn.—G
 Automatic Alarms, Inc., Youngstown, Ohio—BA
 Automatic Electric Mfg. Co., Mankato, Minn.—BO, LC, PC, TI
 The Automatic Electrical Devices Co., 324 E. 3rd St., Cincinnati, Ohio—BA, BO, V
 Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.—SV
 Automatic Temperature Control Co., 24 E. Logan St., Philadelphia, Pa.—TI

THE CONVERSION OF A PARALLEL CIRCUIT TO AN EQUIVALENT SERIES CIRCUIT

GENERAL CASE



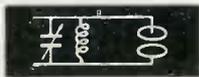
$$(1) R_1 = \frac{(X_2 + X_3)(X_2 R_3 + R_2 X_3) + (R_2 + R_3)(R_2 R_3 - X_2 X_3)}{(R_2 + R_3)^2 + (X_2 + X_3)^2}$$

$$(2) X_1 = \frac{(R_2 + R_3)(X_2 R_3 + R_2 X_3) - (X_2 + X_3)(R_2 R_3 - X_2 X_3)}{(R_2 + R_3)^2 + (X_2 + X_3)^2}$$

(90) Electronic Control

Superior Electric Company, Laurel St., Bristol, Conn.—HC, LC
 Supreme Electric Products Corp., 194 Vassar St., Rochester, N. Y.—TC
 Synchro-Start Products, Inc., 221 E. Cullerton, Chicago, Ill.—AS, BO, B, BA, IC, C, DC, D, EF, G, HC, LC, MS, M, MI, MC, P, PI, PC, S, TC, TI, TR, V, WC, WE
 C. J. Tagliabue Mfg. Co., 540 Park Ave., Brooklyn, N. Y.—HC, TC, TI, PI
 Technical Apparatus Co., Inc., 1171 Tremont St., Boston, Mass.—HC, LC, M, S
 Televiso Products, Inc., 6533 Olmstead Ave., Chicago, Ill.—DC, V
 Tenney Engineering, Inc., 8 Elm St., Montclair, N. J.—H, PI, TC
 Thomas-Gibb Welding Co., Lynn, Mass.—WE
 Tork Clock Co., Inc., Mt. Vernon, N. Y.—BO, LC, TI
 United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—BA, D, LC, PC, TI
 Waldron Electric Co., 13221 Merl Ave., Cleveland, Ohio—EF
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—C, G, HC, MC, P, PC, TC, TI, TR, WE
 Weston Electrical Instrument Corp., 597 Frelinghuysen Ave., Newark, N. J.—LC
 Wheelco Instruments Co., 847 W. Harrison St., Chicago, Ill.—B, HC, PI, TC
 Worner Products Corp., 1019 W. Lake St., Chicago, Ill.—AS, BO, BA, C, DC, D, EF, G, LC, MS, M, P, PC, S, TI, TR, WC, WE
 Zenith Electric Co., 15 W. Walton St., Chicago, Ill.—BO, TI

Electronic Equipment



Anoxia photometersAP
 AudiometersA
 DiathermyD
 Electro-cardiographEC
 Electro-encephalographEE
 Fluoroscope screensF
 Geophysical instrumentsGI
 Germicidal lampsGL
 Induction heatingI
 Lie detectorsL
 Metal locatorML
 Skin temperatureSTE
 StethographsST
 Wind velocity meterWM
 X-ray machinesX
 X-ray intensity metersXM
 X-ray screens & filtersXS

Amplifier Co. of America, 17 W. 20th St., New York, N. Y.—EC
 Associated Research, Inc., 432 S. Dearborn St., Chicago, Ill.—L
 The Audio-Tone Oscillator Co., 62 Walter St., Bridgeport, Conn.—EC, EE
 Austin Electronic Mfg. Co., Warren Pa.—D
 Barker and Williamson, 237 Fairfield Ave., Upper Darby, Pa.—D
 The Burdick Corp., Milton, Wisc.—D, EC, X
 Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.—ST
 Campbell-X-Ray Corp., 138 Brookline Ave., Boston, Mass.—X
 Coleman Electric Co., 318 Madison St., Maywood, Ill.—AP
 Lee De Forest Laboratories, 5106 Wilshire Blvd., Los Angeles, Calif.—D
 Electro-Medical Laboratory, Inc., 1529 Highland Ave., Holliston, Mass.—EC, EE
 Electron Equipment Corp., Palm Springs, Calif.—I
 Electronic Control Corp., 626 Harper, Detroit, Mich.—XM
 Engineering Laboratories, Inc., 624 E. Fourth St., Tulsa, Okla.—EC
 Ferranti Electric, Inc., 30 Rockefeller Plaza, New York, N. Y.—GI
 General Electric Co., 1 River Rd., Schenectady, N. Y.—D, EC, F, X
 Geophysical Instrument Co., 1315 Half St., S.E., Washington, D. C.—GI
 W. & L. E. Gurley, 514 Fulton St., Troy, N. Y.—WM
 Heiland Research Corp., 130 E. Fifth Ave., Denver, Colo.—GI
 Herbach & Rademan Co., 522 Market St., Philadelphia, Pa.—D
 Induction Heating Corp., 389 Lafayette St., New York, N. Y.—I
 Industrial Electronics Corp., 951 McCarter Highway, Newark, N. J.—GL
 Industrial X-Ray Labs., Inc., 1615 Second St., Seattle, Wash.—X
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—D, EC, EE, X
 Laurehk Radio Mfg. Co., 3918 Monroe Ave., Wayne, Mich.—EC
 Lektra Labs., Inc., 30 E. 10th St., New York, N. Y.—EE

ELECTRONIC ENGINEERING DIRECTORY

McKesson Appliance Co., 2228 Ashland Ave., Toledo, Ohio—EC, STE
 The Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland, Ohio—I
 The Patterson Screen Co., 625 Main St., Towanda, Pa. F, XS
 Philips Metalix Corp., 419 Fourth Ave., New York, N. Y.—D, F, X
 Radio Electronic Co., 1816 Villanova Dr., Oakland, Calif.—D, EC
 Record-O-Vox, Inc., 1379 E. 8th St., Brooklyn, N. Y.—D
 Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago, Ill.—D
 Western Electric Co., 195 Broadway, New York, N. Y.—A
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—D, X

Hardware—Connectors and Misc. Parts



Binding postsBP
 Cable clampsCC
 Cable connectorsC
 Coil shieldsCS
 Contact pointsCM
 CouplingsCP
 Flex. control shaftsFS
 Fuses (meter)F
 Fuse holdersFH
 Grid clipsGC
 GrommetsG
 JacksJ
 Mounting bracketsMB
 NutsNL
 PlugsP
 RivetsR
 Safety terminalsSTE
 ScrewsS
 Self tapping screwsSS
 Shielding, rubberSR
 SocketsSKT
 Soldering lugsSL
 SpringsSP
 Clips, springSC
 TerminalsTE
 Terminal stripsT
 Tube shieldsTS
 Tube clampsTC
 Washers, brassWB
 Washers, feltWF
 Washers, fibreFW
 Washers, lockWL
 Washers, plasticWP
 Washers, rubberWR

Aircraft-Marine Products, Inc., 288 N. Broad St., Elizabeth, N. J.—C, GC, P, SL
 Alden Products Co., 119 N. Main St., Brockton, Mass.—BP, C, CP, FH, GC, J, P, SKT
 Allen Mfg. Co., 133 Sheldon St., Hartford, Conn.—S
 American Automatic Electric Sales Co., 1019 W. Van Buren St., Chicago, Ill.—BP, TE
 American Emblem Co., Inc., Box 116-E, Utica, N. Y.—G
 American Instrument Co., Silver Spring, Md.—J, P
 American Microphone Co., 1915 S. Western Ave., Los Angeles, Calif.—C, CP
 American Nut & Bolt Fastener Co., 2029 Doerr St., Pittsburgh, Pa.—NL, FW, WF, WL
 American Phenolic Corp., 1830 S. 54th St., Chicago, Ill., "Amphenol"—C, GC, P, SKT, TS
 American Radio Hardware Co., Inc., 476 Broadway, New York, N. Y., "Arhco"—BP, C, FH, G, GC, J, MB, P, S, SKT, SL, SC, SP, SS, T, TS, FW, WL
 American Screw Co., 21 Stevens St., Providence, R. I.—S, SS
 American Steel & Wire Co., Rockefeller Bldg., Cleveland, Ohio—SP
 Amphenol—American Phenolic Corp.
 Arhco—American Radio Hardware Co.
 Armstrong Cork Co., Lancaster, Pa.—WF, FW
 Arrow-Hart & Hegeman Electric Co., Laurel & Peck Sts., Hartford, Conn.—J
 The Astatic Corp., 830 Market St., Youngstown, Ohio—P, SKT
 Atlantic India Rubber Works, Inc., 1453 W. Van Buren St., Chicago, Ill.—G, P, WR
 Auburn Mfg. Co., 100 Stock St., Middletown, Conn. FW, G, WF
 Airadio, Inc., 2 Selleck St., Stamford, Conn.—C
 N. S. Baer Co., 9 Montgomery St., Hillside, N. J.—FW, T
 Baker & Co., Inc., 113 Astor St., Newark, N. J.—CM
 Barker & Williamson, 235 Fairfield Ave., Upper Darby, Pa.—CP, J, P
 Birmback Radio Co., Inc., 145 Hudson St., New York, N. Y.—BP, CP, FS, P, S, SKT, SL, T, WF, WL
 The Birtcher Corp., 5087 Huntington Dr., N., Los Angeles, Calif.—SKT, TC

C. S. Brainin Co., 233 Spring St., New York, N. Y.—CM
 Breeze Corporations, Newark, N. J.—SR
 The Bristol Co., Waterbury, Conn.—S
 J. H. Bunnell & Co., 81 Prospect St., Brooklyn, N. Y.—BP
 Burndy Engineering Co., 105 Eastern Blvd., New York, N. Y.—C
 Busmann Mfg. Co., University at Jefferson, St. Louis, Mo., "Buss"—F, FH
 Callite Tungsten Corp., 558 39th St., Union City, N. J.—CM
 Cannon Electric Development Co., 3209 Humboldt St., Los Angeles, Calif.—C, P, SKT
 Chandler Products Corp., 1491 Chardon Rd., Cleveland, Ohio—S
 Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.—BP, C, FH, G, R, S, SC, WL
 Chicago Telephone Supply Co., Elkhart, Ind.—J
 Cinch Mfg. Corp., 2335 W. Van Buren St., Chicago, Ill., "Cinch"—BP, C, G, GC, P, SKT, SL, T, TS
 Cinema Engineering Co., 1508 W. Verdugo Ave., Burbank, Calif., "Cinema"—J, P, T
 Cleveland Tungsten, Inc., 10200 Meech Ave., Cleveland, Ohio—CM
 Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—CC, CM, STE
 Columbia Nut & Bolt Co., 945 Main St., Bridgeport, Conn.—NL
 Connector Corp., 401 N. Broad St., Philadelphia, Pa.—C
 Consolidated Molded Products Corp., 309 Cherry St., Scranton, Pa.—BP, T
 Continental Screw Co., 457 Mt. Pleasant St., New Bedford, Mass.—S, SS
 Cook Electric Co., 2700 Southport Ave., Chicago, Ill.—T
 The Daven Co., 158 Summit St., Newark, N. J.—BP
 Dossier & Co., 242 W. 41st St., New York, N. Y.—C
 Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia, Pa.—BP, C, J, P, SKT, SL, T
 Elastic Stop Nut Corp., 2330 Vauxhall Rd., Union, N. J.—NL
 Elco Tool & Screw Corp., 1800 Broadway, Rockford, Ill.—R, S, SS
 Electrical Facilities, Inc., 4224 Holden St., Oakland, Calif.—T
 Erie Can Co., 816 W. Erie St., Chicago, Ill., "Erie"—CS, TS
 H. C. Evans & Co., 1528 W. Adams St., Chicago, Ill.—F, FH, NL, R, S, SS, SL, SP, SC, WL
 Everlock—Thompson-Bremer & Co.
 Federal Screw Products Co., 224 W. Huron St., Chicago, Ill.—G, GC, MB, NL, R, S, SL, SS, T, FW, WL
 A. W. Franklin Mfg. Corp., 175 Vartek St., New York, N. Y.—BP, C, FH, FW, G, GC, MB, P, SC, SKT, SL, SP, T
 Franklin Fibre Lamitex, Corp., Wilmington, Del.—FW
 G-C—General Cement Mfg. Co.
 Gemloid Corp., 7910-7930 Albion Ave., Elmhurst, L. I., N. Y.—G
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill., "G-C"—G, J, NL, P, R, S, SS, SKT, SL, SP, WF, FW, WL
 General Electric Co. 1285 Boston Ave., Bridgeport, Conn., "GE"—P
 General Plate Co., Div. of Metals & Controls Corp., 40 Forest St., Attleboro, Mass.
 General Radio Co., 30 State St., Cambridge, Mass.—BP, J, P
 General Winding Co., 254 W. 31st St., New York, N. Y., "Gen-Win"—BP
 Gen-Win—General Winding Co.
 Goat Metal Stampings, Inc., 314 Dean St., Brooklyn, N. Y., "Goat-Form-Fitting"—GC, TS
 Gregory Mfg. Co., 67 Franklin St., New Haven, Conn.—FH, SL
 Gripmaster—George Walker Co.
 The Harwood Co., 540 N. LaBrea St., Los Angeles, Calif.—C
 John Hassall, Inc., Clay & Oakland Sts., Brooklyn, N. Y.—R, S
 The Holo-Krome Screw Corp., Hartford, Conn.—S
 J. Hope, P. O. Box 666, Wenonah, N. J.—FH, SC, T
 Hunter Pressed Steel Co., Lansdale, Pa.—SC, SP
 ICA—Insuline Corp. of America
 Industrial Screw & Supply Co., 717 W. Lake St., Chicago, Ill.—BP, FW, G, NL, R, S, SL, SS, T, WF, WL
 Instrument Specialties Co., Inc., 244 Bergen Blvd., Little Falls, N. J.—SP
 Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago, Ill.—FW, G
 Insuline Corp. of America, 3602 35th Ave., Long Island City, N. Y., "ICA"—BP, C, CP, CS, FH, FS, FW, G, GC, J, MB, NL, P, R, S, SC, SKT, SL, SP, SS, T, TS, WF, WL
 J.F.D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn, N. Y.—C, FS, P
 E. F. Johnson Co., Waseca, Minn., "Johnson"—BP, CP, FS, GC, J, P, SKT
 Howard B. Jones, 2300 Wabansia Ave., Chicago, Ill., "Howard B. Jones"—C, P, SKT, T
 Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.—C, P, S

Kiegl Bros. University Electric Stage Lighting Co., 321 W. 50th St., New York, N. Y.—C, T
 Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y. SC, SP
 Lenz Electric Mfg. Co., 1751 N. Western Ave., Chicago, Ill.—SKT
 Linick, Green & Reed, Inc., 29 E. Madison St., Chicago, Ill.—FS
 Littelfuse, Inc., 4732 Ravenswood Ave., Chicago, Ill.—C, F, GC, P, SC, SL, SP, T
 Lord Mfg. Co., Erie, Pa.—CP
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind., "Yaxley"—C, FW, G, GC, J, MB, P, S, SL, T, WF, WL
 Manufacturers Screw Products, 216-222 W. Hubbard St., Chicago, Ill.—BP, G, NL, R, S, SL, SS, T, FW, WF, WL
 Micarta Fabricators, Inc., 4619 Ravenswood Ave., Chicago, Ill.—GC, SKT, T, WF
 Mid-West Screw Products Co., Main & St. George St., St. Louis, Mo.—S
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—BP, C, CP, CS, FS, GC, MB, P, SKT, STE, T, TS
 J. W. Miller Co., 5917 S. Main St., Los Angeles, Calif., "Miller"—CS, G, MB, T
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—BP, C, J, P, SKT, T
 Muehlhausen Spring Corp., Logansport, Ind.—SP
 Mueller Electric Co., 1583 E. 31st St., Cleveland, Ohio, "Universal"—GC, SC
 Multi Electrical Mfg. Co., 1840 W. 14th St., Chicago, Ill.—FH, SL
 The Muter Co., 1255 S. Michigan Ave., Chicago, Ill., "Muter"—SL, T
 National Company, Inc., Malden, Mass.—J, P, SKT
 National Lock Washer Co., 40 Hermon St., Newark, N. J.—WL
 The National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, Ohio—R, S, SS
 National Vulcanized Fibre Co., Wilmington, Del.—T, WF
 New England Screw Co., Keene, N. H.—SS
 The North Electric Mfg. Co., P. O. Box 267, Gallon, Ohio—T
 Northam Warren Corp., War Works Div., Stamford, Conn.—P, SKT
 The Palmot Co., 62 Cordier St., Irvington, N. J.—NL
 Parker-Kalon Corp., 200 Varick St., New York, N. Y.—SS
 Patton-MacGuyer Co., 17 Virginia Ave., Providence, R. I.—TE
 Paul & Beekman, Div. of Philadelphia Lawnmower & Mfg. Co., 18th & Courtland Sts., Philadelphia, Pa.—TS
 Penn Fibre & Specialty Co., 2030 E. Westmoreland St., Philadelphia, Pa.—FW
 Penn-Union Electric Corp., 315 State St., Erie, Pa., —C, CP, FH, GC, NL, SC, SL, T, WL
 Perm-O-Flux Corp., 4916 W. Grand Ave., Chicago, Ill.—MB
 Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.—N, S, SS, WB
 Phonette Co. of America, 7122 Melrose Ave., Los Angeles, Calif.—FW, WF
 Printloid, Inc., 93 Mercer St., New York, N. Y.—WP
 The Pyle-National Co., 1334 N. Kostner Ave., Chicago, Ill.—P
 Radex Corp., 1322 Elston Ave., Chicago, Ill.—BP, CS, GC, J, SC
 Radio Essentials, Inc., 69 Wooster St., New York, N. Y.—BP, CS, CP, FW, GC, G, J, MB, NL, P, S, SKT, SL, SP, SS, SC, T, WL
 The Rajah Co., Bloomfield, N. J.—TE
 Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.—SC, SP
 Reed & Prince Mfg. Co., 1 Duncan Ave., Worcester, Mass.—S, SS
 Remler Co., Ltd., 19th at Bryant, San Francisco, Calif., "Remler"—P
 Reynolds Spring Co., 955 Water St., Jackson, Mich. SP
 Bernard Rice's Sons, Inc., 325 Fifth Ave., New York, N. Y.—TE
 Rupp's Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago, Ill.—P, S, SKT, SL
 St. Louis Screw & Bolt Co., 6900 N. Broadway, St. Louis, Mo.—NL, S, WL
 Walter L. Schott Co., 9306 Santa Monica Blvd., Beverly Hills, Calif.—S, SP
 Shakeproof Lock Washer Co., 2539 N. Keeler Ave., Chicago, Ill.—WL
 Small Motors, Inc., 1322 Elston Ave., Chicago, Ill.—BP, CS, J
 Nathan R. Smith Mfg. Co., 105 Pasadena Ave., So. Pasadena, Calif.—SL
 Staco—Standard Electrical Products Co.
 Standard Electrical Products Co., 300 E. 4th St., St. Paul, Minn., "Staco"—T
 Standard Locknut & Lockwasher, Inc., 33-35 W. St. Clair St., Indianapolis, Ind.—NL
 Standard Pressed Steel Co., Jenkintown, Pa.—S, SS
 The States Co., 19 New Park Ave., Hartford, Conn.—BP, SC
 Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—TE
 Synthane Corp., Highland Ave., Oaks, Pa.—SKT, T
 Taylor Fibre Co., Norristown, Pa.—WF
 Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill., "Everlock"—WL

Tinnerman Products, Inc., 2038 Fulton Rd., Cleveland, Ohio
 Trans-American Airports Corp., 271 Madison Ave., New York, N. Y.—G, NL, P, R, S, SC
 Tubular Rivet & Stud Co., Wollaston, Mass.—R
 The Ucinite Co., 459 Watertown St., Newtonville, Mass.—C, CP, FH, MB, SKT, SC, SL, T
 Union Aircraft Products Corp., 380 Second Ave., New York, N. Y.—CS, CP, MB, NL, TS
 United Screw & Bolt Corp., 2513 W. Cullerton St., Chicago, Ill.—BP, C, CP, CS, F, FH, FS, FW, G, GC, J, MB, NL, P, R, S, SKT, SL, SC, SP, SS, T, TS, WF, WL
 United States Rubber Co., 1230 6th Ave., New York, N. Y.—P
 Universal—Mueller Electric Co.
 Universal Microphone Co., Ltd., 424 Warren Lane, Inglewood, Calif.—P
 W. Urban & Co., 518 Broadway, Camden, N. J.—TE
 Utah Radio Products Co., 850 Orleans St., Chicago, Ill.—GC, J, P, TS
 George Walker Co., 118 Amsterdam Ave., Passaic, N. J., "Gripmaster"—CC
 Western Electric Co., 195 Broadway, New York, N. Y.—J, P, SKT, T
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—CP
 The S. S. White Dental Mfg. Co., Industrial Division, 10 E. 40th St., New York, N. Y.—FS
 Whitehead Stamping Co., 1683 W. Lafayette Blvd., Detroit, Mich.—WB
 Wilmington Fibre Specialty Co., Wilmington, Del.—FW
 C. D. Wood Electric Co., Inc., 826 Broadway, New York, N. Y.—BP, J
 Worcester Pressed Steel Co., Worcester, Mass.—CS, G
 Yaxley—P. R. Mallory & Co., Inc.
 Yost Superior Co., Springfield, Ohio—SP
 Zierick Mfg. Corp., 385 Gerard Ave., New York, N. Y. C, GC, MB, SL

Lumenite Electric Co., 407 S. Dearborn St., Chicago, Ill.—R
 Murdock Mfg. Co., 158 Carter St., Chelsea, Mass.—M
 E. A. Myers & Sons, Radioear Bldg., Mt. Lebanon, Pa., "Radioear"—C, M
 Philmore Mfg. Co., 113 University Pl., New York, N. Y., "Philmore"—M
 Quam-Nichols Co., 33rd Pl. & Cottage Grove Ave., Chicago, Ill.—D, M
 Radioear—E. A. Myers & Sons
 Radio Speakers, Inc., 221 E. Cullerton St., Chicago, Ill.—D, M
 The Rola Co., Inc., 2530 Superior Ave., Cleveland, Ohio—M
 Sonotone Corp., Elmsford, N. Y.—C, M
 Stromberg-Carlson Tel. Mfg. Co., 100 Carlson Rd., Rochester, N. Y.—M
 Telex Prods. Co., Telex Park, Minneapolis, Minn.—C, M
 Tibbetts Labs., 12 Norfolk St., Cambridge, Mass.—C
 Trimmed, Inc., 1770 W. Berteau, Chicago, Ill.—M
 Webster Electric Co., 1900 Clark St., Racine, Wis.—W
 Western Electric Co., 195 Broadway, New York, N. Y.—D, M

Insulation & Insulators



Bushings	.....B
Ceramic parts	.....C
Condenser paper	.....CP
Enamel	.....E
Insulating beads	.....IB
Fibre	.....F
Fibre-glass	.....FG
Friction tape	.....FT
Mica	.....M
Mycalex	.....MY
Paper	.....P
Plastics	.....PL
Rubber insulation	.....RI
Scotch tape	.....ST
Special ceramics	.....SC
Steatite	.....S
Stand-off insulators	.....SO
Tubing (varnished)	.....T
Varnished cambric	.....VC
Paper tubing	.....PT
Glass tubing	.....G

Headphones

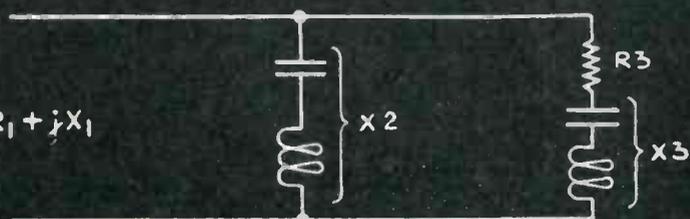


Crystal	.....C
Dynamic	.....D
Magnetic	.....M

American Amplifier & Tel. Co., Inc., 1222 Glendon Ave., Los Angeles, Calif.—M
 Autocrat Radio Co., 3855 N. Hamilton Ave., Chicago, Ill.—M
 Best Mfg. Co., Inc., 1202 Grove St., Irvington, N. J.—D, M
 The Birtcher Corp., 5087 Huntington Dr., N., Los Angeles, Calif.—PL
 Brush Development Co., 3311 Perkins Ave., Cleveland, Ohio—C
 C. F. Cannon Co., Springwater, N. Y.—M
 Carron Mfg. Co., 415 S. Aberdeen St., Chicago, Ill., "Carron"—M
 Chicago Telephone Supply Co., 1142 W. Beardsley Ave., Elkhart, Ind., "Frost"—M
 Conn. Tel. & Elec. Div., Great American Industries Inc., 70 Britannia St., Meriden, Conn.—C, M
 Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia, Pa.—M
 Frost—Chicago Telephone Supply Co.
 General Electric Co., Plastics Dept., 1 Plastics Ave., Pittsfield, Mass.
 Godfrey Mfg. Corp., 2140 N. 27 St., Milwaukee, Wis.—W
 Horni Signal Mfg. Corp., 310 Hudson St., New York, N. Y.—WS
 ICA—Insuline Corp. of America
 Insuline Corp. of America, 3602—35th Ave., Long Island City, N. Y., "ICA"—M
 Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.—M
 Laurehk Radio Mfg. Co., 3918 Monroe Ave., Wayne, Mich., "Laurehk"—C

Acme Wire Co., New Haven, Conn.—FG, VC
 The Akron Porcelain Co., Cory Ave., Akron, Ohio—B, C
 Alden Products Co., 117 N. Main St., Brockton, Mass.—PL, SO
 Alsimag—American Lava Corp.
 American Insulator Corporation, New Freedom, Pa.—PL
 American Lava Corp., Chattanooga, Tenn., "Alsimag"—B, C, IB, SO
 American Phenolic Corp., 1830 S. 54th St., Chicago, Ill., "Amphenol"—C, IB, PL, SO
 Amphenol—American Phenolic Corp.
 Armite—Spaulding Fibre Co., Inc.
 Atlantic India Rubber Works, Inc., 1453 W. Van Buren St., Chicago, Ill.—B
 Auburn Mfg. Co., 100 Stack St., Middletown, Conn.—B, F, P, VC
 N. S. Baer Co., 9 Montgomery St., Hillside, N. J.—F, PL
 Bakelite Corporation, 30 E. 42nd St., New York, N. Y.—E, PL
 Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—B, C, PL, SO
 B & C Insulation Products, Inc., 261 Fifth Ave., New York, N. Y.—PL, T, VC
 Bentley, Harris Mfg. Co., Conshohocken, Pa., "B-H"—T
 B-H—Bentley, Harris Mfg. Co.
 Boonton Molding Co., Boonton, N. J.—PL

(Continued from preceding page)



$$(3) R_1 = R_3 \frac{X_2^2}{(X_2 + X_3)^2 + R_3^2}$$

$$(4) X_1 = X_2 \frac{X_3 (X_2 + X_3) + R_3^2}{(X_2 + X_3)^2 + R_3^2}$$

L. S. Brach Mfg. Corp., 55 Dickerson St., Newark, N. J.—C, F, PL, SO
Wm. Brand & Co., 276 Fourth Ave., New York, N. Y., "Turbo"—M, T, VC
Brandywine Fibre Products Co., 14th & Walnut Sts., Wilmington, Dela.—F
Bud Radio, Inc., 2118 E. 55th St., Cleveland, Ohio, "Bud"—C, SO
Carbide & Carbon Chemicals Corp., Plastics Div., 30 E. 42nd St., New York, N. Y.—PL
Catalin Corp., 1 Park Ave., New York, N. Y., "Loalin"—PL
Celanese Celluloid Corp., 180 Madison Ave., New York, N. Y., "Lumarith Protectoid"—PL
Centralab, 900 E. Keefe Ave., Milwaukee, Wis.—B, C, IB, S, SO
Ceramic Specialties Co., East Liverpool, Ohio
Colonial Kolonite Co., 2212 Armitage Ave., Chicago, Ill.—B, C, F, PL
Consolidated Molded Products Corp., 309 Cherry St., Scranton, Pa.—B, PL
Continental-Diamond Fibre Co., Newark, Dela., "Diamond," "Dilecto"—F, M, PL
Cook Ceramic Mfg. Co., 503 Prospect St., Trenton, N. J.—B, C, IB
Corning Glass Works, Corning, N. Y., "Pyrex"—B, G, IB, SO
Cottrell Paper Co., Inc., 19 Purchase St., Fall River, Mass.—P
Crolite—Henry L. Crowley & Co.
Henry L. Crowley & Co., Inc., 1 Central Ave., West Orange, N. J., "Crolite"—C
Harry Davies Molding Co., 1428 N. Wells St., Chicago, Ill.—PL
Diamond—Continental-Diamond Fibre Co.
Dilecto—Continental-Diamond Fibre Co.
John C. Dolph Co., Dept. a-12, 168 Emmett St., Newark, N. J.—B, C, E, F, FG, FT, G, IB, M, P, PL, PT, SO, ST, T, VC
Dow Chemical Co., Plastics Div., Midland, Mich.—PL
E. I. DuPont de Nemours & Co., Inc., Plastics Dept., 626 Schuyler Ave., Arlington, N. J.—PL
Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., "Durez"—PL
Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia, Pa.—PL
Electronic Mechanics, Inc., 70 Clifton Blvd., Clifton, N. J.—C
Endurette Corp. of America, Cliffwood, N. J.—P, T, VC
Federal Screw Products Co., 224 W. Huron St., Chicago, Ill.—T
Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati, Ohio, "Formica"—PL
A. W. Franklin Mfg. Corp., 175 Varick St., New York, N. Y.—B, C, PL
Franklin-Fibre-Lamitex Corp., Wilmington, Dela.—B, F, PL
Fyberoid—Wilmington Fibre Specialty Co.
Gemold Corp., 7910-7930 Albion Ave., Elmhurst, L. I., N. Y.—PL
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—B, E, F, FG, FT, P, ST, T, VC
General Ceramics & Steatite Corp., Keasby, N. J.—C, IB, S, SO
General Electric Co., 1 River Rd., Schenectady, N. Y.—B, C, F, FT, M, MY, PL, VC
General Electric Co., Plastics Dept., 1 Plastics Ave., Pittsfield, Mass.—PL
The General Industries Co., Taylor & Olive Sts., Elyria, Ohio—PL
General Paper Tube Co., 430 E. Chelton Ave., Philadelphia, Pa.—PT
Halowax Products Division, Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.—PL
Hodgman Rubber Co., Framington, Mass.—RI
J. Hope, P. O. Box 666, Wenonah, N. J.—CP, IB, VC
ICA—Insuline Corp. of America
Imperial Porcelain Works, Inc., Trenton Ave. & Mulberry St., Trenton, N. J.—B, C
Industrial Molded Products Co., 2035 Charleston, Chicago, Ill.—PL
Industrial Synthetics Corp., 60 Woolsey St., Irvington, N. J.—B, PL, T
Industrial Screw & Supply Co., 717 W. Lake St., Chicago, Ill.—FT, ST, T
Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago, Ill.—B, E, F, FG, FT, G, M, P, PT, ST, T, VC
Insulation Products Co., 504 N. Richland St., Pittsburgh, Pa.—PL
Insuline Corp. of America, 3602 35th Ave., Long Island City, N. Y., "ICA"—B, C, E, F, FG, IB
Insurok—The Richardson Co.
Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington, N. J., "Trv-O-Volt"—E, FG, P, PL, T, VC
Irv-O-Volt—Irvington Varnish & Insulator Co.
Isolatite, Inc., 343 Cortlandt St., Belleville, N. J.—B, C, IB, SC, SO
E. F. Johnson Co., Waseca, Minn.—C
Katz & Quash, Inc., 33 W. 60th St., New York, N. Y.—IB
Keystone Specialty Co., 1373 1/2 Cove Ave., Lakewood, Cleveland, Ohio—PL
J. R. Kilburn Glass Co., Inc., S. Worcester St., Chertsey, Mass.—B, SO
Knox Porcelain Corp., Knoxville, Tenn.—C, SO
Lamicoid—Mica Insulator Co.
Lapp Insulator Co., Inc., Le Roy, N. Y.—B, C, SO
Lavite—D. M. Steward Mfg. Co.
Lenoxite Div., Lenox, Inc., 65 Prince St., Trenton, N. J.—B, C, S, SC, SO
Laplin—Catalin Corp.

Locke Insulator Corporation, S. Charles & Cromwell Sts., Baltimore, Md.—B, C, SO
The Louthan Mfg. Co., 200 Harvey Ave., East Liverpool, Ohio—B, C
Lumarith Protectoid—Celanese Celluloid Corp.
The Macallen Co., 16 Macallen St., Boston, Mass.—M
Makalot Corp., 262 Washington St., Boston, Mass.—PL
John A. Manning Paper Co., Inc., Troy, N. Y.—F, P
The Metsch Refractories Co., East Liverpool, Ohio—C
Mica Insulator Co., 200 Varick St., New York, N. Y., "Lamicoid," "Mico"—B, F, FG, FT, G, M, P, PL, T, VC
Mica Products Mfg. Co., 69 Wooster St., New York, N. Y.—B, F, M, P, T, VC
Micarta Fabricators, Inc., 4619 Ravenswood Ave., Chicago, Ill.—F, PL, T
Mico—Mica Insulator Co.
James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—C, IB, PL, SO
Mitchell-Rand Insulation Co., 51 Murray St., New York, N. Y.—F, FG, FT, G, M, P, ST, T, VC
Molded Insulation Co., 335 East Price St., Philadelphia, Pa.—PL
Monsanto Chemical Co., Plastics Division, Springfield, Mass.—PL
Multi Electrical Mfg. Co., 1840 W. 14th St., Chicago, Ill.—B
Eugene Munsell & Co., 200 Varick St., New York, N. Y.—M
Mycalex Corporation of America, 60 Clifton Blvd., Clifton, N. J.—B, C, SC, SO
N-C—National Company, Inc.
National Co., Inc., Malden, Mass., "N-C"—C
National Porcelain Co., 400 Southard St., Trenton, N. J.—BC, IB, SC, SO
National Tile Co., 26th & Lynn Sts., Anderson, Ind.—C, IB, SO
National Vulcanized Fibre Co., Wilmington, Dela., "Phenolite"—F, P, PL
Nepperhan Sales Co., 175 Fifth Ave., New York, N. Y.—FG, G, T, VC
New England Mica Co., Waltham, Mass.—M
New England Radiocrafters, 1156 Commonwealth Ave., Brookline, Mass.—PL
Northern Industrial Chemical Co., Elkins St., S. Boston, Mass.—PL
Norton Laboratories, Inc., 520 Mill St., Lockport, N. Y.—PL
Ohmoid—Wilmington Fibre Specialty Co.
Pacific Clay Products, 306 W. Ave. 26, P. O. Box 145, Sta. A, Los Angeles, Calif.—"Steapactite"—C
Parisian Novelty Co., 3510 S. Western Ave., Chicago, Ill.—PL
Penn Fibre & Specialty Co., 2030 E. Westmoreland St., Philadelphia, Pa.—R, F, PL, SO
Phenolite—National Vulcanized Fibre Co.
Plastics Division, Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y.—PL
Plex Corp., 133 Walnut St., Hartford, Conn.—PL, SO
Prestolite, Inc., 11 Cedar Ave., Paterson, N. J.—PL
Porcelain Enamel & Mfg. Co., Plastics Div., 5601 Eastern Ave., Baltimore, Md.—M, PL
The Precrain Insulator Corp., Main St., Lima, N. Y.—R, C, SO
Porcelain Products, Inc., 124 W. Front St., Findlay, Ohio—R, C, SO
Precision Power Tube Co., 2933 W. Charleston St., Chicago, Ill.—P, PL, PT, T
Printolite, Inc., 93 Meador St., New York, N. Y.—B
Pyrex—Corning Glass Works
Racor Elec. Co., Inc., 52 E. 19th St., New York, N. Y.—B
Radio Enamel, Inc., 63 Wooster St., New York, N. Y.—B, SO, T
Retto Molded Products, Inc., Appleton & B. & O. E. R., Cincinnati, Ohio—PL
Reynolds Spring Co., Molded Plastics Division, Cambridge, Mass.—PL
The Richardson Co., Melrose Park, Ill., "Insurok"—PL
Rogan Bros., 2001 S. Michigan Ave., Chicago, Ill.—PL
The T. R. Routh Co., 1045 Bryant St., San Francisco, Calif.—SO
Rupp's Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago, Ill.—B
Saxonburg Potteries, Saxonburg, Pa.—C
Smith Paper Co., Inc., Lee, Mass.—CP
Spaulding Fibre Co., Inc., 310 Wheeler St., Tonawanda, N. Y., "Spauldite," "Armitite," "Spauldo"—B, F, PL
Spauldite—Spaulding Fibre Co., Inc.
Spauldo—Spaulding Fibre Co., Inc.
Square D Co., 6060 Rivard St., Detroit, Mich.—P
Star Porcelain Co., 41 Muirhead Ave., Trenton, N. J.
Steapactite—Pacific Clay Products
D. M. Steward Mfg. Co., Chattanooga, Tenn., "Lavite"—C, IB, SO
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—C
Synthane Corp., Highland Ave., Oaks, Pa., "Synthane"—PL
Taylor Fibre Co., Norristown, Pa.—F, PL
R. Thomas & Sons Co., Lishon, Ohio—B, C, SO
Tingstol Corp., 1461 W. Grand Ave., Chicago, Ill.—PL
Tungston Contact Mfg. Co., 7511 Cottage Ave., North Bergen, N. J.—PL
Turbo—Wm. Brand & Co.
Ucinite Co., 459 Watertown Ave., Newtonville, Mass.—PL
U. S. Rubber Co., 1230 Sixth Ave., New York, N. Y.—FT
Universal Clay Products Co., Sandusky, Ohio—C, SO

W. Urban & Co., 518 Broadway, Camden, N. J.—F, SO
Vap-O-Lite Co., see Nepperhan Sales Co.
Varflex Corp., Rome, N. Y.—FG, T
Victor Insulators, Inc., Maple Ave., Victor, N. Y.—B, C, IB, SO
Washington Porcelain Co., Washington, N. J.—C, SO
R. D. Werner Co., Inc., 380 Second Ave., New York, N. Y.—PL
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.—B, C, F, FG, FT, M, P, PL, PT, SO, T, VC
West Virginia Pulp & Paper Co., 230 Park Ave., New York, N. Y.—F
Whitney Blake Co., New Haven, Conn.—PL
Wilmington Fibre Specialty Co., Wilmington, Dela., "Fyberoid," "Ohmoid"—F, PL

Inter-Communicating Systems



WiredW
WirelessWS
American Amplifier & Tel. Co., Inc., 1222 Glendon Ave., Los Angeles, Calif.—W
American Communications Corp., 306 Broadway, New York, N. Y.—W
American Automatic Electric Sales Co., 1019 W. Van Buren St., Chicago, Ill.—W
Austin Electronic Mfg. Co., Warren, Pa., "Port-A-Fone"—W, WS
Auth Electrical Specialty Co., Inc., 422 E. 53rd St., New York, N. Y.—W
Autocrat-Phone—Autocrat Radio Co.
Autocrat Radio Co., 3855 N. Hamilton Ave., Chicago, Ill., "Autocrat-Phone"—W
Bank's Mfg. Co., 1105 Lawrence Ave., Chicago, Ill.—W
Belfone—Bell Sound Systems, Inc.
Bell Sound Systems, Inc., 1183 Essex Ave., Columbus, Ohio, "Belfone"—W
David Bogen Co., Inc., 663 Broadway, New York, N. Y.—W, WS
Chicago Sound Systems Co., 2124 S. Michigan Ave., Chicago, Ill.—W, WS
Clarion—Electronic Corp. of America
Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—W
Communications Co., Inc., 300 Greco Ave., Coral Gables, Fla.—W
Conn. Telephone & Elec. Div., Great American Industries, Inc., Meriden, Conn.—W
Control Corp., 600 Stinson Blvd., Minneapolis, Minn.—W
De Wald Radio Mfg. Corp., 440 Lafayette St., New York, N. Y.—W
Frank I. Dufrane Co., Inc., 1138 Howard St., San Francisco, Calif.—W, WS
Electrical Research Lab, Inc., 122 W. New York St., Evanston, Ill.—W
Electronic Corp. of America, 45 W. 18th St., New York, N. Y., "Clarion"—W
Executone, Inc., 415 Lexington Ave., New York, N. Y.—W
Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—W
Gentlemen Products Division, Henney Motor Co., 1708 Cuming St., Omaha, Neb.—W, WS
Godfrey Manufacturing Corp., 2140 N. 27th St., Milwaukee, Wis.—W
Hollywood Electronic Co., 800 Sunset Blvd., Los Angeles, Calif.—W
Intercall Systems, Inc., 610 Linden Ave., Dayton, Ohio—W
International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—W, WS
Lake Mfg. Co., 2323 Chestnut St., Oakland, Calif., "Voycall"—W
Laurehk Radio Mfg. Co., 3918 Monroe Ave., Wayne, Mich.—W
Lektra Laboratories, Inc., 30 E. Tenth St., New York, N. Y.—W
John Meck Industries, Liberty St., Plymouth, Ind.—W
Megard Corp., 331 W. 38th St., Los Angeles, Calif.—W
Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill.—W
Miles Reproducer Co., 812 Broadway, New York, N. Y.—W, WS
National Inter-Communicating Systems, 2434 Montrose Ave., Chicago, Ill.—W
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles, Calif.—W
The North Electric Mfg. Co., P. O. Box 267, Galion, Ohio—W
Operadio Mfg. Co., 13th & Indiana Sts., St. Charles, Ill.—W
Philon Radio & Television Corp., Tioga & C Sts., Philadelphia, Pa.—W
Phonette Co. of America, 7122 Melrose Ave., Los Angeles, Calif.—W
Port-A-Fone—Austin Electronic Mfg. Co.
Radex Corp., 1322 Elston Ave., Chicago, Ill.—WS
Radio Electronic Co., 1816 Villanova Dr., Oakland, Calif.—W, WS
The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—W
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—W, WS

Record-O-Vox, Inc., 1379 E. 8th St., Brooklyn, N. Y.—W, WS
 Regal Amplifier Mfg. Corp., 14 W. 17th St., New York, N. Y. "Tok-Fone"—W, WS
 Remler Co., Ltd., 2101 Bryant St., San Francisco, Calif., "Remler"—W
 Select-O-Phone Co., 1012 Eddy St., Providence, R. I.—W
 Silman Mfg. Corp., 305 Pennsylvania Ave., Pittsburgh, Pa.—W
 Mark Simpson Mfg. Co., Inc., 188 W. 4th St., New York, N. Y.—W
 Stromberg-Carlson Tel. Mfg. Co., 100 Carlson Rd., Rochester, N. Y.—W
 Telemotor Corp., 260 5th Ave., New York, N. Y.—W Tok-Fone—Regal Amplifier Mfg. Corp.
 Trebor Radio Co., Pasadena, Calif.—W
 Troy Radio & Television Co., 1144 S. Olive St., Los Angeles, Calif.—W, WS
 Vovca.—Lake Mfg. Co.
 Western Sound & Electric Labs., Inc., 3512 W. St. Paul, Milwaukee, Wis.—W, WS

Brush Development Co., 3311 Perkins Ave., Cleveland, Ohio—RO, SM, VM, WA
 J. H. Bunnell & Co., 81 Prospect St., Brooklyn, N. Y. RD
 Wm. W. L. Burnett Radio Laboratory, 4814 Idaho St., San Diego, Calif.—FS
 Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.—PH
 Campbell X-Ray Corp., 138 Brookline Ave., Boston, Mass.—X
 Carrier Corp., Syracuse, N. Y.—RC
 Carron Mfg. Co., 415 S. Aberdeen St., Chicago, Ill.—L, SA, SR
 Central Scientific Co., 1700 Irving Park Blvd., Chicago, Ill.—CA, CO
 Cinema Engineering Co., 1508 W. Verdugo Ave., Burbank, Calif.—B, EF, R, RD
 The Clough-Brengle Co., 5501 Broadway, Chicago, Ill.—B, E, FS, O, SA, SR
 Coleman Electric Co., 318 Madison St., Maywood, Ill.—S, PH
 Commercial Engineering Laboratories, 4612 Woodward Ave., Detroit, Mich.—VM
 Communication Measurements Laboratory, 136 Liberty St., New York, N. Y.—B
 C. G. Conn, Ltd., Elkhart, Ind.—FS, VM, WA
 Consolidated Engineering Corp., Pasadena, Calif.—O
 Cornell-Dubilier Electric Corp., 1000 Hamilton Blvd., S. Plainfield, N. J.—B, C, DC
 Corning Glass Works, Corning, N. Y.—CA
 The R. W. Cramer Co., Inc., Centerbrook, Conn.—ES
 The Daven Co., 158 Summit St., Newark, N. J.—RD
 Tohe Deutschmann Corp., Canton, Mass.—B, C
 John Dougherty, 74 N. Willow St., Montclair, N. J.—RC
 Allen B. DuMont Labs, Inc., 2 Main Ave., Passaic, N. J.—ES, O
 Electro-Medical Laboratory, Inc., 1529 Highland Ave., Holliston, Mass.—O, OA, OD, VM
 Electro Products Laboratories, 549 W. Randolph St., Chicago, Ill.—FS, SA
 Electronic Control Corp., 626 Harper, Detroit, Mich.—ES, X
 Electronic Products Co., 19 N. First St., Geneva, Ill.—CA, CO, ES, RD
 Engineering Laboratories, Inc., 624 E. Fourth St., Tulsa, Okla.—SW, VM
 Erco Radio Labs, Inc., Hempstead, L. I., N. Y.—FS
 Ess Instrument Co., George Washington Bridge Plaza, Fort Lee, N. J.—CO
 Federal A. C. Switch Corp., 1200 Niagara St., Buffalo, N. Y.—ES
 Federal Telephone & Radio Corp., 1000 Passaic Ave., E. Newark, N. J.—RE
 Ferranti Electric, Inc., 30 Rockefeller Plaza, New York, N. Y.—E
 Ferris Instrument Corp., 110 Cornelia St., Boonton, N. J.—DA, FS, SR
 Fisher Scientific Co., 711 Forbes St., Pittsburgh, Pa.—CO, GA, PH
 Freed Transformer Co., 72 Spring St., New York, N. Y.—E, EF, L
 Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago, Ill.—CA
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—FS
 General Electric Co., 1 River Rd., Schenectady, N. Y.—B, C, CA, DC, E, ES, FS, L, O, R, RD, SA, SM, SR, SW, VM, WA, X
 General Electric X-Ray Corp., 2012 Jackson Blvd., Chicago, Ill.—X
 General Radio Co., 30 State St., Cambridge, Mass.—"Strobolux," "Strobotac"—B, C, DA, DC, E, FS, L, O, R, RD, SA, SR, ST, SW, VM, WA
 Gisholt Machine Co., 13 S. Baldwin St., Madison, Wis.—VM
 Hardwick, Hindle, Inc., 40 Herman St., Newark, N. J.—R
 Hathaway Instrument Co., 1315 S. Clarkson, Denver, Colo.—FS, O, OD, VM
 H-B Electric Co., 6122 N. 21st St., Philadelphia, Pa.—ES

Heiland Research Corp., 130 E. Fifth Ave., Denver, Colo.—O, RA, VM
 Herbach & Rademan Co., 522 Market St., Philadelphia, Pa.—CO, ES, FS, O, VM, X
 Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—L, E, FS, SA, SW, WA
 The Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland, Ohio—B, FS, O, SA, SW, SR
 Hollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—O, SA, SR, VM
 Hollywood Transformer Co., 645 N. Martel Ave., Los Angeles, Calif.—L
 Industrial Filter & Pump Mfg. Co., 3017 W. Carroll Ave., Chicago, Ill.—SC
 Industrial Instruments, 156 Culver Ave., Jersey City, N. J.—B, RD
 Industrial X-Ray Laboratories, Inc., 1615 2nd Ave., Seattle, Wash.—X
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—B, C, CA, CO, E, EF, ES, L, O, R, RA, SM, SW, VM, WA, X
 The Jackson Electrical Instrument Co., Dayton, Ohio—O, SA
 Jarrell Ash Co., 165 Newbury St., Boston, Mass.—CA, X
 Klett Mfg. Co., 179 E. 87th St., New York, N. Y.—CO
 Kold-Hold Mfg. Co., 424 N. Grand Ave., Lansing, Mich.—RC
 L. A. B. Corp., P. O. Box 162, Summit, N. J.—VM
 Landis & Gyr, Inc., 104 Fifth Ave., New York, N. Y.—R
 Lapp Insulator Co., Inc., Le Roy, N. Y.—C, DA
 Lavoie Laboratories, Morganville, N. J.—FS
 Leeds & Northrup Co., 4901 Stanton Ave., Philadelphia, Pa.—B, DC, RD
 Littifeus, Inc., 4732 Ravenswood Ave., Chicago, Ill.—ES
 Luxtral Co., 54 W. 21st St., New York, N. Y.—CA
 Measurements Corp., Box 88, Boonton, N. J.—F, SA, SR, SW
 Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill.—FS
 Merwin-Wilson Co., New Milford, Conn.—E, L
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—FS, O
 Mobile Refrigeration, Inc., 630—5th Ave., New York, N. Y.—RC
 Wm. Mogy & Sons, Inc., Plainfield, N. J.—OE
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—VM
 Monarch Mfg. Co., 3341 Belmont Ave., Chicago, Ill.—"Monarch"—B, M, SR, VT
 Motor Mike—Sprague Products Co.
 Motor Products Corp., 2301 Davis St., N. Cicero, Ill.—RC
 New York Transformer Co., 26 Waverly Place, New York, N. Y.—L
 The Ohio Carbon Co., 12508 Berea Rd., Cleveland, Ohio—R
 Ohmite Mfg. Co., 4984 W. Flournoy St., Chicago, Ill.—DA, RD
 Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—B, C, E
 Panoramic Radio Corp., 242 W. 55th St., New York, N. Y.—O, WA
 Peerless Laboratories, Inc., 115 E. 23rd St., New York, N. Y.—X
 The Perkin-Elmer Corp., P. O. Box 331, Glenbrook, Conn.—LE, OE
 Pfaltz & Bauer, Inc., 350 Fifth Ave., New York, N. Y.—CO
 Philips Metalix Corp., 419 Fourth Ave., New York, N. Y.—X
 Photobell Corp., 114 Nassau St., New York, N. Y.—B, CA, CO, DC, ES, L, SA
 Protovolt Corp., 95 Madison Ave., New York, N. Y.—CA, CO
 Physicists Research Co., 343 S. Main St., Ann Arbor, Mich.—SM

Laboratory and Production Test Equipment



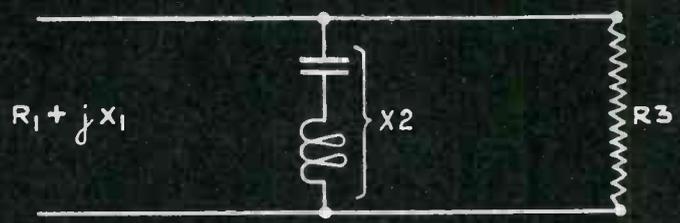
See also Measuring Instruments and Test & Maintenance

Bridges	B
Color analyzers	CA
Colorimeters	CO
Condenser specialties	C
Decade boxes, capacity	DC
Decade boxes, resistance	RD
Dummy antennas	DA
Electric wave filters	E
Electronic balances	EB
Electronic switches	ES
Equalizing filters	EF
Frequency standards	FS
Frequency response recorders	FR
Gas analyzers	GA
Inductance specialties	L
Lenses	LE
Optical equipment	OE
Oscillographs, accessories	OA
Oscillographs, direct-writing	OD
Oscilloscopes	O
P. E. densitometers	PD
PH meters	PH
Radio spectrum analyzers	RA
Rectifiers	RE
Refrigerated test cabinets	RC
Resistance specialties	R
Salt-spray cabinets	SC
Spectrographic equipment	S
Square wave gen.	SW
Standard signal A.F. gen.	SA
Standard signal R.F. gen.	SR
Stroboscopes	ST
Surface analyzers	SM
Tuning fork oscillators	TO
Vibration measuring equipment	VM
Wave analyzers	WA
X-ray equipment	X

Aerovox Corp., 742 Belleville Ave., New Bedford, Mass.—B, C, IT
 Aircraft Accessories Corp., Fairfax & Punsten Rd., Kansas City, Kan.—DA, FS, O, SA, SR, SW
 American Automatic Electric Sales Co., 1019 W. Van Buren St., Chicago, Ill.—RD
 American Coils Co., 29 Lexington St., Newark, N. J.—RC
 American Instrument Co., Silver Spring, Md.—B, CO, RC, S, SA, TF, VM
 American Transformer Co., 180 Emmet St., Newark, N. J.—E, EF, L
 Amplifier Co. of America, 17 W. 20th St., New York, N. Y.—E, IT
 R. B. Annis Co., 1101 N. Delaware St., Indianapolis, Ind.—ER, O, VM
 Applied Research Laboratories, 4336 San Fernando Rd., Glendale, Calif.—PD, S
 Approved Technical Apparatus Co., 733 Blake Ave., Brooklyn, N. Y.—C, SR
 Associated Research, Inc., 431 S. Dearborn St., Chicago, Ill., "Vibrotest"—B, R, RD
 Audio Development Co., 2833 13th Ave., S., Minneapolis, Minn.—S, EF
 The Audio-Tone Oscillator Co., 60 Walter St., Bridgeport, Conn.—E, SW
 Alfred W. Barber Laboratories, 34-04 Francis Lewis Blvd., Flushing, L. I., N. Y.—FS, RA, SA, SW, WA
 Barker & Williamson, 235 Fairfield Ave., Upper Darby, Pa.—L
 James G. Biddle Co., 1211-13 Arch St., Philadelphia, Pa.—R, VM
 Boonton Radio Corp., Boonton, N. J., "Q Meter," "QX Checker"—SR
 Bradley Labs., Inc., 81 Meadow St., New Haven, Conn., "Varistor"—RE
 Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—FS

(Continued from preceding page)

Where $X_3 = 0$ we have :—



From which :

(5) Here : $R_1 = R_3 \frac{X_2^2}{X_2^2 + R_3^2}$ (7) $X_2 = \pm R_3 \sqrt{\frac{R_1}{R_3 - R_1}} = \frac{R_1 R_3}{X_1}$

and :

(6) $X_1 = X_2 \frac{R_3^2}{X_2^2 + R_3^2}$ (8) $R_3 = \frac{X_1^2 + R_1^2}{R_1}$

Potter Co., 1950 Sheridan Rd., N. Chicago, Ill., "Potter"—C
Q Meter—Boonton Radio Corp.
QX Checker—Boonton Radio Corp.
Radex Corp., 1322 Elston Ave., Chicago, Ill.—B
Radio City Products Co., Inc., 127 W. 26th St., New York, N. Y.—B, FM, O, SA, SR, SW
Radio Electronic Co., 1817 Villanova Drive, Oakland, Calif.—CA, CO
Radio Electronics Laboratory, Inc., 120 Freeman St., Brooklyn, N. Y.—O
The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—FS
Rawson Electrical Instrument Co., 110 Potter St., Cambridge, Mass.—IT
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—ES, O, SA, SR, SW
Riverbank Laboratories, Geneva, Ill.—FS
Roller-Smith Co., Bethlehem, Pa.—B
Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago, Ill.—B, C, E, ES, L, O, SA, SW, VM
Rubicon Co., 3751 Ridge Ave., Philadelphia, Pa.—B, CA, CO
Saxl Instrument Co., Inc., 38 James St., E. Providence, R. I.—SM, VM
Schaar & Co., 754 W. Lexington St., Chicago, Ill.—CO, RC
Schüttig & Co., 9th & Kearny Sts., Washington, D. C.—B, C, DA, L, R
Shallcross Mfg. Co., 10 Jackson Ave., Collingdale, Pa.—B, R, RD
Shure Bros., 225 W. Huron St., Chicago, Ill.—VM
F. W. Sickles Co., Chicopee, Mass.—L
F. A. Smith Mfg. Co., Inc., P. O. Box 509, Rochester, N. Y.—ES
Solar Mfg. Corp., 586 Avenue A, Bayonne, N. J.—C
Sound Apparatus Co., 150 W. 46th St., New York, N. Y.—ES, FR, FS
Sprague Products Co., N. Adams, Mass., "Motor Mike"—C
Sprague Specialties Co., N. Adams, Mass.—C
The States Co., 19 New Park Ave., Hartford, Conn.—DA
Strobolux—General Radio Co.
Strobotac—General Radio Co.
Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—O
Supreme Instruments Corp., Howard St., Greenwood, Miss., "Supreme"—B, O, RD
S-W Inductor Co., 1056 N. Wood St., Chicago, Ill.—L
C. J. Tagliabue Mfg. Co., 540 Park Ave., Brooklyn, N. Y.—B
Tech Laboratories, 7 Lincoln St., Jersey City, N. J., "Tech Lab"—B, R, SL
Technical Apparatus Co., Inc., 1171 Tremont St., Boston, Mass.—B, ES, O, SA, SW
Tenney Engineering, Inc., 8 Elm St., Montclair, N. J.—RC
Thorlanson Electric Mfg. Co., 500 W. Huron St., Chicago, Ill.—E, EF
Tibbetts Laboratories, 12 Norfolk St., Cambridge, Mass.—O
Transformer Engineering Co., Stamford, Conn.—E, EF
Trinlett Electrical Instrument Corp., Harmon Rd., Bluffton, Ohio—B, SR
Triumph Mfg. Co., 913-21 W. Van Buren St., Chicago, Ill.—O, SR
United Cinephone Corp., Torrington, Conn.—B, SL
United Transformer Co., 150 Varick St., New York, N. Y.—B, E, EF, L, SA, WA
Varistor—Bradley Labs., Inc.
Vibrofest—Associated Research, Inc.
Waugh Laboratories, 420 Lexington Ave., New York, N. Y.—VM
Wm. M. Welch Mfg. Co., 1515 N. Sedgwick St., Chicago, Ill.—RD
Western Electric Co., 195 Broadway, New York, N. Y.—B, E, EF, FM, VM, WA
Weston Electrical Instrument Corp., 597 Frelinghuysen Ave., Newark, N. J.—SR
The S. S. White Dental Mfg. Co., Industrial Division, 10 E. 40th St., New York, N. Y.—R

Alliance Mfg. Co., Alliance, Ohio—FR
Andrews & Perillo Mfg. Corp., 39-30 Crescent St., Long Island City, N. Y.—D, J
Bear Mfg. Co., Rock Island, Ill.—VC
Black & Decker Electric Co., Kent, Ohio—FR
Bodine Electric Co., 2266 W. Ohio St., Chicago, Ill.—FR
The Brown-Brockmeyer Co., 1004 Smithville, Dayton, Ohio—FR, G
Burgess Battery Co., 180 N. Wabash Ave., Chicago, Ill.—MN
Century Electric Co., 1808 Pine St., St. Louis, Mo.—FR
Cleveland Tungsten, Inc., 10200 Meech Ave., Cleveland, Ohio—PW
Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—CW, P
Continental Machines, Inc., 1301 Washington Ave., S., Minneapolis, Minn.—MF
Crescent Industries, Inc., 4140 Belmont Ave., Chicago, Ill.—D
The Dickey-Grabler Co., 10302 Madison Ave., Cleveland, Ohio—D
Diehl Mfg. Co., 80 Trumbull St., Elizabethport, N. J.—FR
Distillation Products, Inc., 755 Ridge Rd., W., Rochester, N. Y.—VP
The Dumore Co., 1225-14th St., Racine, Wis.—FR
Ecco High Frequency Electric Corp., 7020 Hudson Blvd., N. Bergen, N. J.—VM
Eisler Engineering Co., 740-770 S. 13th St., Newark, N. J.—CW, L, VM, VP, VT
Emerson Electric Mfg. Co., 410 N. 19th St., St. Louis, Mo.—FR
Fairbanks, Morse & Co., 606 S. Michigan Ave., Chicago, Ill.—FR
General Electric Co., 1 River Rd., Schenectady, N. Y.—FR, VM, VP
General Motors Corp., Sunlight Electrical Div., 523 Dana Ave., Warren, Ohio—FR
The General Industries Co., Taylor & Olive Sts., Elyria, Ohio—FR
Haydon Mfg. Co., Inc., Forestville, Conn.—FR
Haydu Bros., Plainfield, N. J.—VM, VP
Holtzer-Cabot Electric Co., 125 Armory St., Boston, Mass.—FR
Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J.—IT, MO
Kahle Engineering Co., 1307-7th St., N. Bergen, N. J.—CW, VM, VP
Kinney Mfg. Co., 3529 Washington St., Boston, Mass.—VP
Kollman Instrument Div., Square D Co., 80-08-45th Ave., Elmhurst, L. I., N. Y.—SM
Korfund Co., Inc., 48-15-32nd Pl., Long Island City, N. Y.—VC
Lear Avia, Inc., Piqua, Ohio—FR
Leland Electric Co., 1501 Webster St., Dayton, Ohio—FR
Lepel High Frequency Labs Inc., 39 W. 60th St., New York, N. Y.—CW
Linick, Green & Reed, Inc., 29 E. Madison St., Chicago, Ill.—P
The Maico Co., Inc., 2832 Nicollet Ave., Minneapolis, Minn.—D, J
Markem Machine Co., Keene, N. H.—MN
Master Electric Co., 126 Davis Ave., Dayton, Ohio—FR
Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill., "Meissner"—CW
Merwin-Wilson Co., New Milford, Conn.—CW
New Jersey Machine Corp., Willow Ave., at 16th St., Hoboken, N. J.—VP
Numeral Stamp & Tool Co., 379 Huguenot Ave., Staten Island, N. Y.—MN
O'Neill-Irwin Mfg. Co., 316-8th Ave., S., Minneapolis, Minn.—MF
Pratt & Whitney Div. of Niles-Bement-Pond Co., West Hartford, Conn.—L
Production Instrument Co., 710 W. Jackson Blvd., Chicago, Ill.—CW
Radex Corp., 1322 Elston Ave., Chicago, Ill.—CW, FR, IM
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—VM
Reynolds Electric Co., 2650 W. Congress St., Chicago, Ill.—FR, G
Robbins & Myers, 1934 Clark Blvd., Springfield, Ohio—FR
Signal Electric Mfg. Co., 1939 Troam St., Menominee, Mich.—FR
F. A. Smith Mfg. Co., Inc., P. O. Box 509, Rochester, N. Y.—FR
Tingstol Corp., 1461 W. Grand Ave., Chicago, Ill.—CW
Harold E. Trent Co., Leverington Ave., & Wilde St., Manayunk, Philadelphia, Pa.—HT, IM
U. S. Electrical Motors, Inc., 200 East Slauson Ave., Los Angeles, Calif.—FR
U. S. Electrical Tool Co., 1050 Findlay St., Cincinnati, Ohio—G
Universal Winding Co., 1655 Elmwood Ave., Cranston, R. I.—CW
Wagner Electric Corp., 6410 Plymouth Ave., St. Louis, Mo.—FR
Westinghouse Electric & Mfg. Co., 1216 W. 58 St., Cleveland, Ohio—AC
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—AC
Yeomans Brothers Company, 1433 Dayton St., Chicago, Ill.—VP

Measuring Instruments



Ammeters, indicatingA
Ammeters & milliammeters, recording.....AM
Attenuation metersAR
Distortion metersD
Electronic hygrometersEH
Electrostatic VME
Field strength metersF
Frequency measuring devices.....FM
GalvanometersG
Insulation testersIT
Light intensityL
Megohm metersMO
MicrovoltmetersMV
Multi-metersM
Phase angle metersP
Sound level meters & recorders.....S
TachometerTA
TelemeterTM
Thermo-couplesTH
Thermometers & pyrometersT
Tuning forkTF
Vacuum gaugesVG
Vac. tube voltmeters.....VT
Volum indicatorsVI
VoltmetersV
Watt-hour metersWH
Watt metersW
Wave metersWM

Aetna Electrical Mfg. Corp., 276 McKibbin St., Brooklyn, N. Y.
Aircraft Accessories Corp., Fairfax & Funsten Rd., Kansas City, Kans.—FM, WM
Airplane & Marine Instruments, Inc., Box 92, Clearfield, Pa.—FM
Allen Elec. & Equip. Co., 2103 Pitcher St., Kalamazoo, Mich.—A, V
American Instrument Co., Silver Spring, Md.—T
American Thermo-Electric Co., 69 E. 8th St., New York, N. Y.—TH (vacuum)
Amplifier Co. of America, 17 West 20th St., New York, N. Y.—S
Associated Research, Inc., 431 S. Dearborn St., Chicago, Ill.—IT, MO
The Audio-Tone Oscillator Co., 60 Walter St., Bridgeport, Conn.—AR, S, W
Ballantine Laboratories, Inc., Boonton, N. J.—MV, V, VT
Alfred W. Barber Laboratories, 34-04 Francis Lewis Blvd., Flushing, L. I., N. Y.—VT
Biddle Co., James G., 1211 Arch St., Philadelphia, Pa.—FM, IT, MO
Boonton Radio Corp., Boonton, N. J.—IT
The Bristol Co., Waterbury, Conn.—AR, T, TH
Brown Instrument Co., 4530 Wayne Ave., Philadelphia, Pa.—T, TH
Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—FM
Bruno-New York, Inc., 460 W. 34th St., New York, N. Y.—S
Bud Radio, Inc., 2118 E. 55th St., Cleveland, Ohio—WM
Brush Development Co., 3311 Perkins Ave., Cleveland, Ohio—G
Bulova Watch Co., 630 Fifth Ave., New York, N. Y.—M
Burlington Instrument Co., Burlington, Iowa—A, FM, TH, V, W
Wm. W. L. Burnett Radio Laboratory, 4814 Idaho St., San Diego, Calif.—FM
Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.—G, TH, GA
Central Scientific Co., 1700 Irving Park Blvd., Chicago, Ill.—G
The Clough-Brengle Co., 5501 Broadway, Chicago, Ill.—A, FM, IT, M, V, MO, MV, AM
Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—G, T
Communication Measurements Laboratory, New York, N. Y.—FM, VT, WM
Continental Electric Co., Geneva, Ill.—VG
Control Corp., 600 Stinson Blvd., Minneapolis, Minn.—TM
The Daven Co., 158 Summit St., Newark, N. J.—VI
Distillation Products, Inc., 755 Ridge Rd., W., Rochester, N. Y.—VG
Electrical Facilities, Inc., 4224 Holden St., Oakland, Calif.—LA, A
Electro-Medical Laboratory, Inc., 1529 Highland Ave., Holliston, Mass.—CH
Electro-Products Laboratories, 549 West Randolph St., Chicago, Ill.—FM
Electronic Products Co., 19 No. First St., Geneva, Ill.—VT, L, EH
Ess Instrument Company, George Washington Bridge Plaza, Fort Lee, N. J.—SG
Esterline—The T. R. Routh Co.
The Esterline-Angus Co., Inc., P. O. Box 596, Indianapolis, Ind.—AR
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York, N. Y.—A, E, IT, V

Machinery & Equipment



Air cleanersAC
Bench lathesL
Buffers & grindersG
Coil winding machinesCW
DiesD
Drill pressP
Fractional H.P. motorsFR
Impregnating equipmentIM
Jigs & fixturesJ
Marking & numbering machinesMN
Metal forming equipmentMF
Pressure welding electrodesPW
Special motorsSP
Vacuum tube machineryVM
Vacuum pumpsVP
Vacuum tanksVT
Vibration control equipmentVC

The Acromark Co., 13 Morrell St., Elizabeth, N. J.—D, MN

Ferris Instrument Corp., 110 Cornelia St., Boonton, N. J.—VT, F, FM, RN
 Field Electrical Instrument Co., 2432 Grand Concourse, New York, N. Y.—TH
 George E. Fredericks, Bethayres, Pa.—VG
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—FM
 General Electric Co., 1 River Rd., Schenectady, N. Y.—A, AR, E, FM, IT, G, M, MV, S, W, WH, T, V, VT, MO, L, P, F, TH, WM
 General Radio Co., 30 State St., Cambridge, Mass.—D, FM, IT, MN, MO, MV, S, V, VT, WM
 General Time Instruments Corp., Seth Thomas Clocks Division, Thomaston, Conn.—CH
 G-M Laboratories, Inc., 4326 N. Knox Ave., Chicago, Ill.—G
 G. M. Mfg. Co., 50 West 3rd St., New York, N. Y.—T
 Gruen Watch Co., Time Hill, Cincinnati, Ohio—M
 W. & L. E. Gurley, 514 Fulton Street, Troy, N. Y.—FM
 Hathaway Instrument Co., 1315 South Clarkson Denver, Colo.—FM, G, MI
 Haydon Mfg. Co., Forestville, Conn., FR
 Heiland Research Corp., 130 East 5th Ave., Denver, Colo.—G
 Herbach & Rademan Co., 522 Market St., Philadelphia, Pa.—FM, WM
 Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—VT, D, FM
 The Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland, Ohio—A, E, FM, IT, DV, G, M, W, V, VT, MO
 Hollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—F, MO, MV, S, VT
 Hy Ef Electrical Products Mfg. Co., 1515 W. Pico Blvd., Los Angeles, Calif., "Hy-Ef"—IT
 Industrial Instruments, 156 Culver Ave., Jersey City, N. J.—IT
 Industrial Transformer Corp., 2540 Belmont Ave., New York, N. Y.—IT
 Intercontinental Marketing Co., 95 Madison Ave., New York, N. Y.—L
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—D, F, FM, IT, L, P, MV, S, VT
 J-B-T Instruments, Inc., 441 Chapel St., New Haven, Conn.—A, FM, G, T, V
 Lampkin Labs., Bradenton, Fla.—FM
 Landis & Gyr, Inc., 104 Fifth Ave., New York, N. Y.—WH
 Lavoie Laboratories, Morganville, N. J.—FM, WM
 Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.—FM, G, IT, T, TH, V
 Fred M. Link, 12 W. 17th St., New York, N. Y.—FM, IT
 Merwin-Wilson Co., New Milford, Conn.—TH
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—F, FM, WM
 B. F. Miller Co., P. O. Box 56B, Trenton, N. J.—IT
 Monarch Mfg. Co., 3341 Belmont Ave., Chicago, Ill., "Monarch"—MV
 National Instrument Co., 44 School St., Boston, Mass.—HC
 Newark Transformer Co., 17 Frelinghuysen Ave., Newark, N. J.—IT
 Nothelfer Winding Labs., 111 Albermarle Ave., Trenton, N. J.—IT
 Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—F, M, WM
 Panoramic Radio Corp., 242 W. 55th St., New York, N. Y.—FM
 Pfaltz & Bauer, Inc., 350 Fifth Ave., New York, N. Y.—G
 Philco Radio & Television Corp., Tloga & C Sts., Philadelphia, Pa.—M, W, VT
 Photobell Corp., 114 Nassau St., New York, N. Y.—F, IT, L, MO, VT
 Photovolt Corp., 95 Madison Ave., New York, N. Y.—L
 The Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.—T
 Radio City Products Co., 127 W. 26th St., New York, N. Y.—M, MO, S, V, VT, W
 Radio Design Co., 1353 Sterling Place, Brooklyn, N. Y.—M, V
 Radiotechnic Lab., 1328 Sherman Ave., Evanston, Ill.—V, VT
 The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—FM
 Rawson Electrical Instrument Co., 90 Potter St., Cambridge, Mass.—A, E, G, M, MO, TH, V, W
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—D, F, FM, P
 Arklay S. Richards Co., Inc., 72 Winchester St., Newtown Highlands, Mass.—T, TH
 Frank Rieber, Inc., 11916 W. Pico Blvd., Los Angeles, Calif.—FM
 Riverbank Laboratories, Geneva, Ill.—TF
 W. C. Robinette Co., 802 Fair Oaks, South Pasadena, Calif.—P
 The T. R. Routh Co., 1045 Bryant St., San Francisco, Calif., "Esterline," "Vibrotest"—AR, IT, V, MO, W
 Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago, Ill.—E, FM, MO
 Rubicon Co., 3753 Ridge Ave., Philadelphia, Pa.—G, IT
 Sangamo Electric Co., Springfield, Ill.—M
 Schaar & Co., 754 W. Lexington St., Chicago, Ill.—T, TH
 Schuttig & Co., 9th & Kearny Sts., Washington, D. C.—FM

Sensitive Research Instrument Corp., 4545 Bronx Blvd., New York, N. Y.—G, TH, V, WH
 Shallock Mfg. Co., 10 Jackson Ave., Collingdale, Pa.—M, T
 Simpson Electric Co., 5216 West Kinzie St., Chicago, Ill.—A, G, M, V
 Sound Apparatus Co., 150 W. 46th St., New York, N. Y.—FM, S
 Standard Electric Time Co., Springfield, Mass.—CH, FM, TA
 Herman H. Sticht Co., Inc., 27 Park Place, New York, N. Y.—A, AR, E, FM, MO, V, W, WH
 Sun Mfg. Co., 6323 Avondale Ave., Chicago, Ill.—A, MO, TH V
 Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—TH
 Supreme Instruments Corp., 414 Howard St., Greenwood, Miss.—A, M, MO, V, VT
 C. J. Tagliabue Mfg. Co., 540 Park Ave., Brooklyn, N. Y.—G, T, TH
 Technical Apparatus Co., Inc., 1171 Tremont St., Boston, Mass.—MV
 Televisio Products, Inc., 6533 Olmstead Ave., Chicago, Ill.—TH, VT
 Thwing-Albert Instrument Co., Penn St. & Pulaski Ave., Philadelphia, Pa.—G
 Triplet Electric Instrument Co., Harmon Rd., Bluffton, Ohio—A, FM, G, M, MO, MV, S, TH, V, VT, W
 Triumph Mfg. Co., 913-21 W. Van Buren St., Chicago, Ill.—A, M, V
 United Transformer Co., 150 Varick St., New York, N. Y.—IT
 Vibrotest—The T. R. Routh Co.
 Earl Webber Co., 4352 W. Roosevelt, Chicago, Ill.—FM, MV
 W. M. Welch Mfg. Co., 1515 N. Sedgwick St., Chicago, Ill.—A, G, T, V, W
 Western Electric Co., 195 Broadway, New York, N. Y.—FR, FS, S, TH, W
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—A, AR, FR, G, M, MO, P, S, T, TH, V, W, WH
 West Shore Laboratories, Box 117, Marblehead, Mass.—VG
 Weston Electrical Instrument Corp., 597 Frelinghuysen Ave., Newark, N. J.—A, FM, G, IT, L, MM, MO, PF, T, TA, TH, V, VT, W
 Wheelco Instruments Co., 847 W. Harrison St., Chicago, Ill.—G, T, TH

Die castings	DC
Foils, tin, lead, etc.....	FO
Getter	GE
Graphite	G
Iron (SVEA metal).....	I
Laminations	L
Lead, tin alloys.....	LT
Metal coated steel.....	CS
Molybdenum	M
Monel tubing	ML
Nickel	N
Nickel tubing	NT
Panels	P
Permanent magnets	PM
Powdered iron cores.....	IC
Screw machine products.....	SP
Silver brazing alloys.....	SB
Silver & compounds	AG
Speaker housings	SH
Spring contact metals.....	SM
Stampings	S
Steel tubing	FT
Strontium	ST
Tantalum	TA
Transformer housings	TH
Tube seal leads.....	TS
Tungsten	T
Wire woven cloth.....	WC

Ace Mfg. Corp., E. Erie Ave., Philadelphia, Pa.—S
 Acheson Colloids Corp., Port Huron, Mich.—G
 The Acklin Stamping Co., 1926 Nebraska Ave., Toledo, Ohio—S
 Aircraft-Marine Products, Inc., 288 North Broad St., Elizabeth, N. J.—S
 Aladdin Radio Industries, 235 W. Jackson, Chicago, Ill.—IC, CP
 Alden Products Co., 117 N. Main St., Brockton, Mass., "Na-Ald"—S
 Alpha Metal & Rolling Mills, Inc., 363 Hudson Ave., Brooklyn, N. Y.—LT
 Aluminum Co. of America, Oliver Bldg., Pittsburgh, Pa.—A
 American Brass Co., Waterbury, Conn.—S
 American Electro Metal Corp., 320 Yonkers Ave., Yonkers, N. Y., "Elmet"—M, T
 The American Rolling Mill Co., 1939 Armo Ave., Middletown, Ohio, "Armo"—CM
 Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.—BT, C, CT
 Apollo Metal Works, 6666 S. Oak Park Ave., Chicago, Ill.—CS
 Armo—The American Rolling Mill Co.
 The Arnold Engineering Co., 147 E. Ontario St., Chicago, Ill.—PM
 Art Specialty Co., 3245 W. Lake St., Chicago, Ill.—DC, S, TH
 The Automatic Electrical Devices Co., 324 E. Third St., Cincinnati, Ohio—PM
 Best Mfg. Co., Inc., 1200 Grove St., Irvington, N. J.—S, SH, TH
 Bridgeport Brass Co., Grand St., Bridgeport, Conn.—S
 Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.—B, CT, DC, BT, S
 Cinadagraph Corp., 2 Selleck St., Stamford, Conn.—PM
 Cleveland Tungsten, Inc., 10200 Meech Ave., Cleveland, Ohio—T, TS
 Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—L, S
 Continental Machines, Inc., 1301 Washington Ave., S., Minneapolis, Minn.—S

Metal for Radio



Aluminum	A
Aluminum tubing	AT
Barium	BA
Bearings	BG
Brass	B
Brass tubing	BT
Carbon	CA
Chassis	C
Coils	F
Copper tubing	CT
Core materials, laminated.....	CM
Core materials, powdered.....	CP

CIRCUIT THEOREMS

RECIPROCIITY THEOREM

If an E.M.F. of any character whatsoever located at one point in a network produces a current at any other point in the network, the same E.M.F. acting at the second point will produce the same current at the first point.

THEVENIN'S THEOREM

If an impedance Z is connected between any two points of a circuit, the resulting steady-state current I through this impedance is the ratio of the p.d. V between the two points prior to the connection of Z, and the sum of the values of (1) the connected impedance Z, and (2) the impedance Z₁ of the circuit measured between the two points.

$$I = \frac{V}{Z + Z_1}$$

PRINCIPLE OF SUPERPOSITION

The current which flows at any point in a circuit composed of constant resistances, inductances and capacitances, or the p.d. which exists between any two points in such a circuit, due to the simultaneous action of a number of E.M.F.'s distributed in any manner throughout the circuit, is the sum of the component currents at the first point, or the component p.d.'s between the two points, which would be caused by the individual E.M.F.'s acting alone. (Applicable to E.M.F.'s of any character).

MAXIMUM REACTANCE THEOREM

Any coil or system of coils carrying alternating currents tends to take the shape or position that will give maximum reactance.

Data charts on this and other Directory pages, compiled by engineers of the International Telephone & Telegraph Corp.

Cook Electric Co., 2700 Southport Ave., Chicago, Ill.—F
Crescent Industries, Inc., 4140 Belmont Ave., Chicago, Ill., "Crescent"—S
Crowe Name Plate & Mfg. Co., 3701 Ravenswood Ave., Chicago, Ill., "Crowe"—S
Henry L. Crowley & Co., Inc., 1 Central Ave., West Orange, N. J.—CP
Crucible Steel Co., 405 Lexington Ave., New York, N. Y.—PM
Dahlstrom Metallic Door Co., Metal Specialties Div., Buffalo & E. 2nd, Jamestown, N. Y.—C, S, TH
DeJurAmsco Corp., Bridge St., Shelton, Conn.—A, AR, D, FR, G, L, M, S, TH, V, VT, WM
The Dickey-Grabler Co., 10302 Madison Ave., Cleveland, Ohio—S
Driver-Harris Company, Harrison, N. J.—N
Hugh H. Eby, Inc., 18 W. Cheltenham, Philadelphia, Pa.—S
Electro Products Laboratories, 549 W. Randolph St., Chicago, Ill.—IC
Elmet—American Electro Metal Corp.
Erie Art Metal Co., Erie, Pa.—C
Faustel Metallurgical Corp., 46 W. 22nd St., No. Chicago, Ill.—M, SM, T, TA
Ferrocart Corp. of America, Hastings-on-Hudson, N. Y.—IC
Flock Process Co., 17 West 31st St., New York, N. Y.—WG
Froiland Mfg. Co., 430 St. James Ave., Springfield, Mass.—S
General Aniline Works, 435 Hudson St., New York, N. Y.—CP
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—CP, G
General Electric Co., 1 River Rd., Schenectady, N. Y.—PM
Goat Metal Stampings, Inc., 314 Dean St., Brooklyn, N. Y.—S
Goldsmith Bros. Smelting & Refining Co., 58 E. Washington St., Chicago, Ill.—AG
L. F. Grammes & Sons, Inc., 399 Union St., Allentown, Pa.—S
Handy & Harman, 82 Fulton St., New York, N. Y.—AG
John Hassall, Inc., Clay & Oakland St., Brooklyn, N. Y.—SP
Haydon Mfg. Co., Inc., Forestville, Conn.—M
Haydu Bros., Plainfield, N. J.—S
ICA—Insuline Corp. of America
Indiana Steel Prods. Co., Valparaiso, Ind.—PM
Industrial Sound Products Co., 3597 Mission St., San Francisco, Calif.—SH
The International Nickel Co., Inc., 67 Wall St., New York, N. Y.—N, NT
Insuline Corp. of America, 3602 35th Ave., Long Island City, N. Y., "ICA"—A, C, CA, F, L, S
The Johnson Tin Foil & Metal Co., 6016 So. Broadway, St. Louis, Mo.—FO, LT
King Laboratories, Inc., 201-207 Oneida St., Syracuse, N. Y.—BA, GE, S, ST
Lansing Stamping Co., 1159 Pennsylvania Ave., Lansing, Mich.—L, S
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.—N, S
Linick, Green & Reed, Inc., 29 E. Madison St., Chicago, Ill.—LT, M, N, TA
P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind.—IC, M, SM, T
G. S. Mepharm Corp., 2001 Lynch Ave., E. St. Louis, Ill.—CP
Merwin-Wilson Co., New Milford, Conn.—L, TH
Metroloy Co., Inc., 55 E. Alpine St., Newark, N. J.—T
Mid-West Screw Products Co., Main & St. George Sts., St. Louis, Mo.—SP
Miniature Precision Bearings, Keene, N. H.—BG
Na-Ald—Alden Products Co.
New Products Corp., Benton Harbor, Mich.—DC, S
North American Philips Co., Inc., 145 Palisade St., Dobbs Ferry, N. Y.—M, T
Peerless Mfg. Corp., 1400 W. Ormsby, Louisville, Ky.—L, S
Penn Fibre & Specialty Co., 2030 E. Westmoreland St., Philadelphia, Pa.—S
Plastic Metals, Inc., 119 Bridge St., Johnstown, Pa.—CP
Plume & Atwood Mfg. Co., Waterbury, Conn.—S, SP
Precision Tube Co., 3828 Terrace St., Philadelphia, Pa.—AT, BT, CT
Pyroferic Corp., 175 Varick St., New York, N. Y.—CP
Racon Electric Co., Inc., 52 East 19th St., New York, N. Y.—SH
Radiant Service, 720 Schubert Ave., Chicago, Ill.—C, TH
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.—S
Revere Copper & Brass, Inc., 230 Park Ave., New York, N. Y.—A, B, BT, CT, NT
Bernard Rice's Sons, Inc., 325 5th Ave., New York, N. Y.—S
Riverside Metal Co., Keystone Bldg., Riverside, N. J.—N, SM
Simmonds Saw & Steel Co., Lockport, N. Y.—PM
Sirian Wire & Contact Co., 260 Sherman Ave., Newark, N. J.—M, T
Stackpole Carbon Co., St. Marys, Pa.—CP
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—TS
Summer! Tubing Co., Bridgeport, Pa.—NT
Superior Tube Co., Norristown, Pa.—AT, MT
Swedish Iron & Steel Corp., 17 Battery Place, New York, N. Y.—I, PM

Taylor-Wharton Iron & Steel Co., High Bridge, N. J.—PM
Thermador Elec. Mfg. Co., 5119 S. Riverside Dr., Los Angeles, Calif.—L, S, TH
Thomas & Skinner Steel Prods. Co., 1116 E. 23rd St., Indianapolis, Ind.—L, PM, S, TH
Thordarson Electric Mfg. Co., 500 W. Huron St., Chicago, Ill.—TH
Uniform Tubes, Shurs Lane & Lauriston St., Roxborough, Philadelphia, Pa.—BT, CT
Union Aircraft Products Corp., 380 Second Ave., New York, N. Y.—A, C, S, TH
The United States Graphite Co., Saginaw, Mich.—CA, CP, G, IC
Veeder-Root, Inc., Hartford, Conn.—DC
Western Electric Co., 195 Broadway, New York, N. Y.—C, CM, IC, L, P, SM
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—CM, F, LT
Westinghouse Lamp Division, Bloomfield, N. J.—M, N, TA, T
Whitehead Stamping Co., 1683 W. Lafayette Blvd., Detroit, Mich.—L, S
Worcester Pressed Steel Co., Worcester, Mass.—C, S
Youngstown Pressed Steel Co., Warren, Ohio—S

Lifetime Sound Equipment Co., 1101-1103 Adams St., Toledo, Ohio—ACC, CAR, CON, CTR, DYN, SPR, STD, VEL
John Meck Industries, Liberty St., Plymouth, Ind., "Audiograph"—ACC, CRY, CTR, DYN, STD, VEL
Miles Reproducer Co., 812 Broadway, New York, N. Y.—CAR, CON, CRY, CT, DYN
Molded Insulation Co., 335 East Price St., Philadelphia, Pa.—CTR
E. A. Myers & Sons, Radioear Bldg., Mt. Lebanon, Pa.—CAR
Na-Ald—Alden Products Co.
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles, Calif.—CRY, DYN, STD
Otto K. Olesen III Co., Ltd., 1560 Vine St., Hollywood, Calif.—STD
Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—DYN, HB
Permoflux Corp., 4916 W. Grand Ave., Chicago, Ill.
Quam-Nichols Co., 33rd Pl. & Cottage Grove Ave., Chicago, Ill.—DYN, HB
Racon Elec. Co., Inc., 52 E. 19th St., New York, N. Y.—DYN
Radiotone, Inc., 7356 Melrose Ave., Hollywood, Calif.—CRY, DYN, STD
The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—ACC, CRY, DYN, STD, VEL
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J., "RCA"—ACC, CRY, CTR, DYN, STD, VEL
Remler Co., Ltd., 2101 Bryant St., San Francisco, Calif., "Remler"—ACC, CTR, CRY, STD
Selectar Mfg. Corp., 21-10 49th Ave., Long Island City, N. Y.—CTR
Shure Bros., 225 W. Huron St., Chicago, Ill., "Shure," "Uniplex," "Unidyne"—ACC, CAR, CON, CRY, CT, CTR, DYN, HB, SPR, STD
Mark Simpson Mfg. Co., Inc., 188 W. 4th St., New York, N. Y.—ACC, CT, STD
Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York, N. Y.—CAR, CRY, SPR, STD
Stromberg-Carlson Telephone Mfg. Co., 100 Carlson Rd., Rochester, N. Y.—CAR, ACC, CRY, CTR, DYN, STD
Tibbitts Labs., 12 Norfolk St., Cambridge, Mass.—CRY
The Turner Co., Cedar Rapids, Iowa, "Turner"—ACC, CRY, CT, CTR, DYN, HB, SPR, STD
Unidyne—Shure Bros.
Uniplex—Shure Bros.
Universal Microphone Co., Ltd., 424 Warren Lane, Inglewood, Calif.—ACC, CAR, CRY, CTR, DYN, SPR, STD, VEL
Western Electric Co., 195 Broadway, New York, N. Y.—CAR, CON, CRY, DYN, VEL, ACC, CTR, STD

Microphones



- AccessoriesACC
Cable, see wire
CarbonCAR
CondenserCON
ConnectorsCTR
ContactCT
CrystalCRY
DynamicDYN
Home broadcastingHB
SpringsSPR
StandsSTD
VelocityVEL

Alden Products Co., 119 N. Main St., Brockton, Mass., "Na-Ald"—ACC, CTR
American Amplifier & Tel. Co., 1222 Glendon Ave., Los Angeles, Calif.—DYN, VEL
American Automatic Electric Sales Co., 1019 W. Van Buren, Chicago, Ill.—CAR
American Microphone Co., Inc., 1917 S. Western Ave., Los Angeles, Calif., "American"—ACC, CAR, CON, CTR, CRY, DYN, HB, SPR, STD, VEL
American Phenolic Corp., 1832 S. 54th Ave., Cicero, Ill., "Amphenol"—ACC, CTR
Amperite Co., 561 Broadway, New York, N. Y., "Amperite"—ACC, CT, CTR, DYN, STD, VEL
Amphenol—American Phenolic Corp.
Art Specialty Co., 3245 W. Lake St., Chicago, Ill.—ACC, STD
The Astatic Corp., 830 Market St., Youngstown, Ohio—CRY, STD, ACC, DYN
Atlas Sound Corp., 1443 39th St., Brooklyn, N. Y., "Atlas Velvet Action"—ACC, CTR, STD
Audiograph—John Meck Industries
Aurex Corp., 1115 N. Franklin St., Chicago, Ill.—CON
Austin Electronic Mfg. Co., Warren, Pa.—DYN
Belfone—Bell Sound Systems, Inc.
Bell Sound Systems, Inc., 203 N. 4th St., Columbus, Ohio, "Belfone"—CRY, DYN, STD, VEL
Best Mfg. Co., Inc., 1200 Grove St., Irvington, N. J.—DYN
Brush Development Co., 3311 Perkins Ave., Cleveland, Ohio—CRY, STD
Cannon Electric Development Co., 3209 Humboldt St., Los Angeles, Calif.—ACC, CTR
Collins Co., 644 Landfair Ave., Westwood Village, Los Angeles, Calif.—CRY, DYN
Conn. Telephone & Elec. Div., Great American Industries, Inc., Meriden, Conn.—CAR
Eastern Mike-Stand Co., 56 Christopher St., Brooklyn, N. Y., "Eastern"—STD
Electrical Industries Mfg. Co., 1938 Morford Pl., Red Bank, N. J.—CAR
Electro-Voice Mfg. Co., Inc., 1239 South Bend Ave., South Bend, Ind., "Electro-Voice"—ACC, CAR, DYN, SPR, STD, VEL
Erwood Sound Equipment Co., 223 W. Erie St., Chicago, Ill.—ACC, DYN, STD
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York, N. Y.—P, S
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—CAR, SPR
General Electric Co., 1 River Rd., Schenectady, N. Y., "G.E." (Broadcast Microphones)
Gibson, Inc., 225 Parsons St., Kalamazoo, Mich.—CAR, CRY, STD, VEL
Robert Hetherington & Son, Inc., 1216 Elmwood Ave., Sharon Hill, Pa.—ACC
Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif., "Kaar"—CAR
Kellogg Switchboard & Supply Co., 6650 S. Cicero St., Chicago, Ill.—CAR

Noise Elimination Equipment



- Interference analyzersIA
Interference locatorsI
Power filtersP
Radio set filters.....S
Fluorescent lamp filtersFF

Aerovox Corp., 742 Belleville Ave., New Bedford, Mass.—FF, IA, O, P, S
American Communications Corp., 308 Broadway, New York, N. Y.—S
American Transformer Co., 180 Emmet St., Newark, N. J.—P
Apex Industries, Inc., 1035 W. Lake St., Chicago, Ill.—FF, P, S
Automatic Electric Mfg. Co., Mankato, Minn.—P
Avia Products Co., 749 N. Highland, Los Angeles, Calif.—FF, P, S
Bendix Radio Div., Bendix Aviation Corp., 920 E. Fort Ave., Baltimore, Md.—I
The Birchcher Corp., 5087 Huntington Dr. N., Los Angeles, Calif.—P
L. S. Brach Mfg. Corp., 55 Dickerson St., Newark, N. J.—S
Consolidated Wire & Assoc. Corps., 1635 S. Clinton, Chicago, Ill.—S
Continental Carbon, Inc., 13900 Lorain Ave., Cleveland, Ohio—"Continental," "Filternoys"—P, S
Cornell-Dubilier Elec. Corp., 1000 Hamilton Blvd., S. Plainfield, N. J., "Quietone"—FF, P, S
Henry L. Crowley & Co., Inc., 1 Central Ave., West Orange, N. J.—P
Tobe Deutschmann Corp., Canton, Mass.—I, IA, P
Dumont Electric Co., 34 Hubert St., New York, N. Y.—P
Electro Products Laboratories, 549 W. Randolph St., Chicago, Ill.—P, S
Elim-O-Stat—Solar Mfg. Corp.
Ferris Instrument Corp., 110 Cornelia St., Boonton, N. J., "Ferris"—I
Filternoys—Continental Carbon, Inc.
General Electric Co., Pittsfield, Mass.—P
Industrial Condenser Corp., 1725 W. North Ave., Chicago, Ill.—FF, P, S

ICA—Insuline Corp. of America
 Insuline Corp. of America, 3602 35th Ave., Long
 Island City, N. Y.—"ICA"—P, S
 International Electronics, Inc., 630 Fifth Ave., New
 York, N. Y.—FF, I, IA, P, S
 International Transformer Co., 17 W. 20th St., New
 York, N. Y.—P
 J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brook-
 lyn, N. Y.—FF, S
 Lear Avia, Inc., Piqua, Ohio—P
 P. R. Mallory & Co., Inc., 3029 E. Washington St.,
 Indianapolis, Ind.—FF, P, S
 Measurements Corp., Box 88, Boonton, N. J.—I, IA
 James Millen Mfg. Co., Inc., 150 Exchange St.,
 Malden, Mass.—P
 J. W. Miller Co., 5917 S. Main St., Los Angeles,
 Calif., "Miller"—FF, P, S
 Pioneer Gen-E-Motors, 5841 Dickens Ave., Chicago,
 Ill.—P
 Quietone—Cornell-Dubilier Elec. Corp.
 RCA Victor Div., Radio Corp. of America, Front &
 Cooper Sts., Camden, N. J.—I, IA
 Solar Mfg. Corp., 586 Avenue A, Bayonne, N. J.,
 "Elim-O-Stat"—FF, P, S
 Sprague Products Co., North Adams, Mass.—FF, I,
 IA, P, S
 Sprague Specialties Co., N. Adams, Mass.—FF, I,
 IA, P, S
 Super Electric Products Corp., 1057 Summit Ave.,
 Jersey City, N. J.—P
 S-W Inductor Co., 1056 N. Wood St., Chicago, Ill.—S
 Talking Devices Co., 4447 W. Irving Park Rd., Chicago,
 Ill.—FF
 Whisk Laboratories, 145 W. 45th St., New York,
 N. Y.—P

Marlette Corp., 57-21 30th St., Long Island City,
 N. Y.—C, L, R, V
 Meissner Mfg. Co., 7th & Belmont, Mt. Carmel, Ill.
 "Meissner"—CD
 Mica Insulator Co., 200 Varick St., New York, N. Y.,
 "Mico"—C, I
 Mico—Mica Insulator Co.
 James Millen Mfg. Co., Inc., 150 Exchange St.,
 Malden, Mass.—C, CD
 Mitchell Rand Insulation, 51 Murray St., New York,
 N. Y.—E, I, P, R, V, W
 Murphy Varnish Co., 224 McWhorter St., Newark,
 N. J.—E, L, P, V
 New England Radiocrafters, 1156 Commonwealth Ave.,
 Brookline, Mass.—CD, L
 New Wrinkle, Inc., 314 W. First St., Dayton, Ohio
 —E, L, P, R, V, WF
 Pioneer Asphalt Co., 435 N. Michigan Ave., Chicago,
 Ill.—P
 Poinsetta, Inc., 111 Cedar Ave., Pitman, N. J.—W
 Pratt & Lambert, Inc., 92 Tonawanda St., Buffalo,
 N. Y.—E, L, P, V
 Production Engineering Corp., 666 Van Houten Ave.,
 Clifton, N. J.—IE
 The Resinous Products & Chemical Co., West Wash-
 ington St., Philadelphia, Pa.—R, S
 Roxalin Flexible Finishes, Inc., 800 Magnolia Ave.,
 Elizabeth, N. J.—C, CD, E, I, L, P, R, S, V, W
 Schaar & Co., 754 W. Lexington St., Chicago, Ill.—C
 Walter L. Schott Co., 9306 Santa Monica Blvd.,
 Beverly Hills, Calif., "Walsco"—C, CD, E, L, P,
 S, V
 Sherron Metallic Corp., 1201 Flushing Ave., Brook-
 lyn, N. Y.—P
 The Sherwin-Williams Co., 101 Prospect Ave., Cleve-
 land, Ohio—E, I, L, P, R, S, V
 Solar Corp., 944 W. Bruce St., Milwaukee, Wis.—
 E, P, R, S, V
 Standard Oil Co. (Indiana), 910 S. Michigan Ave.,
 Chicago, Ill.—W
 Stromberg-Carlson Tel. Mfg. Co., 100 Carlson Rd.,
 Rochester, N. Y.—I
 Trans-American Airports Corp., 271 Madison Ave.,
 New York, N. Y.—S, W
 Walsco—Walter L. Schott Co.
 R. D. Werner Co., Inc., 380 Second Ave., New York,
 N. Y.—I
 Western Electric Co., 195 Broadway, New York, N. Y.
 —I
 Westinghouse Electric & Mfg. Co., East Pittsburgh,
 Pa.—CD, E, I, L, R, V
 Zophar Mills, Inc., 128 26th St., Brooklyn, N. Y.—
 I, W, WP

American Automatic Electric Sales Co., 1019 W. Van
 Buren St., Chicago, Ill.—E
 American Instrument Co., Silver Spring, Md.—EE
 The Audio-Tone Oscillator Co., 62 Walter St., Bridge-
 port, Conn.—EE
 Auth Electrical Specialty Co., Inc., 422 E. 53rd St.,
 New York, N. Y.—R
 Bank's Mfg. Co., 1105 Lawrence Ave., Chicago, Ill.
 —R
 Bradley Labs., Inc., 81 Meadow St., New Haven,
 Conn., "Luxtron"—PC
 Brooke Engineering Co., Inc., 4517 Wayne Ave., Phila-
 delphia, Pa.—I
 Burke & James, Inc., 223 W. Madison St., Chicago,
 Ill.—L
 Cetron—Continental Electric Co.
 Carlton Lamp Corp., 730 S. 13th St., Newark, N. J.
 —L
 Coleman Electric Co., 318 Madison St., Maywood, Ill.
 —PM
 Continental Electric Co., Geneva, Ill., "Cetron"—
 PG, PV
 Struthers Dunn, Inc., 1321 Arch St., Philadelphia,
 Pa.—R
 Eastern Amplifier Corp., 794 E. 140th St., Bronx,
 N. Y.—EE
 Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia,
 Pa.—EE, PC, R
 Electric Sorting Machine Co., 802 Michigan Trust
 Bldg., Grand Rapids, Mich.—EE
 Electro-Eye—Wm. Hansen Co.
 Electronic Control Corp., 626 Harper, Detroit, Mich.
 —EE, R, L
 Electronic Products Co., 19 N. 1st St., Geneva, Ill.
 —EE, L, R
 Ess Instrument Co., George Washington Bridge Plaza,
 Fort Lee, N. J.—EE, R
 General Electric Co., 1 River Rd., Schenectady, N. Y.
 —EE, L, PC, PG, PV, R
 General Scientific Corp., 4029 S. Kedzie Ave., Chi-
 cago, Ill.—"Lumotron"—PC
 G-M Laboratories, Inc., 4326 N. Knox Ave., Chicago,
 Ill.—PC, PG, PV, R
 Guardian Electric Mfg. Co., 1622 Walnut St., Chicago,
 Ill.—R
 Wm. Hansen Co., R. 3, Niles, Mich., "Electro-Eye,"
 "Radiocall," "Ordercall"—EE
 International Electronics, Inc., 630 Fifth Ave., New
 York, N. Y.—E
 Klien Bros. Universal Electric Stage Lighting Co.,
 321 W. 50th St., New York, N. Y.—L
 Leach Relay Co., 5915 Avalon Blvd., Los Angeles,
 Calif.—R
 Lumotron—General Scientific Corp.
 Luxtron—Bradley Labs., Inc.
 National Union Radio Corp., 15 Washington St.,
 Newark, N. J.—PC, PG, PV
 The North Electric Mfg. Co., P. O. Box 267, Gallon,
 Ohio—R
 Ordercall—Wm. Hansen Co.
 Peerless Mfg. Corp., 1400 W. Ormsby, Louisville, Ky.
 —R
 Pfaltz & Bauer, Inc., 350 Fifth Ave., New York,
 N. Y.—EE, PC
 Photobell Corp., 114 Nassau St., New York, N. Y.
 —EE, L, PC, PG, PV, R
 Photowitch, Inc., 89 Broadway, Cambridge, Mass.
 —EE
 Photovolt Corp., 95 Madison Ave., New York, N. Y.
 —PC
 Photronic—Weston Electrical Instrument Corp.
 Potter & Brumfield Mfg. Co., Princeton, Ind.—R
 Potter Elec. Signal & Mfg. Co., Century Bldg., St.
 Louis, Mo.—EE
 Radiocall—Wm. Hansen Co.

Paint, Cement & Wax Products



- CementC
- Coil dopesCD
- EnamelsE
- Impregnating equipIE
- Insulating compounds.....I
- LacquersL
- PaintP
- ResinsR
- SolventsS
- VarnishV
- WaxW
- Waterproofing compoundsWP
- Wrinkle finishWF

Aiden Products Co., 119 N. Main St., Brockton, Mass.
 —C, L
 American Phenolic Corp., 1832 S. 54th St., Chicago,
 Ill., "Amphenol"—CD, R
 Amphenol—American Phenolic Corp.
 Anaconda Wire & Cable Co., 25 Broadway, New York,
 N. Y.—I
 Bakelite Corp., 30 E. 42nd St., New York, N. Y.—
 C, E, I, L, R, V
 Barker & Williamson, 237 Fairfield Ave., Upper Darby,
 Pa.—CD
 B & C Insulation Products, Inc., 261 Fifth Ave.,
 New York, N. Y.—I
 Biwax Corp., 3445 Howard St., Skokie, Ill.—I, W
 Cantol Wax Co., 211 N. Washington St., Bloomington,
 Ind.—I, W
 Carbide & Carbon Chemicals Corp., Plastics Div., 30
 E. 42nd St., New York, N. Y.—C, I, R
 Celanese Celluloid Corp., 180 Madison Ave., New York,
 N. Y.—C
 Crolite—Henry L. Crowley & Co.
 Henry L. Crowley & Co., 1 Central Ave., West Orange,
 N. J., "Crolite"—C
 James B. Day & Co., 1872 Clybourn Ave., Chicago,
 Ill.—C, CD, E, I, L, P, R, S, V, W
 John C. Dolph Co., Dept. A-12, 168 Emmet St.,
 Newark, N. J.—E, I, L, V, W
 Egyptian Lacquer Mfg. Co., 1270 Sixth Ave., New
 York, N. Y.—E, L, P, S, V
 GC—General Cement Mfg. Co.
 General Cement Mfg. Co., 919 Taylor Ave., Rockford,
 Ill., "GC"—C, CD, E, I, L, P, R, S, V, W, WF
 General Electric Co., 1 River Rd., Schenectady, N. Y.
 —C, I
 The P. D. George Co., 4153 Bingham Ave., St. Louis,
 Mo.—I, V
 Girard-Hopkins, 1000 40th Ave., Oakland, Calif.—
 P, S
 Halowax Products Div., Union Carbide & Carbon Corp.,
 30 E. 42nd St., New York, N. Y.—I, R, W
 Harvel—Irvington Varnish & Insulator Co.
 Industrial Synthetics Corp., 60 Woolsey St., Irving-
 ton, N. J.—I
 Insulation Mfrs. Corp., 565 W. Washington Blvd.,
 Chicago, Ill.—C, E, L, V
 Irvington Varnish & Insulator Co., 6 Argyle Terrace,
 Irvington, N. J.—"Irvington," "Harvel"—I, L,
 R, V
 J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brook-
 lyn, N. Y., "JFD"—C, L, S
 The Lowe Bros. Co., 424 E. 3rd St., Dayton, Ohio
 —E, L, P, S, V
 Maas & Waldstein Co., 438 Riverside Ave., Newark,
 N. J.—C, CD, E, I, L, P, R, S, V, W

Photo Electric Equipment



- Complete unitsEE
 - Light suppliesL
 - Photo tubes, gasPG
 - Photo tubes, vacuum.....PV
 - Photo cellsPC
 - PhotometersPM
 - RelaysR
 - Smoke indicatorsI
- Advance Electric Co., 1262 W. Second St., Los
 Angeles, Calif.—R
 Allied Control Co., Inc., 229 Fulton St., New York,
 N. Y.—E

POWER RATIO, VOLTAGE RATIO, DECIBEL TABLE

Power ratio	Voltage ratio	Decibels	Power ratio	Voltage ratio	Decibels
1:0233	1:0116	0.1	19:953	4:4668	13.0
1:0471	1:0233	0.2	25:119	5:0119	14.0
1:0715	1:0315	0.3	31:623	5:6234	15.0
1:0965	1:0471	0.4	39:811	6:3096	16.0
1:1220	1:0593	0.5	50:119	7:0795	17.0
1:1482	1:0715	0.6	63:096	7:9433	18.0
1:1749	1:0839	0.7	79:433	8:9125	19.0
1:2023	1:0965	0.8	100:00	10:0000	20.0
1:2303	1:1092	0.9	158:49	12:589	22.0
1:2589	1:1220	1.0	251:19	15:849	24.0
1:3183	1:1482	1.2	398:11	19:953	26.0
1:3804	1:1749	1.4	630:96	25:119	28.0
1:4454	1:2023	1.6	1000:0	31:623	30.0
1:5136	1:2303	1.8	1584:9	39:811	32.0
1:5849	1:2589	2.0	2511:9	50:119	34.0
1:6595	1:2882	2.2	3981:1	63:096	36.0

Radio Electronic Co., 1816 Villanova Dr., Oakland, Calif.—EE
The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—PV
RBM Mfg. Co., Logansport, Ind.—R
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—PG, PV
Saxl Instrument Co., Inc., 38 James St., E. Providence, R. I.—EE
Selenium Corp. of America, 1800 W. Pico Blvd., Los Angeles, Calif.—PC
Sigma Instruments, Inc., 78 Freeport St., Boston, Mass.—R
Nathan R. Smith Mfg. Co., 105 Pasadena Ave., S. Pasadena, Calif.—R
Talking Devices Co., 4447 W. Irving Park Rd., Chicago, Ill.—L
United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—EE, R
Vacutron, Inc., 2819 12th St., Arlington, Va.—PC
Weltron Corp., 3080 E. Outer Dr., Detroit, Mich.—EE
Western Electric Co., 195 Broadway, New York, N. Y.—PC
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—PC, R, L, EE
Westinghouse Lamp Div., Bloomfield, N. J.—PC, PG, PV
Weston Electric Instrument Corp., Newark, N. J., "Photronic"—EE, PC, R
Worner Prods. Corp., 1019 W. Lake St., Chicago, Ill.—EE, L

Franklin Fibre-Lamitex Corp., Wilmington, Del., "Lamitex"—L
Gemloid Corp., 7910-7930 Albion Ave., Elmhurst, L. I., N. Y., "Gemloid"—C, CN
Gemstone—A. Knoedler Co.
General Electric Co., Plastics Dept., 1 Plastics Ave., Pittsfield, Mass., "Textolite"—PH, L
Gering Products, Inc., N. 7th & Monroe Ave., Kenilworth, N. J.—C, CN, EC
B. F. Goodrich Co., 500 S. Main St., Akron, Ohio, "Koroseal"—V
Haveg Corp., E. Newark, Del., "Haveg"—PH
Hercules Powder Co., 916 Market St., Wilmington, Del., "Herculoid"—CN, EC
Herculoid—Hercules Powder Co.
Heresite & Chemical Co., Manitowoc, Wis., "Heresite"—CR, PH
Indur—Reilly Tar & Chemical Corp.
Industrial Synthetics Corp., 60 Woolsey St., Irvington, N. J.—C, CA, EC
The Insel Co., Schuyler Ave., Fort Quincy, Arlington, N. J.—EC
Insurok—The Richardson Co.
Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington, N. J.—C
A. Knoedler Co., Lancaster, Pa., "Gemstone"—CR
Koroseal—B. F. Goodrich Co.
Lamitex—Franklin Fibre-Lamitex Corp.
Loalin—Catalin Corp.
Lucite—DuPont de Nemours & Co., Ltd.
Lumarith—Celanese Celluloid Corp.
Lustron—Monsanto Chemical Co.
Makalot Corp., 262 Washington St., Boston, Mass. "Makalot"—C, CA, PH, U
Manufacturers Chemical Corp., Berkeley Heights, N. J.—C, CA, EC
Marblette Corp., 37-21—30th St., Long Island City, N. Y., "Marblette"—CR
McInerney Plastics Co., 655 Godfrey Ave., S. W., Grand Rapids, Mich.—L
Mica Insulator Co., 200 Varick St., New York, N. Y.—L
Micarta—Westinghouse Elec. & Mfg. Co.
Michigan Molded Plastics, Inc., Dexter, Mich., "Michrock"—PH
Michrock—Michigan Molded Plastics, Inc.
Monsanto Chemical Co., Plastics Div., Springfield, Mass., "Fibestos," "Lustron," "Opalon" "Resinox"—C, CN, CR, P, PH, V
National Plastic Products Co., 2527 Russell St., Detroit, Mich.—C, CR, L
National Vulcanized Fibre Co., Wilmington, Del., "Phenolite"—L
Neillite—Watertown Mfg. Co.
Nixonite—Nixon Nitration Works
Nixon Nitration Works, Nixon, N. J., "Nixonite"—C, CN, EC
Ohmold—Wilmington Fibre Specialty Co.
Opalon—Monsanto Chemical Co.
Panelyte Division, St. Regis Paper Co., 230 Park Ave., New York, N. Y., "Panelyte"—L
Peters Chemical Mfg. Co., 3623 Lake St., Melrose Park, Ill.—A
Phenolite—National Vulcanized Fibre Co.
Plaskon Co., 2121 Sylvan Ave., Toledo, Ohio, "Plaskon"—U
Plastacele—E. I. DuPont de Nemours & Co., Inc.
Plasticraft Associates, 155 E. Ohio St., Chicago, Ill.—L
Plax Corp., 133 Walnut St., Hartford, Conn.—P
Plexiglas—Rohm & Haas Co.
Pyralin—E. I. DuPont de Nemours & Co., Inc.
Reilly Tar & Chemical Corp., Merchants Bank Bldg., Indianapolis, Ind., "Indur"—PH
Resinous Products & Chemical Co., 222 W. Washington Sq., Philadelphia, Pa., "Uformite"—U
Resinox—Monsanto Chemical Co.
Resistolux Corp., 39 Plansoen St., Belleville, N. J.—V
The Richardson Co., Melrose Park, Ill., "Insurok"—L, PH
Rohm & Haas Co., 222 W. Washington St., Philadelphia, Pa., "Plexiglas"—A, U
Shawinigan Prod. Corp., 350 Fifth Ave., New York, N. Y., "Alvar," "Butvar," "Formvar"—V
Spaulding Fibre Co., 310 Wheeler St., Tonawanda, N. Y., "Spauldite"—L
Spauldite—Spaulding Fibre Co.
Styron—Dow Chemical Co.
Synthane Corp., Oaks, Pa., "Synthane"—L
Synvar Corp., 109 Lombard St., Wilmington, Del.—PH, U
Taylor Fibre Co., Norristown, Pa.—L
Templus—Bryant Electric Co.
Tenite—Tennessee Eastman Corp.
Tennessee Eastman Corp., Kingsport, Tenn., "Tenite"—C
Textolite—General Electric Co., Plastics Div.
Uformite—Resinous Products & Chemicals Co.
Vinylite—Carbide & Carbon Chemicals Corp.

Vulcoide—Continental Diamond Fibre Co.
Watertown Mfg. Co., Watertown, Conn., "Neillite"—PH
R. D. Werner Co., Inc., 380—2nd Ave., New York, N. Y.—V
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., "Micarta"—PH
Wilmington Fibre Specialty Co., P. O. Box 944, Wilmington, Del., "Ohmold"—L

Plastic Molders and Fabricators



Table with 2 columns: Item name and code. Cabinet molders...C, Extruded shapes...E, Fabricators...F, Parts molders...P

Plastics

Table with 2 columns: Material name and code. Acrylics...A, Cast resin...CR, Cellulose acetate...C, Cellulose nitrate...CN, Ethyl cellulose...EC, Laminates...L, Phenols...PH, Polystyrene...P, Urea...U, Vinyl resins...V

Alvar—Shawinigan Prod. Corp.
American Cyanamid Co., Plastics Div., 30 Rockefeller Plaza, New York, N. Y., "Beetle"—U
American Molding Powder & Chemical Corp., 109 S. 5th St., Brooklyn, N. Y.—C, EC
American Phenolic Corp., 1830 S. 54th St., Chicago, Ill.—P
American Products Mfg. Co., 8131 Oleander St., New Orleans, La.—C
Bakelite Corp., 30 E. 42nd St., New York, N. Y., "Bakelite"—C, CR, P, PH, U
Baker Oil Tools, Inc., P. O. Box 127, Vernon Station, Los Angeles, Calif.—CR
A. Bamberger, 109 S. 5th St., Brooklyn, N. Y.—C, CN, EC
Beetle—American Cyanamid Co.
Bryant Electric Co., 1421 State St., Bridgeport, Conn., "Templus"—PH
Butacite—E. I. DuPont de Nemours & Co., Inc.
Butvar—Shawinigan Prod. Corp.
Carbide & Carbon Chemicals Corp., Plastics Div., 30 E. 42nd St., New York, N. Y., "Vinylite"—V
Catalin Corp., 1 Park Ave., New York, N. Y., "Catalin," "Loalin"—CR, P, L
Celanese Celluloid Corp., 180 Madison Ave., New York, N. Y., "Celluloid," "Lumarith"—C, EC, CN
Celeron—Continental Diamond Fibre Co.
Cellanite—Continental Diamond Fibre Co.
Celluloid—Celanese-Celluloid Corp.
Celluluplastic Corp., 50 Avenue L, Newark, N. J.—C
Central Process Corp., Forest Park, Ill.—CR, PH
Ciba Corp., 627 Greenwich St., New York, N. Y., "Cibanoid"—U
Cibanoid—Ciba Corp.
Coffite—Formica Insulation Co.
Coltrack—Colts Patent Fire Arms Mfg. Co.
Colts Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn., "Coltrack"—PH
Continental Diamond Fibre Co., Newark, Del., "Celeron," "Callanite," "Dilectene," "Dilecto," "Vulcoide"—L
Crystalite—Rohm & Haas Co.
Detroit Paper Products Co., 5800 Domine St., Detroit, Mich., "Duraloy"—L
Dilectene—Continental Diamond Fibre Co.
Dilecto—Continental Diamond Fibre Co.
Dow Chemical Co., Midland, Mich., "Ethocel," "Styron"—EC, P
E. I. DuPont de Nemours & Co., Inc., Plastics Dept., 626 Schuyler Ave., Arlington, N. J., "Butacite," "Lucite," "Plastacele," "Pyralin"—A, C, CN, V
Duraloy—Detroit Paper Products Co.
Durez Plastics & Chemicals, Inc., N. Tonawanda, N. Y., "Durez"—PH
Durite Plastics Div., Stokes & Smith Co., 5010 Summerdale Ave., Philadelphia, Pa.—PH
Eastman Kodak Co., 343 State St., Rochester, N. Y.—C, CN
Essex Corp., Charlottesville, Va.—CN
Ethocel—Dow Chemical Co.
Farley & Loetscher Mfg. Co., Dubuque, Iowa—L
Fibestos—Monsanto Chemical Co.
Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati, Ohio, "Coffite," "Formica"—L
Formvar—Shawinigan Prod. Corp.

Alden Prods. Co., 117 N. Main St., Brockton, Mass. F, P
American Insulator Corp., New Freedom, Pa.—C, P
American Phenolic Corp., 1830 S. 54th St., Chicago, Ill., "Amphenol"—E, F, P
Amphenol—American Phenolic Corp.
Auburn Button Works, Inc., Auburn, N. Y.—E, P
Barber-Colman Co., Molded Prods. Div., Rockford, Ill.—P
Bastian Bros. Co., 1600 Clinton Ave., N., Rochester, N. Y.—F
Bend-A-Lite Plastics Co., 123 S. Honore St., Chicago, Ill.—F
Boonton Molding Co., Boonton, N. J.—P
Bridgeport Molded Prods., Inc., 303 Myrtle Ave., Bridgeport, Conn.—P
Bryant Electric Co., Plastics Div., 1105 Railroad Ave., Bridgeport, Conn.—P
Catalin Corp., 1 Park Ave., New York, N. Y., "Catalin"—C, F
Chicago Molded Prods. Corp., 1020 N. Kolmar Ave., Chicago, Ill.—C, E, P
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati, Ohio—P
Cleveland Plastics, Inc., 1611 E. 21st St., Cleveland, Ohio—P
Colt's Patent Fire Arms Mfg. Co., Plastics Div., Hartford, Conn.—E, P
Consolidated Molded Prods. Corp., 409 Cherry St., Scranton, Pa.—P
Creative Plastics Corp., 963 Kent Ave., Brooklyn, N. Y.—P
Cutler-Hammer, Inc., 1401 W. St. Paul Ave., Milwaukee, Wis.—P
Harry Davies Molding Co., 1428 N. Wells St., Chicago, Ill.—C, P
Dayton Insulating Molding Co., 418 E. First St., Dayton, Ohio—C, E, F, P
Diemolding Corp., Rasbach St., Canastota, N. Y.—C, P
Eagle Plastics Corp., 23-10 Bridge Plaza South, Long Island City, N. Y.—P
Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia, Pa.—P
Eclipse Moulded Products Co., 5151 N. 32nd St., Milwaukee, Wisc.—C, E, P
Emeloid Co., 291 Laurel Ave., Arlington, N. J.—F, P
Erie Resistor Corp., 640 W. 12 St., Erie, Pa.—E, P
Extruded Plastics, Inc., New Canaan Ave., Norwalk, Conn., "Interlox"—E
Franklin Fibre-Lamitex Corp., Wilmington, Del.—P
Garfield Mfg. Co., Garfield, N. J.—P
Gemloid Corp., 7910-7930 Albion Ave., Elmhurst, L. I., N. Y., "Gemute"—E, F, P
Gemute—Gemloid Corp.
General Electric Co., Plastics Dept., 1 Plastics Ave., Pittsfield, Mass.—C, E, P
The General Industries Co., Taylor & Olive Sts., Elyria, Ohio—C, P
Gits Molding Corp., 4600 Huron St., Chicago, Ill.—P
Imperial Molded Prods. Corp., 2925 W. Harrison St., Chicago, Ill.—P
Industrial Molded Prods. Co., 2035 Charleston, Chicago, Ill.—P
Industrial Synthetics Corp., 60 Woolsey St., Irvington, N. J.—P
Insulation Mfg. Co., 11 New York Ave., Brooklyn, N. Y.—P
Insulation Prods. Co., 504 N. Richland St., Pittsburgh, Pa.—P
Insurok—The Richardson Co.
Interlox—Extruded Plastics, Inc.
Keasby & Mattison Co., Butler Ave., Ambler, Pa.—P
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.—P
Keystone Specialty Co., 1373 1/2 Cove Ave., Lakewood, Cleveland, Ohio—P
Kuhn & Jacob Molding & Tool Co., 1200 Southard St., Trenton, N. J.—P
Kurz-Kasch, Inc., 1421 S. Broadway, Dayton, Ohio—C, P
Mack Molding Co., Wayne, N. J.—E, C, P
Meissner Mfg. Co., 7th & Belmont, Mt. Carmel, Ill.—P

OMISSIONS

Listings have been omitted in all cases where, after three requests, a company has failed to return our directory questionnaire or otherwise verify its activity.

Michigan Molded Plastics, Inc., G St., Dexter, Mich.—P
 Elmer E. Mills Corp., 812 W. Van Buren St., Chicago, Ill.—E, P
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—P
 Niagara Insul Bake Specialty Co., Inc., 483 Delaware Ave., Albany, N. Y.—P
 Northern Industrial Chem. Co., 10 Elkins St., S. Boston, Mass.—C, P
 Norton Labs., Inc., 520 Mill St., Lockport, N. Y.—C, P
 Oris Mfg. Co., Thomaston, Conn.—P
 Parisian Novelty Co., 3510 S. Western Ave., Chicago, Ill.—F
 Plastic Fabricators, Inc., 500 Sansone St., San Francisco, Calif.—F
 Plastic Molding Corp., Sandy Hook, Conn.—P
 Plastikmould—R. D. Werner Co., Inc.
 Plastiktrim—R. D. Werner Co., Inc.
 Poinsettia, Inc., 111 Cedar Ave., Pitman, N. J.—P
 Precision Fabricators, Inc., Champeney Terrace, Rochester, N. Y.—F
 Printold, Inc., 93 Mercer St., New York, N. Y.—F
 Recto Molded Prods., Inc., Appleton & B. & O. R. R., Cincinnati, Ohio—E, P
 Remler Co., Ltd., 2101 Bryant St., San Francisco, Calif., "Remler"—C, P
 Reynolds Spring Co., Molded Plastics Div., Cambridge, Ohio—C, E, P
 The Richardson Co., Melrose Park, Ill., "Insurok"—C, E, P
 Rogan Brothers, 2001 S. Michigan Ave., Chicago, Ill.—P
 Royal Moulding Co., Inc., 69 Gordon Ave., Providence, R. I.—P
 Shaw Insulator Co., 150 Colt St., Irvington, N. J.—P
 Specialty Insulation Mfg. Co., Church St., Hoosick Falls, N. Y.—C
 Jos. Stokes Rubber Co., Taylor & Webster Sts., Trenton, N. J.—P
 Synthetic Plastics Co., 88 St. Francis St., Newark, N. J.—P
 Tech-Art Plastics Co., 41-01 36th Ave., Long Island City, N. Y.—C, E, P
 Terkelsen Machine Co., 326 A St., Boston, Mass.—P
 Telex Prods. Co., Telex Park, Minneapolis, Minn.—P
 Tungsten Contact Mfg. Co., 7311 Cottage Ave., N. Bergen, N. J.—P
 Union Insulating Co., Box 351 Parkersburg, W. Va.—P
 Universal Plastics Corp., 235 Jersey Ave., New Brunswick, N. J.—C, P
 Varflex Corp., Rome, N. Y.—E
 Waterbury Button Co., 835 S. Main St., Waterbury, Conn.—P
 Watertown Mfg. Co., 3 Porter St., Watertown, Conn.—P
 Wernco—R. D. Werner Co., Inc.
 R. D. Werner Co., Inc., 380—2nd Ave., New York, N. Y., "Wernco," "Plastiktrim," "Plastikmould"—E, P
 Western Electric Co., 195 Broadway, New York, N. Y.—P
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—P
 Wheeling Stamping Co., Wheeling, W. Va.—P
 The S. S. White Dental Mfg. Co., Industrial Div., 10 E. 40th St., New York, N. Y.—P

H. O. Boehme, Inc., 915 Broadway, New York, N. Y.—AC
 J. H. Bunnell & Co., 81 Prospect St., Brooklyn, N. Y.—K
 Cover Dual Signal Systems, Inc., 125 W. Hubbard St., Chicago, Ill.—AC
 Gardiner-Levering Co., Haddon Hts., N. J.—AC
 Horn Signal Mfg. Corp., 310 Hudson St., New York, N. Y.—K
 ICA—Insuline Corp. of America
 The Instructograph Co., 4701 Sheridan Rd., Chicago, Ill.—AC
 Insuline Corp. of America, 3602—35th Ave., Long Island City, N. Y., "ICA"—AC
 Lear Avia, Inc., Piqua, Ohio—K
 T. R. McElroy, 100 Brookline Ave., Boston, Mass.—AC, K
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—K
 The North Electric Mfg. Co., P. O. Box 267, Gallon, Ohio—AC
 Radio Essentials, Inc., 69 Wooster St., New York, N. Y.—K
 Teleplex Co., 107 Hudson St., Jersey City, N. J.—AC
 The Vibroplex Co., 832 Broadway, New York, N. Y.—K
 Waters Conley Co., Rochester, Minn.—AC

Brush Development Co., 3313 Perkins Ave., Cleveland, Ohio, "Soundmiron"—CH, E, MT
 Carbide & Carbon Chemicals Corp., Plastics Div., 30 E. 42nd St., New York, N. Y.—RP
 C. G. Conn, Ltd., Elkhart, Ind.—CH, D, RA, RS
 The Daven Co., 158 Summit St., Newark, N. J.—E
 Dearborn Glass Co., 2414 W. 21st St., Chicago, Ill.—R
 Dictaphone Corp., 420 Lexington Ave., New York, N. Y.—RM, RS
 Duodisc—Duotone Co.
 Duotone Co., 799 Broadway, New York, N. Y., "Duodisc"—CH, CN, D, E, RS
 The Eideen Co., 504 N. Water St., Milwaukee, Wis.—CN
 Electrovox Co., 169 Maplewood Ave., Maplewood, N. J.—"Walco"—CN
 Emeloid Mfg. Co., 289 Laurel Ave., Arlington, N. J.—D
 Fairchild Aviation Corp., 88-06 Van Wyck Blvd., Jamaica, L. I., N. Y., "Fairchild"—A, CH, RM
 Federal Recorder Co., Inc., 630 S. Wabash Ave., Chicago, Ill.—CH, CN, D, RM, RS
 Filmgraph—Miles Reproducer Co., Inc.
 Flock Process Co., 17 W. 31st St., New York, N. Y.—TT
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—CN, S
 General Electric Co., 1 River Rd., Schenectady, N. Y.—MW
 The General Industries Co., Taylor & Olive Sts., Elyria, Ohio—M, RA, RM, TT
 General Phonograph Corp., Putnam, Conn.—CN
 M. A. Gerett Corp., 2947 N. 30th St., Milwaukee, Wis., "Black Diamond"—CN
 The Gould-Woody Co., 395 Broadway, New York, N. Y.—CN, D, RS
 Gray Mfg. Co., 230 Park Ave., New York, N. Y.—RM
 Harris Mfg. Co., 2422 W. 7th St., Los Angeles, Calif.—CN, D
 Hollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—A, E
 Home Recording Co., 9 E. 19th St., New York, N. Y.—D
 Industrial Screw & Supply Co., 717 W. Lake St., Chicago, Ill.—S
 J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn, N. Y.—ST
 Lear Avia, Inc., Piqua, Ohio—M
 Manufacturers Screw Products, 216 W. Hubbard St., Chicago, Ill.—S
 Miles Reproducer Co., Inc., 812 Broadway, New York, N. Y., "Filmgraph"—CH, M, MT, RM
 Mirror Record Corp., 58 W. 25th St., New York, N. Y.—CN, D, RM, RS
 Montgomery Bros., 61 Fremont St., San Francisco, Calif.—RM
 Music Master Mfg. Co., 508 S. Dearborn St., Chicago, Ill.—CN
 The National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, Ohio—S
 Pacific Sound Equipment Co., 1534 Cahuenga Blvd., Hollywood, Calif., "Port-Elec"—M, RM, RA, TT
 The Parolay Co., 600 S. Michigan Ave., Chicago, Ill.—CN
 Permo Point—Permo Products Corp.
 Permo Products Corp., 6415 Ravenswood Ave., Chicago, Ill., "Permo Point"—CN, RS
 Phonograph Needle Mfg. Co., Inc., 42 Dudley St., Providence, R. I.—CN
 Poinsettia, Inc., 111 Cedar Ave., Pitman, N. J.—RS
 Port-Elec—Pacific Sound Equipment Co.

Recording Equipment & Blanks



- Code recordersCR
- Cutting headsCH
- Discs (blank)D
- EqualizersE
- Film recordersF
- Graphic recordersRG
- Magnetic tape recordersMT
- Magnetic wire recorderMW
- MotorsM
- Needles (cutting)CN
- Record preforms and molding compoundsRP
- Recording machinesRM
- Recording machine assem.RA
- Recording suppliesRS
- ScrewsS
- Stroboscopic speed disc.ST
- TurntablesTT

Advance Recording Prods. Co., 36-12 34th St., Long Island City, N. Y.—D
 Alliance Mfg. Co., Lake Park Blvd., Alliance, Ohio—M, RM, TT
 Allied Recording Prods. Co., 21-09 43rd Ave., Long Island City, N. Y.—CH, D, M, CN, RM, RS, S, TT
 Audio Devices, Inc., 1602 Broadway, New York, N. Y., "Audiodesics," "Audiopoints"—CN, D
 Audiodesics—Audio Devices, Inc.
 Audiopoints—Audio Devices, Inc.
 The Audio-Tone Oscillator Co., 62 Walter St., Bridgeport, Conn.—RG
 Austin Electronic Mfg. Co., Warren, Pa.—CH, E, RM, RA
 Berger Electronics, 109-01 72nd Rd., Forest Hills, N. Y.—E, S
 Black Diamond—M. A. Gerett Corp.
 The Bristol Co., Waterbury, Conn.—S

Publishers—Engineering Books



Theo. Audel & Co., 49 West 23rd St., New York, N. Y.
 The Blakiston Co., 1012 Walnut St., Philadelphia, Pa.
 Gold Shield Products Co., 350 Greenwich St., New York, N. Y.
 Maedel Publishing House, 593 East 38th St., Brooklyn, N. Y.
 McGraw-Hill Book Co., 330 West 42nd St., New York, N. Y.
 Prentice Hall, Inc., 70 Fifth Ave., New York, N. Y.
 Radio & Technical Publ. Co., 45 Astor Pl., New York, N. Y.
 John F. Rider Publisher, Inc., 404 Fourth Ave., New York, N. Y.
 D. Van Nostrand Company, Inc., 250 Fourth Ave., New York, N. Y.
 John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y.

Radiotelegraph Communications Equipment

- Auto code sendersAC
- Keys, telegraphK

American Communications Corp., 306 Broadway, New York, N. Y.—AC, K
 Automatic Electric Mfg. Co., Mankato, Minn., "Automatic"—AC

POWER RATIO, VOLTAGE RATIO, DECIBEL TABLE
 (Continued from preceding page)

Power ratio	Voltage ratio	Decibels	Power ratio	Voltage ratio	Decibels
1-7328	1-3183	2-4	6309-6	79-433	38-0
1-8198	1-3490	2-6	104	100-000	40-0
1-9055	1-3804	2-8	104 x 1-5849	125-89	42-0
1-9953	1-4125	3-0	104 x 2-5119	158-49	44-0
2-2387	1-4962	3-5	104 x 3-9811	199-53	46-0
2-5119	1-5849	4-0	104 x 6-3096	251-19	48-0
2-8184	1-6788	4-5	105	316-23	50-0
3-1623	1-7783	5-0	105 x 1-5849	398-11	52-0
3-5480	1-8836	5-5	105 x 2-5119	501-19	54-0
3-9811	1-9953	6-0	105 x 3-9811	630-96	56-0
5-0119	2-2387	7-0	105 x 6-3096	794-33	58-0
6-3096	2-5119	8-0	106	1,000-00	60-0
7-9433	2-8184	9-0	107	3,162-3	70-0
10-0000	3-1623	10-0	108	10,000-0	80-0
12-589	3-5480	11-0	109	31,623-0	90-0
15-849	3-9811	12-0	1010	100,000-0	100-0

(100) Recording Equipment

Presto Recording Corp., 242 W. 55th St., New York, N. Y., "Presto"—CH, CN, D, E, M, RA, RM, RS, S, ST, TT
 Rangertone, Inc., 73 Winthrop St., Newark, N. J.—CN, D, RM
 The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—RM
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J., "RCA"—CN, D, RM, RA, F, TT
 Recordis Corp., 395 Broadway, New York, N. Y.—CN, D, RS
 The Recordit Co., 555 Bedford Ave., University City, Mo.—CN, RS
 Record-O-Vox, Inc., 1379 E. 8th St., Brooklyn, N. Y.—RM
 Recoton Corp., 21-10 49th Ave., Long Island City, N. Y.—CN, RS
 Rek-O-Kut Corp., 176 Lafayette St., New York, N. Y.—M, RM, RA, TT
 Frank Rieber, Inc., 11916 W. Pico Blvd., Los Angeles, Calif.—D, RM
 Walter L. Schott Co., 9306 Santa Monica Blvd., Beverly Hills, Calif., "Walco"—RS
 Scranton Record Co., 300 Brook St., Scranton, Pa.—CH, CN, D, E, M, MT, RA, RM, RS, S, ST, TT
 Scully Machine Co., 62 Walter St., Bridgeport, Conn.—RM
 Selector Mfg. Corp., 21-10 49th Ave., Long Island City, N. Y.—RM
 Shure Bros., 225 W. Huron St., Chicago, Ill.—CH
 Mark Simpson Mfg. Co., Inc., 188 W. 4th St., New York, N. Y.—RM
 Soundmirror—Brush Development Co.
 The Sound Scriber Corp., 82 Audubon St., New Haven, Conn.—RM, RS
 Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York, N. Y., "Speakophone"—CH, CN, D, RA, RM, RS, S, TT
 Talk-A-Phone Mfg. Co., 1219 W. Van Buren St., Chicago, Ill.—RA, RM, TT
 Talking Devices Co., 4447 W. Irving Park Rd., Chicago, Ill.—CH, RM, TT
 Thordarson Elec. Mfg. Co., 500 W. Huron St., Chicago, Ill.—E
 Tibbetts Laboratories, 12 Norfolk St., Cambridge, Mass.—CH
 Troy Radio & Television Co., 1144 S. Olive St., Los Angeles, Calif.—CN, D, M, RS
 Walco—Electrovox Co.
 Walco—Walter L. Schott Co.
 Waters Conley Co., Rochester, Minn.—CR
 Webster Electric Co., 1900 Clark St., Racine, Wis.—CH
 Western Sound & Electric Labs., Inc., 3512 W. St. Paul St., Milwaukee, Wis.—RM, RS
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—M
 Wilcox-Gay Corp., Charlotte, Mich., "Wilcox-Gay"—D, RM, RS
 Zephyr Prods. Corp., 67 W. 44th St., New York, N. Y.—RM

Records, Transcriptions & Playing Equipment



Automatic record changersARC
 Cactus needle sharpenerCS
 Coin record playersCM
 Electric phonographsEL
 Felt-flock, turntableFR
 Frequency recordsFR
 MotorsM
 NeedlesN
 Needles, sapphireSN
 Pick-ups (crystal)PC
 Dynamic pick-upsPD
 Pick-ups (magnetic)PM
 RecordsR
 Record albumsRA
 Record cabinets, see Cabinets
 Records compoundsRO
 Record player attachmentsRP
 Record pressersRM
 Store equipmentSE
 Transcription record playersTR
 TurntablesTT
 Wireless playersWP

H. W. Acton Co., Inc., 372 7th Ave., New York, N. Y., "Actone"—N
 Actone—H. W. Acton Co., Inc.
 Alliance Mfg. Co., Lake Park Blvd., Alliance, Ohio—M, TT
 The Astatic Corp., 832 Market St., Youngstown, Ohio, "Astatic"—PC
 Auburn Mfg. Co., 102 Stack St., Middletown, Conn.—F
 Audak Co., 500 Fifth Ave., New York, N. Y., "Audax"—PM
 Audax—Audak Co.
 Audio Devices, Inc., 1600 Broadway, New York, N. Y., "Audiopoint"—N, SN
 Audiopoint—Audio Devices, Inc.
 The Audio-Tone Oscillator Co., 60 Walter St., Bridgeport, Conn.—FR

Berger Electronics, 109-01 72nd Rd., Forest Hills, L. I., N. Y.—N, F
 A. Bitter Construction Co., 721-723 E. 133rd St., New York, N. Y.—SE
 Bluebird—RCA Victor Div., Radio Corp. of America
 Boetsch Bros., 221 E. 144th St., New York, N. Y.—EL
 Bruno-New York, Inc., 460 W. 34th St., New York, N. Y.—ARC, TT
 Champion—Decca Records, Inc.
 Chicago Sound Systems Co., 2124 S. Michigan Ave., Chicago, Ill.—RA
 Classic Point—The Eldeen Co.
 Classic Record Co., 2 W. 46th St., New York, N. Y., "Elite"—N, R, RA
 Columbia Recording Corp., 1473 Barnum Ave., Bridgeport, Conn., "Columbia," "Masterworks," "Okeh"—EL, N, R, RA, RM
 Decca Records, Inc., 50 W. 57th St., New York, N. Y., "Champion," "Decca"—EL, M, N, PC, R, RA, RP, WP
 Diehl Mfg. Co., Elizabethport, N. J.—M
 Duotone Co., 799 Broadway, New York, N. Y.—CS, N, SN, RO
 The Eldeen Co., 504 N. Water St., Milwaukee, Wis., "Maestro Point," "Classic Point," "Victory Point," "Merit Point"—N
 Electrical Research Laboratories, Inc., 2020 Ridge Ave., Evanston, Ill.—EL, RP
 Electrovox Co., 169 Maplewood Ave., Maplewood, N. J., "Walco"—SN
 Elite—Classic Record Co.
 Emerson Electric Mfg. Co., 410 N. 19th St., St. Louis, Mo.—M
 Fairchild Aviation Corp., 88-06 Van Wyck Blvd., Jamaica, L. I., N. Y.—D, PC, TT
 Fidelity—Permo Products Corp.
 Flock Process Co., 17 W. 31st St., New York, N. Y.—F
 Garrard Sales Corp., 206 Broadway, New York, N. Y.—ARC, EL, M, N, SN, PC, PM, RP, TR
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—F, N, RO
 General Electric Co., 1 River Rd., Schenectady, N. Y.—EL
 The General Industries Co., Taylor & Olive Sts., Elyria, Ohio—ARC, M, TR, TT
 General Instrument Corp., 829 Newark Ave., Elizabeth, N. J.—ARC
 General Phonograph Corp., Putnam, Conn.—N
 M. A. Gerett Corp., 2947 N. 30th St., Milwaukee, Wis., "Miracle Point"—N
 Goldenpoint—Lowell Needle Co.
 Goldentone—Lowell Needle Co.
 The Gould-Moody Co., 395 Broadway, New York, N. Y.—N, SN
 Harris Mfg. Co., 2422 W. 7th St., Los Angeles, Calif.—CS, EL, N, RA, RP, SN, TR
 Hilo—Shure Bros.
 Hollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—RP, TR
 Jensen Industries, Inc., 737 N. Michigan Ave., Chicago, Ill.—N
 Lowell Needle Co., 1 Wildore St., Putnam, Conn., "Goldentone," "Goldenpoint"—N
 Maestro Point—The Eldeen Co.
 The Magnavox Co., Inc., 2131 Bueter Rd., Ft. Wayne, Ind.—EL, SN
 Masterworks—Columbia Recording Corp.
 Megard Corp., 381 W. 38th St., Los Angeles, Calif.—TR
 John Meck Industries, Liberty St., Plymouth, Ind.—ARC, EL, RP, TT
 Mel-O-Tone—Herbert Corp.
 Merit Point—The Eldeen Co.
 Miracle Point—M. A. Gerett Corp.
 Music Master Mfg. Co., 508 S. Dearborn St., Chicago, Ill.—ARC, EL, N, R, RP, SN
 New Products Corp., Benton Harbor, Mich.—ARC
 Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill.—ARC
 Okeh—Columbia Recording Corp.
 Otto K. Olesen III. Co., Ltd., 1560 Vine St., Hollywood, Calif.—TR
 Pacific Sound Equipment Co., 1534 Cahuenga Blvd., Hollywood, Calif., "Port-Elec."—EL, N, PC, TR, TT
 The Paroloy Co., 600 S. Michigan Ave., Chicago, Ill.—N
 Peerless Alum. Co., Inc., 38 W. 21st St., New York, N. Y.—RA
 Permo Point—Permo Products Corp.
 Permo Products Corp., 6415 Ravenswood Ave., Chicago, Ill., "Fidelity," "Permo Point"—N, R, TR
 Pfanstiel Chemical Co., 104 Lake View Ave., Waukegan, Ill.—N
 Phonograph Needle Mfg. Co., Inc., 42 Dudley St., Providence, R. I., "Supreme"—N, SN
 Poinsettia, Inc., 111 Cedar Ave., Pitman, N. J.—R, RA, RM
 Port-Elec.—Pacific Sound Equipment Co.
 Presto Recording Corp., 242 W. 55th St., New York, N. Y., "Presto"—EL, M, N, PM, SN, TR
 Radiad Service, 720 Schumbert Ave., Chicago, Ill.—TR
 Rangertone, Inc., 73 Winthrop St., Newark, N. J.—N, R
 The Rauland Corp., 4245 Knox Ave., Chicago, Ill.—ARC, RP, TR
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J., "RCA," "Victor," "Bluebird"—ARC, EL, N, PC, PM, R, RA, TR, TT

ELECTRONIC ENGINEERING DIRECTORY

The Recordit Co., 555 Bedford Ave., University City, Mo.—N, R, RA
 Record-O-Vox, Inc., 1379 E. 8th St., Brooklyn, N. Y.—ARC, EL, CM, WP
 Recoton Corp., 21-10 49th Ave., Long Island City, N. Y.—N, SN
 Walter L. Schott Co., 9306 Santa Monica Blvd., Beverly Hills, Calif., "Walco"—RO
 Scranton Record Co., 300 Brook St., Scranton, Pa.—ARC, CM, CS, D, EL, F, M, N, PC, PM, R, RA, RO, RP, RM, SE, SN, TR, TT, WP
 Shure Bros., 225 W. Huron St., Chicago, Ill., "Hilo," "Zephyr"—PC
 Mark Simpson Mfg. Co., Inc., 188 W. 4th St., New York, N. Y.—EL, TR
 F. A. Smith Mfg. Co., P. O. Box 509, Rochester, N. Y.—M
 The Sound Scriber Corp., 82 Audubon St., New Haven, Conn.—TR
 Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York, N. Y., "Speakophone"—CS, EL, F, M, N, PC, R, SN, TR, TT
 Supreme—Phonograph Needle Mfg. Co., Inc.
 Talk-A-Phone Mfg. Co., 1219 W. Van Buren St., Chicago, Ill.—ARC, EL, RP, TR, TT, WP
 Talking Devices Co., 4447 W. Irving Park Rd., Chicago, Ill.—R, RM, RO, TT
 Tibbetts Laboratories, 12 Norfolk St., Cambridge, Mass.—PC
 Trans-American Airports Corp., 271 Madison Ave., New York, N. Y.—RA
 Troy Radio & Television Co., 1144 S. Olive St., Los Angeles, Calif.—ARC, EL, N, PC, P, V, R, RA, WP
 Victor—RCA Victor Div., Radio Corp. of America, Victory Point—The Eldeen Co.
 Walco—Electrovox Co.
 Walco—Walter L. Schott Co.
 Waters Conley Co., Rochester, Minn.—EL
 Webster Electric Co., 1900 Clark St., Racine, Wis., "Webster-Electric"—D, PC, PM
 Western Elec. Co., 300 Central Ave., Kearney, N. J.—EL, PM, TR
 Western Sound & Electric Labs., Inc., 3512 W. St. Paul, Milwaukee, Wis., EL, SN
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—M
 Wilcox-Gay Corp., Charlotte, Mich.—ARC, EL, N, WP
 Zephyr—Shure Bros.

Resistors & Volume Controls



Attenuators (precision)A
 Fixed compositionFC
 Fixed wirewoundFW
 Industrial fixedI
 Plug-in (tubes)PT
 Power rheostatsPR
 PrecisionPRE
 SuppressorsSU
 VariableV
 Volume controlsVC
 High frequency resis. slugHR
 Slide wire potsS

Aerovox Corp., 742 Bellerile Ave., New Bedford, Mass.—FC, FW
 Allen-Bradley Co., 1323 S. 2nd St., Milwaukee, Wis., "Bradleyunit," "Bradleyometer"—FC, SU, V, VC
 American Automatic Electric Sales Co., 1019 W. Van Buren St., Chicago, Ill.—FW, SU
 Atlas Resistor Co., 425 Broome St., New York, N. Y., "Atlas"—FW, V
 The Audio-Tone Oscillator Co., 60 Walter St., Bridgeport, Conn.—A
 Berger Electronics, 109-01 72nd Rd., Forest Hills, L. I., N. Y.—V, VC
 James G. Biddle Co., 1211 Arch St., Philadelphia, Pa.—PR
 The Birtcher Corp., 5087 Huntington Dr., N., Los Angeles, Calif.—PC
 Bradleyometer—Allen-Bradley Co.
 Bradleyunit—Allen-Bradley Co.
 Brown Devil—Ohmite Mfg. Co.
 Candohms—The Muter Co.
 Carborundum Co., Niagara Falls, N. Y.—FC, I
 Centralab, 900 E. Keefe Ave., Milwaukee, Wis., "Centralab"—V, VC
 Chicago Telephone Supply Co., Elkhart, Ind.—V, VC
 Cinema Engineering Co., 1508 W. Verdugo Ave., Burbank, Calif., "Cinema"—A, FW, PRE, V, S
 Clarostat Mfg. Co., Inc., 285 N. 6th St., Brooklyn, N. Y., "Clarostat"—A, FC, FW, I, PT, PR, PRE, V, VC
 Consolidated Wire & Assoc. Corps., 1635 S. Clinton, Chicago, Ill.—FC, FW, SU, VS, V
 Continental Carbon, Inc., 13900 Loraine Ave., Cleveland, Ohio, "Continental"—FC, FW, PRE, SU
 Cordohm—Ohmite Mfg. Co.
 Daven Co., 158 Summit St., Newark, N. J.—A, FW, PRE, VC
 Dependable—Radio City Prods. Co., Inc.
 Dividohm—Ohmite Mfg. Co.
 Electronic Prods. Co., 19 N. 1st St., Geneva, Ill.—A, FC, FW, I

Erie Resistor Corp., 640 W. 12th St., Erie, Pa.—FC, SU
 Ex-Stat—Tilton Electric Co.
 Ferris Instrument Corp., 110 Cornelia St., Boonton, N. J.—A, S
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—FC
 General Electric Co., 1 River Rd., Schenectady, N. Y.—I, PR, PT
 General Radio Co., 30 State St., Cambridge, Mass.—“G-R”—A
 G-H—Girard-Hopkins
 Girard-Hopkins, 1000 40th Ave., Oakland, Calif.—“G-H”—FC
 G-R—General Radio Co.
 Hardwick & Hindle, Inc., 40 Herman St., Newark, N. J.—FW, I, PR, S, V
 Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—A
 Hytron Corp., 23 New Derby St., Salem, Mass.—“Hytron”—PT
 Industrial Transformer Corp., 2540 Belmont Ave., New York, N. Y.—I
 Instrument Resistors Co., 25 Amity St., Little Falls, N. J.—FW
 International Resistance Co., 401 N. Broad St., Philadelphia, Pa.—“IRC”—A, FC, FW, HR, I, PR, PRE, S, SU, V, VC
 IRC—International Resistance Co.
 J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn, N. Y.—“JFD”—PT
 Keystone Carbon Co., St. Marys, Pa.—N
 Koolohms—Sprague Products Co.
 Landis & Gyr, Inc., 104 5th Ave., New York, N. Y.—FW, I
 Lectrahm, Inc., 5125 W. 25th St., Cicero, Ill.—FW, I, PR, V
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind.—“Yaxley”—A, FW, I, V, VC
 Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y.—FW, PT
 Microhm—Precision Resistor Co.
 Multivolt—Ohmite Mfg. Co.
 The Muter Co., 1255 S. Michigan Ave., Chicago, Ill.—“Candohms,” “Zipohms.”—FW
 National Technical Laboratories, 820 Mission St., S. Pasadena, Calif.—PRE, S, VC
 National Union Radio Corp., 15 Washington St., Newark, N. J.—PT, VC
 The Ohio Carbon Co., 12508 Berea Rd., Cleveland, Ohio—FC, FW
 Ohmite Mfg. Co., 4984 W. Flournoy St., Chicago, Ill.—“Ohmite,” “Red Devil,” “Brown Devil,” “Multivolt,” “Riteohm,” “Cordohm,” “Dividohm”—FW, HR, I, PR, PRE, V
 Ohmspun—The States Co.
 Precision Resistor Co., 334 Badger Ave., Newark, N. J.—“Microhm”—A, I, PR, PRE, RW, V
 Radio City Products Co., Inc., 127 W. 26th St., New York, N. Y.—“Dependable”—PRE
 Raytheon Production Corp., 55 Chapel St., Newton, Mass.—PT
 Red Devil—Ohmite Mfg. Co.
 Riteohm—Ohmite Mfg. Co.
 Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago, Ill.—A
 Sensitive Research Instrument Co., 4545 Bronx Blvd., New York, N. Y.—FW
 Shallcross Mfg. Co., 10 Jackson Ave., Collingdale, Pa.—“Shallcross”—PRE
 Sner Resistor Corp., St. Marys, Pa.—FW, V
 Sprague Products Co., N. Adams, Mass.—“Koolohms”—FW, I, PRE
 Sprague Specialties Co., N. Adams, Mass.—FW, I, PRE
 Stackpole Carbon Co., St. Marys, Pa.—“Stackpole”—FC, V, VC
 The States Co., 19 New Park Ave., Hartford, Conn.—“Ohmspun”—HR
 Herman H. Sticht Co., Inc., 27 Park Pl., New York, N. Y.—FW, PR, PRE
 Sylvania Electric Products, Inc., Emporium, Pa.—“Sylvania”—PT
 Tech Laboratories, 7 Lincoln St., Jersey City, N. J.—“Tech Lab”—A, PRE, VC
 Tilton Electric Corp., 138 W. 17th St., New York, N. Y.—“Ex-Stat”—FW, SU, VC
 H. W. Tuttle & Co., 261 W. Maumee St., Adrian, Mich.—FW, I
 Utah Radio Products Co., 820 Orleans St., Chicago, Ill.—A, FW, I, PRE, V, VC
 Ward Leonard Electric Co., 35 South St., Mt. Vernon, N. Y.—FW, I, PR, SU, V
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—FW, I, PR
 Wirt Co., 5221 Greene St., Philadelphia, Pa.—“Wirtco Phenocote”—FW, I, SU, V, VC
 Wirtco Phenocote—Wirt Co.
 Yaxley—P. R. Mallory & Co., Inc.
 Zipohms—The Muter Co.

Rotary Machines



- AlternatorsA
- Power plantsAC
- ConvertersCON
- DC generatorsDC
- DynamotorsDYN
- Gas enginesENG
- Motor generatorMG

Alliance Mfg. Co., Lake Park Blvd., Alliance, Ohio—DYN, MG
 The Automatic Electrical Devices Co., 326 E. Third St., Cincinnati, Ohio—CON
 Bendix Radio Div., Bendix Aviation Corp., 922 E. Fort Ave., Baltimore, Md.—DYN
 The Brown-Brackmeyer Co., 1002 Smithville, Dayton, Ohio—DC, MG
 Carson Machine & Supply Co., Box 4547, Oklahoma City, Okla.—AC
 Carter Motor Co., 1609 Milwaukee Ave., Chicago, Ill.—CON, DC, DYN
 Caterpillar Tractor Co., Peoria, Ill.—AC
 Climax Engineering Co., Clinton, Iowa—AC, ENG
 Diehl Mfg. Co., 80 Trumbull St., Elizabethport, N. J.—“Diehl”—CON, MG
 Ecor, Inc., 1501 Congress St., Chicago, Ill.—DYN
 Electric Specialty Co., Stamford, Conn.—“Esco”—CON, DYN, DC
 Electron Equipment Corp., Palm Springs, Calif.—CON
 Esco—Electric Specialty Co.
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—CON, ENG
 General Electric Co., 1 River Rd., Schenectady, N. Y.—CON, DC, DYN, MG
 Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.—CON, DC, DYN, MG
 Kato Engineering Co., 530 N. Front St., Mankato, Minn.—AC, CON, DC, MG
 Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.—CON
 Lauson Co., New Holstein, Wis.—ENG
 Lear Avia, Inc., Piqua, Ohio—CON, DC, DYN, MG
 Leland Electric Co., 1501 Webster St., Dayton, Ohio—CON, DYN, MG
 Master Vibrator Co., 200 Davis Ave., Dayton, Ohio—AC
 Midco Mfg. & Dist. Co., Inc., 13th St. & Kentucky Ave., Sheboygan, Wis.—AC
 The K. B. Noble Co., 450 Capitol Ave., Hartford, Conn.—AC
 North American Philips Co., Inc., 145 Palisade St., Dobbs Ferry, N. Y.—FW
 D. W. Onan & Sons, 48 Royalston Ave., Minneapolis, Minn.—AC, MG

Pioneer Gen-E-Motor Corp., 466 W. Superior St., Chicago, Ill.—AC, CON, DC, DYN, ENG, MG
 The Ready Power Co., 3826 Grand River, Detroit, Mich.—AC
 F. A. Smith Mfg. Co., Inc., P. O. Box 509, Rochester, N. Y.—A
 Webster—Chicago Corp., 3825 Armitage Ave., Chicago, Ill.—DYN
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—CON, DC, DYN, MG
 Wincharger Corp., Sioux City, Iowa—AC, CON, DYN, ENG

Sound Systems, Amplifiers & Accessories



- Acoustic materialsAM
- Carrying casesC
- Kits (amplifier)K
- Mobile amplifiersM
- Power amplifiersPA
- Pre amplifiersPRE
- Remote controllersRC
- Sound systems (complete)SS
- Car-top speaker rackCR

ACA—Amplifier Co. of America
 Aircraft Accessories Corp., Fairfax & Funsten Rd., Kansas City, Kans.—K, M, PA, PRE
 Altec Lansing Corp., 6900 McKinley Ave., Los Angeles, Calif.—M, PA, PRE, SS
 American Communications Corp., 306 Broadway, New York, N. Y.—PA, PRE, SS
 American Transformer Co., 178 Emmet St., Newark, N. J.—PA
 Amplifier Co. of America, 17 W. 20th St., New York, N. Y.—“ACA”—M, PA, PRE, RC, SS
 Art Specialty Co., 3245 W. Lake St., Chicago, Ill.—CR
 Atlas Sound Corp., 1443—39th St., Brooklyn, N. Y.—“Atlas”—C
 Audiograph—John Meck Industries
 Austin Electronic Mfg. Co., Warren, Pa.—PA, PRE, RC, SS
 Bellone—Bell Sound Systems, Inc.
 Bell Radio & Television, 125 E. 46th St., New York, N. Y.—SS
 Bell Sound Systems, Inc., 1183 Essex Ave., Columbus, Ohio.—“Bellone”—C, K, M, PA, PRE, RC, SS
 David Bogen Co., Inc., 663 Broadway, New York, N. Y.—C, M, PA, PRE, RC, SS
 Boom Electric & Amplifier Co., 1227 W. Washington Blvd., Chicago, Ill.—SS

RESISTIVITY AND TEMPERATURE COEFFICIENT

$$\text{Sectional Area of Conductor } S = \frac{kW \times L \times P \times 100,000}{E^2 \times \text{per cent. loss}}$$

Material	Resistivity, ρ		Temperature Range °C.		Temperature Coefficient Referred to 0°C.
	Microhms per Cm. Cube at 0°C.	Ohms per Mil. Foot at 0°C.	From	To	
Aluminium	2-62	15-76	0	100	0-00423
Copper—					
Standard	1-589	9-56	0	100	0-00427
Hard-drawn	1-60	9-62	0	100	0-00408
Gold	2-20	13-23	18	100	0-00368
Iron, cast—					
Soft	74-4	447-5			
Hard	97-8	588-3			
Lead	19-8	119-1	0	100	0-00411
Mercury	94-07	565-9	0	100	0-00086
Nickel—					
Commercial wire	9-9	59-55	0	100	0-0039
Platinum—					
Drawn	11-0	66-17	0	100	0-00367
Silver	1-47	8-84	0	100	0-00400
Steel—					
Soft	11-8	70-98	10	35	0-00423
Hard	45-6	274-3	10	35	0-00161

OMISSIONS

Listings have been omitted in all cases where, after three requests, a company has failed to return our directory questionnaire or otherwise verify its activity.

Chicago Sound Systems Co., 2124 S. Michigan Ave., Chicago, Ill., "Chicago Sound Amplifiers"—PA, SS
Clarion—Electronic Corp. of America
E. G. Conn, Ltd., Elkhart, Ind.—SS
Cover Dual Signal Systems, Inc., 125 W. Hubbard St., Chicago, Ill.—RC
DeVry Corp., 1111 Armitage Ave., Chicago, Ill.—SS
Diks Acoustic Products Co., 540 West Ave., Norwalk, Conn.—M, PA, SS
Frank I. Dufrane Co., Inc., 1138 Howard St., San Francisco, Calif.—SS
Eastern Amplifier Corp., 794 E. 140th St., Bronx, N. Y.—M, PA, PRE, RC, SS
Eckstein Radio & Television Co., 1400 Harmon Pl., Minneapolis, Minn.—M, PA, PRE, SS
Electronic Corp. of America, 45 W. 18th St., New York, N. Y., "Clarion"—M, PA, PRE, RC, SS
Electronic Products Co., 19 N. First St., Geneva, Ill.—K
Empire Radio Mfg., 114 E. 47th St., New York, N. Y.—SS
Erwood Sound Equipment Co., 223 W. Erie, Chicago, Ill.—C, K, M, PA, PRE, REC, SS, CR
Execution, Inc., 415 Lexington Ave., New York, N. Y.—PA, SS
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York, N. Y., "Ferranti"—PA, PRE
The Forest Electronic Co., 320 E. 65th St., New York, N. Y.—PA, SS
Gates American Corp., Quincy, Ill.—SS
Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—PA
Gentleman Products Div., Henney Motor Co., 1708 Cumming St., Omaha, Nebr.—M, PA, PRE, RC, SS
Gibson, Inc., 225 Parsons St., Kalamazoo, Mich.—PA, SS
Godfrey Mfg. Corp., 2140 N. 27th St., Milwaukee, Wis.—PA, PRE, SS
Harvey-Wells Communications, Inc., Southbridge, Mass.
Herbach & Rademan Co., 522 Market St., Philadelphia, Pa.—M, PA, PRE, RC, SS
Hollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—M, PA, PRE, SS
International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—SS
Johns-Manville, 22 E. 40th St., New York, N. Y.—AM
Karadio Corp., 1400 Harmon Pl., Minneapolis, Minn.—M, PA, PRE
Laurehk Radio Mfg. Co., 3918 Monroe Ave., Wayne, Mich., "Laurehk"—PA
Lifetime Sound Equipment Co., 1101-1103 Adams St., Toledo, Ohio—SS
Lincophone Co., 1661 Howard Ave., Utica, N. Y.—C, M, PA, SS
John Meck Industries, Liberty St., Plymouth, Ind., "Audiograph"—CK, M, PA, PRE, SS
Megard Corp., 381 W. 38th St., Los Angeles, Calif.—PA, SS
Miles Reproducer Co., Inc., 812 Broadway, New York, N. Y., "Miles"—C, K, M, PA, PRE, RC, SS, CR
National Inter-Communicating Systems, 2434 Montrose Ave., Chicago, Ill.—PA, PRE, SS
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles, Calif.—C, M, PA, PRE, RC, SS
Operadio Mfg. Co., 13th & Indiana Sts., St. Charles, Ill., "Operadio"—M, PA, PRE, RC, SS
Oxford Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—K, M, PA, PRE, SS
Pacific Sound Equipment Co., 1534 Cahuenga Blvd., Hollywood, Calif., "Port-Elec."—SS
Port-Elec.—Pacific Sound Equipment Co.
Presto Recording Corp., 242 W. 55th St., New York, N. Y., "Presto"—M, PA, PRE
Racon Elec. Co., Inc., 52 E. 19th St., New York, N. Y.—AM, SS
Radjad Service, 720 Schubert Ave., Chicago, Ill.—PA
Radio Electronic Co., 1816 Villanova Drive, Oakland, Calif.—SS
Radiotechnic Lab., 1328 Sherman Ave., Evanston, Ill.—SS
Rangertone, Inc., 73 Winthrop St., Newark, N. J.
The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill., "Rauland"—M, PA, PRE, RC, SS
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—M, PPA, PRE, RC, SS
Regal Amplifier Mfg. Corp., 20 W. 20th St., New York, N. Y.—M, PA, SS
Remler Co., Ltd., 2101 Bryant St., San Francisco, Calif., "Remler"—SS
Frank Rieber, Inc., 11016 West Pico Blvd., Los Angeles, Calif.—PA, PRE, RC, SS
Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago, Ill.—PRE
Schulmerich Electronics, Inc., 141 E. Glenside Ave., Glenside, Pa.—M, PA, PRE, RC, SS
Setchell-Carlson, Inc., 2233 University Ave., St. Paul, Minn., "Setchell-Carlson"—PA, SS, M
Silman Mfg. Corp., 305 Pennsylvania Ave., Pittsburgh, Pa.—PA, PRE
Mark Simpson Mfg. Co., Inc., 188 W. 4th St., New York, N. Y.—C, K, M, PA, PRE, RC, SS
The Sound Scriber Corp., 82 Audubon St., New Haven, Conn.—PRE
Stancor—Standard Transformer Corp.
Standard Transformer Corp., 1500 N. Halsted St., Chicago, Ill., "Stancor"—K
Stromberg-Carlson Tel. Mfg. Co., 100 Carlson Rd., Rochester, N. Y., "Stromberg-Carlson"—PA, PRE, SS
Talk-A-Phone Mfg. Co., 1219 W. Van Buren St., Chicago, Ill.—PRE
Technical Apparatus Co., Inc., 1171 Tremont St., Boston, Mass.—PRE

Thordarson Electric Mfg. Co., 500 W. Huron St., Chicago, Ill., "Thordarson"—C, K, M, PA, PRE
Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York, N. Y.—PA, PRE, RC
Vac-O-Grip Co., 2025 Detroit Ave., Toledo, Ohio—CR
Webster Electric Co., 1900 Clark St., Racine, Wis., "Webster Electric"—C, M, PA, PRE, RC, SS
Wesbar Stamping Corp., West Bend, Wis.—CR
Western Electric Co., 195 Broadway, New York, N. Y.—PA, PRE, SS
Western Sound & Elec. Labs., Inc., 3512 W. St. Paul, Milwaukee, Wis.—M, PA, PRE, RC, SS, CR

Speakers & Parts



Accessories ACC
Acoustic chambers CH
Baffles B
Cones C
Crystal speakers CS
Electro-dynamic D
Field coils F
Field exciters FE
Grille cloths GC
High frequency HF
Magnetic M
Permanent magnet dyn. PM
Power speakers PS
Projector horns PH
Stands ST
Wall speaker baffles WB
PM drivers PD
Shims, adjusting S

The Acme Wire Co., New Haven, Conn.—F
Altec Lansing Corp., 6900 McKinley Ave., Los Angeles, Calif.—B, C, D, F, FE, HF, PH, PM, PS
Apex Industries, Inc., 1035 W. Lake St., Chicago, Ill.—F
Art Specialty Co., 3245 W. Lake St., Chicago, Ill.—B, PH, ST, WB
Atlas Sound Corp., 1451—39th St., Brooklyn, N. Y., "Atlas"—ACC, CH, B, C, D, FE, PD, PM, PS, PH, ST, WB
Auburn Mfg. Co., 100 Stack St., Middletown, Conn.—S
Best Mfg. Co., Inc., 1200 Grove St., Irvington, N. J.—ACC, C, D, F, M, PM, S
Brush Development Co., 3311 Perkins Ave., Cleveland, Ohio—CS
Carroll Mfg. Co., 415 S. Aberdeen St., Chicago, Ill.—C, F
Cinaudagraph Speakers, Inc., 3929 S. Michigan Blvd., Chicago, Ill.—ACC, B, C, CH, D, E, FE, GC, HF, M, PM, PS, PD, PH, S, ST, WB
Cleveland Wire Cloth & Mfg. Co., 3576 E. 78th St., Cleveland, Ohio—GC
Crescent Industries, Inc., 4140 Belmont Ave., Chicago, Ill., "Crescent"—D, PM
Electronic Transformer Co., 515 W. 29th St., New York, N. Y.—F, FE
Erwood Sound Equip. Co., 223 W. Erie St., Chicago, Ill.—FE, PH, ST
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill., "G-C"—ACC, GC, S
Hawley Products Co., 201 N. First Ave., St. Charles, Ill., "Hawley"—B, C, CH, PH, WB
A. G. Hintz Co., Westchester, Ill.—GC
Hollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—B, CH
Illinois Wood Products Corp., 2512 S. Damen Ave., Chicago, Ill.—B, WB
Industrial Wire Cloth Products Corp., Wayne, Mich.—GC
Jensen Radio Mfg. Co., 6601 S. Laramie Ave., Chicago, Ill., "Jensen"—B, C, CH, D, F, FE, HF, PH, PM, PS, ST, WB
J.F.D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn, N. Y.—F, S
The Magnavox Co., 2131 Bueter Rd., Ft. Wayne, Ind.—D, PM
Magnetic Windings Co., 16th & Butler Sts., Easton, Pa.—F
Miles Reproducer Co., 812 Broadway, New York, N. Y.—B, CH, D, PS
Newcomb Audio Products Co., 2915 S. Hill St., Los Angeles, Calif.—ACC, PD, PH, PS, WB
Otto K. Olesen Ill. Co., Ltd., 1560 Vine St., Hollywood, Calif.—B
Operadio Mfg. Co., 13th & Indiana Sts., St. Charles, Ill., "Operadio"—B, CH, D, FE, PH, PM, PS, WB
Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill., "Oxford"—B, C, D, F, FE, HF, M, PD, PH, PM, PS
Parisian Novelty Co., 3510 S. Western Ave., Chicago, Ill.—S
Peerless Mfg. Corp., 1400 W. Ormsby, Louisville, Ky.—F
Permoflux Corp., 4916 W. Grand Ave., Chicago, Ill.—D, M, PM
Quam-Nichols Co., 33rd Pl. & Cottage Grove Ave., Chicago, Ill.—D, F, HF, M, PM, PS
Racon Elec. Co., Inc., 52 E. 19 St., New York, N. Y.—ACC, B, CH, C, D, F, FE, HF, M, PD, PH, PM, PS, ST, WB

Radio Speakers, Inc, 221 E. Cullerton St., Chicago, Ill.—D, PM
The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—B, PH, WB
RCA Victor Div., Radio Corp. of America, Camden, N. J.—B, D, FE, HF, PD, PM, PS, PH, ST, WB
The Rola Co., Inc., 2530 Superior Ave., Cleveland, Ohio—D, PM
Walter L. Schott Co., 9306 Santa Monica Blvd., Beverly Hills, Calif., "Walsco"—GC
Mark Simpson Mfg. Co., Inc., 188 W. 4th St., New York, N. Y.—B, CH, PD, PH, WB
Nathan R. Smith Mfg. Co., 105 Pasadena Ave., So. Pasadena, Calif.—F
Thomas & Skinner Steel Prod. Co., 1116 E. 23rd St., Indianapolis, Ind.—PM
Tibbetts Labs., 12 Norfolk St., Cambridge, Mass.—CS
Trebore Radio Co., Pasadena, Calif.—F
Troy Radio & Telev. Co., 1144 S. Olive St., Los Angeles, Calif.—D, PM
University Labs., 225 Varick St., New York, N. Y.—B, D, HF, PD, PH, PM, PS
Utah Radio Prods. Co., 850 Orleans St., Chicago, Ill.—C, D, M, PM, WB
Weller Bros., 516 Northampton St., Easton, Pa.—F
Western Elec. Co., 195 Broadway, New York, N. Y.—D, HF, M, PH, PM, PS
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—ACC
The Wheeler Insulated Wire Co., 378 Washington Ave., Bridgeport, Conn.—F, FE
Worcester Pressed Steel Co., Worcester, Mass.—S
Wright, Inc., 2233 University Ave., St. Paul, Minn.—"Nokoll"—D, WB

Switches & Relays



Capacity CS
Circuit breakers CB
Counters, electric C
Fluorescent lamp starters FS
Keys, semi-automatic KS
Keys, switch SK
Keying relays KR
Mercury M
Polarized relays RP
Power P
Protective PR
Push button PB
Relays R
Safety interlocks S
Safety relays SRE
Selector switches SL
Stepping relays SR
Toggle switches TO
Test equipment TS
Thermostats TH
Thermal switches T
Timers TE
Vacuum V
Wave change (receiver) W
Wave change (transmitter) WT

The Acro Electric Co., 1305 Superior Ave., Cleveland, Ohio—PR
The Adams & Westlake Co., Elkhart, Ind.—R
Advance Elec. Co., 1260 W. 2nd St., Los Angeles, Calif.—R
Bruno H. Ahlers, 8524 89th St., Woodhaven, L. I., N. Y.—P, SL, TS
Allied-Control Co., Inc., 227 Fulton St., New York, N. Y.—CB, R
Allis-Chalmers Mfg. Co., Boston Works, Hyde Park, Boston, Mass.—CB
American Automatic Electric Sales Co., 1019 W. Van Buren St., Chicago, Ill.—C, M, P, PR, R, RP, S, SK, SR, TE, TS
American Gas Accumulator Co. 1027 Newark Ave., Elizabeth, N. J.—TE
American Instrument Co., Silver Spring, Md.—M, R, TS
American Phenolic Corp., 1830 S. 54th St., Cicero, Ill., "Amphenol"—TS, W
Amperite Co., 561 Broadway, New York, N. Y.—R, TE
Amphenol—American Phenolic Corp.
Apex Industries, Inc., 1035 W. Lake St., Chicago, Ill.—CB, R, RP, SR, TE
The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford, Conn.—PB, R, TO
Audio Development Co., 2833 13th Ave., Minneapolis, Minn.—SK
Automatic Electric Mfg. Co., Mankato, Minn. "Automatic"—R, TE
Automatic Switch Co., 41 E. 11th St., New York, N. Y.—P, R
Automatic Temperature Control Co., 24 E. Logan St., Philadelphia, Pa.—TE
Bacon Electric Timer Corp., 4513 Brooklyn Ave., Cleveland, Ohio—M
Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—WT
Berger Electronics, 109-01 72nd Rd., Forest Hills, L. I., N. Y.—CS, S
Best Mfg. Co., 1200 Grove St., Irvington, N. J.—R, RP

The Birtcher Corp., 5087 N. Huntington Dr., Los Angeles, Calif.—R
 J. H. Bunnell & Co., 81 Prospect St., Brooklyn, N. Y.—CB, R, RP
 Chicago Telephone Supply Co., 1142 W. Beardsley Ave., Elkhart, Ind.—PB, SK, W
 C. P. Clare Co., 4719 W. Sunnyside Ave., Chicago, Ill.—C, R, SK, TE
 Clarostat Mfg. Co., 285 N. 6th St., Brooklyn, N. Y., "Clarostat"—P
 Control Corp., 600 Stinson Blvd., Minneapolis, Minn.—R, TE
 Cook Electric Co., 2700 Southport Ave., Chicago, Ill.—R, TE
 Cover Dual Signal Systems, Inc., 125 W. Hubbard St., Chicago, Ill.—C, R, SR, TE
 The R. W. Cramer Co., Inc., Centerbrook, Conn.—TE
 Cutler-Hammer, Inc., 1333 W. St. Paul Ave., Milwaukee, Wisc., "Cutler-Hammer"—P, TS
 Struthers Dunn, Inc., 1321 Arch St., Philadelphia, Pa.—R, RP, SR, S, TE
 Durakool, Inc., 1010 N. Main St., Elkhart, Ind.—R
 Eagle Signal Corp., 202 20th St., Moline, Ill.—C, TE
 Eimac—Eitel-McCullough, Inc.
 Eitel-McCullough, Inc., San Bruno, Calif., "Eimac"—V
 The Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio—PB
 Electrical Facilities, Inc., 4224 Holden St., Oakland, Calif.—TS
 Electron Equipment Corp., Palm Springs, Calif.—V
 Electronic Products Co., 19 N. 1st St., Geneva, Ill.—C, R, TE
 Ess Instrument Co., Bridge Plaza, Ft. Lee, N. J.—R
 H. C. Evans & Co., 1528 W. Adams St., Chicago, Ill.—R
 Federal A. C. Switch Corp., 1200 Niagara St., Buffalo, N. Y.—SK
 General Cement Mfg Co., 919 Taylor Ave., Rockford, Ill.—P, PB, TO, TS, W, WT
 General Controls Co., Glendale, Calif.—R
 General Electric Co., 1 River Rd., Schenectady, N. Y.—C, CB, CS, FS, M, P, PB, PR, R, S, TS, V
 Thomas B. Gibbs & Co., Delevan, Wisc., "Gibbs"—TE
 G-M Laboratories, Inc., 4326 N. Knox Ave., Chicago, Ill.—C, R, SP
 Guardian Electric Mfg. Co., 1622 Walnut St., Chicago, Ill.—C, M, P, PB, PB, R, S, SR, TE, V
 Hart Mfg. Co., 110 Bartholomew Ave., Hartford, Conn.—KR, TH, TO
 Haydon Mfg. Co. Inc., Forestville, Conn.—TE
 H-B Electric Co., 6122 N. 21st St., Philadelphia, Pa.—M, P, R, TE, V
 Heinemann Circuit Breaker Co., 137 Plum St., Trenton, N. J.—CB
 Robert Hetherington & Son, Inc., 1216 Elmwood Ave., Sharon Hills, Pa.—P
 Horni Signal Mfg. Corp., 310 Hudson St., New York, N. Y.—C, PB, S, SR, TE, V
 Industrial Electronics Corp., 951 McCarter Highway, Newark, N. J.—FS
 Industrial Timer Corp., 117 Edison Pl., Newark, N. J.—TE
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—C, V
 J-B-L Instrument Co., 228 Hazelwood Ave., Alden, Pa.—SL
 J-B-T Instruments, Inc., 441 Chapel St., New Haven, Conn.—SL
 Jefferson Electric Co., Bellwood, Ill.—R
 E. F. Johnson Co., Waseca, Minn.—R
 Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.—R, SK
 H. R. Kirkland Co., Morristown, N. J.—PB
 Leach Relay Co., 5915 Avalon Blvd., Los Angeles, Calif.—R
 Lear Avia, Inc., Piqua, Ohio—R, W, WT
 Lektra Laboratories, Inc., 30 E. 10th St., New York, N. Y.—TE
 Littelfuse, Inc., 4732 Ravenswood Ave., Chicago, Ill.—CB, M, PB, R, TS
 Lumenite Electric Co., 407 So. Dearborn St., Chicago, Ill.—CS, R, TE
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind., "Yaxley"—PB, TS, W, WT
 Mark Time—M. H. Rhodes, Inc.
 Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill.—R, W
 The Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.—M
 Micro Switch Corp., 3 W. Spring St., Freeport, Ill., "Microswitch"—P, PB, SK, TS
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—R, SRE
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—PB, SK
 Donald P. Mossman, Inc., 6133 Northwest Highway, Chicago, Ill.—PB, R, SK
 Mu-Switch Corp., Canton, Mass.—PB, S
 The Muter Co., 1255 S. Michigan Ave., Chicago, Ill., "Muter"—PB, R
 New England Radiocrafters, 1156 Commonwealth Ave., Brookline, Mass.—W
 The North Electric Mfg. Co., P.O. Box 267, Gallon, Ohio—R, SK, SR, TE
 Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill., "Oak"—PB, W, WT
 Peerless Laboratories, Inc., 115 E. 23rd St., New York, N. Y.—P
 Peerless Mfg. Corp., 1400 W. Ormsby, Louisville, Ky.—C, PR, R, S, SR

Phonette Co. of America, 7122 Melrose Ave., Los Angeles, Calif.—WT
 Photobell Corp., 114 Nassau St., New York, N. Y.—C, CS, RP, S, TE, TS
 Potter & Brumfield Mfg. Co., Princeton, Ind.—R, S
 Reynolds Electric Co., 2650 W. Congress St., Chicago, Ill.—SL, TE
 M. H. Rhodes, Inc., Hartford, Conn., "Mark Time"—TE
 Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago, Ill.—TE, TS
 Shallcross Mfg. Co., 10 Jackson Ave., Collingdale, Pa., "Shallcross"—SL
 Sigma Instruments, Inc., 78 Freeport St., Boston, Mass.—R, RP
 F. A. Smith Mfg. Co., Inc., P. O. Box 509, Rochester, N. Y.—CB, PR
 Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.—CB, PR
 Stackpole Carbon Co., St. Marys, Pa., "Stackpole"—TS
 Staco—Standard Electrical Prods. Co.
 Standard Electric Time Co., Springfield, Mass.—TE
 Standard Electrical Prods. Co., 300 E. 4th St., St. Paul, Minn., "Staco"—M, P, PB, PR, R, RP, S, SR, TE, W, WT
 The States Co., 19 New York Ave., Hartford, Conn.—TS
 Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—CB
 Tech Laboratories, 7 Lincoln St., Jersey City, N. J., "Tech-Lab"—TS, WT
 Trans-American Airports Corp., 271 Madison Ave., New York, N. Y.—FS
 Triplet Electrical Instrument Corp., Harmon Rd., Bluffton, Ohio, "Triplet"—R, RP, TS
 Tung-Sol Lamp Works, 95 Eighth Ave., Newark, N. J.—T
 The Ucinite Co., 459 Watertown St., Newtonville, Mass.—W, WT
 United Cinephone Corp., 65 Litchfield St., Torrington, Conn.—PR, R, TE, V
 Universal Microphone Co., Ltd., 424 Warren Lane, Inglewood, Calif.—PB
 Utah Radio Prods. Co., 850 Orleans St., Chicago, Ill.—R
 Veeder-Root, Inc., Hartford, Conn.—C
 Ward Leonard Electric Co., Mt. Vernon, N. Y., "Ward Leonard"—P, PR, R, TE, W, WT
 Western Electric Co., 195 Broadway, New York, N. Y.—C, PB, R, RP, SK, SR, TE, V
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—C, CB, FS, P, PR, R, TE
 Weston Electrical Instrument Corp., 597 Frelinghuysen Ave., Newark, N. J., "Weston"—R
 Wheelco Instruments Co., 847 W. Harrison St., Chicago, Ill.—PB
 Yaxley—P. R. Mallory & Co., Inc.
 Zenith Electric Co., 152 W. Walton St., Chicago, Ill.—SL, TE

Test & Maintenance Equipment



Adapters A
 Audio oscillators AC
 Battery testers B
 Cabinet touch-up kit B
 Cathode ray oscilloscopes & oscillographs CR
 Condenser testers C
 Contact cleaner C
 Crystal calibrators C
 Dial oil D
 Dummy antenna D
 Frequency meters FA
 Impedance bridges FI
 Multi-meters MA
 Neon indicators N
 Osc. frequency modulators MO
 Ohmmeters OHA
 Output indicators O
 Push button alignment oscil. PI
 Resistance bridges R
 Set analyzers S
 Signal generators SG
 Signal tracers ST
 Speaker testers SPI
 Test leads TL
 Tube testers T
 Tuning wands TW
 Vacuum tube voltmeters VT
 Vibrator testers V

Aerovox Corp., 742 Belleville Ave., New Bedford, Mass., "L-C Checker"—CT, RB
 Aircraft Accessories Corp., Fairfax & Funsten Rd., Kansas City, Kan.—AO, CRO, CC, DA, FM, MO, SG, VTV
 Airplane & Marine Instruments, Inc., Box 95, Clearfield, Pa.—FM
 Alden Products Co., 119 N. Main St., Brockton, Mass., "Na-Ald"—AD, HV
 Allen Elec. & Equip. Co., 2103 N. Pitcher St., Kalamazoo, Mich.—BT, CT
 American Communications Corp., 306 Broadway, New York, N. Y.—AO
 American Radio Hardware Co., Inc., 476 Broadway, New York, N. Y., "Arhco"—HV, TW
 Analyst—Meissner Mfg. Co.
 R. B. Annis, 1101 N. Delaware St., Indianapolis, Ind.—CRO
 Arhco—American Radio Hardware Co.
 Associated Research, Inc., 431 S. Dearborn St., Chicago, Ill.—HV, OHM, RB
 The Audio-Tone Oscillator Co., 60 Walter St., Bridgeport, Conn.—AO, SG, SPK

RESISTIVITY AND TEMPERATURE COEFFICIENT

$$\text{Sectional Area of Conductor } S = \frac{kW \times L \times \rho \times 100,000}{E^2 \times \text{per cent. loss}}$$

(Continued from preceding page)

Material	Resistivity, ρ		Temperature Range C.		Temperature Coefficient Referred to 0°C.
	Microhms per Cm. Cube at 0 C.	Ohms per Mil. Foot at 0 C.	From	To	
Tungsten— Hard-drawn Annealed	5.42	32.6	0	170	0.0051
	4.37	26.29	0	170	0.0051
Zinc	5.38	32.36	18	100	0.00402
Nichrome	112	675	0	400	0.00015
Nichrome V	108	650	0	400	0.00013
Manganese	41.4 to 73.8	249 to 443	0	35	0.00011 0.000039
Values of ρ at 60°F. or 15°C.					
Commercial Wire S, cross-section ; L, length		S, sq. ins. L, yards	S, sq. ins. L, miles	S, sq. mm. L, metres	
Hard-drawn copper		0.000024528	0.043169		0.01730
Annealed copper		0.000024042	0.042314		0.0170
Aluminium, Hard		0.0000409	0.0720		0.02886
Soft		0.0000394	0.0693		0.02781

The Automatic Electrical Devices Co., 324 E. Third Cincinnati, Ohio—NI
 Ballantine Labs., Inc., Boonton, N. J.—VTV
 Berger Electronics, 109-01 72nd Pl., Forest Hills, L. I., N. Y.—AD, SA
 Best Mfg. Co., Inc., 1200 Grove St., Irvington, N. J.—SPK
 Biddle Co., James G., 1211 Arch St., Philadelphia, Pa.—FM, OHM
 Biley Electric Co., 207 Union Sta. Bldg., Erie, Pa.—CC
 Boonton Radio Corp., Boonton, N. J.—MOD
 Browning Labs., Inc., 750 Main St., Winchester, Mass.—FM
 Bruno—New York, Inc., 460 W. 34th St., New York, N. Y.—AO, NI, OI
 J. H. Bunnell & Co., 81 Prospect St., Brooklyn, N. Y. SG
 Wm. W. L. Burnett Radio Lab., 4814 Idaho St., San Diego, Calif.—FM
 Carron Mfg. Co., 415 S. Aberdeen St., Chicago, Ill.—AO, MOD, SG, ST
 Cinema Engineering Co., 1508 W. Verdugo Ave., Burbank, Calif.—IB, RB
 Communication Measurements Laboratory, 131 Liberty St., New York, N. Y.—CC, CT, MOD
 Communications Co., Inc., 300 Greco Ave., P. O. Drawer 8250, Coral Gables, Fla.—SG
 Consolidated Wire & Assoc. Corps., 1635 S. Clinton St., Chicago, Ill.—CT, OL, RB, TT
 Cornell-Dubilier Elec. Corp., 1000 Hamilton Blvd., S. Plainfield, N. J.—CT
 The Daven Co., 158 Summit St., Newark, N. J.—IB, OI, RB
 Dayton Acme Co., 930 York St., Cincinnati, O.—AO, CRO, MOD, ODM, SA, SG, ST, TT, VTV
 Dependable—Radio City Products Co., Inc.
 Determohm—Dumite Mfg. Co.
 Tobe Deutschmann Corp., Canton, Mass.—CT
 Allen B. DuMont Labs., Inc., 2 Main Ave., Passaic, N. J.—CRO
 Eidson's, 1309 N. Second St., Temple, Texas—CC
 Electronic Corp. of America, 45 W. 18th St., New York, N. Y.—AO, MOD
 Electronic Prods. Co., 19 N. First St., Geneva, Ill.—OHM, OI, RB, VTV
 Ferris Instrument Corp., 110 Cornelia St., Boonton, N. J., "Ferris"—CC, DA, SG, VTV
 M. M. Fleron & Son, Inc., 113 N. Broad St., Trenton, N. J.—NI
 Fred E. Garner Co., 43 E. Ohio St., Chicago, Ill.—CC, SG
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—CU, CF, DO, NI
 General Elec. Co., 1 River Rd., Schenectady, N. Y.—CRO, FM, IB, MM, OHM, OI, RB, SA, SG, TT, VTV, VT
 General Radio Co., 30 State St., Cambridge, Mass.—AO, CRO, CC, FM, IB, OHM, RB, SG, VTV
 W. & G. Gurley, 514 Fulton St., Troy, N. Y.—FM
 Hathaway Instrument Co., 1315 S. Clarkson, Denver, Colo.—CRO, RB
 Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—AO, VTV
 The Hickok Elec'l. Instrument Co., 10514 Dupont Ave., Cleveland, O., "Tracometer"—AO, MM, MOD, OHM, RB, SA, SG, ST, TT, VTV
 Hollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—AO, CRO, VTV, CC
 Hoyt Electrical Instrument Works, 857 Boylston St., Boston, Mass.—MM
 Hy Ef Elec'l Prods. Mfg. Co., 1515 W. Pico Blvd., Los Angeles, Calif., "Hy-Ef"—CT
 ICA—Insuline Corp. of America
 Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J.—RB
 Industrial Transformer Corp., 2540 Belmont Ave., Chicago, Ill.—VT
 Insuline Corp. of America, 3602 35th Ave., Long Island City, N. Y., "ICA"—AD, AO, HV
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—AO, BT, CT, SA, VTV
 The Jackson Elec'l Instrument Co., 131 Wayne Ave., Dayton, O., "Jackson"—AO, CRO, CT, MM, OHM, SG, ST, TT, VTV
 I. F. D. Mfg. Co., 4111 Ft. Hamilton Pkway, Brooklyn, N. Y.—HV
 Lampkin Labs., Bradenton, Fla.—FM
 Lapp Insulator Co., Inc., LeRoy, N. Y.—DA
 L-C Checker—Aerovox Corp.
 Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.—FM, IB, OHM, RB
 Lepel High Frequency Labs., Inc., 39 W. 60th St., New York, N. Y.—TT
 Fred M. Link, 125 W. 17th St., New York, N. Y.—FM
 Littelfuse, Inc., 4732 Ravenswood Ave., Chicago, Ill.—F, NI
 Measurements Corp., Box 88, Boonton, N. J.—SG, VTV
 Meissner Mfg. Co., 7th & Belmont, Mt. Carmel, Ill., "Analyst"—CC, ST
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—FM, MOD, CC
 Musicmaster Mfg. Co., 508 S. Dearborn, Chicago, Ill.—CT, ST
 Na-Ald—Aldca Prods. Co.
 Ohmite Mfg. Co., 4984 W. Flournoy St., Chicago, Ill., "Determohm"—DA
 Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—MOD, OHM, SPK

Photobell Corp., 114 Nassau St., New York, N. Y.—AO, IB, RB
 Precision Apparatus Co., 92-27 Horace Harding Blvd., Elmhurst, N. Y., "Precision"—BT, MM, OHM, SA, SG, TT, VTV
 Radio City Prods. Co., Inc., 127 W. 26th St., New York, N. Y., "Dependable"—AD, AO, BT, CRO, CCT, FM, HHV, MM, OHM, OI, RB, SA, SG, SPK, TT, VTV
 Radio Design Co., 1353 Sterling Pl., Brooklyn, N. Y., "Radio Design"—AO, CT, MM, NI, OHM, OI, SA, VTV
 Radio Essentials, Inc., 69 Wooster St., New York, N. Y.—HV
 Radio Frequency Labs., Inc., Boonton, N. J.—SA
 Radiotechnic Lab., 1328 Sherman Ave., Evanston, Ill.—"R-T-L"—TT
 Radio Service Engineers, 110 W. Packard Ave., Ft. Wayne, Ind.—CT
 Ranger-Examiner—Readrite Meter Works
 The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—FM
 Rawson Elec'l. Instrument Co., 90 Potter St., Cambridge, Mass.—MM, OHM
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—"RCA"—AO, CRO, CC, FM, MOD, SG, ST
 Readrite Meter Works, 136 E. College Ave., Bluffton, O., "Ranger-Examiner," "Readrite"—AD, CRO, CT, M, MM, OHM, OI, SA, SG, TT
 Rowe Radio Research Lab. Co., 2422 N. Pulaski Rd., Chicago, Ill.—AO, CRO, IB, VTV
 Rupp's Assembling & Mfg. Wks., 2341 N. Seminary Ave., Chicago, Ill.—HV
 Schuttig & Co., 9th & Kearney Sts., Washington, D. C.—DA
 Sensitive Research Instrument Co., 4545 Bronx Blvd., New York, N. Y.—OHM
 Shallcross Mfg. Co., 10 Jackson Ave., Collingdale, Pa., "Shallcross"—MM, OHM, RB
 Simpson Electric Co., 5216 W. Kinzie St., Chicago, Ill.—HV, HM, OHM, SA, SG, ST, TT
 The State Co., 19 New Park Ave., Hartford, Conn.—DA
 Sterling Mfg. Co., 9205 Detroit Ave., Cleveland, O.—BT, M, MM, OHM, OI
 Herman H. Sticht Co., Inc., 27 Park Pl., New York, N. Y.—FM, OHM, RB
 Stromberg-Carlson Tel. Mfg. Co., 100 Carlson Rd., Rochester, N. Y.—CU
 Sun Mfg. Co., 6323 Avondale Ave., Chicago, Ill.—BT, CT, OHM, SA
 Suedt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—NI
 Superior Instruments Co., 227 Fulton St., New York, N. Y.—MM, OHM, SA, SG, TT, VTV
 Supreme Instruments Corp., 414 Howard St., Greenwood, Miss., "Supreme"—AO, BT, CRO, MM, MOD, OHM, OI, SA, SG, ST, HV, TT, VTV
 Technical Apparatus Co., Inc., 1171 Tremont St., Boston, Mass.—AO, BT, CRO, CT, CC, FM, MM, NI, OHM, RB, TT, VTV
 Televiso Prods., Inc., 6533 Olmstead Ave., Chicago, Ill.—AO, FM, VTV
 Tracometer—The Hickok Elec'l. Instr. Co.
 Triplett Elec'l. Instr. Corp., Harmon Rd., Bluffton, O., "Triplett"—AD, AO, BT, CRO, CT, FM, HV, MM, OHM, OI, SA, SG, TT, VTV, VT
 Triumph Mfg. Co., 913-21 W. Van Buren St., Chicago, Ill., "Triumph"—AO, BT, CRO, HV, MM, MOD, OHM, SG
 Earl Webber Co., 4352 W. Roosevelt, Chicago, Ill., "Webber"—AD, AO, CRO, CT, M, MM, MOD, OHM, OI, RB, SA, SG, ST, SPK, TT, TW, VT
 Western Electric Co., 195 Broadway, New York, N. Y.—AO, FM, OI
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—MM, OHM
 Weston Elec'l. Instr. Corp., 597 Frelinghuysen Ave., Newark, N. J., "Weston"—BT, MM, OHM, OI, SA, SG, TT, VTV
 Willard Storage Battery Co., 246 E. 131st St., Cleveland, O.—BT

Testing Laboratories

Electrical Testing Laboratories, East End Ave. & 79th St., New York, N. Y.
 New York Testing Laboratories, 80 Washington St., New York, N. Y.
 Pittsburgh Testing Laboratory, 1330 Locust St., Pittsburgh, Pa.
 U. S. Testing Co., Inc., 1415 Park Ave., Hoboken, N. J.

Tools



Alignment toolsAT
 Chassis holdersCH
 DemagnetizersDM
 Drills, electricD

Electric etchersEE
 ElectroplaterE
 Hack saw bladesHB
 Hand drillsHD
 Hole cuttersHC
 Knob pullerKP
 PliersP
 PunchesPU
 Punching machinesPM
 Ratchet wrenchesRW
 ScrewdriversSD
 Socket wrenchesSW
 SolderS
 Soldering irons (elec.)SI
 Soldering iron standsSS
 Soldering iron tipsSE
 Solder potsST
 Staple driverSF
 Flux, fluidSF
 Flux, pasteSP
 Tube pullersTP
 Wire strippersWS

Ackermann, Steffan Co., 4532 W. Palmer St., Chicago, Ill.—ST
 Acro Tool & Die Co., 5326 N. Kedzie Ave., Chicago, Ill.—CH
 Alpha Metal & Rolling Mills, Inc., 363 Hudson Ave., Brooklyn, N. Y.—S
 American Phenolic Corp., 1832 S. 54th Ave., Cicero, Ill., "Amphenol"—HC, PU
 American Radio Hardware Co., 476 Broadway, New York, N. Y., "Arhco"—SD, SE, SI, SW, TP
 Amphenol—American Phenolic Corp.
 R. B. Annis Co., 1103 N. Delaware St., Indianapolis, Ind.—DM, EE
 Arhco—American Radio Hardware Co.
 The Automatic Electrical Devices Co., 324 E. Third St., Cincinnati, Ohio—SF
 Automatic Mfg. Co., Inc., Harrison, N. J.—PM
 Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.—S, SE
 Cole Radio Works, Caldwell, N. J., "Instansolder"—SI, SS
 Continental Screw Co., 457 Mt. Pleasant St., New Bedford, Mass.—SD
 Detroit Power Screw Driver Co., 2801 W. Fort St., Detroit, Mich.—SD
 Division Lead Co., 836 W. Kinzie St., Chicago, Ill. S, SE, SP
 Drake Electric Works, Inc., 3656 Lincoln Ave., Chicago, Ill.—SI, SS
 Eisler Engineering Co., 740-770 So. 13th St., Newark, N. J.—ST
 Electric Soldering Iron Co., Inc., Deep River, Conn., "Esico"—SI
 Esico—Electric Soldering Iron Co., Inc.
 The Forsberg Mfg. Co., Bridgeport, Conn.—HB, HD, SD
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill., "G-C"—AT, CH, KP, PU, SE, SP, SW, WS
 General Electric Co., 1 River Road, Schenectady, N. Y.—SE, SI, SS, ST
 Goldsmith Bros., Smelting & Refining Co., 58 E. Washington St., Chicago, Ill.—S
 Greenlee Tool Co., 1903 Columbia Ave., Rockford, Ill.—HC, PU
 Hexagon Elec. Co., 161 W. Clay Ave., Roselle Park, N. J.—SI
 Industrial Screw & Supply Co., 717 W. Lake St., Chicago, Ill.—HB, S, SD, SF, SP
 Instansolder—Cole Radio Works
 Insuline Corp. of America, 3602 35th Ave., Long Island City, N. Y.—AT, CH, PU, SE, SI, SS, SW
 K-D Mfg. Co., 526 N. Plum St., Lancaster, Pa., "K-D"—P, RW
 Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.—SI
 Kester Solder Co., 4201 Wrightwood Ave., Chicago, Ill.—S, SS
 Kraeuter & Co., Inc., 563 18th Ave., Newark, N. J.—P, PU
 Kwikheat—Vanatta Mfg. Co.
 Lectrohm, Inc., 5125 W. 25th St., Cicero St., Ill.—"Lectrohm"—ST
 Linick, Green & Reed, Inc., 29 E. Madison St., Chicago, Ill.—AT, D, E, HB, S, SD, SF
 Mueller Electric Co., 1533 E. 31st St., Cleveland, Ohio, "Snapper"—AT
 New York Solder Co., Inc., 15 Crosby St., New York, N. Y.—S
 The Ohio Carbon Co., 12508 Berea Rd., Cleveland, Ohio—SF
 Park Metalware Co., Inc., Orchard Park, N. Y.—AT, P, SD, SW
 Parker-Kalon Corp., 200 Varick St., New York, N. Y.—PU
 Photobell Corp., 114 Nassau St., New York, N. Y.—SS
 Pyramid Products Co., 2224 S. State St., Chicago, Ill.—WS
 Radio Essentials, Inc., 69 Wooster St., New York, N. Y.—AT, SD, SE, SI, SW
 Rapid Electroplating Process, Inc., 1414 S. Wabash Ave., Chicago, Ill.—E
 The Ruby Chemical Co., 68-70 McDowell St., Columbus, Ohio, "Rubyfluid"—S, SF, SP
 Rubyfluid—The Ruby Chemical Co.
 The Wm. Schollhorn Co., 414 Chapel St., New Haven, Conn.—P, PU
 Walter L. Schott Co., 9306 Santa Monica Blvd., Beverly Hills, Calif.—SD, SH

Snapper—Mueller Electric Co.
 Speedcraft—Wire Stripper Co.
 Stanley Tools, New Britain, Conn.—SI
 The L. S. Starrett Co., Athol, Mass.—HB, PU, SD
 Stevens Walden, Inc., 475 Shrewsbury St., Worcester, Mass.—AT, HC, P. PU, RW, SW
 Tifton Electric Corp., 138 W. 17th St., New York, N. Y.—S
 Harold E. Trent Co., Leverington Ave. & Wilde St., Manayunk, Philadelphia, Pa.—ST
 Tuck Mfg. Co., 74 Ames St., Brockton, Mass.—SD
 The United States Electrical Tool Co., 1050 Findlay St., Cincinnati, Ohio—D, SD
 Utica Drop Forge & Tool Corp., Utica, N. Y.—P, W
 Vaco Prods. Co., 317 E. Ontario St., Chicago, Ill.—SD, SW
 Vanatta Mfg. Co., 516 Monterey Ave., Ontario, Calif., "Kwikheat"—SE, SI
 Weller Bros., 516 Northampton St., Easton, Pa.—SI
 Wellmade Electric Mfg. Co., Torrington, Conn.—SI
 Western Electric Co., 195 Broadway, New York, N. Y.—S
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—S, ST
 Wire Stripper Co., 1725 Eastham Ave., East Cleveland, Ohio, "Speedcraft"—WS

Transformers & Chokes



- Amateur transmittingAT
- Audio (receiving)A
- Auto transformersAU
- BridgeB
- ChokesC
- Coils & windingsCW
- Commercial & broadcast trans.....CT
- Fence controllersFA
- Fluorescent reactorsR
- Current trans.T
- Mike cable transformersMT
- Plug-in transformersPT
- PowerP
- Transformers, special range.....TR
- Voltage regulatingVR
- Welding transformersWT

ACA—Amplifier Co. of America
 Acme Electric & Mfg. Co., 54 Water St., Cuba, N. Y., "Acme"—A, AU, C, CT, P, R, VR
 Acme Wire Co., New Haven, Conn.—CW
 Adjust-a-Volt—Standard Elec'l. Prods. Co.
 Allen Elec. & Equip. Co., 2103 N. Pitcher St., Kalamazoo, Mich.—AU
 Altec Service Corp., 252 W. 57th St., New York, N. Y.—A, AC, C
 American Transformer Co., 178 Emmet St., Newark, N. J., "Amertran"—A, AT, AU, C, CT, CW, P, PT, R, T, VR
 Amertran—American Transformer Co.
 Amplifier Co. of America, 17 W. 20th St., New York, N. Y., "ACA"—AU, CW, VR
 R. B. Annis Co., 1101 N. Delaware St., Indianapolis, Ind.—T
 Apex Industries, Inc., 1035 W. Lake St., Chicago, Ill.—A, AT, AU, C, CT, CW, FA, MT, P, PT, R, T, VR
 Audio Development Co., 2833—13th Ave., S., Minneapolis, Minn.—A, AU, C, CT, P
 Best Mfg. Co., Inc., 1200 Grove St., Irvington, N. J.—A, C, CW
 Burlington Instrument Co., Burlington, Iowa—VR
 Chicago Transformer Corp., 3501 W. Addison St., Chicago, Ill., "Chitran"—A, AU, C, CT, CW, FA, MT, P, R
 Chitran—Chicago Transformer Corp.
 Cinaudagraph Speakers, Inc., 3929 S. Michigan Ave., Chicago, Ill.—A, C, CW
 Cook Electric Co., 2700 Southport Ave., Chicago, Ill.—CW
 Dean W. Davis & Co., Inc., 549 Fulton St., Chicago, Ill.—AU, C, CW
 Dinion Coil Co., P. O. Box D, Caledonia, N. Y.—A, AU, C, CT, CW, P, VR
 Eisler Engineering Co., 740-770 So. 13th St., Newark, N. J.—WT
 Electric Sorting Machine Co., 802 Michigan Trust Bldg., Grand Rapids, Mich.—VR
 Electrical Facilities, Inc., 4224 Holden St., Oakland, Calif.—T
 Electricoil Transformer Co., 417-421 Canal St., New York, N. Y.—AU, C, CW, P, PT, R, T
 Electronic Products Co., 19 N. First St., Geneva, Ill.—FA, VR
 Electronic Products Mfg. Corp., 7300 Huron River Drive, Dexter, Mich.—J
 Electronic Transformer Co., 515 W. 29th St., New York, N. Y.—A, AT, AU, C, CT, CW, FA, P, T
 Engineering Laboratories, Inc., 624 E. Fourth St., Tulsa, Okla.—A
 Ferranti Electric Inc., 30 Rockefeller Plaza, New York, N. Y.—AU, C, P, VR
 Freed Transformer Co., 72 Spring St., New York, N. Y.—A, AT, AU, C, CT, CW, FA, MT, P, PT, T, VR
 Gardner Electric Mfg. Co., 4227 Hollis St., Emeryville, Calif.—AU, C, CW, R

General Electric Co., 1 River Road, Schenectady, N. Y.—A, AU, C, CT, CW, P, R, T, VR
 General Radio Co., 30 State St., Cambridge, Mass.—"G-R," "Variac"—A, AU, B
 General Transformer Corp., 1250 W. Van Buren St., Chicago, Ill., "Streamliner"—A, AU, C, FA, P, R
 G-R—General Radio Co.
 The Halldorson Co., 4500 Ravenswood Ave., Chicago, Ill.—A, AU, C, CW, P, PT
 Hollywood Transformer Co., 645 N. Martel Ave., Los Angeles, Calif.—A, C, CT, CW, TR
 Industrial Electronics Corp., 951 McCarter Highway, Newark, N. J.—R
 Industrial Transformer Corp., 2540 Belmont Ave., New York, N. Y.—A, AT, AU, C, CT, CW, FA, MT, P, PT, R, T, VR
 Jefferson Electric Co., Bellwood, Ill.—A, AC, CT, P, R, VR
 Kenyon Transformer Co., Inc., 840 Barry St., New York, N. Y.—A, AT, AU, C, CT, P, PT
 Magnetic Windings Co., 16th & Butler Sts., Easton, Pa.—A, C, CW, P, R
 Merit Coil & Transformer Corp., 311 N. Desplaines St., Chicago, Ill.—A, AT, AU, C, CT, CW, FA, P
 Merwin-Wilson Co., New Milford, Conn.—A, AT, AU, C, MT, P, PT, R, T, VR
 B. F. Miller Co., P. O. Box 56B, Trenton, N. J.—AU, C, CT, CW, P, T, VR
 Musicmasters Mfg. Co., 508 S. Dearborn St., Chicago, Ill.—A, AT, AU, C, CT, CW, P
 National Co., Inc., 61 Sherman St., Malden, Mass., "National"—A, C, P
 Newark Transformer Co., 17 Frelinghuysen Ave., Newark, N. J.—A, AT, AU, C, CT, CW, FA, MT, P, PT, T
 Newton Company, 244 W. 23rd St., New York, N. Y.—CT, CW
 New York Transformer Co., 26 Waverly Pl., New York, N. Y.—A, AU, C, CT, MT, P, VR
 Nothofer Winding Labs., 111 Albermarle Ave., Trenton, N. J.—AT, AU, CT, T
 Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—A, AT, C, CT, CW, MT, P
 Peerless Laboratories, Inc., 115 E. 23rd St., New York, N. Y.—VR
 The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—A, AU, C, MT, P, PT
 Red Arrow Electric Corp., 100 Coil St., Irvington, N. J.—A, AU, C, CT, P, PT, R
 A. E. Rittenhouse Co., Honeyoe Falls, N. Y.—AU, CW, PT
 The RoLa Co., Inc., 2530 Superior Ave., Cleveland, Ohio—A, AU, C, CW, P
 Shure Bros., 225 W. Huron St., Chicago, Ill.—MT
 Nathan R. Smith Mfg. Co., 105 Pasadena Ave., So. Pasadena, Calif.—CW, R
 Sola Electric Co., 2525 Clybourn Ave., Chicago, Ill.—AU, CW, R, VR
 Stancor—Standard Transformer Corp.
 Standard Electrical Products Co., 300 E. 4th St., St. Paul, Minn., "Adjust-a-Volt"—VR
 Standard Transformer Corp., 1500 N. Halsted St., Chicago, Ill., "Stancor"—A, AT, AU, C, CT, CW, FA, P
 Streamliner—General Transformer Corp.
 Super Electric Products Corp., 1057 Summit Ave., Jersey City, N. J.—A, AU, C, CT, CW, P, R, VR
 Superior Electric Co., Laurel St., Bristol, Conn.—VR
 Teleradio Engineering Corp., 484 Broome St., New York, N. Y.—A, AT, AU, C, CT, CW
 Thermador Elec. Mfg. Co., 5119 S. Riverside Dr., Los Angeles, Calif.—A, AT, C, CT, CW, FA, MT, P, PT, R, VR
 Thordarson Electric Mfg. Co., 500 W. Huron St., Chicago, Ill., "Thordarson"—A, AT, AU, C, CT, CW, FA, MT, P, PT, T, VR
 Transformer Engineering Co., Stamford, Conn.—A, AT, AU, C, CT, FA, MT, P, PT, T, VR
 United Transformer Co., 150 Varick St., New York, N. Y., "UTC"—A, AT, AU, C, CT, CW, FA, MT, P, PT, R, T, VR
 UTC—United Transformer Co.
 Utah Radio Products Co., 850 Orleans St., Chicago, Ill.—A, AT, AU, C, P
 Variac—General Radio Co.
 Waldron Electric Co., 13221 Merl Ave., Cleveland, Ohio—FA
 Ward Leonard Electric Co., Mt. Vernon, N. Y.—VR
 Weller Bros., 516 Northampton St., Easton, Pa.—CW

Western Electric Co., 195 Broadway, New York, N. Y.—A, AU, C, CT, MT, P, VR
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—CT, T
 Weston Electrical Instrument Corp., 597 Frelinghuysen Ave., Newark, N. J.—T
 The Wheeler Insulated Wire Co., 378 Washington Ave., Bridgeport, Conn.—A, AT, AU, C, CT, CW, FA, MT, P, PT, R, T, VR

Transmitters & Equipment



- Amateur (xmitters)AM
- Amateur kitsAK
- AntennasA
- Antenna tunersAT
- Aviation (xmitters)AV
- Broadcast (xmitters)BC
- Commercial (xmitters)COM
- Control consolesCC
- FacsimileFAC
- Frequency control equip.FC
- Frequency measurementsFM
- Ground screensOS
- InsulatorsI
- Marine (xmitters)M
- Police (xmitters)P
- RadioteletypeRT
- Speech amplifiersSA
- TowersT
- Transmission monitor equip.TM
- Vertical radiatorsVR

Abbott Instrument Inc., 8 W. 18th St., New York, N. Y.—AM
 Airadio, Inc., 4 Selleck St., Stamford, Conn.—AV, M, P
 Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—AV
 Aircraft Accessories Corp., Fairfax & Funsten Rd., Kansas City, Kans.—AM, AT, AV, BO, CC, COM, CR, FAC, FC, FM, M, P, SA, TM
 Aircraft Radio Corp., Boonton, N. J.—AV
 Airplane & Marine Instruments, Inc., Box 92, Clearfield, Pa.—A, AT, AV, M, T, VR
 American Communications Corp., 308 Broadway, New York, N. Y.—AV, COM, CC, M, P, SA
 American Lava Corp., Chattanooga, Tenn.—I
 Amplex Engineering, Inc., New Castle, Ind.—A
 Amplifier Co. of America, 19 W. 20th St., New York, N. Y.—SA
 Austin Electronic Mfg. Co., Warren, Pa.—AM, AV, SA
 Barker and Williamson, 235 Fairfield Ave., Upper Darby, Pa.—AM, AT, COM, FC, FM, I, M, P, TM
 Rex Bassett, Inc., 500 S.E. Second St., Ft. Lauderdale, Fla.—AV, CR, M, P
 Bendix Radio Div., Bendix Aviation Corp., 920 E. Fort Ave., Baltimore, Md.—AV, COM, CR
 Blaw-Knox Co., Blawnox, Pa.—VR
 Biley Electric Co., 207 Union Sta. Bldg., Erie, Pa.—CR
 J. H. Bunnell & Co., 81 Prospect St., Brooklyn, N. Y.—BC, COM, M
 Wm. W. L. Burnett Radio Lab., 4814 Idaho St., San Diego, Calif.—CR, FC, FM
 Carlisle Crystal Corp., Carlisle, Pa.—CR
 Clarion—Electronic Corp. of America
 Collins Radio Co., 2920 First Ave., Cedar Rapids, Iowa—AM, A, AV, BC, COM, CC, FC, FM, I, M, P, SA, T, TM, VR
 Communications Co., Inc., 300 Greco Ave., P. O. Drawer 6250 Coral Gables, Fla.—A, AV, COM, CC, M, P, SA
 Communications Equipment Corp., 134 W. Colorado Blvd., Pasadena, Calif.—A, AT, AV, CC, COM, M, P, SA
 Corning Glass Works, Corning, N. Y., "Pyrex"—I
 Coto-Coil Co., Inc., 71 Willard Ave., Providence, R. I.—AM, I
 Cover Dual Signal Systems, Inc., 125 W. Hubbard St., Chicago, Ill.—COM, M, P

COMPARATIVE RESISTANCES

Material	Relative Resistance	Material	Relative Resistance
Copper	1	Brass and Phosphor-bronze	4-4
German Silver	11-7 to 18-5	Nickel	4-3
Eureka	29-3	Platinoid	21-0
Nichrome	55	Iron	6-1
Silver	.94	Mercury	57-8
Silicon Bronze	1-5	Carbon	2,500 to 6,000
Aluminium	1-6	Manganin	27-0

Data charts on this and other Directory pages, compiled by engineers of the International Telephone & Telegraph Corp.

De Forest Labs., 5106 Wilshire Blvd., Los Angeles, Calif.—AV
 Wald Radio Mfg. Corp., 440 Lafayette St., New York, N. Y.—FM
 Little Radio, Inc., 7421 S. Loomis Blvd., Chicago, Ill.—A, AV, BC, CC, COM, FC, FM, P, SA, TM
 X Crystal Co., 1841 W. Carroll Ave., Chicago, Ill.—AK, CR
 ckstein Radio & Telev. Co., 1400 Harmon Pl., Minneapolis, Minn.—AV, P, TM
 idson's, 1309 N. Second St., Temple, Texas—CR
 ical Industries Mfg. Co., Red Bank, N. J.—COM, M
 lectronic Communications Co., 36 N.W. Broadway, Portland, Ore.—M
 lectronic Corp. of America, 45 W. 18th St., New York, N. Y., "Clarion"—AM, COM, SA
 lectronic Specialty Co., 3456 Glendale Blvd., Glendale, Calif.—AV
 rco Radio Labs., Inc., Hempstead, L. I., N. Y.—AM, AT, AV, COM, FM, M, P, SA
 merson Radio & Phonograph Corp., 111 Eighth Ave., New York, N. Y.—AM, AV, COM
 ada Radio & Electric Co., Inc., 30-20 Thomson Ave., Long Island City, N. Y.—AM, AV, COM, M, P
 ederal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark, N. J., "Federal"—BC, COM
 isher Research Lab., 1961 University Ave., Palo Alto, Calif.—AV, COM, M, P
 A. M. Fleron & Son, Inc., 113 N. Broad St., Trenton, N. J., "Fleron"—A, I
 red E. Garner Co., 43 E. Ohio St., Chicago, Ill.—CR, FM, M, VR
 eneral Ceramics & Steatite Corp., Keasbey, N. J.—I
 eneral Communication Co., 681 Beacon St., Boston, Mass.—M, SA
 eneral Electric Co., 1 River Rd., Schenectady, N. Y.—A, AV, BC, CC, COM, CR, FC, FM, I, M, P, SA, TM
 eneral Radio Co., 30 State St., Cambridge, Mass.—FM
 Thomas B. Gibbs & Co., Delavan, Wis., "Gibbs"—SA
 ray Radio Co., West Palm Beach, Fla.—AV, M
 tobert M. Hadley Co., 707 E. 61st St., Los Angeles, Calif., "Hadley"—AK
 lamilton Radio Corp., 510 6th Ave., New York, N. Y.—BC, M
 ammarlund Mfg. Co., Inc., 460 W. 34th St., New York, N. Y.—AM, AK, COM
 J. H. Harrel, 1527 E. 74th Pl., Chicago, Ill.—A, VR
 arvey Radio Labs., Inc., 447 Concord St., Cambridge, Mass., "Harvey"—AM, AV, COM, M, P, SA
 arvey-Wells Communications, Inc., Southbridge, Mass.—AM, AV, COM, M, P
 heintz & Kaufman, Ltd., South San Francisco, Calif.—COM
 erbach & Rademan Co., 522 Market St., Philadelphia, Pa.—AM, AT, AV, COM, FC, FM, M, P, SA
 P. R. Hoffman Co., 321 Cherry St., Carlisle, Pa.—CR
 ollywood Electronics Co., 800 Sunset Blvd., Los Angeles, Calif.—COM
 toward Radio Co., 1731 Belmont Ave., Chicago, Ill.—FM
 deco—International Stacey Corp.
 Illinois Seating Corp., 2138 N. Racine Ave., Chicago, Ill.—A, VR
 mperial Porcelain Wks., Inc., New York Ave. & Mulberry St., Trenton, N. J.—I
 ernational-Stacey Corp., International Derrick & Equip. Div., 910 Michigan Ave., Columbus, Ohio, "Ideco"—A, GS, T, VR
 ay Jefferson, Inc., 132 Mullburn Ave., Baldwin, N. Y.—AV, M, P
 E. F. Johnson Co., Waseco, Minn., "Johnson Q"—I
 Caar Engineering Co., 619 Emerson St., Palo Alto, Calif., "Kaar"—AV, CR, M, P
 aradio Corp., 1400 Harmon Pl., Minneapolis, Minn.—AV, CC, P, SA
 emlite Labs., 1809 N. Ashland Ave., Chicago, Ill.—CR
 Lear Avia, Inc., Piqua, Ohio—A, AT, AV, COM, CR, M
 eeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.—FC, FM
 ehigh Structural Steel Co., 17 Battery Pl., New York, N. Y.—T, VR
 enoxite Division, Lenox, Inc., 65 Prince St., Trenton, N. J.—I
 John E. Lingo & Son, Inc., 28th St. & Buren Ave., Camden, N. J.—A, T, VR
 Fred M. Link, 125 W. 17th St., New York, N. Y.—A, P
 Maritime Radio Corp., 24 Whitehall St., New York, N. Y.—M
 Megard Corp., 381 W. 38th St., Los Angeles, Calif.—SA
 Weissner Mfg. Co., Belmont & 7th Sts., Mt. Carmel, Ill., "Meissner"—AM, AT, FC, I
 James Millen Mfg. Co., Inc., 150 Exchange St., Malden, Mass.—AM, AK, AT, AV, BC, COM, CC, FC, FM, I, M, P, SA, TM
 Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—AV, I, SA
 N-C—National Co.
 National Co., Inc., Malden, Mass., "N-C"—AK, AM, I
 Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—AK, AM, AT, AV, BC, COM, FC, M, P, SA
 Panoramic Radio Corp., 242 W. 55th St., New York, N. Y.—TM
 Philco Radio & Telev. Corp., Tioga & C Sts., Philadelphia, Pa.—A

Pierson-DeLane, Inc., 2345 W. Washington Blvd., Los Angeles, Calif.—BC, FC, FM, P, TM
 The Porcelain Insulator Corp., Main St., Lima, N. Y.—I
 Premax Prods. Div., Chisholm-Ryder Co., Inc., Niagara Falls, N. Y., "Premax"—A, I, VR
 Presto Recording Corp., 242 W. 55th St., New York, N. Y.—COM, SA
 Pyrex—Corning Glass Wks.
 The Radiart Corp., 3571 W. 62nd St., Cleveland, Ohio—A
 Radio Engineering Labs., Inc., 35-54 36th St., Long Island City, N. Y.—BC
 Radio Frequency Labs., Inc., Boonton, N. J.—AV
 Radiomarine Corp. of America, 75 Varick St., New York, N. Y.—COM, M
 Radio Mfg. Engineers, Inc., Peoria, Ill.—COM
 Radio Receptor Co., Inc., 251 W. 19th St., New York, N. Y., "Radio Receptor"—AV, VR
 Radio Transceiver Labs., 86-27 115th St., Richmond Hill, N. Y., "Radio Transceiver Labs."—AM, COM
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—AT, AV, BC, CC, COM, CR, FAC, P, SA, TM
 Record-O-Vox, Inc., 1379 E. 8th St., Brooklyn, N. Y.—SA
 Raymond Rosen Co., 32nd & Walnut Sts., Philadelphia, Pa.—CC
 Schuttig & Co., Ninth & Kearny Sts., Washington, D.C.—AT, RT, TM
 Sea Pal Radio Co., 228 N. LaSalle St., Chicago, Ill.—M
 Maxwell Smith Co., 1027 N. Highland Ave., Hollywood, Calif.—A, AM, AK, AV, BC, CC, COM, FC, M, P, SA, TM, VR
 Stancor—Standard Transformer Corp.
 Standard Transformer Corp., 1500 N. Halsted St., Chicago, Ill., "Stancor"—AK, AM, AV, P
 Standard Winding Corp., Newburgh, N. Y.
 Stromberg-Carlson Tel. Mfg. Co., 100 Carlson Rd., Rochester, N. Y.—A, SA
 Technical Prods. International, 135 Liberty St., New York, N. Y., "Technipower"—AK, AM, SA
 Technical Radio Co., 275 9th St., San Francisco, Calif.—COM
 Technipower—Technical Prods. International
 Temco—Transmitter Equipment Mfg. Co.
 The R. Thomas & Sons, Lisbon, Ohio—I
 Thordarson Elec. Mfg. Co., 500 W. Huron St., Chicago, Ill.—AK, SA
 Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York, N. Y., "Temco"—AM, AV, BC, CC, COM, CR, FAC, FC, M, P, SA
 Union Elec'l. Porcelain Wks., Inc., Trenton, N. J.—I
 United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—AV, BC, SA
 United Transformer Corp., 150 Varick St., New York, N. Y.—AK, AM
 Utah Radio Prods. Co., 850 Orleans St., Chicago, Ill., "Utah"—AK
 Weltronic Corp., 3080 E. Outer Dr., Detroit, Mich.—AV, COM, P
 Western Electric Co., 195 Broadway, New York, N. Y.—A, AT, AV, BC, CC, COM, CR, FC, FM, M, P, SA, TM
 Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.—COM, P
 Wilcox Elec. Co., Inc., 4014 State Line, Kansas City, Kans.—A, AM, AV, CC, COM, FC, FM, M, P, SA, TM

The Bead Chain Mfg. Co., 110 Mountain Grove St., Bridgeport, Conn.—TP
 The Birtcher Corp., 5089 Huntington Dr., N. Los Angeles, Calif.—TP
 Cetron—Continental Elec. Co.
 Sigmund Cohn, 44 Gold St., New York, N. Y.—TP
 Continental Elec. Co., Geneva, Ill., "Cetron"—I, R, ST
 Corning Glass Wks., Corning, N. Y.—TP
 Cunningham—RCA Victor Div., Radio Corp. of America
 Distillation Prods., Inc., 755 Ridge Rd., W. Rochester, N. Y.—GM
 Wilbur B. Driver Co., 150 Riverside Ave., Newark, N. J.—TP
 Allen B. DuMont Labs., Inc., 2 Main Ave., Passaic, N. J.—CR, TT
 Eimac—Eitel-McCullough, Inc.
 Eisler Elec. Corp., 534—39th Ave., Union City, N. J.—I, TT, TM
 Eitel-McCullough, Inc., 798 San Mateo Ave., San Bruno, Calif., "Eimac"—I, T
 Electronic Corp. of America, 45 W. 18th St., New York, N. Y.—T, VC
 Electronic Enterprises, 67 Seventh Ave., Newark, N. J.—T
 Electronic Labs., Inc., 122 W. New York St., Indianapolis, Ind.—FL
 Electrons, Inc., 127 Sussex Ave., Newark, N. J.—I
 Gammatron—Heintz & Kaufman, Ltd.
 General Electric Co., 1 River Rd., Schenectady, N. Y.—B, F, CR, FM, I, R, TT, T, TP, VC, MT
 General Electric X-Ray Corp., 2012 Jackson Blvd., Chicago, Ill.—X
 Geophysical Instrument Co., 1815 Half St., S.E., Washington, D. C.—GM
 Goat Metal Stampings, Inc., 314 Dean St., Brooklyn, N. Y.—TP
 Haydu Bros., Plainfield, N. J.—TP
 Heintz & Kaufman, Ltd., S. San Francisco, Calif., "HK," "Gammatron"—T
 HK—Heintz & Kaufman, Ltd.
 Hytron Corp., 23 New Derby St., Salem, Mass., "Hytron"—B, I, R, TT, T, VC, MT
 Industrial & Commercial Electronics Co., Belmont, Calif.—T
 The C. O. Jelliff Mfg. Corp., Southport, Conn.—TP
 Jennings Radio Mfg. Co., McLaughlin Rd., San Jose, Calif.—T
 King Laboratories, Inc., 201 Oneida St., Syracuse, N. Y.—TP
 Lewis Electronics, Route E, Shannon Rd., Los Gatos, Calif.—TR
 Machlett Labs., Inc., 25 Grand St., Norwalk, Conn.—X
 Metroloy Co., Inc., 57 E. Alpine St., Newark, N. J.—TP
 National Union Radio Corp., 15 Washington St., Newark, N. J., "National Union"—B, CR, EM, I, R, TT, T, VC, MT
 North American Philips Co., Inc., 145 Palisade St., Dobbs Ferry, N. Y.—CR, F, I, T, TT
 Northern Mfg. Co., Inc., 36 Spring St., Newark, N. J.—CR, F
 The Patterson Screen Co., 625 Main St., Towanda, Pa.—P
 Philips Metalix Corp., 419 Fourth Ave., New York, N. Y.—X
 Radio Electronic Co., 1816 Villanova Dr., Oakland, Calif.—CR, I, R, TP, T, X
 Raytheon Production Corp., 55 Chapel St., Newton, Mass.—B, T
 RCA-Radiotron—RCA Victor Div., Radio Corp. of America
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J., "RCA-Radiotron," "RCA-Victor," "Cunningham"—CR, I, R, RT, T, VC, MT, EM, TP
 Bernard Rice's Sons, Inc., 325 5th Ave., New York, N. Y.—TP
 Slater Electric & Mfg. Co., 726 Atlantic Ave., Brooklyn, N. Y., "Slater"—B, I, R, T
 Speer Carbon Co., Theresia St., St. Marys, Pa.—AG
 Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—TP
 Summerill Tubing Co., Bridgeport, Pa.—I, TP
 Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—ST
 Superior Electric Co., Laurel St., Bristol, Conn.—VC
 Superior Tube Co., Norristown, Pa.—AM, TP
 Swedish Iron & Steel Corp., 17 Battery Pl., New York, N. Y.—TP
 Sylvania Elec. Prod., Inc., "Sylvania" 500 Fifth Ave., New York, N. Y.—CR, R, TP
 Taylor Tubes, Inc., 2341 Wabansia Ave., Chicago, Ill., "Taylor"—I, T
 Translite, Inc., 639 Kent Ave., Brooklyn, N. Y.—T
 Tung-Sol Lamp Works, Inc., Radio Tube Div., 95—8th Ave., Newark, N. J., "Tung-Sol"—R, MT, T, TT
 United Electronics Co., 42 Spring St., Newark, N. J.—I, T
 U. S. Tool Co., Inc., Ampere, E. Orange, N. J.—AG
 Western Electric Co., 195 Broadway, New York, N. Y.—CR, EM, MT, R, T, VC
 Western Elec. Co., 300 Central Ave., Kearny, N. J.—B, CR, I, T, VC
 Westinghouse Elec. & Mfg. Co., 2519 Wilkens Ave., Baltimore, Md.—T, VC, I, X
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.—I, T, VC, X
 Westinghouse Lamp Div., Westinghouse Elec. & Mfg. Co., Bloomfield, N. J.—B, CR, EM, F, I, MT, T, TP, TT, VC, X
 Wilcox Electric Co., 14th & Chestnut Sts., Kansas City, Mo.—T

Tubes & Parts



- Anodes, graphiteAG
- Anodes, metalAM
- Ballast (regulating)B
- Cathode-rayCR
- Electron multiplierEM
- Filament wireF
- FluorescentFL
- Geiger-Mueller tubesGM
- IndustrialI
- Miniature tubesMT
- PhosphorsP
- Rare gasesRG
- Receiving (including rectifiers)R
- Special tubesST
- Tube repairingTR
- TelevisionTT
- TransmittingT
- Tube partsTP
- Voltage controlVC
- X-rayX

Admak Mfg. Co., 44-46 Corder St., Irvington, N. J.—TP
 Air Reduction Sales Co., 62 E. 42nd St., New York, N. Y.—RG
 American Lava Corp., Chattanooga, Tenn.—TP
 Amperex Electronic Prods. Corp., 81 Washington St., Brooklyn, N. Y., "Amperex"—AG, I, TT, T, VC, MT, X

Vibrators & DC Power Packs



- Auto radioA
- Farm radioF
- InvertorsINV
- Vibrator power packsVP

Aurex Corp., 1115-7 N. Franklin St., Chicago, Ill.—VP
 The Automatic Electrical Devices Co., 326 E. Third St., Cincinnati, Ohio—A, F, INV, VP
 Electrical Research Lab., Inc., 124 W. New York St., Evanston, Ill.—F
 Electro Products Laboratories, 549 W. Randolph St., Chicago, Ill.—F, VP
 Electronic Equipment Corp., Palm Springs, Calif.—INV
 Electronic Laboratories, Inc., 122 W. New York St., Indianapolis, Ind., "Portapower," "Portapack"—INV, VP
 Ferris Instrument Corp., 110 Cornelia St., Boonton, N. J.—INV, VP
 General Communication Co., 681 Beacon St., Boston, Mass.—VP
 General Electric Co., 1 River Rd., Schenectady, N. Y.—INV, VP
 General Transformer Corp., 1250 W. Van Buren St., Chicago, Ill.—F, VP
 International Electronics, Inc., 630 Fifth Ave., New York, N. Y.—A, F, INV, VP
 James Vibrapower Co., Inc., 1551 Thomas St., Chicago, Ill.—A, F, VP
 Jefferson-Travis Radio Mfg. Corp., 380 Second Ave., New York, N. Y.—VP
 Lear Avia, Inc., Piqua, Ohio—VP
 Leland Electric Co., 1501 Webster St., Dayton, Ohio—INV
 P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis, Ind., "Mallory"—A, F, VP
 Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill.—A, F
 National Co., Inc., 61 Sherman St., Malden, Mass.—VP
 Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill., "Oak"—A, F, INV
 Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—VP
 Philco Radio & Television Corp., Tioga & C Sts., Philadelphia, Pa.—A, F
 Portapack—Electron Laboratories
 Portapower—Electron Laboratories
 The Radiart Corp., 3571 W. 62nd St., Cleveland, Ohio—A, F, VP
 The Rauland Corp., 4245 N. Knox Ave., Chicago, Ill.—INV, VP
 RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—VP
 Small Motors, Inc., 1322 Elston Ave., Chicago, Ill.—INV
 Standard Transformer Corp., 1500 N. Halsted St., Chicago, Ill.—A, F
 Transformer Engineering Co., Stamford, Conn.—INV, VP
 The Turner Co., Cedar Rapids, Iowa—A, F
 Utah Radio Products Co., 850 Orleans St., Chicago, Ill.—A, F
 The Wheeler Insulated Wire Co., 378 Washington Ave., Bridgeport, Conn.—A, F, INV, VP
 Wincharger Corp., Sioux City, Iowa—INV

Wire & Cable



- Antenna (receiving)A
- Antenna (transmitting)AT
- Antenna transmission (rec)AN
- Antenna transmission (tr)ANT
- Cable assembliesCA
- Coaxial cableCC
- Cords (attachment)CO
- Flat woven cableFL
- GuyG
- Hook-upHU
- Insulated cableIC
- LitzendrahtL
- MagnetM
- Mike cableMC
- Radio harnessH
- ResistanceR
- Resistance cordsRC
- ShieldedS
- Shielded ignitionSI
- Wire shieldingWS

Acme Wire Co., 1257 Dixwell Ave., New Haven, Conn., "Cottonite," "Enamelite," "Heatex," "Paperite," "Silkenite"—L, M
 Aircraft-Marine Products, Inc., 288 N. Broad St., Elizabeth, N. J.—CA

Airplane & Marine Instruments, Inc., Box 92, Clearfield, Pa.—CA
 Alden Products Co., 119 N. Main St., Brockton, Mass.—CA, CO, FL, HU, H, IC, MC, S, SI, WS
 American Automatic Electric Co., 1019 W. Van Buren St., Chicago, Ill.—CA, CO
 American Insulated Wire Co., 610 Manton Ave., Providence, R. I.—IC
 American Phenolic Corp., 1830 S. 54th St., Chicago, Ill., "Amphenol"—CC
 American Steel & Wire Co., Rockefeller Bldg., Cleveland, Ohio—IC, M, S
 Amphenol—American Phenolic Co.
 Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.—A, AN, ANT, AT, CC, CO, FL, IC, M, MC, S, SI
 Art Specialty Co., 3245 W. Lake St., Chicago, Ill.—RC
 Belden Mfg. Co., 4647 W. Van Buren St., Chicago, Ill.—A, AT, AN, ANT, CA, CC, CO, FL, G, H, HU, IC, L, M, MC, R, RC, S, SI, WS
 Best Mfg. Co., Inc., 1200 Grove St., Irvington, N. J.—CO
 Birnbach Radio Co., Inc., 145 Hudson St., New York, N. Y.—A, AN, ANT, AT, CC, CO, FL, G, HU, IC, L, M, MC, RC, S, SI
 Central Cable Corp., 4 S. 15th St., Philadelphia, Pa.—A, AT, IC
 Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.—IC, M, S
 Chicago Metal Hose Corp., 1315 S. 3rd Ave., Maywood, Ill.—WS
 C. G. Conn, Ltd., Elkhart, Ind.—ANT
 Consolidated Wire & Assoc. Corps., 1635 S. Clinton St., Chicago, Ill.—A, AN, ANT, AT, CO, HU, IC, M, MC, RC, S, SI, WS
 Cornish Wire Co., Inc., 15 Park Row, New York, N. Y., "Corwico"—A, AN, AT, CA, CO, FL, G, H, HU, IC, MC, S, SI, WS
 Corwico—Cornish Wire Co.
 Cottonite—Acme Wire Co.
 The Crescent Co., Front & Central Ave., Pawtucket, R. I.—CA, FL, IC, H, S, SI, WS
 Crescent Insulated Wire & Cable Co., Trenton, N. J.—A, AN, ANT, AT, CO, H, HU, IC, L, M, MC, S
 Diamond Wire & Cable Co., 16th & Union, Chicago Heights, Ill.—CA, CO, HU, IC, MC, RC, WS
 Driver-Harris Co., Harrison, N. J.—R
 Wilbur B. Driver Co., 150 Riverside Ave., Newark, N. J.—A, R
 Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza S., Long Island City, N. Y.—CA, CO
 Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia, Pa.—CA
 The Electric Auto-Lite Co., Wire Div., Port Huron, Mich.—A, AN, ANT, AT, CA, CO, FL, H, HU, IC, M, MC, S, SI, WS
 Electro-Voice Mfg. Co., Inc., 1239 S. Bend Ave., S. Bend, Ind.—MC
 Enamelite—Acme Wire Co.
 Essex Wire Corp., 14312 Woodward Ave., Detroit, Mich.—A, CC, CO, H, HU, IC, L, M, MC, R, S, SI
 M. M. Fleron & Son, Inc., 113 N. Broad St., Trenton, N. J., "Fleron"—CO, HU
 Flexo Wire Co., 638 W. Genesee St., Syracuse, N. Y.—A, AN, ANT, AT, FL, WS
 General Cable Corp., 420 Lexington Ave., New York, N. Y.—A, AN, ANT, AT, CA, CO, FL, G, HU, IC, L, M, MC, S, SI, WS
 General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill., "G-C"—A, AT, CO, HU
 General Electric Co., 1 River Rd., Schenectady, N. Y.—CA, CC, CO, IC, L, M
 General Insulated Wire Works, Inc., 69-105 Gordon Ave., Providence, R. I.—CA, CO, H, IC, MC, S
 The James Goldmark Wire Co., 116 West St., New York, N. Y.—FL, HU, L, M, R, WS
 Hatfield Wire & Cable Co., 605 Hillside Ave., Hillside, N. J.—IC
 Heatex—Acme Wire Co.
 Hudson Wire Co., Winsted Div., 981 Main St., Winsted Conn.—M
 INCA—Phelps Dodge Copper Prods. Corp.
 Indiana Steel Wire Co., 700 S. Council St., Muncie, Ind.—G
 Industrial Screw & Supply Co., 717 W. Lake St., Chicago, Ill.—WS
 Industrial Synthetics Corp., 60 Woolsey St., Irvington, N. J.—WS
 J.F.D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn, N. Y.—CA, H
 The C. O. Jelliff Mfg. Corp., Southport, Conn.—R
 E. F. Johnson Co., Waseca, Minn., "Johnson"—ANT, AT, CC
 Kennecott Wire & Cable Co., Phillipsdale, R. I.—IC, M, S
 Knickerbocker Annunciator Co., 116 West St., New York, N. Y.—FL, IC, L, M
 Lear Avia, Inc., Piqua, Ohio—CC
 Lenz Electric Mfg. Co., 1751 N. Western Ave., Chicago, Ill.—A, HU, IC, M, S
 Lowell Insulated Wire Co., 171 Lincoln St., Lowell, Mass.—CO, HU, IC
 Meissner Mfg. Co., 7th & Belmont Sts., Mt. Carmel, Ill.—HU, L, M
 North American Phillips Co., Inc., 145 Palisade St., Dobbs Ferry, N. Y.—R
 Northern Electric Co., 5224 N. Kedzie, Chicago, Ill.—RC
 Ohmite Mfg. Co., 4984 W. Flournoy St., Chicago, Ill., "Cordohm"—RC

The Okonite Co., Passaic, N. J.—AN, ANT, CA, CC, CO, IC, MC, S, SI
 Paperite—Acme Wire Co.
 Patton-MacGuyver Co., 17 Virginia Ave., Providence, R. I.—M
 Phelps-Dodge Copper Prods. Corp., 40 Wall St., New York, N. Y., "INCA"—CC, IC, M, S
 Precision Tube Co., 3828 Terrace St., Philadelphia, Pa.—CC, IC, S, WS
 Radex Corp., 1322 Elston Ave., Chicago, Ill.—ACC
 Rea Magnet Wire Co., Inc., E. Pontiac St., Ft. Wayne Ind., "Rea"—M
 E. A. Rittenhouse Co., Honeoye Falls, N. Y.—CA
 Rockbestos Products Corp., P. O. Box 1102, New Haven, Conn.—HU, IC, M, S
 John A. Roebbling's Sons Co., Trenton, N. J.—A, AN, ANT, AT, CO, FL, G, HU, IC, M, MC, S, SI, WS
 Rome Cable Corp., 332 Ridge St., Rome, N. Y.—IC, M
 Royal Electric Co., Inc., 95 Grand Ave., Pawtucket, R. I.—CA, CO, IC
 Rupp's Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago, Ill.—CA, CO, H
 Walter L. Schott Co., 9306 Santa Monica Blvd., Beverly Hills, Calif.—A, AT
 Sherman & Reilly, Inc., 1st & Broad, Chattanooga, Tenn.—G
 Silkenite—Acme Wire Co.
 Simplex Wire & Cable Co., 79 Sidney St., Cambridge, Mass.—CC, IC, MC, S
 Swedish Iron & Steel Corp., 17 Battery Pl., New York, N. Y.—R
 The Ucinite Co., 459 Watertown St., Newtonville, Mass.—A, AT
 Uniform Tubes, Shurs Lane & Lauriston St., Roxborough, Philadelphia, Pa.—CC, S, SI, WS
 Universal Microphone Co., Ltd., 424 Warren Lane, Inglewood, Calif.—CA, MC
 Utilities Service Co., Allentown, Pa.—G
 Western Electric Co., 195 Broadway, New York, N. Y.—AT, AN, ANT, CC, CO, FL, HU, IC, MC, S
 Western Insulated Wire, Inc., 1001 E. 82nd St., Los Angeles, Calif.—CA, CO, HU, IC, MC, S, SI, WS
 The Wheeler Insulated Wire Co., 378 Washington Ave., Bridgeport, Conn.—L, M
 Whitney Blake Co., New Haven, Conn.—S
 C. D. Wood Electric Co., Inc., 826 Broadway, New York, N. Y.—CA, CC, CO, H

ELECTRONIC SUPPLIERS AND EXPEDITER-JOBBERS

Including parts distributors, mail order houses and others advertising electronic apparatus and supplies for war plants and communication services.

Allied Radio Corp., 833 W. Jackson Blvd., Chicago, Ill.
 Chem City Radio & Electric Co., P. O. Box 1501, Charleston, W. Va.
 H. L. Dalis, Inc., 17 Union Sq., New York, N. Y.
 Harrison Radio Co., 12 West Broadway, New York, N. Y.
 Lafayette Radio Corp., 100 6th Ave., New York, N. Y.
 Radio Specialties Co., 20th & Figueroa Sts., Los Angeles, Calif.
 Sun Radio Co., 212 Fulton St., New York, N. Y.
 Terminal Radio Co., 85 Courtland St., New York, N. Y.
 Walker-Jimieson, Inc., 311 South Western Ave., Chicago, Ill.

ASSOCIATIONS AND ORGANIZATIONS

Acoustical Society of America, 120 S. LaSalle St., Chicago, Ill.
 American Institute of Electrical Engineers, 29 W. 39th St., New York.
 American Radio Relay League, East Hartford, Conn.
 American Standards Association, 29 W. 39th St., New York.
 Associated Police Communication Officers, Buffalo, N. Y.
 Institute of Radio Engineers, 330 W. 42nd St., New York.
 National Association of Broadcasters, 1626 K St., NW, Washington, D. C.
 National Electronic Distributors Association, Box 2, Reading, Pa.
 National Electrical Manufacturers Association, 155 E. 44th St., New York.
 Radio Club of America, 11 W. 42nd St., New York.
 Radio Manufacturers Association, 1317 F St., NW, Washington, D. C.
 Society of Motion Picture Engineers, Hotel Pennsylvania, New York.

ALPHABETICAL FINDING LIST of Electronic Manufacturers

Use this list if you know the name of a company and want to learn its principal products. Asterisks following listings indicate companies making products too numerous for individual inclusion.

A

- ABC Radio Labs., Indianapolis, Ind.—Antennas
Abbott Instrument, Inc., New York, N. Y.—Transmitters
Ace Mfg. Corp., Philadelphia, Pa.—Metal Stampings
Acheson Colloids Corp., Port Huron, Mich.—Graphite
Ackermann, Steffan Co., Chicago, Ill.—Tools
Acklin Stamping Co., Toledo, Ohio—Metal Stampings
Acme Battery Co., Brooklyn, N. Y.—Batteries
Acme Electric & Mfg. Co., Cuba, N. Y.—Transformers*
Acme Welding Co., Louisville, Ohio—Antennas
Acme Wire Co., New Haven, Conn.—Wire*
The Acromark Corp., Elizabeth, N. J.—Machinery*
The Acro Electric Co., Cleveland, Ohio—Switches
Acro Tool & Die Works, Chicago, Ill.—Tools
H. W. Acton Co., Inc., New York, N. Y.—Needles
The Adams & Westlake Co., Elkhart, Ind.—Relays
Adler Mfg. Co., Louisville, Ky.—Cabinets
Admak Mfg. Co., Irvington, N. J.—Tube Parts
Advance Electric Co., Los Angeles, Calif.—Relays*
Advance Recording Products, Long Island City, N. Y.—Recorders
Aerovox Corp., New Bedford, Mass.—Capacitors*
Aetna Electrical Mfg. Corp., Brooklyn, N. Y.—Hardware*
Bruno H. Ahlers, Woodhaven, N. Y.—Relays
Airadio, Inc., Stamford, Conn.—Connectors*
Air Communications, Inc., Kansas City, Mo.—Transmitters
Aircraft Accessories Corp., Kansas City, Kans.—Transmitters*
Aircraft-Marine Products Co., Elizabeth, N. J.—Hardware*
Aircraft Radio Corp., Boonton, N. J.—Transmitters*
Air King Products Co., Inc., Brooklyn, N. Y.—Communication Equipment
Airplane & Marine Instruments, Inc., Clearfield, Pa.—Transmitters*
Air Reduction Sales Co., New York, N. Y.—Tube Parts
Akron Porcelain Co., Akron, Ohio—Insulation*
Aladdin Radio Industries Inc., Chicago, Ill.—Coils*
Alden Products Co., Brockton, Mass.—Hardware*
Allen Electric & Equip. Co., Kalamazoo, Mich.—Test Equipment*
Allen-Bradley Co., Milwaukee, Wis.—Resistors
Allen Mfg. Co., Hartford, Conn.—Hardware
Alliance Mfg. Co., Alliance, Ohio—Motors*
Allied Control Co., Inc., New York, N. Y.—Relays*
Allied Recording Products Co., Long Island City, N. Y.—Recorders
Allis-Chalmers Mfg. Co., Boston Works, Boston, Mass.—Relays
Alpha Metal & Rolling Mills, Inc., Brooklyn, N. Y.—Tools*
Altec Lansing Corp., Los Angeles, Calif.—Sound Systems*
Altec Service Corp., New York, N. Y.—Transformers
Aluminum Co. of America, Pittsburgh, Pa.—Metal
American Amplifier & Tele. Co., Inc., Los Angeles, Calif.—Microphones*
American Automatic Electric Sales Co., Chicago, Ill.—Relays*
American Battery Co., Chicago, Ill.—Chargers
The American Brass Co., Waterbury, Conn.—Metal
American Coils, Inc., Newark, N. J.—Laboratory Equipment
American Communications Corp., New York, N. Y.—Sound Systems*
American Condenser Corp., Chicago, Ill.—Capacitors
American Cyanamid Co., New York, N. Y.—Plastics
American District Telegraph Co., New York, N. Y.—Control Equipment
American Electro Metal Corp., Yonkers, N. Y.—Hardware
American Emblem Co., Inc., Utica, N. Y.—Dials, Parts*
American Gas Accumulator Co., Elizabeth, N. J.—Switches*
American Instrument Co., Silver Spring, Md.—Relays*
American Insulated Wire Co., Providence, R. I.—Wire
American Insulator Corp., New Freedom, Pa.—Insulation*
American Jewels Corp., Attleboro, Mass.—Crystals
American Lava Corp., Chattanooga, Tenn.—Insulation*
American Microphone Co., Los Angeles, Calif.—Microphones*
American Molding Powder & Chemical Corp., Brooklyn, N. Y.—Plastics
American Nut & Bolt Fastener Co., Pittsburgh, Pa.—Hardware
American Phenolic Corp., Chicago, Ill.—Plastics*
American Photocopy Equip. Co., Chicago, Ill.—Drafting Equipment
American Platinum Works, Newark, N. J.—Metal
American Products Mfg. Co., New Orleans, La.—Plastics
American Radio Hardware Co., Inc., New York, N. Y.—Hardware*
American Rolling Mill Co., Middletown, Ohio—Metal
American Screw Co., Providence, R. I.—Hardware
The American Steel Package Co., Defiance, Ohio—Capacitors*
American Steel & Wire Co., Cleveland, Ohio—Wire*
American Television & Radio Co., St. Paul, Minn.—Chargers*
American Thermo-Elec. Co., New York, N. Y.—Measuring Instruments
American Transformer Co., Newark, N. J.—Transformers*
Ampere Electronic Products, Inc., Brooklyn, N. Y.—Tubes
Ammerite Co., New York, N. Y.—Microphones*
Amplex Engineering Inc., New Castle, Ind.—Antennas*
Amplifier Co. of America, New York, N. Y.—Sound Systems*
Amy, Aches & King, Inc., New York, N. Y.—Antennas
Anaconda Wire & Cable Co., New York, N. Y.—Wire*
Andrea Radio Corp., Long Island City, N. Y.—Communication Equipment
Andrew & Perillo Mfg. Corp., Long Island City, N. Y.—Control Equipment*
R. B. Annis Co., Indianapolis, Ind.—Transformers*
Ansley Radio Corp., Long Island City, N. Y.—Communication Equipment
Apex Industries, Inc., Chicago, Ill.—Switches*
Apex Specialty Co., Chicago, Ill.—Speaker Parts
Apollo Metal Works, Chicago, Ill.—Metal
Applied Research Labs., Glendale, Calif.—Laboratory Equipment
Approved Technical Apparatus Co., Brooklyn, N. Y.—Test Equipment
The Arco Electric Co., Cleveland, Ohio—Switches
Arlavox Mfg. Co., Chicago, Ill.—Metal*
Armstrong Cork Co., Lancaster, Pa.—Insulation
The Arnold Engineering Co., Chicago, Ill.—Magnets
The Arrow-Hart & Hegeman Electric Co., Hartford, Conn.—Switches*
Art Specialty Co., Chicago, Ill.—Sound Systems*
Askania Regulator Co., Chicago, Ill.—Control Equipment
Associated Research, Inc., Chicago, Ill.—Test Equipment*
The Astatic Corp., Youngstown, Ohio—Microphones*
Atlantic India Rubber Works, Inc., Chicago, Ill.—Insulation*
Atlas Resistor Co., New York, N. Y.—Resistors
Atlas Condenser Products Co., Bronx, N. Y.—Capacitors
Atlas Sound Corp., Brooklyn, N. Y.—Sound Systems*
Auburn Button Works, Inc., Auburn, N. Y.—Plastic Molders
Auburn Mfg. Co., Middletown, Conn.—Insulation*
Audak Co., New York, N. Y.—Pickups
The Audel & Co., New York, N. Y.—Books
Audio Development Co., Minneapolis, Minn.—Transformers*
Audio Devices, Inc., New York, N. Y.—Recorders*
The Audio-Tone Oscillator Co., Bridgeport, Conn.—Control Equipment*
Aurex Corp., Chicago, Ill.—Microphones*
The O. Austin Co., New York, N. Y.—Dials, Parts
Austin Electronic Mfg. Co., Warren, Pa.—Sound Systems*
Auth Electrical Specialty Co., Inc., New York, N. Y.—Sound Systems*
Autocrat Radio Co., Chicago, Ill.—Sound Systems*
Automatic Alarms Co., Youngstown, Ohio—Control Equipment
Automatic Electric Co., Chicago, Ill.—Relays*
Automatic Elec. Mfg. Co., Mankato, Minn.—Relays*
The Automatic Electrical Devices Co., Cincinnati, Ohio—Chargers*
Automatic Mfg. Co., Inc., Harrison, N. J.—Tools
Automatic Products Co., Milwaukee, Wis.—Solenoid Valves
Automatic Radio Mfg. Co., Boston, Mass.—Communication Equipment
Automatic Switch Co., New York, N. Y.—Switches
Automatic Temperature Control Co., Inc., Philadelphia, Pa.—Control Equipment*
Automatic Winding Co., E. Newark, N. J.—Coils*
Avia Products Co., Los Angeles, Calif.—Power Filters
- B**
- Bacon Electric Timer Corp., Cleveland, Ohio—Switches
N. S. Baer Co., Hillside, N. J.—Hardware*
Bakelite Corp., New York, N. Y.—Plastics*
Baker & Co., Inc., Newark, N. J.—Hardware
Baker Oil Tools, Inc., Los Angeles, Calif.—Plastics
Ballantine Labs., Inc., Boonton, N. J.—Measuring Instruments*
A. Bamberger, Brooklyn, N. Y.—Plastics
Bank's Manufacturing Co., Chicago, Ill.—Sound Systems*
Alfred W. Barber Labs., Flushing, N. Y.—Measuring Instruments*
Barber-Coleman Co., Molded Products Div., Rockford, Ill.—Plastic Molders
Barker & Williamson, Upper Darby, Pa.—Coils*
Rex Bassett, Inc., Fort Lauderdale, Fla.—Crystals*
Bastian Bros. Co., Rochester, N. Y.—Dials*
B & C Insulation Products, Inc., New York, N. Y.—Insulation*
The Bead Chain Mfg. Co., Bridgeport, Conn.—Tube Parts
Bear Mfg. Co., Rock Island, Ill.—Machinery and Equipment
Belden Mfg. Co., Chicago, Ill.—Wire*
Bell Radio & Television, New York, N. Y.—Sound Systems*
Bell Sound Systems, Inc., Columbus, Ohio—Sound Systems*
Belmont Radio Corp., Chicago, Ill.—Communication Equipment
Bend-A-Lite Plastics Co., Chicago, Ill.—Fabricators
Bendix Aviation, Ltd., No. Hollywood, Calif.—Intercommunicators
Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.—Communication Equipment*
Bentley, Harris Mfg. Co., Conshohocken, Pa.—Insulation
The Benwood Linze Co., St. Louis, Mo.—Chargers*
Berger Electronics—Forest Hills, L. I., N. Y.—Control Equipment*
Best Mfg. Co., Inc., Irvington, N. J.—Speakers
James G. Biddle Co., Philadelphia, Pa.—Test Equipment*
Birnback Radio Co., Inc., New York, N. Y.—Wire*
The Bircher Corp., Los Angeles, Calif.—Hardware*
A. Bitter Construction Co., New York, N. Y.—Cabinets*
Biwax Corp., Skokie, Ill.—Waxes
Black & Decker Electric Co., Kent, Ohio—Motors
The Blakiston Co., Philadelphia, Pa.—Books
Blaw-Knox Division, Blaw-Knox Co., Blawnox, Pa.—Antennas*
Bliley Electric Co., Erie, Pa.—Crystals*
Charles J. Bodner, Inc., Tuckahoe, N. Y.—Crystals
Bodine Electric Co., Chicago, Ill.—Motors
H. O. Boehme, Inc., New York, N. Y.—Radiotelegraph Equipment*
Boetsch Bros., New York, N. Y.—Phonographs
David Bogen Co., Inc., New York.—Sound Systems*
Bond Electric Corp., New Haven, Conn.—Batteries
Boom Elec. & Amplifier Co., Chicago, Ill.—Sound Systems
Boonton Molding Co., Boonton, N. J.—Insulation*
Boonton Radio Co., Boonton, N. J.—Test Equipment
Boston Insulated Wire & Cable Co., Boston, Mass.—Wire
L. S. Brach Mfg. Co., Newark, N. J.—Antennas
Bradley Laboratories, Inc., New Haven, Conn.—Photo Electric Equipment*
C. S. Brainin Co., New York, N. Y.—Hardware
Wm. Brand & Co., New York, N. Y.—Insulation
Brandywine Fibre Products Co., Wilmington, Del.—Insulation
Breeze Corporations, Newark, N. J.—Hardware
Breon Laboratories, Williamsport, Pa.—Crystals
Bridgeport Brass Co., Bridgeport, Conn.—Metal
Bridgeport Molded Products, Inc., Bridgeport, Conn.—Plastic Molders

All sections of the directory are coded for copyright protection

- Briggs & Stratton Corp., Milwaukee, Wis.—Chargers
Bright Star Battery Co., Clifton, N. J.—Batteries
The Bristol Co., Waterbury, Conn.—Measuring Equipment*
Brooke Engineering Co., Inc., Philadelphia, Pa.—Control Equipment*
The Brown-Brockmeyer Co., Dayton, Ohio—Resistors*
Brown Instrument Co., Philadelphia, Pa.—Control Equipment
Browning Labs., Inc., Winchester, Mass.—Communication Equipment*
Bruno-New York, Inc., New York, N. Y.—Control Equipment*
Brunswick Radio Division, Mersman Bros. Corp., New York, N. Y.—Cabinets
Brush Development Co., Cleveland, Ohio—Microphones*
Bryant Electric Co., Bridgeport, Conn.—Plastics
Bryant Mfg. Co., Chicago, Ill.—Batteries
Bud Radio, Inc., Cleveland, Ohio—Dials, Parts*
Bulova Watch Co., New York, N. Y.—Meters
J. H. Bunnell & Co., Brooklyn, N. Y.—Hardware*
The Burdick Corp., Milton, Wis.—Electronic Equipment
Burgess Battery Co., Chicago, Ill.—Batteries*
Burke & James, Inc., Chicago, Ill.—Photo Electric Equipment
Burling Instrument Co., Newark, N. J.—Control Equipment
Burlington Instrument Co., Burlington, Iowa—Control Equipment*
Burndy Engineering Co., New York, N. Y.—Connectors
Wm. W. L. Burnett Radio Lab., San Diego, Calif.—Coils*
Bussmann Mfg. Co., St. Louis, Mo.—Fuses
- C**
- Callite Tungsten Corp., Union City, N. J.—Hardware*
Campbell X-Ray Corp., Boston, Mass.—Laboratory Equipment*
Cambridge Instrument Co., Inc., New York, N. Y.—Laboratory Equipment*
C. F. Cannon Co., Springwater, N. Y.—Headphones
Canon Electric Development Co., Los Angeles, Calif.—Connectors*
Cantol Wax Co., Bloomington, Ind.—Wax
Capitol Radio Engineering Institute, Washington, D. C.—School
Oscar Caplan & Sons, Diamond Tool Replacement Div., Baltimore, Md.—Crystals
Carb Mfg. Co., Brooklyn, N. Y.—Cabinets
Carborundum Co., Niagara Falls, N. Y.—Resistors
Carbide & Carbon Chemicals Corp., Plastics Division, New York, N. Y.—Plastics*
The Allen D. Cardwell Mfg. Corp., Brooklyn, N. Y.—Capacitors*
Carlisle Crystal Corp., Carlisle, Pa.—Transmitters
Carlton Lamp Corp., Newark, N. J.—Dials, Parts*
Carrier Corp., Syracuse, N. Y.—Laboratory Equipment
Carron Mfg. Co., Chicago, Ill.—Speakers*
Carson Machine & Supply Co., Oklahoma City, Okla.—Resistors
Carter Motor Co., Chicago, Ill.—Rotary Machines*
Castlewood Mfg. Co., Inc., Louisville, Ky.—Cabinets
Caswell-Runyan Co., Huntington, Ind.—Cabinets
Catalin Corp., New York, N. Y.—Plastics*
Caterpillar Tractor Co., Peoria, Ill.—Resistors
Celanese Celluloid Corp., New York, N. Y.—Plastics*
Celluplastic Corp., Newark, N. J.—Plastics
Centralab Div., Globe Union, Milwaukee, Wis.—Volume Controls*
Central Cable Corp., Philadelphia, Pa.—Wire
Central Process Corp., Forest Park, Ill.—Plastics
Central Scientific Co., Chicago, Ill.—Measuring Equipment*
Century Electric Co., St. Louis, Mo.—Motors
Ceramic Specialties Co., East Liverpool, Ohio—Insulation
Chandler Products Corp., Cleveland, Ohio—Hardware
Chase Brass & Copper Co., Waterbury, Conn.—Brass*
Chicago Metal Hose Corp., Maywood, Ill.—Wire*
- Chicago Molded Products Corp., Chicago, Ill.—Molders
Chicago Sound Systems Co., Chicago, Ill.—Sound Systems*
Chicago Telephone Supply Co., Elkhart, Ind.—Switches*
Chicago Transformer Corp., Chicago, Ill.—Transformers
Churchill Cabinet Co., Chicago, Ill.—Cabinets
Ciba Corp., New York, N. Y.—Plastics
Cinaudagraph Corp., Stamford, Conn.—Metal*
Cinaudagraph Speakers, Inc., Chicago, Ill.—Speakers
Cinch Manufacturing Co., Chicago, Ill.—Hardware
Cincinnati Molding Co., Cincinnati, Ohio—Molders
Cinema Engineering Co., Burbank, Calif.—Attenuators*
C. P. Clare & Co., Chicago, Ill.—Relays
Clark Controller Co., Cleveland, Ohio—Control Equipment
Clarostat Mfg. Co., Inc., Brooklyn, N. Y.—Volume Controls*
Classic Record Co., Pittsburgh, Pa.—Records
Cleveland Plastics, Inc., Cleveland, Ohio—Molders
Cleveland Tungsten, Inc., Cleveland, Ohio—Tungsten*
Cleveland Wire Cloth & Mfg. Co., Cleveland, Ohio—Speaker Parts
Climax Engineering Co., Clinton, Iowa—Rotary Machines*
The Clough-Brengle Co., Chicago, Ill.—Laboratory Equipment*
Sigmund Cohn, New York, N. Y.—Tube Parts
Cole Radio Works, Caldwell, N. J.—Speaker Parts
Coleman Electric Co., Maywood, Ill.—Control Equipment*
Collins Co., Los Angeles, Calif.—Microphones*
Collins Radio Co., Cedar Rapids, Iowa—Transmitters
Colonial Kolonite Co., Chicago, Ill.—Insulation
Colonial Radio Corp., Buffalo, N. Y.—Communication Equipment
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.—Plastics
Columbia Metal Box Co., New York, N. Y.—Cabinets
Columbia Nut & Bolt Co., Bridgeport, Conn.—Hardware
Columbia Recording Corp., Bridgeport, Conn.—Records
Commercial Crystal Co., Lancaster, Pa.—Crystals
Commercial Engineering Laboratories, Detroit, Mich.—Laboratory Equipment
Commercial Radio Equipment Co., Kansas City, Mo.—Crystals
Communications Co., Inc., Coral Gables, Fla.—Transmitters*
Communications Equipment Co., Pasadena, Calif.—Transmitters
Communication Measurements Lab., New York, N. Y.—Measuring Instruments*
C. G. Conn. Ltd., Elkhart, Ind.—Recording Equipment*
Conn. Telephone & Elec. Div., Great American Industries, Inc., Meriden, Conn.—Microphones*
Connector Corp., Philadelphia, Pa.—Hardware
Consolidated Engineering Corp., Pasadena, Calif.—Laboratory Equipment
Consolidated Molded Products Corp., Scranton, Pa.—Insulation*
Consolidated Wire & Assoc. Corps., Chicago, Ill.—Wire*
Continental Carbon, Inc., Cleveland, Ohio—Resistors*
Continental-Diamond Fibre Co., Newark, Del.—Plastics*
Continental Electric Co., Geneva, Ill.—Photo Electric Equipment*
Continental Machines, Inc., Minneapolis, Minn.—Machinery & Equipment*
Continental Radio & Television Corp., Chicago, Ill.—Communication Equipment
Continental Screw Co., New Bedford, Mass.—Hardware*
Control Corp., Minneapolis, Minn.—Control Equipment*
Cook Ceramic Mfg. Co., Trenton, N. J.—Insulation*
Cook Electric Co. of Chicago, Chicago, Ill.—Switches*
Cornell-Dubilier Elec. Corp., South Plainfield, N. J.—Capacitors*
Corninn Glass Works, Insulation Div., Corning, N. Y.—Insulation*
Cornish Wire Co., Inc., New York, N. Y.—Wire*
Cosmic Radio Corp., New York, N. Y.—Capacitors
Coto-Coil Co., Providence, R. I.—Coils*
- Cottrell Paper Co., Inc., Fall River, Mass.—Insulation
Cover Dual Signal Systems, Inc., Chicago, Ill.—Sound Systems*
The R. W. Cramer Co., Inc., Centerbrook, Conn.—Control Equipment*
Creative Plastics Corp., Brooklyn, N. Y.—Plastic Molders
The Crescent Co., Pawtucket, R. I.—Wire
Crescent Industries, Inc., Chicago, Ill.—Speaker Parts*
The Crosley Corp., Cincinnati, Ohio—Communication Equipment
Crowe Name Plate & Mfg. Co., Chicago, Ill.—Dials, Parts*
Henry L. Crowley & Co., Inc., West Orange, N. J.—Coils*
Crucible Steel Co. of America, New York, N. Y.—Metal
Crystal Mfg. Co., Chicago, Ill.—Crystals
Crystal Products Co., Kansas City, Mo.—Crystals
Crystal Research Labs., Inc., Hartford, Conn.—Crystals
Cutler-Hammer, Inc., Milwaukee, Wis.—Switches
- D**
- Dahlstrom Metallic Door Co., Metal Specialties Div., Jamestown, N. Y.—Metal Stampings*
Dallons Laboratories, Los Angeles, Calif.—Crystals
The Daven Co., Newark, N. J.—Attenuators*
Harry Davies Molding Co., Chicago, Ill.—Insulation*
Dean W. Davis & Co., Inc., Chicago, Ill.—Transformers
James P. Day & Co., Chicago, Ill.—Lacquers
Dayton Acme Co., Cincinnati, Ohio—Test Equipment
Dayton Insulating Molding Co., Dayton, Ohio—Plastic Molders
Dearborn Glass Co., Chicago, Ill.—Recording Blanks
Decca Records, Inc., New York, N. Y.—Records
Lee de Forest Laboratories, Los Angeles, Calif.—Transmitters*
DeJury-Amsco Corp., Shelton, Conn.—Measuring Instruments*
Delco Radio Div., General Motors Corp., Kokomo, Ind.—Communication Equipment
Denham & Co., Detroit, Mich.—Colloidal Graphite
Detroit Paper Products Co., Detroit, Mich.—Plastics
Detroit Power Screwdriver Co., Detroit, Mich.—Screwdrivers
Detroit Corp., Detroit, Mich.—Communication Equipment
Toke Deutschmann Corp., Canton, Mass.—Capacitors*
De Vry Corp., Chicago, Ill.—Sound Systems
DeWald Radio Mfg. Corp., New York, N. Y.—Communication Equipment*
Dial Light Co. of America, Inc., New York, N. Y.—Dial Lamps
The Diamond Drill Carbon Co., New York, N. Y.—Crystals
Diamond Wire & Cable Co., Chicago Heights, Ill.—Wire
The Dickey-Grabler Co., Cleveland, Ohio—Hardware*
Dictaphone Corp., New York, N. Y.—Recorders
Diehl Mfg. Co., Elizabethport, N. J.—Motors*
Diemolding Corp., Canastota, N. Y.—Plastic Molders
Diks Sales Co., Norwalk, Conn.—Sound Systems
Dinion Coil Co., Caledonia, N. Y.—Coils*
Distillation Products, Inc., Rochester, N. Y.—Measuring Instruments*
Division Lead Co., Chicago, Ill.—Solder
Joseph Dixon Crucible Co., Jersey City, N. J.—Drafting Equipment
John C. Dolph Co., Newark, N. J.—Lacquers*
Doolittle Radio, Inc., Chicago, Ill.—Transmitters
Dossier & Co., New York, N. Y.—Hardware
Dow Chemical Co., Midland, Mich.—Plastics*
L. A. Dow, Seattle, Wash.—Crystals
Drake Electric Works, Inc., Chicago, Ill.—Tools
Frederick J. Drake & Co., Chicago, Ill.—Books
Drake Mfg. Co., Chicago, Ill.—Dials, Parts
Driver-Harris Co., Harrison, N. J.—Wire*
Wilbur B. Driver Co., Newark, N. J.—Wire*
- Dual Remote Control Co., Wayne, Mich.—Control Heads
Frank I. DuFrane Co., Inc., San Francisco, Calif.—Sound Systems*
Allen B. DuMont Laboratories, Inc., Passaic, N. J.—Tubes*
Dumont Electric Co., New York, N. Y.—Capacitors*
The Dumore Co., Racine, Wis.—Motors
Dunn, Struthers, Inc., Philadelphia, Pa.—Relays*
Duotone Company, Inc., New York, N. Y.—Needles*
E. I. DuPont de Nemours & Co., DuPont Plastics, Arlington, N. J.—Plastics*
Durakool, Inc., Elkhart, Ind.—Relays
Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.—Plastics*
Durite Plastics Div., Stokes & Smith Co., Philadelphia, Pa.—Plastics
DX Crystal Corp., Chicago, Ill.—Crystals*
- E**
- Eagle Electric Mfg. Co., Inc., Long Island City, N. Y.—Drafting Equipment*
Eagle Pencil Co., New York, N. Y.—Drafting Equipment*
Eagle Plastics Corp., Long Island City, N. Y.—Plastic Molders
Eagle Signal Corp., Moline, Ill.—Relays*
Eastern Amplifier Corp., Bronx, N. Y.—Sound Systems*
Eastern Mike-Stand Co., Brooklyn, N. Y.—Microphones
Eastman Kodak Co., Rochester, N. Y.—Plastics
Hugh H. Eby, Inc., Philadelphia, Pa.—Dials, Parts*
Ecco High Frequency Elec. Corp., North Bergen, N. J.—Machinery Equipment*
Eckstein Radio & Telev. Co., Inc., Minneapolis, Minn.—Communication Equipment*
Eclipse Moulded Products Co., Milwaukee, Wis.—Dials, Parts
Edison Storage Battery Div., Thomas A. Edison, West Orange, N. J.—Batteries
Egyptian Lacquer Mfg. Co., Inc., New York, N. Y.—Lacquers
Eicor, Inc., Chicago, Ill.—Rotary Machines*
Eidson's, Temple, Texas—Crystals*
Eisler Electric Corp., Union City, N. J.—Tube Parts
Eisler Engineering Co., Newark, N. J.—Machinery*
Eitel-McCullough, Inc., San Bruno, Calif.—Tubes
Elastic Stop Nut Corp., Union, N. J.—Hardware
Elco Tool & Screw Corp., Rockford, Ill.—Hardware
The Eldeen Co., Milwaukee, Wis.—Needles*
The Electric Auto-Lite Co., Port Huron, Mich.—Wire
Electric Controller & Mfg. Co., Cleveland, Ohio—Control Equipment*
Electric Eye Equip. Co., Danville, Ill.—Control Equipment
Electric Soldering Iron Co., Deep River, Conn.—Tools
Electric Sorting Machine Co., Grand Rapids, Mich.—Control Equipment*
Electric Specialty Co., Stamford, Conn.—Rotary Machines
Electric Storage Battery Co., Philadelphia, Pa.—Batteries
Electrical Coil Winding Co., Camden, N. J.—Coils
Electrical Facilities, Inc., Oakland, Calif.—Transformers*
Electrical Products Co., Detroit, Mich.—Chargers
Electrical Research Labs., Inc., Evanston, Ill.—Communication Equipment*
Electrical Testing Laboratories, New York, N. Y.—Testing Laboratories
Electrocoil Transformer Co., New York, N. Y.—Transformers*
Electro-Medical Laboratory, Inc., Holliston, Mass.—Measuring Instruments*
The Electro Motive Mfg. Co., Willimantic, Conn.—Capacitors*
Electro Products Labs., Chicago, Ill.—Control Equipment*
Electron Equipment Corp., Palm Springs, Calif.—Control Equipment*
Electronic Communications Co., Portland, Ore.—Transmitters
Electronic Control Corp., Detroit, Mich.—Control Equipment*
Electronic Corp. of America, New York, N. Y.—Sound Systems*
Electronic Enterprises, Newark, N. J.—Tubes
Electronic Laboratories, Inc., Indianapolis, Ind.—Vibrators*
Electronic Mechanics, Inc., Clifton, N. J.—Insulation
Electronic Products Co., Geneva, Ill.—Photo Electric Equipment*

Electronic Products Mfg. Corp., Dexter, Mich.—Crystals*
 Electronic Radio Alarm, Inc., Philadelphia, Pa.—Control Equipment
 Electronic Specialty Co., Glendale, Calif.—Transmitters
 Electronic Transformer Co., New York, N. Y.—Transformers*
 Electrons, Inc., Newark, N. J.—Tubes
 Electro-Voice Mfg. Co., Inc., South Bend, Ind.—Microphones*
 Electrovox Co., Maplewood, N. J.—Needles*
 Emeloid Mfg. Co., Arlington, N. J.—Recording Blanks
 Emerson Electric Mfg. Co., St. Louis, Mo.—Motors
 Emerson Radio & Phono. Corp., New York, N. Y.—Communication Equipment*
 Endurette Corp. of America, Cliffwood, N. J.—Insulation
 Engineering Laboratories, Inc., Tulsa, Okla.—Transformers*
 Erco Radio Labs., Inc., Hempstead, L. I., N. Y.—Laboratory Equipment*
 Erie Art Metal Co., Erie, Pa.—Cabinets*
 Erie Can Co., Chicago, Ill.—Hardware*
 Erie Resistor Corp., Erie, Pa.—Resistors*
 Erwood Sound Equip. Co., Chicago, Ill.—Sound Systems*
 Espey Mfg. Co., Inc., New York, N. Y.—Communication Equipment
 Ess Instrument Co., Fort Lee, N. J.—Laboratory Equipment*
 Essex Corp., Charlottesville, Va.—Plastics
 Essex Wire Corp., Detroit, Mich.—Wire
 The Esterline-Angus Co., Inc., Indianapolis, Ind.—Measuring Instruments
 Etched Products Corp., Long Island City, N. Y.—Dials, Parts*
 H. C. Evans & Co., Chicago, Ill.—Coils*
 The Exact Weight Scale Co., Columbus, Ohio—Control Equipment
 Executone, Inc., New York, N. Y.—Intercommunications*
 Extruded Plastics, Inc., Norwalk, Conn.—Plastic Molders

F

A. W. Faber Co., Newark, N. J.—Drafting Equipment
 Fada Radio & Electric Co., Inc., Long Island City, N. Y.—Communication Equipment*
 Fairbank Morse & Co., Chicago, Ill.—Machinery & Equipment
 Fairchild Aviation Corp., Jamaica, L. I., N. Y.—Recorders*
 Fansteel Metallurgical Corp., North Chicago, Ill.—Metal*
 Farley & Loetscher Mfg. Co., Dubuque, Iowa—Plastics
 Farnsworth Telev. & Radio Corp., Fort Wayne, Ind.—Communication Equipment*
 John E. Fast & Co., Chicago, Ill.—Capacitors*
 Federal A. C. Switch Corp., Buffalo, N. Y.—Switches*
 Federal Recorder Co., Inc., Chicago, Ill.—Sound Systems
 Federal Screw Products Co., Chicago, Ill.—Hardware*
 Federal Telephone & Radio Corp., Newark, N. J.—Transmitters*
 Felker Mfg. Co., Torrance, Calif.—Crystals (Blades)
 Ferranti Electric, Inc., New York, N. Y.—Transformers*
 Ferris Instrument Corp., Boonton, N. J.—Laboratory Equipment*
 Ferrocar Corp. of America, Hastings-on-Hudson, N. Y.—Metal
 Field Electric Instrument Co., New York, N. Y.—Measuring Instruments
 Finch Telecommunications, Inc., Passaic, N. J.—Communication Equipment
 Fisher Research Laboratory, Palo Alto, Calif.—Transmitters*
 Fisher Scientific Co., Pittsburgh, Pa.—Laboratory Equipment
 M. M. Fleron & Sons, Inc., Trenton, N. J.—Antennas*
 Flexo Wire Co., Syracuse, N. Y.—Wire*
 Flock Process Co., New York, N. Y.—Dials, Parts*
 The Forest Electronic Co., New York, N. Y.—Sound Systems*
 Formica Insulation Corp., Cincinnati, Ohio—Plastics*
 Foote Mineral Co., Philadelphia, Pa.—Crystals
 The Forsberg Mfg. Co., Bridgeport, Conn.—Tools
 A. W. Franklin Mfg. Corp., New York, N. Y.—Sockets*
 Franklin-Fibre-Lamitex Corp., Wilmington, Dela.—Plastics*

George E. Fredericks Co., Bethayres, Pa.—Measuring Instruments
 Freed Radio Corp., New York, N. Y.—Communication Equipment
 Freed Transformer Co., New York, N. Y.—Transformers*
 Freeland & Olschner, Inc., New Orleans, La.—Tubes (Rebuilt)
 Froiland Mfg. Co., Springfield, Mass.—Metal

G

Gaertner Scientific Corp., Chicago, Ill.—Laboratory Equipment
 Galvin Mfg. Corp., Chicago, Ill.—Communication Equipment*
 Gardner Electric Mfg. Co., Emeryville, Calif.—Transformers
 Garfield Mfg. Co., Garfield, N. J.—Plastic Molders
 Fred E. Garner Co., Chicago, Ill.—Test Equipment*
 Garod Radio Corp., Brooklyn, N. Y.—Communication Equipment
 Garrard Sales Corp., New York, N. Y.—Record Players
 Gardiner-Levering Co., Haddon Heights, N. J.—Radiotelegraph equipment
 Gates American Corp., Quincy, Ill.—Sound Systems
 Genloid Corp., Elmhurst, L. I., N. Y.—Plastics*
 General Aniline & Film Corp., Ozalid Products Div., Johnson City, N. Y.—Drafting Equipment
 General Aniline Works, New York, N. Y.—Metal
 General Cable Corp., New York, N. Y.—Wire
 General Cement Mfg. Co., Rockford, Ill.—Lacquers*
 General Ceramics & Steatite Corp., Keasbey, N. J.—Insulation*
 General Communication Co., Boston, Mass.—Transmitters*
 General Control Co., Cambridge, Mass.—Control Equipment
 General Controls Co., Glendale, Calif.—Relays
 General Crystal Corp., Schenectady, N. Y.—Crystals*
 General Dry Batteries, Inc., Cleveland, Ohio—Batteries
 General Electric Co., Bridgeport, Conn.—Communication Equipment*
 General Electric Co., Pittsfield, Mass.—Plastics*
 General Electric Co., Schenectady, N. Y.—Transformers*
 General Electric X-Ray Corp., Chicago, Ill.—Laboratory Equipment*
 The General Industries Co., Elyria, Ohio—Insulation*
 General Instrument Corp., Elizabeth, N. J.—Capacitors*
 General Insulated Wire Works, Inc., Providence, R. I.—Wire
 General Lead Batteries Co., Paterson, N. J.—Batteries
 General Paper Tube Co., Philadelphia, Pa.—Insulation
 General Phonograph Corp., Putnam, Conn.—Needles
 General Plate Co., Div. Metals & Controls Corp., Attleboro, Mass.—Hardware
 General Radio Co., Cambridge, Mass.—Laboratory Equipment*
 General Scientific Corp., Chicago, Ill.—Photo Electric Equipment
 General Telev. & Radio Corp., Chicago, Ill.—Communication Equipment
 General Time Instruments Corp., Thomaston, Conn.—Measuring Instruments*
 General Transformer Co., Chicago, Ill.—Transformers*
 General Winding Co., New York, N. Y.—Coils*
 Gentleman Prod. Div., Henney Motor Co., Omaha, Nebr.—Crystals*
 The P. D. George Co., St. Louis, Mo.—Varnishes
 Geophysical Instrument Co., Washington, D. C.—Crystals*
 M. A. Gerett Corp., Milwaukee, Wisc.—Recording Equip*
 Gering Products, Inc., Kenilworth, N. J.—Plastics
 Thomas B. Gibbs & Co., Delavan, Wis.—Switches*
 Gibson, Inc., Kalamazoo, Mich.—Sound Systems*
 Gillilan Brothers, Inc., Los Angeles, Calif.—Communication Equipment
 Girard-Hopkins, Oakland, Calif.—Capacitors*
 The Girdler Corp., Louisville, Ky.—Control Equipment
 Gisholt Machine Co., Madison, Wis.—Control Equipment*

Gits Molding Corp., Chicago, Ill.—Dials, Parts*
 G-M Laboratories, Inc., Chicago, Ill.—Measuring Equipment*
 G. M. Mfg. Co., New York, N. Y.—Measuring Instruments
 Goat Metal Stampings, Inc., Brooklyn, N. Y.—Metal*
 Godfrey Mfg. Corp., Milwaukee, Wis.—Sound Systems*
 The James Goldmark Wire Co., New York, N. Y.—Wire
 Gold Shield Prods. Co., New York, N. Y.—Books
 Goldsmith Bros. Smelting & Refining Co., Chicago, Ill.—Metal
 B. F. Goodrich Co., Akron, Ohio—Plastics
 Carl Gorr Printing Co., Chicago, Ill.—Knobs
 Gothard Mfg. Co., Springfield, Ill.—Dial Lights
 The Gould-Moody Co., New York, N. Y.—Records*
 Gould Storage Battery Corp., Depew, N. Y.—Batteries*
 L. F. Grammes & Sons, Inc., Allentown, Pa.—Dials, Parts*
 Gray Mfg. Co., New York, N. Y.—Recording Equipment
 Gray Radio Co., West Palm Beach, Fla.—Transmitters
 Greenlee Tool Co., Rockford, Ill.—Tools
 Gregory Mfg. Co., New Haven, Conn.—Hardware
 Groen Watch Co., Time Hill, Cincinnati, Ohio—Meters
 Guaranteed Products Corp., Wellington, Ohio—Control Equipment
 Guardian Electric Mfg. Co., Chicago, Ill.—Relays*
 W. & L. E. Gurley, Troy, N. Y.—Test Equipment*
 Edwin I. Guthman & Co., Inc., Chicago, Ill.—Coils

H

The Halldorson Co., Chicago, Ill.—Transformers
 The Hallicrafters Co., Chicago, Ill.—Communication Equipment
 Halowax Products Div., Union Carbide & Carbon Corp., New York, N. Y.—Insulation*
 Hamilton Mfg. Co., Two Rivers, Wisc.—Drafting Equipment
 Hamilton Radio Corp., New York, N. Y.—Communication Equipment
 The Hammarlund Mfg. Co., Inc., New York, N. Y.—Capacitors*
 Handy & Harman, New York, N. Y.—Silver
 Wm. Hansen Co., Niles, Mich.—Control Equipment*
 Hardwick, Hindle, Inc., Newark, N. J.—Resistors*
 Harris Mfg. Co., Los Angeles, Calif.—Recorders*
 Hart Mfg. Co., Hartford, Conn.—Switches*
 Harvey Machine Co., Electronics Div., Los Angeles, Calif.—Communication Equipment
 Harvey Radio Labs., Inc., Cambridge, Mass.—Transmitters
 Harvey-Wells Communications, Inc., Southbridge, Mass.—Communication Equipment*
 The Harwood Co., Los Angeles, Calif.—Connectors
 John Hassall, Inc., Brooklyn, N. Y.—Hardware*
 Hathaway Instrument Co., Denver, Colo.—Test Equipment
 Hatfield Wire & Cable Co., Hillside, N. J.—Wire
 Haveg Corp., E. Newark, Dela.—Plastics
 Hawley Products Co., St. Charles, Ill.—Speaker Parts
 Haydon Mfg. Co., Inc., Forrestville, Conn.—Control Equipment*
 Haydu Bros., Plainfield, N. J.—Tube Parts*
 Hazeltine Electronics Corp., New York, N. Y.—Communication Equipment
 H-B Electric Co., Philadelphia, Pa.—Control Equipment*
 Heiland Research Corp., Denver, Colo.—Laboratory Equipment*
 Heineemann Circuit Breaker Co., Trenton, N. J.—Switches
 Heintz & Kaufman, Ltd., South San Francisco, Calif.—Tubes
 Henry Radio Shop, Los Angeles, Calif.—Crystals
 Herbach & Rademan Co., Philadelphia, Pa.—Laboratory Equipment*
 Hercules Powder Co., Wilmington, Dela.—Plastics
 Heresite & Chemical Co., Manitowoc, Wisc.—Plastics

Robt. Hetherington & Son, Inc., Sharon Hill, Pa.—Microphones*
 Hetro Electrical Industries, Inc., Chicago, Ill.—Communication Equipment
 Hewlett-Packard Co., Palo Alto, Calif.—Laboratory Equipment*
 Hexacon Electric Co., Roselle Park, N. J.—Tools
 The Hickok Electrical Instrument Co., Cleveland, Ohio—Laboratory Equipment*
 Higgins Industries Inc., Santa Monica, Calif.—Crystals
 A. G. Hintze Co., Westchester, Ill.—Speaker Parts
 Hipower Crystal Co., Chicago, Ill.—Crystals
 Hollister Crystal Co., Boulder, Colo.—Crystals
 Hodgman Rubber Co., Framingham, Mass.—Insulation
 P. R. Hoffman Co., Carlisle, Pa.—Crystals
 Holliston Mills, Inc., Norwood, Mass.—Drafting Equipment
 The Holo-Krome Screw Corp., Hartford, Conn.—Hardware
 Hollywood Electronics Co., Los Angeles, Calif.—Sound Systems*
 Hollywood Transformer Co., Los Angeles, Calif.—Transformers*
 Holtzer-Cabot Electric Co., Boston, Mass.—Machinery & Equipment
 Home Recording Co., New York, N. Y.—Recording Blanks
 J. Hope, Wenonah, N. J.—Insulation*
 Horn Signal Mfg. Corp., New York, N. Y.—Control Equipment*
 Howard Mfg. Co., Council Bluffs, Iowa—Crystals
 Howard Radio Co., Chicago, Ill.—Communication Equipment
 H. R. S. Products, Chicago, Ill.—Capacitors
 Hoyt Electrical Instrument Works, Boston, Mass.—Test Equipment
 Hudson Wire Co., Winsted Div., Winsted, Conn.—Wire
 G. C. Hunt & Sons, Carlisle, Pa.—Crystals
 Hunter Pressed Steel Co., Lansdale, Pa.—Hardware
 Hy Ef Electrical Products Mfg. Co., Los Angeles, Calif.—Capacitors*
 Hytron Corp., Salem, Mass.—Tubes*

I

Ideal Commutator Dresser Co., Sycamore, Ill.—Batteries
 Illinois Cabinet Co., Rockford, Ill.—Cabinets
 Illinois Condenser Co., Chicago, Ill.—Capacitors
 Illinois Wood Products Corp., Chicago, Ill.—Cabinets*
 Imperial Molded Products Co., Chicago, Ill.—Plastic Molders
 Imperial Porcelain Works, Inc., Trenton, N. J.—Insulation*
 Indiana Steel Products Co., Valparaiso, Ind.—Metal
 Indiana Steel & Wire Co., Muncie, Ind.—Wire
 Induction Heating Corp., New York, N. Y.—Induction Heating
 Industrial & Commercial Electronics Corp., Belmont, Calif.—Tubes
 Industrial Condenser Corp., Chicago, Ill.—Capacitors*
 Industrial Electronics Corp., Newark, N. J.—Transformers*
 Industrial Filter & Pump Mfg. Co., Chicago, Ill.—Laboratory Equipment
 Industrial Instruments, Inc., Jersey City, N. J.—Laboratory Equipment*
 Industrial Molded Prods. Co., Chicago, Ill.—Insulation*
 Industrial Sound Products Co., San Francisco, Calif.—Metal
 Industrial Screw & Supply Co., Chicago, Ill.—Hardware*
 Industrial Synthetics Corp., Irvington, N. J.—Plastics
 Industrial Timer Corp., Newark, N. J.—Control Equipment*
 Industrial Transformer Corp., New York, N. Y.—Transformers*
 Industrial X-Ray Laboratories, Inc., Seattle, Wash.—Laboratory Equipment*
 Industrial Wire Cloth Products Corp., Wayne, Mich.—Speaker Parts
 Ingraham Co., Bristol, Conn.—Cabinets
 The Insel Co., Arlington, N. J.—Plastics
 Instructograph Company, Chicago, Ill.—Radio Telegraph Equipment
 Instrument Resistors Co., Little Falls, N. J.—Resistors
 Instrument Specialties Co., Inc., Little Falls, N. J.—Springs
 Insulation Mfg. Co., Brooklyn, N. Y.—Plastic Molders

Insulation Manufacturers Corp., Chicago, Ill.—Insulation*
 Insulation Products Co., Pittsburgh, Pa.—Insulation*
 Insuline Corp. of America, Long Island City, N. Y.—Hardware*
 Intercall Systems, Inc., Dayton, Ohio—Intercommunicators
 International Electronics, Inc., New York, N. Y.—Sound Systems*
 The International Nickel Co., Inc., New York, N. Y.—Metal
 International Resistance Co., Philadelphia, Pa.—Resistors
 Int. Tel. & Tel. Co., New York, N. Y.—Communication Equip.*
 International Transformer Co., New York, N. Y.—Filters
 Irvington Varnish & Insulator Co., Irvington, N. J.—Lacquers*
 Isolantite, Inc., Belleville, N. J.—Insulation

J

The Jackson Electrical Instrument Co., Dayton, Ohio—Laboratory Equipment*
 James Vibrapowr Co., Inc., Chicago, Ill.—Vibrators
 Janette Mfg. Co., Chicago, Ill.—Rotary Machines*
 Jarrell-Ash Co., Boston, Mass.—Laboratory Equipment
 J-B-L Instrument Co., Alden, Pa.—Rotary Switches
 J-B-T Instrument, Inc., New Haven, Conn.—Measuring Equipment*
 Jefferson Electrical Co., Bellwood, Ill.—Transformers*
 Jefferson-Travis Radio Mfn. Corp., New York, N. Y.—Communication Equipment*
 The C. O. Jelliff Mfg. Corp., Southport, Conn.—Tube Parts
 Jennings Radio Mfg. Co., San Jose, Calif.—Tubes
 Jensen Industries, Inc., Chicago, Ill.—Speakers*
 Jensen Radio Mfg. Co., Chicago, Ill.—Speakers*
 J. F. D. Manufacturing Co., Brooklyn, N. Y.—Dials, Parts*
 E. F. Johnson Co., Waseca, Minn.—Insulation*
 The Johnston Tin Foil & Metal Co., St. Louis, Mo.—Metal
 Howard B. Jones, Chicago, Ill.—Terminal Strips

K

Kaar Engineering Co., Palo Alto, Calif.—Transmitters
 Kable Engineering Co., North Bergen, N. J.—Machinery & Equipment
 Kane Mfn. Corp., Kane, Pa.—Cabinets
 Karadio Corp., Minneapolis, Minn.—Sound Systems*
 Karn Metal Products Co., Inc., Brooklyn, N. Y.—Cabinets
 Kato Engineering Co., Mankato, Minn.—Rotary Machines*
 Katz & Ogush, Inc., New York, N. Y.—Crystals*
 K. D. Mfg. Co., Lancaster, Pa.—Tools
 The Krasby & Mattison Co., Ambler, Pa.—Plastic Molders
 Kellong Switchboard & Supply Co., Chicago, Ill.—Relays*
 Kemlite Labs., Chicago, Ill.—Crystals
 Kennecott Wire & Cable Co., Phillipsdale, R. I.—Wire
 Ken-Rad Tube & Lamp Corp., Owensboro, Ky.—Tubes
 Kenyon Transformer Co., Inc., New York, N. Y.—Transformers*
 Kester Solder Co., Chicago, Ill.—Solder
 Keuffel & Esser Co., Hoboken, N. J.—Drafting Equipment
 Keystone Carbon Co., Inc., St. Marys, Pa.—Resistors
 Keystone Specialty Co., Cleveland, Ohio—Insulation*
 J. F. Kilburn Glass Co., Chartley, Mass.—Insulation*
 King Laboratories, Inc., Syracuse, N. Y.—Tube Parts*
 Kinney Mfg. Co., Boston, Mass.—Machinery & Equipment
 H. R. Kirkland Co., Morristown, N. J.—Parts*
 Klett Mfg. Co., New York, N. Y.—Laboratory Equipment
 Kliegl Bros. Universal Electric Stage Lighting Co., New York, N. Y.—Photo Electric Equipment*
 Knickerbocker Annunciator Co., New York, N. Y.—Wire

The James Knights Co., Sandwich, Ill.—Crystals
 A. Knoedler Co., Lancaster, Pa.—Plastics
 Knox Porcelain Corp., Knoxville, Tenn.—Insulation
 Kold-Hold Mfg. Co., Lansing, Mich.—Laboratory Equipment
 Kollsman Instrument Div., Square D Co., Elmhurst, L. I., N. Y.—Laboratory Equipment
 Korfund Co., Inc., Long Island City, N. Y.—Machinery & Equipment
 Kraeuter & Co., Inc., Newark, N. J.—Tools
 Kuhn & Jacob Molding & Tool Co., Trenton, N. J.—Plastic Molders
 Kurman Electric Co., Inc., Long Island City, N. Y.—Control Equipment
 Kurz-Kasch, Inc., Dayton, Ohio—Plastic Molders

L

L A B Corp., Summit, N. J.—Control Equipment*
 Lake Mfg. Co., Oakland, Calif.—Inter-Communicators
 Lampkin Laboratories, Bradenton, Fla.—Test Equipment*
 Landis & Gyr, Inc., New York, N. Y.—Laboratory Equipment*
 Lansing Stamping Co., Lansing, Mich.—Stampings
 Lapp Insulator Co., Inc., LeRoy, N. Y.—Insulators*
 Laueh Radio Mfg. Co., Wayne, Mich.—Sound Systems*
 The Lauson Co., New Holstein, Wis.—Rotary Machines
 Lavoie Laboratories, Morganville, N. J.—Laboratory Equipment*
 Leach Relay Co., Inc., Los Angeles, Calif.—Relays*
 Lear Avia, Inc., Piqua, Ohio—Laboratory Equipment*
 Lectrohm, Inc., Cicero, Ill.—Resistors*
 Lee Spring Co., Inc., Brooklyn, N. Y.—Hardware*
 Leeds & Northrup Co., Philadelphia, Pa.—Laboratory Equipment*
 Le Febure Corp., Cedar Rapids, Iowa—Cabinets
 Lehigh Structural Steel Co., New York, N. Y.—Antennas
 Lektra Laboratories, Inc., New York, N. Y.—Laboratory Equipment*
 Leland Electric Co., Dayton, Ohio—Motors*
 Lenoxite Division, Lenox, Inc., Trenton, N. J.—Insulation
 Lenz Electric Mfg. Co., Chicago, Ill.—Wire*
 Lenel High Frequency Labs., Inc., New York, N. Y.—Laboratory Equipment*
 Lewek Electric Co., Lincoln, Nebr.—Crystals
 Lewis Electronics, Los Gatos, Calif.—Tubes
 Lewyt Metal Products Co., Inc., Brooklyn, N. Y.—Cabinets
 Lifetime Sound Equipment Co., Toledo, Ohio—Sound Systems*
 The Lincophone Co., Inc., Utica, N. Y.—Sound Systems
 Limick, Green & Reed, Inc., Chicago, Ill.—Hardware*
 John E. Lingo & Son, Inc., Camden, N. J.—Antennas
 Fred M. Link, New York, N. Y.—Test Equipment*
 Littelfuse, Inc., Chicago, Ill.—Control Equipment*
 Locke Insulator Corporation, Baltimore, Md.—Insulators*
 Lord Mfg. Co., Erie, Pa.—Control Equipment*
 The Louthan Mfg. Co., E. Liverpool, Ohio—Insulation*
 Lowe Brothers Co., Dayton, Ohio—Lacquers
 Lowell Insulated Wire Co., Lowell, Mass.—Wire
 Lowell Needle Co., Inc., Putnam, Conn.—Needles
 J. Milton Luers, Mt. Clemens, Mich.—Control Equipment
 Lumenite Electric Co., Chicago, Ill.—Control Equipment*
 Luxtrol Co., New York, N. Y.—Laboratory Equipment

M

Maas & Waldstein Co., Newark, N. J.—Lacquers
 The Macallen Co., Boston, Mass.—Mica
 Machlett Laboratories, Inc., Norwalk, Conn.—Tubes

Mack Molding Co., Wayne, N. J.—Plastic Molders
 Maedel Publishing House, Brooklyn, N. Y.—Books
 The Magnavox Co., Fort Wayne, Ind.—Capacitors*
 The Magnetic Gauge Co., Akron, Ohio—Control Equipment
 Magnetic Windings Co., Easton, Pa.—Coils*
 The Maico Co., Inc., Minneapolis, Minn.—Machinery & Equipment
 Majestic Radio & Telev. Corp., Chicago, Ill.—Communication Equipment*
 Makalot Corp., Boston, Mass.—Plastics*
 P. R. Mallory & Sons, Inc., Indianapolis, Ind.—Capacitors*
 John A. Manning Paper Co., Troy, N. Y.—Insulation
 Manufacturers Chemical Corp., Bekeley Heights, N. J.—Plastics
 Manufacturers Screw Products, Chicago, Ill.—Hardware*
 Marathon Battery Co., Wausau, Wis.—Batteries
 Marblette Corp., Long Island City, N. Y.—Plastics*
 Marion Elec. Instr. Co., Manchester, N. H.—Test Equipment
 Maritime Radio Corp., New York, N. Y.—Transmitters
 Markem Machine Co., Keene, N. H.—Machinery & Equipment
 Master Electric Co., Dayton, Ohio—Machinery & Equipment
 Master Vibrator Co., Dayton, Ohio—Power Plant
 Measurements Corp., Boonton, N. J.—Laboratory Equipment*
 John Meck Industries, Plymouth, Ind.—Sound Systems*
 Megard Corp., Los Angeles, Calif.—Control Equipment*
 Meissner Mfg. Co., Mt. Carmel, Ill.—Coils*
 George S. Mephram Corp., E. St. Louis, Ill.—Metal
 The Mercoid Corp., Chicago, Ill.—Relays*
 Merit Coil & Transformer Corp., Chicago, Ill.—Coils*
 Merwin-Wilson Co., New Milford, Conn.—Transformers*
 Metroloy Co., Inc., Newark, N. J.—Metal*
 Metsch Refractories Co., East Liverpool, Ohio—Insulation
 Mica Insulator Co., New York, N. Y.—Insulators*
 Mica Products Mfg. Co., New York, N. Y.—Insulation
 Micamold Radio Corp., Brooklyn, N. Y.—Capacitors
 Micarta Fabricators, Inc., Chicago, Ill.—Insulation*
 Michian Molded Plastics, Inc., Dexter, Mich.—Molders*
 Mico Instrument Co., Cambridge, Mass.—Engravers
 Micro Switch Corp., Freeport, Ill.—Switches
 Midcro Mfg. & Distributing Co., Inc., Sheboygan, Wis.—Power Plants
 Midwest Radio Corp., Cincinnati, Ohio—Communication Equipment
 Mid-West Screw Products Co., St. Louis, Mo.—Hardware*
 Miles Reproducer Co., New York, N. Y.—Speakers*
 James Millen Mfg. Co., Inc., Malden, Mass.—Capacitors*
 August E. Miller, North Bergen, N. J.—Crystals
 B. F. Miller Co., Trenton, N. J.—Laboratory Equipment*
 J. W. Miller Co., Los Angeles, Calif.—Coils*
 Elmer E. Mills Corp., Chicago, Ill.—Plastic Molders
 Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.—Control Equipment
 Miniature Precision Bearings, Keene, N. H.—Metal
 Mirror Record Corp., New York, N. Y.—Records
 Mitchell-Rand Insulation Co., Inc., New York, N. Y.—Insulation*
 Mobile Refrigeration, Inc., New York, N. Y.—Laboratory Equipment
 Wm. Mogy & Sons, Inc., Plainfield, N. J.—Laboratory Equip.
 Molded Insulation Co., Philadelphia, Pa.—Insulation*
 Monark Battery Co., Chicago, Ill.—Batteries
 Monarch Mfg. Co., Chicago, Ill.—Laboratory Equipment*
 Monsanto Chemical Co., Plastics Div., Springfield, Mass.—Plastics*
 Montgomery Bros., San Francisco, Calif.—Recorders

Donald P. Mossman, Inc., Chicago, Ill.—Relays
 Motor Products Corp., North Chicago, Ill.—Laboratory Equipment
 Mueller Electrical Mfg. Co., Cleveland, Ohio—Hardware*
 Multi Electrical Mfg. Co., Chicago, Ill.—Insulation*
 Eugene Munsell & Co., New York, N. Y.—Insulation
 Murdock Mfg. Co., Chelsea, Mass.—Head-phones
 Murphy Varnish Co., Newark, N. J.—Varnish
 Music Master Mfg. Co., Chicago, Ill.—Recorders*
 Mu-Switch Corp., Canton, Mass.—Switches
 The Mutter Co., Chicago, Ill.—Coils*
 E. A. Myers & Son, Mt. Lebanon, Pa.—Microphones*
 Mycallex Corp. of America, Clifton, N. J.—Insulation*

Mc

McDonnell & Miller, Chicago, Ill.—Control Equipment
 McElroy Mfg. Corp., Boston, Mass.—Radiotelegraph Equipment*
 McGraw-Hill Book Co., New York, N. Y.—Books
 McInerney Plastics Co., Grand Rapids, Mich.—Plastics
 McKesson Appliance Co., Toledo, Ohio—Electronic Equipment
 T. W. McNeil Engineering Equipment Co., Chicago, Ill.—Control Equipment

N

National Battery Co., St. Paul, Minn.—Batteries
 National Carbon Co., New York, N. Y.—Batteries
 National Co., Inc., Malden, Mass.—Communication Equipment*
 National Instrument Co., Boston, Mass.—Measuring Instruments
 National Inter-Communicating Systems, Chicago, Ill.—Intercommunicators*
 National Lock Washer Co., Newark, N. J.—Hardware
 National Plastics Products Co., Detroit, Mich.—Plastics
 National Porcelain Co., Trenton, N. J.—Insulation*
 National Scientific Products Co., Chicago, Ill.—Crystals
 National Screw & Mfg. Co., Cleveland, Ohio—Hardware*
 National Technical Laboratories, South Pasadena, Calif.—Resistors
 National Tile Co., Anderson, Ind.—Insulation*
 National Union Radio Corp., Newark, N. J.—Tubes*
 National Vulcanized Fibre Co., Wilmington, Del.—Insulation*
 Neperthan Sales Co., Inc., New York, N. Y.—Insulation
 Newark Transformer Co., Newark, N. J.—Transformers*
 Newcomb Audio Products Co., Los Angeles, Calif.—Sound Systems*
 New England Confectionary Co., Cambridge, Mass.—Capacitors
 New England Mica Co., Inc., Waltham, Mass.—Insulation
 New England Radiocrafters, Brookline, Mass.—Insulation*
 New England Screw Co., Keene, N. H.—Hardware
 New Jersey Machine Corp., Hoboken, N. J.—Pumps
 New Products Corp., Benton Harbor, Mich.—Record Changers*
 Newton Company, New York, N. Y.—Transformers
 New Wrinkle, Inc., Dayton, Ohio—Lacquers
 New York Solder Co., Inc., New York, N. Y.—Solder
 New York Testing Laboratories, New York, N. Y.—Testing Laboratories
 New York Transformer Co., New York, N. Y.—Transformers*
 Niagara Insul Bake Specialty Co., Inc., Albany, N. Y.—Plastic Molders
 Nixon Nitration Works, Nixon, N. J.—Plastics
 The K. B. Noble Co., Hartford, Conn.—Rotary Machines
 Noblitt-Sparks Industries, Columbus, Ind.—Communication Equipment
 Norcraft Radio Co., Independence, Mo.—Crystals
 Northam Warren Corp., Stamford, Conn.—Hardware

North American Philips Co., Dobbs Ferry, N. Y.—Tubes*
 North Electric Mfg. Co., Galion, Ohio—Hardware*
 Northern Electric Co., Chicago, Ill.—Wire
 Northern Industrial Chemical Co., South Boston, Mass.—Insulation*
 Northern Mfg. Co., Inc., Newark, N. J.—Tubes
 Norton Laboratories, Inc., Lockport, N. Y.—Insulation*
 Notthofer Winding Labs., Trenton, N. J.—Measuring Instruments*
 Numberall Stamp & Tool Co., Staten Island, N. Y.—Numbering Machines

O

Oak Mfg. Co., Chicago, Ill.—Vibrators*
 The Ohio Carbon Co., Cleveland, Ohio—Resistors*
 The Ohio Crankshaft Co., Cleveland, Ohio—Electronic Equipment
 Ohmite Mfg. Co., Chicago, Ill.—Resistors*
 The Okonite Co., Passaic, N. J.—Wire
 Otto K. Olesen III., Ltd., Hollywood, Calif.—Microphones*
 D. W. Onan & Sons, Minneapolis, Minn.—Rotary Machines*
 O'Neill-Irwin Mfg. Co., Minneapolis, Minn.—Machinery
 Operadio Mfg. Co., St. Charles, Ill.—Speakers*
 Oris Mfg. Co., Thomaston, Conn.—Plastic Molders
 Oxford-Tartak Radio Corp., Chicago, Ill.—Speakers*
 Owens-Corning Fiberglas Corp., New York, N. Y.—Insulation

P

Pacific Clay Products, Los Angeles, Calif.—Insulation
 Pacific Radio Crystal Co., San Francisco, Calif.—Crystals
 Pacific Sound Equipment Co., Hollywood, Calif.—Sound Systems*
 The Palnut Co., Irvington, N. J.—Nuts
 Panelyte Corp., New York, N. Y.—Plastics
 Panoramic Radio Corp., New York, N. Y.—Communication Equipment*
 The Paralay Co., Chicago, Ill.—Needles*
 Paramount Radio Co., Oakland, Calif.—Cabinets*
 Parisian Novelty Co., Chicago, Ill.—Insulation*
 Parker-Kalon Corp., New York, N. Y.—Screws*
 Park Metalware Co., Inc., Orchard Park, N. Y.—Tools
 Par-Metal Products Corp., Long Island City, N. Y.—Cabinets
 Patterson Screen Co., Towanda, Pa.—Electronic Equipment*
 Patton-MacGuey Co., Providence, R. I.—Hardware*
 Paul & Beekman, Philadelphia, Pa.—Hardware
 Peerless Laboratories, Inc., New York, N. Y.—Laboratory Equipment*
 Peerless Mfg. Corp., Louisville, Ky.—Coils*
 Penn Fibre & Specialty Co., Philadelphia, Pa.—Insulation*
 Penn-Union Electric Corp., Erie, Pa.—Control Equipment*
 Perkin-Elmer Corp., Glenbrook, Conn.—Laboratory Equipment
 Perm-O-Flux Corp., Chicago, Ill.—Speakers*
 Permo-Products Corp., Chicago, Ill.—Needles*
 Peters Chemical Mfg. Co., Melrose Park, Ill.—Plastics
 Peterson Radio Co., Council Bluffs, Iowa—Crystals
 Pfaltz & Bauer, Inc., New York, N. Y.—Control Equipment*
 Pfaltz & Bauer Chemical Co., Waukegan, Ill.—Needles
 Phelps Dodge Copper Products Corp., Dobbs Ferry, N. Y.—Wire
 Phono Mfg. Co., Chicago, Ill.—Hardware
 Philco Radio & Telev. Corp., Philadelphia, Pa.—Communication Equipment*
 Philharmonic Radio Corp., New York, N. Y.—Communication Equipment
 Philinc Metalix Corp., New York, N. Y.—Laboratory Equipment*
 Philmore Mfg. Co., Inc., New York, N. Y.—Intercommunicators
 Philson Mfg. Co., Inc., New York, N. Y.—Antennas
 Phone Co. of America, Los Angeles, Calif.—Crystals*
 Phonogram Needle Mfg. Co., Inc., Providence, R. I.—Needles*

Photobell Corp., New York, N. Y.—Photo Electric Equipment*
 Photoswitch, Inc., Cambridge, Mass.—Photo Electric Equipment*
 Photovolt Corp., New York, N. Y.—Photo Electric Equipment*
 Physicists Research Co., Ann Arbor, Mich.—Laboratory Equipment
 Pilot Radio Corp., Long Island City, N. Y.—Communication Equipment
 Pinkam & Smith Co., N. Boston, Mass.—Crystals
 Pioneer Asphalt Co., Chicago, Ill.—Lacquers
 Pioneer Gen-E-Motor Corp., Chicago, Ill.—Rotary Machines*
 Pittsburgh Testing Laboratory, Pittsburgh, Pa.—Testing Laboratory
 Plaskon Co., Toledo, Ohio—Plastics
 Plastic Fabricators, Inc., San Francisco, Calif.—Fabricators
 Plastic Metals, Inc., Johnstown, Pa.—Metal
 Plastic Molding Corp., Sandy Hook, Conn.—Plastic Molders
 Plasticraft Associates, Chicago, Ill.—Plastics
 Plax Corp., Hartford, Conn.—Plastics*
 Plume & Atwood Mfg. Co., Waterbury, Conn.—Metal Stampings
 Poinsettia, Inc., Pitman, N. J.—Molders*
 Polymet Condenser Co., New York, N. Y.—Capacitors
 Porcelain Enamel & Mfg. Co., Plastics Division, Baltimore, Md.—Insulation
 The Porcelain Insulator Corp., Lima, N. Y.—Insulators
 Porcelain Products, Inc., Findlay, Ohio—Insulation*
 The Frederick Post Co., Chicago, Ill.—Drawing Equipment
 Potter Co., North Chicago, Ill.—Capacitors*
 Potter & Brumfield Mfg. Co., Princeton, Ind.—Coils*
 Potter Elec. Signal & Mfg. Co., St. Louis, Mo.—Photo Electric Equipment
 The Powers Regulator Co., Chicago, Ill.—Measuring Instruments
 Pratt & Lambert, Inc., Buffalo, N. Y.—Lacquers
 Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn.—Machinery & Equipment
 Precise Development Co., Chicago, Ill.—Crystals
 Precision Apparatus Corp., Elmhurst, N. Y.—Test Equipment
 Precision Fabricators, Inc., Rochester, N. Y.—Plastic Molders
 Precision Instrument Mfg. Co., Inc., Elmhurst, N. Y.—Crystals
 Precision Paper Tube Co., Chicago, Ill.—Insulation*
 Precision Resistor Co., Newark, N. J.—Resistors
 Precision Tube Co., Philadelphia, Pa.—Metal Tubing*
 Premax Products Div., Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.—Antennas
 Premier Crystal Laboratories, Inc., New York, N. Y.—Crystals
 Premier Metal Etching Co., Long Island City, N. Y.—Dials, Parts*
 Prentice-Hall, Inc., New York, N. Y.—Books
 Prest-O-Lite Battery Co., Indianapolis, Ind.—Batteries
 Presto Recording Corp., New York, N. Y.—Recording Equipment*
 Printoid, Inc., New York, N. Y.—Insulation*
 Production Engineering Corp., Clifton, N. J.—Impregnating Equipment
 Pyle-National Co., Chicago, Ill.—Hardware
 Pyroferic Corp., New York, N. Y.—Metals
 Pyramid Products Co., Chicago, Ill.—Tools

Q

Quam-Nichols Co., Chicago, Ill.—Speakers*

R

Racon Electric Co., Inc., New York, N. Y.—Sound Systems*
 Radex Corp., Chicago, Ill.—Laboratory Equipment*
 Radiad Service, Chicago, Ill.—Test Equipment*
 The Radiart Corp., Cleveland, Ohio—Vibrators*
 Radio City Products Co., New York, N. Y.—Test Equipment*
 Radio Condenser Co., Camden, N. J.—Capacitors
 Radio Design Co., Brooklyn, N. Y.—Measuring Equipment*

Radio Electronic Co., Oakland, Calif.—Sound Systems*
 Radio Electronics Laboratory, Inc., Brooklyn, N. Y.—Laboratory Equipment
 Radio Engineering Labs., Inc., Long Island City, N. Y.—Test Equipment
 Radio Essentials, Inc., New York, N. Y.—Hardware*
 Radio Frequency Labs., Inc., Boonton, N. J.—Test Equipment*
 Radio Mfg. Engineers, Inc., Peoria, Ill.—Transmitters*
 Radio Receptor Co., Inc., New York, N. Y.—Sound Systems
 Radio Service Engineers, Ft. Wayne, Ind.—Test Equipment
 Radio Speakers, Inc., Chicago, Ill.—Speakers*
 Radio Specialty Mfg. Co., Portland, Ore.—Crystals*
 Radiotechnic Laboratory, Evanston, Ill.—Test Equipment*
 Radio & Technical Publ. Co., New York, N. Y.—Books
 Radiotone, Inc., Hollywood, Calif.—Microphones
 The Rajah Co., Bloomfield, N. J.—Hardware
 Rangerton, Inc., Newark, N. J.—Sound Systems*
 Rapid Electroplating Process, Inc., Chicago, Ill.—Tools
 The Rauland Corp., Chicago, Ill.—Sound Systems*
 Rawson Electrical Instrument Corp., Cambridge, Mass.—Test Equipment*
 Raymond Mfg. Co., Corry, Pa.—Springs*
 Ray-O-Vac Co., Madison, Wisc.—Batteries
 Raytheon Mfg. Co., Electrical Equip. Div., Waltham, Mass.—Power Units*
 Raytheon Production Corp., Newton, Mass.—Tubes*
 RBM Mfg. Co., Logansport, Ind.—Photo Electric Equipment
 RCA Victor Div. of Radio Corp. of America, Camden, N. J.—Communication Equipment*
 Readrite Meter Works, Bluffton, Ohio—Test Equipment
 Reading Batteries, Inc., Reading, Pa.—Batteries
 Rea Magnet Wire Co., Inc., Fort Wayne, Ind.—Wire
 The Ready-Power Co., Detroit, Mich.—Chargers*
 The Recordis Corp., New York, N. Y.—Recording Blanks
 The Recordit Co., University City, Mo.—Recording Supplies*
 Record-O-Vox, Inc., Brooklyn, N. Y.—Recorders*
 Recto Molded Products, Inc., Cincinnati, Ohio—Insulation*
 Recton Corp., Long Island City, N. Y.—Needles*
 Red Arrow Electric Corp., Irvington, N. J.—Transformers
 Reed & Prince Mfg. Co., Worcester, Mass.—Hardware
 Reeves Sound Lab. Inc., New York, N. Y.—Crystals
 Regal Amplifier Mfg. Corp., New York, N. Y.—Sound Systems*
 Rehtron Corp., Chicago, Ill.—Control Equipment
 Reilly Tar & Chemical Corp., Indianapolis, Ind.—Plastics
 Rek-O-Kut Corp., New York, N. Y.—Recording Assemblies
 Remler Co., Ltd., San Francisco, Calif.—Sound Systems*
 Resinuss Products & Chemicals Co., Philadelphia, Pa.—Plastics
 Resistoflex Corp., Belleville, N. J.—Plastics
 Revere Copper & Brass, Inc., New York, N. Y.—Metal
 Reynolds Electric Co., Chicago, Ill.—Machinery & Equipment*
 Reynolds Spring Co., Plastic Div., Cambridge, Ohio—Insulation*
 Reynolds Spring Co., Jackson, Mich.—Hardware
 M. H. Rhodes, Inc., Hartford, Conn.—Switches
 Bernard Rice's Sons, Inc., New York, N. Y.—Metal*
 Richards' Electro-Fence Co., Boise, Idaho—Control Equipment
 Arklay S. Richards Co., Inc., Newton Highlands, Mass.—Measuring Equipment
 Richardson-Allen Corp., New York, N. Y.—Control Equipment
 The Richardson Co., Melrose Park, Ill.—Insulation*
 John F. Rider Publisher, Inc., New York, N. Y.—Books
 Frank Rieber, Inc., Los Angeles, Calif.—Sound Systems*

Rinauld Optical Co., Webster, Mass.—Crystals
 A. E. Rittenhouse, Honeoye Falls, N. Y.—Transformers*
 Riverbank Labs., Geneva, Ill.—Measuring Equipment
 Riverside Metal Co., Riverside, N. J.—Metal
 W. C. Robinette Co., S. Pasadena, Calif.—Control Equipment*
 Rockbestos Products Corp., New Haven, Conn.—Wire
 John A. Roebing's Sons Co., Trenton, N. J.—Wire*
 Rogan Brothers, Chicago, Ill.—Insulation*
 Rohm & Haas Co., Philadelphia, Pa.—Plastics
 The Rola Co., Inc., Cleveland, Ohio—Speakers*
 Roller-Smith Co., Bethlehem, Pa.—Laboratory Equipment
 Rome Cable Corp., Rome, N. Y.—Wire
 Raymond Rosen & Co., Philadelphia, Pa.—Transmitters
 The T. R. Routh Co., San Francisco, Calif.—Laboratory Equipment*
 Rowe Radio Research Laboratory Co., Chicago, Ill.—Sound Systems*
 Roxalin-Flexible Finishes, Inc., Elizabeth, N. J.—Lacquers
 Royal Electric Co., Inc., Pawtucket, R. I.—Wire
 Royal Moulding Co., Inc., Providence, R. I.—Plastic Molders
 Rubicon Company, Philadelphia, Pa.—Laboratory Equipment*
 The Ruby Chemical Co., Columbus, Ohio—Soldering Flux
 Rupp's Assembling & Mfg. Works, Chicago, Ill.—Hardware*

S

St. Louis Screw & Bolt Co., St. Louis, Mo.—Hardware
 Sanders Bros. Mfg. Co., Ottawa, Ill.—Cabinets
 Sangamo Electric Co., Springfield, Ill.—Capacitors
 E. M. Sargent Co., Oakland, Calif.—Intercommunicators
 Saxl Instrument Co., Inc., E. Providence, R. I.—Laboratory Equipment*
 Saxonburg Potteries, Saxonburg, Pa.—Insulation
 Schaar & Company, Chicago, Ill.—Laboratory Equipment*
 Schloss Brothers Corp., New York, N. Y.—Cabinets
 The William Schollhorn Co., New Haven, Conn.—Tools
 Walter L. Schott Co., Beverly Hills, Calif.—Lacquers*
 Schulmerich Electronics, Inc., Glenside, Pa.—Control Equipment*
 Schuttig & Co., Washington, D. C.—Cabinets*
 Scientific Radio Service, Hyattsville, Md.—Crystals
 Scientific Radio Products Co., Council Bluffs, Iowa—Crystals
 E. H. Scott Radio Laboratories, Inc., Chicago, Ill.—Communication Equipment
 Scranton Record Co., Scranton, Pa.—Recording Blanks*
 Scully Machine Co., Bridgeport, Conn.—Recorders
 Seely Instrument Co., Akron, Ohio—Control Equipment
 Select-O-Phone Co., Providence, R. I.—Intercommunicators
 Selenium Corp. of America, Los Angeles, Calif.—Control Equipment*
 Sensitive Research Instrument Corp., New York, N. Y.—Measuring Instruments*
 Sentry Crystal Co., Portland, Ore.—Crystals
 Setchell-Carlson, Inc., St. Paul, Minn.—Communication Equipment*
 Shallcross Mfg. Co., Collingdale, Pa.—Laboratory Equipment*
 Shakeproof, Inc., Chicago, Ill.—Hardware
 Shawingam Products Corp., New York, N. Y.—Plastics
 Shaw Insulator Co., Irvington, N. J.—Plastic Molders
 Sherman & Reilly, Inc., Chattanooga, Tenn.—Wire
 Sherron Metallic Corp., Brooklyn, N. Y.—Cabinets
 The Sherwin-Williams Co., Cleveland, Ohio—Paint*
 Shideler Crystal Laboratory, Fort Dodge, Iowa—Crystals
 Shure Brothers, Chicago, Ill.—Microphones*
 F. W. Sickles Co., Chicopee, Mass.—Laboratory Equipment*
 Sigma Instruments, Inc., Boston, Mass.—Photo Electric Equipment*

- Signal Electric Co., Menominee, Mich.—Machinery & Equipment
- Silman Mfg. Corp., Pittsburgh, Pa.—Sound Systems*
- Simonds Saw & Steel Co., Lockport, N. Y.—Metal
- Simmonds Aerossories, Inc., Long Island City, N. Y.—Transmitters
- Simplex Wire & Cable Co., Cambridge, Mass.—Wire
- Mark Simpson Mfg. Co., Inc., New York, N. Y.—Sound systems*
- Simpson Electric Co., Chicago, Ill.—Measuring Equipment
- Sirian Wire & Contact Co., Newark, N. J.—Metal
- Slater Electric Mfg. Co., Inc., Brooklyn, N. Y.—Tubes
- Small Motors, Inc., Chicago, Ill.—Vibrators*
- F. A. Smith Mfg. Co., Rochester, N. Y.—Switches*
- Melvin L. Smith Laboratories, Kane, Pa.—Crystals
- Nathan R. Smith Mfg. Co., S. Pasadena, Calif.—Transformers*
- Smith Paper Co., Inc., Lee, Mass.—Insulation
- Snyder Mfg. Co., Philadelphia, Pa.—Antennas
- Sola Electric Co., Chicago, Ill.—Transformers
- Solar Mfg. Corp., Bayonne, N. J.—Capacitors*
- Solar Corp., Milwaukee, Wis.—Enamels*
- Somerset Laboratories, Lyndhurst, N. J.—Crystals
- Sonora Radio & Telev. Corp., Chicago, Ill.—Communication Equipment
- Sonotone Corp., Elmford, N. Y.—Headphones*
- Sound Apparatus Co., New York, N. Y.—Laboratory Equipment*
- Soundscribe Corp., New Haven, Conn.—Recorders*
- Southern Battery Co., Appomattox, Va.—Batteries
- Sparks-Withington Co., Jackson, Mich.—Communication Equipment
- Spaulding Fibre Co., Inc., Tonawanda, N. Y.—Plastics*
- Speak-O-Phone Recording & Equip. Co., New York, N. Y.—Recorders*
- Specialty Insulation Mfg. Co., Hoosick Falls, N. Y.—Plastic Molders
- Speer Carbon Co., St. Mary's, Pa.—Tube Parts
- Speer Resistor Co., St. Mary's, Pa.—Resistors
- Spencer Thermostat Co., Attleboro, Mass.—Control Equipment*
- Sperry Gyroscope Co., Inc., Brooklyn, N. Y.—Communication Equipment
- Sperli, Inc., Cincinnati, Ohio—Tubes
- Sprague Products Co., N. Adams, Mass.—Capacitors
- Sprague Specialties Co., N. Adams, Mass.—Resistors*
- Square D Co., Detroit, Mich.—Insulation
- Stackpole Carbon Co., St. Mary's, Pa.—Resistors*
- Standard Coil Products Co., Chicago, Ill.—Crystals
- The Standard Electric Time Co., Springfield, Mass.—Control Equipment*
- Standard Electrical Products Co., St. Paul, Minn.—Hardware*
- Standard Locknut & Lockwasher, Inc., Indianapolis, Ind.—Hardware
- Standard Oil Co. (Indiana), Chicago, Ill.—Waxes
- Standard Piezo Co., Carlisle, Pa.—Crystals
- Standard Pressed Steel Co., Jenkintown, Pa.—Hardware
- Standard Transformer Corp., Chicago, Ill.—Transformers*
- Standard Winding Corp., Newburgh, N. Y.—Transformers*
- The Stanley Works, Magic Door Div., New Britain, Conn.—Control Equipment
- Stanley Tools, New Britain, Conn.—Tools
- Star Porcelain Co., Trenton, N. J.—Insulation
- The L. S. Starrett Co., Athol, Mass.—Tools
- The States Co., Hartford, Conn.—Control Equipment*
- Steger Furniture Mfg. Co., Steger, Ill.—Cabinets
- Sterling Mfg. Co., Cleveland, Ohio—Test Equipment
- Stevens Walden, Inc., Worcester, Mass.—Tools
- D. M. Stewart Mfg. Co., Chattanooga, Tenn.—Insulation
- F. W. Stewart Mfg. Corp., Chicago, Ill.—Control Heads
- Stewart-Warner Corp., Chicago, Ill.—Communication Equipment
- Herman H. Sticht Co., Inc., New York, N. Y.—Measuring Equipment*
- Jos. Stokes Rubber Co., Trenton, N. J.—Plastic Molders
- Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.—Communication Equipment*
- Strawers Dunn, see Dunn, Strawers
- Supakon Ceramic & Mfg. Co., Latrobe, Pa.—Insulation*
- Summeritt Tubing Co., Bridgeport, Pa.—Tube Parts
- Sun Mfg. Co., Chicago, Ill.—Measuring Equipment*
- Sunat Engineering Co., Chicago, Ill.—Laboratory Equipment*
- Sunlight Electrical Div., General Motors Corp., Warren, Ohio—Motors
- Super Electric Products Corp., Jersey City, N. J.—Transformers*
- Superior Electric Co., Bristol, Conn.—Control Equipment
- Superior Instruments Co., New York, N. Y.—Test Equipment
- Superior Porcelain Co., Parkersburg, W. Va.—Antennas
- Superior Tube Co., Norristown, Pa.—Tube Parts
- Supreme Electric Products Corp., Rochester, N. Y.—Coils*
- Supreme Instruments Corp., Greenwood, Miss.—Test Equipment*
- S-W Inductor Co., Chicago, Ill.—Coils*
- Swedish Iron & Steel Corp., New York, N. Y.—Metal*
- Sylvania Electric Products, Inc., New York, N. Y.—Tubes*
- Synchro-Start Products, Inc., Chicago, Ill.—Control Equipment
- Synthane Corp., Oaks, Pa.—Plastics*
- Synthetic Plastics Co., Newark, N. J.—Plastic Molders
- Syracuse Ornamental Co., Syracuse, N. Y.—Dials, Parts
- C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.—Control Equipment*
- Talk-A-Phone Mfg. Co., Chicago, Ill.—Intercommunicators
- Talking Devices Co., Chicago, Ill.—Recorders*
- Taylor Fibre Co., Norristown, Pa.—Plastics*
- Taylor Tubes, Inc., Chicago, Ill.—Tubes*
- Taylor-Wharton Iron & Steel Co., High Bridge, N. J.—Metal
- Tech-Art Plastics Co., Long Island City, N. Y.—Plastic Molders
- Tech Laboratories, Jersey City, N. J.—Laboratory Equipment*
- Technical Apparatus Co., Inc., Boston, Mass.—Test Equipment*
- Technical Appliance Corp., New York, N. Y.—Antennas
- Technical Radio Co., San Francisco, Calif.—Transmitters
- Telemotor Corp., New York, N. Y.—Intercommunicators
- Telex Co., Jersey City, N. J.—Radio Telegraph Equipment
- Teleradio Engineering Corp., New York, N. Y.—Coils*
- Televiso Products Inc., Chicago, Ill.—Test Equipment*
- Telex Products Co., Minneapolis, Minn.—Headphones*
- Templeton Radio Co., Mystic, Conn.—Communication Equipment
- Tennessee Eastman Corp., Kingsport, Tenn.—Plastics
- Tenney Engineering, Inc., Montclair, N. J.—Laboratory Equipment*
- Terkelsen Machine Co., Boston, Mass.—Plastic Molders
- Thermador Electrical Mfg. Co., Los Angeles, Calif.—Transformers*
- The R. Thomas & Sons Co., Lisbon, Ohio—Insulation*
- Thomas-Gibb Welding Co., Lynn, Mass.—Control Equipment
- Thomas & Skinner Steel Products Co., Indianapolis, Ind.—Metal*
- Thompson-Bremer & Co., Chicago, Ill.—Hardware
- Thordarson Elec. Mfg. Co., Chicago, Ill.—Transformers*
- Thwing-Albert Instrument Co., Philadelphia, Pa.—Measuring Instruments
- Tibbetts Laboratories, Cambridge, Mass.—Crystals*
- Tilton Electric Corp., New York, N. Y.—Resistors*
- Tingstol Corp., Chicago, Ill.—Insulation*
- Timmerman Products, Inc., Cleveland, Ohio—Hardware
- Tonk Manufacturing Co., Chicago, Ill.—Cabinets
- Tork Clock Co., Mount Vernon, N. Y.—Control Equipment
- Trans-American Airports Corp., New York, N. Y.—Hardware*
- Transformer Engineering Co., Stamford, Conn.—Laboratory Equipment*
- Transite Inc., Brooklyn, N. Y.—Transmitters
- Transmitter Equipment Mfg. Co., Inc., New York, N. Y.—Sound systems
- Trav-Ler Karanola Television Corp., Chicago, Ill.—Communication Equip.
- Harold E. Trent Co., Philadelphia, Pa.—Tools*
- Frimm, Inc., Chicago, Ill.—Headphones
- Trebort Radio Co., Pasadena, Calif.—Cabinets*
- The Triplet Electrical Instrument Co., Bluntton, Ohio—Laboratory Equipment*
- Triumph Manufacturing Co., Chicago, Ill.—Test Equipment*
- Troy Radio & Television Co., Los Angeles, Calif.—Speakers*
- Tubular Rivet & Stud Co., Wollaston, Mass.—Hardware
- Tuck Mfg. Co., Brockton, Mass.—Speakers
- Tung-Soi Lamp Works, Inc., Newark, N. J.—Tubes*
- Tungsten Contact Mfg. Co., North Bergen, N. J.—Dials, Parts*
- The Turner Co., Cedar Rapids, Iowa—Microphones*
- H. W. Tuttle & Co., Adrian, Mich.—Resistors
- The Ucinite Company, Newtonville, Mass.—Dials, Parts*
- Uniform Tubes, Philadelphia, Pa.—Wire*
- Union Aircraft Products Corp., New York, N. Y.—Hardware*
- Union Insulating Co., Parkersburg, W. Va.—Plastic Molders
- United Cigarette Corp., Torrington, Conn.—Laboratory Equipment*
- United Electronics Co., Newark, N. J.—Tubes
- United Screw & Bolt Corp., Chicago, Ill.—Hardware
- United States Electric Mfg. Corp., New York, N. Y.—Batteries
- U. S. Electrical Motors, Inc., Los Angeles, Calif.—Machinery & Equipment
- The U. S. Electrical Tool Co., Cincinnati, Ohio—Tools*
- U. S. Graphite Co., Saginaw, Mich.—Metal
- U. S. Rubber Co., New York, N. Y.—Insulation*
- U. S. Testing Co., Inc., Hoboken, N. J.—Testing Laboratory
- U. S. Tool Co., Inc., East Orange, N. J.—Tubes
- United transformer Corp., New York, N. Y.—Transformer*
- Universal Battery Co., Chicago, Ill.—Batteries
- The Universal Clay Products Co., Sandusky, Ohio—Insulation
- Universal Microphone Co., Ltd., Inglewood, Calif.—Microphones*
- Universal Plastics Corp., New Brunswick, N. J.—Plastic Molders
- Universal Winding Co., Cranston, R. I.—Machinery & Equipment
- University Laboratories, New York, N. Y.—Speakers
- N. Urban & Co., Camden, N. J.—Hardware*
- USL Battery Corp., Niagara Falls, N. Y.—Batteries
- Utah Radio Products Co., Chicago, Ill.—Speakers*
- Utica Drop Forge & Tool Corp., Utica, N. Y.—Tools
- Utilities Service Co., Allentown, Pa.—Wire*
- Vac-O-Grip Co., Toledo, Ohio—Sound Systems
- Vaco Products Co., Chicago, Ill.—Tools
- Vacutron, Inc., Arlington, Va.—Photo Electric Equipment
- The Valpey Crystals, Holliston, Mass.—Crystals
- Vanatta Mfg. Co., Ontario, Calif.—Tools
- D. Van Nostrand Company, Inc., New York, N. Y.—Books
- Varflex Corp., Rome, N. Y.—Insulation*
- Veeder-Root, Inc., Hartford, Conn.—Control Equipment*
- The Vibroplex Co., New York, N. Y.—Radiotelegraph Equipment*
- Victor Insulators, Inc., Victor, N. Y.—Insulators*
- Vreeland Lapidary Mfg. Co., Portland, Ore.—Crystals
- Wabash Cabinet Co., Wabash, Ind.—Cabinets
- Wagner Electric Corp., St. Louis, Mo.—Motors
- Waldron Electric Co., Cleveland, Ohio—Control Equipment
- George Walker Co., Passaic, N. J.—Hardware
- Walker-Turner Co., Inc., Plainfield, N. J.—Flexible Shafts
- Wm. T. Wallace Mfg. Co., Peru, Ind.—Crystals*
- Ward Leonard Electric Co., Mt. Vernon, N. Y.—Resistors*
- Ward Products Corp., Cleveland, Ohio—Antennas
- Warwick Mfg. Co., Chicago, Ill.—Communication Equipment
- Washington Porcelain Co., Washington, N. J.—Insulation
- Waterbury Button Co., Waterbury, Conn.—Plastic Molders
- Waters-Conley Co., Rochester, Minn.—Radiotelegraph Equipment*
- Watertown Mfg. Co., Watertown, Conn.—Plastics*
- Watterson Radio Mfg. Co., Dallas, Texas—Communication Equipment
- Waugh Labs., New York, N. Y.—Laboratory Equipment
- Earl Webber Co., Chicago, Ill.—Test Equipment*
- Webster-Chicago Corp., Chicago, Ill.—Sound Systems*
- Webster Electric Co., Racine, Wisc.—Sound Systems*
- W. M. Welch Mfg. Co., Chicago, Ill.—Laboratory Equipment*
- Weller Bros., Easton, Pa.—Tools*
- Wellmade Electric Mfg. Co., Torrington, Conn.—Tools
- Wells-Gardner & Co., Chicago, Ill.—Communication Equipment
- Weltronic Corp., Detroit, Mich.—Photo Electric Equipment*
- Wenckstern Hasley Co., Cedar Rapids, Iowa—Crystals
- R. D. Werner Co., Inc., New York, N. Y.—Insulation*
- Wesbar Stamping Corp., West Bend, Wisc.—Sound Systems
- Western Electric Co., New York, N. Y.—Transmitters*
- Western Insulated Wire, Inc., Los Angeles, Calif.—Wire
- Western Sound & Electric Labs Inc., Milwaukee, Wisc.—Sound Systems*
- Westinghouse Electric & Mfg. Co., Bloomfield, N. J.—Transmitters*
- Westinghouse Electric & Mfg. Co., Newark, N. J.—Tubes
- Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—Transformers*
- Weston Electrical Instrument Co., Newark, N. J.—Laboratory Equipment*
- West Shore Laboratories, Marblehead, Mass.—Measuring Instruments
- West Virginia Pulp & Paper Co., New York, N. Y.—Insulation
- Wheeler Instruments Co., Chicago, Ill.—Laboratory Equipment*
- Wheeler Insulated Wire Co., Bridgeport, Conn.—Wire*
- Wheeling Stamping Co., Wheeling, W. Va.—Plastic Molders
- Whisk Laboratories, New York, N. Y.—Power Filters*
- S. S. White Dental Mfg. Co., Industrial Div., New York, N. Y.—Flexible Shafts*
- Whitehead Stamping Co., Detroit, Mich.—Metal*
- Whitney Blake Co., New Haven, Conn.—Shielded Wire*
- Wickes Brothers, Saginaw, Mich.—Drafting Equipment
- Wilcox Electric Co., Kansas City, Mo.—Tubes
- Wilcox-Gay Corp., Charlotte, Mich.—Communication Equipment*
- John Wiley & Sons, Inc., New York, N. Y.—Books
- Willard Storage Battery Co., Cleveland, Ohio—Batteries*
- Wilmington Fibre Specialty Co., Wilmington, Del.—Insulation*
- Wincharger Corp., Sioux City, Iowa—Rotary Machines*
- Winchester Repeating Arms Co., New Haven, Conn.—Batteries

OMISSIONS

Listings have been omitted in all cases where, after three requests, a company has failed to return our directory questionnaire or otherwise verify its activity.

WHEN YOU
NEED HELP

ON
Electronic

ENGINEERING, DESIGN AND
 MANUFACTURING, TURN TO

OPERADIO

MANUFACTURING COMPANY



Here is electronic "know-how" built on 15 years experience as contract manufacturers marked by many significant "firsts." If you have a war or post-war electronic problem involving design, engineering or manufacturing, let us help you with it. Although our laboratory is temporarily working day and night on electronic engineering for the Army and Navy and our production workers are busy on vital equipment for these same government agencies, war has sharpened our ingenuity and taught us many short-cuts to apply on *your* problems.

File a reminder now so you'll know where to go with problems in electronics. Let Operadio supplement your own engineering staff and be your electronics laboratory.



φ SYMBOL OF ELECTRONIC EXCELLENCE

OPERADIO
 MANUFACTURING COMPANY
 ST. CHARLES, ILLINOIS

Wind-Impeller Electric Works, Ellsworth, Iowa—Chargers
 Wire Stripper Co., East Cleveland, Ohio—Tools
 Wirt Co., Philadelphia, Pa.—Resistors
 Withers Gen. Co., Atlanta, Ga.—Crystals
 C. D. Wood Electric Co., Inc., New York, N. Y.—Hardware*
 Worcester Pressed Steel Co., Worcester, Mass.—Wire*
 Worner Products Corp., Chicago, Ill.—Control Equipment*
 Wright, Inc., St. Paul, Minn.—Speakers
 Wynn Precision Co., Griffen, Ga.—Crystals

Y

Yoemans Bros. Co., Chicago, Ill.—Machinery & Equipment
 Yost Superior Co., Springfield, Ohio—Hardware
 Youngstown Pressed Steel Co., Warren, Ohio—Metal

Z

Carl Zeiss, Inc., New York, N. Y.—Crystals
 Zenith Electric Co., Chicago, Ill.—Control Equipment*
 Zenith Radio Corp., Chicago, Ill.—Communication Equipment
 Zephyr Prods. Corp., New York, N. Y.—Recording Blanks
 Zierick Mfg. Corp., New York, N. Y.—Coils*
 Wm. Zinsser & Co., Inc., New York, N. Y.—Lacquers
 Zophar Mills, Inc., Brooklyn, N. Y.—Insulating Compounds

**Manpower Info
 to Electronic Plants**

Electronic-equipment, electronic-component and industrial-instrument manufacturers have received up-to-date information on manpower problems, Selective Service, labor relations, the filing of manning tables, etc. in a "Manual on Manpower Procedures" prepared by the Radio and Radar Division. Dispatched to over 500 ANEPA offices, the manual contains a complete directory of the field offices of the War Manpower Commission, etc.

**Dr. Paul Heyl's
 Electronic Lectures**

To promote a better understanding of electronics and its significance in the future of industrial development, P. R. Mallory & Co., Inc., has scheduled a series of four lectures by Dr. Paul R. Heyl to be given in Indianapolis on March 1 and 29, May 3, and June 7.

The lectures will develop the history, theory and practical applications of electrons, and indicate the progress which the science of electronics has made in gaining control of nature's forces for employment by mankind. Dr. Heyl is one of America's foremost physicists, for many years known throughout the country for his work with the U. S. Bureau of Standards. Recently retired from the Bureau, he has been retained as consultant for Mallory.

Although the lectures are planned primarily for the Mallory engineering, sales and production personnel, a number of individuals from manufacturing plants, colleges, broadcasting stations and training schools for the armed forces have been invited.

GUIDE TO UNITED NATIONS BUYING OFFICES

Government Departments which purchase radio and electronic equipment. Department headquarters, local addresses, Washington telephone numbers

Compiled by ELECTRONIC INDUSTRIES

In most cases, the U. S. Government attempts to decentralize purchasing as much as possible. Contractual details are handled in various ways, but many agencies maintain bidders' notice lists of likely manufacturers. When requesting that your firm be included to receive bid requests, give all specific facts and figures on your production facilities. If your facilities are not large, the government agencies will supply you with names and addresses of prime contractors from whom you can get subcontracts.

SIGNAL CORPS

Office of the Chief Signal Officer, Pentagon Building, Arlington, Va. REpublic 6700.

Signal Corps Procurement Districts (Bulk of Army and Lend-Lease radio equipment): Philadelphia, Pa.; Wright Field, Dayton, Ohio; San Francisco, Calif.; 1819 West Pershing Road, Chicago, Ill.

Signal Depots (Maintenance stock items): Philadelphia, Pa.; Chicago, Ill.; Lexington Signal Depot, Ogden, Utah; Dayton, Ohio.

Laboratories (Special items. Laboratories develop new equipment): Signal Corps General Development, Fort Monmouth, N. J.; Camp Coles Laboratory, Red Bank, N. J.; Signal Corps Radar, Belmar, N. J.; Aircraft Radio, Wright Field, Dayton, Ohio.

Signal Corps Schools (Maintenance stock items): Eastern. Fort Monmouth, N. J.; Midwestern: Camp Crowder, Missouri; Pacific: Camp Kohler, Calif.

Service Command Maintenance Depots.

ARMY EXCHANGE SERVICE (Individual Post Exchanges make own purchases. Prices are arranged with manufacturers through New York office).

Army Exchange Service, Services of Supply, War Department, 111 Eighth Ave., New York, N. Y.

AIR CORPS (Aircraft radio and other equipment. Equipment installed in ground locations bought by Signal Corps.)

Army Air Forces Materiel Center, Wright Field, Dayton, Ohio.

Procurement Districts: Eastern: 90 Church St., New York City; Central: 8505 West Warren Ave., Detroit, Mich.; Midwestern: Wichita, Kan.; Western: 506 Santa Monica Blvd., Santa Monica, Calif.

MEDICAL DEPARTMENT (Short wave diathermy equipment, ultra violet and infra-red sources, electrocardiographs, galvanic generators, etc.)

Rooms 1203 and 1205 U. S. P. O. Bldg., Canal and Van Buren Sts., Chicago, Ill.; 461 8th Ave., New York, N. Y.; Second and Arsenal Sts., St. Louis, Mo.; San Francisco General Depot, Fort Mason, Calif.

CHEMICAL WARFARE SERVICE (Miscellaneous electrical equipment: clips, connectors, wire, etc., under radio and electronic heading.)

Room 2000, Post Office & Courthouse Bldg., Boston, Mass.; Room 1506, North Wacker Drive, Chicago, Ill.; 292 Madison Ave., New York, N. Y.; American Bank Bldg., 6th Ave. and Grant St., Pittsburgh, Pa.; Room 201, 1355 Market St., San Francisco, Calif.

ENGINEER CORPS (Welding equipment, alarm systems, etc.)

Room 533, U. S. Courthouse & Customhouse, Mobile, Ala. (Birmingham); 1117 United States Post Office Bldg., Chicago, Ill.; 120 Wall St., New York, N. Y.; 900 U. S. Customhouse, 2nd & Chestnut Sts., Philadelphia, Pa.; 1012 New Federal Bldg., Pittsburgh, Pa.; Room 410, Customhouse, San Francisco, Calif.

ORDNANCE DEPARTMENT (Limited amounts electrical and electronic test and measurement equipment.)

New York Ordnance District, 80 Broadway, New York, N. Y.; Frankford Arsenal, Philadelphia, Pa.; Aberdeen Proving Ground, Maryland; Detroit Ordnance District, Buhl Bldg., Detroit, Mich.

QUARTERMASTER CORPS

Office of the Quartermaster General, Procurement Control Branch, War Dept., Washington, D. C. TEmple 5886.

Washington Quartermaster Depot (Lamps, ranges, fixtures, generators, etc.), 24th and M Sts., N.W., Washington, D. C.

VETERAN'S ADMINISTRATION, Washington, D. C. (m. p. equipment, p. a. systems, centralized radio, etc., for entire U.S.A.)

NAVY DEPARTMENT

Bureau of Supplies and Accounts (Handles all contractual details), Washington, D. C., REpublic 7400.

Radio and Sound Branch, Design Division, Bureau of Ships, Washington, D. C. (Charged with design, development, and manufacture of all radio equipment for the Navy.)

Radio and Electrical Section, Engineering Branch, Materiel Division, Bureau of Aeronautics, Washington, D. C. (Maintenance items.)

Radio Materiel Section, Fleet Maintenance Division, Bureau of Operations, Washington, D. C. (Maintenance items.)

Radio Facilities Section, Bureau of Yards and Docks, Washington, D. C.

All Naval establishments in the field (Occasional purchases.)

U.S. COAST GUARD (Coast Guard radio equipment. Minor purchases made through district offices and field establishments.)

Radio Engineering Section, Materiel Division: United States Coast Guard, Washington, D. C. REpublic 7400.

CIVIL AERONAUTICS ADMINISTRATION

Radio Engineering Section, Signals Division, Civil Aeronautics Administration, Department of Commerce, Washington, D. C. EXecutive 2460 (Bulk of CAA procurement.)

Central Depot, Civil Aeronautics Administration, Fort Worth, Texas (Maintains a reservoir of replacement parts.)

Regional Offices (Emergency purchases): New York, N. Y.; Atlanta, Ga.; Chicago, Ill.; Fort Worth, Texas; Kansas City, Mo.; Los Angeles, Calif.; Seattle, Wash.; Anchorage, Alaska.

MARITIME COMMISSION

Procurement Section, Production Division, Maritime Commission, Washington, D. C. (Wartime procurement.)

Division of Purchase and Supply, Maritime Commission, Washington, D. C. (Peacetime and special wartime procurement.)

WAR PRODUCTION BOARD

Radio and Radar Branch, Ray C. Ellis, deputy director, Room 4332, New Social Security Building, Washington, D. C. REpublic 7500, Ext. 2566.

WEATHER BUREAU

Procurement Section, U.S. Weather Bureau, Department of Commerce, Washington, D. C. Michigan 3200 (Handles actual purchase details.)

Instrument Division, U.S. Weather Bureau, Department of Commerce, Washington, D. C. Michigan 3200 (Designs all equipment.)

Regional Offices (Emergency purchases): New York, N. Y.; Atlanta, Ga.; Chicago, Ill.; Fort Worth, Texas; Kansas City, Mo.; San Francisco, Calif.; Seattle, Wash.; Anchorage, Alaska.

NATIONAL BUREAU OF STANDARDS

Purchase Section, National Bureau of Standards, Washington, D. C. (Actual purchase details.)

Radio Section, National Bureau of Standards, Washington, D. C. (Radio and electronic equipment.)

COAST AND GEODETIC SURVEY

Office of the Chief Clerk, Coast and Geodetic Survey, Department of Commerce, Washington, D. C. District 2200 (Actual purchase details.)

Division of Coastal Surveys, Coast and Geodetic Survey, Department of Commerce, Washington, D. C.

Division of Geomagnetism and Seismology, Coast and Geodetic Survey, Department of Commerce, Washington, D. C.

FEDERAL COMMUNICATIONS COMMISSION

Engineering Department, Federal Communications Commission, Washington, D. C. EXecutive 3620.

FOREST SERVICE

Division of Fire Control and Improvement, Forest Service, Agriculture Department, Washington, D. C. REpublic 4142.

Regional Offices (Maintenance items): Philadelphia, Pa.; Milwaukee, Wis.; Atlanta, Ga.; Missoula, Mont.; Denver, Colo.; Albuquerque, New Mex.; Ogden, Utah; San Francisco, Calif.; Portland, Ore.

OFFICE OF WAR INFORMATION

Outpost Bureau, Overseas Branch, Office of War Information, Washington, D. C.

MISCELLANEOUS

Bureau of Reclamation

Bonneville Dam Administration

Federal Bureau of Investigation

Panama Canal

Tennessee Valley Authority

National Park Service

TREASURY DEPARTMENT (Procurement for Lend-Lease and a large number of Federal agencies.)

Procurement Division, Treasury Department, Washington, D. C. District 5700.

DIRECT ALLIED PURCHASING (Most of the important Allied procurement is now under Lend-Lease. However, some purchasing is still handled directly with American manufacturers. Most of the Allied governments maintain offices both in Washington and in New York City, but radio and electronic equipment is usually contracted for by the Washington offices.)

GREAT BRITAIN—The British Ministry of Supply Mission, Willard Hotel, Washington, D. C.; The British Ministry of Supply Mission, 15 Broad St., New York, N. Y.

CANADA—J. B. Carswell, Department of Munitions and Supplies, 1205 15th St., N.W., Washington, D. C.

U.S.S.R.—Soviet Government Purchasing Commission, Washington, D. C.; Amtorg Trading Corp., 210 Madison Ave., New York, N. Y.

CHINA—China Defense Supplies Inc., 601 "V" St., N.W., Washington, D. C.; Universal Trading Corp., 630 Fifth Ave., New York, N. Y.

AUSTRALIA—Australian War Supplies Procurement, 1700 Massachusetts Ave., Washington, D. C.; Australian War Supplies Procurement, 15 Broad St., New York, N. Y.

SOUTH AFRICA—South African Supply Mission, 907 15th St., N.W., Washington, D. C.



Above, Dr. Southworth is shown holding one of his resonant chambers used for wave-guide tests, while he stands in front of the two experimental wave-guide transmission lines at Holmdel, N. J. At the right Dr. Southworth is seen making a platform demonstration of uhf guided by tubing

UHF THROUGH PIPES

Dr. G. C. Southworth, of Bell Laboratories staff, comments on the future of billion-cycle transmission

Wave guides are decidedly useful for conveying microwaves from their generator to the place where they will be used. For one reason, they contain no insulating material and so are entirely immune to moisture. Moreover their waves can be radiated by simply flaring out the tube into a horn. A wave guide may also be made into a resonant chamber by blocking one end with a metal plate and closing the other partially by a plate with a hole in it. By varying the length of the chamber, it can be tuned to the precise frequency desired; with a small hole, if the chamber is $\frac{1}{2}$, 1 , $1\frac{1}{2}$ of a wavelength, it will admit energy readily; if $\frac{1}{4}$, $\frac{3}{4}$, $\frac{5}{4}$ wavelengths, it will repel energy, i.e. be anti-resonant. Since the wave pattern in a resonator is fixed, it is possible to locate a detector at precisely the right spot in the pattern to get maximum response.

Because they, too, can be guided down a tube, sound waves are strikingly analogous to electric waves in some of the properties just described; for example in radiation from a horn and resonance in chambers. However, any hole in the tube will let out some of the sound energy. One of the most useful forms of the electric wave, on the other hand, can be so oriented to a hole in the tube, or even to a long slot, that no energy escapes, and hence it is possible to insert an electrical probe and move it along the tube. That procedure makes possible the detection of any irregularities in the flow of power.

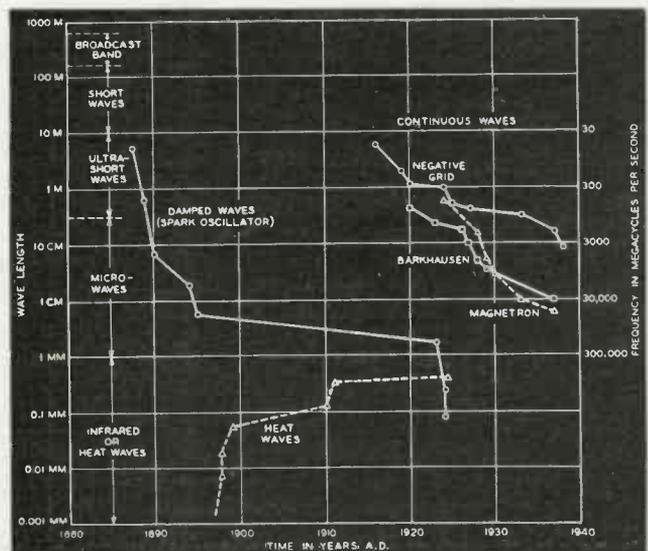
Concentrating power

It might be thought that the only way to concentrate all the power into a single point, as for instance a crystal detector, would be by drawing the tube down to a point. However, that result can be

secured by inserting a small "doublet" antenna with the detector at the center, properly placing it longitudinally and orienting it correctly.

Somewhere along the frequency scale in the neighborhood of a billion cycles per second—wavelength about one foot—microwave technic undergoes a marked change. Methods using the conventional go-and-return-conductor type of circuit give way to the somewhat simpler hollow pipe, or wave guide, circuit. These newer methods seem to be at their best in the centimeter wave-length range. At the longer wavelengths, the component parts become inconveniently large. For shorter waves, it would appear that ability to manufacture small parts would become an important limitation.

The trend to shorter wavelengths





Hytron

DEDICATES *the* **PRESENT**

to **PRESERVATION** *of the* **FUTURE**

HYTRON'S SOLE PURPOSE for the duration is to maintain an always-increasing flow of tubes into the radio and electronic equipment which is playing a vital part in winning this Radio War. It is our firm conviction that the torch of Liberty which Hytron is helping to keep burning will light the way to the unconditional surrender of our enemies and to an electronic age which will amaze a freed world.



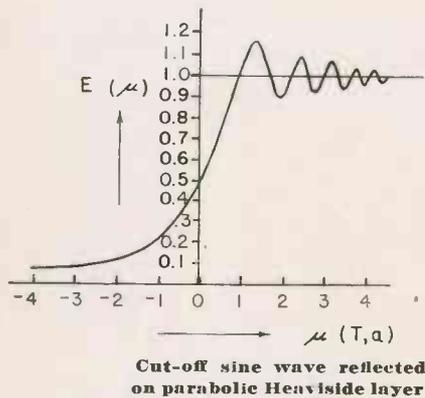
HYTRON CORP., Salem and Newburyport, Mass.

... Manufacturers of Radio Tubes Since 1921 ...



SURVEY of WIDE READING

Electronic news in the world's press. Review of engineering, scientific and industrial journals, here and abroad



Reflection on Heaviside Layer

V. L. Ginsburg (Journal of Physics, Moscow, Vol. VI, No. 3-4, 1942)

A thorough mathematical investigation of the reflection of electromagnetic waves on the Heaviside layer is carried out. The ion density in the layer is assumed to vary parabolically or linearly with height, other distributions also being considered in general.

It is established that, provided certain limiting conditions are fulfilled, the problem may be treated by the methods of geometrical optics. The Fourier integrals for the reflected waves—assuming the original wave to be a cut-off sine wave and inserting the phase lag due to the frequency-dependent refractive index of the layer, also varying with height according to the ion distribution—are discussed and evaluated.

In the figure showing the amplitude of the reflected wave for a parabolically varying ion layer, T is the time interval counted from the moment of arrival of a wave at the point of observation for a signal traveling without deformation and with the group velocity corresponding to the carrier frequency; $u=0$ for $T=0$; a is a function of ion distribution in the layer.

Distortion in Wave Guides

H. Samulon (Bulletin des Schweizer Elektrotechnischen Vereins, Basle, Vol. XXXIII, No. 19)

The subject of the article is the distortion of an amplitude-modulated wave propagated in a wave guide. Only distortion due to frequency dependence of phase velocity is considered. The formula for the resulting amplitude of the modulating wave is discussed as to

linear distortion, or displacement of its Fourier components with respect to one another, and non-linear distortion, or product terms under the radical in the expression for the amplitude.

It is established that non-linear distortion may be avoided by choosing the carrier frequency sufficiently higher than the cut-off frequency of the guide and so that none of the difference frequencies between carrier and any of the modulating frequencies is too close to the cut-off frequency. Two simple numerical examples are given.

Radiotelephone in Private Flying

P. J. Noizeux (Revista Telegraphica No. 362, 1942)

The author points out that radiotelephone equipment for use in lightplanes for sport and tourist flying and in gliders must be reduced to simplest possible form, for satisfactory operation by the pilot himself. This is particularly true where the primary purpose of the equipment is to serve as communication between a student pilot and the instructor, on the ground or in a nearby plane.

Several models of uhf crystal-controlled glider and ground units are shown and described, and developmental problems are discussed. One of the receivers uses a loudspeaker near the pilot instead of headphones. Several miniature types of ultra short and long wave transmitter-receiver sets for powered planes are described and pictured. Entirely satisfactory results were obtained with the simplest possible equipment.

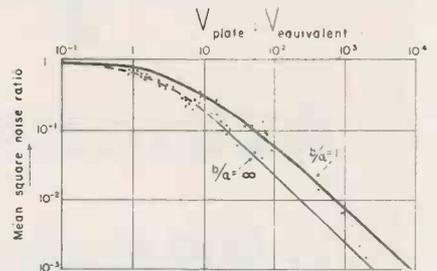
Random Fluctuations in Space-Charge-Limited Tubes

D. A. Bell (Journal of Institution of Electrical Engineers, London, Part III, Dec. 1942)

There are two sources of random current fluctuations in a tube, the shot noise caused by the velocity distribution of the electrons leaving the cathode in temperature-limited condition, and the thermal noise originated in the internal resistance of the tube in space-charge-limited condition. Based on the assumption that this latter effect is essentially the same as noise in metallic resistors, it is, similarly, explained in terms of the thermal velocity

components of the electrons forming the current through the tube. However, the noise observed for space-charge-limited condition is substantially greater than predicted by the theory but many times less than shot noise would be in the absence of space charge. It is the object of the article to explain this discrepancy.

Heretofore it had been supposed that in the space-charge region no correction corresponding to the initial velocity distribution was required in the formula for noise be-



Influence of initial random electron velocity distribution on fluctuation noise

cause of the comparatively small equivalent voltage of the emitted electrons. However, for triodes the effective anode voltage may be considerably reduced, and, consequently, the contribution of the initial velocity distribution noticeable.

Computations for noise combining both effects in a space-charge-limited diode are carried through, starting with the equations for a diode with thermal fluctuations only and then introducing corrections for dependency of transit time on initial velocity, cylindrical instead of planar arrangements of the electrodes, and for finite initial velocities of transit electrons.

Ratio of plate to cathode diameter, b/a , is found to be of little importance, as will be seen from the diagram showing the computed values and various available experimental data. The mean-square-noise ratio is an indication of noise reduction or "smoothing" effected by the space charge as compared with temperature-limited noise. It is stated that the fundamental difference between pure space-charge-limited condition and pure temperature-limited condition resides in the fact that in the first instance the virtual cathode has constant average potential, while in the second instance the actual cathode potential varies upon emission of electrons.

(Continued on page 122)

THE ONLY REAL HERMETICALLY-SEALED RESISTORS

...that will stand the most severe salt water immersion and temperature shock tests



POWER WIRE WOUND RESISTORS AND METER MULTIPLIERS

These Koolohms, designed for the toughest resistor applications facing the industry today, again emphasize the importance of exclusive Koolohm construction features combined with Koolohm engineering ingenuity in solving almost any wire wound resistor problem.

For Koolohms are entirely different from



conventional wire wounds. There are no other resistors like them. No other type of resistor can match their performance on exacting jobs. AVAILABLE WITH NON-INDUCTIVE WINDINGS. Get the facts! Write for catalog and sample Koolohms. SPRAGUE SPECIALTIES COMPANY (Resistor Division), North Adams, Mass.

LATEST

NEWS FROM WASHINGTON

Concerning the Electronic Industries



DISTRIBUTION IS NEXT BATTLE OF SUPPLY — Distribution of equipment to the combat forces, including spare parts to keep apparatus in operation, is the new phase of the war, Lieutenant General Brehon B. Somervell, Commanding General of the Services of Supply, has pointed out. He indicated that the "battle of production" has been fought and been conquered, but the new effort is on distribution. Major General Dawson Olmstead, Chief Signal Officer, and Major General Roger B. Colton, Chief of the Signal Supply Services, are out in front in foreseeing this change in the war's supply efforts and have just created the Field Service Division of the Signal Supply Services which coordinates and insures adequate distribution of equipment and spare parts and the maintenance and repair of equipment of electronic, radio and wire apparatus of all branches of the Army in the zone of the interior (United States) and all theatres of war.

NEW FIELD SERVICE ORGANIZATION — The new Field Service Division is headed by David H. O'Brien, former vice-president of Graybar Electric Co., and is designed to maintain advisory assistance and service and to plan and program the distribution of apparatus and spare parts, handling of maintenance and repair, and inspection and salvage in the field. The Division will have field units located at strategic points in the United States and overseas to perform these functions. The radio industry should get some credit for this move because the new Division is modeled in its functions after the service advisory agencies of radio manufacturers in their relations with wholesale and retail outlets of pre-war days.

SCHEDULING IS CHIEF GOAL — The internal tussle within the War Production Board, which led to the appointment of Charles E. Wilson, former General Electric President, as WPB Executive Vice Chairman and the ousting of Ferdinand E. Eberstadt as Program Vice Chairman, was mainly a clash on policy-making, and WPB Chairman Nelson felt that Mr. Wilson, considered in the topflight of production executives in American industry, would make the greatest contribution. Newspaper reports about the controversy being between the military and civilian control were considerably exaggerated. Mr. Wilson will direct the major policies on the scheduling of production and spare-parts manufacture, and Washington leaders feel his industrial experience is such that he will come through that difficult task with "flying colors". Because Mr. Wilson previously as Production Vice Chairman had radio under his direct supervision, it is felt the position in WPB of the Radio Division, headed by Ray Ellis, is strengthened very much and the Radio Division activities will be in the forefront of the WPB top leadership's observation.

WPB RADIO DIVISION ACCOMPLISHMENTS — On many phases of solving electronic and radio production problems, the WPB Radio Division has been ahead of the parade during February. A special industry "task committee" has been organized to deal with vacuum-tube manufacture because of the danger of a bottleneck in this field. The Division is studying a plan for the allocation of the production of tubes for detection, generation, amplification and control purposes to the manufacturers who can produce such respective types with greatest efficiency. Under the guidance of the Division the armed services are working out a series of agreements to assure the use of single sets of specifications in the production of component parts for radio and electronic equipment for the Army and Navy, with a chief aim for interchangeability of replacement parts for equipment on the battle fronts.

REDUCTION IN COMPONENTS -- Types of components, ranging from capacitors, transformers, insulators, batteries, meters to tubes, have been drastically cut in number from peace time customs — this work having been done by the War Committee on Radio of the American Standards Association. (See December "Electronic Industries".) The maintenance-repair priority preference rating for radiocommunication and broadcasting apparatus is being raised from AA-2X to AA-1 under plans of the Division to have the P-133 order conform with the CMP-5 regulations.

MIRACULOUS MINUTENESS in EMBY Selenium

Instrument Rectifiers Engineered for Engineers

EMBY Instrument Rectifiers

have specially treated metal electrodes and use the uni-polar conductivity of metal to selenium junction. Rectification is instantaneous—no warm-up period required. No moving parts. Shock proof. Permanent characteristics. Unlimited life. Increased efficiency with increased temperature. Temperature range, -70 to $+70^\circ$. Unaffected by severe atmospheric conditions. Sealed-off units supplied for aircraft service. Series "N" and "S" have satisfactory frequency characteristics and can be used in the frequency range up to 100 kc.



Input 5 volts. Half wave. Continuous dc current 1 ma. Used with meters, detector circuits, bias voltage.



Input 5 volts. Half wave. Continuous direct current 8 ma. Numerous field applications.



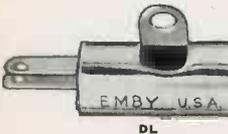
Input and output same as H-5M, but has two rectifying elements connected in series.



Input 10 volts. Full wave Bridge. Continuous dc 10 ma. Unbreakable plastic case with mounting extension.



Input 10 volts. Full wave. Continuous dc rating 35 ma. Mounted in [redacted]



Input 10 volts. Full wave Bridge. Continuous dc rating 35 ma. Mounted in aluminum case with mounting extension.



Input 10 volts. Continuous dc rating 50 ma. Mounting extension available if specified.



Input 10 volts. Continuous output rating 80 ma. Designed for [redacted]

ALL ILLUSTRATIONS ACTUAL SIZE
Send for Bulletin with complete specifications. (Bulletin No. 10 on Self-generating Photo-Electric Cells is also available.)

SELENIUM CORP. OF AMERICA



Manufacturers of EMBY Rectifiers, Photo-Electric Cells and allied scientific products

1800-1804 West Pico Blvd. Los Angeles, California

Eastern Sales Div.: 2957 214th St., Bayside, L. I.

WIDE READING

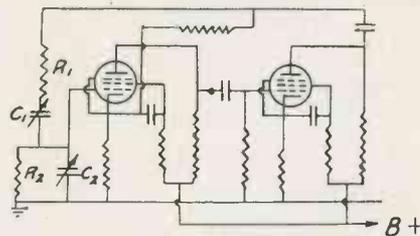
(Continued from page 118)

Provided all parts of the cathode wire equally contribute to the emission, no shielding of the grid being present, the noise in a triode may be computed in exactly the same manner, and, upon substitution of the effective potential for the plate potential, with the same results.

Frequency-Modulated Oscillator

C. K. Chang (IRE Proceedings, Jan. 1943)

It is known that the resonance frequency of the resistance-capacitance oscillator shown equals $f = \frac{1}{2\pi} (C_1 C_2 R_1 R_2)^{-1/2}$. R_1 and/or R_2 may be replaced by vacuum tubes, preferably variable- μ tubes, the resistance of which will be a function of grid potential. The tube



Resistance-capacitance-tuned oscillator

providing the variable resistance is connected as cathode-follower. As the oscillator output voltage will also vary with audio frequency, a limiter is provided. Simple mathematical considerations showing the grid-voltage dependency of the resonant frequency are included as well as experimental results.

Hot-Filament Resistances

C. C. Minter (Journal of Applied Physics, Jan. 1943)

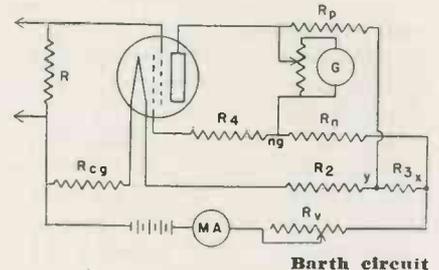
If a hot filament with positive temperature coefficient is mounted in an atmosphere the thermal conductivity of which increases rapidly with increasing pressure, it is obvious that the hot filament may lose more heat upon increase in ambient temperature provided the pressure simultaneously and sufficiently increases. The hot filament will, thus, simulate a negative temperature coefficient, i.e., its resistance will decrease with increasing ambient temperature.

To obtain a suitable atmosphere, a not-too-volatile vapor and a small quantity of the corresponding liquid were used. Water was found to give satisfactory results. All that is necessary to produce a simulated increase in positive temperature coefficient is to find an atmosphere the thermal conductivity of which decreases with rising pressure and temperature. A mixture of hydrogen gas, water vapor and liquid water may be used.

Balanced DC Amplifier

Roy C. Spencer and LeRoy Schulz (Review of Scientific Instruments, Jan., 1943)

The behavior of a Barth circuit, shown in the sketch, was investigated. When the deflection of the galvanometer G passes through a minimum as the filament current is varied, the circuit is said to be balanced. It was found that the balance shifts to another value of filament current upon variation of grid voltage and, further, that a minimum may exist for several filament current values.



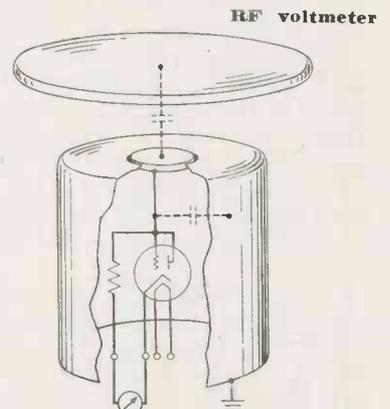
Barth circuit

The object of the investigation was to eliminate shifting of balance with grid potential which was found to be obtainable with special resistance values, and it was further established that the minimums for which balance exists may be moved together forming a broad plateau resulting in comparative independence of the amplifier characteristic on filament current. Circuit dimensions are given and a procedure for adjustment is suggested.

RF Voltmeter

(Bell Laboratories Record, Jan., 1943)

The capacitance between top plate and small metal disc below and the much larger distributed capacitance between this disc and ground constitute a voltage divider which makes possible measurements up to 10,000 volts with frequencies up to 50 megacycles by means of a rectifying tube and a milliammeter.



(Continued on page 125)

PHILCO MEN AND WOMEN WIN WHITE STAR AWARD FOR ARMY-NAVY "E" FLAG!



".... The White Star, which the renewal adds to your Army-Navy Production Award Flag, is the symbol of appreciation from our Armed Forces for your continued and determined effort and patriotism."

(signed) Robert P. Patterson, Under Secretary of War

SIX MONTHS AGO, the Army and Navy honored the men and women of Philco with the "E" Flag for outstanding achievement in the production of war equipment. In accepting the award, they pledged themselves to even greater achievements to come.

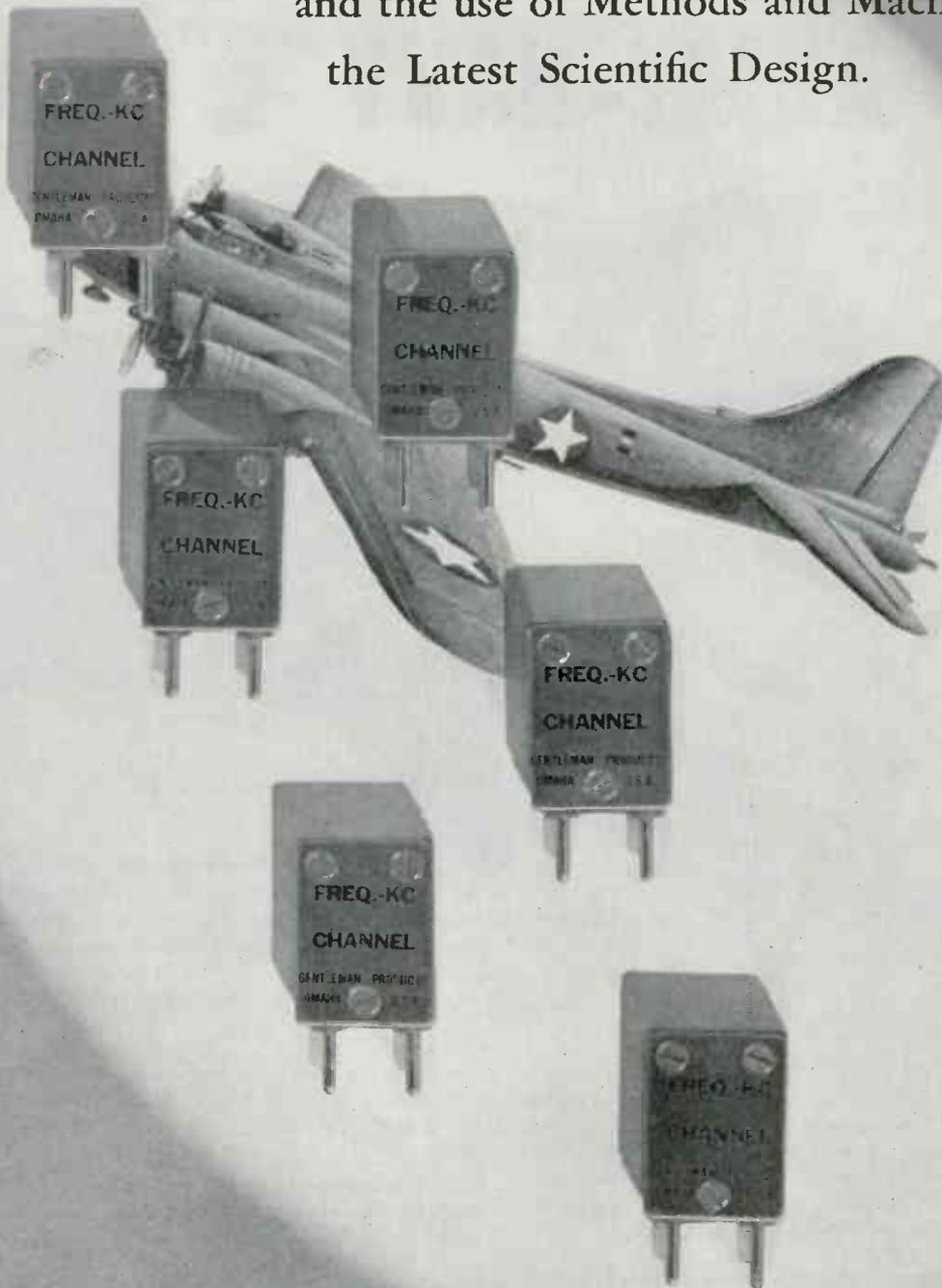
Today, that pledge is fulfilled! During the last six months, Philco soldiers of production exceeded the records that won their first awards. Their research laboratories and production lines have produced miracles of electronic science, equipping our planes, tanks and ships with the eyes and ears of modern, mechanized warfare. And today,

the men and women of Philco are among the first in the nation to win the right to fly the Army-Navy "E" Flag with the *added* White Star!

The achievements of Philco research laboratories in the science of radio, television and electronics have enabled Philco to serve the fighting forces of the nation with honor. After Victory, these research and production achievements for war will enable Philco not only to serve the homes of the nation in thrilling new applications to radio, television, refrigeration and air conditioning but also the industries of the nation in modern applications of the new science of electronics.

PHILCO CORPORATION

We Maintain Precision in our Manufacture
of Quartz Crystals with Line Production
and the use of Methods and Machines of
the Latest Scientific Design.



GENTLEMEN PRODUCTS

Division

HENNEY MOTOR COMPANY

Since 1868



Home Office
FREEPORT, ILL.

Production Office and Factory
OMAHA, NEB.

WIDE READING

(Continued from page 122)

Inductance of Tubular Conductors

T. H. Higgins (Journal of Mathematics and Physics, Vol. XXI, No. 3)

The mathematical expression is derived for the inductance of two parallel, hollow, cylindrical conductors of different permeability, their cross-sections being eccentric annulus and the permeabilities of the external and the two internal media being different from one another. The differential equations for the vector potential of the electromagnetic field are solved for the particular boundary conditions by means of a conformal transformation. The general solution found, special cases corresponding to simplified conditions are considered.

Public Address Systems

S. Hill (Electrical Communication, Vol. 21, No. 1)

A survey of the history and of recent developments in public address systems is given. The problems encountered in microphone, amplifier and loudspeaker design are pointed out and the various solutions adopted by present day industry are shown.

Tube Oscillators for Inductive Heating

J. P. Jordan (Electrical Engineering, AIEE, Nov. 1942)

The author segregates inductive heating, according to the frequencies involved:

1. Up to 1000 cps: Used for forging and melting steel and non-ferrous metals. The power requirements range from a few watts to several thousand kw. generated by motor-generators.

2. 1000 to 12,000 cps.: These frequencies are generated mostly by rotating machines with power rat-

ings from 20-1200 kw. Applications cover surface hardening, forging, brazing, soldering, melting etc.

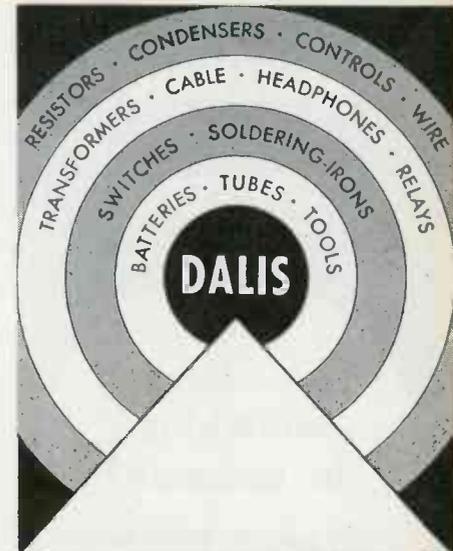
3. 50,000 cps. to 1 megacycle: In this range spark-gap and vacuum-tube oscillators are utilized. From the spark-gap generator, outputs up to 25 kw are obtainable, with frequencies as high as 200,000 cycles. Vacuum-tube oscillators are most economically employed above this range, and powers up to 200 kw are easily obtainable.

In dielectric heating the vacuum-tube oscillator is the only source available, giving powers up to 200 kw in the frequency range of 1 to 30 megacycles. The theory involved in the heating processes is explained. The material to be heated is generally considered a short-circuited secondary coil of a transformer, the primary of which is the heating coil. Heat is produced by resistive and hysteresis losses. The depth of penetration by the heat varies inversely with the square root of the frequency and directly with the specific resistance of the material. The vacuum-tube oscillators used are the simplest possible circuits, generally either the Colpitts or the coupled-grid self-excited oscillator. The ac of the line is stepped up by transformers to about 7,500 to 15,000 volts and then rectified by mercury-vapor tubes before application to oscillator.

Secondary Emission

William R. Kennedy & Paul L. Copeland (The Physical Review, Jan. 1943)

Beryllium-coated molybdenum strips were used as target in an experimental secondary emission tube. Secondary emission measurements as functions of primary electron energy were made for target temperatures from room temperature to appreciable thermionic emission. Substantially no temperature dependency was noted. A maximum of about 2.5 secondaries per primary was found for primary



WARTIME SERVICE

● The country's largest exclusively wholesale distributor of radio parts offers you the benefit of its well-trained organization, long experience and exceptional factory affiliations, in filling your PRIORITY requirements.

Dalis is supplying materials to many branches of the armed forces, war plants, sub-contractors, laboratories, training schools, etc.

Ample stocks on hand provide prompt shipment on many items. And if required items are not in stock, Dalis go-gets 'em for you in shortest possible time.

TRY Dalis — a dependable source of supply since 1925.

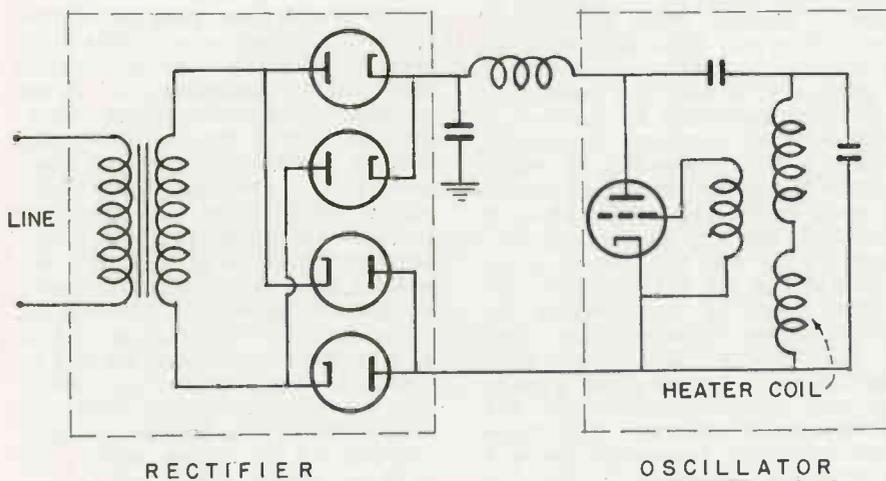
● Write, wire or phone

H. L. DALIS, Inc.

Distributors of
RADIO & ELECTRONIC SUPPLIES
17 Union Square • New York, N. Y.
Phones: ALgonquin 4-8112-3-4-5-6-7



Oscillator for heating



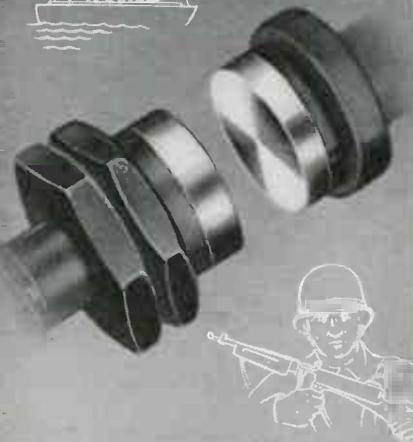
COMMANDOS and TUNGSTEN

... have
something
in common!

Alert, ready for instant action, taking tough assignments in their stride, bearing the brunt of aggressive force—that's the job of commandos... and the function of tungsten contacts.

Heavy service loads at the flick of a control, unceasing operations day after day, high speed opening and closing. All come under the heading of specifications. Intangibles, such as the elimination of operation loss caused by film coatings adhering to contact surfaces, are taken for granted.

That's why METROLOY contacts can be depended upon for aggressive action in your future sales campaigns. Metroloy Company, 53-55 E. Alpine Street, Newark, N. J.



METROLOY
TUNGSTEN PRODUCTS



NEAREST TO RESISTANCE-FREE OPERATION

WIDE READING

(Continued from page 125)

electron energies of about 500 electron volts.

Further, the work function of the target electrode as determined from thermionic emission data is about 5.5 volts.

Two-Antenna Array

Charles W. Harrison (IRE Proceedings, Feb. 1943)

Based on the definition of the effective length of a transmitting antenna given by Dr. King in a recent article in the Proceedings, the radiation resistance of a two-vertical-antenna array is computed. The series involved converges rapidly, and the expression can, therefore, easily be evaluated. The directivity of the arrangement and its gain in decibels is also calculated. A numerical example is given.

Night Glow

C. T. Elvey and Alice H. Farnsworth (Astrophysical Journal, Nov. 1942)

The intensity variations of the light in the night sky with distance from zenith and with time of day have been spectrophotometrically investigated, the first being indicative of the height of the corresponding auroral layer. From the results obtained it is concluded that the distribution of sodium, emitting the characteristic yellow line, between the levels of 70 and 115 km is exponentially with height. The red and green auroral lines, both radiations of oxygen atoms, originate 500 km up in the skies.

Electronics in Medicine and Surgery

A. W. Lay (Electronic Engineering)

The author discusses apparatus for the generation of high-voltage energy. The condenser-rectifier type of multiplier gives energies up to about 1.0 million volts by rectifying and charging condensers 60 times a second. With an electrostatic generator (Van de Graaff) it is possible to produce energies of 5 million volts and the method is still being improved by the use of "Freon" as an insulator. Frequently used for the generation of high-voltage X-rays are resonance transformers employing high-frequency oscillators as well as the low frequencies of the a-c power lines, which by the use of frequency multipliers can be transformed to higher values. Voltages in the order of 1.2 million volts have been reached and currents up to 9 milliamperes are obtainable from the low-frequency system. The main part of the discussion centers around the "cyclotron," which in

the author's opinion will hold the future for multi-million generators. The mechanical construction as well as some simple theory are given. The cyclotron causes extreme acceleration of ions by the combined influences of electric and magnetic fields. A powerful electromagnet produces a strong magnetic field perpendicular to a vacuum chamber, which has provisions for introducing a source of electrons, either a filament or an arc. A transverse oscillating electric field is generated between two hollow plates of D-shape, which are fed from an RF oscillator. A gas is introduced into the vacuum chamber, which when ionized by the electron bombardment will produce the desired particles. (For instance, helium will produce alpha particles, when doubly ionized.) The ions are accelerated by the oscillating electric field, while the magnetic field will constrain them to follow a cycloidal path of widening radius within the "dees".

Neutralizing Low-Frequency Regeneration and Power-Supply Hum

Wen-Yuan Pan (IRE Proceedings)

The article describes a method for neutralizing power-supply hum and motorboating in high-gain multistage amplifiers which is independent of frequency and which has no effect on the amplification characteristics. The circuit was designed to eliminate regeneration at very low frequencies, where a decoupling filter is ineffective. Reductions of the order of 40 decibels are mentioned. A balanced-bridge circuit is formed by inserting an additional condenser between cathode and screen supply in an intermediate stage of the amplifier and the cathode bias resistance and capacitance are proportioned accordingly.

Sealed-Tube Ignitron Rectifiers

M. M. Morack and H. C. Steiner (General Electric Review).

The sealed tube ignitron rectifier is static, noiseless and has high overall efficiency over the entire load range. Dimensions of power rectifier tubes and working conditions are given in the article and various rectifier circuits and their performance are discussed. Methods for anode firing excitation and for separate excitations and provisions for fault protection are described, with information on applications, requirements and cooling water supplies. The comparison of a 75-kw motor-generator set and an equivalent ignitron rectifier shows that the motor-generator losses exceed those of the ignitron rectifier by 5.5 to 6.8 kw in the range of 20 to 80 per cent of rated load.

OHMITE

Rheostats and Resistors



For

CONTROL

*of Electronic Tubes and Devices
... Today and Tomorrow*

The advancement of electronics has meant wider use of Ohmite Rheostats and Resistors . . . in science and industry, in laboratories, products and production. Engineers, scientists and manufacturers have come to know and rely on them for accurate, dependable control of electronic tubes and devices . . . from x-ray to radio and television, from instruments and machines to airplanes. These time-proved resistance units insure *permanent performance*.

Today, of course, Ohmite Rheostats and Resistors serve the Armed Forces and Industry in combat, production and research in an all-out effort to speed Victory. The electronic world of tomorrow will find Ohmite units ready to meet new requirements and Ohmite Engineers ready to help you on any problem.

Write on company letterhead for helpful 96-page Catalog and Engineering Manual No. 40—an invaluable guide in the selection and application of Rheostats, Resistors and Tap Switches.

OHMITE MANUFACTURING CO., 4983 Flournoy St., Chicago, U. S. A.

Foremost Manufacturer of Power Rheostats, Resistors, Tap Switches.



WHAT'S NEW

Devices, products and materials the manufacturers offer



Photocopy Machine

To speed up production and save man hours for government reports, statistics, etc., the American Photocopy Equipment Co., 2849 N. Clark St., Chicago, has perfected a photocopy machine which produces exact copies any size up to 18 x 22 in. of typewritten, hand written, printed, drawn or photographed material. The machines do not require a dark room or skilled handling and no comparison or proof-reading is necessary because copy is photo-exact. Price, \$55 f.o.b. Chicago.



Electronic Inverter

A self-contained electronic inverter is available from Electron Equipment Corp., Box 165, Palm Springs, Calif. The device, without moving parts, operates on 24 volts direct current to 400 cycles at any voltage. It is resistant to altitude or varying temperatures and the frequency is unaffected by the load or other external conditions.

Aircraft Radio Relay

A high speed keying and break-in relay, model AK, for aircraft radio equipment is compactly designed for high voltage and resistance to vibration by Allied Control Co., 227 Fulton St., New York.

Its push-pull magnetic arrangement provides holding pressure on both transmitting and receiving contacts. Opening the key cuts off the bucking flux and the holding flux pulls the armature back to receive position. Weight, 17 ounces.



Solenoid Water Valves

Orifice valves, model 73-RJ and 71-J to regulate water to water-cooled compressors, are announced by Automatic Products Co., 2450 North 32nd St., Milwaukee, Wis. Although identical in appearance, one



model is available with $\frac{1}{8}$ in. orifice and the other in two orifice sizes, $\frac{3}{16}$ in. and $\frac{7}{32}$ in. Designed specifically for water control on water-cooled condensing units, humidifying systems and similar applications, the valves operate by the action of a movable plunger housed in a non-magnetic plunger tube surrounded by a coil. Noise and mechanical rattle are eliminated with these valves.

Six In One

One instrument, model 419 multitester, combines ac-dc voltmeter, milliammeter, ammeter, capacity meter, ohmmeter and inductance meter. It is suitable for a wide range of shop, laboratory and field applications, and incorporates a system of ac measurements which

eliminate the copper oxide rectifier. Manufactured by Radio City Products Co. Inc., 127 W. 26th St., New York, the multitester is available in three models, for carrying, open face bench type and an upright instrument. Prices from \$34.50 to \$44.50.

Polymerizing Varnish

A varnish developed by the John C. Dolph Co., 168 Emmett St., Newark, N. J., is used on flexible armature coils, and possesses the essential bonding properties which will hold modern types of magnet wire and insulating materials intact under the centrifugal force developed by high speed unit windings.

Curing by heat induced chemical polymerization which solidifies the entire mass of varnish in the deepest winding voids or spaces, eliminates surface sealing which usually causes uncured varnish to remain in the interiors of windings.

Laminated Cellulose Acetate

A laminated plastic called Dura-shield is meeting Navy and defense demands for a substitute for metal nameplates, tool checks, dial faces and similar marking plates on ships and machinery.

The material is produced by a lamination process by Plastic Fabricators, Inc., 500 Sansome St., San Francisco, Calif. The center sheet upon which the wording is printed is an opaque cellulose acetate plastic, 0.010 in. thick. On each side of this is laminated a transparent acetate material 0.020 in. thick. The transparent outside allows a clear vision of the directions, name or printed matter on the center and successfully resists wear.



Paved with Good INVENTIONS

Application of fundamental discoveries in science, the *development of inventions* into practical devices, presents challenging problems to the Electronic Industries.

Inspired theoretical analyses of men like Henry, Faraday and Maxwell; inventions of others like Marconi, de Forest and Armstrong—these are the fundamental ideas of modern communications and electronics.

Working with these ideas, electronic engineers have progressed brilliantly over a part of the long, winding road from scientific discovery to a fast-growing industry serving millions of people.

In this great task IRC is proud to have played a notable part in its special province: investigation in the field of Electronics directed toward the design and construction of fixed and variable Resistors and the use of Resistors as com-

ponents in the circuits of electronic devices.

Though we may not be able right now to supply you with the Resistors you need for other than war uses, our engineers and executives are at your service for counsel, without obligation, to help you in the solution of Resistor problems. Please feel free to consult them in your search for the best obtainable resistance devices under existing conditions.



INTERNATIONAL RESISTANCE COMPANY

425 N. BROAD ST., PHILADELPHIA

"This Time Delay Relay can help us bridge that tough electronic-control problem... immediately!"



The AGASTAT, an Electro-Pneumatic Relay Making or Breaking Electrical Circuits at Predetermined Intervals.

By a thumbscrew adjustment, the AGASTAT permits a delay ranging from a fraction of a second to several minutes. The time delay period is essentially unaffected by usual variations in operating voltage, temperature and humidity. Constructed with a minimum of moving parts, this instantaneous recycling unit is small, compact, and easily mounted. Contacts are made of silver, and all working switch parts are of beryllium copper. Magnetic circuit is designed to reduce hum and residual magnetism. Write for Bulletin EI-3 today. Electrical Division, American Gas Accumulator Company, Elizabeth, New Jersey.



WHAT'S NEW



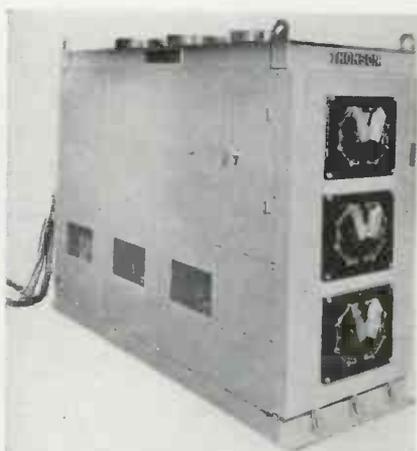
Agastat Time Delay Relay

In redesign of the Agastat—the electropneumatic time-delay relay for making or breaking electrical circuits at predetermined intervals—several vital factors were carefully considered. First—the possibility of increasing operating efficiency of an already highly-adaptable and diversified instrument; second—a thorough evaluation of available materials; and third—the minimizing of size and respective application-area displacement. This sensitive precision instrument is unaffected by heat, cold or variations in operating voltage, temperature or humidity.

Illustration compares new Agastat with its predecessor. New unit weighs only one pound, seven ounces—a saving in weight of one pound, six ounces. Height is now four inches. Product of American Gas Accumulator Company, Elizabeth, N. J.

Resistance Welding

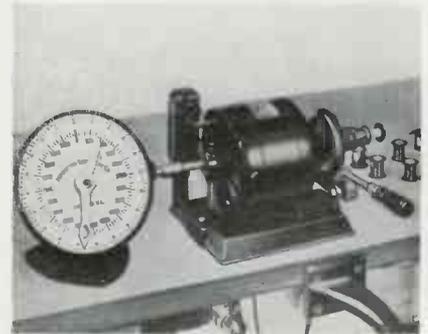
A compact, self-contained unit, known as the Power Pack, is connected by flexible cables to one or several welding guns or other welding equipment. Able to provide from three phase ac power source ample dc welding current for one or several spot or projection welds anywhere up to 150 ft. Houses a



three phase transformer and three phase copper oxide rectifier with connecting bus bars, air blowers for cooling, ignitron type contactors, timing control and voltage regulator. Furnishes current for welding aluminum up to 0.040 in. thick or for welding steel up to 0.064 in. thick. Obtainable from Thomas-Gibb Welding Co., Lynn, Mass.

High Speed Coil Winding Counter

An improved high speed coil winding counter, called the Clipper, is announced by Production Instrument Company, 702-20 W. Jackson Blvd., Chicago, and is designed for



direct connection to the motor shaft or for operation through a flexible shaft. Reset to zero is accomplished with a single motion. Unique pointer design gives instant visual check of reset. Legible figures read to 10,000 turns. Pointers have specially designed friction hubs which afford large bearing area for dependability and minimum wear.

Time Delay Relay

Designed specifically to furnish maximum protection to vacuum tube equipment under unusual operating conditions, a new time delay relay has been developed by the R. W. Cramer Co., Inc., of Centerbrook, Conn.



Consisting of a synchronous motor-driven timer which delivers an accurately measured time delay prior to activation of a switch mechanism, it controls plate voltage to mercury vapor rectifiers and other tube equipment.

FLYING THE "On-Course" TO BERLIN AND ROME!

Power and Transmitter Tubes by **ELECTRONIC ENTERPRISES** are now on the first front, too

Vital applications in the Signal Corps, Navy and Air Forces are proving the axiom that difficult tasks are those which can be done immediately . . . and impossible ones being those taking a little longer.

The fact that these highly-specialized, precision-functioning electronic components are now serving in the master strokes of United Nation strategy, also proves the calibre of E-E research and development.

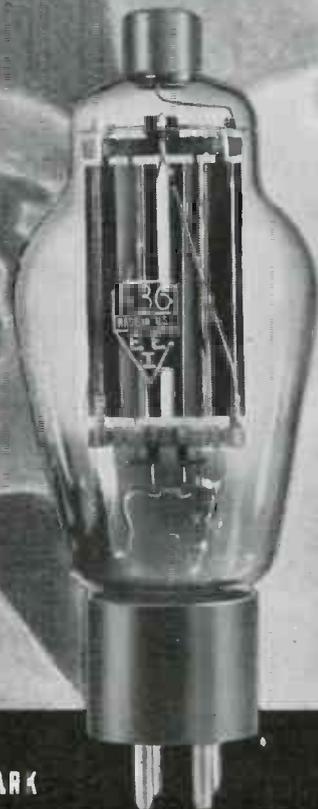
Post-war retranchments, expansions and projections will require a new scheme of things—new economies, greater diversifications, etc. The complete engineering facilities of Electronic Enterprises are available to you for collaboration on your problems. Inquiries invited.

**ELECTRONIC
ENTERPRISES, INC.**



GENERAL OFFICES: 65-67 SEVENTH AVENUE, NEWARK

NEW JERSEY



... you've never heard any finer recordings than the results you'll get when using the now famous

GOULD-MOODY "Black Seal"
glass base instantaneous
RECORDING BLANKS



"Black Seal" Glass Base Instantaneous Recording Blanks have been one of the really outstanding achievements in radio during the year 1942. Broadcasting's keenest ears were given a new delight, a bang-up thrill as they listened to recordings made with these blanks. What are you waiting for? The time is now to install "Black Seal" as a definite, necessary part of your own equipment. Order a trial supply. Try them out under your most exacting conditions. If you're not entirely convinced, not entirely satisfied—we'll stand all the expenses!



Old Aluminum Blanks Re-coated with the "Black Seal" Formula in 2 1/2 Fast Hours!

Eliminate broken records! Ship with safety in the new Gould-Moody PackARTON, a perfected, light-weight, corrugated container that not only protects your records but also reduces your shipping costs. Write for details.

No waiting! No delay. Gould-Moody "Black-Seal" Blanks will be shipped immediately. Styli and shipping cartons supplied at actual cost.

*Reg. U.S. Pat. Off.

the GOULD-MOODY company

Recording Blank Division

395 BROADWAY

NEW YORK, N. Y.

LET'S ALL TOP
 THAT 10%
 WAR BOND
 Purchase Plan

WHAT'S NEW



Kelvin-Wheatstone Bridge

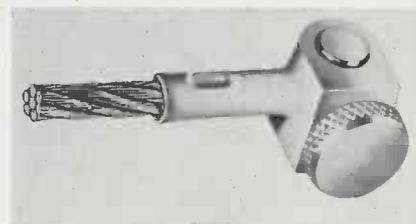
638-L Kelvin-Wheatstone Bridge is manufactured by Shallcross Mfg. Co., Collingdale, Pa. It has an effective range from 0.0001 ohm to 11,000,000 ohms. By using a source of current of considerable capacity, resistances as low as 0.00001 ohm may be detected and measured. The rheostat arm consists of four decades, variable in 1 ohm increments. The ratio arm has two sets of multipliers. The set designated W is for use in Wheatstone Bridge measuring and the set designated K is for measuring with the Kelvin Bridge method.

Voltage Regulator

The new type Amperite automatically controls the voltage delivered to a vibrator used for airplane service. With a battery variation of 20 to 30 volts—50 per cent, the voltage on the vibrator is kept between 6.0 and 6.3 volts—5 per cent variation. Included is an automatic thermal switch which automatically turns on any auxiliary circuit 10 seconds after the vibrator is started. Manufactured by Amperite Co., 561 Broadway, New York.

Stud Connector

A new electronic tube stud connector, the Burndy Hystud, has been developed for use in joining flexible leads to filament studs of large electronic tubes. This indent-type connector, was designed for maximum compactness because of close spacing of the several studs encountered on this type of apparatus. Manufactured by Burndy Engineering Co., Inc., 459 East 133rd St., New York.





"Q. E. D."

Television . . . "which was to be proved" . . . *has been proved, decisively.* For British-Gaumont, Ltd., Baird Television and Cinema Television, Ltd., long recognized as leaders in this field, have already thrilled London theatre audiences with televised events projected on regulation 15' x 20' screens, showing such attractions as prize fights, boat races and cricket matches. In view of these world-leading achievements it is of marked significance that RAULAND has been assigned all American rights to patents and processes of these pioneer companies, thus combining proved British technique with the advanced electronic applications of RAULAND research-physicists and engineers; in final perfection of commercial television when conditions permit. RAULAND's full productive facilities are devoted to *one* objective . . . *total allied victory* . . . but developments unfolding at RAULAND laboratories foreshadow complete fulfillment of the promise of television entertainment.

DR. C. S. SZEGHO, Rauland Chief Research-Physicist, has devoted a major part of his scientific career to the development of specialized electron optical devices culminating in the high power cathode ray tube for large screen television. A native of Czechoslovakia, he received his Electrical Engineering degree at Munich Institute of Technology and his Doctorate at Aix La Chapelle, where he became lecturer in Electro-Physics. Eight years ago he was made head of Research for Baird Television of London and New York from which post he joined the Rauland organization.



• *Electroneering is our business* •

Rauland

RADIO  SOUND  COMMUNICATIONS
The Rauland Corporation • Chicago, Illinois

Buy War Bonds and Stamps! . . . Rauland employees are all doing their part as members of the 10% Bond club.

"They'll hear you all right—your transmitter checks to the cycle!"



Then, as now and in the past, Browning will make available what it takes to know that transmitters are "right to the cycle". Then, as now, Browning will be in the forefront of electronic development and commercial production of useful apparatus.



Type S-2 Frequency Meter

BROWNING
Laboratories
INCORPORATED
WINCHESTER, MASS.

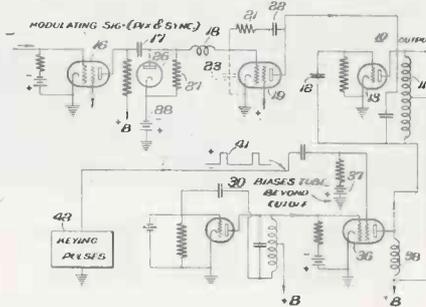
NEW PATENTS ISSUED

Summaries of inventions relating to electronic uses

Note: Date application was Filed shown by (F). Date patent Issued (I). For the reader's convenience, patents most recently issued are presented first.

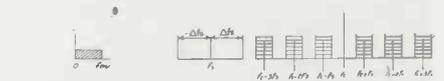
Tuneable UHF Tube—The two resonant chambers of a velocity-modulated tube are provided with one diaphragm each, which two diaphragms are adjustable so as to vary the resonant frequency of both chambers. Further, by measuring the current at the target electrode it may be seen whether or not the tube is oscillating. C. V. Litton, Int. Stand. Electrical Corp., (F) July 13, 1940, (I) Feb. 2, 1943, No. 2,309,966.

FM Television Transmitter—Carrier wave oscillator 10 is frequency modulated by means of reactance tube 19. The frequency of crystal oscillator 30 is the frequency to which the synchronizing pulses in the modulating signal are supposed to deviate the carrier wave. Upon application of keying pulse 41, amplifier tube 36, usually biased beyond cut off, passes current and



controls tuned circuit 11. Thus, crystal oscillator 30 will pull the carrier-wave frequency to the desired value should it deviate from it. At the same time, the arrangement provides for constant carrier frequency. Thomas L. Gottier, RCA, (F) Sept. 23, 1941, (I) Feb. 2, 1943, No. 2,309,764.

FM Diversity System—To overcome selective fading, a sub-carrier is frequency modulated with the signal, and this combination in turn modulates a carrier frequency f_c . By this expedient, an infinite number of side-band carriers are obtained, spaced by the sub-carrier frequency f_s , and each containing the same signal intelligence. At the receiver, several preferred side-band carriers—which will permit limiting—are received by a diversity receiving system, i.e. they are received at distant points, separ-



ately detected and then combined. With this device, short waves reflected from the ionosphere may be used as FM-carrier waves. To avoid interference with other programs, side band groups not used can be suppressed. J. E. Smith, RCA, (F) Aug. 31, 1940, (I) Feb. 2, 1943, No. 2,309,678.

Piezoelectric Resonator Network—Two balanced bridge crystal circuits, having tuned input and output circuits, respectively, are connected by a variable coupling reactance. To obtain band-width control without changing the resonant frequency of the crystals, the resistance in shunt with the two tuned circuits is varied, thereby varying the effective resistance in series with the series resonance of the crystals, and the reactance of the coupling is changed. The device, as described, is used in an IF amplifier. W. R. Koch, RCA, (F) April 1, 1941, (I) Jan. 26, 1943, No. 2,309,602.

Color Phasing—Automatic synchronization and phasing of the color discs in transmitter and receiver is achieved by transmission of an additional intelligence originated by the transmitter color disc when in a certain position. The additional pulse may also trigger the amplifying channels for the different colors making them operative for the required time interval. At the receiver, the color phasing signal is separated from the other intelligence, compared with a signal derived from a corresponding point of the receiver color disc, and applied to the phonic motor. P. J. Herbst, Farnsworth Television and Radio Corp., (F) March 7, 1941, (I) Jan. 26, 1943, No. 2,309,506.

Frequency Monitor—Both windings of transformer 8 are tuned to the frequency to be monitored by means of condensers 10 and 12, respectively. Microammeter 22 indicates the difference in current through the two diodes 14 and 15 connected across the secondary of

PRECISION
POWER TUBES
FOR EVERY PURPOSE
MADE BY

UNITED

Skills in Electronics

When the war ends, there will be a phenomenal expansion in the peace-time use of electronics. Today—while the war absorbs the tube output—try to fix in your mind this unique source for tubes which you will seek tomorrow:

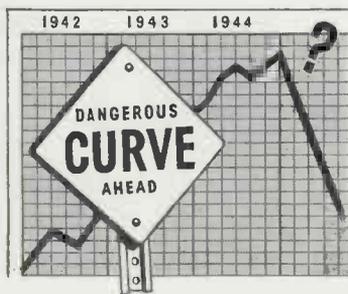
Its name: **UNITED**. Its organization: a group of eminent engineers and technicians, uniting their highly specialized skills. Its product: power tubes, unsurpassed in precision, for every electronic requirement including radio communication, physiotherapy and industrial control. Its standard: power tubes that consistently attain the highest record in every test of performance. Remember the name "United."



UNITED ELECTRONICS COMPANY

NEWARK, NEW JERSEY





Technical Training Now Will Assure You of a Secure Career in the Future

• Do you believe in signs? NOW is the time to make sure of the road ahead. Any thinking radioman will realize that the future belongs to those men who are equipped to handle technical assignments—men who have trained for the opportunities in post-war radio and industrial electronics.

After the war, thousands of untrained, and part-trained radiomen will be left behind. That's why CREI stresses the need now for a planned program of training in practical radio engineering. Our home study courses will help to increase your technical ability so that you will be in a position to command an important job when the inevitable readjustment comes after the war.

Decide now to make your present radio job pay you dividends in the years to come by investing in CREI technical training. CREI will show you the proven way to advancement, increased pay and security in your chosen profession.

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

• Write for FREE BOOKLET



CREI Students, Graduates — ATTENTION!

The CREI Placement Bureau is flooded with requests for radiomen. Employers in all branches of radio want trained men. Your Government wants every man to perform his job, or be placed in a job, that will allow him to work at maximum productivity. If you are or will be in need of reemployment write your CREI Placement Bureau at once.

CAPITOL RADIO ENGINEERING INSTITUTE

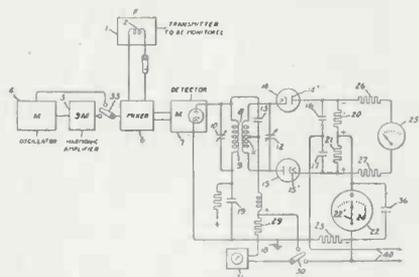
Home Study Courses in Practical Radio Engineering for Professional Self-Improvement

Dept. EI-3 3224 — 16th Street, N.W.

WASHINGTON, D. C.

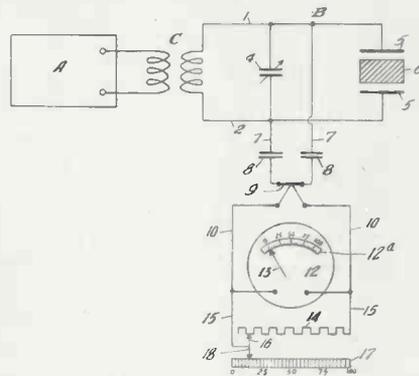
Contractors to the U.S. Signal Corps—U.S. Coast Guard
Producers of Well-trained Technical Radiomen for Industry

NEW PATENTS ISSUED



transformer 8, the mid-point of which is in turn connected to the high-potential end of the primary. Upon a change in frequency or amplitude, instrument 22 will deviate from its zero position. Amplitude variations are indicated by instrument 25 and can be compensated for by an additional arrangement. H. R. Summerhayes, Jr., G. E., (F) March 1, 1941, (I) Jan. 26, 1943, No. 2,309,481.

HF Wattmeter—The device is intended to measure the power absorbed by the load in the output circuit of a high frequency generator, as distinguished from the total power output. This is accomplished by a square law instrument in combination with resistance 14 which is so adjusted as to make the sensitivity of the instrument inversely proportional to the resistivity of the load to be investigated. E. Mittelman, (F) May 6, 1941, (I) Jan. 26, 1943, Re. 22,258.



Piezoelectric Crystal—The invention refers to the use of one or more useful low frequency face shear type modes of motion of Rochelle salt piezoelectric crystals and describes arrangements to utilize them either separately or simultaneously and without interference from other modes of motion. It is proposed to connect a crystal in a filter in such a way that only one crystal is required for a circuit ordinarily requiring two. W. P. Mason, Bell Tel. Labs., (F) July 25, 1941, (I) Jan. 26, 1943, No. 2,309,467.

Delayed Automatic Volume Control—The apparatus provides a volume control so connected to the amplifier that the latter remains at or near its maximum sensitivity for a predetermined period of time before reduction of gain starts. This action, found useful in connection with exploring surface strata of the earth, is obtained by interposing a capacitance-resistance delaying network between volume control tube and grid or grids of amplifier tube or tubes to be controlled. G. M. Groenendyke, Socony-Vacuum Oil Co., Inc., (F) March 23, 1939, (I) Dec. 29, 1942, No. 2,306,991.

Unidirectional Electro - Acoustical Transducer—Considering a special circuit, the inventor shows that unidirectional reception over a wide range of frequencies may be achieved with any two transducers spaced from one another and a network of certain design. By the use of an equivalent acoustical network, the unidirectional effect may be obtained from combination of the wave energy at two spaced points of the same transducer. B. B. Bauer, Shure Bros., (F) April 7, 1941, (I) Dec. 22, 1942, No. 2,305,596.

Frequency Shifting—The effect produced in a receiver by multiple signalling paths in radio telegraph communications are reduced by shifting the signal frequency at the

The Electronic Industries Defined

Electronics is the science and art and industry of applying the magic of radio and electronic tubes to a host of purposes besides broadcasting and wireless communication.

An electronic tube—like a valve with which a child can control the power of tremendous hydraulic pressure—amplifies a minute electrical impulse thousands of times. The source of that impulse can be sound waves, light rays, heat, pressure, or any one of a dozen other things.

The end result can be the guidance of a ship or plane, the television picture in your living room, X-rays that penetrate solid steel, a "ray" that melts metals or sets plastics without applying heat, or a complicated industrial device that measures or controls a vital production process.

Electronics is "talkies," fluorescent lightning, hearing aids, long-distance telephony, the detection of approaching bombers, the photo-finish of a horse race, and a thousand other applications. The surface hasn't yet been scratched!

The above bit of electronic eloquence was found hidden away in a carbon copy of a letter written by Gilbert Sonbergh, of Electronic Industries' staff, in answer to an inquiry—"What ARE electronics, anyway?"

We think it just about rings the bell, and may be useful to readers in answering queries from laymen.—EDITOR

Burned Out



... at the moment
it was needed most

WITH CONSTANT VOLTAGE THIS MIGHT HAVE BEEN AVOIDED

This tube might have been transmitting orders to a battle fleet . . . or controlling some delicate operation in a war plant . . . or guiding an airliner through a storm "upstairs".

Then, a sudden surge of line voltage, a tiny filament gives way—and thousands of tons of fighting ships are out of contact with land . . . a whole production line has broken down . . . or a slender silver airliner lies wrecked against a peak.

Human lives and enterprises depend daily upon hundreds of functions controlled by electronic tubes. These tubes are delicate, precious, nowadays all but irreplaceable. Their priceless life must be kept safe.

In operation, rotate your tubes and spares. And guard them against destructive voltage

fluctuation with SOLA CONSTANT VOLTAGE TRANSFORMERS. Sola "CV's" eliminate distortion, faulty emission, grid activation and filament failure due to voltage variation. They absorb line sags and surges up to 30% and still put out a constant filament voltage at rated level. Day and night, without supervision, they're on the job—instantaneous in action, without moving parts, self-protecting against short circuit.

Sola "CV's" are available in standard units with capacities from 10 VA to 15 KVA. Special units can be built to specification.

Note to Industrial Executives: *If you have a problem involving voltage control, no matter what its nature, Sola "CV" transformers can help you solve it. Ask for bulletin 10CV-74.*

Constant Voltage Transformers

SOLA

Transformers for: Constant Voltage • Cold Cathode Lighting • Mercury Lamps • Series Lighting • Fluorescent Lighting • X-ray Equipment • Luminous Tube Signs • Oil Burner Ignition • Radio • Power • Controls • Signal Systems • Door Bells and Chimes • etc. SOLA ELECTRIC CO., 2525 Clybourn Ave., Chicago, Ill.

ACME

PRECISION-BUILT TRANSFORMERS

FOR ELECTRONIC PERFORMANCE

Controlling electrons to a useful purpose requires transformers of exact performance characteristics. Acme precision-built transformers for electronic applications, when submitted to unbiased tests, invariably win top honors for performance. If your electronic application is out of the ordinary, let Acme transformer engineers help in its solution.



FOR EXAMPLE

Acme compound-filled transformers for short wave communication, public address systems and other radio applications are preferred for their serviceability under temperature variations from -40° to $+120^{\circ}$.



And preferred for rugged construction, trouble-free long-life. Typical, high voltage plate supply transformer for transmitter. 33,000 volts, 1.8 ampere secondary.



ISOLATING TRANSFORMERS

For use wherever radio, communication, or other electrical equipment must be tested with complete freedom from outside interference. Shielded secondary winding and shielded secondary cable isolate primary fluctuations and interference. Write for details.

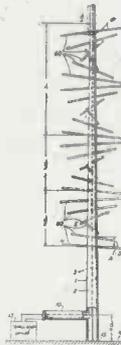
THE ACME ELECTRIC & MFG. CO.
65 WATER ST. CUBA, N. Y.

Acme Electric
TRANSFORMERS

NEW PATENTS ISSUED

transmitter between two frequencies and also introducing a transient overswing in the frequency shift toward and through both signal frequencies, the overswing being a substantial percentage of the difference between the two frequencies. Clarence W. Hansell, RCA, (F) November 23, 1940, (I) October 20, 1942, No. 2,299,388.

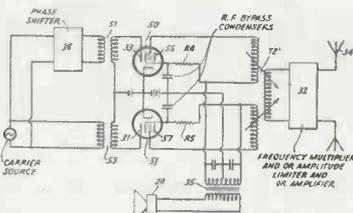
Antenna—Equi-intensity radiation in all directions in a plane is obtained by a pair of sheet conductors



spirally twisted around an antenna. Arnold B. Bailey, Bell Telephone Laboratories, Inc., (F) Nov. 8, 1941, (I) Oct. 13, 1942, No. 2,298,449.

Ignitron Welding Timer. For use in supplying power from a source of ac to a load, the combination comprising a pair of ignitrons, the ignitron electrode of each being connected in antiparallel between the source and the load. Two pairs of auxiliary electron discharge tubes are connected in series between anode and ignitron electrode of each ignitron. A control potential is impressed between junction points of the pairs of tubes. Adolph H. Toepfer, Westinghouse Electric, (F) March 23, 1939, (I) October 6, 1942; No. 2,298,240.

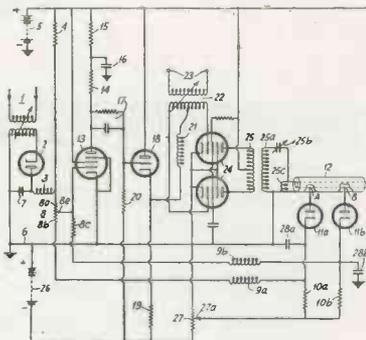
Phase Modulation—In a phase modulation system including a pair of electron tubes and a first transformer, the primary of which is coupled to a source of wave energy, while the secondary winding is connected between control grid and cathode of one of the tubes. The input of a phase shifter is also coupled to the source of wave energy and its output connects to the primary of a second transformer.



The secondary of this transformer is coupled to control grid and cathode of the other tube. A source of modulating potentials is coupled differentially through a transformer to the screen grids and anodes of the tubes, an output load circuit also being coupled to them. Murray C. Crosby, RCA, (F) Oct. 6, 1938, (I) Oct. 6, 1942, No. 2,298,092.

Shoe Cementing Apparatus. An electrostatic heating apparatus comprises a pair of electrodes arranged in edge-to-edge alignment. Opposite sides of a push-pull high-frequency oscillator are connected to these electrodes, and a free electrode is spaced from the pair of electrodes. Ervin L. Crandel, Compo Shoe Machinery Corp, (F) June 13, 1941, (I) October 6, 1942; No. 2,298,038.

Transmitter—A modulated carrier-wave transmitting system utilizes a coaxial cable coupled to one end of the modulator stage output circuit. A feedback circuit having two parallel paths and a rectifier in each path is connected to the coaxial cable at points separated by a quarter wave length of the carrier wave. The feedback energies are



applied through the parallel paths to the input circuit of the modulating stage in order to compensate for nonlinear distortion arising elsewhere in the system. Eric L. C. White, Electric & Musical Industries, England, (F) March 16, 1940, (I) October 6, 1942, No. 2,297,931

Standard Frequency Oscillator

—Alternating current of a predetermined frequency is produced by an oscillator tube coupled to a bridge circuit. An electromechanical vibrator is connected between cathode and control grid of the oscillator tube and a variable capacitor shunts the vibrator. The bridge has identical impedances in one pair of adjacent arms, a second electromechanical vibrator in the third arm and a capacitor shunted by a resistor in the fourth arm. Oscillator output voltages are im-

Continuous Service Rating Data

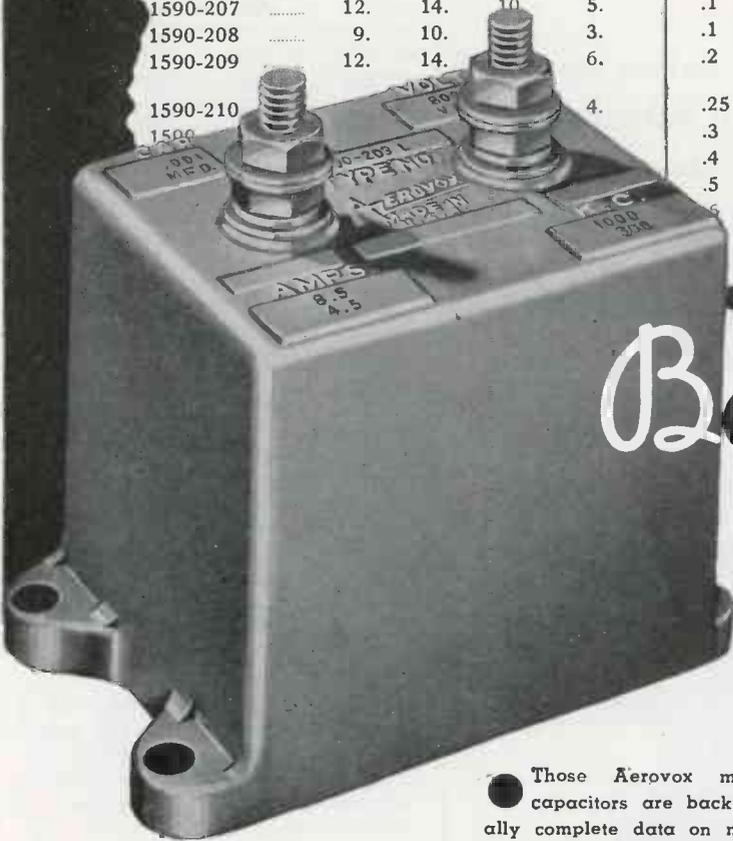
TYPES 1550-1560-1570-1580-1590

Maximum Current in Amperes—Maximum Ambient Temperature 60° C



TYPE 1590

Catalog Number	10,000 kc.	3000 kc.	1000 kc.	300 kc.	100 kc.	Cap. Mfds.	Test Volts Eff.	Catalog Number	10,000 kc.	3000 kc.	1000 kc.	300 kc.	100 kc.
1590-200		7.	4.5	1.5	.5	.01	8000	1590-217		16.	20.	15.	8.
1590-201		8.5	6.	3.	1.	.01	6000	1590-218		16.	20.	15.	8.
1590-202		6.	4.	2.	.7	.02	5000	1590-219		18.	20.	17.	10.
1590-203		10.	8.5	4.5	1.5	.03	4000	1590-220		18.	20.	18.	12.
1590-204		8.	7.	3.5	1.2	.04	4000	1590-221		18.	23.	20.	12.
1590-205		11.	11.	7.5	2.5	.05	4000	1590-222		18.	25.	22.	12.
1590-206		9.	8.	6.	2.	.05	2000	1590-223		18.	25.	22.	12.
1590-207		12.	14.	10.	5.	.1	2000	1590-224		18.	25.	22.	12.
1590-208		9.	10.	3.	3.	.1	1000	1590-225		18.	25.	22.	12.
1590-209		12.	14.	6.	6.	.2	600	1590-226		18.	25.	22.	12.
1590-210					4.	.25	600	1590-227		18.	25.	22.	12.
1590-211						.3	600	1590-228		18.	25.	22.	12.
1590-212						.4	600	1590-229		18.	25.	22.	12.
1590-213						.5	600	1590-230		18.	25.	22.	12.
1590-214						.6	600	1590-231		18.	25.	22.	12.
1590-215						.8	600	1590-232		18.	25.	22.	12.
1590-216						1.0	600						12.



Aerovox mica transmitting capacitors are available in the widest range of types, capacities, working voltages. Type here shown is the bakelite-cased 1590 series for medium-duty high-frequency current-handling functions.

Backed by

the most complete CONTINUOUS SERVICE RATING DATA

Those Aerovox mica transmitting capacitors are backed by exceptionally complete data on maximum current-carrying ratings at five different frequencies, in addition to capacity and test-voltage ratings. The unit best suited for given current at given voltage and frequency may thus be selected quickly and precisely. This data, the accumulation of years of research and experience based on extensive tests conducted with special test equipment, was determined in con-

nection with standard circuits in which such units are extensively used.

Good capacitors, plus good application data, account for the tremendous popularity which Aerovox transmitting capacitors enjoy today.

Be sure to reserve your copy of the Aerovox Transmitting Capacitor Catalog, now in preparation, for your working library, if you are engaged in professional radio or electronic work.

**NEW BEDFORD, MASS.,
U. S. A.**
Sales Offices in All
Principal Cities

AEROVOX

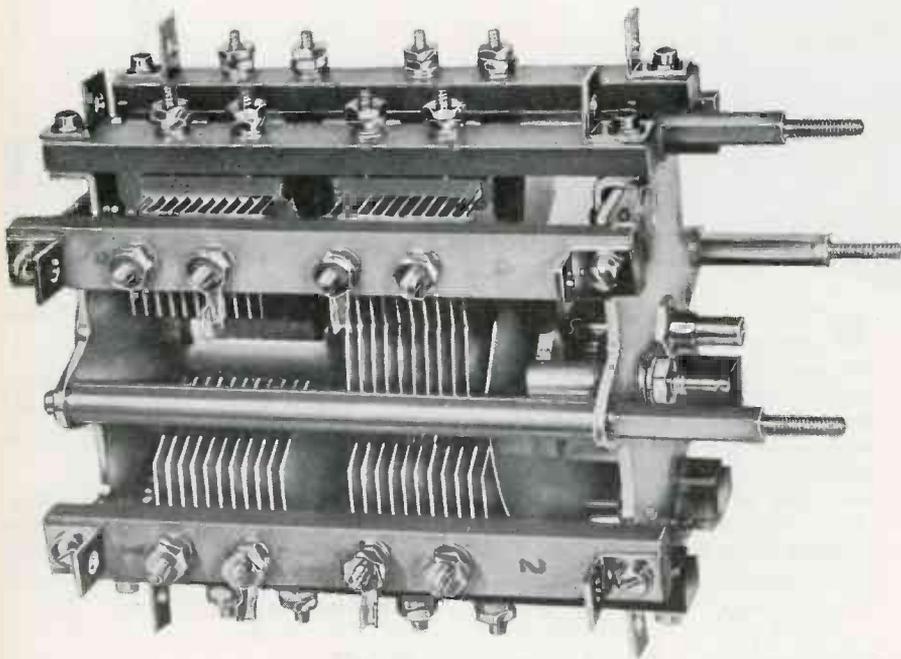
CORPORATION

In Canada
AEROVOX CANADA LTD.
Hamilton, Ont.
EXPORT: 100 Varick St., N. Y.
Cable 'ARLAB'

Those things we haven't mentioned

Frankly, there's a great deal going on at Cardwell that we haven't mentioned in our ads. We can't catalogue our new and improved equipment, nor can we promise it for civilian application at any definite future time, since only orders bearing the very highest priority ratings can be accepted.

We can, however, pledge an even better Cardwell product for your eventual use. Design refinements in existing models, developments in standard condenser types and radically new features are incorporated in the present Cardwell line. The experience of the men who pioneered the original metal end plate capacitors makes Cardwell, as always, a standard of comparison.



CARDWELL  CONDENSERS

THE ALLEN D. CARDWELL MANUFACTURING CORPORATION

BROOKLYN, NEW YORK

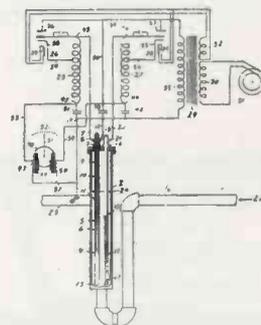
NEW PATENTS ISSUED

pressed on the non-adjacent terminals of the identical impedances, while the voltage developed across the other diagonally opposite corners of the bridge is utilized to vary the first mentioned capacitor. Thomas A. Read, Westinghouse, (F) November 1, 1941, (I) October 6, 1942, No. 2,297,800.

Automatic Temperature Regulation. A regulator system for controlling the temperature of an electrical device. A variable impedance is included in the load circuit for limiting the energy supplied to the device. Grid-controlled rectifiers supply a control circuit, which varies the effective value of the variable impedance. Provisions are made for obtaining bias for the grid-controlled rectifiers, which is a measure of both the temperature of the electrical device and the flow of energy in the load circuit. Cyril C. Levy, Westinghouse, (F) February 26, 1941, (I) Oct. 6, 1942; No. 2,297,836.

Trains Communications—A receiver for train communications systems comprises a demodulator, having a filter across its output tuned to pass only energy of a preselected frequency within the voice frequency band. The filter is connected to an amplifier tube, which operates a control relay. A condenser remains charged as long as signal energy operates the relay and provisions are made for indicators, as flashing lamps and bells, when the relay is de-energized and the condenser discharges. Andrew J. Sorensen, Union Switch & Signal Co., (F) Jan. 2, 1941, (I) Sept. 29, 1942, No. 2,297,172.

Electrical Conductivity of Liquids—This apparatus for controlling the proportionate admixture of ingredients with liquids utilizes a standard test tube consisting of dielectric material and having a double wall for a portion of its length, a liquid mixture of standard proportions being within the tube. A condenser plate covering part of the outer surface of the inner wall is connected to a source of high-fre-





For a nation on wings

Built to Civil Aeronautics Administration specifications, CAA-515, the Electro-Voice Model 7-A microphone is widely used for airport landing control and is highly suitable for many other sound pick-up applications.

The smooth frequency curve, rising with frequency, gives extremely high intelligibility even under adverse conditions. Desk mounting incorporates easily accessible switch which can be operated by thumb of either right or left hand. Microphone may be moved without danger of pressing this switch. If you have a microphone problem, we invite you to consult our engineering department.

If, however, your limited quantity requirements can be met by any of our standard model microphones, with or without minor modifications, may we suggest that you contact your local radio parts distributor? He may be able to supply your immediate needs from remaining stocks. In all instances, his familiarity with our products and many of your problems will enable him to serve you well. Our distributors should prove to be vital links in expediting your smaller orders.

... Any model Electro-Voice microphone may be submitted to your local supplier for TEST and REPAIR at our factory.



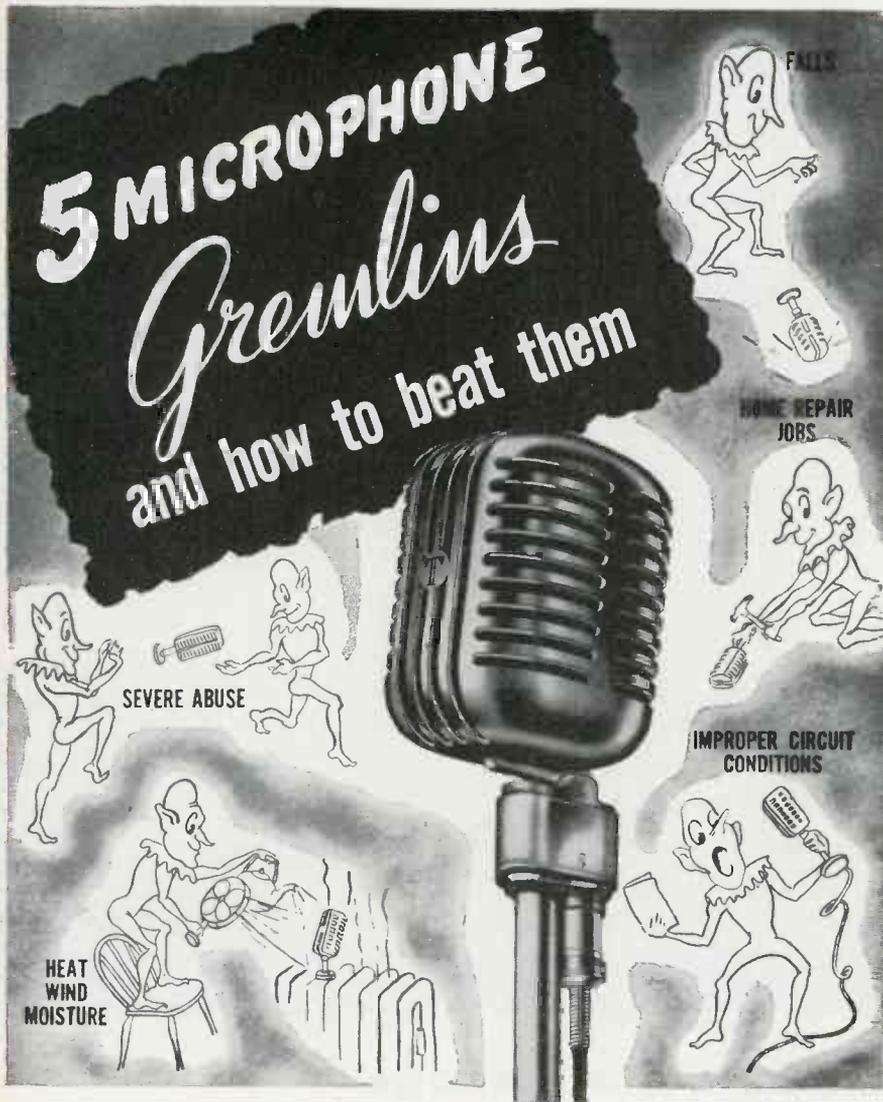
Electro-Voice MICROPHONES

ELECTRO-VOICE MANUFACTURING CO., INC.

1239 SOUTH BEND AVENUE, SOUTH BEND, INDIANA

ELECTRONIC INDUSTRIES • March, 1943

141



Those imaginary pixies that haunt our pilots can also gum up your microphone. Protect your unit from falls, heat, wind, moisture and improper circuit conditions. Above all, use common sense in handling your mike. Don't bang it around as though it were a football. You'll get longer, better service if you treat it right. When your mike fails or gives trouble, send it to the factory or its dealer — don't try home repair jobs!

The back page of the new Turner Microphone Catalog lists the DOs and DON'Ts for longer mike life. It's Free. Send for yours.

Send NOW for your Free Copy of Turner's new 8-page, fully illustrated, colorful Microphone Catalog. Each unit is engineered for specific jobs and trouble-free performance. Select the one best suited to your needs at the price you want to pay.

The
Turner
Company

Cedar Rapids, Iowa

Free

THIS NEW TURNER
MICROPHONE CATALOG

NEW PATENTS ISSUED

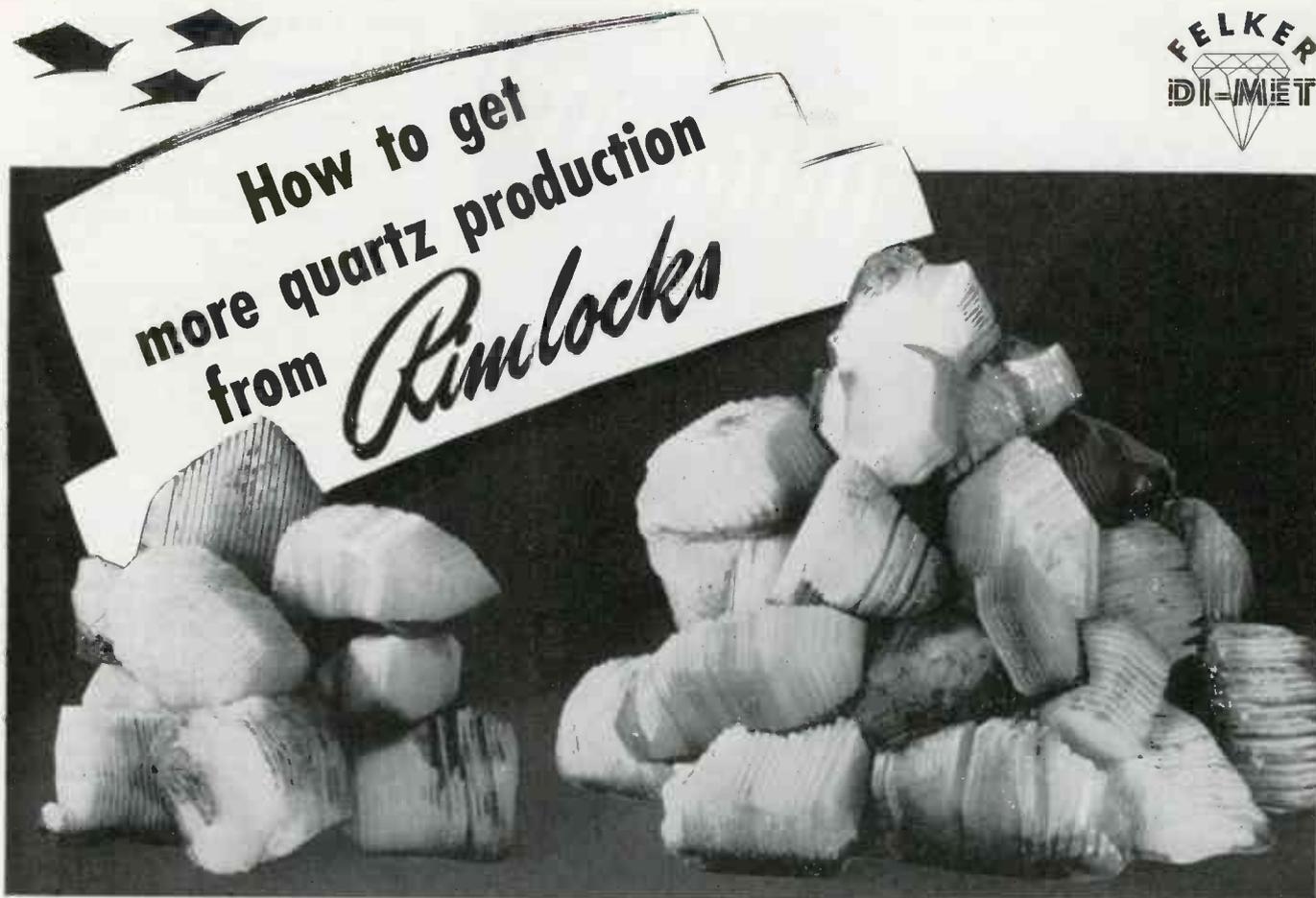
quency a-c current, and enables the measurement of the electrical conductivity of the liquid mixture. There are provisions to compensate errors due to thermal expansion. Ralph W. Osborne, Canada, (F) Aug. 12, 1939, (I) Sept. 29, 1942, No. 2,296,867.

Electronic Timer—An electronic timing delay circuit to be operated from the a-c power supply. A transformer supplies the heating current for the tube and has terminal connections for producing a greater potential than that of the supply for biasing the grid of the tube to a value more negative than the cathode on the negative a-c current cycle. The grid input circuit has a condenser and a resistance, which is connected to the desired potential established by the transformer. The output circuit operates a relay, which, when the a-c potential is removed from the input circuit to the output circuit, will respond in definite time relation to the change. Gilbert Smiley, General Control Company, (F) Dec. 5, 1939, (I) Sept. 22, 1942. No. 2,296,580.

Control Apparatus—A pair of vacuum tubes, supplied with a-c potentials, in the plate circuit of each a relay being connected, which operates a controller to speed up or slow down a motor, depending on which relay is energized. The motor drives spaced pairs of rolls feeding a strip to a flying shear; a slack or looped portion can be maintained between the feed rolls depending on the driving speed. Two respective grid circuit closing members are positioned for coaction with the looped portion of the strip, so as to cause one or the other of the relays to be energized upon contact of the strip with the closing members. John B. Looney, Birmingham, Ala., (F) Sept. 9, 1941, (I) Sept. 15, 1942. No. 2,296,719.

AVC for Musical Instrument

—A device for electrically reproducing and amplifying the sound of a keyboard instrument in accordance with the amount of depression of one of the keys. A variable resistor is utilized, the moving arm of which is mechanically controlled by the avc-key and electrically connected to a compensation system, which impresses positive or negative voltages on the suppressor grid of one of the amplifier tubes depending on the direction of key movement, to equalize the volume output of the amplifier by the movement of the key toward and away from its maximum depressed position. John L. Traub, (F) May 6, 1941, (I) Sept. 15, 1942. No. 2,296,125.



Proper operation of DI-MET Rimlock quartz cutting wheels leads to greatly improved production, longer blade life . . . eliminates blade sharpening and gives better over-all results on all methods of cutting. Recommended procedures are simple, and resulting benefits are well worth the effort.

OBERVE these four major rules in your quartz cutting operations and you'll get more satisfaction than ever before from fast-cutting Rimlocks!

1 Operate Rimlocks at the correct speed! Surface speed should range from 4000 to 4500 s.f.m., which is an r.p.m. of approximately 2000 for an 8" diameter Rimlock.

2 Keep the feed pressure light! A load of 7 lbs. is ample. Too much pressure shortens blade life . . . drives diamonds back into the metal and turns them sideways, destroying the fast, free cutting action.

3 Use abundant coolant of rich mixture! A mineral base soluble oil mixed in a ratio of 4 parts water to 1 part oil provides very satisfactory lubrication with efficient cooling ability. Flood both sides of blade generously.

4 Use ample motor power! Variation of

blade r.p.m. during cutting operations lowers blade efficiency, dulls cutting edges and destroys accuracy. A 3/4 h.p. motor is recommended for general quartz cutting operations.

Have you received your free copy of this new Rimlock folder? It provides many hints on proper Rimlock operation that may improve your quartz production. Fill in and mail this coupon today!



FELKER MANUFACTURING CO.
TORRANCE, CALIFORNIA

Please send me the new Rimlock folder.

Name _____

Title _____

Company _____

Address _____



FELKER MANUFACTURING CO.
1114 BROAD ST., TORRANCE, CALIFORNIA

MANUFACTURERS OF DIAMOND ABRASIVE WHEELS



Thermador Transformers are Thermitite treated to withstand extreme temperatures and humidity—arid or moist heat—dry or damp cold do not hamper their efficiency. Thermitite is the name of a process of accurate heat controlled vacuum impregnation developed and improved over a period of ten years.

THERMADOR

THERMITITE TREATED

TRANSFORMER

THE THERMADOR TRANSFORMER LINE

Included in the Thermador Transformer line are audio, auto, geophysical, bias supply, bridging, cathode modulation, coupling, driver, field supply, filament, high fidelity audio, input, midget plug-in audio, mixing and matching, modulation, output, plate, power, television, and tube-to-line transformers. Filters, chokes, and reactors.

THERMADOR ELECTRICAL MFG. COMPANY
5119 S. Riverside Dr., Los Angeles, Calif.

"Seven Leagues Ahead"



NEW PATENTS ISSUED

Four-Channel Musical Generator—A system having four tone generator channels (soprano, alto, tenor, bass), each provided with separate push-pull output, separate speakers and separate tone and volume controls. Between each generator and its output are a pair of channels connected to receive signals in 180 deg. phase relation, one of each being designed to attenuate the signal more than the other, and means common to all transmission systems for rendering its attenuating channel ineffective. John M. Hanert, Hammond Instrument Co. No. 2,295,524.

Low Voltage Gaseous Tube Lamp—A gaseous tube electric lamp with heating element and anode at each end of the tube, the heating elements and anodes being connected together at one point. A transformer with one primary and two secondary coils provides the two heating elements with power, the anodes being supplied through a choke coil. There are provisions for automatically disconnecting one anode lead after a certain interval of time, thus heating up the tube through the heating elements and thereby applying to the anodes the high voltage transitory currents produced. Paul F. Lebrun, (F) Jan. 25, 1940, (I) Sept. 1, 1942. No. 2,294,623.

Record Card Control Apparatus—Record cards have conductive index points, which are differentially spaced. The cards are fed under a conductive guide connected to the grid of an amplifier tube. The conductive index points on the cards, when in proximity to, but not touching the guide, act as a condenser, which is charged through an external potential. Varying impulses are produced in accordance with the proximity of the index point to the guide and these impulses are amplified to operate electric control devices. C. K. Moon, I.B.M., (F) June 6, 1939, (I) Sept. 1, 1942. No. 2,294,681.

They Had the Right Idea!

"Electric matter consists of particles extremely subtle."

—Benjamin Franklin (1756)

"In this state of matter (electrons) we seem to have at last in our grasp and convenient to our control, little indivisible particles which with good warrant are supposed to constitute the physical basis of the universe."

—Sir William Crookes (1879)



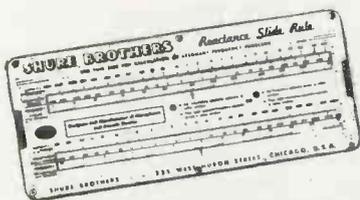
WANTED AT ONCE! — a Doctor

Tomorrow You Will Reach Him by Microphone

In the postwar world, when the saving of a life is a matter of seconds, your doctor will be as close as your nearest microphone.

Instant contact! . . . this is the future of communications. Not just station to station, but person to person in the broadest possible application of communications. Firemen fighting a raging fire, the policemen on the beat, the salesman on the road, the businessman on the plane, all will be able to do a better job because of a microphone and communication equipment.

The equipment that will make this possible is being produced for our Armed Forces today. Microphones for this equipment are being developed and manufactured by Shure Brothers. The War Microphones of today will be the Peace Microphones of Tomorrow. Shure Brothers will provide Better Microphones for Better Communications for this new world of the future.



SHURE BROTHERS, 225 W. Huron St., Chicago, Illinois
Designers and Manufacturers of Microphones and Acoustic Devices

Send for This New Shure Reactance Slide Rule

Makes extremely simple the calculation of complicated problems in resonant frequencies. Also helps in the solution of circuit problems involving inductances and condensers. Covers a frequency range of 5 cycles per second to 10,000 megacycles. Indispensable for radio and electrical engineers, technicians and circuit designers. Send 10c. in coin to cover mailing costs to Dept. 174K.



NEW BOOKS

A.S.T.M. Standards on Electrical-Heating and Resistance Alloys

By A.S.T.M. Committee B-4, published by the American Society for Testing Materials, Philadelphia, Pa., 160 pages, \$1.50.

Pages 49 to 77 of this publication on testing methods are of special interest to the manufacturer of radio metal parts and wires. They deal with specifications and testing methods for wire used for radio tubes, incandescent lamps and electronic devices, methods of testing sleeves and tubing for radio tube cathodes, tests for sheet metals for electronic devices, and methods of measuring mica stampings used in electronic devices and lamps.

Television Standards and Practice

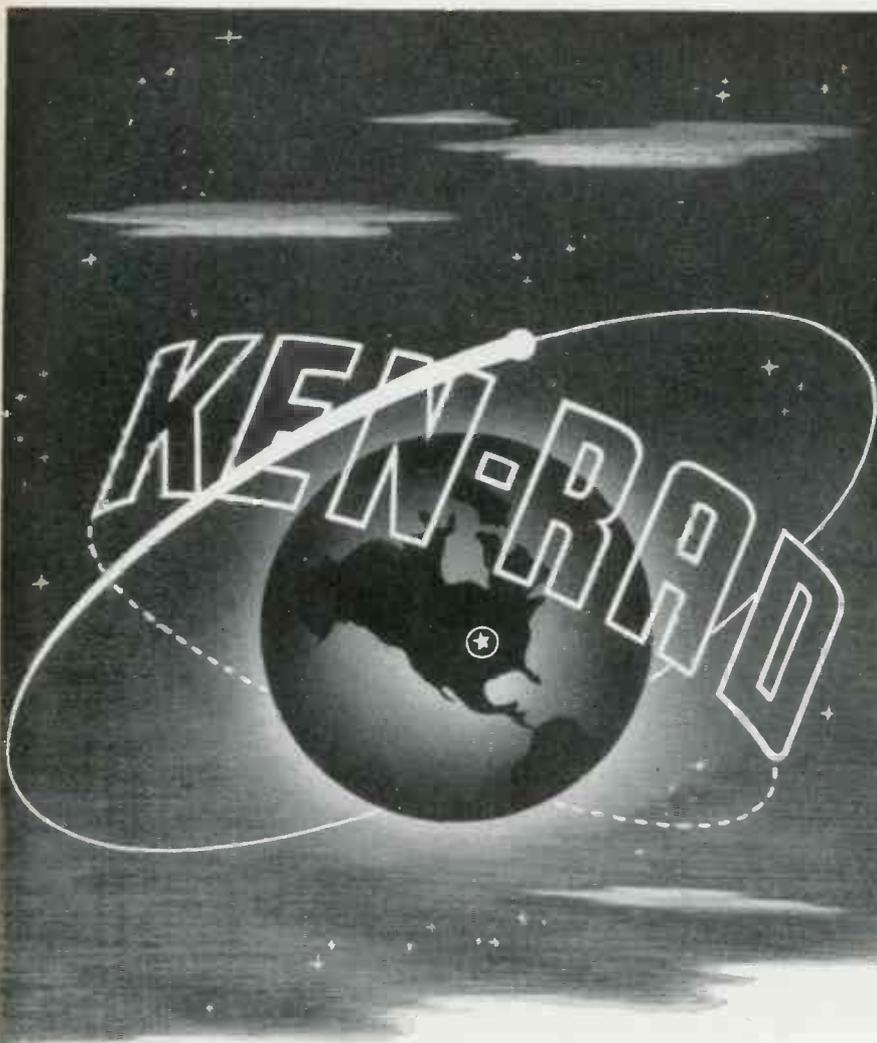
Edited by Donald G. Fink, from papers of the National Television System Committee, published by McGraw-Hill Book Co., Inc., New York and London, 1943, \$5.00.

This is an abridged report of the most important information presented during the deliberations of the National Television System Committee, held during 1940 and 1941. This group was created jointly by the Engineering Committee of the RMA and the F.C.C. for the purpose of analyzing the possibilities of all known television processes and selecting the most desirable portions of each for commercial standardization.

The committee and the numerous associated technical subgroups included representatives of all prominent television research groups. This book is a "must have" item for those in television development as it gives the basic reasons for the selection of particular standards finally agreed upon together with the advantages and disadvantages of alternate arrangements as they appeared to the committee at the time of the deliberations. Complete details of current standards are listed.

One remarkable fact brought out, is the great mass of information assembled as to many non-engineering aspects that contribute to the television problem. From the evidence presented television should progress in a more orderly manner than did many other technical fields, where the final outcome was the survival of the "strongest" system if not the "fit-test."

The book, containing more than 400 pages, has bibliographical in-



Our developments for the future evidence themselves in the applications of today which will become the commonplaces of tomorrow

Today KEN-RAD is in the thick of it and we've been in there all the time — in tanks planes ships submarines PT boats plane locators direction finders fire control apparatus and all the other tube applications We've been busy with new plants new developments expansions These new applications these added production facilities and expanded engineering capacity provide better tubes for a wider range of uses Let us match our experience with yours KEN-RAD TUBE & LAMP CORPORATION and KEN-RAD TRANSMITTING TUBE CORPORATION

KEN-RAD

OWENSBORO KENTUCKY U S A

Important Openings for ENGINEERS & TECHNICAL MEN



The following engineering positions with Bendix Radio, Division of Bendix Aviation Corporation in Baltimore, Maryland, are open. The salary is open and depends only upon the ability and experience of the engineer.

- 1 Electronic and radio engineers to design electronic navigation and communication equipment for aircraft.
- 2 Mechanical engineers familiar with and interested in the design of small precision equipment and familiar with shop practice and tools.
- 3 Engineers familiar with the design of components for electronic equipment.
- 4 Technical men able to write technical material for instruction books.

These positions are not for the duration only, and can be permanent for the right men. There are excellent opportunities for advancement.

Engineers with experience as outlined are preferred, but the right persons do not need experience if they have the ability to learn and the required aptitude. Applicants may be male or female. Persons already engaged in war work cannot be considered.

*Write directly to Chief Engineer, Bendix
Radio Division, Baltimore, Maryland, giving
complete details of education and experience*

BENDIX RADIO DIVISION

THE INVISIBLE CREW

PRECISION
EQUIPMENT &

Bendix
AVIATION CORPORATION



The Communication Systems Must Not Fail

AS the convoy of vital cargo inches its way toward sea, communication between patrol planes and the ships must be kept open. The communication systems must remain operative at all times for instant warnings of danger.

This is another service requiring transformers fitted to the job—and the long experience of Jefferson Electric in the field of radio and communication systems has been applied to the production of the particular types of transformers required for "walkie-talkies", Naval and airplane communication systems.

Realizing that failure of but one transformer may cause the loss of men, ships, planes and vital cargoes, our engineers and production force have taken additional steps to safeguard the traditional and uniform high quality which is more necessary today than ever before. JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago), Illinois. Canadian Factory: 60-64 Osler Avenue, West Toronto, Ontario.



TRANSFORMERS

formation covering most of the details examined so that the reader can make further study on any particular aspect desired. It also contains a list of the many papers and reports presented during the meetings but not reviewed in this edition of the book.

NEW LITERATURE

Abrasive Cut-Off Wheels

Four pages are devoted to diamond abrasive cut-off wheels in a pamphlet issued by the Felker Mfg. Co., Torrance, Calif. The wheels are designed for quartz cutting. Bonding the diamonds to the periphery of the wheel is accomplished by locking them in a radial pattern. Prices and specifications are included.

Metal Duplicating Without Dies

A very complete 32-page booklet issued by O'Neil-Irwin Manufacturing Co., Minneapolis, Minn., tells of the company's precision machines used for duplicating and forming parts without dies. The last page of the booklet is a question and answer sheet, containing 26 questions and answers about the precision equipment, benders, brakes and shears.

Pilot Light Assemblies

An 8-page booklet showing the Gothard Mfg. Co., 1300 N. 9th St., Springfield, Ill., pilot light assemblies for marine, aircraft, Signal Corps and industrial applications, covers a complete range of types and sizes. Dimensional diagrams and prices are included for the standard models.

Acme Electric War Production Transformer Catalog

In a Bulletin 159 just issued, The Acme Electric & Mfg. Co. of Cuba, New York, lists standard specifications and mounting means of audio transformers, driver transformers, interstage transformers, reactors, microphone input transformers for air-borne equipment and transmitter transformers and reactors for mobile equipment. In addition to specifications covering such units, a chapter is devoted to the explanation of transformer compounding.

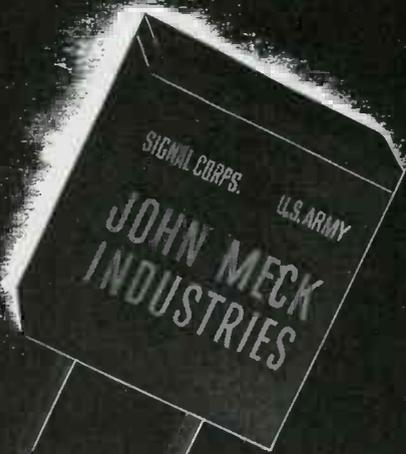
Electrical Aircraft Instruments

Prepared especially for use in student training, a booklet entitled "Electrical Aircraft Instruments" has been published by Weston Electrical Instrument Corp., Frelinghuysen Ave., Newark, N. J. The first two chapters of this booklet



**I KNOW WHERE
YOU CAN GET
CRYSTALS
IN A HURRY**

If you need crystals—promptly—not TOO many—we can supply them. We have set up a special Crystal Service to handle rush orders to small-lot users—in a hurry. When you write—or better yet—phone, a competent crystal engineer will immediately be assigned to your project to insure accuracy, as well as speed. Our service today makes friends for the future for our Family of Activities in the field of Sound and its projection.



Phone **CRYSTAL SERVICE DIVISION
PLYMOUTH THREE THREE**

JOHN MECK INDUSTRIES
PLYMOUTH, INDIANA





For many years Carter Dynamotors have been widely accepted for the High Standard they have created in the Radio Communication field. Dependability, extra efficiency, durability and originality of design are some of the qualities built into every Carter product. It is this traditional pride and workmanship that has made Carter a famous name in radio for over twenty years, and that will continue on in leading the industry with new and original advanced developments.

HIGH STANDARDS

SEND FOR OUR
New Catalog

A new and different catalog of Dynamotors, Magmotors, Converters, Permanent Magnet Hand Generators, etc., is yours upon request.



Carter Motor Co.
Chicago, Illinois

1609 Milwaukee Ave. Carter, a well known name in radio for over twenty years. Cable: Genemotor

NEW LITERATURE

cover the elements of an electrical circuit, and electrical instruments in general. Following chapters cover various types of electrical flight, engine and radio instruments in detail. Included are circuit diagrams, curves, parts illustrations, etc., in 36 pages of text with over 75 illustrations. Copies of the booklet are available at 25c each; in quantities of 20 or more, at 15c each.

Radio Parts

"Mr. Purchasing Agent! Your plant is fighting America's war—keep it rolling" is the way a four-page bulletin published by Sun Radio Co., 212 Fulton St., New York, calls to the attention of the reader the importance of production schedules. The radio and industrial electronic equipment distributed by the company is listed.

Factory Intercommunication—

"Tell It to Sweeney" is the title of a handsome new booklet issued by Stromberg-Carlson Telephone Manufacturing Co., Rochester, N.Y., outlining the advantages of its intercommunicator devices for industrial plants and factories in speeding up the war effort. By means of pictures, the booklet shows how difficult it sometimes is for front-office executives to reach plant supervisors, and how modern factory intercommunication can facilitate war production.

Spray Equipment

An interesting 32-page booklet entitled "Eclipse Spray Equipment on the Job" has just been issued by The Eclipse Air Brush Co., Inc., 400 Park Ave., Newark, N. J. Pictures of actual spray operations in various industries such as shipbuilding, aircraft, baking (spraying grease on bread pans), machinery, leather, structural steel, munitions, give the reader some idea of the scope of application.

Wartime Conservation

"Wartime Conservation," a new 96-page booklet just published, contains recommendations by Westinghouse engineers for selecting, applying and using electrical equipment so as to achieve the best possible output with the greatest saving in critical materials.

All recommendations in this new book are in line with policies suggested by the W.P.B. for the conservation of critical materials. A copy of booklet B-3206 may be secured from Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.



TOUGH CUSTOMERS

These men who fight for America . . . we knew them as just boys a few months ago. Now they're the toughest fighting men in the world. Call it the American love of freedom and justice, if you will, that makes them fighting mad. Or let's say simply that they don't like bullies. This much you can count on—they're going to drive a hard bargain with America's enemies.

For the big job they've got to do, they deserve the finest tools that American skill and ingenuity can contrive. We at Simpson are proud and glad to give our best . . . to match their fight with work . . . to produce Simpson Instruments in unprecedented numbers . . . and to wish them Godspeed with every working hour.



SIMPSON ELECTRIC COMPANY
5200-5218 Kinzie Street, Chicago, Illinois

Simpson

INSTRUMENTS THAT STAY ACCURATE

Buy War Bonds and Stamps for Victory





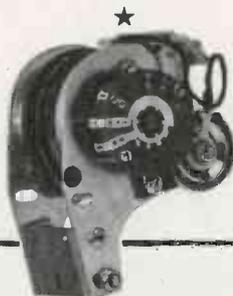
Shown below is a Utah Potentiometer for power-driven machine gun or cannon aircraft turrets. This gunner has feather-touch control of his guns' position—no matter from which direction the enemy may attack. In this precision operation, the Utah part plays a vital role. It has been fitted for that role by split-hair accuracy in manufacture. This is only one of many Utah products now in service with the armed forces.

When there's a Messerschmitt on his tail, equipment must operate with the precision of a fine watch. That's when a "Fortress" gunner appreciates flawless construction. Precision work, however, is no stranger to the Utah factory. Their outstanding reputation in the radio and electrical industries has been built on precision manufacturing. Advanced Utah engineering has kept ahead of requirements. The dependability of Utah parts—long a by-word among radio men and in industrial plants—is now being proved in all parts of the world.

If you have a problem, calling for precision electrical parts, why not take advantage of Utah's extensive experience? Utah makes a complete line of Potentiometers, Rheostats and Attenuators—as well as other electrical parts. Write today for complete information—and see what Utah precision manufacturing and advanced engineering can do for your product. There is no obligation.

UTAH RADIO PRODUCTS COMPANY
850 Orleans Street • Chicago, Illinois

Canadian Office: 838 King St., W., Toronto • In Argentine: UCOA Radio Products Co., SRL, Buenos Aires • Cable Address: UTARADIO, Chicago



UTAH WIRE-WOUND CONTROLS, RELAYS, JACKS, RESISTORS, PLUGS, SWITCHES, MOTORS

NEW LITERATURE

Controlling Specific Gravity

The Ess Instrument Company, George Washington Bridge Plaza, Fort Lee, N. J., has just published a 4-page pamphlet describing "A New Job for the Electric Eye." The instruments manufactured by the company are used to measure light density of gases with phototubes and to indicate reading of sensitive hydrometers measuring specific gravities.

Automatic Control Equipment

A 4-page bulletin describing and illustrating magnetic contactors, remote control switches and automatic transfer switches has been issued by Zenith Electric Co., 152 W. Walton St., Chicago. Units are made to operate from ac to ac, ac to dc or in any combination. Operation is instantaneous, positive and no interruption nor lag in the transfer of a load from normal to emergency service is possible, according to the manufacturer.

Insulating Varnishes

The P. D. George Company of St. Louis, Mo., manufacturer of insulating varnishes and compounds has announced the publication of its new catalog. This profusely illustrated, 36-page varnish guide contains data on over forty different materials, each graphically described in easy-to-read charts. Along with the technical information offered, are illustrations of production and laboratory operations.

Technical Booklet on Design of Plastic Parts

General Electric Company's Plastics Department, One Plastics Avenue, Pittsfield, Mass., announces a new 16-page booklet entitled "Designing Molded Plastics Parts." It is an enlarged edition of a similar 8-page booklet issued last year.

The booklet is technical, and is intended for product engineers. Subjects covered include: inserts, shrinkage, tolerances, wall thickness, holes, undercuts, ribs, bosses, fillets, threads, assembly devices, materials, physical properties, chemical and thermal properties, and electrical properties.

Multiform Glassware

The Multiform process adapted to the manufacture of solid cylinders, plates with many holes, heavy walled articles, coil forms, and hollow cylindrical beads of Pyrex, is described in the Corning Glass Works, Corning, N. Y. new

STUPAKOFF

FOUNDED IN 1897

Ceramics for the World of Electronics

Pioneer Manufacturers of Dependable Ceramic Insulators

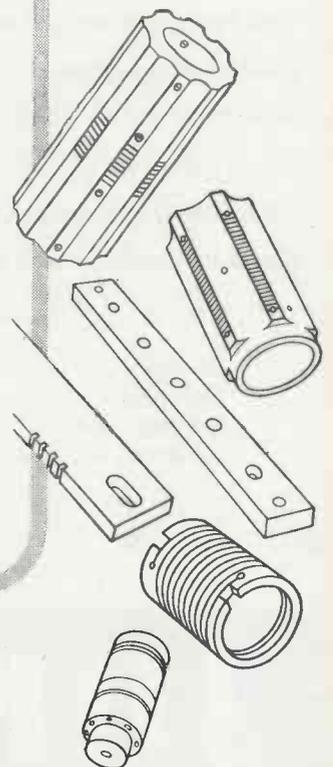
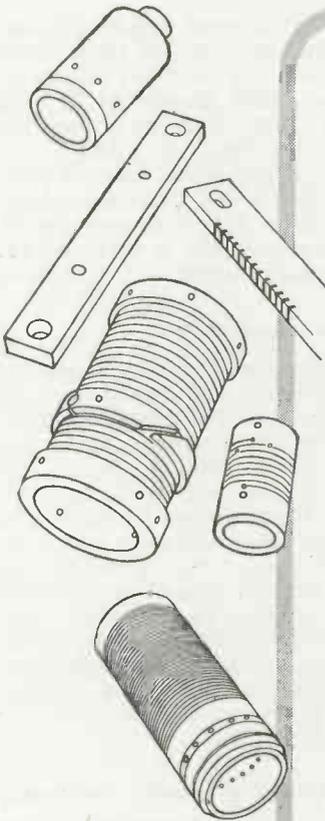
- 1900** The late S. H. Stupakoff, Sr., a former associate of George Westinghouse, establishes his own business in Pittsburgh, Pa., manufacturing pyrometers in which ceramics play an important part. Through research and ingenuity, he revolutionizes the industry by producing pyrometers of far greater accuracy and reliability.
- 1914** World War I cuts off the supply of ceramic protection tubes from Germany. Mr. Stupakoff, aided by the U. S. Bureau of Standards, takes immediate steps to develop tubes that will be equal in quality to those imported. From the beginning, this American-made product proves far superior.
- 1923** Continued research and development leads to widespread application. Stupakoff ceramics used in *first* A. C. radio tube.
- 1930** Stupakoff manufactures daily over a million ceramic parts for the radio tube industry.
- 1936** Kovar,* alloy for sealing to hard glass, fabricated and distributed by Stupakoff in many forms and shapes for various applications.
- *Trade Mark 337962, Registered in U. S. Patent Office
- 1940** Increased manufacturing facilities needed for expanding line. Stupakoff moves to larger, modern plant at Latrobe, Pa.
- 1943** Stupakoff is equipped to produce *every type of ceramic used by the electronic industry*. Today our ceramic manufacturing facilities are devoted 100% to the production of "radio grade" ceramics for the war program. An experienced engineering staff is ready at all times to assist you in the development of ceramic parts for war products.

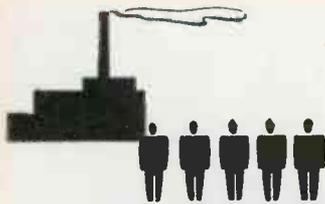
**STUPAKOFF CERAMIC AND MANUFACTURING CO.
LATROBE, PA.**

STUPAKOFF

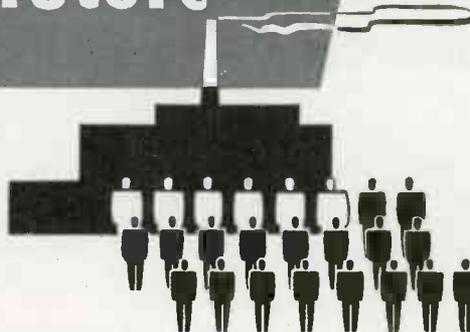
Steatite

INSULATORS





GROWTH...
for the future



For military reasons, there are many things we cannot tell—facts that would give aid (not comfort) to the enemy—figures from which Schickelgrueber et al could get an idea of American radio and mobile equipment production. We can tell you that in slightly over two years we have expended our floor space to four times the former amount (our own buildings, not rented space), the number of employees to ten times, and dollar production to fifteen times. All of this additional capacity is being used to produce the same type of parts we have always manufactured—tube sockets, insulators, plugs and jacks, inductors, condensers, and similar items. It is being used to produce war material exclusively.

To those now requiring these or similar parts—if they will help win the war, send us your inquiries. Catalog 967 free on request.



JOHNSON
a famous name in Radio

NEW LITERATURE

bulletin. Properties, mechanical and dielectric strength, design suggestions for the use of the glass, as well as tables of characteristics and comparative properties of glasses and ceramic materials are included.

Electrical Connectors

Type AN 82-page Electrical Connector Bulletin has just been issued by the Cannon Electrical Development Co., 3209 Humboldt St., Los Angeles, Calif. Well illustrated, the booklet contains, in addition to general information and tabular matter, pages on junction shells, cable clamps, dust caps, receptacles, bonding rings and a total of 167 insert arrangements with wire data.

Selenium Rectifiers

A 4-page bulletin describing the characteristics and advantages of B-L Selenium Rectifiers, is published by The Benwood Linze Co., 1811-19 Locust St., St. Louis, Mo. Charts showing efficiency; approximate ac input voltage; overload vs. operating time; ambient temperature derating table; forward and reverse voltage drop characteristic; output voltage vs. ambient temperature with normal load and constant applied ac volts; regulation, single phase rectifier; and rectifier circuits and output wave forms, are included.

Manual of Electronic Servicing

Allied Radio Corporation, 833 West Jackson Boulevard, Chicago, announces publication of a new pocket-sized manual, written by Major J. G. Tustison, U. S. Army Signal Corps, formerly electronics engineer with EPRI and Altec Service Corporation.

The booklet describes practical field-tested short-cut methods for servicing electronic and radio devices, with only the simplest equipment and tools. Many methods described are those used by our armed forces for servicing equipment in the field of operations.

Engineers will be interested in the application of principles for practical servicing of radio and electronic units without the use of complex test instruments. This handy booklet includes color code information on resistors, condensers, power and audio transformers, IF transformers, and speaker lead and plug connections.

Copies of the publication are offered free to engineers, who send in requests on firm letterheads. Regular sale price is 10c. Special quantity prices are extended to industrial organizations who purchase publication for distribution to their employees.



Tubes bouncing around



MILLIONS of electron tubes bouncing around in tanks, jeeps and ships are equipped with sturdy, efficient SPEER Graphite Anodes. Today the entire output of Speer Anodes is going into tubes for war service. The lessons learned from the performance of tubes will help produce even greater SPEER Anodes for radio transmission and power tubes when victorious peace has been won.

SPEER Graphite Anodes release strategic metals, add power and life to tubes. Only anodes of graphite can never fuse or even soften, will not warp, help keep tubes gas-free.

Use tubes with SPEER Graphite Anodes—for important war jobs now, for every transmission service when the American Victory has been won.

Anode Booklet and list of tube manufacturers using SPEER Graphite Anodes gladly mailed upon request.



SPEER
CARBON COMPANY
ST. MARYS, PA.
 CHICAGO · CLEVELAND · DETROIT
 MILWAUKEE · NEW YORK · PITTSBURGH

**"...IN-RES-CO
resistors have
that essential
designability"**



★ Manufacturers of sensitive equipment for industrial and military needs, have found the integrating advantages of IN-RES-CO resistors of particular importance where space is limited. These exceedingly compact components offer dependability under severe atmospheric and electrical conditions because each must pass a voltage breakdown overload test of 100% their rated working voltage. Literature will be sent promptly on request without obligation.

TYPE RL (at left), 1/2 Watt, Non-inductive, Standard tolerance 1/2%, Maximum resistance 500,000 ohms, Size 1/2" diam. x 1/2" high.

TYPE SL (at right), 1 Watt, Non-inductive, Standard tolerance 1/2%, Maximum resistance 1 Megohm, Size 1/2" diam. x 15/16" high.



**INSTRUMENT
RESISTORS COMPANY**

25 AMITY ST., LITTLE FALLS, N. J.

ASSOCIATION NEWS

RMA Polling Members on "Electronic" Name

In connection with future commercial development of electronic apparatus, the RMA Executive Committee is understood to have arranged for a survey of opinion from the RMA membership as to whether or not the name of the Association should be changed to provide for its specific inclusion. The survey will be made by the Organization and By-Laws Committee, of which past-president Leslie F. Muter of Chicago is chairman. Recommendations will be made to the RMA Board of Directors at its next meeting, scheduled for April, for possible future action by the entire RMA membership.

Conventions and Meetings Ahead

Radio Club of America (11 West 42nd Street, New York), March 11, Columbia University, New York.

American Physical Society, New York Section Meeting, March 26, New York.

Society for Measurement and Control, New York Section Meeting, March 30, New York.

Electrochemical Society (Colin G. Fink, Columbia University, New York), April 7-10, Hotel Roosevelt, Pittsburgh.

American Mathematical Society, April 22-24, New York.

American Institute of Electrical Engineers (H. H. Henline, 29 West 39th Street, New York), District Technical Meetings (April 8-9, Pittsfield, Mass., and April 28-30, Kansas City, Mo.; National Technical Meeting, June 21-25, Cleveland, Ohio.

American Chemical Society (Alden H. Emery, 1155 Sixteenth Street, N.W., Washington), April 12-16, Indianapolis.

National Electrical Manufacturers Association (W. J. Donald, 155 East 44th Street, New York), Spring Meeting, April 19-23, Chicago; Annual Meeting, Oct. 25-29, Waldorf-Astoria Hotel, New York.

American Society of Mechanical Engineers (Ernest Hartford, 29 West 39th Street, New York), Spring Meeting, April 26-28, Davenport, Iowa.

American Institute of Chemical Engineers (50 East 41st Street, New York), May 10-11, New York.

Acoustical Society of America (Wallace Waterfall, 120 South LaSalle Street, Chicago), May, New York.

American Society for Testing Materials, June 28-July 2, Pittsburgh.

Associated Police Communication Officers, Inc. (Buffalo, New York), July, Buffalo, New York.

American Welding Society (Miss M. M. Kelly, 29 West 39th Street, New York), Oct. 18-21, Chicago.

N. Y. Society for Measurement and Control

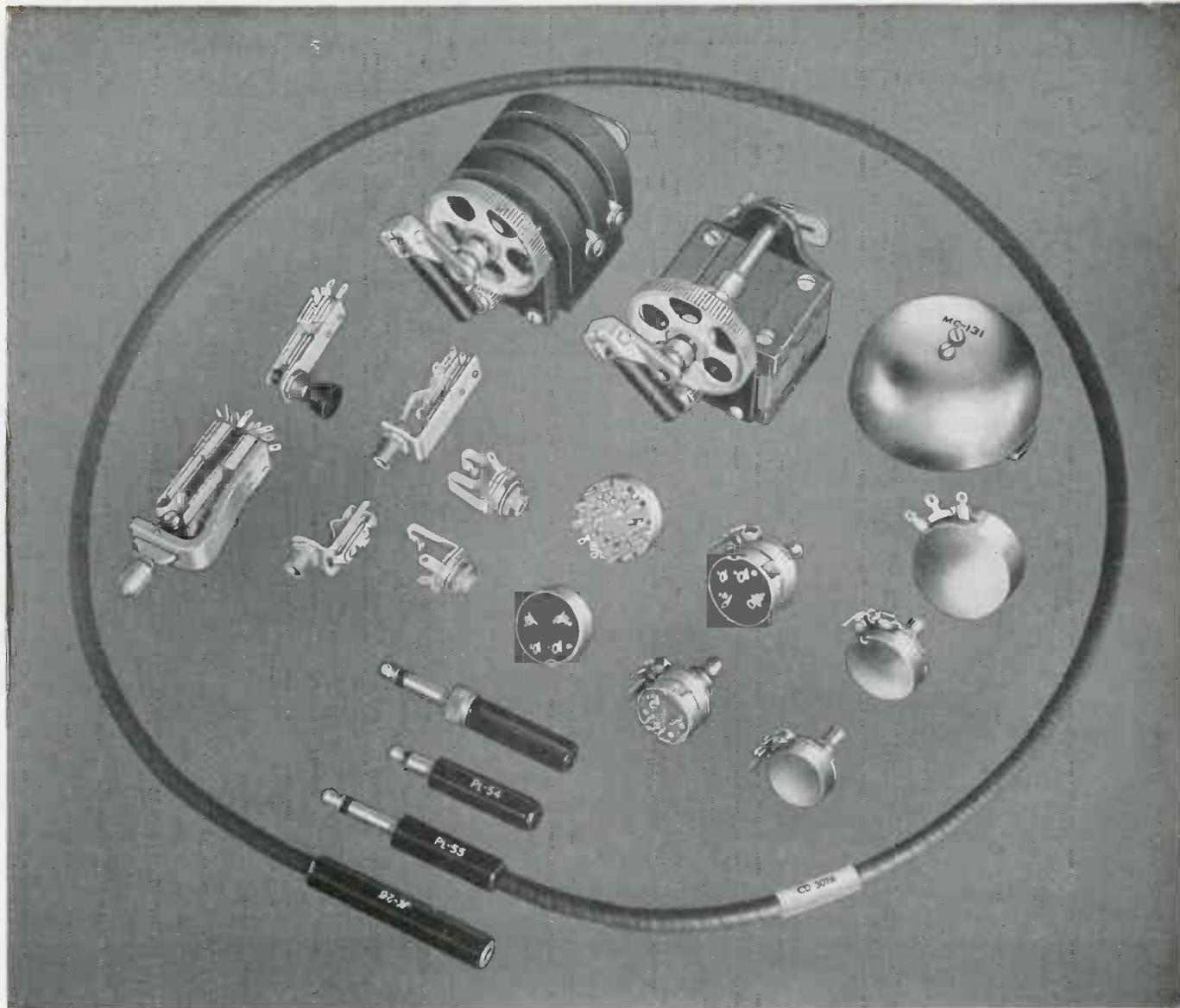
The New York Society for Measurement and Control at its meeting on January 26, elected C. O. Fairchild, C. J. Tagliabue Mfg. Co., president; P. G. Weiller, Kollsman Instruments, vice-president; R. K. Farnham, "Instruments" magazine, secretary, and E. E. Corbett, C. J. Tagliabue Mfg. Co., treasurer. The executive committee consists of Lieut. H. R. Kalbfleisch, U. S. N.; Herbert Proske, Wheelco Instruments Co.; Ward O'Connor, Lummus Co., and J. C. Banks, N. Y. School of Aircraft Instruments.

At the meeting on February 23, Dr. P. G. Weiller of Kollsman Instrument Division of the Square D Company, spoke on the subject of "Instruments—the Buyer and the Seller." The meeting was held at Churchill's Terminal Restaurant, 60 E. 42nd Street, New York City.

Chairman Electronic Section, A.I.E.E.



Dr. S. B. Ingram, who has been elected chairman of the new electronic section of the American Institute of Electrical Engineers, is a leader in electron-tube subjects at the Bell Telephone Laboratories, 463 West Street, New York City. William C. White, director of the electronic laboratories of the General Electric Co., at Schenectady, N. Y., is vice-chairman of the new A.I.E.E. Section.



**46 YEARS AS MANUFACTURERS OF TELEPHONE EQUIPMENT
22 YEARS AS MANUFACTURERS OF RADIO COMPONENTS**

Serving a greater field than ever before with the same high quality workmanship and service that our old customers have been accustomed to for many years. Now offering a greater line of products than ever before.

- VARIABLE RESISTORS—Carbon and Wire-wound.
- SWITCHES—Separate and in Combination with Variable Resistors.
- PLUGS
- JACKS
- KEY SWITCHES
- PUSH SWITCHES
- TELEPHONE RINGERS and GENERATORS

In addition we are manufacturing several telephone and radio components and assemblies for special Government applications.

We earnestly solicit your inquiries.

**CHICAGO TELEPHONE SUPPLY CO.
ELKHART, INDIANA**

BRANCH OFFICE, 401 N. BROAD STREET

PHILADELPHIA, PENNSYLVANIA



Identical Specs for Army and Navy Radio

The three goals of (1) cheaper production costs, (2) greater quantity, and (3) top-flight quality in radio components are being met under a program sponsored by the WPB Radio Division to assure the use of single sets of specifications in the production of components parts for radio and electronic equipment for the armed services. These standardization agreements which are being worked out by the Army and the Navy working with the War Production Board, cover a long list of insulating materials and electronic components.

Initiated by the WPB about six months ago, a standardization program covering 12 important components is expected to be completed by end of March, and at least 40 or 50 standards will be approved by the end of June. According to present estimates, by the end of 1943 a complete standardization of specifications for military electronic equipment will be in effect with production on the simplified components going ahead full-speed in present plant facilities.

S. K. Wolf heads work

Overall administration of the program is housed in the War Radio Committee, headed by Sidney K. Wolf of the WPB Radio Division. The Committee's membership also includes representatives of the Army, Navy, Institute of Radio Engineers, American Standards Association, and prime and sub-contractors. Working with the master committee are 44 task committees, each of whose job is the standardization and simplification of one or more radio components.

Identical specifications for Army and Navy use have already been completed on fixed mica-dielectric capacitors, cutting down the number of types from 10,000 to 2,000. Agreement by the armed services on specifications for electrical indicating instruments has also reduced the number of types from 90,000 to 2,100.

Components interchangeable

The simplification of military components will mean greatly increased efficiency on both the production and operating fronts. Use of the same specifications for the Army and Navy will provide for the interchangeability of many replacement parts destroyed in battle. On the production side, the joint program unifies production methods in a given plant and allows the merging of previously segregated inventories. Finally, elimination of separate Army and Navy specifications does away with the necessity of

WE CAN HANDLE SUBCONTRACTS THAT REQUIRE:

- Radio, Electronic or Mechanical Engineering
- Completely Equipped Tool Room
- Automatic Screw Machines
- Hand Screw Machines
- Swaging Operations
- Punch Presses
- Drill Presses
- Threading Operations
- Lathe Operations
- Milling Operations
- Foot Presses
- Wire Braiding
- Light Section Spot Welding
- Intricate Soft and Silver Soldering
- Buffing and Sanding
- Careful Inspection
- Parkerizing
- Plating
- Painting or Spraying
- Infra-red Baking or Air Dried Finishing
- Intricate Mechanical and Electronic Assemblies



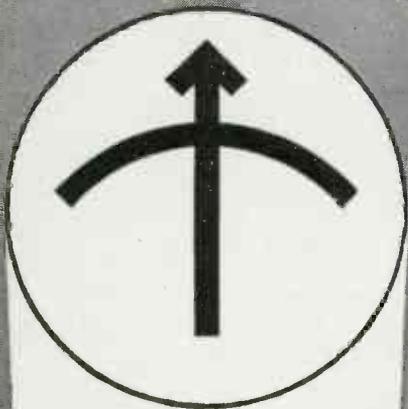
We offer the facilities of our two modern plants to any manufacturer faced with production problems. Our equipment is particularly well adapted to turning out intricate mechanical or electronic assemblies, and we would prefer work involving our assembly department. However, we can accept contracts for any one or more of our production units, except that we are not interested in work which involves only our screw machines.

Our two plants comprise 72,000 square feet of floor space, and we have several hundred trained employees on our payroll. Expert engineering and development services are available. Our company is well financed and now engaged in prime and subcontracts for war production, but is able to take on considerably more.

Address all inquiries to The Ward Products Corporation, 1523 East 45th Street, Cleveland, Ohio.



The **WARD PRODUCTS CORP.**
CLEVELAND, OHIO



LABORATORY STANDARDS

Standard Signal Generators

•
Square Wave Generators

•
Vacuum Tube Voltmeters

•
U. H. F.

Noisemeters

•
Pulse

Generators

•
Moisture Meters

MEASUREMENTS CORPORATION

Boonton, New Jersey

separate tests of the components and allows a single military laboratory to test components for use by either of the services.

As part of the military radio program, a task group to determine the form in which the WPB should report 1943 requirements of fixed capacitors in the manufacture of military radio was named at the first meeting of the Industry Advisory Committee on Fixed Capacitors held in Washington recently with the WPB and armed services. Shortages of aluminum, copper and difficulties in obtaining skilled labor were given as the principal production obstacles at the meeting. WPB Radio Division official Elmer Crane presided over the meeting.

WOR's 20,000-hour Tubes

With transmitter tubes high on the list of broadcast equipment that is no longer available, the three longevity records for tubes made by WOR during 1942 came at an opportune time.

The most recent of these lifetime accomplishments was set by a tube installed in WOR's 50,000-watt transmitter almost three years ago. A few months ago—19,557 hours later—this tube was finally retired. It had been in service nearly 20 times its lifetime guarantee of 1,000 hours and closely approached the 20,691 hour span established by a similar Western Electric tube in the same WOR transmitter on June 15. The latter is a record for this type of tube. A third tube completed the outstanding wartime stint of 18,386 hours during the year.

WOR engineers point out that such long tube life results not only in a considerable saving of critical materials, but materially reduces operating costs. When the 20,691-hour patriarch finally burned out, WOR statisticians calculated that the filament cost of the tube was reduced from 48 cents per hour to 2.31 cents per hour.

Changes at Tung-Sol

In announcing recent changes at Tung Sol Lamp Works, Inc., Newark, N. J., R. E. Carlson, vice president, made some comments that apply to many companies in the electronic industries.

"Channels of distribution are changing so that we must keep in touch with old business associates and make new ones. In fact, the only constant thing is Change.

"Impact of the war on our civilian economy has naturally affected our own operations in many ways. We are limited by Government order in the amount and kind of goods we can manufacture and sell

"All Out"

For the Duration

WE'RE WORKING FULL SPEED TO HELP WIN THE WAR.

GREATER FACILITIES, INCREASED PRODUCTION—THAT'S OUR AIM TODAY.

WHEN VICTORY IS ACHIEVED, WE WILL AGAIN BE MAKING QUALITY RADIOS AND YOU WILL STILL SAY

If you want Something Better, demand

DEWALD RADIO

DeWALD RADIO MFG. CORP.
440 Lafayette St. New York City



SOUND is the backbone of coordination . . . in this World Wide War. An enemy squadron approaches a battleship . . . "calling all men to their stations" . . . and in no time all guns are going full blast. Atlas Sound Equipment . . . clear, reliable, weather proof . . . is lending its voice in all theatres of war, doing an exacting task dependably. ★ Our craftsmen and machines can handle minor conversion of our regular precision line . . . we will be glad to discuss your problems with you.

Complete Atlas Sound Catalog on request



ATLAS SOUND CORPORATION

1448 39th Street, Brooklyn, N. Y.



ULTRA SENSITIVE MULTITESTER

20,000 OHMS PER VOLT

The R.C.P. Model 461 Ultra Sensitive Multitester provides a wide range of measurements and features required for general laboratory purposes. It is also ideally suited for field and shop measurements on military, naval and Radar equipment.

Sensitivity of 20,000 ohms per volt on all D.C. measurements results in negligible loading of delicate circuits. Wide scale, 4½" rectangular meter used, with a movement of 50 microamperes. Readings as low as 1 microampere can be made on the 100 microampere scale.

A.C. voltmeter sensitivity is 1,000 ohms per volt. Meter movement is 2% accurate. Shunts and matched pair metallized voltage multipliers accurate to within 1%. A suppressor type copper oxide rectifier is used.

RANGES:

D.C. voltmeter:	0-2.5-10-50-250-1,000-5,000 volts.
A.C. voltmeter:	0-2.5-10-50-250-1,000-5,000 volts.
Output voltmeter:	0-2.5-10-50-250-1,000-5,000 volts.
D.C. microammeter:	0-100 microamps.
D.C. milliammeter:	0-10-100-500 milliamps.
Ohmmeter:	0-1,000-100,000 ohms; 10 megohms.
db meter:	minus 10 to plus 55.

Over all dimensions of the model 461 are 7" x 5½" x 3". Complete with self-contained battery supply and convenient leather handle . . . net. **\$34⁵⁰**

Other instruments in the complete line of R.C.P. electronic and electrical instruments described in Catalog No. 126. If you have an unusual test problem—either for production or laboratory work—our engineers will be happy to cooperate in finding the most efficient solution.

RADIO CITY PRODUCTS COMPANY, INC.

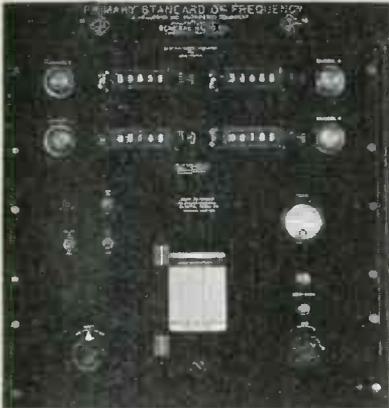
127 WEST 26th STREET • NEW YORK CITY



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



The stroboscopic clock is for comparison of integrated oscillator frequency with radio time signals. The hand on the dial at the left indicates seconds; the two hands at the right indicate the tenths and thousandths of seconds. The received time signal flashes a stroboscopic lamp, which arrests the motion of the tenth and thousandths-second hands once each second. The precision of reading is about 0.0002 second, which is equivalent to approximately two parts in one billion for a twenty-four-hour interval. Variations in radio-time-signal transmission, of course, make it impossible to utilize this precision completely.



Note the recording panels which show the beats between pairs of oscillators. The deviation from a vertical line is a measure of the variation in frequency of one oscillator with respect to the other, as indicated by the scale at the bottom of the chart. The precision of reading can be increased or decreased if desired. Beats are recorded between each of four oscillators and a common reference oscillator. If all beat records show identical deviations, the reference oscillator is drifting, while if only one line deviates, the drift is in the oscillator being measured.

Above the recorder are counters which indicate the time in seconds for a predetermined number of beats.

THE MASTER STANDARD OF FREQUENCY

Nearly twenty years ago, the General Radio Company started a program of research and development in the field of frequency standardization, which has produced many general-purpose and specialized frequency measuring instruments for the world's civil and military communication systems.

The center of this research program is the master primary standard of frequency shown here, which supplies standard frequencies for the calibration of General Radio instruments and for measurements in the General Radio laboratories. Consisting of five quartz-crystal-controlled oscillators, with means for timing and intercomparing their frequencies, this standard is far more accurate than present-day commercial requirements. In addition to the frequency standard itself, the racks shown in the photograph include experimental equipment in which new circuits and methods are proved before their incorporation into commercial instruments.

To implement the production of military radio equipment, General Radio frequency measuring instruments are now more important than ever before. Their continued reliability and accuracy are assured by this master standard and the unceasing research program associated with it.

for civilian use. Travel restrictions make it more difficult to contact customers. We have lost personnel to the armed forces or to other war work.

"In order to obtain the best operating efficiency, the following changes in Tung-Sol organization are being made: G. A. Bodem, formerly in charge of exports and radio-tube equipment sales, is now sales manager for radio tubes, lamps and special products. The market research and advertising department are combined with W. B. Masland as manager. Mr. Masland, formerly renewal sales manager, is now on loan to the War Production Board in Washington.

Behavior of Dielectrics

"The Behavior of Dielectrics Over Wide Ranges of Frequency and Temperature" was discussed by Robert F. Field, engineer of the General Radio Company, Cambridge, Massachusetts, at the February 11 meeting of the Radio Club of America.

Changes in dielectric "constants" at zero, infinite, and certain critical frequencies were shown to be the result of dipole or interfacial polarization, defined by parameters whose values are found by plotting loss factor against dielectric constant, or by an analysis of current-time curves of the dielectric. Although a great deal of work is still to be done, Mr. Field has made important contributions to the study of dielectrics in this paper.

Manpower Studied by SSS

Of importance to the electronic industries in the retention of their engineering and technical staffs is the idea, now being studied, to have the Selective Service System expand its policy recently enunciated in regard to the blanket draft exemption of "physicists" so as to cover the higher technical brackets of electronic radio and electrical engineers. The SSS has already issued an occupational bulletin granting temporary deferment to radio engineers and draftsmen, as well as radio service repair men.

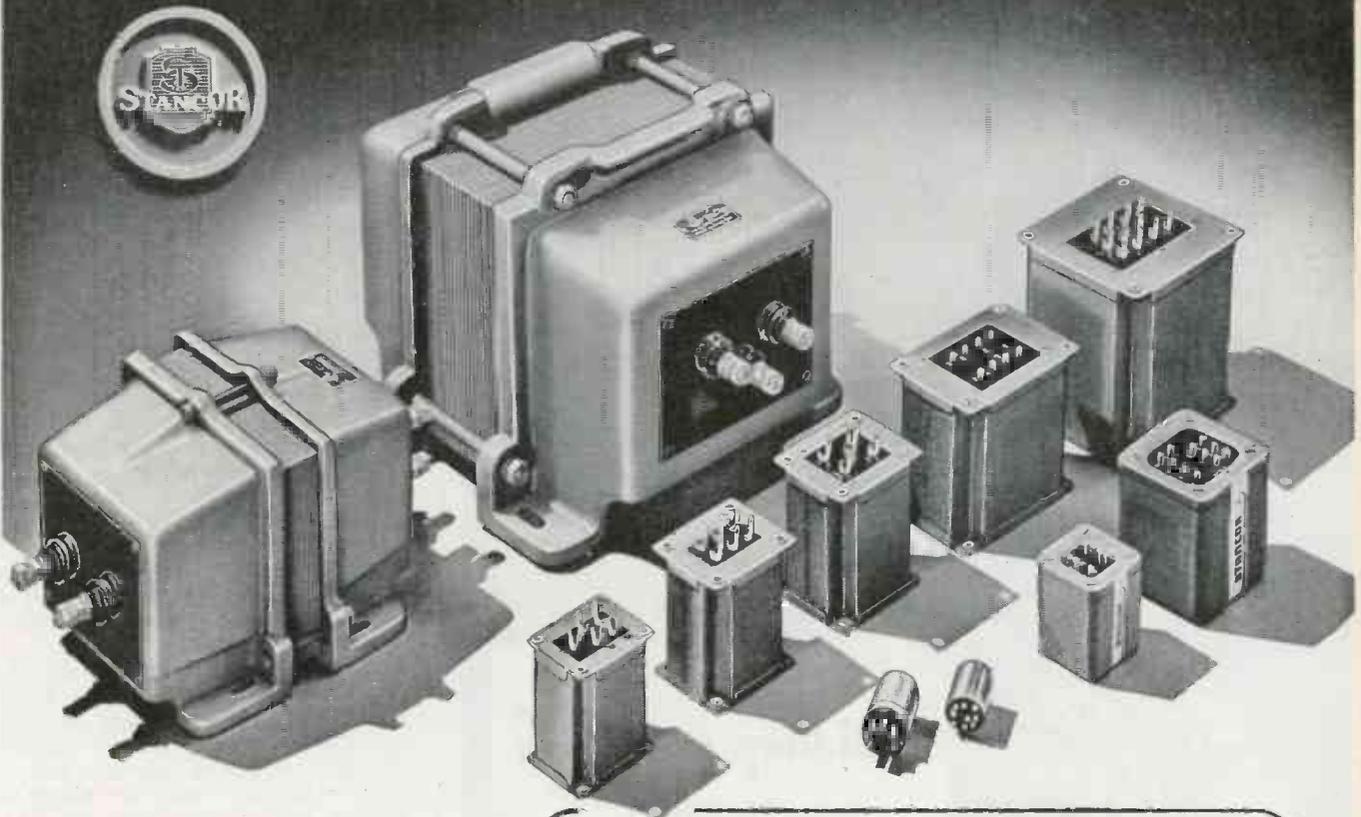
But the manpower situation in regard to engineers and technicians, both in the future and after the war, is viewed in some quarters with concern. If the war should last a long time, there are some opinions that the electronic and radio fields may have a difficult time in obtaining sufficient technical personnel. It has been pointed out that with the draft age starting at 18 years, the SSS policy of last November deferring engineering students who have completed a year's study, may not be feasible because the average age of stu-



GENERAL RADIO COMPANY
Cambridge, Massachusetts

New Available . . .

STANCOR PROFESSIONAL SERIES TRANSFORMERS



THE Stancor Professional Series Transformers are now available to manufacturers who are doing essential war work. Built to fit many needs, the multiple features of these transformers combine to make them the finest and most versatile group of units Stancor ever has designed.

Sound engineering, highest quality materials and precision manufacturing have won these transformers highest acclaim.

For information write for catalog No. 240 or contact our representative nearest you. See list at right.

SALES OFFICES IN PRINCIPAL CITIES

WIRE OR CALL THE NEAREST STANCOR SALES OFFICE

ATLANTA
Main 5878

DENVER
Emerson 2437

NEW YORK CITY
Rector 2-1423—2-5334

BOSTON
Hancock 0200

DETROIT
Vermont 7-5310

PHILADELPHIA
Walnut 3575

BUFFALO
Washington 2517

KANSAS CITY
Victor 7057

ST. LOUIS
Franklin 0482

CLEVELAND
Academy 4932

LOS ANGELES
Richmond 6363

ST. PAUL
Emerson 8619

COLUMBUS
Adams 8928

MEMPHIS
2-0612

SAN FRANCISCO
Hemlock 2625

DALLAS
Tennessee 37093

MILWAUKEE
Concord 7799

SEATTLE
Main 8811

Main Office and Warehouse • **CHICAGO** • Mohawk 5300

STANDARD TRANSFORMER CORPORATION • 1500 NORTH HALSTED STREET • CHICAGO

STANCOR



THE
"Giddap and Whoa"
 OF THE
War Horses!

United Transmitting Tubes serve with distinction in vehicles of modern war.

Extensively used in communication systems on many battlefronts, these tubes "speak" the "stop and go" signals to mighty cannonading monsters.

To assure maximum reliability, United Electronics depends on Callite Tungsten precision-ground tungsten rod, welds, leads and filaments. Perhaps Callite's extensive

metallurgical experience can assist you in improving the quality and production rate of your product. Why not consult with our engineers today?

Specialists in the manufacture of welds, lead-in wires, filaments, grids, rods, formed parts, electrical contacts, bi-metals and other metallurgical products. *You will greatly facilitate production and expedite deliveries by supplying properly executed Preference Rating Extensions with your orders.*

CALLITE TUNGSTEN CORPORATION

544 39th STREET



UNION CITY, N. J.

CABLE: "CALLITES" • BRANCH OFFICES: CHICAGO • CLEVELAND

dents starting technical college courses is 18. Of course, the deferred engineering students go into the Army or Navy and only a comparative few, disqualified physically, reach industry. The training in industry, too, is not successful in solving the technician shortages because many of the trainees are eligible for the draft after they complete their courses.

For the post-war period, however, the signs seem to favor a good supply of electronic experts and physicists because the Army and Navy in their Reserve courses have had hundreds of reserve officers and technicians at the 70 colleges and universities used for this training. After Feb. 1 the enlisted reserve enrollments stopped except for specialized students.

**Licenses on
 Enemy-Owned Patents**

"Patents at Work, a Statement of Policy by the Alien Property Custodian of the United States," is the title of a booklet that tells the story of the seizure of enemy-owned patents and describes the simple procedures to procure copies and obtain licenses. Under the law, the Alien Property Custodian is given jurisdiction over patents in which any foreign national has an interest.

One passage summing up the general policy of the Alien Property Custodian reads: "For our part we pledge, first, that the patents directly controlled by this agency of Government will be available readily and immediately to serve all American industry, and that active use of the store of technical knowledge which these patents represent will be fostered; second, we pledge that we shall encourage further research on these inventions for the lasting benefit of American industry, American labor, and the consuming public; and third, we shall take all steps within our power to make certain that vested enemy patents are made available forever to American industry." The patents are made available without the restrictions and substantial royalty costs which ordinarily accompany new inventions.

In the booklet, the conditions for issuance of licenses are stated. Information may be obtained from the Office of Alien Property Custodian, Chicago, Ill., and lists of vested patents and patent applications may be secured from the Commissioner of Patents, Washington, D. C., for a nominal charge.

About 50,000 patents, some of great industrial importance, are involved, and they may prove extremely effective in our war effort and in peacetime economy.

*Scientifically Built
for the most Critical
Requirements...*



FAST

Condensers and Capacitors

The recognized quality of FAST products is deep-rooted. It is the result of close to a quarter of a century of specialized experience. Each step in the process of design and manufacture is based on thorough scientific research in the chemistry of raw materials and in dielectrics . . . on engineering skill and manufacturing technique. Each is important in itself . . . together, *all-important*. For it all results in Condensers and Capacitors of high quality, precision exactness and uniformity.

Today, FAST units are designed and built to meet every condition of service on land, sea and in the air. Tomorrow, they will be ready to serve your peacetime requirements better than ever. FAST engineers are glad to help you on any problem.

Standard or Special Units to Meet Every Need...

FAST Condensers and Capacitors are produced in many types and sizes, in standard and special designs, for a great variety of electronic and electrical applications in war and industry. Paper Capacitors—Oil or Wax impregnated—Rectangular or Tubular—in sizes from the smallest to the largest.

Units specially engineered or built to government specifications including thermal cycle and salt water immersion tests.

JOHN E. FAST & CO.

Capacitor Specialists for 23 Years
3129 North Crawford Avenue, Chicago

Canadian Representatives: Beupre Engineering Works Reg'd.
2101 Bennett Avenue, Montreal, for Power Factor Correction
J. R. Longstaffe, Ltd., 143 Berkeley Street, Toronto, for Special Applications

Pin Ball Machines to Signal Corps

Pin ball machines, "one arm" bandits and other similar gambling devices which contain relays, magnets, switches and other parts, are coming out of their habitats of poolrooms, beer joints, rundown drugstores and night clubs to go to war as new volunteers of the Signal Corps.

The electrical components of these machines are being stripped and salvaged for their metals and for any usable parts in Signal Corps apparatus at the Enlisted School of the Eastern Signal Corps Training Center at Fort Monmouth, N. J. Not only is the salvaging proving valuable but the training of the Signal Corps students in the school's "elements of radio" section is being benefitted, the Signal Corps reports.

Signal Corps Procurement

A new Signal Corps Procurement District—the Monmouth Procurement District—has been established at Asbury Park, N. J. It will perform the procurement functions formerly handled by the Signal Corps General Development Laboratory at Fort Monmouth, N. J. and the Signal Corps Laboratory at Belmar, N. J., respectively. The Signal Corps has two other procurement districts—the Wright Field Procurement District, Dayton, O., and the Philadelphia Procurement District.

Donald and O'Connor at Formica's "E" Award

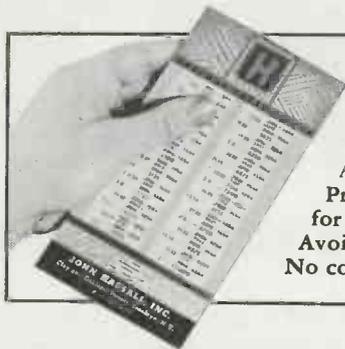


When Formica Insulation Co., Cincinnati, received Army-Navy "E," Feb. 6, a military inspection of plant was made by W. J. Donald, NEMA director, New York, Major H. W. Smith, Major H. T. Shepherd, and President D. J. O'Connor of Formica



SKI POLE POINTS for example

Ski pole points are made on equipment regularly used in the manufacture of HASSALL special nails, rivets and screws. So are metal fasteners for bombers, pursuit planes, training planes, gliders, PT boats, assault boats, parachute harness, belts and thousands of other war needs. Send us your specifications.



Decimal Equivalents Chart FREE!

Accurate to four places.
Printed in three colors
for maximum legibility.
Avoids errors. Saves time.
No cost. No obligation.

JOHN HASSALL, INC.

Established 1850

412 Oakland Street, Brooklyn, N.Y.



Use this coupon
for convenience
in ordering your

Subscription

to:

**ELECTRONIC
INDUSTRIES**

Or, order on your
letterhead giving
same instructions
as in coupon.

ELECTRONIC INDUSTRIES
480 Lexington Avenue, New York, N. Y.

Enter the following subscription for the period checked below
and mail bill.

Please check 1 Year \$3.00 2 Years \$5.00

Your name

Title and position

Name of company

Company address

City State

If magazine is to go to your home fill in here:

Subscriptions accepted only from those who are professionally
active.

E1-C1

This is it!



MICAMOLD

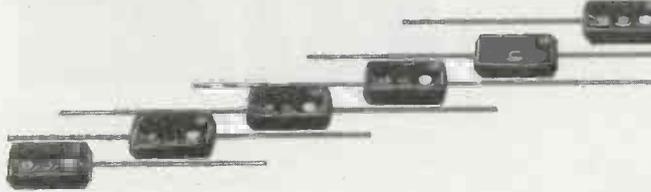
Molded Paper

CAPACITORS

The condenser line which has contributed most toward the elimination of production stoppages during these critical times!

More than eight years ago, *Micamold* pioneered the development of paper condensers molded in bakelite. Throughout the fields of communications and electronics they quickly became accepted as the finest capacitors of their type, and their claim to this honor has not been challenged. Since Pearl Harbor, when the emergencies of war demand breathtaking speed in "getting the goods" to the **Armed Forces**, *Micamold Molded Paper Condensers* have performed as a superb alternate for mica condensers and, as such, have helped save the day on hundreds of occasions.

Remember, please—there is only one **MICAMOLD**—but **there's a MICAMOLD CAPACITOR** for all communications and electronic applications



- RECEIVING AND TRANSMITTING MICA CAPACITORS
- MOLDED PAPER CAPACITORS
- OIL IMPREGNATED PAPER CAPACITORS
- DRY ELECTROLYTIC CAPACITORS
- MOLDED WIRE WOUND RESISTORS

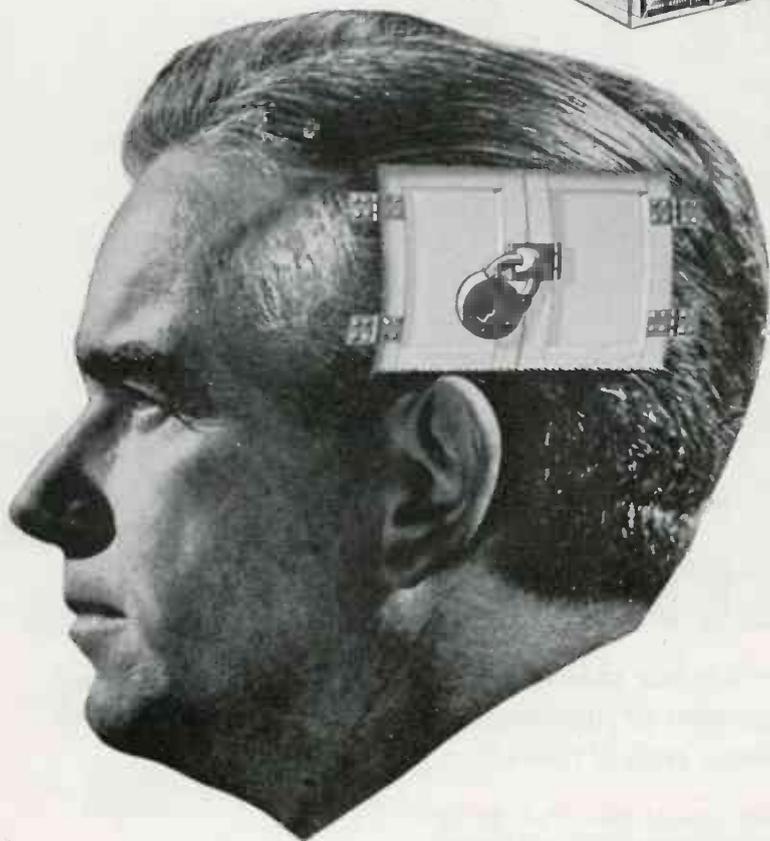
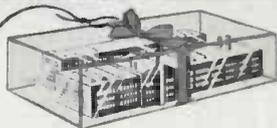
Let **MICAMOLD** help solve your capacitor problems. Write today.

HERE'S ONE GOOD THING YOU CAN'T OVERDO—
Keep buying ^{MORE} War Bonds

MICAMOLD RADIO CORPORATION
1087 FLUSHING AVENUE BROOKLYN, N. Y.



**PACKAGED
PRODUCTION**



BEST TOOLS KEPT HERE

Some of America's most famous companies will tell you that we have exceptionally excellent facilities for precision manufacturing. That's right! But, we maintain that our very best tools are 54 years of "Know What" and "Know How."

When you, too, need Metal Fabrication: Precision Machine Work: Electrical and Mechanical Assembly—"Let Lewyt Do It." Our carefully engineered methods and closely coordinated production controls enable you to shoulder us with the entire production responsibility for a complete product—or a single part. This "Packaged Production" may deliver the best answer to your war production problems and peacetime plans. Prior commitments permitting!

Lewyt
CORPORATION

60 BROADWAY, BROOKLYN, N. Y.

Have You a War Job for Experienced Engineer?

The editors of "Electronic Industries" know of a widely experienced engineer and inventor—with own private laboratory near New York—who is tired of enjoying the fruits of his financial independence and wants to get into war work without delay. He is qualified to take on important electronic or radio research problems or to act in consulting capacity. At our request here is the way he states his case:

"American engineer, 52, financially independent, with 30 years experience in radio and electroacoustics, and patentee of over 100 inventions in these fields, having private research laboratory near New York, is available in a consulting or research capacity preferably on wartime problems."

Address Engineer, care Editor Electronic Industries, 480 Lexington Avenue, New York, N. Y.

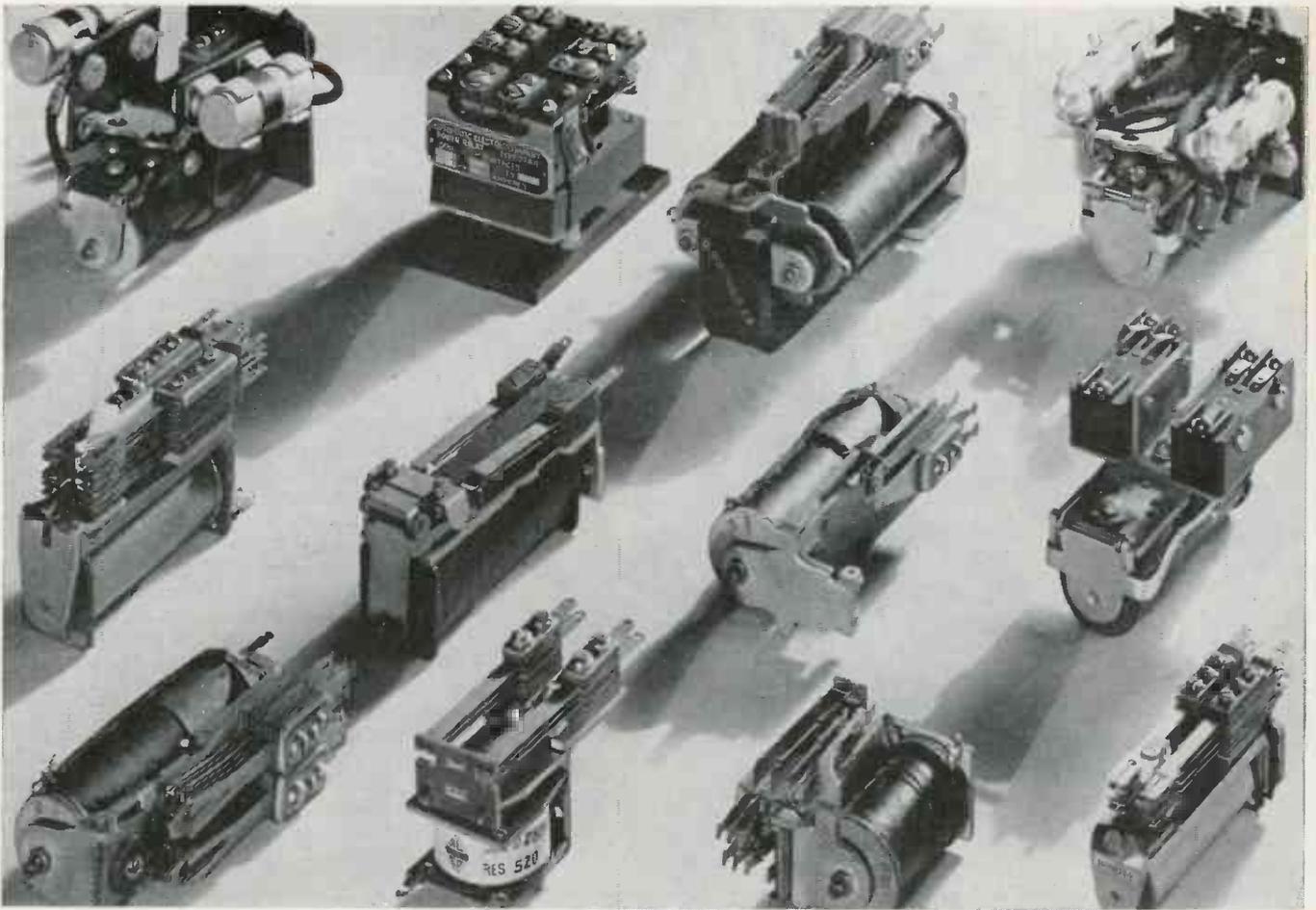
Profit Motive Held Up Radio Detector—Chalkley

The development of "probably the most dramatic new weapon to come out of this war," lagged before the war because the profit motive was lacking, Dr. Lyman Chalkley, Head Economic Analyst at the Board of Economic Warfare, charged in a paper written by him for re-

Kelly Johnson to Navy



John Kelly Johnson, for many years engineer in charge of the Hazeltine laboratories in Chicago, has resigned his position as senior engineer in Hazeltine Electronics Corporation in order to accept the position of special representative assigned to the Office of Procurement and Material of the Office of the Under-Secretary of the Navy. He will assume his new duties with headquarters in Washington, D. C., immediately.



HOW TO SELECT THE RIGHT RELAY FOR YOUR CONTROL PROBLEM

For any electrical control problem, it is easy to find a relay that "will work." But that isn't good enough. You want the one combination that will exactly fit the conditions of your problem, and give you the longest, most dependable service at lowest cost. You can get it by taking these two simple steps:

First, get your copy of the most complete handbook on the subject ever published—the Automatic Electric catalog of electrical control apparatus. In it you will find one or more basic types that will fit your conditions.

Then, if you want competent help in determining the exact coil and contact combination you need, call in our field engineer. He knows from long experience with such problems as yours which particular combination will serve you best.

Follow this dual guide and you can't go wrong, for when you select Automatic Electric relays, stepping

switches or other control devices, you not only get products of proved dependability; you benefit also from the engineering technique that created the dial telephone system—the world's most outstanding example of the application of electrical control to a basic need.

Write today for your copy of the catalog—or simply ask our field engineer to bring one over.



AMERICAN AUTOMATIC ELECTRIC SALES COMPANY
1033 West Van Buren Street, Chicago, Ill.



Relays
AND OTHER CONTROL DEVICES
by **AUTOMATIC ELECTRIC**

WAR EARS

FOR

Uncle Sam!

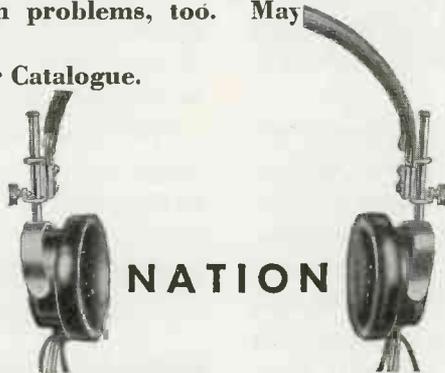


BUILDING "war ears" for the U. S. Army Air and Signal Corps is our job in this war. We're proud of the famous sensitivity and clear reception of our Radio Phones—proud that Uncle Sam is using so many of them. We're proud, too, that we're beating our war production schedules!

Murdock Radio Phones have solved many civilian communication problems, too. May we help you?

Write to Dept. 69 for Catalogue.

THE EARS OF A NATION



Murdock

RADIO PHONES

WM. J. MURDOCK CO.
CHELSEA • MASSACHUSETTS

lease by the American Institute of Public Affairs. "Before the war," Mr. Chalkley wrote, there did not appear "to be any profitable major peacetime uses for this device; therefore it was not subjected to the intensive practical development given potentially profitable inventions."

Mr. Chalkley, whose dissertation on a profit economy was confined to the inadequacy of the profit system to prepare a nation for the demands of total war, pointed out that because of our failure to develop this device, "with the war we had to start almost from scratch, meanwhile losing ships and planes and men because the profit motive had not guided us to its development from the stage of laboratory curiosity to the manufacture of practical instruments."

This war device, which can detect airplanes at night, "see naval vessels through fog and darkness, and do other remarkable things, many of them still secret," works by radio, Mr. Chalkley continued, citing that America is certainly to a large extent the home of the wireless and radio and the country in which most progress has been made in the radio art. For this reason, the lack of its development prior to the war is particularly noteworthy, he pointed out. (Incidentally, the mention of the name of this war device in a public monograph written by a government official is in violation of the censorship rulings of the Army and Navy.)

The discussion of the secret device in Mr. Chalkley's monograph raised objections from the Office of War Information which acting under orders from the Army and Navy has refused to clear for publication any mention of the name of the device, and in its efforts at secrecy has even recently changed the name of the WPB Radio Division to just the "Radio" division.

Industrial Magnet Tube-Operated

Electromagnets have always been an economical means for handling iron parts but have required a special direct-current source. D. B. Clark of the Electron Equipment Corporation, Palm Springs, Cal., has developed a rectifier for lifting magnets which supplies pure direct current to magnets or other industrial loads in amounts of 5 kw or higher. This electronic unit withstands vibration encountered in crane cabs, and the severe loads imposed by lifting magnets. Cost is about half that of a standard motor-generator set, and copper and steel saved totals 500 lb. for the 5-kw size.



FIRST in Ability to "Take It" at Sea

Official U. S. Navy Photograph

I.T. & T. Selenium Rectifiers now "Armored" against Salt Sea and Air... as result of New Assembly Method

Another I. T. & T. First! Now—in addition to the standard assembly—I. T. & T. Selenium Rectifiers can be supplied with a *special assembly*, coated for protection against the corrosive action of salt spray, moisture and humidity.

Thus the organization which was first to introduce Selenium Rectifiers in the United States is now first to extend their many advantages to marine and other high humidity services.

Compact, light, electrically and mechanically stable—with no moving parts to wear out or cause failure—I. T. & T. Selenium Rectifiers have set a standard for the industry.

Now, on the Fifth Anniversary of their introduction, they are prepared to take on the toughest jobs that weather and war can hand them.

Consulting Engineering Service available for specific requirements. For descriptive bulletins address Department F.



Special Assembly Method — showing single metal washer which facilitates protective coating against corrosion



Standard Assembly Method—showing conventional petal-shaped brass contact washer



IT&T Selenium RECTIFIERS

SELENIUM RECTIFIER DIVISION

Federal Telephone and Radio Corporation



1000 Passaic Ave.
East Newark, New Jersey

WINCO DYNAMOTORS

Are On The Job To Get Them
OVER THE SPOT



BERLIN

ROME

TOKIO

Winco Dynamotors are always ready to "dish it out" whether in the numbing cold of the stratosphere or in the flaming desert heat. Right on the job—constant and reliable—they supply power that will keep your communications clear and intelligible.

Simple or complex, whatever your specifications, we believe Winco will meet them. Already our engineers have done marvels in lightening weight, increasing efficiency and eliminating hash. They are at your service for new or special designs. Simply write or wire us. No obligation, of course.

ONLY WINCO GIVES YOU

ALTI-TEMP

The Dynamotor specially designed to insure maximum efficiency at all operating altitudes and temperatures.



WINCO DYNAMOTORS
WINCHARGER CORPORATION - SIOUX CITY, IOWA

Purdue to Train Electronic Co-eds

A comprehensive program designed to turn out trained women radio technicians will be undertaken by RCA Victor Division of Radio Corporation of America, announces F. H. Kirkpatrick, the company's director of personnel.

Comprising the first girl's training school of its kind in the electronics field, the engineering cadettes will earn as they learn at Purdue University in Lafayette, Indiana. Classes will begin around May 1st. A group of from 80 to 100 girls, between the ages of 18 and 22, will be selected from the company's own plants and from colleges and universities. Basic requirements, Mr. Kirkpatrick revealed, are two years of college study with satisfactory grades, some competence in mathematics, good health, and an interest in technical radio work.

The curriculum provides for two terms of 22 weeks each, with 40 class-room hours per week. The cadettes will be given courses of study designed especially to qualify them for immediate assignment on test and quality control work on the electronic, sound, and radio equipment which RCA is building for the armed forces. Cadettes will be paid a salary and will be considered "employees-in-training." All their university expenses will be paid by RCA. The cadettes will live on the Purdue campus and will have the same status as other students.

"E" for Electronic Labs

W. W. Garstang, general manager of Electronic Laboratories, Indianapolis, Ind., holds up his end of the Army-Navy "E" pennant which has just been awarded by Col. R. L. Finkensaedt of the Army Air Forces, on Feb. 2.



I'll
VICTORY
and Beyond

You can count on Wincharger Antenna Towers. They combine strong efficient coverage with built to last qualities that insure you years of service.

Add to these advantages their strikingly attractive appearance plus a sensationally low initial cost and it's easy to see why an ever increasing number of Wincharger Antenna Towers are being used for:

- Commercial Broadcasting
- Police Work
- Signal Corps
- Air Lines
- Ordnance Plants

To be sure for years ahead—be sure to specify Wincharger Antenna Towers.

Makers of
WINCHARGER
FARM ELECTRIC SYSTEMS
WINCO
DYNAMOTORS
WINCHARGER
VERTICAL RADIATORS

WINCHARGER VERTICAL RADIATOR
WINCHARGER CORPORATION SIOUX CITY, IOWA

**FOR INDUSTRIAL HIGH-FREQUENCY
POWER SOURCES**



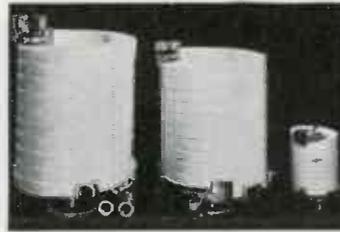
LAPP GAS-FILLED CONDENSERS

In any high-frequency high-power circuit, lump capacitance can most efficiently be provided by Lapp gas-filled condensers. They are ruggedly built to maintain their electrical characteristics under all conditions. Fixed and variable-capacitance models are available over a wide range of power and capacitance ratings. Above is Unit No. 26541, consisting of two No. 25934 units. The assembly provides pivoting bus conductors, arranged so that the units may be used singly, in series, or in parallel, providing capacitance continuously variable from .0022 mf. to .022 mf. Each unit is rated at 200 amp., 6500 volts, capacitance variable .0043 mf. to .011 mf.; the combination in series, 200 amp., 13,000 volts, .0022 to .0055 mf.; in parallel, 400 amp., 6500 volts, .0086 to .022 mf. The small unit in the girl's hands is No. 23722, rated at 50 amp., 7500 volts, capacitance .000045 mf. to .000075 mf.

**ANY REQUIRED WATTAGE AND CAPACITANCE
ZERO LOSS
NO CHANGE WITH TEMPERATURE
COMPACT
PUNCTURE PROOF
SOUND, TROUBLE-FREE CONSTRUCTION**



Standoff, entrance, bowl, and other special-purpose insulators are available in many types. Lapp is equipped also for production of many special assemblies, incorporating porcelain or steatite and associated metal parts.



Lapp porcelain water coils, porcelain pipe and fittings provide a highly efficient means for cooling high frequency tubes. Sludging is eliminated and, with it, need for water changing and periodic cleaning of the cooling system.

Lapp

**INSULATOR CO., INC.
LEROY, N. Y.**



"Making BETTER Connections"

B6999

B6998

7130

7131

7249

7240

7175

B7109

★ The successful functioning of radio equipment between ground stations, planes, ships, tanks and other machines of war depends upon the uninterrupted flow of communication through radio plugs, sockets and connectors. The manufacturing of these important parts has been entrusted, in part, to The Astatic Corporation, its organization and facilities. Production, on a volume basis, is now under way, supplying concerns holding government contracts for radio equipment. Inquiries from qualified manufacturers given prompt attention.

ASTATIC

IN CANADA:
CANADIAN ASTATIC, LTD
TORONTO, ONTARIO

THE ASTATIC CORPORATION
YOUNGSTOWN, OHIO

Thermador Gets "E"



Harrison H. Fogwell, president of Thermador Electrical Manufacturing Co., Los Angeles, made the address of acceptance, and Coast Guard Bandmaster Rudy Vallee played, on Jan. 27, when the Army-Navy "E" was awarded Thermador for "high accomplishment and outstanding production effort"

Planning Post-War Period

Universal Microphone Co., Inglewood, Cal., has announced the formation of its post-war planning department. Long before Pearl Harbor the organization conducted a special laboratory test division for war planning so that the moment war was declared it was possible to become 100 per cent engaged in war work. The personnel of that division was retained and is now the post-war department.

The rapid advance of electronics, and re-tooling plans for post war production, means that tomorrow's microphone will keep pace with the changing scientific trends for private industry and also for mass military operations, according to Universal officials.

Dr. Wheeler and the National Research Council

Dr. L. P. Wheeler, new president of the Institute of Radio Engineers, writes that the mention of the Scientific Advisory Board in his biographical sketch on page 59 of our January issue, is in error—probably having been confused with his work on the National Research Council. Dr. Wheeler has served on several committees of the National Research Council. He is listed under the Council's Division of Physical Sciences as a member of the executive committee of the International Scientific Union (URSI); also under the Division of Engineering and Industrial Research as a member of the Conference on Electrical Insulation.

Under the Sea Pincor Products
Keep 'Em Winning!
DYNAMOTORS * CONVERTERS * GENERATORS
D.C. MOTORS * POWER PLANTS * GEN-E-MOTORS
PIONEER GEN-E-MOTOR
CHICAGO, ILLINOIS
EXPORT ADDRESS: 25 WARREN STREET, N. Y., N. Y.
CABLE: SIMONTRICE, NEW YORK

Communications from Westinghouse

Capacity is available to produce the following products for early delivery to communications equipment manufacturers. Watch this board for latest lists of manufacturing capacities.

PRESTITE—CERAMICS

"Solder-Seal" hermetically tight bushings and terminal boards. Mechanical bushings, standoff insulators, coil forms. Grade "F" characteristics.

BI-METAL THERMOSTATS

Both strip and disc type. Overheating or Temperature Control for cooling systems, crystal ovens, etc.

HIPERSIL TYPE "C" CORES

Three grades of two-piece, laminated steel cores for power, audio, intermediate radio and higher frequencies. Space factors 95%, 92% and 89%. Windows down to $\frac{1}{2}$ " x $\frac{1}{4}$ ". These cores do not require dies or nickel.

BLOWERS AND BLOWER MOTORS

400-800 cycle models, 6700 rpm, magnesium housings.

RECTOX—RECTIFIERS

Copper oxide rectifiers for power packs, instruments, etc.

MICARTA—PLASTICS

Phenol-formaldehyde, thermosetting. 11-NEMA Grades including XXX, X, P, and LE. Plates, shapes, punchings, moldings.

DYNAMOTORS

Types PE-59, 60, 86; DM-25, 32, 33, 34, 35, 36, 45, 53. Now in production.

TUFFERNELL INSULATING MATERIALS

Varnished cambric and cotton tapes; synthetic, air drying and baking varnishes; thinners; compounds and enamels.

INERTEEN CAPACITORS

Nonflammable, hermetically-sealed, very compact. Ratings from 10,000 to 100,000 volts.

J-94556

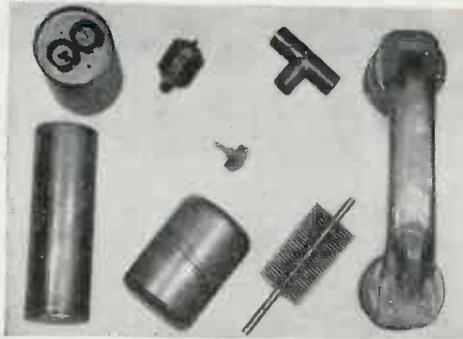


For further information on products or deliveries, wire or write Communications Division, Dept. 10-L, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania.

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

- ★ SOLDERING
- ★ BRAZING
- ★ BOMBARDING
- ★ HARDENING
- ★ ANNEALING
- ★ MELTING



A COMPACT **LEPEL** HIGH FREQUENCY INDUCTION HEATING UNIT

... performs all these operations quicker, simpler, more efficiently and at a fraction of the cost. Complete engineering data on your work is freely offered. Send samples, or write for catalog E today.



Lepel
HIGH FREQUENCY LABORATORIES, INC.
39 West 60th Street, New York, N. Y.
PIONEERS IN INDUCTION HEATING

It's Now GE's "Electronics Department"

The General Electric Radio, Television and Electronics Department will henceforth be known as the Electronics Department, according to an announcement by Dr. W. R. G. Baker, General Electric Company vice-president in charge of the department.

Now "Hazeltine Electronics Corp."

The name of Hazeltine Service Corporation has been changed to Hazeltine Electronics Corporation, according to an announcement just made by W. A. MacDonald, president, with offices at 1775 Broadway, New York. This step follows completion of a program of plant expansion providing large additional facilities for electronics research and development.

"The tremendous growth in the use of electronic devices by the Army and Navy has greatly increased the responsibilities entrusted to the Hazeltine organization," said Mr. MacDonald. "Since the infancy of radio broadcasting Hazeltine has been supplying new principles, circuits, techniques and equipment, and Hazeltine developments today are playing an ever more vital part in helping to keep the United Nations superior to the enemy. With enlarged facilities in plant and personnel we can undertake solution of the most complex problems in electronics. Following the war, Hazeltine Electronics Corporation will be able to supply the public, through industry, with electronic marvels that can make life safer and happier for every one."

Death of I. R. Baker of RCA

A leader in electronic development at the Camden plant of RCA, Irvin Ray Baker died of a cerebral hemorrhage during work, Feb. 9, at the age of 39. Formerly head of broadcast transmitter sales, Mr. Baker had been latterly advancing applications of electronics to war industries.

First employed by General Electric at WGY, Schenectady, N. Y., he joined RCA in 1929, and had since been active in broadcast and electronic work. He is survived by his wife and a month-old son.

Army Navy E

The Dejur Amsco Corporation, manufacturer of precision instruments, was awarded the Army Navy E for excellence in war production. The presentation ceremony took place at the Shelton-Derby Community House, Shelton, Conn., home town of the company.

READY NOW!

NEW ALLIED 1943 BUYING GUIDE

FOR EVERYTHING IN
ELECTRONICS AND RADIO



CENTRALIZE YOUR PROCUREMENT
SAVE TIME...SPEED DELIVERY

FREE
SEND FOR
YOURS..
NOW!

Get this latest Allied Buying Guide for *everything* in Electronics and Radio. Procure all your needs from this ONE central source. Our large complete stocks of over 10,000 items assure you of prompt attention and quick delivery. Our staff is trained to help you with your problems... write, wire or phone Haymarket 6800, today!

NEW... ALLIED'S RADIO DATA HANDBOOK

Most essential formulas, charts, tables, standards and technical data on radio and electronics..... **25¢**

ALLIED RADIO CORP.
833 W. Jackson Blvd.
Dept. 32-C-3 Chicago



OVER 10,000 WARTIME ITEMS

- | | | |
|--------------|----------------|------------|
| Condensers | Switches | Rectifiers |
| Relays | Resistors | Sockets |
| Tubes | Rheostats | Wire |
| Test Equip. | Public Address | Generators |
| Transformers | Coils | Receivers |
| Photo Cells | Tools | Speakers |

ALLIED RADIO



May We Serve You, Too?

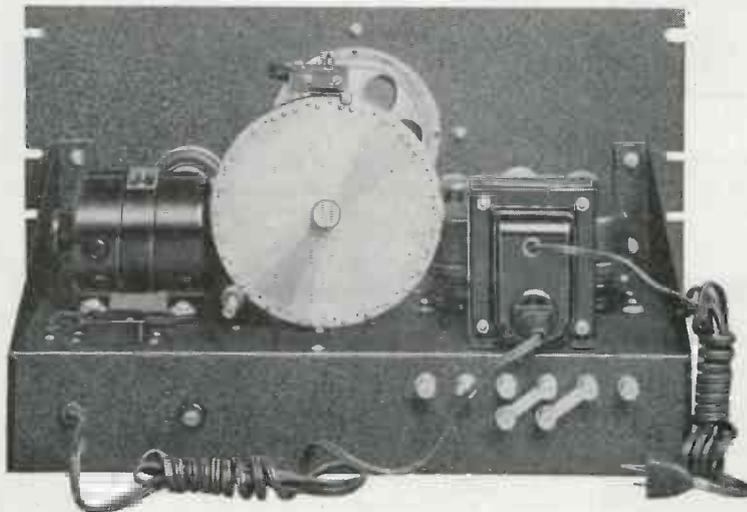
If you have a wireless transmission problem which requires the services of a specialist, the McElroy organization may be of assistance to you. We are the largest manufacturers in the world devoted exclusively to the production of equipment for the transmission and reception of dots and dashes. Apparatus that is recognized as the world's finest: photo tube units and ink recorders for teaching code, high speed transmitters for perforated tape, Wheatstone perforators, high speed ink recorders, etc. . . . In addition to manufacturing our standard line, we are always available for special design assignments that are within the scope of our activities.

These photographs illustrate our latest product, a Radio Beam Keyer, model RBK 1142, developed for one of America's largest aircraft manufacturers.

★ ★ ★

As creative telegraphic engineers, we are leaders in our field. We create. We design. We build. We do not imitate and we do not copy. And we can deliver. Our corps of experienced engineers and craftsmen are at your disposal.

McELROY MANUFACTURING CORPORATION
82 BROOKLINE AVENUE ★ BOSTON, MASSACHUSETTS



Luxtron

PHOTO ELECTRIC CELLS

IN ANY . . .

Size-Type-Shape
Capacity

EQUAL TO ANY . . .
REQUIREMENTS

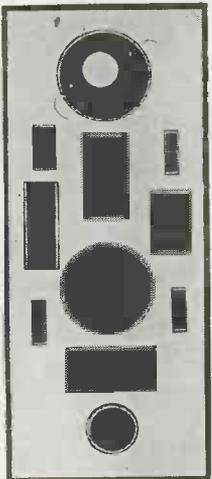
The widest range of scientific and industrial requirements can be met by Luxtron Cells—the Cells that meet the stringent requirements of the Army and Navy. For measurements, analysis, indication, metering, control, signal, inspection, sound reproduction, etc. Luxtron Units can also be produced to meet special needs.



USED TO
PRE-TEST

Bomber Pilots
IN STRATOSPHERE
CHAMBERS

Luxtron Photo-Electric Cells in Stratosphere Chambers, where pilots are pre-tested, have to meet the most severe conditions of cold, humidity, vibration. The fact that they satisfy the Army and Navy requirements is proof that they can meet the most particular specifications of all commercial and industrial applications.



* Write for special illustrated literature with complete technical data. We are at your service for consultation on special problems.

PHOTO ELECTRIC CELLS
BRADLEY LABORATORIES, INC.
51 MEADOW ST. • NEW HAVEN, CONN.

Emby Becomes "Selenium Corp."

Emby Products Company, Inc., announces a change in name to Selenium Corporation of America, for the purpose of indicating its increased scope of manufacturing activities. Located at 1800-1804 West Pico Boulevard, Los Angeles, Calif., the company manufactures Emby instrument and relay rectifiers, Emby photoelectric cells and other related scientific products.

Officers of the corporation are C. O. Rich, president, nationally known in the photographic field; Maurice N. Burlin, general sales manager and secretary-treasurer, well known executive in the photoelectric equipment industry, and Eric Lidow, vice president and chief engineer, authority on the design of rectifiers and photoelectric cells, and associated with that industry since 1933.

Manufacturing facilities have been greatly enlarged during recent months to meet the increasing demand for selenium rectifiers and self-generating photoelectric cells. Special attention is being given to a new line of rectifiers, for which many exclusive improvements are claimed, including extreme compactness, instantaneous response, ability to withstand overloads as high as 1000 per cent without permanent injury, complete protection against low pressures at high altitudes, increased efficiency at higher temperatures and positive insulation against atmospheric disturbances.

Mallory Gets New "E" Honors

P. R. Mallory & Co., Inc., Indianapolis, Ind., has been granted a renewal of the Army-Navy "E" Award for an additional six months, dating from December 31, 1942. This renewal grants Mallory the right to add an additional white star to its pennant.

Mallory was the first company in Indianapolis to receive the Navy "E" pennant and flag of the Bureau of Ordnance. These were awarded in December of 1941 by Secretary of Navy Knox.

On July 18, 1942, notice of the renewal of this award was announced.

Electronic Corporation's Removal to New Offices

Electronic Corporation of America, formerly Transformer Corporation of America announces the removal of its offices and plant to 45 West 18th Street, New York. The company manufactures electronic equipment.

**PURCHASING AGENTS!
ENGINEERS!**

THIS BOOK FREE!

800 Page
Buying
Directory

We Can
Aid
Your War
Effort!

RADIO PARTS

and ELECTRONIC EQUIPMENT
— NOW! — FROM STOCK!

Here, at SUN, you will find the solution to your urgent needs—a complete, single source of supply under one roof! Thousands of standard electronic parts and equipment in stock for all industrial research, development or production requirements. Save time by coming to SUN first!

SEND FOR FREE CATALOG!

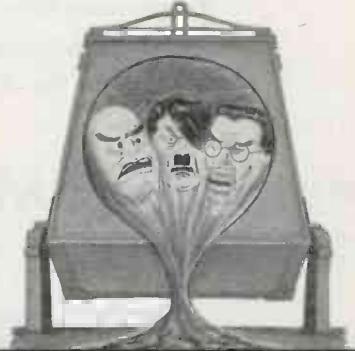
Write today on your company letterhead for free, valuable copy of our 800 page buying directory—a decided asset in your war work. Address Box X-3.

New York's Oldest Radio Supply House

— Telephone BARclay 7-1840 —

SUN RADIO CO.
212 FULTON ST.
NEW YORK, N. Y.

Melting 'em down



All Wilbur B. Driver Company special alloys including "BERALLOY A" (beryllium-copper), "TOPHET" (nickel-chrome), and "CUPRON" (copper-nickel) are melted in our Ajax Northrup Induction Furnaces under the supervision of our Metallurgical Staff. The countless vital war applications for these alloys in rod, wire, ribbon, and strip are definitely helping to dissolve the Axis. We are literally "melting 'em down"!

WILBUR B. DRIVER CO.
NEWARK, NEW JERSEY

when Johnny comes marching home again



As a radio technician, Johnny is a vital part of our armed forces. He sees an amazing electronic future in the new devices developed by the urgency of war. No, he can't talk about them now, but as he uses them he dreams of electronic wonders to come.

Someday soon, Johnny and thousands like him will come marching home to take their places in their chosen field. Their vision . . . their plans . . .

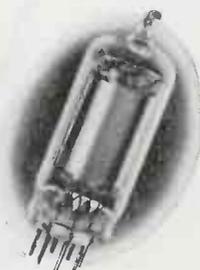
their energy will give us those wonders in electronics of which they dreamed.

Wherever Johnny's ambition leads him in electronics, he will find TUNG-SOL ready for the peacetime developments. TUNG-SOL tubes for transmitting, receiving and amplifying, TUNG-SOL research engineering service will be important parts of his future and the future of electronics.

TUNG-SOL

vibration-tested

RADIO TUBES



TUNG-SOL LAMP WORKS INC., NEWARK, N. J., Sales Offices: ATLANTA, CHICAGO, DALLAS, DENVER, DETROIT, LOS ANGELES, NEW YORK
ALSO MANUFACTURERS OF MINIATURE INCANDESCENT LAMPS, ALL-GLASS SEALED BEAM HEADLIGHT LAMPS AND THERMAL SWITCHES

BONE DRY!

absolutely
NO MOISTURE WITH
PRECISION METAL SHIELDED WIRE

NO compromise with moisture — NO compromise with electrical interference — NO compromise with mechanical damage!

ONLY with PRECISION METAL SHIELDED WIRE can all three of these exclusive features be found.

Top-flight engineers the country over are recognizing the amazing qualities and specifying METAL SHIELDED WIRE in their equipment. Catalog upon request.



PRECISION TUBE CO.

SPECIALISTS IN ACCURATELY DRAWN TUBING AND METAL SHIELDED WIRE
Factory: 3824-26-28 TERRACE STREET • PHILADELPHIA, PA.
BRANCHES IN ALL PRINCIPAL CITIES SALES DEPT. 2957 214th ST., BAYSIDE, L. I., N. Y.



ACCURATE • PRECISION BUILT • RELIABLE

BILEY ELECTRIC COMPANY
ERIE, PENNSYLVANIA

Heads Westinghouse Electronic Committee



Electronic topics in the far-flung Westinghouse organization are now in charge of an electronic committee, made up of managers and engineers interested. Heading up the committee is A. C. Montieth, of East Pittsburgh, here pictured during an AIEE gathering.

M. Scott Chief of New England WPB Radio

Establishment of a radio and radar section of the War Production Board's New England regional production specialists' department is announced by W. H. Wheeler, Jr., regional director. The section will be headed by Michael Scott, who has been associated with the radio industry since 1930, and will be represented in several district WPB offices by a staff of assistants.

The new division will help manufacturers in problems of plant expansion, facilities, critical materials, and the issuance of priorities. Under its jurisdiction fall all military and civilian radio, radar, underwater sound, electronic equipment and component parts.

Activities of the field service section, radio and radar division, are coordinated in Washington under Frank S. Horning, chief. New England manufacturers who have production problems are advised to consult their nearest WPB district office.

Mr. Scott is a former official of Radio Wire Television, Inc., and Waltham Electric Co., and is a member of the National Electronic Distributors Association.

Hackbusch's Novel Pocketpieces

Ralph A. Hackbusch, long active in IRE affairs in Canada, and now vice-president of the radio division of Research Enterprises, Limited, Toronto, visited the IRE winter conference at New York in Janu-

LISTEN AND BEHOLD ANEW

★ The world and most that we know about it is the gift of our eyes and ears. Listen, and Behold, are the earliest admonitions for knowledge. Could any mission be higher, then, than that of expanding the scope of human sight and hearing? Even when the means is modest, as an incandescent lamp, or fluorescent lamps and equipment, or radio and electronic tubes? Everyday things these, of critical value now, that we work upon here at Sylvania. Yet they are keys to whole new worlds of boon and blessing. Already flaring in the vacuum tubes are prophetic miracles, from television to aircraft landing beams, from making germ structure visible to killing bacteria by light, from measuring ocean depths to penetrating fog and storm. Small wonder we approach our work humbly. Or that we set for ourselves the highest standards known.

SYLVANIA

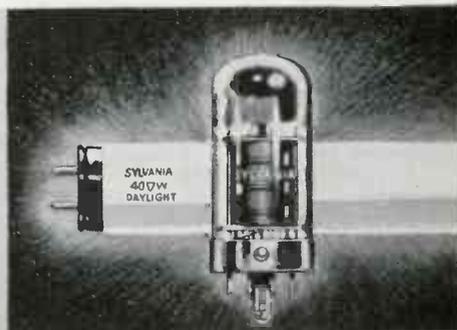
ELECTRIC PRODUCTS INC.

formerly Hygrade Sylvania Corporation

Emporium, Pa.

Established 1901 . . . Makers of Incandescent Lamps, Fluorescent Lamps, Fixtures and Accessories, Radio Tubes and Electronic Devices

NAME TO REMEMBER. You may find the Sylvania name and mark on radio tubes, incandescent lamps and fluorescent lamps and equipment already in your service. It is a name to remember—to hold in mind and seek out when time comes to make necessary replacements. If you then find it less easy than formerly to locate Sylvania Tubes and Lamps—just remember that war needs must come first. We are doing all we can to fill-civilian needs in view of wartime necessities that must be met.



BUYERS —

1=137

to save you time!

A single order placed with Harrison can bring you the products of one hundred and thirty-seven different manufacturers for whom we are Authorized Distributors.

Concentrate and simplify your purchasing,—one requisition, order, report, voucher, file, etc., instead of many!

And we usually ship your entire order from our stock, or refill stock, further saving you weeks or months of delivery time.

For eighteen years many manufacturers and laboratories have depended upon Harrison to supply them with Electronic parts and equipment—*quickly, and economically.* Today, they find our diversified stock, our technical sales assistance, and our procurement knowledge more invaluable than ever!

Let us serve you!

To men actively engaged in the purchase of Electronic supplies, we offer without cost, our 800 page

MASTER CATALOG ◀

To engineers we offer, with our compliments, the RCA 1943 Reference Book. (Please write immediately as supply is limited.)

Kindly write on Company letter-head, giving your title.

HARRISON

RADIO CORPORATION
12 WEST BROADWAY
NEW YORK CITY
Phone WOrth 2-6276

MICA CONDENSERS —	Harrison has 213,550
FILTER CAPACITORS —	Harrison has 37,480
TRANSFORMERS —	Harrison has 2,230
TUBES —	Harrison has 26,140
RESISTORS —	Harrison has 64,860

FOR IMMEDIATE DELIVERY!

ary. To a number of radio men he met, he presented the new Canadian five-cent pieces which, instead of being circular, have twelve straight edges around the rim. Inscribed in a circle inside the edge are dots and dashes of the International Code, reading "We Will Win if We Will Work." So far as is known, this is the first instance in which telegraphic code has been included in a coin.

Elaborate Air-raid Changes Found Unworkable

Sir Noel Ashbridge of the British Broadcasting Corporation, addressing, by radio, members of the American Institute of Radio Engineers, during the recent New York meeting, told of war experiences on the engineering side of the BBC:

"For example, technical arrangements had been planned three and a half years ago to be put in action in the event of an air raid. It so happened that the sirens got to work a matter of minutes after the declaration of war, so we soon were provided with a sort of dress rehearsal. Even then, air-raid warnings were for a time few and far between, and we felt rather pleased with the arrangements we had made, elaborate and laborious though they were.

"However, when the Battle of Britain started some time later, we frequently had four or five air-raid warnings each day, and this showed us clearly enough that any elaborate technical changes to meet air raid conditions were somewhat unworkable. The only solution to being within seventy miles of the enemy was to be ready all the time, even though carrying on as usual between times. Of course, all this meant more and more equipment, and how to produce it quickly enough was for some time one of our great problems. Then there was the problem of how to avoid giving navigation assistance to enemy aircraft through the many stations we have up and down the country. We just had time to work out a plan for avoiding this in the few weeks before the war when the crisis threatened. But more than this I can't say now.

"Of course, there were several unpleasant incidents during the Blitz of 1940-41. Some of you may have heard already of one of them, when broadcasting continued in one part of our building after a bomb—one of the heavy explosive type—had blown a considerable part of the building into the street. This affair, tragic in one of its effects, was in other respects highly successful in that broadcasting service was maintained without a break."

Now Director-General



Ralph Cordner, for many years a leading GE radio sales executive, and more recently president of Schick Mfg. Co., Stamford, Conn., has been called to Washington to serve under his old chief, Charles E. Wilson, WPB vice-chairman, as director-general of production expediting for the War Production Board

Plastic Wire and Cable Insulation

Timely availability of vinyl copolymers for insulating electric wires and cables is emphasized by the acute shortage of rubber. Insulation failures have been caused by poor aging characteristics, inability to withstand immersion in water, weathering, and extended contact with oils, greases and chemicals. New vinyl copolymer plastic insulating materials, manufactured by Bakelite Corp., 30 E. 42 St., New York, exhibit definite advantages in respect to these forms of attack. Their electrical characteristics are exceptionally constant whether the installation is dry or wet.

Installation advantages

Of minor importance technically, but of appreciable dollars-and-cents value in manufacturing operations is the fact that the plastic insulating material can be stripped off easily, quickly and cleanly.

Adequate insulating protection with less wall thickness is also provided. Overall diameter of wires can be less—therefore more wires can be carried in conduits, or compacted within limited space. Wires of a given outside diameter can have larger conductors; existing runway can be rewired for more current capacity, making it unnecessary in such instances to tear out floors, walls and ceilings.

Because of its low-moisture absorption, this insulation, in the

T

his is the knob—that opened the door



that led to . . .

MICROWAVES

It was a miracle! Back in 1936, the Western Electric 316A—delivering 6 watts at 500 megacycles—was recognized as something phenomenal. Radical in design and performance, it pioneered in UHF transmission.

The electronic art has progressed so far and so fast that the 316A now seems almost a relic. But it's an historic one—for microwave transmission is the logical development of what the 316A helped to start!

Responsible for this tube were Bell Telephone Laboratories and Western Electric—whose development and manufacturing skills have made countless outstanding contributions to electronic progress.

What Bell Labs and Western Electric are doing today must remain a secret. But you can be sure they are helping to meet war-time electronic needs; are gaining knowledge and skill that will assure continued leadership after the war.

60 YEARS
OF WAR AND PEACE



W.M. MOGEY & SONS, INC.
PLAINFIELD
NEW JERSEY
PRECISION LENSES - INSTRUMENTS

form of wire jacketing and cable sheathing, eliminates need of lead covering for many installation requirements. Furthermore, the insulation is extremely tough and resistant to abrasion, efficiently protecting the wire and cable against mechanical injury in installation and service.

Civilian Replacement Program of "Victory" Components

The War Production Board's program for production of civilian replacement tubes and parts is nearing completion under the direction of S. K. Wolf and Frank H. McIntosh of the WPB Radio Division.

There will be "Victory" tubes and parts of the types largely needed for maintenance and repair of radios in public use. The tube program will be authorized first, because of the present shortage and also the time-lag in production, with a proposed authorized program of about eleven million tubes during the current, first quarter of 1943. The WPB order assigns production quotas to various tube manufacturers, covering about 117 proposed types, but production of other important types will also be authorized, within a range of a total probably of 150 types.

A tentative "Victory" list of replacement parts also has been completed by the WPB parts standardization committee, the War Radio Committee headed by Dr. O. H. Caldwell, editor of "Electronic Industries." Standards for these parts types are being developed and, later, OPA will establish price ceilings. Still under consideration are the types for wire-bound resistors, ballast tubes, and resistance wire.

The WPB "Victory" replacement and repair program contemplates a requirement for purchasers to turn in a used tube when securing a new tube, and also all possible repair of replacement parts. Also contemplated is a new procedure for distribution of replacement tubes and parts through distributors, dealers, and servicemen, to dispense with PD-1X applications of distributors. The "Victory" replacement components will bear a "Victory" label, but manufacturers will be permitted to imprint their own identification numeral symbols.

Radio-set owners probably will be required to turn in an old tube or part when buying a new one, but there will be a simplified system for the trade to secure new replacement components from manufacturers. A limitation or "L" order will restrict future replacement parts production to the "Victory" types of authorized parts, but there will not be such rigid restriction of tube types.

Solve Voltage Variation
PROBLEMS IN AIRCRAFT, TANKS, ETC.

WITH

AMPERITE

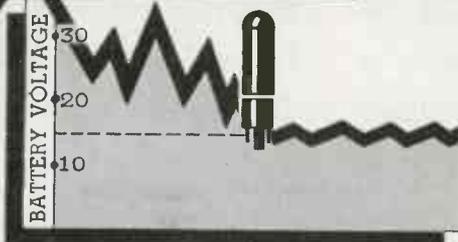
BATTERY CURRENT & VOLTAGE REGULATORS

Features:—

1. Amperites cut battery voltage fluctuation from approx. 50% to 2%.
2. Hermetically sealed — not affected by altitude, ambient temperature, or humidity.
3. Compact, light, and inexpensive.

Now used by U. S. Army, Navy, and Air Corps.

Send us your problem.



VOLTAGE OF 24V
BATTERY & CHARGER
VARIES APPROX.

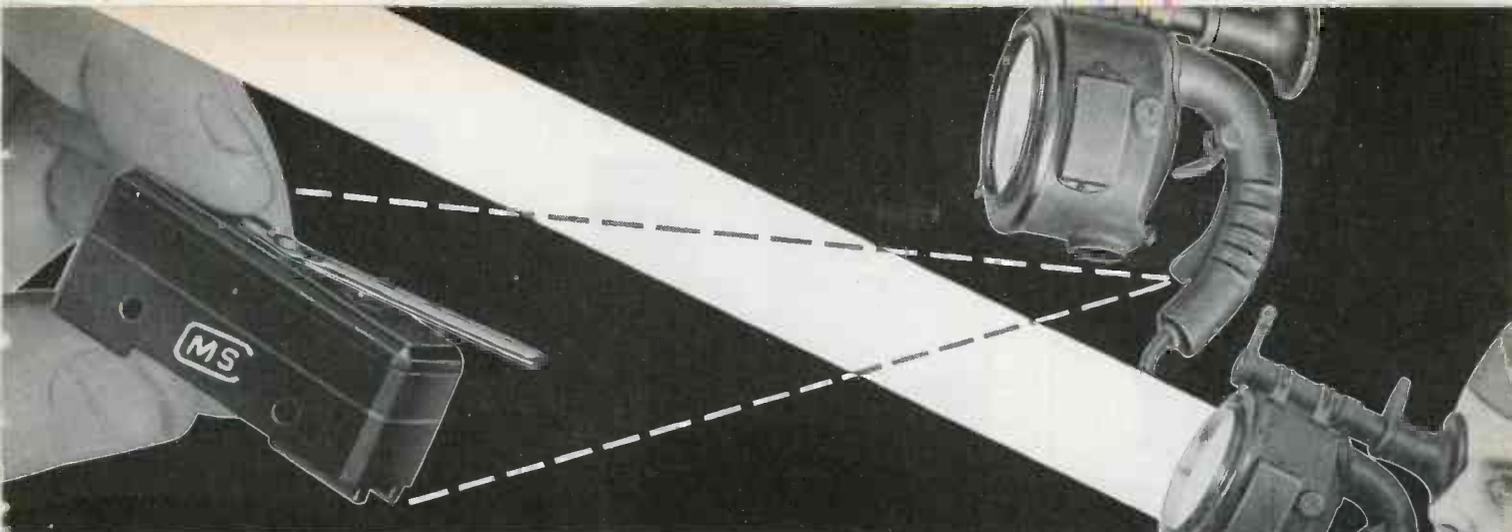
50%

WITH AMPERITE
VOLTAGE VARIES
ONLY

2%

AMPERITE COMPANY • 561 Broadway, New York, N. Y.
In Canada: Atlas Radio Corp., Ltd., 560 King St. W., Toronto

Cable:
Alkem.
New York



Precision Signaling With Micro Switch Precision

The Aldis type Portable Signal Lamp, manufactured by the Manhattan Marine and Electric Company, Incorporated, of New York City, is widely used by the air, land, and sea forces of the United Nations. Because an observer, more than 6 degrees off the angle of the beam cannot read the signals, this lamp provides safe communication in daylight, at night, and in mist or fog. It has a safe visibility range up to 10 miles. It is an ingenious combination of a range finder, a light and a tilting reflector.

The Aldis type Portable Signal Lamp permits extremely precise signaling through the use of Micro Switch with a double spring actuator which is fitted into the grip of his lamp. Being small and compact, light in weight, rugged and dependable in operation, Micro Switch assures the necessary operating precision. To quote the manufacturer of the Aldis type Signal Lamp, "We are very pleased with the Switch for this unit."

This is but one of many applications through which Micro Switch is performing vital functions in all equipment going into our war program. Micro Switch is on every fighting front—in machine tools and on production lines; on the surface and underneath the surface of the sea; on land, in the dust and heat of the desert, and in Arctic cold.

If you have a problem of precision switching, you should consider Micro Switch—its precise, fast action—its ability to operate at exactly the same point for millions of operations.

Micro Switch measures only 11/16" x 27/32" x 1-15/16", weighs only one ounce, operates on minute movement and force differentials, and is listed by Underwriters' Laboratories with ratings of 1200 V.A. loads, from 125 to 600 volts A.C. It can be supplied in the Bakelite housing as shown above, or in protective housings—die cast, sealed against oil and water; steel, for machine tool applications; aluminum for aircraft; and heavy cast iron for explosion-proof—all with a wide variety of actuating mechanisms.



Send for These Catalogs

The two catalogs illustrated here will give you the complete details—Number 60 which covers Micro Switch in general, and Number 70 which deals with specific Micro Switches for aircraft.

Micro Switch Corporation, Freeport, Illinois
Branches: 43 E. Ohio St., Chicago • 11 Park Place, New York City
Sales and Engineering Offices: Boston • Hartford • Los Angeles

The trademark MICRO SWITCH is our property and identifies switches made by Micro Switch Corporation.

How and For What Micro Switches Are Used

This shows an explosion proof Micro Switch used with a spray gun which automatically cuts out the entire operation of the spraying booth when the gun is shut off.

This illustration shows a Micro Switch with a pushbutton actuator being used as a safety switch in a high tension cabinet door. It is a normally open switch in which the circuit is opened as the door is opened.

This illustration shows the use of two Micro Switches with spring type plungers to insure safe positioning of material in a punch press or a similar tool.

This illustration shows the Micro Switch with a spring leaf actuator serving as a break indicator as used in textile mills or paper mills.

This illustration shows a Micro Switch enclosed in a die cast housing with a synthetic rubber seal, and is being used as a lathe carriage stop.

This illustration shows two steel enclosed Micro Switches which serve as overrun limit switches on a machine tool.

This illustration shows use of a Micro Switch with a spring plunger which is actuated by the pressure of a liquid in a line as the actuating medium.

M I C R O S W I T C H

Made Only By Micro Switch Corporation Freeport, Illinois



Photo by Office of War Information

GLAD HE'S ON OUR SIDE!

Glider pilots have a job to do. They have to set them down at a certain place at a certain time, slug the enemy where it hurts him most, and hold till reinforcements arrive. Coordination with other arms must be perfect, and radio makes this coordination possible. It's a tough job for tough men, and we're glad this Marine Lieutenant is on our side. . . . Wonder where he is now?



NATIONAL COMPANY, Inc.
MALDEN, MASS.



Navy's Short Wave Pioneer



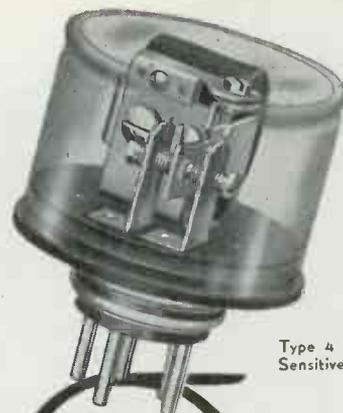
Commissioner T. A. M. Craven of the Federal Communications Commission had long experience as radio expert for the Navy before he joined the FCC. Commander Craven's initial task when assigned to the old Federal Radio Commission in 1928 was to lay out for the first time the present short-wave allocations

"Five Billions for Radio" —Olmstead

In showing a score of newspapermen at Fort Monmouth the marvels of electronic and radio apparatus developed for the Army, ranging from small weather-reporting radios, watertight radios for rubber rescue rafts, direction-finding transmitters for missing planes and the latest aircraft detection sets, Major General Dawson Olmstead, Chief Signal Officer, related how the Signal Corps is spending five billion dollars for radio equipment and is doubling its procurement effort of last year, during 1943.

General Olmstead feels that the Army should have complete supervision of the procurement cycle from development to production and distribution and cited how he had recently signed a 100 million dollar contract for radio sets—one-third as much as the Panama Canal cost.

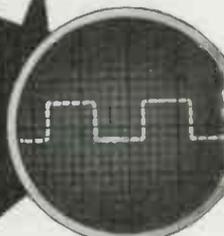
Renegotiation of contract prices, carried on voluntarily, had brought back to the Treasury over 100 million so far. The electronic and radio industries, too, had saved the Army millions of dollars by their liberal patent usage policy—over 25,000 patents are now given the Signal Corps royalty-free or with minimum license fees to aid the war production. (Around 100 companies, practically the entire industry, has cooperated. The Navy also shares in this use of patents.)



Type 4 Series Sensitive Relay

SIGMA
Sensitive Relays

Permit
POSITIVE
PRECISE
CHATTERLESS
Switching



Note clean square wave pattern as seen on oscilloscope.

SIGMA Sensitive Relays can provide positive, precise switching at high speeds . . . viz. 20 to 200 or more contacts per second.

Time patterns in the controlled circuit may duplicate those in the input or controlling circuit with high precision. Total operating delay can be held to well under 1000 microseconds. All these things can be accomplished in the presence of severe vibration, and at considerable extremes of temperature and pressure.

PREREQUISITES

It is not possible to state general conditions under which these results can be attained. It is in many cases possible to attain them when:

1. Relay is matched to output or controlled circuit correctly.
2. Circuit controlling relay is designed with benefit of data which we can gather in the laboratory from experimental circuits and actual relay tests.

We are better equipped to conduct these tests because of experience in the correlation of problems in vacuum tube circuits to relay behaviour.

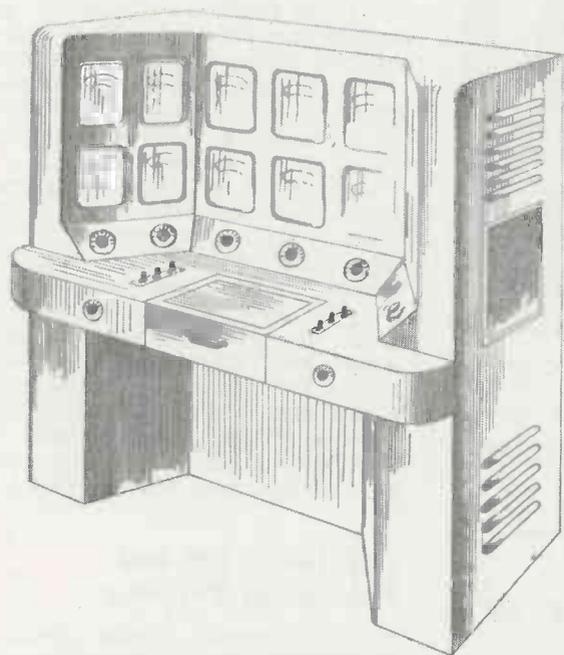
Submit your problem to us . . . security of all information—military or commercial—is strictly assured.



72 FREEPORT STREET
BOSTON, MASS., U. S. A.

TEST EQUIPMENT

COMPLETE UNIT PRODUCTION TO SPECIFICATIONS



For military reasons the test set shown is not a new development.

for the
ELECTRONIC TUBE MANUFACTURER...

Exhaust Machine Controls
Bombarders
Oscillation Aging
Static Aging
Static Characteristic Test
Oscillation Characteristic Test
Noise Test
Ionization Test
Filament Flashing
Gas Aging

for the
COMMUNICATIONS MANUFACTURER...

High Frequency and Ultra High
Frequency at High Power Levels

for the
MANUFACTURER . . .

Automatic or Semi-Automatic
Electronic Devices Designed and Built
to Fill the Manufacturer's Need

FACILITIES FOR QUANTITY PRODUCTION



Engineering, Design, Development and Manufacture
of Radio and Allied Communications and Test
Equipment. Development of Electronic Controls and
Measuring Devices.

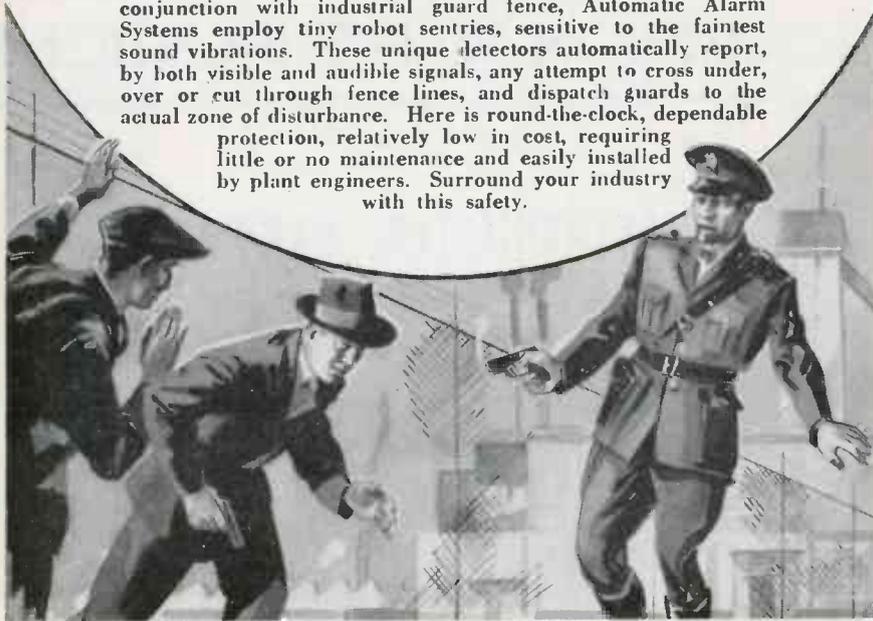
ELECTRONIC DIVISION

SHERRON METALLIC CORPORATION

1201 FLUSHING AVENUE • BROOKLYN • NEW YORK

TRAPPING 'RATS'

★ The job of A.A.I. Automatic Alarms, America's most modern method of industrial plant and property protection, is to trap "rats" . . . not after, but BEFORE they have accomplished their nefarious errands of sabotage, espionage or theft. Used in conjunction with industrial guard fence, Automatic Alarm Systems employ tiny robot sentries, sensitive to the faintest sound vibrations. These unique detectors automatically report, by both visible and audible signals, any attempt to cross under, over or cut through fence lines, and dispatch guards to the actual zone of disturbance. Here is round-the-clock, dependable protection, relatively low in cost, requiring little or no maintenance and easily installed by plant engineers. Surround your industry with this safety.



Write for Literature



Licensed under DuPont and Astatic Patents

SALES OFFICES, Philadelphia, Chicago, Pittsburgh, Detroit, Tulsa, and Toronto, Canada

AUTOMATIC ALARMS Incorporated
849 MARKET STREET YOUNGSTOWN, OHIO, U. S. A.

Electronic Manpower Advisory Committee

Because of serious labor problems in radio production, an "Electronics Manpower Advisory Committee," representing management and labor, has been organized to prepare recommendations to the War Manpower Commission and other government agencies in the radio-electronic field which is completely 100 per cent on war production.

The committee was formed by the Radio Division of the Navy's Bureau of Ships, the Army and Navy Electronic Production Agency and the Radio Division of WPB. At the organization meeting, it was decided to set up a special task committee to summarize the manpower problems of the electronic industry for presentation to the full committee at an early meeting.

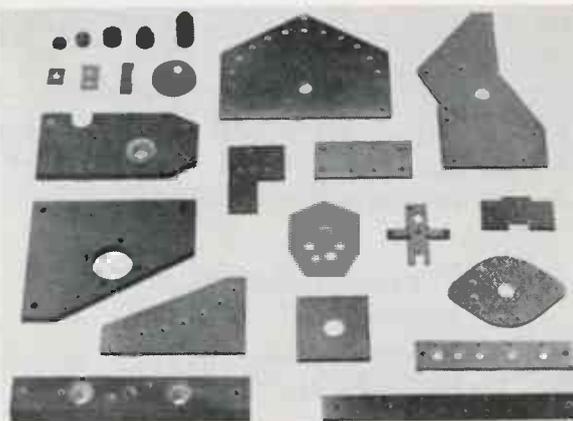
Members of the committee representing management are: L. B. Morris, R.C.A., chairman; J. D. Washburn, Sprague Specialties Co., North Adams, Mass., and W. K. Wiggins, Western Electric Co., Chicago, Ill. Members representing labor are: Harold Sharpe and James J. Conroy, United Electric, Radio and Machine Workers of America (C.I.O.) and Lawson B. Wimberly, International Brotherhood of Electrical Workers (A.F.L.).

Let us be your dependable source of Custom Fabricated Mycalex

Accurately Turned Parts Our Specialty

Like the celebrated man on the flying trapeze, we turn out the most difficult shapes "with the greatest of ease," because of having the right type of special machines, and specialists who know their jobs.

We especially invite war work . . . all of our materials are approved by Army and Navy for radio and other electronic applications.



Wire or Write for further information without obligation

COLONIAL KOLONITE COMPANY
2212 West Armitage Ave. - Chicago, Ill.

FCC Holds FM and Television Pending

The Federal Communications Commission is not disturbing the construction permits already issued for television and frequency modulation stations even though the shortages of materials has frozen any progress on their completion for the duration. These applications will be kept in the pending file of the FCC.

In the case of television, the FCC ruled that holders of construction permits may obtain licenses during the war to operate existing facilities either on an experimental or commercial basis provided construction has reached a point where the station is capable of rendering a substantial service.

Ceiling on Quartz Prices

Ceiling prices for resales of Brazilian quartz crystals in the United States are being prepared by the OPA and for this goal the agency is calling a meeting of importers to discuss grading and pricing methods. Meanwhile, President Vargas of Brazil has urged the shipment of quartz crystals in greater quantities by air transport, citing it as one commodity which can be handled by plane.



RACONS do their bit —

★ Under prime and sub contracts RACON Products contribute to many phases of the war effort. For example, shown here is a RACON Marine Horn Speaker in the cabin of the B-19; and in the other extreme, on the ground a Sperry anti-aircraft detector battery, the three locator horn units of which were made by RACON.

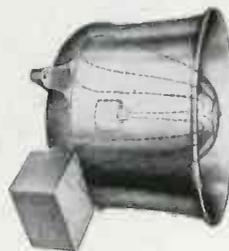
★ If space permitted we'd show how RACONS are used at Army and Air Force training bases—at shipyards—aboard Navy, Coast Guard, Maritime Commission and Transport ships—in factories, and in countless industrial public-address systems.

★ The most important point is this, the quality, efficiency and dependability of RACONS have long been recognized. There's nothing finer. RACONS deliver more energy per watt input. They use RACON's exclusive Waterproof, Weatherproof, Acoustic Material. The elements cannot affect RACON's efficient operation. Use RACONS when planning your next installation. There is a horn, speaker or driving unit for every conceivable purpose. Inquiries are invited—perhaps we can help you in some phase of the war effort. Ask for our free catalog, too.

RACON ELECTRIC CO., 52 East 19th St., New York, N. Y.



Official Photo by U. S. Signal Corps; courtesy of Douglas Aircraft Co. and Sperry Gyro scope Co



MARINE HORN SPEAKERS



RACON P. M. HORN UNITS



MARINE CONE SPEAKERS

Shown here are but two of the many RACON Speakers and one type of RACON P. M. Horn Unit. The MARINE HORN SPEAKER may be used as a loud-speaker or microphone, comes in several sizes; is approved by the Bur. of Marine Inspection, Dept. of Commerce. MARINE CONE SPEAKERS are the re-entrant type, suitable for indoor or outdoor use. Stormproofed for all weather conditions. Sizes for 2, 3, 5, 8 and 12 inch speakers. RACON P-M HORN UNITS are available in operating capacities of from 5 to 50 watts.

RACON

"They're Fine Products"

That's the way satisfied customers constantly refer to coils and electronic equipment fabricated by S-W.

• We, too, are busy—at the moment—working for Uncle Sam and his helpers . . . but, if you have a problem in radio frequency design—coils—filters and networks—or electronic equipment for the future . . . something you want fabricated to work better, to look better, and BE better . . . we will be glad to discuss it with you, without obligation.

You will find here a clean-cut, practical, understanding, capably engineered organization waiting to work with you on your new designs or developments.

S-W INDUCTOR COMPANY

1056-58 N. WOOD ST. ★ CHICAGO, ILL.

Col. Baxter Watching Electronic Communications

The Directorate of Communications of the Army Air Forces, which is commanded by Colonel A. W. Marriner, the principal veteran communications officer of the Air Service, is now closely following electronic developments.

As part of the Directorate, Col. Marriner established a Division which is charged with the responsibility of coordinating the development and procurement of electronic systems and devices peculiar to the Army Air Forces. This Division, which is commanded by Col. T. H. Baxter, another veteran of aviation communications in its early days in the Army, maintains close liaison with the other branches of the Army and with the electronic laboratories and the electronics industries.

Electronic Manpower, Physicists

As forecast in February "Electronic Industries," the labor shortage problems of the industry are being actively considered by the WPB, Army, Navy, ANEPA (Army-Navy Electronic Production Agency), industry and labor unions and a special "Electronics Manpower Advisory Committee" has been established to present recommendations to the War Manpower Commission.

The National Committee on Physicists, headed by Dr. Leonard Carmichael, Director of the National Roster of Scientific and Specialized Personnel, has been functioning efficiently preserving a backlog of physicists for the research and developmental activities of industries and universities and colleges and has indorsed 600 requests for occupational draft deferments of physicists during the first month of its operation up to mid-February with about 100 of the cases being students in colleges or universities.

Dr. Saul Dushman at Brooklyn Polytech

The Society of the Sigma Xi will install a chapter at the Polytechnic Institute of Brooklyn, N. Y., on March 25th. The installation ceremonies will be held in the afternoon, and will be followed by inspection of the laboratories. After dinner, a public address will be given by Dr. Saul Dushman, assistant director of the General Electric Research Laboratory. This, the first public meeting of the new Polytechnic Chapter, will be held in the auditorium of the Brooklyn Law School, 375 Pearl Street, Brooklyn.

ATTACK! 130° ABOVE ZERO

30° BELOW ZERO

DX Xtals are helping to keep communications open in all climates.

BUY MORE STAMPS AND BONDS

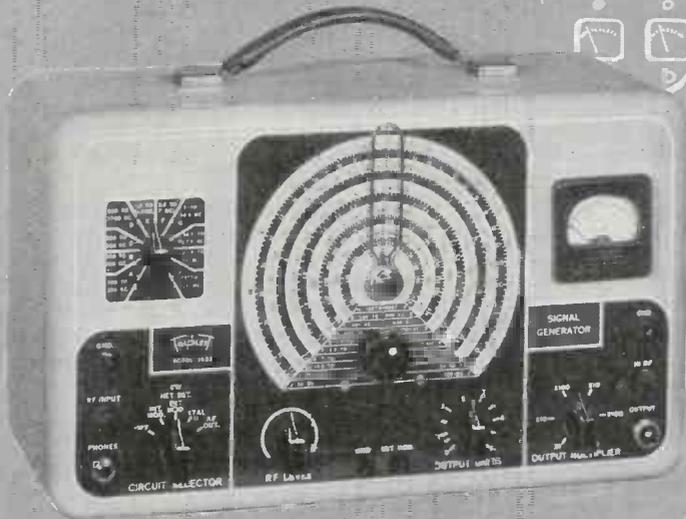
DX CRYSTAL CO.

GENERAL OFFICES: 1841 W. CARROLL AVE., CHICAGO, ILL., U.S.A.

DX XTALS
the heart of a good transmitter
TRADE MARK

TRIPPLET

Combat Line TESTING EQUIPMENT



TRIPPLET

The Toughest Test in History

Miracles must be done in minutes in this war of mechanized movement. And Triplet Testers, built to the needs of war, are valued tools with America's armed forces on 22 fronts and on the seven seas.

Here are a very few of Triplet Combat Line Testers. There are many! Built for every tester job, they are different in adaptation to each specific purpose; unfailingly alike in precision performance rendered under the toughest test ever devised since the beginning of time.

When the last gun has been fired, the values of Triplet wartime experience will be evidenced by advanced technical superiority and by precision performance that might well seem miraculous today.

THE TRIPPLET ELECTRICAL INSTRUMENT CO., BLUFFTON, OHIO

A WORD ABOUT DELIVERIES

Naturally deliveries are subject to necessary priority regulations. We urge prompt filing of orders for delivery, as may be consistent with America's War effort.

ELECTRONICS AND THE FUTURE



FINAL INSPECTION! Tested at every stage, each National Union Electronic Tube passes a rigid final test before shipment.

With an established reputation for quality and precision, National Union engineers have been in the forefront of electronic tube development in the past. Today, their war research is developing new applications of the electronic tube for the future. Tomorrow, they will be ready to help you apply the new science of electronics to your production problems.

NATIONAL UNION RADIO CORPORATION
NEWARK, N. J. LANSDALE, PA.

NATIONAL UNION ELECTRONIC TUBES



*Immediate
Delivery!*

7 Inch Cathode Ray Oscillograph

\$13950

The 7" tube offers larger, brighter patterns with fine line trace and clean focusing to the very edges of the screen. In addition, this instrument provides all the features of the ordinary five inch oscillograph! A moderate quantity in stock for immediate shipment.

Lafayette carries complete stocks of nationally advertised radio, sound and electronic parts . . . quick deliveries from two big warehouses!

FREE—130 page illustrated catalog contains thousands of radio, sound and electronic items—indexed for quick reference. Write today to Dept. 3J3, 901 West Jackson Boulevard, Chicago, Ill.

LAFAYETTE RADIO CORP.

901 W. JACKSON BLVD., CHICAGO, ILL. • 265 PEACHTREE ST., ATLANTA, GA.

A. J. Carter, Electronic Pioneer, Dead

A. J. ("Nick") Carter, president of the Carter Motor Company of Chicago, and founder and former director of RMA, died suddenly at his home there, January 24. Mr. Carter was among the organizers of the RMA, and for many years served on its Board of Directors. He was a pioneer in television, having promoted the first television exhibitions in Chicago in 1928-29. He was a director on the first RMA governing board through 1924-25, and served on the Association's board for several years thereafter.

Arco Electric Moves Plant

The Arco Electric Company, manufacturers of Arco snap switches, has moved into a new plant, at 1305 Superior Avenue, Cleveland, Ohio, with manufacturing facilities and space enlarged 300 per cent for increased production, permitting the acceptance of greatly increased orders.

B. Winston is president, C. A. Robinson is general manager, and J. S. McComb is vice-president and sales manager.

Scophony Elects Levey President

Following a meeting of the directors of Scophony Corporation of America, 527 Fifth Avenue, New York, Arthur Levey was signed to a five-year contract to serve as president and general manager of the television company. It was announced that the board took this action to insure continuity of management and to keep Levey at the helm of the organization which he established. Television Productions Inc., a subsidiary of Paramount Pictures, Inc. and General Precision Equipment Corporation are associated with Levey in the operation of Scophony.

American enterprise and capital may be said to have contributed largely to the successful development of the new "supersonic" television which brings to this country the only system to compete with the "electronic" method used in all other American television systems, inasmuch as Levey, a founder, director and one of the major shareholders of Scophony Ltd., the British company, is an American citizen.

Born in New York City, Levey served with the AEF in the first world war, after which he went to London and became prominently identified with the film industry.

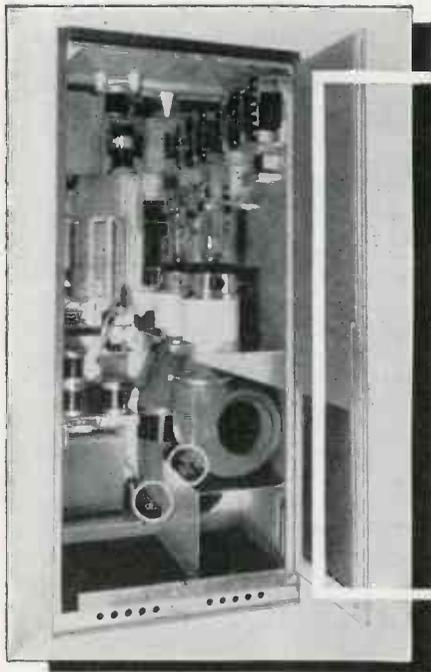


LORD

BONDED RUBBER

MOUNTINGS

Protect ALL Components of
Radio Transmitting Equipment



TYPICAL INSTALLATION

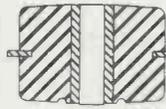


PLATE FORM
VERTICAL SNUBBING
MOUNTING

LORD Shear Type Bonded Rubber Mountings, both snubbing and non-snubbing types, keep radio transmitters and receivers functioning at peak efficiency, by providing protection against shock and vibration. Not only is the entire assembly flexibly supported on Lord Mountings, but, various ACTIVE components are also effectively mounted so as to isolate vibration from surrounding areas. This method of vibration control eliminates fatigue from *all* component parts of the assembly, consequently prolonging operating life as well as insuring functional efficiency of equipment.

Standard Lord Mountings are made in two main types, Plate Form and Tube Form with load capacities ranging from a few ounces up to 1500 pounds. Plate Form Mountings are made in four shapes; square, round, diamond and holder types, allowing ample latitude for correct mounting selection. Tube Form Mountings are made with straight wall or flanged outer metal member. All Lord Mountings are compact, light weight and easy to install. The wide selection of load ratings makes possible the correct choice of mountings for any type of equipment.

For complete information covering all Lord Mountings, as well as an engineering discussion on vibration control, write for Bulletins 103 and 104, or call in a Lord Vibration Engineer for consultation on your design problems. There is no obligation.

LORD MOUNTINGS

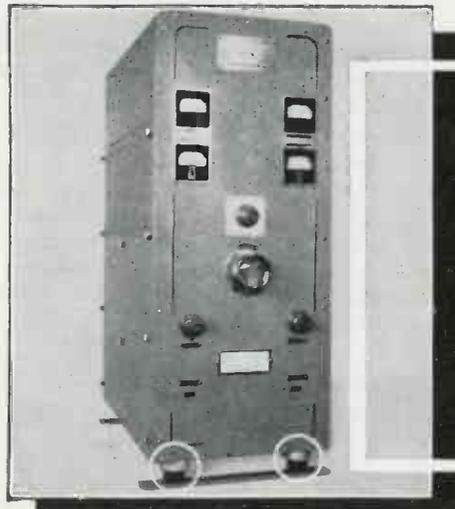
PROLONG EQUIPMENT LIFE by isolating vibration, which reduces metal fatigue and prevents mechanical failure.

INCREASE PRODUCTION by eliminating the necessity for close machining and precision alignment.

SAVE VITAL MATERIAL by reducing equipment weight; inertia masses of machinery bases can be reduced or eliminated.

INCREASE PERSONNEL EFFICIENCY by eliminating nerve wearing noise and vibration, translated through solid conduction.

LOWER MAINTENANCE COSTS by protecting equipment against sudden load shocks and stresses, thereby minimizing repair and replacement operations.



TYPICAL INSTALLATION



HOLDER TYPE

IT TAKES RUBBER IN SHEAR TO ABSORB VIBRATION

STRAIGHT TUBE



VERTICAL SNUBBING (V.S.)
TUBE FORM MOUNTING

SLOPING SHOULDER



VERTICAL SNUBBING (V.S.)
PLATE FORM MOUNTINGS

LORD

BONDED RUBBER

HIGH SHOULDER



VERTICAL SNUBBING (V.S.)
PLATE FORM MOUNTINGS

FLANGED



VERTICAL SNUBBING (V.S.)
TUBE FORM MOUNTING

LORD MANUFACTURING COMPANY . . . ERIE, PENNSYLVANIA

Originators of Shear Type Bonded Rubber Mountings

www.americanradiohistory.com

LETTERS to the EDITORS

Air Raid Sirens at 140 db

Editors Electronic Industries:

In your January issue, the insert "Some Fundamentals of Sound," is very interesting, especially the level of the Chrysler-Bell Victory Siren showing sound intensity at 100 feet. This approximates on the graph 136-137 db.

We furnished alarm systems for the town of Hamden, a suburb of New Haven, Conn., which showed a signal intensity of 140 db at 100 ft. The engineer of the City of New Haven, an engineer of the Connecticut Telephone Co., a professor from Yale and others, were present.

Sometime later the writer tested these units at 175 ft., as far away as I could get at that time, and obtained 140 db. These units at 100 ft. would knock needle of No. 759 General Radio sound-level meter off scale at the highest setting.

The power used to compress the fluid is 2 hp. A 40-watt amplifier, consisting of 4-6L6 tubes, push-pull parallel, was used. The equipment, as tested, weighed less than 400 lbs. The area of throat in the Dilks fluid-flow transmitter was approximately 1/7 sq. in.

C. F. Dilks

Dilks Acoustic Products Company
Norwalk, Conn.

Wasted War Effort Due to "Secrecy"

Editors Electronic Industries:

One of the most pressing current needs for our country is an efficient body for coordinating scientific research and making the results available to those engaged in war work.

At present there is a great amount of duplication of effort. Entire organizations are often slowed down because of what may appear as a technical difficulty in one place or another. That difficulty may have been solved somewhere else, but the information is not made available to the one needing it. There was really no need for slowing down; time was needlessly lost.

Lost time

Frequently an engineering organization will design a piece of equipment in a particular manner in the light of its personal ideas or best information. The desired results may be obtainable by simpler and easier means which have been developed by other engineers, but the information concerning such improved methods is unknown to the first group. The result is reduced efficiency, lost time, wasted

effort. This condition is further aggravated at present by curtailment of published data in technical literature, and by the all-around observance of secrecy. While secrecy is quite important and necessary when applied to the enemy, it will certainly curtail our own efficiency when applied unwisely.

There is an immediate need, therefore, for establishing a method whereby:

1. Duplication of scientific effort will be avoided.
2. Scientific data obtained by any engineering organization will be made readily available to other engineering organizations engaged in the same type of work.
3. Secrecy should be properly applied.

How can this be done? A sketchy plan is outlined below.

Classify research

(a) All engineering and research organizations should first be classified as to group, division and subdivision of scientific endeavor, by a centralized Government body.

(b) The type of work of each of these organizations should be also classified as to "degree of secrecy" by this body.

(c) Each engineer or research worker must keep daily records of his work and make a complete weekly summary of results.

These weekly summaries must be coordinated by a designated official of the company and form the basis for a monthly report which must be sent to the centralized body.

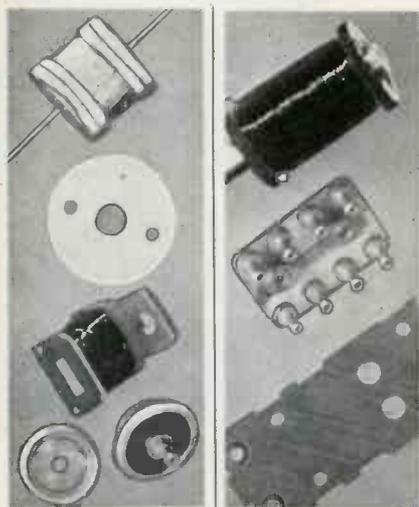
Standardize patterns

The form in which this report is made must correspond to a predetermined pattern, which is the same for all other organizations engaged in the same type of work and which should permit easy or practically automatic breakdown of all data into a series of classifiable subdivisions.

(d) The centralized body sub-classifies this data according to the various subdivisions of work and also according to degree of classified secrecy.

For example, suppose there are six degrees of secrecy: S_1, S_2, \dots, S_6 , the first being the highest degree of secrecy. The data coming from a laboratory whose work is classified as S_4 will be found only in the files S_1, S_2, S_3 and S_4 , and data coming from a laboratory classified as S_1 will be found only in the files of S_1 .

(e) Classify the research workers according to personal qualifications.



SCIENTIFIC MOISTURE-PROOFING OF ELECTRONIC PARTS

In conjunction with one of the largest government contractors of radio equipment, Production Engineering Corp. has designed and built an automatic moisture-proofing apparatus. The process insures operation and stability of treated parts under all conditions of weather—in the stratosphere or on the ground.

We can moisture-proof mica, bakelite, porcelain insulators, coils, chokes, condensers and other small parts—delicate or rugged—according to your needs. An absolute coating of all surfaces, punch holes and thin edges is a safety feature of this operation.

Don't let moisture-proofing headaches hold up your production! Now you can avail yourself of this specialized service and in turn expedite your own orders. A close study of coating and impregnating plus considerable research over the past few years prepares us to handle your work.

Let P-E cut your time and coat your products on an economical contract basis.

Wire, write or phone
for full details

**Production
Engineering Corp.**

660 Van Houten Ave., Clifton, N. J.
Tel. Passaic 2-5161



THIS IS A FIGHTING SPEAKER!

... it is not a figment of the drawing board or the future dream of a designer. This new Jensen speech reproducer is now on active duty with the armed forces.

It is only one of the many newly developed Jensen speech reproducers, products of Jensen's laboratories and factory.

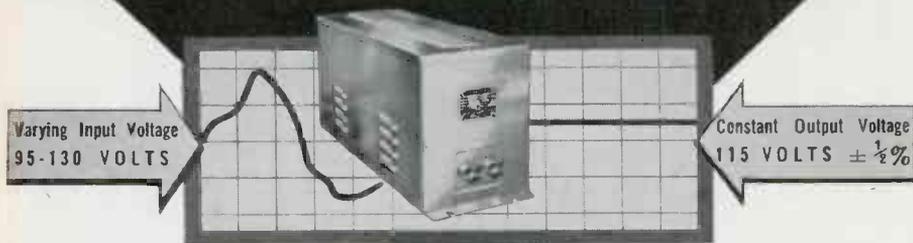
Jensen continues to make a full line of sound reproducers of all types for qualified users.

Jensen

RADIO MANUFACTURING CO., 6601 S. LARAMIE AVENUE, CHICAGO

STABILIZED A. C. VOLTAGE

UP TO 25 KVA



INSTANTANEOUS ACTION

NO MOVING PARTS

When a precision electrical device or a critical process is powered from an AC line, a Raytheon Voltage Stabilizer will permanently eliminate all of the detrimental effects caused by AC line voltage fluctuations. Made for all commercial voltages and frequencies, single or three phase.

Raytheon's twelve years of experience in successfully applying the Stabilizer to hundreds of perplexing voltage fluctuation problems is at your service. It will pay you to take advantage of our engineering skill.

Write for Bulletin DL-48-71 JE describing Raytheon Stabilizers.

RAYTHEON MANUFACTURING CO.

100 Willow Street

WALTHAM, Massachusetts

Each of these workers should have access only to data files corresponding to his own classifications. A man classified as S_4 will have available all information classified under S_4 , S_5 and S_6 but will have no access to files S_7 and above.

Although an organization may be engaged in some type of work having a high degree of secrecy, some of the junior engineers of that organization may have a lower degree. Each advance in degree must be obtained after approval by proper authorities and by a committee of men in the class in which he is to be advanced.

(f) Make available to all classified engineers, all the files corresponding to their classifications, at each important industrial center.

In order to compel all private or commercial research organizations to send all data promptly, the Patent Office should make the date of disclosure to the centralized body the basis for establishing priority in settling patent interferences.

Marcel Wallace,

President

Panoramic Radio Corporation

242 W. 55th Street

New York, N. Y.

**Electronic Engineers,
Please Get Practical!**

Editors Electronic Industries:

Permit me to suggest that your already most excellent magazine might be made acceptable to a larger field of electrical engineers, if more consideration were given to the fact that electronics is well over the head of the practicing electrical engineer.

We purchased and will soon be installing two lines of 600 K.W. each, 200,000 cycles, for the brightening of tin plate.

Our first contact with electronic engineers was disappointing because they seemed to "feel" their superior knowledge and had great confidence in their ability, also they used electrical terms entirely foreign to our understanding, such as the Q constant. In spite of your curve in the December issue, I don't understand its significance; there was no explanation to give value to the elements which go to make it up.

Accept suggestions

The electronic engineer is not readily receptive to suggestions of means to get around his problems. For example, why not use oil instead of distilled water for tube cooling; oil can be maintained at a high resistivity by filtering, will not freeze, has no electrolytic cor-

THOMAS PORCELAIN for COIL FORMS

**STRONG
HEAT-RESISTING
PRECISION MADE
PERMANENT**



THE largest
Thomas Corrugated
Bushing illustrated is
3" diam., 40" long,
used 8 columns in a
circle around which
may be wound a helix
of 45 turns of 1/2"
tubing.

Thomas Porcelain may solve your design and supply problems as it has for others. Quick deliveries of large quantities of precision porcelain is our specialty. If you require special units to specifications our engineers, designers, and development are part of our service.

Write us today—we'll advise as to the adaptability of Thomas Porcelain to your product, quote, make, and deliver in record time.

THE R. THOMAS & SONS CO.

NEW YORK

LISBON, OHIO

BOSTON

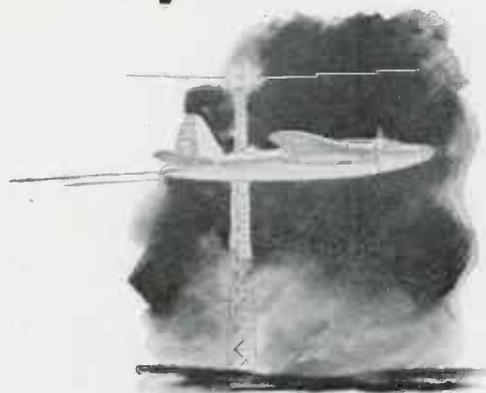
CHICAGO

YESTERDAY

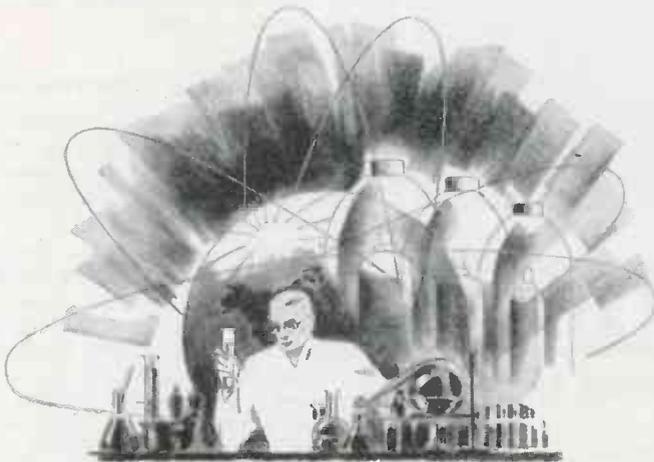


For more than twenty years recognized as builders of the finest sound reproducers. 15,000,000 users of fine radio sets testify to ROLA Quality.

TODAY



Expanded facilities completely dedicated to serving war needs. Producing a variety of high precision, tough-to-make electronic parts, fine radio communications equipment for the U. S. Army and Navy Air Forces.



TOMORROW!

will bring to you all the benefits of improved equipment and processes, all the gains of concentrated experience *plus* the tremendous advantages of intense unhampered research during war years. In the world of tomorrow, Rola will maintain its peacetime leadership. THE ROLA COMPANY, INC., 2530 Superior Avenue, Cleveland, Ohio.

ROLA

MAKERS OF THE FINEST IN SOUND REPRODUCING AND ELECTRONIC EQUIPMENT

ESPEY MANUFACTURING COMPANY, INC.

SIGNAL GENERATORS - AUDIO OSCILLATORS - TEST EQUIPMENT
 RADIO RECEIVERS - TRANSMITTERS - ELECTRONIC DEVICES
 Licensed by - RCA - HAZELTINE - ARMSTRONG

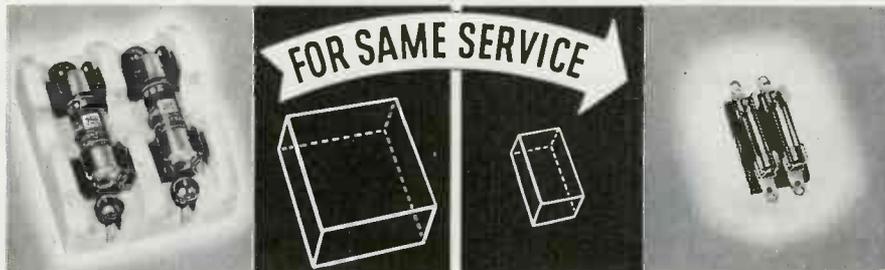
DOING A WAR JOB!

305 EAST 63rd STREET
 NEW YORK CITY, N. Y.
 Telephone: REgent 7-3090

Space Saving LITTELFUSES

UNDERWRITERS APPROVED, 3 A G Glass-Enclosed Littelfuses
 UP TO 8 AMPS., 250 V.

PHOTO SHOWS SAVINGS POSSIBLE



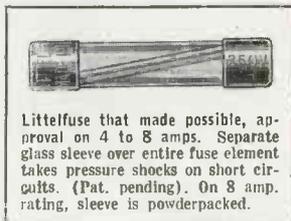
LEFT: Two 250 V cartridge fuses, in large heavy mounting, 2 3/4" x 3 3/8" x 1 3/8".

RIGHT: For same service, two 250 V. 3 A G Underwriters Approved Littelfuses, with terminals on mounting. Over all: 1" x 2" x 2 5/8". Space saved, 11 1/2 cu. in.

TAKE PLACE OF BULKY CARTRIDGE and PLUG FUSES

Littelfuse is first to receive Underwriters Approval on 3 A G fuses (1 1/4" x 1/4") rated over 3 amps. New uses are opened up in electronics, heavy duty power supplies, amplifiers, radio, appliances, motors, etc.

Consult us on fuse protection



Littelfuse that made possible, approval on 4 to 8 amps. Separate glass sleeve over entire fuse element takes pressure shocks on short circuits. (Pat. pending). On 8 amp. rating, sleeve is powderpacked.

LITTELFUSE INC.
 4732 RAVENSWOOD AVE. CHICAGO, ILL.
 202 Ong Street, El Monte, California

rosion of cooling fins; transformers of 1,000,000 volts are cooled and insulated by oil.

Before we were through the final design, both parties had considerable respect for each other. We did not understand their language, but their concept of the mechanical construction needed for a steel-mill installation was equally deficient.

We are the buyers, and we must accept their offerings. But we hesitate to accept something we don't understand enough to picture in our minds what we must contend with in operating and maintaining it.

With the coming developments in high-alloy metals which are responsive to accurate heating and quenching, high-frequency heating with large blocks of power is needed. But to make high frequency more acceptable, the producing and using engineers must talk a common language, otherwise the new art will develop slowly.

Definitions of electrical terms, approved by the American Standards Association would be one point of common ground.

Throw away soldering iron!

I would also suggest that symbols used for years in technical literature be continued. For example, frequency is usually the small letter f—not a capital letter F.

Technical electronic articles should be written with the thought in mind that industrial engineers will also read them, and wherever possible the terms used should be expressed in the technical form and language practically used. The "writing down" of a technical article will help the practicing electrical engineer and the text will still be understandable to the electronic engineer.

Some electronic engineers must throw away their 1/2 in. x 1/2 in. x 1 1/2 in. soldering iron for making a connection to a .0031 in. O.D. conductor, and design a bolted connector 4 in. wide x 1/2 in. thick to fit a 3 in. O.D. conductor!

Carl G. Jones,
 Special Engineer

Youngstown Sheet and Tube Co.
 Youngstown, Ohio.

Water-Tight Radio for Rubber Rafts

One of the Army's latest radio wonders is a little water-tight radio, sealed to a single frequency. This little radio has only one function—to send out at intervals a signal for which all receiving stations with direction-finders will listen, the instant an airplane is reported as missing.

Another midget-sized radio, recently developed by the Signal Corps and weighing only five and a half pounds including batteries, is used by parachutists to talk to each other, while on the way down or after landing at widely separated points.

Another novel piece of apparatus, no larger than a steamer trunk, serves as a combined weather station and radio station. This device can be buried anywhere, preferably on a hostile shore where weather observers cannot be located. For two or three months its batteries, operating the miniature radio, will transmit to the American forces reports every few hours on the temperature and humidity.

Making Tubes Last Longer

"Tips on Making Transmitting Tubes Last Longer" is the title of a new booklet just issued by the RCA Tube and Equipment Department, Harrison, N. J. The booklet is designed as an aid to all users of electronic tubes in the industrial field as well as among broadcasters. The tips, according to the booklet, have been proved in the most exacting applications of communications. Pointing up its message with the analogy of the good motor car tire that will stand up under the strain of operating at 100 miles an hour, but won't last as long, the booklet describes how radio tubes also wear out sooner when they are operated at maximum voltage.

"Facsimile" Finch in Navy



W. G. H. Finch, pioneer in facsimile and television, is now serving as Lieutenant Commander in the Radio and Radar Division of the Bureau of Ships, U. S. Navy, and is stationed at Washington

"ALL-OUT"
TO HELP WIN
THE WAR

Today, the 36-years of skill and experience that pioneered and developed the "QUANTITY-plus-QUALITY" manufacture of BRACH products, are directed exclusively toward serving our armed forces on their road to Victory.

ANTENNAS & RADIO PARTS
BRACH
100% WAR PRODUCTION

L. S. BRACH MFG. CORP.

World's Oldest and Largest Manufacturers of Radio Aerial Systems

55-65 DICKERSON STREET • NEWARK, N. J.



ZOPHAR WAXES

The strict specifications of the Navy, Army and Air force for communications equipment, call for the best and most carefully manufactured products.

ZOPHAR waxes and compounds are

being used and are meeting the rigid tests. We will appreciate your inquiries or will cooperate with you in solving your problems in potting, impregnating or insulating waxes.

ZOPHAR MILLS, INC.

Founded 1846

128-131 26th Street, Brooklyn, N. Y.



GLOBAL WARFARE!

**GLOBAL
THINKING!**

**WIDER
VISION!**

Only PANORAMIC
shows you a wide band
of frequencies—
all at once!

PANORAMIC

An Engineering
Organization
Devoted to Radio
Research, Development and
Manufacture.

PANORAMIC reception is keyed to today's needs—and to the future. Panoramic shows you, visually, a wide band of frequencies to see and analyze.

PANORAMIC RADIO CORPORATION • 242-250 W. 55th STREET, NEW YORK

PLASTIC PARTS

**production
report:**

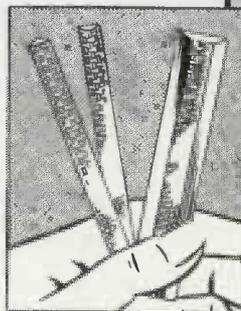
**produced quickly . . . without molds for
RADIO, ELECTRONIC, GENERATOR MANUFACTURERS**

New problems demand new ideas. In Plastics, CREATIVE answers that need for electronic, radio and motor manufacturers.

For example, CREATIVE's new "Asbesto-Wedge," illustrated here. A new type of wedge, designed for use with AC or DC generators, it is virtually unaffected by moisture conditions, and withstands constant heat up to 125°C. In addition, it is very high in dielectric qualities and since it is precision tailored to fit the lamination, shimming is less of a problem, and time is saved in assembly.

This is only one example of new developments by CREATIVE. If you are active in the war effort, we suggest that you contact us at once. There may be many standard parts in your present production which we could produce for you, improve upon, or we may even help you develop new uses for plastics.

CREATIVE PLASTICS CORP.
963 - 969 KENT AVENUE BROOKLYN, NEW YORK



Your inquiry accompanied by sketch or blue print will receive our prompt, careful attention. Illustrated folder sent on request.

MILESTONES TOWARD THE ELECTRONIC ERA

Airplane Radio Aims Its First Artillery Fire

By Maj.-Gen'l Follett Bradley
Commanding General, First Air Force

On November 2, 1912, two young lieutenants took off from the parade ground at Fort Riley, Kan. They were perched on the lower wing of an old Wright-B pusher plane. This was a twin propeller, single-engine machine. Parachutes and safety belts had not yet been invented.

The purpose of the flight was to direct artillery fire by means of radio signals from the plane to the ground, where another young lieutenant listened on an adaptation of the Signal Corps pack-set radio receiver. The transmitter was a quenched-spark, 500-cycle type. It was controlled by a key strapped to the observer's leg.

The target, which was about 3000 yards from the artillery battery, simulated a wagon train and a number of infantry soldiers. It could not be seen from the battery. From an altitude of a few hundred feet, the airplane made figure 8's behind the battery and the observer noted the fall of the high-explosion shells with respect to the target.

He was an artillery officer and sent the necessary orders by his radio to bring the shells onto the target. This was the first time artillery fire had ever been directed from an airplane by radio. The results were startling, and led to the universal use of airborne radio by all nations in war and peace.

The officer who made and installed the transmitter in the plane, and who operated the equipment on the ground, was Lieutenant Joseph O. Mauborgne. He later became Major General and Chief Signal Officer of the Army.

The pilot of that plane was Lieutenant H. H. (Hap) Arnold, now Lieutenant-General, commanding the Army Air Forces.

I was the observer and radio operator on this occasion and thus had the privilege of participating in the world's first successful air-to-ground communication by radio.

Two years later General Mauborgne established two-way radio communication between plane and ground.

Before Veteran Wireless Operators Assn.,
New York, Feb. 11, 1943



LOOK .. FOR THE LITTLE BLACK BOX!

● We believe every good American wants above all to get this war won. Certainly that is the spirit here in the "Connecticut" plant. But postwar planning is as necessary to the business world as to government.

We do not believe tomorrow's world and yesterday's world have much in common.

We think that many of tomorrow's better things will come from "a little black box" containing automatic electric and electronic equipment. It will do much more than turn things on and off automatically at certain times — it will "look inside" materials being fabricated into finished products, "inspect" transportation equipment to be sure it is safe. It will improve communications amazingly.

This "little black box" is not the invention of "Connecticut" or any other one company. It merely represents the practical application of advanced electrical and electronic principles, many of which are being learned from wartime development. "Connecticut" development engineers will have much to offer the manufacturer who would like to see the magic of "a little black box" applied to his product, or to machines in his plant.

CONNECTICUT TELEPHONE & ELECTRIC DIVISION



MERIDEN, CONNECTICUT



"I need EVERY ONE of these 30 items TOMORROW WITHOUT FAIL!"

IT'S not at all unusual for us to get a RUSH ORDER like that from an industrial plant working night and day on important war development work! Buyers like this can tolerate no delay. Getting Radio and Electronic Supplies of every description . . . and **getting them NOW** . . . is a "MUST" for them, these days.

That's why we cooperating distributors of radio and electronic supplies have organized **special** technical staffs and departments to give **EMERGENCY INDUSTRIAL SERVICE** from **coast-to-coast**, delivering the goods with a degree of speed and efficiency heretofore considered impossible under trying war conditions. Strategically located and with very large and diversified stocks, we're ready for the unusual demands of electrical war industries everywhere, whether one or a hundred different items are needed to carry on without delay.

Free

A regular feature of our Industrial Emergency Service is a big cloth-bound Reference Book & Buyer's Guide describing thousands of Radio and Electronic Parts and Equipment available from this one, large, dependable source. Purchasing Agents and other responsible industrial

buyers are invited to ask for a personal copy on their company stationery. This book will prove a big saver of time and trouble . . . an invaluable aid in specifying exactly what you need. Send for your copy today!

WRITE OR PHONE YOUR NEAREST DISTRIBUTOR

TERMINAL RADIO COMPANY

NEW YORK: 85 Cortlandt St.
Telephone: WOrth 2-4416

WALKER-JIMIESON, INC.

CHICAGO 311 South Western Ave.
Telephone: Canal 2525

RADIO SPECIALTIES COMPANY

LOS ANGELES: 20th & Figueroa Streets
Telephone: Prospect 7271

TRAINS BC ENGINEERS TO REPLACE DRAFTEES

The increasing drain upon the engineering staffs of broadcasting stations because their technicians are continually being drafted into the armed forces, is a serious problem which is being faced and solved in Philadelphia by the establishment of a plan that is successfully meeting this man-power shortage.

The idea was conceived in the minds of members of the local Eastern Branch of The American Communications Association of which Charles G. Smith, engineer of station WCAU is an officer in charge. Besides discussing this matter at union headquarters, it was also taken up by the Philadelphia Broadcast Management of which the eight major broadcasting stations in Philadelphia are members. After a series of joint meetings between these groups, committees of various powers and aims were formed and the process of organization started and put into effect. It was decided to organize and equip a school devoted to night

classes only, composed of members of the ACA, every one of which possessed some degree of technical radio training or was an amateur with an operator's license. The class consists of only 30 students specially selected from among a long list of applicants who were considered reasonably free from draft call and possessed the required technical background and other requirements.

Course runs 21 weeks

The full course of the first trial class is to be approximately 21 weeks' duration, 4 hours per night, five nights a week. The first 13 weeks will be devoted to the study and revision of broadcast theory, the remaining 8 weeks to be devoted spending one week alternately among the eight Philadelphia broadcasting stations where students will act only as observers and not participate in any of the actual control work. Thus each student will become acquainted with the peculiarities of each local station, any one of which he may be later assigned to. The closest of co-

operation between management and organized labor is exercised throughout all stages of the plan. The initial method of obtaining applicants was by means of spot announcements over the air from the eight local broadcasting stations. More than 250 replies were received.

The progress of the first class which is now in its sixth week shows gratifying results, and Philadelphia, at least, will not be found lacking in engineering talent to man local broadcasting stations, no matter how deeply the draft board may go toward calling draftees from the ranks of its technicians.

SIX-COLOR PHOTOOMETRY OF STARS

The magazine "Sky," published at Harvard Observatory, Cambridge, Mass., in reporting on the recent Detroit meeting of the American Astronomical Society, tells of the continuation and extension of previous work with the photoelectric cell applied to precise measures of the colors of stars by Drs. A. E.

CML

SPECIALIZES IN THE MANUFACTURE OF

Production Test Equipment

OUR ROTOBIDGE

SPEEDS the PRODUCTION of ALL TYPES of

Electronic Equipment

Tests a circuit per second for resistance, capacity and inductance

Descriptive Literature on this Revolutionary Testing Technique will be mailed on request.

COMMUNICATION MEASUREMENTS
LABORATORY

131 Liberty St. New York, N. Y.

PHONE WH. 4-7275

ELECTRONIC INDUSTRIES

Advertising Rates

	1 ft.	3 ft.	6 ft.	12 ft.
One page	\$230.00	\$225.00	\$220.00	\$210.00
Two-thirds page	153.33	153.33	150.00	146.67
One-half page	115.00	115.00	112.50	110.00
One-third page	76.67	76.67	76.67	75.00
One-quarter page	57.50	57.50	57.50	56.25
One-sixth page	38.33	38.33	38.33	38.33
One-eighth page	28.75	28.75	28.75	28.75

Covers, preferred positions, inserts, color, bleed, etc.—rates on request.

Next issue, APRIL; out APRIL 1

CLOSING DATE: Proofs furnished, March 20; without proofs, March 24.

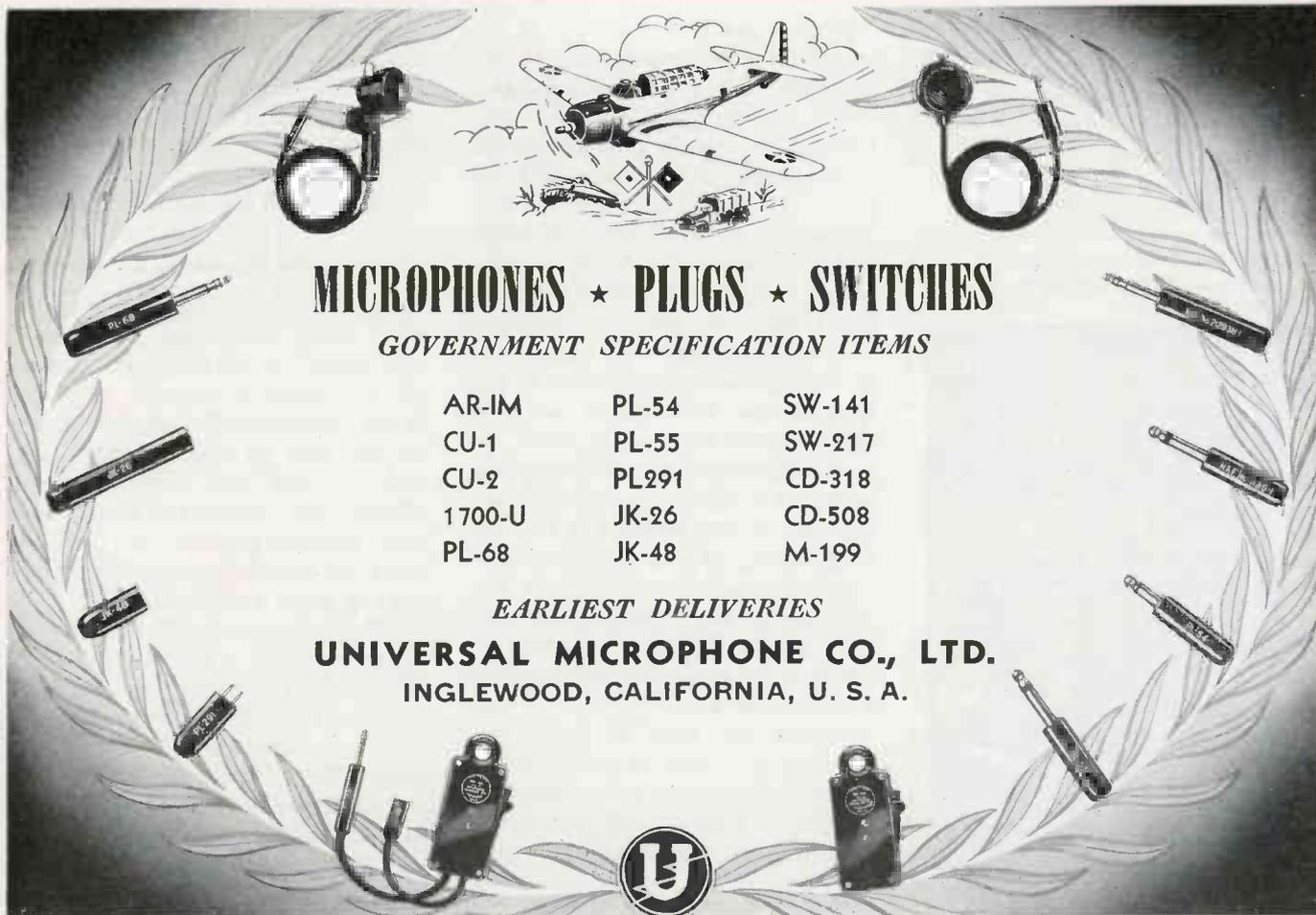
Subscription rate—1 year, \$3.00; 2 years, \$5.00.

Subscriptions accepted only from those who are professionally active in manufacturing companies, laboratories, communications and Government services

CALDWELL-CLEMENTS, Inc.

Publishers of

NEW YORK	Electronic Industries	CHICAGO
480 Lexington Ave.	Electronic Year Book	201 N. Wells St.
Telephone	& Engineering Directory	Telephone
PLaza 3-1340	Radio Retailing Today	Randolph 9225
	The Radio Year Book	



MICROPHONES ★ PLUGS ★ SWITCHES

GOVERNMENT SPECIFICATION ITEMS

AR-IM	PL-54	SW-141
CU-1	PL-55	SW-217
CU-2	PL291	CD-318
1700-U	JK-26	CD-508
PL-68	JK-48	M-199

EARLIEST DELIVERIES

UNIVERSAL MICROPHONE CO., LTD.

INGLEWOOD, CALIFORNIA, U. S. A.



T-PADS! by TECH!

*For Speech
Input
Equipment*

A complete line of speech input controls, Time tested—second to none—at Competitive prices.

Embody years of engineering and production experience. Hundreds of satisfied customers. No exaggerated claims . . . but what we make will give you lasting and trouble-free service.

Also light and heavy duty tap switches—special control to your specs.

Write for Bulletin 403.

Complete catalog on request.

TECH LABORATORIES

7 Lincoln St.

Jersey City, N. J.

. . . For the Duration and after the last "All Clear" is given . . .

RADIO ALARM

Capacity-Operated
INTRUSION DETECTION SYSTEMS

Invisible RADIO ALARM System which will detect approach to protected interior or exterior locations . . . and properly indicate alarm at the source or at a remote point.

Obviously . . . negotiations and layouts are confidential!

Call or write

ELECTRONIC RADIO ALARM, INC.

1920 Lincoln-Liberty Building
Philadelphia, Pennsylvania

RITtenhouse 3480

GET IT HERE!

HARDWARE FOR ELECTRONIC INDUSTRIES

We specialize in the "little things" that are so essential—screws—nuts—lock-washers—cap screws—set screws—terminals—rivets—eyelets—brass, steel and fibre washers—rubber grommets, etc., etc. Centrally located. Ship anywhere. Economy, dependability and satisfaction assured.

WE INVITE YOUR INQUIRIES

FEDERAL SCREW PRODUCTS CO.

224 W. Huron Street Chicago

FEDERAL



RADIO HARDWARE

Goat
ELECTRONIC TUBE
PARTS AND SHIELDS

Small Parts
of the
BIG
WAR
JOB!

Goat Metal Stampings
INC.
Division of THE FRED GOAT CO., INC.
314 DEAN STREET, BROOKLYN, N. Y.

Goat has meant
Accuracy since 1892

Whitford and Joel Stebbins, of Mt. Wilson and Washburn Observatories. By means of suitable glass filters six spectral regions are isolated, ranging from 3,500 angstroms in the ultraviolet to 10,300 angstroms in the infrared. The new colors give a scale for the so-called color index of a star about four times as great as the international scale, which is based upon the difference between photographic and visual brightness. In certain cases it is possible to determine the absolute or intrinsic brightness of a star, and hence its distance, simply by photo-electric measures of its color. Another application of the method is the determination of the relative temperatures of the stars just as the metallurgist measures the temperatures of an incandescent piece of metal by matching its color against a known standard.

During the past 10 years the authors have devoted considerable effort to the study of the dust in interstellar spaces made evident by the reddening of the light of distant stars, just as the sun is apparently reddened near the horizon by the dust in the earth's atmosphere. The previous work has all been done in two colors, but the new method with six colors is much more delicate and powerful. In fact, some difficulty is experienced in finding stars of really normal color, those that we can be sure are unaffected by interstellar dust. It has been known that the clouds of dust are quite irregularly distributed in space, but the new observations give evidence that the quality of this dust—that is, the proportion of large and small particles—is much the same everywhere.

DISSOLVED GASES INCREASE EMISSION

The discovery that gas dissolves in certain metals just as salt dissolves in water, may lead to the production of longer-lasting electronic tubes which will require less power to operate, Dr. Harvey C. Rentschler, noted physicist, told a meeting of the American Physical Society in New York.

Dr. Rentschler, who is director of research for the Westinghouse company, Bloomfield, N. J., reported

the results of his experiments to unravel one of the unsolved mysteries of electronics, namely, how tiny particles of matter called electrons are emitted from metals to set up a flow of current inside such tubes as those for radio and X-ray.

Gas dissolves in metals

Experiments during the last eight years have led to the conclusion that atoms of gas—oxygen, hydrogen or nitrogen—actually dissolve in the crystalline structure of some metals just as salt dissolves in water. These gas particles then "loosen" the electrons in this structure, causing them to be emitted from the metal more readily when heat or light is applied.

"This explanation," Dr. Rentschler declared, "should result in longerlasting tubes and accomplish important savings in the size and number of electric batteries, generators and other apparatus needed to supply the filament power. Such improved tubes would be the result of better 'cathode' construction," he continued. Cathodes are the metal filaments in side tubes which fire a stream of electrons at speeds greater than a million miles an hour. The emission of electrons from metal cathodes is the basic principle of all electronic phenomena. As these tiny particles of negative electricity pass from the cathode to a metal plate called the anode, they set up a flow of electric current which is put to work to accomplish countless tasks.

Oxygen speeds reaction

Dr. Rentschler first discovered, in 1935, that a small amount of oxygen reacting with such metals as thorium, uranium and barium speeded electron emission, but found that a similar effect was not obtained with such commoner metals as iron, nickel, copper, zirconium, titanium and others. "Using a pure form of zirconium, titanium and hafnium," he explained, "we now have found that these metals too are likewise affected by oxygen as well as nitrogen and hydrogen.

"When these metals in a pure state and mounted on a core of tungsten are heated in a vacuum,



No Gremlins NEED APPLY!

ALLIANCE dynamotors and band-switch motors are engineered to stand up and take it. They give it back, too, twenty-four hours a day in Alaska and Africa, from Greenland to Gibraltar — gremlins or no gremlins.

Built with quality materials, by precision methods to exact specifications, Alliance dynamotors and band-switch motors are dependable. Their sound engineering gives economy in construction and operation.

The everyday use of Alliance motors under today's conditions proves "no motors better built or better engineered."



DEPENDABILITY proved by constant service under all conditions.



PRECISION proved by the wide variety of exacting performance.



ECONOMY proved by low initial cost and reliable operation.

ALLIANCE MANUFACTURING CO.
ALLIANCE, OHIO



BRAININ ELECTRICAL CONTACTS

WITH OUR ARMED FORCES —
GIVING PRECISION PERFORMANCE

Brainin contacts enter into many electrical devices which are auxiliary to electronic apparatus. We have the experience to make special designs for your specific purposes.

C. S. BRAININ CO.

PRECIOUS METAL PRODUCTS FOR ELECTRICAL MANUFACTURERS
233 SPRING STREET — NEW YORK, N. Y.
CHICAGO OFFICE: 30 N. MICHIGAN AVENUE

Two Words that Electrified the World

UNCONDITIONAL SURRENDER

Two words that shot terror into the hearts of our enemies. . . .

Two words that foretold the doom of the oppressors. . . .

Two words that lifted the hopes of all the peoples of the world. . . .

And these very same words sounded the Keynote of the policy of American Industry:—

Unconditional Surrender of brain, brawn, and machines to the great job of winning the Battle of Production.

Unconditional Surrender to the mighty task of winning Victory.

To this end the Dial Light Company of America is hard at work. . . . We say this for the record: No problem is too difficult; no delivery schedule is too "impossible" for us to follow-through to a successful conclusion.



DIALCO

PILOT LIGHT ASSEMBLIES

Model illustrated is used with T4½ ¼-Watt Bulb.

We manufacture an extensive line of Warning and Signal Pilot Light Assemblies. If your problem cannot be solved by one of our standard units, we will make one to your exact requirements. Samples and blueprints will be submitted promptly. . . . Write us today, attention Dept. D.



DIAL LIGHT CO. of America INC.

90 WEST STREET • NEW YORK, N. Y.

they will melt into a soft globule. When the pure metal is heated in oxygen, hydrogen or nitrogen at a low temperature and then at a still higher temperature in a vacuum, it becomes brittle and hard.

"After an appreciable amount of gas is 'dissolved' in the metal and all excess gas removed, the metal can be heated to temperature as high as 2,700 degrees Fahrenheit. The fact that there is no pressure increase in the vacuum tube, shows that no further gas is liberated.

The gas apparently dissolves uniformly to form what we call a 'solid solution' in the metal. From such metal can be made excellent cathodes."

High-voltage field

Although scientists have known that oxide-coated cathodes emit electrons more readily than cathodes of plain metal, they have been unable heretofore to use oxides for high-voltage tubes, Dr. Rentschler pointed out. This is because the high voltage sets up such a strong

electric field that the oxide-coating is torn from the surface of the metal. Such a coating consists of a paste baked onto the metal.

By dissolving gas into the metal, however, it may be possible in the future to produce an oxide-coated cathode for high voltage tubes, he continued. The oxide in this case becomes an integral part of the basic cathode metal and cannot be torn off by the strong "pull" of the electric field.



MEISSNER SIGNAL CALIBRATOR GIVES YOU EXACT FREQUENCIES!

A Precision Frequency Standard for Laboratory Use. The Meissner Signal Calibrator is the answer to calibrator checking which is a problem so often encountered in the manufacture of products used in the war effort. Solves the problem of providing accurate signals from 10 KC to 60 megacycles for checking calibration. Provides modulated and unmodulated signals every 10, 50 and 100 KC. Vernier control is provided for adjusting to zero beat against WWV or other primary standard.

Entire unit, including 110 volt A.C. power supply, housed in black crinkle finished cabinet measuring 8" x 8" x 12". Supplied complete with tubes. On special order the Signal Calibrator can be arranged to provide 100 KC and 1000 KC output.

See your Meissner distributor or write



MOUNT CARMEL, ILLINOIS

"PRECISION-BUILT PRODUCTS"

VETERAN WIRELESS MEN HOLD 18TH "CRUISE"

Many well-known radio engineers were present at the Veteran Wireless Operators Association's eighteenth anniversary "dinner cruise" held at the Hotel Astor, New York, February 11th, when Marconi Memorial honor plaques were awarded to each of the armed services and the merchant marine.

Present to receive the plaques were Major General Dawson Olmstead, Chief Signal Officer of the Army; Captain Carl F. Holden, Director of Naval Communications; Colonel A. W. Marriner, Director of Air Corps Communications; Colonel Wallace, Director of Marine Corps Communications; and Captain Thomas Blau, Commandant, United States Maritime Service. The presentation of the plaques was broadcast over WEAJ and a coast-to-coast NBC network.

A special commemorative medal was presented to Major General Follett Bradley, Commanding General, First Air Force, as a pioneer in the use of wireless from an airplane for artillery spotting.

Among the guests present were:

Colonel David Sarnoff, president RCA; C. J. Pannill, VWOA life member, who received a Marconi Memorial Medal of Achievement as a former wireless operator who attained top ranking position in the field and whose organization last year was awarded the Army-Navy "E" pennant for achievement; W. J. Halligan also a life member, who received a similar medal on behalf of his company, the Hallicrafters, in Chicago, also recipients of the Army-Navy "E"; E. A. Nicholas,

Mobile
Crime
Detection
Laboratory
uses
Hallicrafters
Equipment



*T*HE STATE OF ILLINOIS has just completed one of the world's finest mobile crime detection laboratories. The laboratory travels in a truck which is staffed with crime detection experts and a modern laboratory incorporating every device for the scientific detection of crime and the apprehension of criminals.

WITH HALLICRAFTERS short wave radio communications equipment the radio operator can maintain communications with police radio stations and the Illinois State Highway Police Patrol Cars to arrive at the scene of a major crime within a short time after its occurrence.

HALLICRAFTERS short wave radio communications equipment will always be found doing its job where exceptional accuracy and high quality reception are required.

World's largest exclusive manufacturer of short wave radio communications equipment.



hallicrafters

CHICAGO, J. S. A.



"THE INDUCTANCE AUTHORITY"

By EDWARD M. SHIEPE,
B.S., M.E.E.
(A New Book)

THE ONLY BOOK OF ITS KIND IN THE WORLD. "The Inductance Authority" entirely dispenses with any and all computation for the construction of solenoid coils for tuning with variable or fixed condensers of any capacity, covering from ultra frequencies to the borderline of audio frequencies. All one has to do is to read the charts. Accuracy to 1 per cent may be attained. It is the first time that any system dispensing with calculations and correction factors has been presented.

There are thirty-eight charts, of which thirty-six cover the numbers of turns and inductive results for the various wire sizes used in commercial practice (Nos. 14 to 32), as well as the different types of covering (single silk, cotton-double silk, double cotton and enamel) and diameters of $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$ and 3 inches.

Each turns chart for a given wire has a separate curve for each of the thirteen form diameters.

The book contains all the necessary information to give the final word on coil construction to service men engaged in replacement work, home experimenters, short-wave enthusiasts, amateurs, engineers, teachers, students, etc.

There are ten pages of textual discussion by Mr. Shiepe, graduate of the Massachusetts Institute of Technology and of the Polytechnic Institute of Brooklyn, in which the considerations for accuracy in attaining inductive values are set forth.

The book has a flexible fiber black cover, the page size is 9 x 12 inches and the legibility of all prices (black lines on white field) is excellent. PRICE AT YOUR DEALER OR DIRECT—\$2.50

GOLD SHIELD PRODUCTS

350 Greenwich St. (Dept. E.I.2) New York

University

REFLEX SPEAKERS
now the accepted **STANDARD** for all **WAR USE**

EVERY UNIVERSITY REFLEX
the result of years of pioneering research and development

EVERY HIGH EFFICIENCY SPEAKER
in University's extensive line of power speech reproducers has a vital part to play in the WAR program.

REMEMBER
University is now producing many special speakers for the Army, Navy & Signal Corps.
Submit your special problem direct to the engineering dept.

UNIVERSITY LABS., 225 VARICK ST., NYC

president of the Farnsworth Television and Radio Corporation; Commanders Muller, Wallis and Boucheron, U. S. Navy; Admiral Hooper, former Director of Naval Communications and pioneer in the wireless art; General J. O. Mauborgne, an honorary member of the association, and former Chief Signal Officer.

Communication heads

General George L. Van Duesen; Admiral Luke McNamee, president Mackay Radio Telegraph Company; Commander R. V. Howley, General Manager, Tropical Radio Telegraph Company; E. H. Rietzke, President Capitol Radio Engineering Institute; K. B. Warner, secretary and general manager of the American Radio Relay League; W. F. Aufenanger, general superintendent of RCA Institutes; James Francis Rigby, Personnel Director of RCA Communications; J. O. Smith, one of the first amateurs, and a colorful personage in the wireless art from the beginning; Guy R. Entwistle, president, Massachusetts Radio and Telegraph School; Francis C. W. Lazenby, now Warrant Electrician USNR, a pioneer of 20 years standing; Charles D. Guthrie, one of the first official radio inspectors in the United States Government Service.

Dr. Fred A. Kolster, inventor of the modern direction finder; George Lewis, of I.T. & T., who has been to Europe and South America and possibly other continents during the last year (and who is remembered by the matrons who once were students of Hunter College as their good-looking instructor during the last war); "Johnny" Johnstone of the Blue Network (who used to be famous for the fact that he was VWOA's only piano player); Dave Driscoll, in charge of special events for WOR-Mutual; Jack Popelle, secretary and chief engineer of WOR-Mutual, who announced at the dinner that VWOA will award scholarships to the top ranking girls in the WAVES, WAACS and the SPARS; A. J. Costigan, traffic manager Radiomarine Corporation; C. S. Anderson, editor of the VWOA Year - book; George H. Clark, VWOA's Secretary; George W. Bailey, of Washington to whom all

credit is due for the success of this dinner; F. P. Guthrie, chairman of the Washington Chapter of VWOA.

T. R. McElroy, the world's champion and outstanding telegraphist, who unveiled his "chart of all charts," including every known code, the Arabic, the Russian, the International Morse, the American Morse, the Japanese, the Spanish, the Flag Signals, the "Q" signals, the "Z" signals and all others; John Cose, Superintendent, RCA Institutes, New York; Haraden Pratt, vice-president and chief engineer of the Mackay Radio Telegraph Company, who was one of the outstanding radio aids in the Navy Department during the last war; W. S. Fitzpatrick of Radiomarine, one of the pioneers in wireless; J. B. Duffy, assistant traffic manager, Radiomarine Corporation.

O. B. Hansen, vice-president and chief engineer of the National Broadcasting Company; Charles W. Horn, director of development and research of NBC; Benjamin F. Miessner, whose first invention was the cat-whisker detector and later became one of the foremost inventors in the radio art; John V. L. Hogan, consulting engineer, who has made history in the development of the radio art; Arthur Van Dyck, executive engineer, patent department, RCA, junior past-president of the Institute of Radio Engineers; H. J. Scroll, vice-president, New York Telephone Company; Colonel Bender, Signal Officer, Second Corps Area; Major Moody, in charge of communications, Second Corps Area, Governors Island, N. Y.; Dick Nebel, outstanding scholarship student at Radio Engineering Institute; Gerald F. J. Tyne, Bell Laboratories, one of the best known collectors of data on the vacuum tube.

Armstrong, Ballentine, Binns

Dr. Edwin H. Armstrong, inventor of the super heterodyne and frequency modulation, recipient of the 1943 Edison medal of the American Institute of Electrical Engineers; Stuart Ballentine, of the Ballentine Research Laboratories, Boonton, New Jersey, who did yeoman work for Uncle Sam in the last war in the development of the radio compass; Jack Binns of Hazeltine, first

1 Lectrohm ADJUSTABLE WIRE WOUND VITREOUS ENAMELED Resistors

Experience Built . . .
under Personalized Supervision

Every Lectrohm Resistor you receive has passed an individualized standard which has been dictated by Lectrohm's experience to satisfy the most critical requirements. Lectrohm Adjustable Resistors are coated with a durable vitreous enamel which completely embeds its accurate space winding, terminals and silver soldered connections, making the entire unit an integral part of the ceramic core on which it is wound. Available from 10 watt to 200 watt capacities.

• Write for your copy of Lectrohm Resistor Catalog No. 98.

LECTROHM
INCORPORATED
..5139 W. 25TH STREET CICERO, ILL.



HAS MADE

Better Pilot Light Assemblies
FOR YEARS!



NO. 50 TYPE
PAT. No. 2220516

DRAKE is no newcomer in the field of Pilot Light Assembly manufacture. The remarkable dependability and efficiency of our products represent years of experience . . . years of development work, improvement, and specialization . . . making better Dial and Jewel Light Assemblies, and nothing else! Sheer merit has long since resulted in reaching the position of world's largest exclusive manufacturer! Large, high speed facilities for precision production insure prompt deliveries in any quantities.

SEE THE DRAKE CATALOG FOR
DETAILS ON OUR COMPLETE LINE!

DRAKE MANUFACTURING CO.
1713 W. HUBBARD ST. • CHICAGO, U. S. A.

use

DI-ACRO PRECISION MACHINES
(DIE - ACK - ROW)
SHEAR (illustrated) • BRAKES • BENDERS

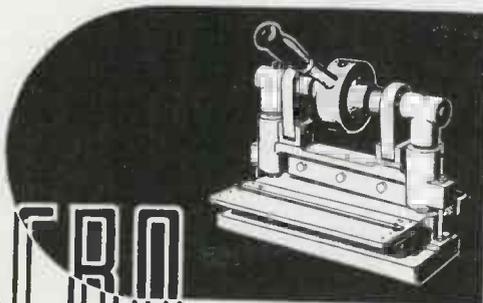
to save "Short Run" die costs

"Extra Special Rush! Speed it up! When can you deliver?" Maybe you don't have to wait — Wait — WAIT — for dies! Try "DIE-LESS DUPLICATING" with Di-Acro Shears, Brakes, Benders. These are precision machines — all duplicated work is accurate to .001". You'll get a new slant on "short-run" production problems from the great variety of parts which can be produced by Di-Acro Machines. Thousands of them are in use saving Man Hours and Critical Materials.

Send Today for Catalog

"METAL DUPLICATING WITHOUT DIES"

It's an eye-opener on what you can do without dies, shows typical parts, and gives sizes and capacities of all models of Di-Acro Shears, Brakes, Benders.



O'NEIL-IRWIN **DI-ACRO** **MFG. CO.**
PRECISION MACHINES

348 8th AVENUE SOUTH

MINNEAPOLIS, MINN.

ELECTRONIC INDUSTRIES • March, 1943



INSTANT HEATING TRANSMITTERS
and
LOW DRAIN RECEIVERS
FOR MAXIMUM POWER ECONOMY IN
TWO-WAY MOBILE RADIO

• ZERO STANDBY CURRENT with either Ultra High or Medium Frequency Mobile Transmitters plus minimum battery drain in the companion receiver result in more transmissions and less battery failure.

Complete control and Instant transmissions from "push-to-talk" button on microphone.

KAAR ENGINEERING CO.
PALO ALTO, CALIFORNIA

Manufacturers of High Grade Radiotelephone Equipment



B-L

SELENIUM RECTIFIERS

Serving UNCLE SAM - WITHOUT NEGLECTING YOU!

THE light weight, small size, and dependable performance of B-L Selenium Rectifiers recommend them for use where other metallic rectifiers are impractical. Aside from their functions for conversion, their unique characteristics suit them ideally to a wide variety of applications as valves, voltage limiters, variable resistances, and similar uses.

Today, the major part of the production of B-L Selenium Rectifiers is being used to fulfill prime and sub contracts in connection with the War program. Fortunately, however, our production facilities at this time are meeting Uncle Sam's needs — and still have available capacity for additional essential industrial business.

Write today for Bulletin R-41, giving full details on B-L Selenium Rectifiers.

THE BENWOOD LINZE CO. • ST. LOUIS, MO.

TECHNICAL WRITER WANTED

We offer you adequate salary, interesting work, and a permanent position. . . .

. . . if you know technical radio, and can write so clearly, so informatively that you can edit manuscripts prepared by engineers — and convert them into "popular" booklets which will interest and instruct students of a long-established home study organization.

You will also have opportunity to do original writing. By your use of words, pictures and diagrams, you will help teach radio and electronics to many thousands of seriously enthusiastic students. You will have the rare opportunity of watching both individual and mass reaction to instruction material you prepare.

We want an UNUSUAL man. Therefore, we lay down no hard and fast specifications as to who and what he should be. If you believe you may qualify, write us so fully about your education, experience, salary requirements, etc., that an immediate interview will be justified.

Post Office Box 2701 • Washington, D. C.

wireless operator to use wireless communications for the saving of lives at sea; Elmer Bucher, author of "Practical Wireless Telegraphy" and other books; T. D. Haubner, the man who first used the signal SOS as a distress signal.

"Bill" Dubilier, who made the mica condenser possible; Carl Dreher, radio engineer and prominent author; Lieut. Commander W. A. Eaton, who formerly was officer-in-charge of the Radio test shop, Washington Navy Yard; R. H. Frey, who handles radio for A. H. Bull and Company; Colonel Moore, Signal officer of the First Army; Colonel Schute of Western Union; Frank Hinners, veteran of the previous war, now with the Hazeltine Corporation.

Old timers

L. C. F. (Larry) Horle, radio aide in World War I, now consulting engineer for the Radio Manufacturers Association; Frank E. Butler, chief engineer of the old deForest Company, who assisted Lee deForest at the time of the invention of the original three-element tube (now associate editor of "Electronic Industries"); Paul Trautwein, VWOA pioneer, who has made many donations of old-time sets to the radio museum; R. M. Keator, who supplied motor generators from the Crocker Wheeler Company when the Navy needed them badly in 1917; T. E. Niverson, general superintendent Mackay Radio Telegraph Company.

E. K. Cohan, technical director of the Columbia Broadcasting System; Roger B. Lum, an announcer of note in the early days of broadcasting; William A. Ready, president National Company, of Malden, Massachusetts; J. V. Maresca, VWOA's first secretary and one of the founders of the association, and also J. F. J. Maher, one of the group's first presidents; George Crouse, who built radio sets for the Sperry Company in the previous war.

All of VWOA's directors were present: George H. Clark, Commander Fred Muller, W. S. Fitzpatrick, William C. Simon, William J. McGonigle, Charles D. Guthrie, A. J. Costigan, and J. R. Popelle. William J. McGonigle continues as the association's energetic president.

A message was read from the association's honorary president, Dr. Lee deForest, stressing the devotion of the radio operators in all branches of the military service and the merchant marine, in the present war.

A communication was also received from James Lawrence Fly, Chairman Federal Communications Commission, which read as follows:

"It is good to know in this time of war that the Veterans Wireless Operators Association carries on uninterruptedly the tradition of heroism and devotion to duty, which wireless operators have maintained in peace and war since the birth of the radio art. Now more than ever we have needed these qualities, both in the communication branches of the armed forces and in civilian communications work. Radio in this war faces an unprecedented task; and I am confident that working together, all concerned in communications problems will continue the forward march until the unconditional surrender of the enemy."

HENS SHOT FROM GUNS, TEST PLANE SHIELDS

A new achievement in air safety, development of a "bird-proof" windshield glass for airplanes, has been announced by the Civil Aeronautics Administration after months of unique experimental work in the high-power laboratory of the Westinghouse Company at East Pittsburgh, Pa.

The tests, carried out by shooting bodies of hens and turkeys from a 20-foot-long compressed-air cannon, resulted in a "club sandwich" design of strong glass and resilient plastic, capable of withstanding impact of a 15-pound bird at 200 miles an hour.

The program was undertaken because of the number of bird-plane collisions, especially during the migrating season. A medium-sized bird smashing into the windshield of an airplane can cause a lot of damage. In fact, some aircraft crashes, not explained in any other way, may have been caused in this manner. Records show, for example, that one bird broke through

TUBES REBUILT

*All type of tubes from
250 watts**

•
*Guarantee—1000 hours—
prorata basis*

•
*Rebuilding charge—
75% of list*

•
**Our past records indicate that approximately
87% of all tubes received were successfully rebuilt.*

Inquiries Invited

FREELAND & OLSCHNER, Inc.

**611 BARONNE STREET
NEW ORLEANS, LA.**

Give your
Recording Troubles
the

"Brush-Off"



"Brush-Off" will positively keep all cuttings away from the recording needle, thereby eliminating skips on the record being made. Fits all automatic and manual recorders. Will save its cost in spoiled records many times over.



List \$150

In addition to manufacturing, we act as Manufacturers' Agents and Distributors, featuring playback and cutting needles, a'bums, record racks, cases, blanks and all necessary items.

Our New Location
RECORDIT CO.
315 North 7th St. Louis, Mo.
Compton Bldg.



VITAL FACTORS

IN OUR GREAT WAR EFFORT!

Electronic Products and Parts are vital factors in our war effort. Insuline is putting vastly increased effort behind the manufacture of these products for the Armed Services:—

- Metal Cabinets, Chassis, Panels
- Metal Stampings • Plugs and Jacks • Completely Assembled Screw Machine Products • Hardware and essentials
- Antennas for "Walkie Talkies", etc.

Mfrs. and Contractors: Send specifications for estimates.

Write for this 12-page Industrial Catalog now:



INSULINE

CORPORATION OF AMERICA

INSULINE BUILDING

(36-02 35th AVENUE)

LONG ISLAND CITY, N.Y.

MATHEMATICS FOR RADIO

Two volumes, 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 114
593 East 38th St., 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 \$3.75 plus 6c postage
 - Book II at \$4.00 plus 6c postage
 - Books I and II at \$7.75 postage prepaid
- Foreign and Canadian prices 25c per volume higher

the windshield of a plane, punched a hole in the metal bulkhead of the pilot's compartment, traveled the length of the plane and burst through the rear wall into the baggage compartment.

Sought safer glass

Seeking a stronger glass, the CAA asked Westinghouse engineers to devise a "cannon" that would shoot birds at a windshield panel, simulating as nearly as possible conditions that might be encountered in actual flight. The problem was turned over to Thomas Spooner, manager of Engineering Laboratories for Westinghouse.

It was possible to design and construct such a gun in a few weeks, because the essential parts had already been developed for high-voltage compressed-air circuit breakers. The gun was fitted with interchangeable barrels for different sized test missiles, which in some cases consisted of bodies of chickens and turkeys, then fired by compressed air at the glass panels being tested.

The trick of making the test missiles travel at high speed lies in releasing compressed air from a storage tank in less than a tenth of a second. This is done by a magnetically operated valve taken from a circuit breaker. Air, compressed by an electrically driven pump, is stored in a bathtub sized tank underneath the barrels. Pressures required for the experiments ranged from 100 to 200 pounds. Velocity of the missiles was governed by air pressure and by the position of the bird in the gun—the nearer the muzzle, the lower the speed.

THE EYE'S RESPONSE TO PHOSPHORESCENT PAINTS

G. T. Schmidling of the Fluorescent Pigments Corporation, 445 W. 41st St., New York, announces the development of a new phosphorescent material, designed to overcome certain defects in this type of product which have limited its military and civilian usefulness, especially outdoors.

The greatest difficulty experienced with phosphorescent coatings has been their susceptibility to moisture. The question of bright-

ness has been solved by matching the phosphorescent color to the color of maximum sensitivity of the dark-adapted eye. Materials therefore cannot be tested in the daytime even in the darkroom, and the poor results obtained by photopic or daytime vision, when the eye is most sensitive to longer wavelengths (556 MU) have been in some instances, responsible for lack of acceptance of these materials.

When tested under conditions of actual use, however, there have been reports of the glow being too bright for certain uses, and the fact that it could not be extinguished at will, like the fluorescent type, became a definite barrier to extensive military use. The present development consists of a pre-fabricated paint film in the form of a tape and in large sheets, and is made by laminating under heat and pressure, with transparent plastic films on each side of the luminous layer. The film is chemically neutral and is non-absorbing, and will withstand six times the government specification in the weatherometer. Brightness is such that it can be seen after twenty-four hours at 70 deg. F. by the dark-adapted eye, and can be extinguished at will by a red light. The color is blue-green and is peaked at 507 milli-microns.

Dark-adaptation

It is well known that after the eye has become dark-adapted and ultra-sensitive to blue-green, the sensitivity is destroyed by this color. Therefore, dials and other indicating devices are usually printed with orange fluorescent or phosphorescent material. The effect is only one of intensity, however, and a much more intense source of orange must be used for the same visual acuity. On the other hand, if the intensity is low enough, a blue-green source will not destroy dark-adaptation any more than the orange color. Since only the outside of the retina is in use at low intensities for light of any color, the best results are obtained by a negative image; i.e. the background of the dial is made luminous and the lettering is done over it with ordinary ink. This enables the eye to apparently focus on the numerals, which it could not do very well if the numerals themselves were luminous. The effect is

HITLER WANTS YOUR SCRAP

TO REMAIN IDLE!

Hitler wants you to believe that scrap metal is no longer needed. He wants you to say—"I can't spare the time or men to clear this junk out." He wants to win the war!

And you're helping him to win it if you fail to round up your scrap and get it into the fight. You're dooming some brave American fighting men to die defenseless because a lack of scrap iron and steel deprived them of the weapons they need.

Don't rest on what you've done in the past. The experience of your fellow businessmen proves that you're *never* cleaned up in the first drive. There are thousands and thousands of tons of valuable scrap lying around in plants and shops of men who think they have already done the job.

Start now to carry on an organized scrap collection program. Apply the ruling given in the box to every idle piece of metal on the grounds. Form a Salvage Committee and select a high executive as Salvage Manager. Choose a man who has authority.

If some of the material you find is still usable, sell it as such to your scrap dealer, or a used machinery dealer; it will bring higher prices than the scrap. Write to this magazine for help with this problem, if necessary.

Above all . . . act now! Do your part to keep our fighting men fighting . . . and winning!

BUSINESS PRESS INDUSTRIAL SCRAP COMMITTEE

ROOM 3303 • EMPIRE STATE BUILDING, N. Y. C.

WHAT IS DORMANT SCRAP?

Obsolete machinery, tools, equipment, dies, jigs, fixtures, etc. which are incapable of current or immediate future use in the war production effort because they are broken, worn out, irreparable, dismantled or in need of unavailable parts necessary to practical re-employment.

FOLLOW THIS RULE

If it hasn't been used for three months, and if someone can't prove that it's going to be used in the next three—sell it—or scrap it!

New and Exclusive!
VINYLITE PLASTIC HAIRLINE INDICATOR
More accurate than human hair.
Moisture-proof, won't shrink or warp.

ACETATE SPACING WASHER
POLYSTYRENE LEAD-THRU BUSHING
POLYSTYRENE LEAD-THRU BUSHING
POLYSTYRENE COIL FORM
POLYSTYRENE COIL FORM

PLASTIC PARTS

Supplied Immediately! No Molds! Close Tolerance!

What's your urgent problem? Send specifications—blue-print, if possible—we'll get to work within 24 hours. Printloid experience and research facilities are your guarantee of satisfaction. Literature on Request. Dept. 2-E.1.

PRINTLOID Inc.

93 Mercer Street
New York, N. Y.

dependable performance with

Janette

D.C. to A.C. CONVERTERS

UP to 3.2 K.V.A.

When only D. C. power is available, ELECTRONIC DEVICES requiring from 110 to 3250 volt-amperes A. C., can be operated by a rugged Janette rotary converter. Many thousands of such essential safety and other electronic devices, used on ships and shore stations, depend upon Janette converters for power.

Wherever there are ships, you will find Janette converters.

Janette

Janette Manufacturing Co. • 556-558 W. Monroe St. • Chicago, Ill.

GONE ARE THE DOODABS!
TODAY THE *Accents* ON

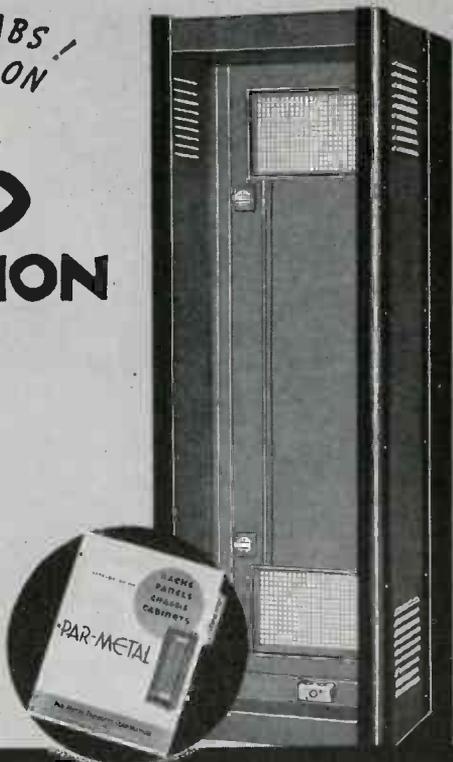
RUGGED CONSTRUCTION

of

- CABINETS
- CHASSIS
- PANELS
- RACKS

for ELECTRONIC APPARATUS

Send specifications; or write for
our Catalog No. 41A.



PAR-METAL PRODUCTS CORPORATION

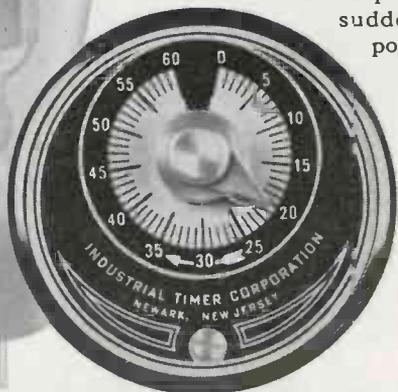
32-62—49th STREET . . . LONG ISLAND CITY, N. Y.
Export Dept. 100 Varick St., N. Y. C.

FOR PROTECTION OF ELECTRONIC TUBES

Equip Circuits with Automatic Timers



With costly tubes now practically irreplaceable, guarding them against damage is a patriotic duty. Circuits equipped with Industrial Timers can dispense with the human element. The correct interval in the application of voltage to plates is controlled automatically. In the event of power failure the Industrial Timer automatically resets. Thus plate circuit is protected against the sudden restoration of power. Write for descriptive bulletins.



INDUSTRIAL TIMER CORPORATION

109 EDISON PLACE

NEWARK, NEW JERSEY

well known to astronomers. The best way to detect the presence of a dim star is to look to one side of it.

The material can be excited by daylight or fotoflood in 20 seconds, or by an ordinary 100-watt lamp in a period from 20 seconds to a minute, depending on the distance from the lamp. Resulting glow lasts twenty-four hours.

There are two peaks of sensitivity in excitation, one at 320 millimicrons and one at 436 millimicrons. The afterglow is accelerated by infra-red light and quenched by red light.

REBUILDING BIG BROADCAST TUBES

Freeland and Olschner of New Orleans, rebuilders of radio transmitting tubes, whose new plant is pictured on page 71, had a simple enough start. Ten years ago these New Orleans men began working with radio tubes. They asked radio stations for their duds and rebuilt them. By November, 1941, they felt they had the experience and equipment to put their first rebuilt tubes into commercial service.

Meanwhile, fixing big transmitter tubes had become important business. With war on, practically the entire production of tube factories is going to the armed forces and materials which go into tubes are now irreplaceable.

Recently, Freeland and Olschner, Inc., with assistance from the Columbia Broadcasting System, have put into operation a greatly enlarged plant, which is equipped to handle practically any of the larger transmitting tubes. These include the 891, 892, 892-R, 893, 343-A, 849 and others.

First steps in repair

In a nutshell here's what happens to a transmitting tube coming in for repair. First, the tube is given a preliminary check for the cause of its failure. Most common fault is a breakdown in the filament. Second most common is a crack in the glass envelope.

After the base of the tube is removed, the glass is punctured, allowing the air to enter. Then, the glass envelope is cut off. The defective part is removed and re-

placed, the glass envelope resealed, and the tube evacuated.

Cutting open the glass envelope is a tricky job, calling for extreme skill and care. For the glass may break in the process, or the parts inside the tube may be disturbed in lifting off the cutaway glass. And the cut must be clean and smooth, because after the tube has been repaired, the glass must be resealed at the cut.

Parts tell own story

Once the glass envelope is cut off, the repairmen make another study of the parts of the tube now exposed. That's where "know-how" comes in. For in the internal parts of a tube is written much of what has happened to it during its past life—for those who know how to read it.

Replacing the defective part is another tricky piece of business. Look at the elements of a tube, and you'll get the idea. Tube repair men must operate with close tolerances, within thousandths of an inch.

Workers at the benches cannot touch any of the fine parts of the tube with their hands. They don't even touch the inside of the glass envelope in its removal. Everything is handled with tools, because one fingermark would form gases under heat which would retard the evacuation of the tube. That's also why the men give the glass envelope many washings with distilled water and chemicals. Arc welding of parts is done in hydrogen to keep the elements from contamination by oxidization.

Brittle parts

Infinite care also has to be taken with the delicate metal parts of the tube. A single slip by the operator, and an invaluable part may be lost. Tungsten, for instance, from which filaments are made, is as brittle as glass and breaks as easily.

After the tube has been repaired, the glass envelope is replaced and resealed by expert glass workers who also make envelopes from raw glass where necessary. Using glass lathes, the men work the molten glass, looking much like cooks handling taffy candy.

Central part of the new plant is the pumping setup for the evacu-



SHAKESPEARE KNEW THE VICTORY FORMULA

The Bard may not have had our war in mind but his "Double, Double Toil and Trouble" is the perfect summary of what it takes to win victories. The opening of Electronic Corporation of America's new plant has set the stage for turning this precept into greater action.

Increased production facilities combined with every last innovation of war-research design have furnished the means for ECA's larger service to the nation. ECA precision electronic apparatus, tailored to the special needs of every branch of the armed forces, will now roll to the battlefronts faster than ever before.

ELECTRONIC CORPORATION OF AMERICA

(Formerly Transformer Corporation of America)

45 West 18th Street

New York, N. Y.



More blue notes than harmony from the Axis just now.

Let's keep them howling . . . War Bonds will help. They're the best possible investment for every cent of your surplus income. Are you buying all that you can?

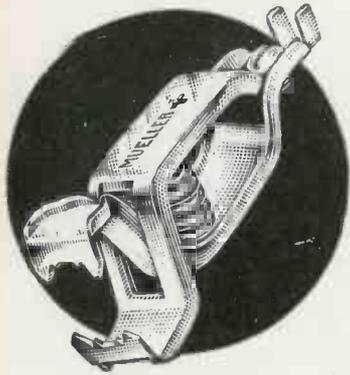
"Der
Cherry
Sisters"

The Erwood Company

223 WEST ERIE STREET

CHICAGO, ILL.

MUELLER



CLIPS

ARE ON THE FIRING LINE
WITH ELECTRONICS EVERYWHERE

- Made in 10 sizes—from the tiny wee-pee-wee to the 300 ampere Big Brute.
- Offered in both steel and solid copper.
- Red and black rubber insulators to fit each size.
- A complete line with

A CLIP FOR EVERY PURPOSE

Immediate deliveries on practically all items
Send for free samples and catalog 701

Mueller Electric Co.

1584 E. 31st St. Cleveland, Ohio

ation of tubes, once they have been sealed by the glass workers after being fixed. Four of the eight pumping stations are designed to accommodate two apiece aircooled tubes of less than a kilowatt. Three can handle larger aircooled tubes in the neighborhood of a kilowatt and watercooled tubes up to 20 kilowatts, and the eighth pump is for big watercooled tubes up to 100 kilowatts.

Heating drives out gas

During the pumping process the tubes are subjected to extremely high temperatures, much higher than they will meet in normal use. The glass envelope is baked at 500 degrees Centigrade, just below its melting point, in an oven built into the pumping chamber, and the elements are heated by high voltage and radio frequency current.

This intense heating releases gases which may be trapped inside the elements of the tube, and, because this heating is much higher than the temperature of ordinary use, no gases will form during the operation of the tube.

Several high - power radio - frequency generating units are built into the plant. Comparable in size to the largest broadcasting stations, they are used to "reach in" and heat the elements of the tube by induction—that is, without use of any direct connection with the elements of the tube.

"Getter" cleans up

During the radio-frequency processing, the tube workers use what they call a "getter" in obtaining the highest level of evacuation. Fastened inside the tube the "getter" is simply a barium pellet contained in aluminum. The aluminum melts rapidly in the heat, throwing off the barium which has the quality of absorbing any gases present.

When the evacuation of high-power type tubes is completed at the pumps, the tube is subjected a number of times to extremely high voltage which "seasons" the tube and reduces the possibility of flash-arcing in service.

Finally, the base is replaced, further checks and tests are made, the tube is "aged" for several hours, crated, given a final check, and sent on its way.

ANTI-SABOTAGE

(Continued from page 61)

beam-type without reaching a point of instability. Obviously, a steady light thrown into the receiver unit, in an attempt to defeat it, will not be amplified.

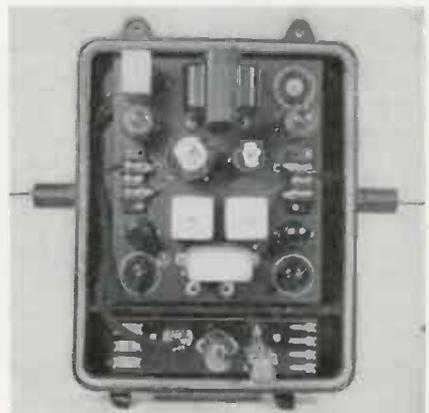
Capacitance-operated alarm

Intrusion detection systems consisting of an oscillator tuned to the vicinity of 200 kc, antenna or "tel-approach" wires inductively coupled to the oscillator tank coil, and one or two stages of amplification, have been developed to practical standards of operation. Like the photo-electric systems, properly engineered capacitance operated installations enjoy the approval of the various government agencies concerned with the protection of war plants.

A method of intrusion detection consisting of crystal microphone, high-gain amplifier, and speaker or relay-operated lamp or other alarm had achieved considerable popularity before the war in the protection of bank vaults, fur vaults, and other storage facilities. This type of detection is, of course, best used in connection with the standard central station protective service. A few recent installations are in use in war-critical storage plants.

A similar type, better fitted for outdoor service, makes use of inertia type vibration pickups, consisting basically of a diaphragm and a set of contacts. The amplification may be single channel, for a number of pickups, or multi-channel, in order to indicate at once the part of the property upon which an intrusion is being at-

Telapproach oscillator unit
with the cover removed



Q
QUESTION

A
ANSWER

1 Must We Use Brass or other Critical Material?

2 Must We Use Slow Costly Engraving for Marking?

1 DO IT ON PLASTIC

2 USE ROGAN Deep-Relief BRANDING

The famous Azimuth Navigation Dial is now made of bakelite in place of critical brass. But, it was up to Rogan to calibrate it.

Because Rogan's exclusive branding process is so much faster and less costly than engraving, yet equal to engraved or molded markings, the Azimuth Dial is branded exclusively by Rogan. Note the tapered sides of the Dial . . . see how clear the markings appear . . . permanently fused with the material.

BRANDED BAKELITE PROTRACTOR

The bakelite protractor is used in conjunction with the Azimuth Dial. Here again Rogan alone does the branding in deep-relief to save time and money.

Your plastic parts of any material, size or shape can be branded successfully, quickly and economically by Rogan.

Get details on Rogan's Molding and Branding service
ROGAN BROS. 2007 S. MICHIGAN AVE.
CHICAGO • ILLINOIS

tempted. This system is well known under the name of the "electronic fence," since the particular type of pick-up is best mounted on steel fencing. The installation at the DuPont plant in Wilmington, Delaware, received wide publicity about a year ago.

Other electronic devices

The success of many electronic methods of apprehending, gathering evidence against, or otherwise dealing with criminals and would-be saboteurs, depends at least in part on their secrecy, and for that reason will not be named or discussed. However, in addition to such well known aids as AM and FM police radio, microphone pick-up "listening in" devices, and the various types of "lie detectors," electronics offers the law-enforcement agencies quick facsimile transmission of photographs and



PH meter used by FBI

fingerprints throughout the country, audio recording, on acetate or on film, of critical courtroom testimony, and a number of minor items such as gun-detectors, as in prison entrances and "electronic friskers"—with which an exploring coil is run rapidly over the subject's clothing—that reveal concealed weapons or other metallic objects.

In criminal investigation

Founded in the fall of 1932 as an aid to Special Agents in their investigations, and later making its facilities available to all local law enforcement agencies, the Technical Laboratory of the FBI is busier today than ever before. In the year ending June 30, 1942, 51,475 examinations involving 93,009 separate items of evidence were performed. A total of 98,025 examinations were made during the following six months, and the work

The most widely used Plugs and Jacks in the U.S.A.



These are only three of the many items now rolling off our production lines. We are equipped to manufacture plugs and jacks to your specifications . . . send us your blueprints for quotations.



Keep Buying War Bonds

American Radio Hardware Company, Inc.

476 BROADWAY, NEW YORK, N. Y.

MANUFACTURERS OF SHORT WAVE • TELEVISION • RADIO • SOUND EQUIPMENT

DYNAMOTORS

...and Dog-fights!



The men in the planes can tell you that it takes perfect coordination of every factor—of manpower, plane and instruments—to come out on top in a dog-fight. Dynamotors don't do the shooting—but they furnish the necessary power for radio communications, direction-finding, radio compass and other instrument controls which enable our men to find the enemy, attack and come back safely. Eicor Engineers are proud of the job Eicor Dynamotors are doing today in fighters, bombers, trainers and transports.



EICOR INC. 1501 W. Congress St., Chicago, U.S.A.

DYNAMOTORS • D. C. MOTORS • POWER PLANTS • CONVERTERS
Export: Ad Auriema, 89 Broad St., New York, U. S. A. Cable: Auriema, New York

PLUGS AND SOCKETS



Three series of Plugs and Sockets cover practically every requirement:

300 series, a popular line of small plugs and sockets adaptable to a thousand uses—from 2 to 23 contacts;



400 series of heavier construction for the Radio, Public Address and kindred fields—made in 2, 4, 6, 8, 10 and 12 contacts;

500 series, heavy duty plugs and sockets designed for 5000 volts and 25 amperes—made in 2, 4, 6, 8, 10 and 12 contacts. All sizes are polarized. All plug contacts are of brass. All socket contacts are of phosphor bronze—Molded, Bakelite Bodies—TOP quality throughout.

TERMINAL STRIPS

For Every Requirement



Series 140 ranging from small sizes (5-40 screws) to large sizes (10 - 12 screws). Over 500 standard items. Also mounted on panels to your specifications.

Illustration shows new Barrier Strips, supplied in six sizes from 3/4" wide and 13/32" high to 2 1/2" wide and 1 1/8" high. Barriers provide long leakage paths and prevent shorts from frayed wires at terminals.

Send for a copy of No. 13 catalog

HOWARD B. JONES
2300 WABANSIA AVENUE,
CHICAGO ILLINOIS

Speed up PRODUCTION

with These Handy



ELECTRONIC PRODUCTS

New Instant Automatic Wire Stripper

Strips all types of wire instantly, easily and perfectly. Just press the handles. Cuts wire too. Saves time, money and trouble for Radio Men, Electricians, Sound Men, etc. List price \$6.00.



Ne-O-Lite Electric Trouble Shooter

Every Radio Man and Electrician should have one. Tests AC and DC lines, DC polarity, blown fuses, etc. Traces ground line in AC circuits. Useful as RF indicator, spark plug and cable tester. Has hundreds of other useful applications. Can be used on 60 volts AC to 500 volts AC or DC. List price \$1.00.



Radio Chemical Laboratory

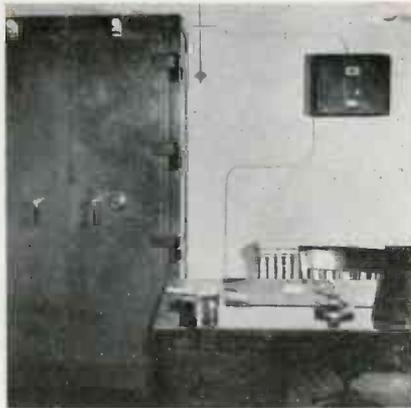
20 large 2 oz. bottles contain cements, solvents, contact cleaners, non-slip dial chemicals, lubricants, ins. varnish, cabinet stains, glue, coil dopes, etc. Dealer net cost \$4.90 with FREE RACK.



G-C Radio Cement, Thinners and Chemicals are available for all types of war work, in gallon, 5 gallon and drum lots. Manufacturers write for samples and quotations.

ORDER FROM YOUR RADIO JOBBER

GENERAL CEMENT MFG. CO.
Rockford, Illinois, U.S.A.



Capacitance system with safe as "antenna"

in one recent month represented an increase of 992 per cent over the same period the year before.

A large percentage of the examinations at the present time concern national security matters, and many involve electronic principles. In certain cases it is sometimes possible to prove that sabotage was committed or could have been perpetrated. Here, of course, the examination is of evidentiary value in the prosecution of the guilty parties. At the other extreme it is possible for the technical inquiry to discount definitely the theory of sabotage and thereby terminate an investigation which might otherwise continue for weeks. Still another possibility is that the examination will narrow the field of inquiry and prevent Special Agents from running out useless leads in their investigations of reported acts of sabotage.

PH meter

In a recent sabotage investigation involving aircraft engines, a glass bottle containing an unknown substance was found in a porcelain-lined tin lunch box. Some of the material had oozed from a ventilator and had caused corrosion on the outside of the box. In determining whether the contents of the bottle could have been used for sabotage purposes, the pH meter was utilized to ascertain that the material was extremely alkaline and not suitable for internal use. It was further identified as sodium hydroxide and sodium carbonate, a combination which could be utilized in attempted sabotage. Further investigation revealed, however, that the owner of the lunch box had been given the material, which was a strong soap for scrubbing

floors, by a paint foreman in the plant and that no sabotage intent was involved.

In another recent case the pH meter was used in examining some spotted areas on fabric manufactured for the armed forces. It was determined that the spots were very acid and further chemical tests revealed the acid to be hydrochloric acid. The investigation indicated that the trouble was due to a defect in the manufacturing process.

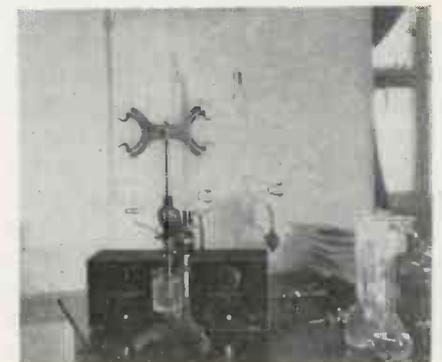
The titrimeter is another electronic instrument which is used in the laboratory. In one sabotage investigation several pieces of a steel beam which buckled were submitted, and through this equipment it was determined that the steel was deficient in manganese. Other tests showed, however, that it possessed the necessary tensile strength.

Densitometric analysis

Qualitative analyses of evidence are performed in the laboratory by spectrographic procedures and densitometric methods are employed to determine the percentages of minor constituents and impurities in the samples. In a recent case several rivets and pieces of scrap metal were found in a drum of grease to be used on delicate machinery in a war plant. Spectrograph and densitometer measurements revealed that the rivets and scrap were identical in composition qualitatively and quantitatively to a particular type of rivet used in the plant and to scrap metal from the company's punch presses.

Still another application of electronics in the Technical Laboratory of the FBI can be seen in the opacimeter which is used in document analysis to determine and compare the opacity of paper. This is one

Titrimeter at Technical Lab. of FBI



of the numerous physical characteristics of paper which are useful in its identification.

These methods are also used widely in examinations of evidence submitted in connection with the usual criminal investigation. In one case a suspect was accused of having burglarized a copper mill and attempting to steal several heavy cakes of copper. A pair of gloves was located at his home, and these were impregnated with what appeared to be copper filings which might have been wiped from the surface of a copper ingot. A spectrographic examination of the particles revealed them to be similar in composition to the metal in the copper ingots. The technical expert who performed the examination testified at the trial of the case which resulted in a verdict of guilty and a penitentiary sentence of one to fifteen years.

Hand in hand with the various types of intrusion alarms, electronic crime prevention, detection, and apprehension methods today hold a vital place in the war on the home front against the saboteur.

TELEPHONE RELAYS

(Continued from page 70)

pulse to perform the stepping operation.

It is to be particularly noted that the telephone-type relay permits this sequence of operation between various contact combinations within a single spring combination. Ordinarily, such sequence operation cannot be specified in the model stage, but must be accomplished as a result of adjustments on a working model.

However, the manner in which telephone relay adjustments are specified is a very useful piece of information for the design engineer in preparing his production specifications. Fig. 3 shows a portion of a typical telephone relay adjustment sheet. The small figures shown between the schematic spring leaves are the measurements in thousandths of an inch of the armature-core gap at which operation of the individual pairs of contacts occurs. For example the figure .011 appears between the springs of the Form B combination.

This means that if a .011 inch gage is inserted in the armature-core gap and the relay electrically operated, the Form B combination will just operate.

Naturally, certain sequence standards have been determined as best for long life and reliable operation, and are to be recommended. Special sequences, as determined by test models, can be easily written in this manner for convenience.

Timing relays

Now we come to relay timing. In the photoelectric door opener or piece part counter immediate action of the relay contact after the coil circuit has been energized is desirable. The sooner this action takes place, the better, for only by very rapid action of the relay can objects on a rapidly moving conveyor belt be counted.

But many problems are not so simple. They may demand that definite time delays occur after the coil is energized or de-energized before contact action takes place. For example, in the hand-keyed radio transmitter, the antenna cir-

FILMGRAPH

Model CD continuous sound-on-film-recorder-reproducer, records lengthy conferences with one or more microphones, either hidden or in sight.

Records incoming and outgoing telephone conversations, interviews, etc. Models for office dictation and for aircraft; for naval and other vessels.

Miles new throat microphone, inductor-dynamic type—ideal for use in very noisy places. Attached to or held on the neck of speaker, only spoken words are transmitted, regardless of volume of extraneous noise.

MILES REPRODUCER CO., INC.

812 BROADWAY Dept. E NEW YORK CITY

CRYSTALS BY

HIPOWER

Thousands of vital transmitting installations rely on the accuracy and dependability of Hipower Precision Crystal units. With recently enlarged facilities, Hipower is maintaining greatly increased production for all important services. When essential demand begins to return to normal, Hipower will be glad to help with your crystal needs.

HIPOWER CRYSTAL COMPANY

Sales Division—205 W. Wacker Drive, Chicago
Factory—2035 Charleston St., Chicago, Illinois



CHEMCITY is now supplying the Radio and Electronic requirements of many of the leading industrial firms and engineers in this area. We have built a reputation for fast and efficient SERVICE, because every order large or small—gets our prompt attention. Ample stocks of standard merchandise are maintained for your priority orders, but if we do not have it in stock—we follow through and GET IT—and with speed that will surprise you. Give us an opportunity to prove this on your next order.

Free—Write today for our complete catalog.

CHEMCITY

RADIO & ELECTRIC COMPANY
1225 EAST WASHINGTON STREET
CHARLESTON, WEST VIRGINIA

TEST

with



18A FREQUENCY METER

(Secondary Frequency Standard)

- ★ Transmits EXACT frequency carriers simultaneously every 10 KC and every 100 KC; also marker carriers every 1000 KC between 100 kilocycles and 60 megacycles. 1000 KC carriers usable from 1 megacycle to 150 megacycles, accuracy .05%.
- ★ The ideal Crystal Controlled Signal Generator for I.F. or R.F. Alignment.
- ★ Checks Factory or Field Test Oscillator Accuracy.
- ★ Checks Receiver and Transmitter Calibration. Unexcelled for setting Electron-coupled Oscillator Transmitter Frequency to Close Tolerance, substituting for Spot Frequency Crystals.
- ★ Modulation "ON-OFF" Switch.
- ★ No calibration or tuning charts required.
- ★ Size 5" x 8" x 8 1/2". Weight 12 lbs.

Operates on 115, 130, 150, 220 and 250 volt 25 to 60 cycle A.C. Supplied complete with Bliley 100 and 1000 K.C. duo-frequency crystal and one 6V6 oscillator, one 6N7 harmonic generator, one 6L7 harmonic amplifier and one 6X5 rectifier.

Manufactured by

FRED E. GARNER CO.
45 E. OHIO ST. CHICAGO, ILL.



cuit must remain connected to the transmitter not only during the interval between dots and dashes or the longer interval between words, but for a still longer interval to insure that false switching is not performed should the operator hesitate slightly during the transmission of a message. In other words, it is not always desirable to have the antenna relay contacts follow the actual keying relay contacts which are in the modulator circuit. But the antenna circuit is probably carrying high voltage at considerable power and it is not possible to build this delay into that relay.

The answer is to use a keying relay with a second set of contacts. These contacts control a slow release relay which, in turn controls the antenna relay. The circuit is shown in Fig. 4. Particularly note that the same type of relay as the keying relay with the exception of the coil does the job. This coil differs from the other in that it has a piece of copper tubing, called a sleeve, which is placed over the coil core before the winding is applied or it may have a large piece of copper called a slug on one end of the coil core. When the coil circuit is opened the induced voltage and resulting current in this sleeve or slug (single-turn, short-circuited winding) delays the decay of the magnetic flux in the iron structure, and, thus holds the relay operated for a short time. Depending upon the contact combination, and the size of the sleeve or slug, delays in release up to 1/2 second may be obtained reliably and consistently.

Delayed operation

Where delays in operation of the relay contacts after the coil is energized are desired, the same sleeve or slug as used for release delays can be employed to effect operate delays up to .100 second. Here, the sleeve or slug delays the build-up of the magnetic flux on the iron section it encircles and thus the relay does not operate until the flux approaches a steady value.

In obtaining operate and release delays, the spring tensions and residual gaps are also varied from those employed in normal quick-acting relays in order to assist in obtaining desired results.

For example, greater than normal spring tensions and larger than normal air gaps are used to increase delay in operation. In a normal quick-acting relay, the minimum amount of flux necessary to operate the relay will be obtained in a given time, x. If, however, the minimum flux necessary is increased by heavier spring tensions and larger gaps, the time to obtain that flux will also be increased, thus affecting operate time.

In the slow release relay, the spring tension and residual air gap are reduced to minimum safe values. Thus, the relay will release on a lower value of flux than will a standard quick-acting relay and consequently it will take a longer time for the decay of the flux to reach the point where the relay will release.

Slug for release delay

The normal slow release relay, using a slug, has this slug on the heel end of the core. In this position, the slug does not materially affect the operate time. The reason is that while the flux through the entire magnetic circuit will be delayed in building up, there will be leakage flux leaving the core at a point between the slug and armature. This leakage flux will re-enter the heel piece opposite its point of exit and thus will still link the armature to provide quick operation. (See Fig. 5). Thus where only release delay is required a heel-end slug is used.

The armature-end slug, on the other hand, delays both operate and release. As previously stated, however, the normal slow-operate relay has increased spring pressures and air gaps and thus the delay in release is minimized. Hence, such a relay is commonly termed slow-operate.

Maximum release delay is also assisted by use of a 1:1 ratio armature in place of the usual 2 3/4:1 armature. As will be noted in Fig. 6, movement between the armature and the core is multiplied in terms of movement at the spring contacts on the standard relay, while no such multiplication is present on the 1:1 armature relay. When the relay is operated there is less restoring force built up in the relay



Rare Gases and Mixtures

ARGON
NEON
HELIUM
XENON
KRYPTON



Airco Rare Gases are pure and free of active gases. Mixtures are blended uniformly and accurately. They are available in lead, glass or pyrex containers.

The individual gases as well as many standard mixtures are available both for production and experimental use. Special mixtures can be supplied to meet any need.

AIR REDUCTION

General Office: 60 E. 42nd St., NEW YORK, N. Y.

springs on the 1:1 ratio armature relay and thus a lower value of flux will still hold the relay operated. This armature construction also permits heavier spring tensions and thus a more reliable adjustment.

Obviously, because the spring pressure on a slow operate relay will differ from that on a slow release relay, it is not possible to obtain both maximum operate and release times on a single relay.

Socket-mounted relays

Probably the most useful characteristics of a telephone-type relay as applied to electronic devices are its size and shape which closely parallel that of the conventional electronic tube. Likewise, just as in the tube, the wiring is entirely behind the panel; while the relay extends from the front of the panel for easy inspection, adjustment and maintenance. As previously indicated, this also permits the mounting of a group of relays in a rather small space. Where service requirements demand frequent changing of relays without undue service interruption they may even be provided with plugs and socket mountings similar to those employed in vacuum tubes.

A typical application of several relays and tubes in combination is the electronic sequence timer designed for use with welding units of the synchronous variety. Many of these timers require control of the squeeze time, weld time, interval time, cool time, hold time and off-time. While the time intervals themselves are measured by electron tube circuits, numerous circuits must be switched at the end of each interval. (Fig. 7 shows such a control unit). Here one type of relay adapts itself to several types of requirements. Result is simplification of the designer's problem of supply and the user's problem of learning to maintain and stock spare parts. Not to be overlooked is the resulting symmetrical design appearance as compared to the jumbled mass of elements which would result if every one of the relays were different basically.

Wide variety

It will be obvious from the foregoing that in the telephone-type relay the designer of electronic de-

Specialists in AUDIO DEVELOPMENT

RIGOROUS SPECIFICATIONS?

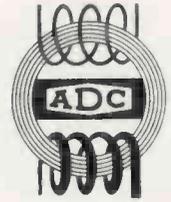
LET US HELP YOU

with

ELECTRICAL
WAVE
FILTERS
TRANSFORMERS
INDUCTORS

KEY SWITCHES
JACKS & PLUGS

(Telephone
Switchboard
Types)



Built to meet your contract requirements

AUDIO DEVELOPMENT CO.

2833 Thirteenth Avenue South • Minneapolis, Minn.

REMLER

Plugs and Connectors



ARMY SIGNAL CORPS SPECIFICATIONS

- Also PL—PLP—PLQ and PLS Plugs
- M Type Connectors
- M Type Caps
- FT Type Fittings

Quantity Prices Quoted
on receipt of Delivery
Schedules

*Manufacturers of Communication Equipment
SINCE 1918*

REMLER COMPANY, Ltd. • 2101 Bryant St. • San Francisco, Calif.

★ *Today Only* **ONE** *Basket Matters!* ★

TODAY our only customers are Uncle Sam and his partners, the United Nations. We are heartily glad of it, because we feel all other matters are of pale importance compared with the winning of this war. Every Perkin-Elmer employee is proud of the fact that his skill can make a vital contribution to fighting efficiency.

The Perkin-Elmer Corporation has two important contributions to make to America in war or peace: First, engineering skill equal to the most exacting task, if it involves optical computations. Second, manufacturing facilities capable of accuracy which in many instances have never

before been achieved in production.

Prior to last year The Perkin-Elmer Corporation's customers included leading Universities, Institutions and Industrial concerns by the score. Today all its eggs are in one basket . . . eggs of deadly precision to be used for pelting the Axis off the stage. Tomorrow, in an age where precision will be paramount, the contributions of the finest optical instruments will be vital. We are already consulting with leading organizations whose future plans involve skills which we possess. We invite the inquiries of others who are thinking in terms of tomorrow.



The **Perkin-Elmer Corporation**

GLENBROOK, CONNECTICUT

Manufacturers of Precision Lenses, Prisms, and Mirrors. Optical Design and Consultation

WHAT IS THE STANDARD ATTENUATOR?



VARIABLE ATTENUATORS

CINEMA ENGINEERING CO.

1508 WEST VERDUGO AVENUE
BURBANK, CALIFORNIA



Send for our new Catalogue,
listing the largest variety of
attenuators ever compiled.



There is a lot being said about post-war production, but we have a sneaking suspicion that little is being done about it. Our government planned for war-time dislocations, but we shall have to plan for post-war adjustments. Some day, suddenly, this war will end. We should be prepared to swing immediately into mass production of civilian receivers.

How can we plan for this? Suppose that our industry organized NOW to pool the technological developments that come out of this war. And that it is decided NOW just about what kind of receivers we will build after the war, what kind of parts will be required, and what kind of replacements will be needed. Wouldn't this help accomplish transition from war- to peace-time production quickly, and with a minimum loss of employment? And wouldn't we earn the respect of our returning soldiers if they found jobs waiting for them?

Anyway it's an idea!

Klaus Staudland
QUAM-NICHOLS CO.
33rd Place & Cottage Grove, Chicago



vices has a tool that is adaptable to almost any problem he will encounter which will require a relay to solve it. The use of telephone-type relays today is almost as broad as the whole range of electronics itself. They are used in devices ranging from the simplest photo-electric door opener to the complex studio switching schemes employed in radio broadcasting stations. Their use in electronically controlled welding equipment is growing and many electronic instruments now make use of them.

Paradoxical as it may seem, automatic telephony has produced a device designed to cut down the number of relays that must be employed in many complex applications. This device, a stepping switch—originally used by telephone engineers—is finding increasing use in the electronic field. In addition to reducing the number of relays required in many applications, it also makes possible the solution of some problems that could not otherwise be solved economically. Stepping switches will be discussed in the succeeding article in "Electronic Industries."

MICA STANDARDS

(Continued from page 63)

testing, and production inspection.

Among the standardized tests for fixed mica-dielectric capacitors are capacitance, capacitance drift and temperature coefficient, Q, current rating, dielectric strength, insulation resistance, thermal cycling, corrosion, vibration, acceleration and shock and life.

The test limits have all been chosen so as to give what the War Committee on Radio felt was the best acceptable compromise between maximum possible production and the "perfect" capacitors needed in electronic and communications equipment used today on land, sea and air under all extremes of humidity, temperature, vibration, shock and atmospheric pressure.

Editor's Note:

As this issue goes to press, word has been received that the Radio Division of the Navy's Bureau of Ships has sent a pilot letter to all naval inspectors, authorizing acceptance of mica capacitors made by the new American Standard, instead of by Navy specifications.

Stopped by the
Electronic Guard

Browning Electronic Boundary System...

product of Browning
Laboratories research,
lays down a protective
curtain, is on the job
night and day, reduces
guarding personnel,
cuts guarding costs.

Details on request

BROWNING
Laboratories
INCORPORATED
WINCHESTER-MASS.

"ELECTRONIC INDUSTRIES"

Advertisers

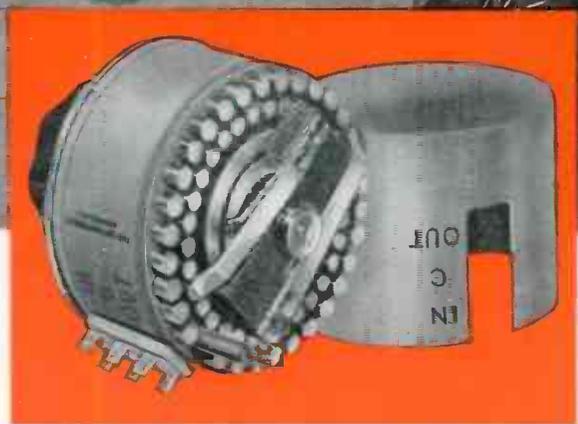
MARCH

The Acme Electric & Mfg. Co.	138	Farnsworth Television & Radio Corp. ...	17	National Union Radio Corp.	192
Aerovox Corp.	139	Fast & Co., John E.	165	New York Transformer Co.	46
Air Reduction	220	Federal Screw Products Co.	204	Ohmite Mfg. Co.	127
Alden Products Co., Inc.	159	Felker Mfg. Co.	143	O'Neil-Irwin Mfg. Co.	209
Alliance Mfg. Co.	205	Formica Insulation Co.	29	Operadio Mfg. Co.	114
Allied Radio Corp.	176	Freeland & Olschner, Inc.	211	Panoramic Radio Corp.	200
American Automatic Electric Sales Co. ...	169	Garner Co., Fred E.	220	Par-Metal Products Corp.	214
American Gas Accumulator Co.	130	General Cement Mfg. Co.	218	Perkin-Elmer Corp.	222
American Lava Corp.	16	General Ceramics & Steatite Corp.	23	Philco Corp.	123
American Radio Hardware Co., Inc.	217	General Electric Co.	8, 9, 10, 11, 15, 39	Pioneer Gen-E Motor	174
American Transformer Co.	14	General Radio Co.	162	Precision Tube Co.	180
Amperex Electronic Products	2	Gentlemen Products	124	Presto Recording Co.	48
Amperite Co.	184	Goat Metal Stampings, Inc.	204	Printloid, Inc.	213
Anaconda Wire & Cable Co.	5	Gold Shield Products	208	Production Engineering Corp.	194
Astatic Corp.	174	Gould-Moody Co.	132	Quam-Nichols Co.	223
Atlas Sound Corp.	160	Guardian Electric Mfg. Co.	27	Racon Electric Co.	189
Audio Development Co.	221	Halicrafters	207	Radio City Products Co., Inc.	161
Automatic Alarms, Inc.	188	Harrison Radio Corp.	182	Radio Specialties Co.	201
Barker and Williamson	24	Hassall, Inc., John	166	Rauland Corp.	133
Bendix Aviation Corp.	147	Haydu Brothers	50	Raytheon Mfg. Co.	13, 196
Benwood Linze Co.	210	Hazeltine Electronics Corp.	40, 41	RCA Victor Div., Radio Corp. of America	73, 74, 75, 76, 77, 78
Bliley Electric Company	180	Hickok Electrical Instrument Corp.	51	Recordit Co.	211
Brach Mfg. Corp., L. S.	199	Hipower Crystal Co.	219	Remler Co., Ltd.	221
Bradley Laboratories, Inc.	178	Hytron Corp.	117	Rogan Bros.	216
Brainin Co., C. S.	205	Industrial Scrap Committee	213	Rola Co., Inc.	197
Browning Labs.	134, 223	Industrial Timer Corp.	214	Selenium Corp. of America	122
Callite Tungsten Corp.	164	Instrument Resistors Co.	156	Sherron Metallic Corp.	187
Cannon Electric Development Co.	28	Insuline Corp. of America	212	Shure Brothers	145
Capitol Radio Engineering Institute	136	International Resistance Co.	129	Sigma Instruments, Inc.	186
Cardwell Mfg. Corp., Allen D.	140	International Tel. & Tel. Corp.	171	Simpson Electric Co.	151
Carter Motor Co.	150	Isolantite, Inc.	25	Sola Electric Co.	137
Catalin Corp.	Cover 4	Janette Mfg. Co.	213	Solar Mfg. Corp.	3
Centralab	36, 37	Jefferson Electric Co.	148	Speer Carbon Co.	155
Chemcity Radio & Electric Co.	219	Jefferson-Travis	44	Sprague Specialties Co.	119
Chicago Telephone Supply Co.	157	Jensen Radio Mfg. Co.	195	Standard Transformer Corp.	163
Cinema Engineering Co.	223	Johnson Co., E. F.	154	Stupakoff Ceramic & Mfg. Co.	153
Clarostat Mfg. Co., Inc.	54	Jones, Howard B.	218	Sun Radio Co.	178
Colonial Kolonite Co.	188	Kaar Engineering Co.	209	Superior Tube Co.	18, 19
Communication Measurements Lab.	202	Ken-Rad Tube & Lamp Corp.	146	S-W Inductor Co.	190
Connecticut Telephone & Electric	201	Lafayette Radio Corp.	192	Sylvania Electric Products, Inc.	181
Cornell-Dubilier Electric Corp.	22	Lapp Insulator Co., Inc.	173	Tech Labs.	203
Corning Glass Works	6, 7	Lectrohm, Inc.	209	Terminal Radio Co.	201
Creative Plastics Corp.	200	Leland Electric Co.	47	Thermador Electrical Mfg. Co.	144
Crystal Products Co.	55	Lepel High Frequency Labs., Inc.	176	Thomas & Sons Co., R.	196
Dalis, Inc., H. L.	125	Lewyt Corp.	168	Thordarson Electric Mfg. Co.	4
Daven Co.	Cover 3	Littelfuse, Inc.	198	Triplet Electrical Instrument Co.	191
De Jur-Amsco Corp.	32	Lord Mfg. Co.	193	Tung-Sol Lamp Works, Inc.	179
Deutschmann Corp., Tobe	1	Maedel Publishing House	212	Turner Co.	142
DeWald Radio Mfg. Corp.	160	Mallory & Co., Inc., P. R.	Cover 2	United Electronics Co.	135
Dial Light Co.	205	McElroy Mfg. Corp.	177	United Transformer Co.	56
Drake Mfg. Co.	209	Measurements Corp.	160	Universal Microphone Co., Ltd.	203
Driver Co., Wilbur B.	178	Meck Industries, John	149	University Labs.	208
Dumont Laboratories, Inc., Allen B.	12	Meissner Mfg. Co.	206	U. S. Treasury	80
Dunn, Inc., Struthers	38	Metroloy Co.	126	Utah Radio Products Company	152
DX Crystal Co.	190	Micamold Radio Corp.	167	Walker-Jimieson, Inc.	201
Eicor, Inc.	217	Micro Switch Corp.	185	Ward Products Corp.	158
Eitel-McCullough, Inc.	34, 35	Miles Reproducer Co., Inc.	219	Western Electric Co.	183
Electronic Corp. of America	215	Millen Mfg. Co., Inc., James	120	Westinghouse Elec. & Mfg. Co.	20, 21, 26, 30, 31, 42, 43, 175
Electronic Enterprises, Inc.	131	Mogey & Sons, Inc., Wm.	184	Weston Elec. Instrument Corp.	52
Electronic Mechanics, Inc.	53	Mueller Electric Co.	216	Wincharger Corp.	172
Electronic Radio Alarm, Inc.	203	Murdock Co., Wm. J.	170	Zophar Mills, Inc.	199
Electro-Voice Mfg. Co., Inc.	141	Mycalex Corp. of America	33		
Emerson Radio & Phono. Corp.	49	National Co., Inc.	186		
Erie Resistor Corp.	45				
Erwood Co.	215				
Espey Mfg. Co., Inc.	198				

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.



Photo Courtesy Pan American Airways



Vital Battlefield

Modern battlefronts are not limited to theaters of war since successful production lies behind military victories. Not only tanks, planes and guns are needed, but machines to make ever-increasing amounts of fighting equipment.

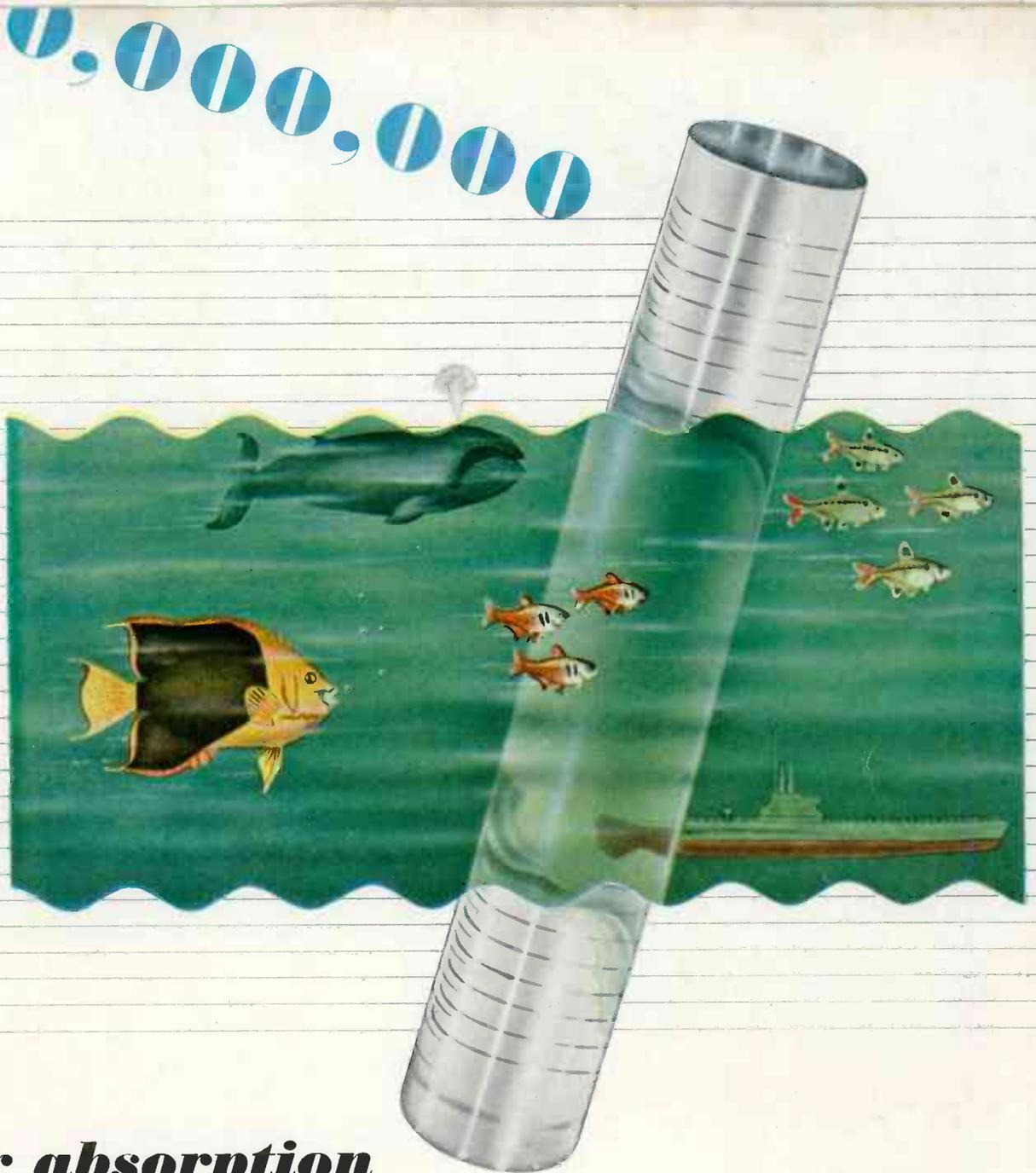
DAVEN builds component parts for many of these machines . . . parts for electronic devices which increase efficiency and speed production.

More than 80 models of Output Power Meters, Transmission Measuring Sets, Decade Resistance Boxes, Attenuation Networks, Volume Level Indicators and many other types of DAVEN Laboratory Test Equipment are used extensively in electrical, broadcast, sound picture and television fields. The DAVEN catalog lists the most complete line of precision attenuators in the world; "Ladder", "T" type, "Balanced H" and potentiometer networks—both variable and fixed—as well as Super DAVOHM precision type wire-wound resistors, with accuracies from $\pm 1\%$ to $\pm 0.1\%$. A copy should be in your reference files.

THE DAVEN COMPANY

158 SUMMIT STREET

NEWARK, NEW JERSEY



water absorption

The degree to which a substance will absorb water is important not only in its own right but because of the intimate relationship it bears to many other physical properties.

Ratings of electrical characteristics, mechanical strengths, chemical resistance and dimensional stability may be meaningless unless the factor of water absorption is taken into consideration.

It's not enough for a plastic material to have certain desired qualities—those same properties must be maintained in the finished fabricated or molded product in actual use under field conditions and over a specified period of time.

That's why when we tell you that

"Loalin", our polystyrene molding compound, has a Water-Absorption of 0.00% (24 hrs.) you know that parts or products built of this material are nowhere surpassed and rarely equalled in this vital respect. The Water-Absorption of "Catalin", our cast phenolic resin, ranges from only 0.1% ("Chemical-Resistant Resin") to 3.0%, depending on the base formula.

There's no mystery to selecting the best plastic for any specific purpose. All it requires is a thorough and *first-hand* knowledge of the physical properties and workability of each type under consideration. Our engineers and chemists have that knowledge... and the

years of experience gained in working with designers and manufacturers in every industry.

Their invaluable services are at your disposal—whether for immediate wartime needs or for foresighted peacetime planning. Your inquiry will receive prompt and expert attention.



Cast Resins
Molding Compounds
Liquid Resins

CATALIN

CORPORATION

ONE PARK AVENUE • NEW YORK, N. Y.