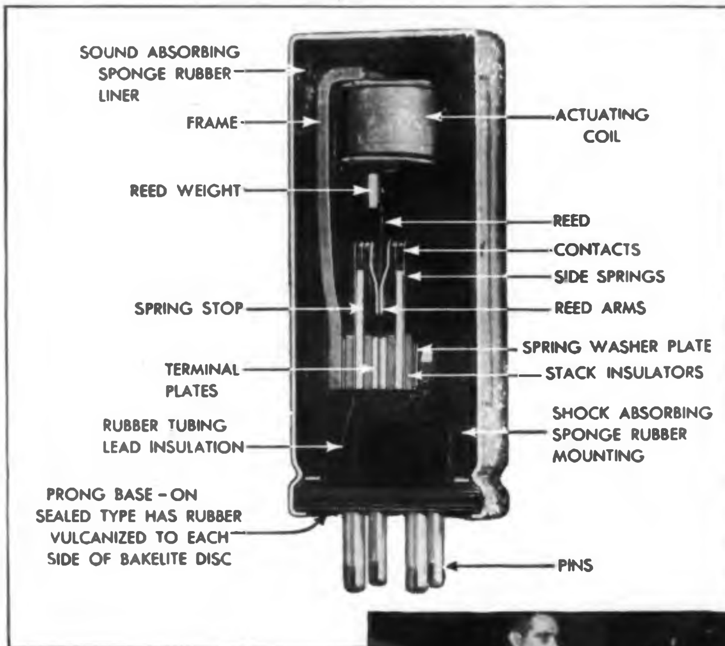
ELECTRONIC INDUSTRIES

1945
DECEMBER
Caldwell-Clements, Inc.

In This Issue ★

ANNUAL ENGINEERING DIRECTORY

Manufacturers and Products Cross-Indexed for Quick Finding



Precise Construction for Precision Performance

•

Each Mallory Vibrator is tested on the oscilloscope for wave form under all operating conditions to insure precise performance.

MALLORY VIBRATORS

Behind each of the construction features you see in this cross-section of a Mallory Vibrator are three important factors:

1. *Engineering* research that determines the design best adapted for high electrical efficiency and dependable operation.
2. *Materials* selected for performance and long life.
3. Precision *workmanship* and testing that assure the uniform high quality of each Mallory Vibrator.

A recent improvement is the hermetic sealing of Mallory Vibrators . . . to protect them against moisture, fumes, or ionization at low atmospheric pressures.

Millions of Mallory Vibrators are now providing excellent service in aircraft, automotive, marine and industrial electronic applications. Mallory Vibrators are available to operate from all battery DC voltages. Ask your Mallory Distributor for the Vibrators or Vibrapacks* you need, and also for a free copy of the Mallory catalog.

[*Inquiries are invited from manufacturers for Vibrators and Vibrapacks for use in original equipment.*]

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

*Reg. U. S. Pat. Off. for vibrator power supplies.

For Portable Plate Power — Mallory Vibrapacks

Mallory Vibrapacks deliver voltages from 125 to 400 from low voltage DC source . . . with high efficiency; low battery drain; ease of installation; long life.

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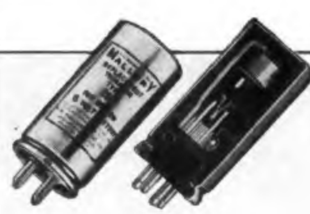

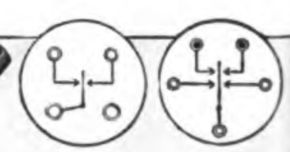

VIBRATORS
and VIBRATOR POWER SUPPLIES

ELECTRONIC INDUSTRIES

Including INDUSTRIAL ELECTRONICS

★ IN THIS ISSUE DECEMBER, 1945 ★

FRONT COVER—*Tube Manufacturing Processes* 4
EDITORIAL 75
ENGINEERS REPORT AT ROCHESTER CONVENTION 76
TROPOSPHERIC STUDY OF FM TRANSMISSION 78
PULSE POSITION MODULATION TECHNIC 83
HIGH SENSITIVITY PICKUP 88
100 MILLION VOLT ELECTRON ACCELERATOR 90
FACTORS DETERMINING INDUSTRIAL TUBE LIFE—*John F. Dreyer Jr.* 94
RADIO PIONEERS' PARTY 97
LABORATORY KEYHOLE 98
PHOSPHORS AND THEIR BEHAVIOR IN TELEVISION—*Irving Krushel* 100
PRINCIPLES OF LORAN IN POSITION LOCATION—*Richard W. Kenyon* 106
TUBES ON THE JOB 108
TRANSITRON OSCILLATOR FOR HIGH STABILITY—*Werner Muller* 110
SURVEY OF WIDE READING 113
NEW PATENTS ISSUED 120

News of the Industry 116
Washington News 118
Television Today 122
Personnel 198
New Bulletins 228
New Books 162
What's New 124

ANNUAL ENGINEERING DIRECTORY .... Opposite 114
ANNUAL INDEX TO ELECTRONIC INDUSTRIES 318

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THE AMPEREXTRA FACTOR in SOUND TRANSMISSION

The Amperextra Factors of dependability and longevity represent important operational and replacement savings in the sound transmission field. Even in wartime, orders from essential civilian users were filled with fairly consistent regularity. Now, with nothing ahead but peace, the Amperextra Factor of service takes on an entirely new meaning for broadcasting stations, amateur radio operators and communications organizations. Your inquiries are invited.

WHAT ONE USER SAYS . . .

. . . "the ease with which they can be driven to full output, the simplification of cooling arrangements, the relative immunity to heavy overloads, and the moderate plate voltages required result in a combination not easily surpassed."

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Amperex tubes will fit into all types of transmitters for which they are intended, and may be interchanged or used to replace tubes of other manufacture without need for circuit readjustment and without impairment of transmitter performance.

SPECIALLY PROCESSED GRAPHITE ANODES . .

. . . in many of our exclusive designs make for more uniform temperature distribution, absence of change in characteristics with time, and a higher initial vacuum which keeps tubes harder and assures longer life.

Amperex Type 2B-120 Transmitting Tube. Filament voltage, 10-10.5 volts AC or DC. Filament current, 2 amperes. Amplification factor, 90. Grid-to-Plate Transconductance at 120 ma., 5000 micromhos. Direct Interelectrode Capacitances: grid-to-plate, 5.2 μμf; grid-to-filament, 5.3 μμf; plate-to-filament, 3.2 μμf.

Amperex Type HF-3000 Transmitting tube. Filament voltage, 21 to 22. Filament current, 40.5 amperes. Filament emission, 6 amperes. Amplification factor, 16. Grid-to-Plate Transconductance of plate current of 1 ampere, 6500 micromhos. Direct Interelectrode Capacitances: grid-to-plate, 10 μμf; grid-to-filament, 13 μμf; plate-to-filament, 4 μμf.

Amperex Type 891-R Transmitting Tube. Filament, two-unit type for single-phase or two-phase AC or DC operation—voltage per unit, 11; current per unit, 60 amperes; amplification factor, 8. Grid-to-Plate Transconductance at a plate current of 0.75 ampere, 4000 micromhos. Direct Interlectrode Capacitances: grid-to-plate, 30 μμf; grid-to-filament, 16 μμf; plate-to-filament, 3 μμf.

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. . . THE HIGH PERFORMANCE TUBE

Many standard types of Amperex tubes are now available through leading radio equipment distributors. The Amperex Special Application Engineering Department will gladly work with you on the solution to your pressing problems.

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THE COVER

A glowing sphere of molten glass on the end of a blowpipe is "pointed" as an expert glass worker prepares for the final blowing into a mold which will turn the little sphere into a 30-in. electronic tube shell. The transformation of this fiery ball into the completed shell takes an employe of the Fairmount glass plant of the Westinghouse Electric Corp. just 60 seconds. In that short time he mounts a four-foot platform, holds the glass ball high so that gravity flattens it like a pumpkin, then swings it in a wide arc to elongate it. Then, watermelon shaped, the hot glass is plunged into a mold surrounded by cooling water jackets where blowing produces an elongated tube with a bulbous end. The shaper is made of cherry wood. The board hanging from a cord around the worker's neck is a face-protecting device held in his teeth by a mouthpiece (center of board) when he gathers glass from the heating furnace.

Farm Radio Demand

Rural electrification plans of the government may bring the number of radios on America's farms to 5,500,000 by 1950, a survey of manufacturers' sales estimates made by the Radio Manufacturers Association reveals. Governmental power planning is expected to electrify more than 3,500,000 farms by the mid-century date. The survey reveals that 90% of the nation's 2,500,000 electrified farms now have home receivers that will need replacing by 1950. The estimates were made on a one set per-family basis.

Have You Heard That:

"An engineer is said to be a man who knows a great deal about very little and goes about knowing more and more about less and less until finally he knows practically everything about nothing.

"A salesman, on the other hand, is a man who knows very little about a great deal and keeps knowing less and less about more and more until he knows practically nothing about everything.

"A purchasing agent starts out knowing everything about everything and ends up knowing nothing about nothing—due to his association with engineers and salesmen."

A G-E TUBE REPRESENTATIVE

will make sure that, when you need them, you have tubes for your electronic control panels like this representative team

GLOW TUBE GL-OC3/VR-105
$.90

Voltage regulator. Two-electrode, cold-cathode, gas-filled electronic tube. Starting supply voltage (d-c min) is 133 v, operating voltage maintained (d-c), approx 105 v. Min and max operating current, 5 ma and 40 ma. Regulation from 5 to 30 ma, 1 volt; 5 to 40 ma, 2 volts.

PLIOTRON, RECEIVING TYPE 6SK7GT/G
$1.10

Amplifier tube. Five-electrode (3-grid) high-vacuum receiving-type tube with indirectly heated cathode, the latter rated at 6.3 volts and 0.3 amperes. Maximum performance ratings are: plate voltage 300 v, screen voltage 125 v, plate dissipation 4 w, screen dissipation 0.4 w.

THYRATRON FG-95
$16.00

Control tube. Four-electrode (2-grid) gas-filled tube with indirectly heated cathode rated at 5 v and 4.5 amp (5.5 v and 5 amp for ignitor firing). Peak anode voltage, 1,000 v; peak anode current 15 amp, average anode current 2.5 amp (40 amp and 0.5 amp respectively for ignitor firing).

TO get top performance *continuously* from your motor, welding, and other control panels, telephone your nearest G-E office or distributor for a tube representative.

His facilities include G-E tubes locally stocked or available, which can be at your door in a matter of hours—glow tubes, pliotrons, thyratrons, ignitrons, and other industrial types in all commonly used sizes and ratings.

Your G-E tube representative will if you wish, as a helpful step, keep his own, independent record of your stock of tube spares and tube usage, so that your inventory may be maintained without need for constant checking on your part. In that way you are sure to have on hand at all times the tubes you need for protection against sudden shutdowns.

Get to know this representative who will supply you *promptly* with G-E electronic tubes in exactly the types and ratings you require! His services are available on request. *Electronics Department, General Electric Company, Schenectady 5, N. Y.*

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Free-Cutting Brass
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Muntz Metal
Commercial Bronze
Roman Bronze
Manganese Bronze
Herculoy
(Silicon Bronze)
Aluminum Bronze
Aluminum-Silicon Bronze
Nickel Silver
Magnesium Alloys
Aluminum Alloys
Special Alloys

Available in coils or straight lengths, depending on size and composition. For full details, prices and deliveries, consult your Revere Distributor or us. The Revere Technical Advisory Service will gladly work with you in selecting the rod best fitted for your needs. For this assistance, which is given without obligation, just write the nearest Revere Office.

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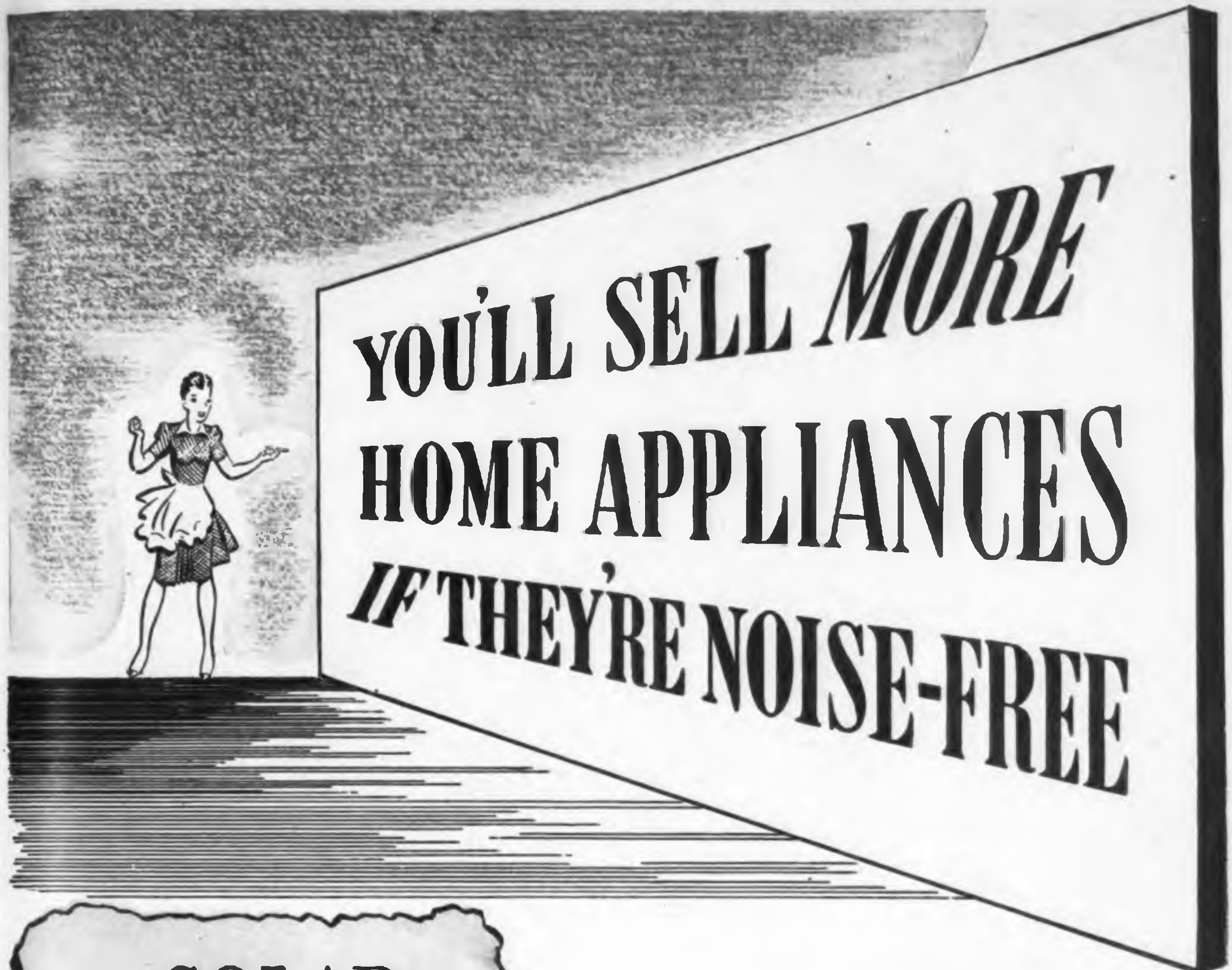

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CUT RADIO NOISE IN:

- ★ *Vacuum cleaners*
- ★ *Refrigerators*
- ★ *Power tools*
- ★ *Electric shavers*
- ★ *Washing machines*
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- ★ *Food mixers*
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- ★ *Oil burners*
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And you can count, too, on *your* share of the long pent-up appliance business by making sure every motorized appliance you sell is equipped with a Solar Elim-O-Stat. Submit your particular appliance problem *now* to the Filter Division, Engineering Dept.

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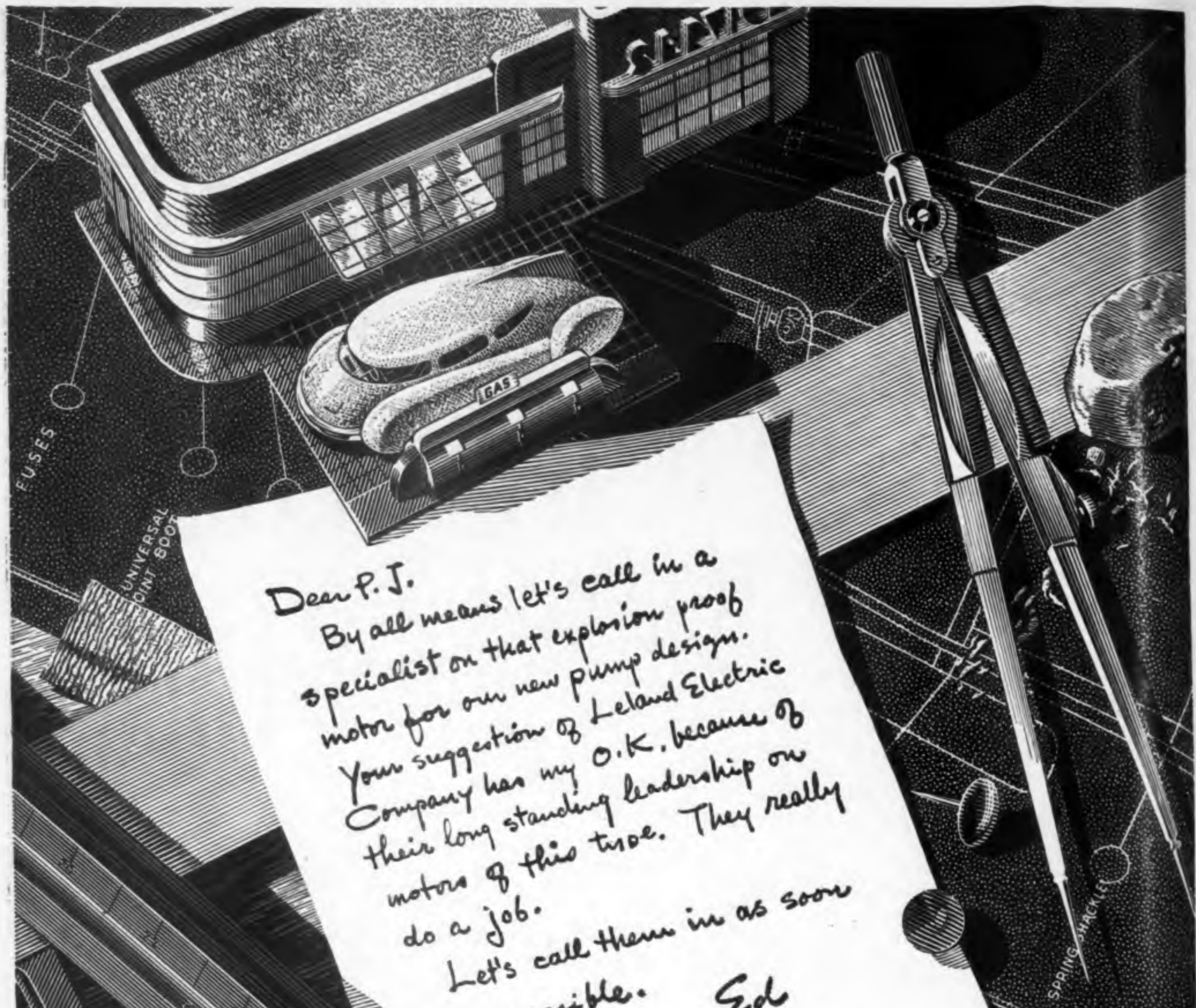

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TOUGH

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THIS informative new catalog contains everything you want to know about Mallory capacitors — pictures, drawings, electrical characteristics. There's information, too, on ingenious new hardware that makes mounting and assembly incredibly simple. Write us direct — or contact your nearest Mallory distributor.

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Will continue to SET DELIVERY RECORDS

Bendix Radio

DIVISION OF BENDIX AVIATION CORPORATION

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August 3, 1945

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Transmitter Equipment Mfg. Co.
345 Hudson Street
New York-14, New York

Dear Mr. Kahn:

May we take this opportunity of expressing our appreciation and thanks for the efficient manner in which your firm has handled our orders for subcontracted items on the MPG equipment.

Your Company, by the all-out effort of yourself, your subordinates, and your personnel, have consistently met the requirements under the most trying conditions possible.

You are to be complemented on the flexibility and versatility of your operation. This has enabled you to put into effect with a minimum of effort the many changes necessary without jeopardizing our delivery requirements.

We have been advised that this is the first radar equipment ever ordered by the Army on which the schedules have been consistently met. For this also, we can thank TEMCO as you are building about seventy per cent of all the electrical components used on this contract.

In conclusion, may we convey our appreciation and thanks to the officers, supervisors and personnel of TEMCO for a job well done under the most trying conditions.

Cordially yours,

BENDIX RADIO, Division of
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R.A.Anderson
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NOW Being Produced by
TEMCO'S
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Normal Rated Output 250 Watts
Maximum Rated Output 375 Watts

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- New miniature high frequency tubes permitting high efficiency and perfect shielding.
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- Noise level AM 70 db below 100% modulation.

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Model 205-S. List Price........$25

**Patent No. 2,350,010*

Higher Articulation with Less Fatigue

Moving coil, hand-held Dynamic microphone for high fidelity speech transmission. Uniform response, free from peaks, in the useful frequencies gives higher articulation, provides more usable power level, and is less fatiguing to the listener. For outdoor or indoor use.

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Widely used because of its dependable all-around performance. Excellent frequency response for both indoor and outdoor speech and music pick-up. Rugged, small size, light weight. High output. Suitable for public address, dispatching, paging, recording and remote broadcast.

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Model V-2. List Price.......$37.50
Model V-3. List Price..........$50

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Gives valuable data on Electro-Voice Microphones for communications, public address, broadcasting and recording. Includes helpful Reference Level Conversion Chart.

Authorized Distributors Everywhere

No finer choice than **Electro-Voice MICROPHONES**

GUARANTEE

The E-V models shown here are guaranteed forever against defects in workmanship and material.

ELECTRO-VOICE, INC., 1239 South Bend Ave., South Bend 24, Indiana • *Export Division:* 13 East 40th St., New York 16, N. Y., U. S. A.— Cables: Arlab

A NEW ECONOMICAL RESISTOR LINE

PERMANENT LOW UNIT COST

CLOSE TOLERANCE LIMITS

PROMPT DELIVERY

QUALITY

IN-RES-CO

TYPE ALA — 3 WATTS
MAX RES: 25,000 Ohms (Nichrome)
MAX. RES: 5,000 Ohms (Manganin)
BODY SIZE: 1⅛" Lg. by ⅜" Dia.
MOUNTING: By Axial Leads
TERMINALS: No. 18 Tinned Copper Leads, 2 Inches Long
TOLERANCES: Standard 3% (1% at Slight Extra Cost)

TYPE ACA — 6 WATTS
Same as Type ALA except coated with high temperature cement.

TYPE BLA — 5 WATTS
MAX. RES: 50,000 Ohms (Nichrome)
MAX. RES: 10,000 Ohms (Manganin)
BODY SIZE: 1⅝" Lg. by ⅜" Dia.
MOUNTING: By Axial Leads
TERMINALS: No. 18 Tinned Copper Leads, 2 Inches Long
TOLERANCES: Standard 3% (1% at Slight Extra Cost)

TYPE BCA — 10 WATTS
Same as Type BLA except coated with high temperature cement.

Types ALA, ACA, BLA, BCA can be supplied with non-inductive winding with 50% reduction in maximum resistance. Add suffix "N" to code when specifying non-inductive types (ALAN, ACAN, BLAN, BCAN).

Dependable!

This new line of resistors—designed to meet current demands for small, low-cost, quality units of close tolerance—is immediately available. They cover the full range from 1 watt to 10 watts and 1 ohm to 1 megohm. Designed for long life and stability, these components have hard soldered connections between resistance wire and terminals, assuring permanent noiseless, trouble-free units. These new resistors are engineered for the manufacturer who desires to retain a reputation of top quality and performance in his equipment. Like all IN-RES-CO products they are produced under rigid control by modern facilities. Write for details.

TYPE BX — 1 WATT
NON-INDUCTIVE

MAX. RES: 1 Megohm (Nichrome)
MAX. RES: 30,000 Ohms (Manganin)
BODY SIZE: 1 5/16" Lg. by 9/16" Dia.
TOLERANCES: Standard 3%
(To 1/10% at Slight Extra Cost)

TYPE CX—1 WATT
NON-INDUCTIVE

MAX. RES: 500,000 Ohms (Nichrome)
MAX. RES: 15,000 Ohms (Manganin)
BODY SIZE: ¾" Lg. by 9/16" Dia.
TOLERANCES: Standard 3%
(To 1/10% at Slight Extra Cost)

INSTRUMENT RESISTORS CO.

29 AMITY STREET, LITTLE FALLS, NEW JERSEY

Just another of the quality controls that put the final OK on AEROVOX

CAPACITOR CRAFTSMANSHIP

● "Leakers" are few and far between in Aerovox oil capacitors. And here's why:

Each and every oil-filled capacitor is examined under ultra-violet or so-called "black" light. The slightest trace of impregnating oil seeping through seams or cracks in containers, shows up as a bright fluorescent spot as the operator peers through the cabinet window. A "leaker" just cannot get by.

Such typical Aerovox quality inspection means much to the oil capacitor user. The life of such capacitors is dependent upon perfect hermetic sealing. This prevents the entry of moisture. Also, even a slight oil leak might damage or interfere with the operation of associated equipment.

Outstanding quality control – from incoming raw materials through each step in production and on to final inspection – is the final endorsement of Aerovox Capacitor Craftsmanship.

● Submit your capacitance problems and requirements.

AEROVOX Capacitors

INDIVIDUALLY TESTED

AEROVOX CORPORATION, NEW BEDFORD, MASS., U. S. A.

Export: 13 E. 40 St., New York 16, N. Y. • Cable: 'ARLAB' • In Canada: AEROVOX CANADA LTD., HAMILTON, ONT.

SALES OFFICES IN ALL PRINCIPAL CITIES

In Springs— it's the X-Dimension that gives a Glider and You a Lift

Ever hear of the X-Dimension of a Spring? Probably not. But, sure as you're born it's there, in every spring. Take, for instance, the intriguing what-is-it pictured below. It's a glider release spring, an assembly which holds the pick-up rope until the parent plane hitches on—then let's go at a precise jerk on the towline.

If Hunter had only manufactured and delivered dependable glider release springs on time and in needed quantities, its job would have been satisfactory. But Hunter invented the device for All American Aviation, Inc., and assigned the patents to them. That's the X-Dimension at work.

It's also at work in such pioneering efforts in spring manufacture as control gaging and statistical methods in quality control. It's your guarantee of good springs, your insurance against failures and customer complaints. It's *more* than you bargained for—in springs.

HUNTER
Science in Springs

HUNTER PRESSED STEEL COMPANY
Lansdale, Pennsylvania
SPRINGS • METAL STAMPINGS • WIRE FORMS
MECHANICAL AND ELECTRICAL ASSEMBLIES

MEMO TO PURCHASING MEN—
• Next time your engineers hand you a tough spring procurement job, let Hunter help you get your money's worth.

NEW!

Cardolite #5616

TRADE-MARK

Cold-Pouring Filling Compound

Solventless — sets at room temperature to resilient, rubbery mass — non-inflammable — has no melting point when set — resists embrittlement to below —40°C. — excellent adhesion to steel, brass, bakelite — easily removed for repairs!

Test Data

Dielectric Strength —
600 vpm on gap of 10 mils
Power factor at 20°C.
1000 cycles — 0.25
Resistivity — 10^7 megohms
Non-inflammable
No measurable shrinkage
Adhesion—
(between plates 2" x 2")
Bakelite 120 lbs.
Steel 105 lbs.
Brass 55 lbs.
Resistant to oil, gasoline, alcohol, water.

Developed specifically for filling voids in junction and terminal boxes, pot-heads, coils, transformer cases, etc., Cardolite #5616 offers important advantages not possessed by earlier, similarly employed materials. Cardolite #5616 is non-inflammable, solventless, non-shrinking, and will neither crack at low temperatures nor "run" at high temperatures. And the unique final state which Cardolite #5616 attains, permits quick, easily made circuit changes or repairs, when necessary. Cardolite #5616 can be cleanly removed without application of heat or time-consuming hand labor. Separate packaging of the liquid setting agent, Irvington #5612, precludes reaction during storage. When other preparations are complete, this setting agent is thoroughly mixed with Cardolite #5616 in the latter's conveniently oversize container. For full particulars, or generous test samples, write to Dept. 50, Irvington Varnish and Insulator Company, Irvington 11, New Jersey.

STANDARD OF THE WORLD — IRVINGTON INSULATION — TRADE MARK

IRVINGTON
VARNISH & INSULATOR CO.
Irvington 11, New Jersey, U. S. A.

ELIMINATE
the Time Consuming ELEMENTS *in Short Run Piercing*

Don't stop long run jobs to set up for short run piercing jobs. A Wiedemann Turret Punch Press can do it with greater accuracy . . . at long run low cost.

Don't interrupt long run production to make 1 or 10 or 100 pieces of a kind, panels, chassis, outlet boxes, special gaskets, louvres, copper buss, and other pierced sheet metal parts. Use a Wiedemann!

A WIEDEMANN *Simplifies* EVERY COSTLY PIERCING OPERATION

★ Layout time is completely eliminated or greatly reduced because of easily operated material positioning gauge tables . . . only one man is needed to handle the largest sheets in the press.

★ Conventional equipment takes 15 or 20 minutes to change punches and dies. With a Wiedemann, punches and dies operate on an easily rotated turret . . . a few seconds is all that is required to rotate turret from one punch to another.

★ 11 to 32 dies at your fingertips for instant piercing . . . all dies are locked into position by means of index pins after correct dies are located on turret.

★ No sheared punches or dies from inaccurate set-ups . . . holes are punched clean.

★ No waiting for die set-up man. A Wiedemann is always ready to run without tearing down any set-up.

★ Long run jobs can be started on your Wiedemann while production dies are being made.

Send today for Wiedemann Bulletin No. 92 to get the complete story of Short Run Piercing Economy.

WIEDEMANN MACHINE COMPANY

1833 SEDGLEY AVENUE
PHILADELPHIA
32, PA.

With a Wiedemann Type R-7, punching is done either directly from blue prints or from charts without any layout work being necessary, merely by turning two handwheels to obtain accurate X and Y coordinate settings.

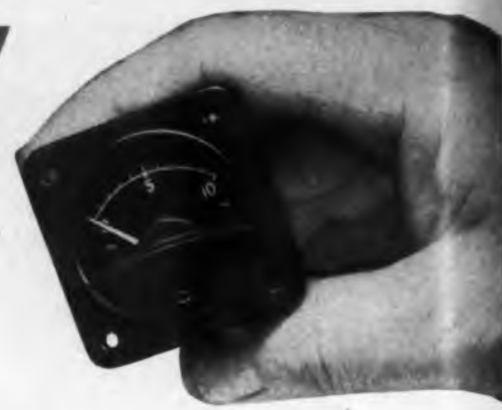
This high speed positioning of material is accomplished on a ball bearing spacing table for sheets up to 50" wide by 100" long. Any point on sheets up to ¼" thick can be located under the punching station for piercing openings, or making louvres or knock-outs.

There are no stops to set . . . from 12 to 32 stations operate on an easily rotated turret for instant piercing. Changing from one punch to another is a matter of seconds . . . practically instantaneous.

The R-4P Power Driven Turret Punch Press is furnished with 12 punches and dies up to 1¼" diameter, mounted in a revolving turret. An accurate, positive indexing device locks the revolving turret, when the punch and die selected for use are located centrally under the ram. This locking and unlocking is done by a small lever shown on the side of the machine; this lever being interlocked with the clutch trip mechanism to prevent operation of the machine unless the turret is properly positioned and the index lever locked in place.

WIEDEMANN TURRET PUNCH PRESSES & GAUGE TABLES

Here They Are!



The New 1½ INCH

G-E PANEL INSTRUMENTS

To meet the need for compactness, especially in electronic and communication devices for combat, they have a body diameter of only 1½ inches, are less than 1 inch deep, and weigh only 3 ounces. They are accurate to within ±2 per cent.

These instruments are of the internal-pivot construction, and in addition to small size and light weight, they have all the other desirable features associated with this unique G-E design.

Because of its high torque and large-radius pivots, the element (which is common to both instruments) is well able to withstand vibration. High torque combined with a lightweight moving element results in fast response. Good damping makes for ease and accuracy of reading. Large clearances help to insure reliable operation.

All these features add up to a high factor of merit and all-round excellent performance.

For advance information, ask the nearest G-E office for Booklet GEA-4380, or write to General Electric Co., Schenectady 5, N.Y.

THEY'RE G-E INTERNAL-PIVOT INSTRUMENTS

External-pivot Internal-pivot

One advantage of the internal-pivot design is compactness. Armature, core, control springs, pivots, jewels, balance weights, and pointer form a single, self-contained unit, all parts of which are supported by a castcomol magnet.

WATERTIGHT

TYPES DN-1, -2, -3

(Left hand, above)

● For applications where equipment may be used in an extremely humid atmosphere, exposed to rain, or accidentally submerged in water. Available for direct-current (DN-1), radio-frequency (DN-2), and audio-frequency (DN-3) service.

CONVENTIONAL

TYPES DN-4, -5, -6

(Right hand, above)

● For use on aircraft and on communications or electronic devices where the instrument is protected. Available for direct-current (DN-4), radio-frequency (DN-5), and audio-frequency (DN-6) service.

HEADQUARTERS FOR ELECTRICAL MEASUREMENT

Buy all the Bonds you can—and keep all you buy

GENERAL ELECTRIC

HOW TO BRIDGE THIS GAP QUICKLY

HERE, on the "banks" of '45 are a handful of the thousands of products stranded by the flood waters of the war in '41. All of them were applications making use of our type of plastics—Synthane. You are probably taking up where you left off or going into new lines of manufacture.

If you are a little rusty on the pre-war part Synthane might have played in your product, or need assistance in designing for the use of Synthane in new or improved products, send for our complete catalog, or ask for our help now.

SYNTHANE CORPORATION, OAKS, PENNA.

Gentlemen:

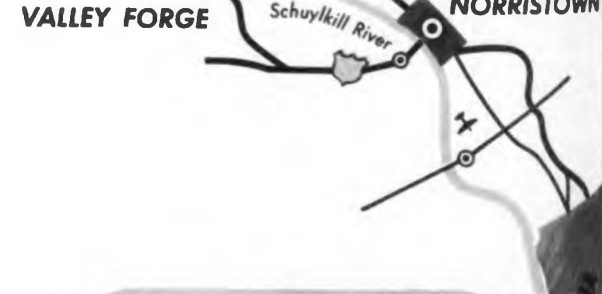
Please send me without obligation the complete catalog of Synthane technical plastics.

NAME______________________________

COMPANY____________________________

ADDRESS____________________________

CITY______________ ZONE______ STATE______



SYNTHANE

Representatives in All Principal Cities

PLAN YOUR PRESENT AND FUTURE WITH SYNTHANE TECHNICAL PLASTICS • SHEETS
RODS • TUBES • FABRICATED PARTS • MOLDED-LAMINATED • MOLDED-MACERATED


NOW it's here
FUSITE
HermetiCan
TO SPEEDILY—THRIFTILY—
PERFECTLY SEAL ELECTRICAL COMPONENTS!
FUSITE HermetiCan
WITH FUSITE SEALS
PEACEWORK ... means mass production of better products at less cost for more people. How to do it at a profit? Consider, then, FUSITE Hermetic Terminals . . . and especially the new FUSITE HermetiCan*. It hermetically seals, without heat. It is done with a "can-sealer" (manual or automatic) as used in quantity production sanitary food-canning. It's fast . . . simple . . . thrifty. It works to perfection. It's the new and better way to hermetically seal transformers . . . relays . . . condensers . . . rectifiers . . . switches. The HermetiCan* is a FUSITE original. Wide range of can sizes. Any number of terminals . . . from one to nine or combinations, thereof. FUSITE terminals are now available in two different styles: (1) Hollow Tube; (2) Flattened and Pierced. Single terminals as low as 3½¢ each in quantity. We invite your inquiry via letter or the coupon below.
AS LOW AS 3½¢ EACH
*HermetiCan is a registered trade name.
SHOWN ACTUAL SIZE
¼"
3/16"
WE HOUSEHOLD AMPS
MEET MANY DAMPS
FROM CELLAR TO ATTIC CEILING;
SO WE ADVISE
THAT YOU BE WISE
MAIL THIS COUPON FOR FUSITE SEALING!
GLASS TO METAL
FUSITE
HERMETIC TERMINALS
CINCINNATI ELEC. PROD. CO., Dept. EI-11
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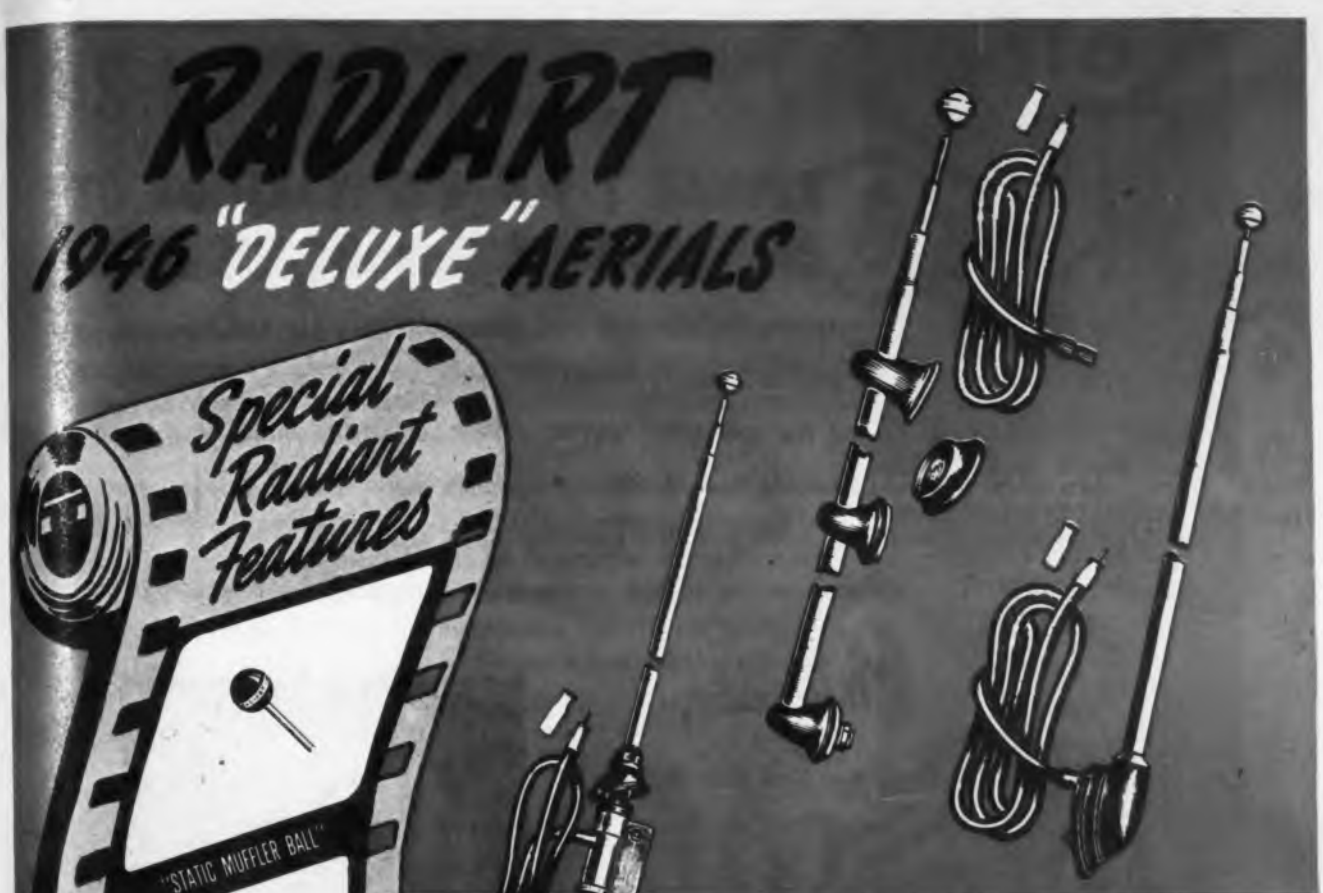
Cincinnati 12, Ohio.
Please send FUSITE literature and samples as indicated below:
Single FUSITES ( ) Multiple FUSITES ( ) FUSITE HermetiCan* ( )
I am interested in the possibilities for hermetically sealing........
(Name or kind of product)
Any information you may have on this will be appreciated.
My Name is........
(Please Print)
My Position is........
For........
(Name of Company)
Whose Address is........
City........Zone........State........


Centralab
CRL
METALLIZED STEATITE
COIL forms, spacer rods, strain insulators and rotor shafts of steatite can now be bonded in an inseparable union with brass, stainless steel, silver, copper and other metals. These shafts of steatite and metal are indicated wherever high frequency insulating material is specified. Both electrically and mechanically they fullfil the most exacting requirements. . . . Centralab is now equipped to supply metallized Steatite in practically any form.
Centralab
CRL
Division of GLOBE-UNION INC., Milwaukee
PRODUCERS OF: Variable Resistors • Selecter Switches • Ceramic Capacitors, Fixed and Variable • Steatite Insulators and Button-type Silver Mica Capacitors.

RADIART 1946 "DELUXE" AERIALS



AGAIN . . RADIART SETS THE STANDARD!

With new features — highest quality materials — and super values, RADIART AERIALS are the Sensation of 1946.

The "Plasti-Loom" Lead (long enough for all installations) and Antimonial Admiralty Brass are two outstanding Radiart features. They make RADIARTS greater values than ever before.

Also, every RADIART AERIAL is complete — no extras to buy — another reason why RADIART is the line to sell in 1946.

Ask your Radiart Jobber how you can get one of these snappy RADIART AERIAL COUNTER DISPLAYS.

Manufactured by the Makers of RADIART "Correct Replacement" Vibrators.

Radiart Corporation

3571 W. 62nd STREET • CLEVELAND 2, OHIO

Export Division
25 Warren St., New York 7, N.Y.

Canadian Office
455 Craig St., W., Montreal, Canada

"The war has sharply demonstrated that the service of railroads is indispensable and that private ownership, management and operation are able and efficient. Now that the war is over, railroad plants should be modernized to take advantage of new things learned during the war years and to permit operation under new and higher standards. Railroad radio is one of these new developments, and, as a means of communication, has already been installed experimentally at several points in yard operation and its experimental use on certain sections on our main line is planned."

President, New York Central System

Mr. Metzman's statement symbolizes the forward-looking thinking of top railway management today. The railroads *are* going forward, with improvements and modernization designed to increase the efficiency and safety of all types of operations.

The Farnsworth Television & Radio Corporation, through its recent acquisition of the Halstead Traffic Communications Corporation, is playing an increasingly important part in furthering these aims. Halstead Systems provide a factor of safety unique to the field of mobile communications. A radio counterpart of the closed-circuit principle, perfected during the war, is contained in the exclusive "auto-pulse" unit, standard on all Halstead equipment, whether AM or FM, space or induction type systems.

The combined talent of Farnsworth and Halstead research and engineering, together with Farnsworth's productive skills and facilities will keep in step with the railroads' growing interest in mobile communications.

For specific information, write Farnsworth Television & Radio Corporation, Dept EI-12, Fort Wayne 1, Ind.

FARNSWORTH TELEVISION & RADIO CORPORATION

Farnsworth Radio and Television Receivers and Transmitters • Aircraft Radio Equipment • Farnsworth Television Tubes • Halstead Mobile Communications and Traffic Control Systems for Rail and Highway • the Farnsworth Phonograph-Radio • the Capehart • the Capehart-Panamuse

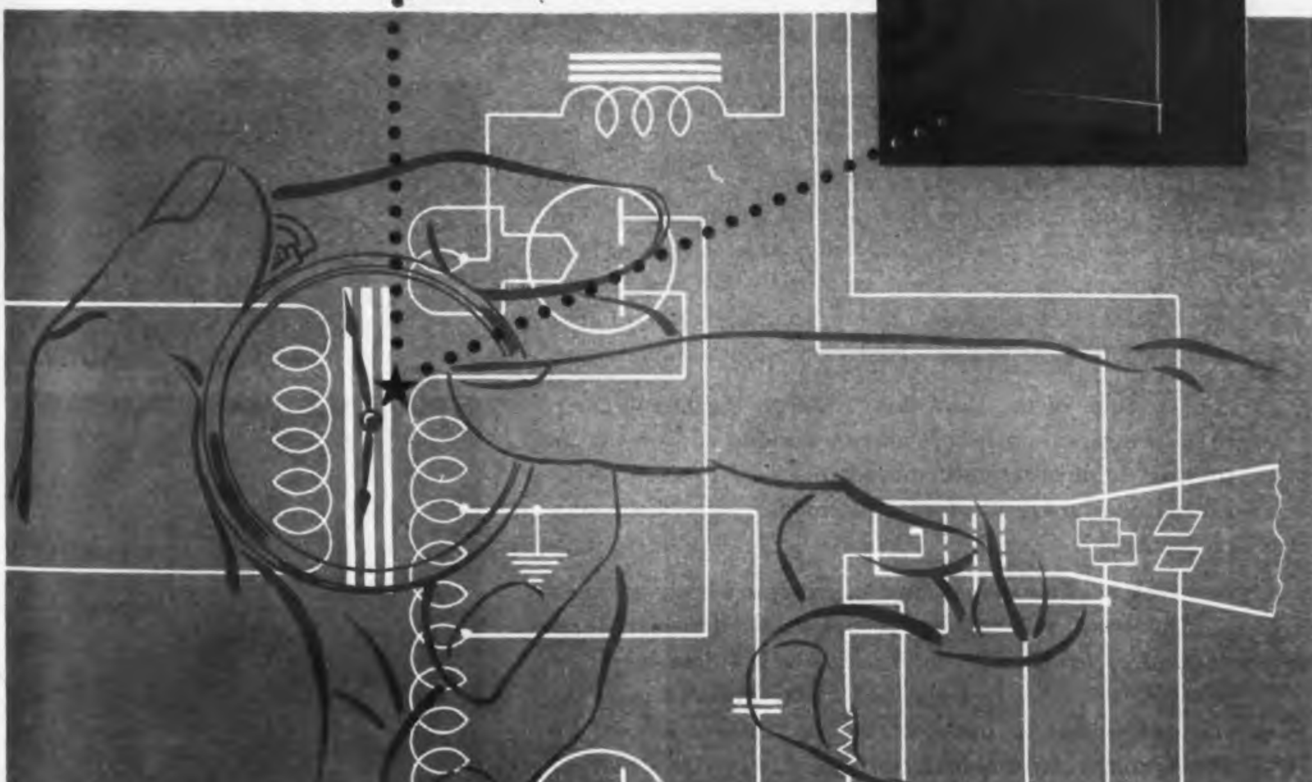
This is the time...

TO CONTACT THE N-Y-T SAMPLE DEPT. FOR TRANSFORMER DESIGNS

Equipped with two complete sample shops, N-Y-T offers experienced collaboration in working out all details—engineering and production—of sample components for your peacetime requirements.

While actual transformer, choke and filter production schedules are still sub-normal, due to material shortages, N-Y-T engineering design service is prompt and efficient. Backed by more than 9,500 separate and distinct transformer, choke and filter developments for critical wartime applications, N-Y-T Sample Department offers all the name implies . . . thorough and complete collaboration with your own engineering department.

Address inquires to Dept. N



NEW YORK TRANSFORMER COMPANY

26 WAVERLY PLACE NEW YORK 3, N. Y.

WE ARE PLEASED TO ANNOUNCE

We are pleased to announce that the cable connectors, pilot light assemblies, tip plugs and tip jacks, former Mallory-Yaxley products, so highly regarded by the electronic industry for many years, will be manufactured and sold in the future solely by Johnson.

The wide acceptance and unquestioned quality of these products make them fitting additions to the Johnson line of plugs, jacks, inductors, insulators, variable condensers and tube sockets.

All tools, inventory and manufacturing rights for these products have been acquired from P. R. Mallory & Company, Inc. Orders should specify the Mallory catalog numbers until these items can be incorporated in the Johnson catalog.

Write us, if you have a special problem involving any of these items.

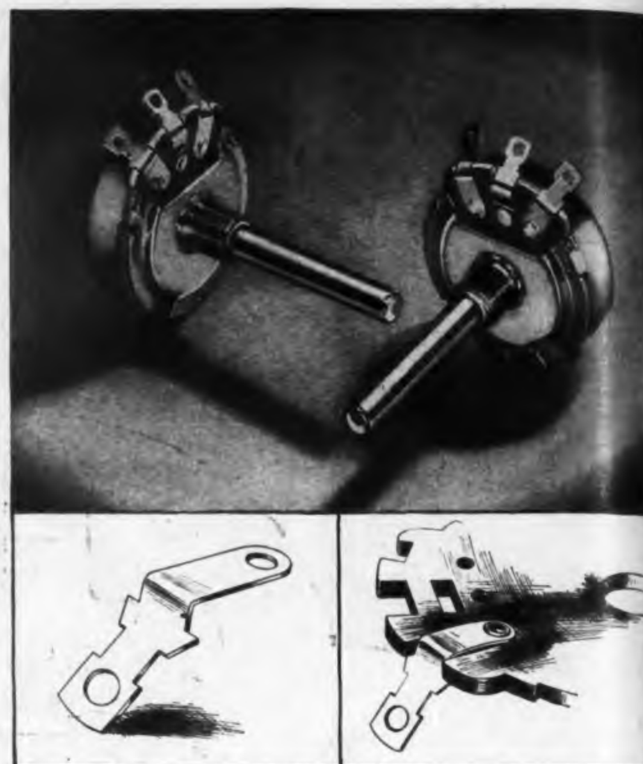
Johnson products are stocked by leading radio-electronic parts jobbers.

JOHNSON
a famous name in Radio

Write for General Products Catalog 968-O

E. F. JOHNSON COMPANY • WASECA • MINNESOTA

New
Terminal Design for
MALLORY VARIABLE RESISTORS
Makes Your Assembly Easier, More Durable



THIS new design for terminal lugs of Mallory Variable Resistors permits speedier, easier, more solid attachment of circuit leads, because each lug is locked in and may be formed or bent to any desired angle without loosening the rivets.

The lug is designed with a spring action and in a patented shape that grips the laminated plastic insulator. This maintains a constant spring pressure and prohibits loosening of the spring caused by bending. This new Type 3U Mallory Variable Resistor is available in 1½" diameter and in resistances from 5000 ohms to 9 megohms.

OTHER VARIABLE WIRE-WOUND RESISTORS—Three types from 2 to 9 watts, 0.5 ohm to 150,000 ohms resistance. In single and multiple units, with or without switch.

VARIABLE CARBON RESISTORS—Standard and midget types in values from 5000 ohms to 9 megohms. Noiseless in operation. Resistant to humidity.

FIXED AND ADJUSTABLE WIRE-WOUND RESISTORS—Rated from 10 watts to 200 watts, in a wide range of resistance values. Moisture resistant.

Standard Mallory Approved Precision Products—resistors, volume controls, capacitors, switches, jacks, plugs, vibrators, rectifiers, power supplies and other electronic parts—are available from your nearest Mallory Distributor. Ask him for your copy of the informative Mallory catalog, or write us today.

Make it a policy to consult Mallory for engineering assistance while your designs are still in the blue print stage.

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

[illegible] of electricity that is hard to hold or control.

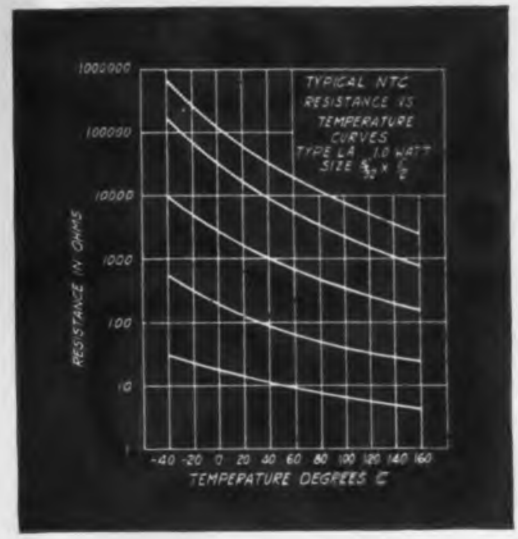
Controlling electrical currents is Formica's big job and it can do it today better than ever before. Some new developments in material and processing have provided grades that reduce high frequency losses to a new minimum, stand more arching, resist more heat.

Glass Cloth and glass mat with melamine resin have stepped up insulating efficiency, increased mechanical strength, produced a laminated material on an entirely new level of quality for many purposes.

These new materials retain the machinability and workability that always adapted laminated material to mass production. They mean better insulated electrical devices at low production costs.

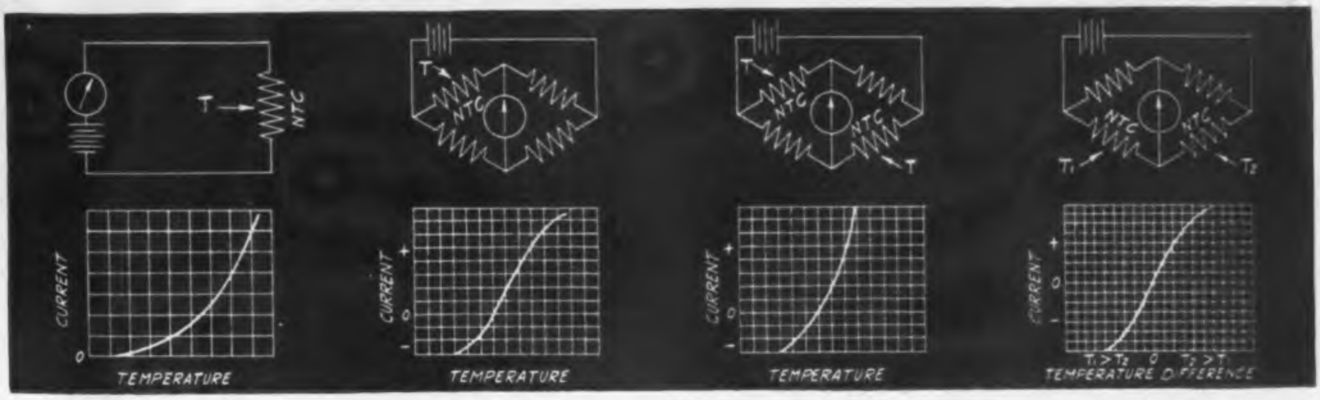
The Formica Insulation Company • 4647 Spring Grove Avenue • Cincinnati 32, Ohio

Do you have a TEMPERATURE MEASUREMENT OR CONTROL PROBLEM ?



CHECK THESE ADVANTAGES OF KEYSTONE NTC UNITS FOR YOUR APPLICATION

Keystone NTC units are electrical resistors especially developed to have an unusually high negative temperature coefficient of resistivity. The slopes are much greater than those observed with pure metals or their alloys. The result is an element with very high thermal sensitivity, useful on AC or DC, inherently suitable for remote indication, which has gained wide acceptance for temperature measurement and control purposes. NTC units are made in wide range of shapes, resistance values, temperature coefficients and wattage ratings, of which the characteristics at the left are typical. The circuits below suggest basic means for translating resistance changes into current or voltage variations. Modifications and extensions of these principles are many, especially in conjunction with electronic apparatus.



This simple series circuit of voltage source, instrument and NTC unit has been utilized to indicate engine coolant temperature, etc. It provides sufficient accuracy for many applications despite scale crowding at the bottom.

Basic bridge circuit straightens and steepens the characteristic. Zero-center meter may be used or balance point may be placed near the lowest temperature. Electronic balance indication provides enhanced sensitivity.

Adding a second NTC unit, and exposing both to the temperature to be indicated, gives a double unbalancing effect and increases sensitivity under certain conditions over part of the temperature range.

Two NTC units in adjacent arms is a method of indicating equality of two temperatures, or temperature difference or rise. Temperature of either source can be obtained by substitution of standard resistance for other NTC unit.

Keystone NTC resistors are also valuable for neutralizing the change in resistance with temperature of electrical indicating instruments and control devices, for introducing time delays and many other applications. Write and tell us about your problem—we'll be glad to analyze it for the applicability of NTC units.

KEYSTONE CARBON COMPANY, INC.
SAINT MARYS . . . PENNA.


It's here!
The new
E·E TELEVISION RECTIFIER
A HIGH VACUUM TUBE WITH PEAK INVERSE VOLTAGE RATING OF 40KV. AVERAGE ANODE CURRENT 5 M.A.
2BT
100-TH
3B27
836
811
812
866-A
E·E TYPE 2BT
available now!
EE 2BT closes the gap in rectifier types suitable for television applications. It is a high vacuum type having high peak inverse rating, and expressly designed for plate supply in video receivers requiring potentials to 12,700 volts on the projector tube.
By incorporating the EE 2BT in television designs, engineers can now eliminate flashback trouble without specifying a rectifier with ratings considerably in excess of actual requirements. For complete specifications and for other important details that explain why the EE 2BT offers exceptional advantages to designers write today.
FAST DELIVERY!
The popular types (illustrated at left) are now supplied from stock. Write for data book, a thirty page compilation of electronic tube types, characteristics and operational information will be promptly furnished on request.
ELECTRONIC ENTERPRISES, INC.
ELECTRONIC
ENTERPRISES
GENERAL OFFICES: 65-67 SEVENTH AVENUE, NEWARK, 4, N. J.
EXPORT DIVISION: 25 WARREN STREET, NEW YORK, 7, NEW YORK

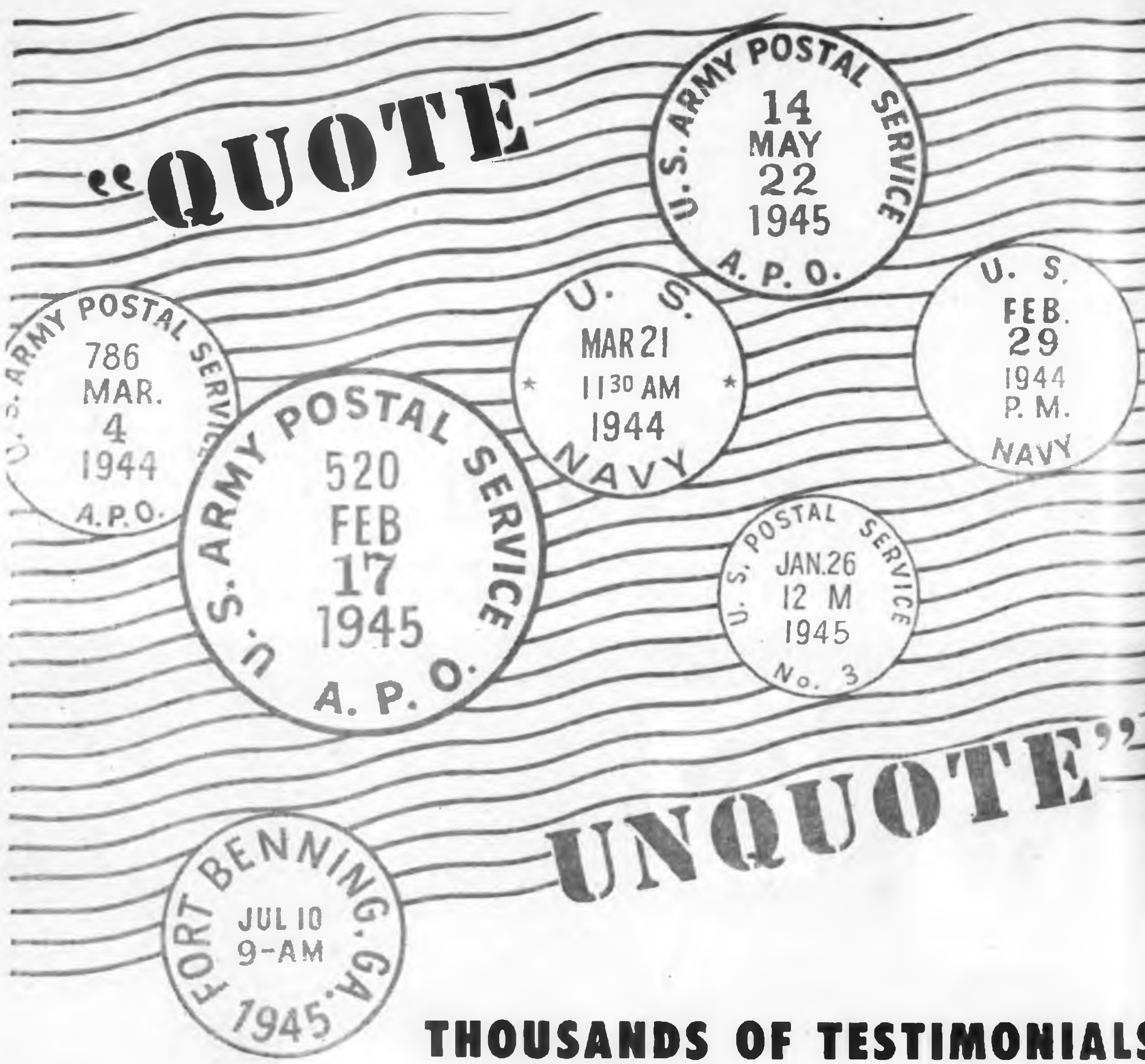
"Impossible" is a word that is not recognized by engineers. To dam a mighty river, tunnel under it or suspend a bridge across it—things such as these that once seemed pure imagination were made possible by instruments devised to refine and extend human faculties, to translate the precision of engineering thought into action.

Keuffel & Esser Co. is proud to have played so large a part in making such instruments widely available. In this way K & E equipment and materials have been partners of the engineer and draftsman for 78 years in shaping the modern world. So universally is this equipment used, it is self-evident that K & E have played a part in the completion of nearly every engineering project of any magnitude. Could you wish any surer guidance than this in the selection of your own "partners in creating"?

partners in creating

Not only for construction and building, but for setting up precision machine tools and long production lines, in the fabrication of large ships and aircraft, experienced engineers know that they can rely utterly on K & E transits and levels. Coated lenses for increased light transmission, precision-ground adjusting screws, chromium-coated inner center and draw tubes, completely enclosed leveling screws, improved achromatic telescopes—all these typify the advanced design of these instruments.

KEUFFEL & ESSER CO.
EST. 1867
NEW YORK • HOBOKEN, N. J.
CHICAGO • ST. LOUIS • DETROIT • SAN FRANCISCO
LOS ANGELES • MONTREAL



THOUSANDS OF TESTIMONIALS

Thousands of testimonials are in the files at Hallicrafters. They are from members of the armed services all over the world. They tell how Hallicrafters-built communications equipment has performed dependably and brilliantly on all the battle fronts of the world. Many of these letters are signed by licensed amateurs who include their call letters with their signatures. A high percentage of the letters conclude with sentiments like these—we quote: "*If a rig can take it like the HT-9 took it in the Australian jungles, it's the rig for my shack after the war*". . . "*When I buy my communications equipment it will be Hallicrafters*". . ."*After we have won this war and I can get a ham ticket there will not be the slightest doubt as to the equipment I will use . . . it will be Hallicrafters*". . ."*Meeting Hallicrafters gear in the service was like seeing someone from home . . . I used to have one of your receivers at W7FNJ . . . hope to have more after the war*" . . ."*being an old ham myself I know what went into the 299 . . .*" Thus does the voice of the amateur come pouring into Hallicrafters headquarters, providing information, guidance and further inspiration to Hallicrafters engineers. Amateurs will find in Hallicrafters peacetime output just the equipment they need—refined and developed in the fire of war and continuing to live up to the well earned reputation as "the radio man's radio."

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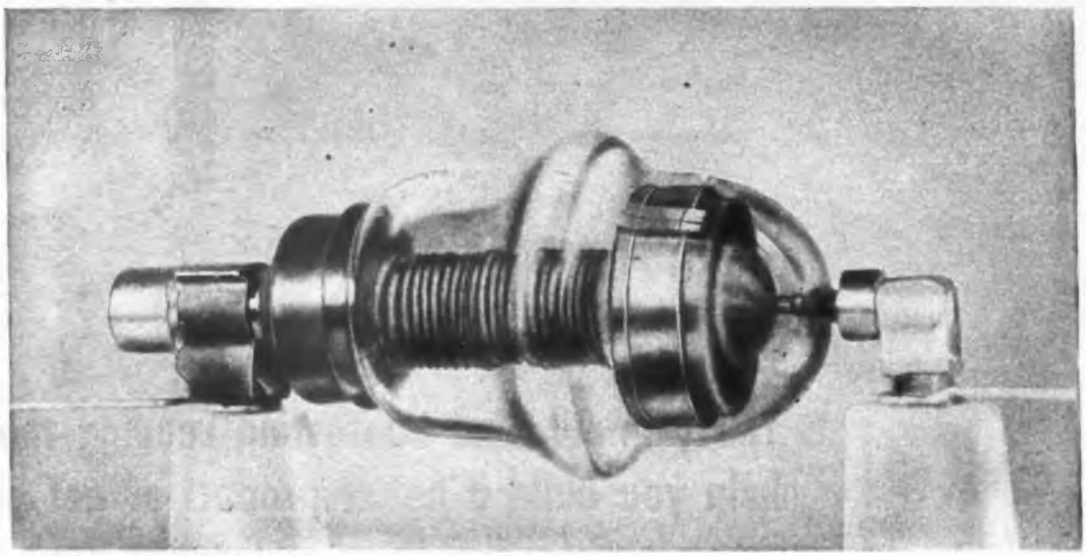

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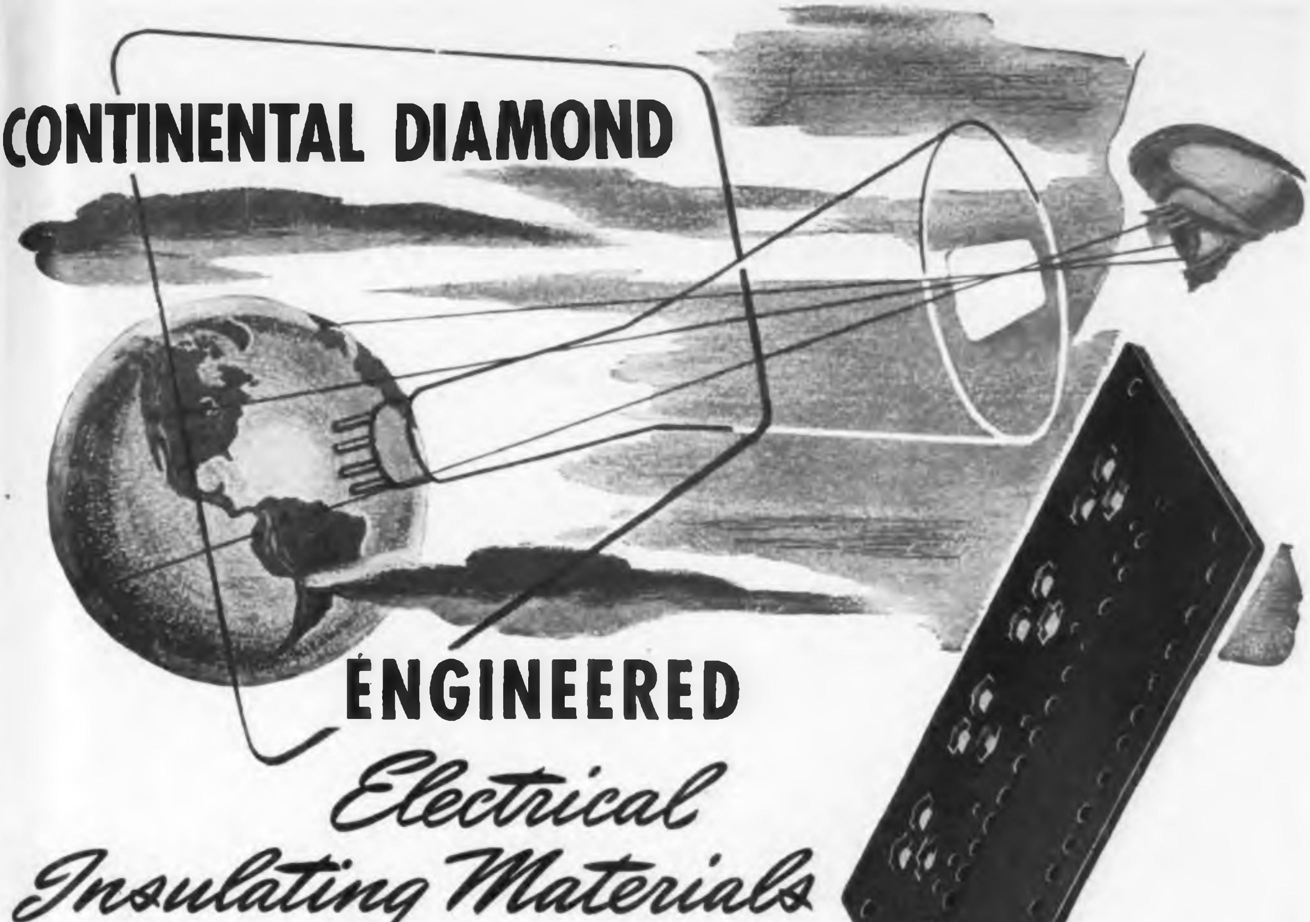

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The part shown is a grade CE DILECTO punching. It met the engineering specifications calling for a high dielectric, strong enough to mount current carrying parts, and resist severe impact and vibration.

KF-45

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DILECTO—A Laminated Phenolic.
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The C-D technicians who have worked to develop better Dielectrics to meet War's severe requirements, are now ready to help you solve your electrical insulating problems. Their familiarity with 6 distinctly different types of electrical insulating materials assures you of unbiased recommendations.

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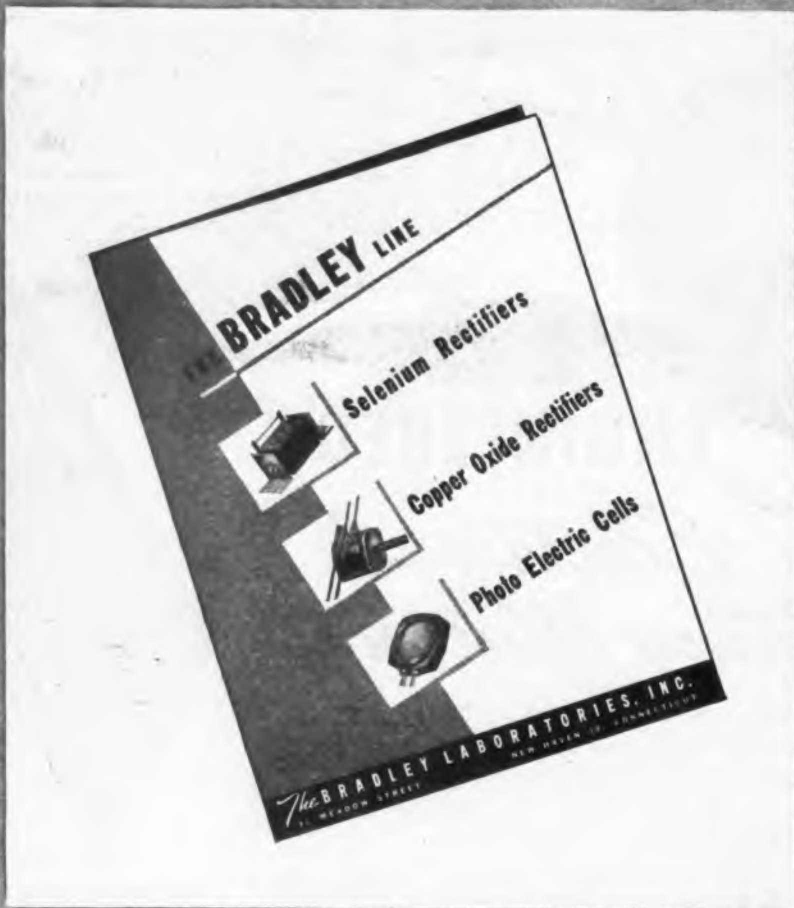

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Why Western Electric equipment leads the way!

1. Western Electric products are designed by Bell Telephone Laboratories —world's largest organization devoted exclusively to research and development in all phases of electrical communication.

2. Since 1869, Western Electric has been the leading maker of communications apparatus. During the war this company was the nation's largest producer of electronic and communications equipment.

3. The outstanding quality of Western Electric equipment has been proved daily on land, at sea, in the air, under every extreme of climate. No other company supplied so much equipment of so many different kinds for military communications.

Western Electric

Today's world is a world of sound. How different it would be without the telephone, radio, public address systems, aids for the hard of hearing, talking pictures!

For many years, Bell Telephone Laboratories and Western Electric—working closely as research and manufacturing teammates —have led the way in building this world of sound.

In the course of their sound-transmission work, these teammates

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AVIATION RADIO

MARINE RADIO

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FOR EIMAC TETRODES
4-125-A, 4-250-A AND OTHERS

The HX-100 is a husky low-loss socket that will handle any tube using the "Giant" 5-pin base, including the Eimac 4-125-A and the Eimac 4-250-A. The HX-100 is of the wafer type with a low-loss ceramic body. Contacts are of the heavy duty type with auxiliary springs to provide ample contact pressure. In every detail, HX-100 is designed to contribute top performance through a long, trouble-free life.

Deliveries to dealers will begin about the time this issue appears.

HX-100 Socket List Price, **$3.30.**

HX-100S Socket with three stand-off insulators, List Price, **$4.25.**

NATIONAL COMPANY, INC.
MALDEN, MASS., U.S.A.

Boost the Performance

OF YOUR EQUIPMENT

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RAYTHEON VOLTAGE STABILIZERS

THE PRECISION, accuracy and dependability of much electrical equipment are impaired by varying supply voltages.

If varying power supply handicaps your equipment why not install magnetic-type RAYTHEON VOLTAGE STABILIZERS? Long-proved, job-rated, and designed to meet practically any installation need, they are *boosting performance* in a wide variety of electrical equipment in many usefu' applications.

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Excellence in Electronics

For Electronic Heating and Television Capacitor Applications

WITH the growing importance of electronic heating and television, design engineers can find the solution to many of their capacitor problems in Erie Ceramicons.

These silvered-ceramic condensers offer advantages because of their low inductance at high frequencies and extremely simple construction that eliminates circulating currents tending to reduce power ratings. Design is further simplified by the fact that where required, corona shields are incorporated directly into the ceramic dielectrics.

Erie Resistor has developed a number of High Voltage and High KVA Ceramicons of special design and several standard styles are now in production. Included in the above group is a specially designed 30,000 volt feed-thru Ceramicon; a dual filament by-pass unit having conductors to carry 325 amps. The standard Erie Resistor High Voltage ceramic condensers shown include two styles of double cup Ceramicons; a new double cup unit for television power supply filtering, rated at 500 MMF and 10,000 volts D. C.; two High Voltage feed-thru Ceramicons; and a High KVA, High Voltage, multiple plate condenser comparable in size to mica type CM75 but particularly adapted to use at very high frequencies.

Write for data sheets on standard Erie Ceramicons for television and electronic heating applications. You are invited to make use of our extensive knowledge and background for the development of special Ceramicons for these applications.

*CERAMICON IS THE REGISTERED TRADE NAME OF SILVERED CERAMIC CONDENSERS MADE BY ERIE RESISTOR CORPORATION.

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Electronics Division

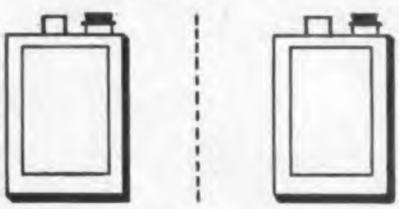
ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND   TORONTO, CANADA.

CONVENTIONAL BLACK AIR DRY	DOLPH'S #238

Settling | **Non-Settling**

Unlike conventional varnishes of this type, the non-pigmented formulation of #238 prevents any "settling out" of color when stored for a period of time.



Special | **Regular**

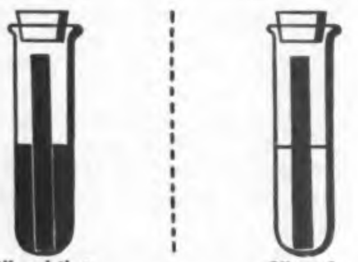
#238 does not require a **special thinner.** For reduction purposes, use Mineral Spirits (Turpentine substitute), which is obtainable anywhere. The flash point of this solvent meets Underwriters' Approval.

Average | **Exceptional**

Both wet and dry dielectric strength of #238 far exceeds the limit afforded by most standard varnishes of this type. The wet dielectric of #238 is over 600 volts per mil. The dry dielectric is over 1300 volts per mil.

Brittle | **Flexible**

The flexibility life of #238 is well over 1000 hours. Most conventional types do not reach 300 hours in this test.



Oil resisting | **Oilproof**

Most standard grades require long drying periods before they are oil resistant. #238 is immediately oilproof.

Dolph's #238 Black

AIR DRYING VARNISH

Realizing the ever present need for an outstanding black, flexible oil-proof finishing varnish, the DOLPH Laboratories, backed by their long years of experience and research, have created, and now make available to you, a new black air drying varnish . . . #238. We definitely feel that this product with all its exceptional attributes, is timely and worthy of your attention.

In addition to the advantages already illustrated, #238 possesses the following characteristics, all included in its formulation to produce better results for you . . . a non-fading opacity which permits excellent hiding power and coverage . . . the slow initial set of this grade affords ultimate ease in application, whether brushing, dipping or spraying, and also provides uniform coverage . . . high degree of resistance to both fresh and salt water.

Although not a baking varnish and not intended for coil impregnation, #238 has many baking varnish properties.

To gain all these qualities of #238, it is only necessary to air-dry this material 6 hours, against 8 or more hours required by similar varnishes of this type.

MAY WE SUGGEST you send for a small sample on your Company letterhead, so that you may conclusively prove the merits of #238 Black Air Drying Varnish. This entails no obligation on your part.

Insulating **Dolph's** *Varnish Specialists*

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for *exact* specifications

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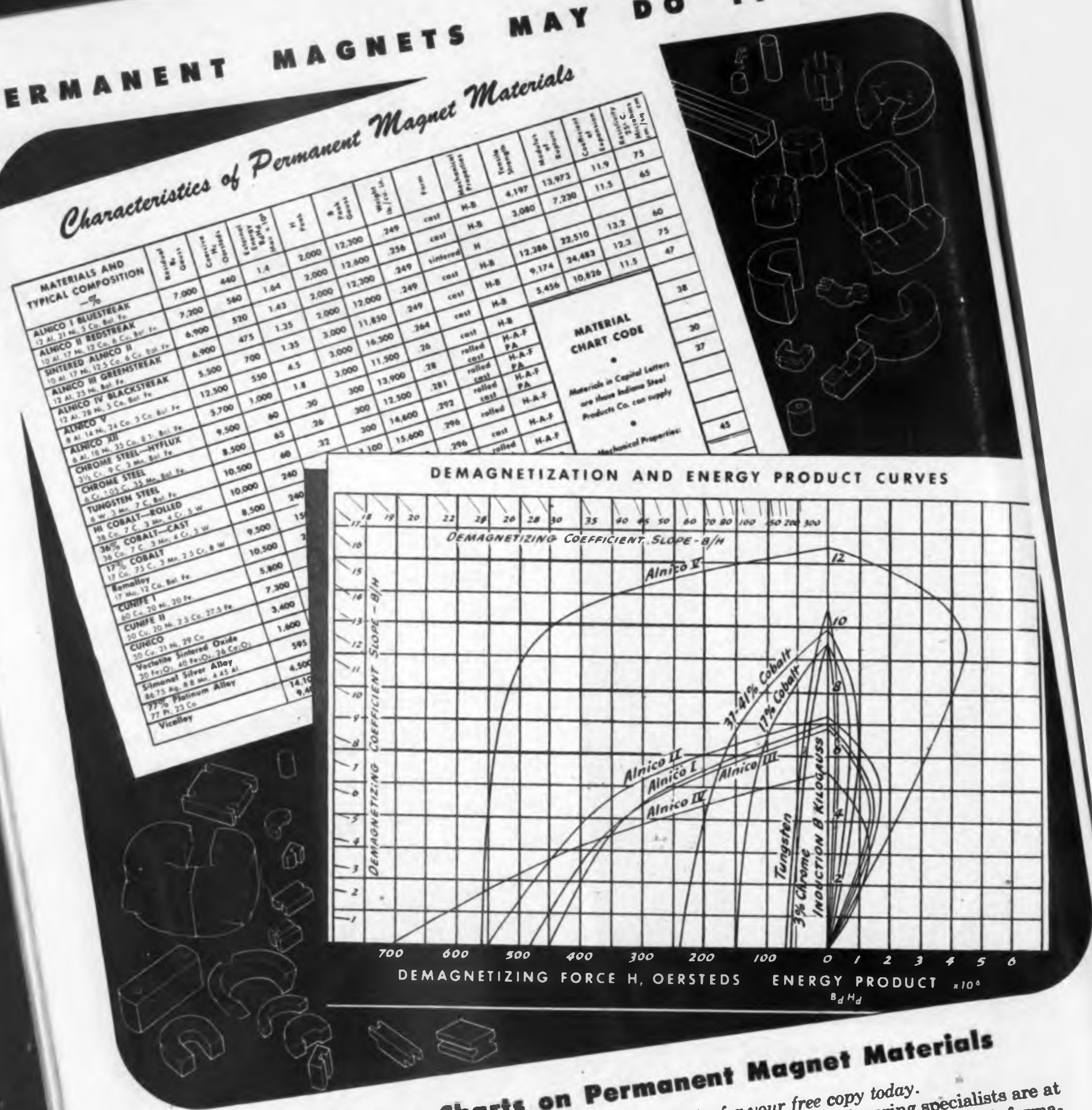
PERMANENT MAGNETS MAY DO IT BETTER



Reference Charts on Permanent Magnet Materials

Engineers! Product designers! For your convenience, in handy reference form, we have prepared two charts (shown in reduced size above) giving helpful data on the energy product and physical characteristics of permanent magnet materials. A supply of these, printed on durable ledger stock, 11″ x 16″, is available for prompt mailing to any firm or individual considering commercial applications of permanent magnets.

Write for your free copy today.

Our research and engineering specialists are at your service for consultation. Complete information on the facilities of The Indiana Steel Products Company—world's largest manufacturer of permanent magnets—is presented in our technical handbook, entitled "Permanent Magnet Manual," now on the press. We will be glad to send you a copy without charge.

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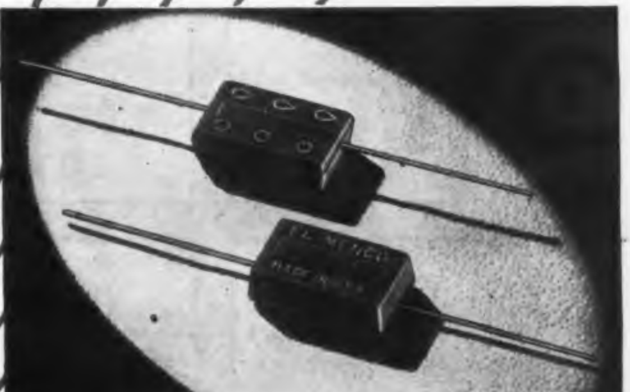

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El-Menco

CAPACITORS

Molded Mica — Mica Trimmer

ARMY NAVY

THE ELECTRO MOTIVE MFG. CO.
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UNUSUAL DESIGNS AT

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This high voltage application involved a minimum size requirement. For maximum compactness, the final transformer produced has a turns ratio of 115/5,800, but a voltage ratio due to resonance of 115/10,000 V.

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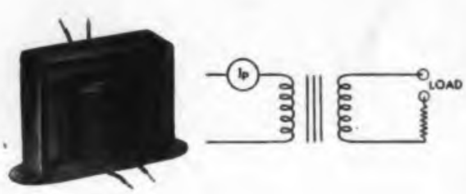
This inductor is part of a voltage sensitive non-linear network. By adustment of the inductor with a specific capacitor, peak non-linearity can be adjusted over a substantial range in voltage.

CONDENSER–PULSE WELDING TRANSFORMER

This transformer is designed for a small precise spot welding set. For this type of application, design factors include High Q and maximum surge power transfer. The transformer shown is the equivalent of 100 VA in size, but handles 1,000 VA pulses.



SPECIAL CONTROL TRANSFORMER

In this odd application, the requirements were that the primary current go down with increase in load current. In actual practice, when normal load is placed on the secondary, the primary current drops 50%.

The UTC application engineering section is available for your problem.

United Transformer Corp.

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O. H CALDWELL, EDITOR ★ M. CLEMENTS, PUBLISHER ★ 480 LEXINGTON AVE., NEW YORK (17), N. Y

FM Needs (1) More Power on 88-106 mc, (2) Extension of Operation on 44-50 mc

FM has long been looked forward to as the first item on the radio industry's reconversion calendar.

With 750 FM stations now in sight and nearly every radio-set manufacturer having indicated intention to produce FM receivers, Frequency Modulation was expected to be the big drawing-card of postwar radio sales. But now the FM picture is filled with confusion and delay—even without Mr. Petrillo's latest plexus blow to FM programs!

Also FM listeners and radio men may find a shock and disappointment, we fear, when they try to tune in on the new FM high-frequency (88-106 mc) band to which FCC has ordered the new super-broadcasting. For, compared with present high field strength and good service on the low (42-50 mc) FM band, listeners on the high-FM-band under the new FCC regulations seem sure to encounter low-intensity signals, reduced station power, limited station radius, increased shadows from foliage, buildings and land obstructions (though better reflection waves), and daytime interference at long distances from transmitters.

Disastrous Power Cuts Ordered

At distances from stations, listeners who want adequate reception on unfilled channels will be required to install costly receivers and lofty dipoles with reflectors, directors, etc.,—elaborations out of the reach of the average rural listener.

And when the channels are filled, under Zone I regulations, FM will become merely a city service. The rural areas, which need FM most of all, to eliminate static, will be largely deprived of FM reception. Rural FM will be almost wiped out, in many important areas.

It will also amaze radio men to learn that pioneer FM stations like Alpine and Paxton have actually been cut to only 2 or 3 per cent of their former licensed powers, although these stations for the present will be lone occupants of their new channels. Thus the great Armstrong transmitter on the Hudson, after being licensed for years at 50 kw output or 250 kw effective power, is now to be cut to 6 kw effective power, which means only 1.2 kw output! Other cuts have been correspondingly disastrous.

A body blow has been dealt FM's immediate commercial progress and sales opportunities by banishing it to reduced power on the high frequencies where home reception meets manifold difficulties.

To Keep FM Going

In order that FM may go ahead during coming months, we urge that part of the present FM band (44 to 50 mc) be continued in use for the time being—certainly for a year or so while television does not need this low-power community channel, and at least until 100-mc FM has demonstrated itself and inherent engineering problems have been solved.

If it is possible, as manufacturers tell us, that AM-FM receiving sets with both low and high FM bands can be sold at only $4 increase over the cost of the high-FM band alone, then such slight premium would be a good investment for the customer's enjoyment of the fine service to be had on the 44-50-mc band—even if only for a limited time.

Give FM Same Chance as TV

Some day, we believe, both FM and television will have their greatest development in the higher frequencies. But just as we urged that television be given a chance to get a commercial tryout on its present partially-developed low-frequency channels, along with an opportunity to pioneer the uhf region, so—

We urge that existing FM stations and existing FM receivers (representing a combined investment of 50 million dollars on the part of the public) be given a chance to demonstrate FM's matchless service on its present tested and effective channels, while pioneering into the new upper frequencies.

Give FM a chance to continue showing its superior qualities in its present listener-tested band!

Keep FM going during 1946—for the listeners in cities and towns and on the farm!

In this Issue, Electronic Industries' Annual Engineering Directory, Turn to Page 114

ENGINEERS REPORT A

War developed advances in communications and industrial electronic applications hold attention of 907 delegates

• The Seventeenth Annual Fall Meeting under the sponsorship of the Rochester (New York) Section of the Institute of Radio Engineers and the Engineering Department of the Radio Manufacturers' Association, was held in Rochester November 12th and 13th. Altogether 907 registrants were attracted by the program which extended for the two days and nights.

In addition to listening to and discussing technical talks by a dozen engineers, those who attended had also the opportunity of inspecting the exhibits of 27 companies. Most of the papers that were presented are briefed herewith.

The details of the FM transmission tests pertaining to the relative importance of the 45 megacycle and 90 megacycle FM band, which were conducted by Zenith were described by Mr. C. W. Carnahan. This report received wide discussion at the meeting and many additional matters pertaining to this subject were brought out by Dr. E. H. Armstrong and others.

Production and operating details were reported on the proximity fuze by Mr. H. Trotter, Jr., of the Eastman Kodak Company. Design details relative to the production of rugged tubes for use in these fuzes were given by Mr. M. A. Acheson and Mr. H. K. Ishler of the Sylvania Electric Products Inc. At another session a description of some of the Microwave Radar systems was given by D. G. Fink. Reports were made on the present technical status of television by E. W. Engstrom of RCA, bringing hearers up to date on the state of art in the television field. A paper reviewing the present day television system from the standpoint of measurements and circuit adjustments was made by Mr. Jerry Minter, of Measurements Corporation, wherein several suggestions were reported as to possible improvements in the television system.

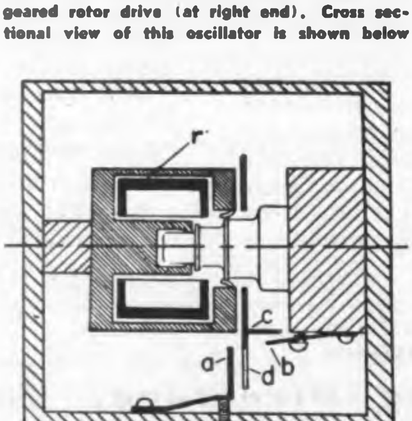
Coaxial Butterfly Oscillator

by E. E. Gross
General Radio Co.

In the coaxial adaptation of the butterfly circuit use is made of a disk seal lighthouse tube as the oscillator. This tube is mounted so that its elements make contact with three concentric cylinders, the plate being connected to the smallest, the grid to the next and the cathode the outermost. The other ends of the cylinders are short-circuited by a heavy disk. This assembly forms two concentric coaxial lines as shown in photograph. The small rotor shown in this figure is shaped and mounted so that when turned it varies the effective ratio of the diameter of the inner to the outer cylinders. This changes the characteristic impedance of these lines.

If these lines were open at one end and shorted at the other they would resonate at a wave length four times their actual physical length. However, since the open ends have the tube capacitances across them, resonant frequency is considerably higher. Due to this fact a change in characteristic impedance causes a change in resonant frequency.

Photograph of coaxial butterfly oscillator with lighthouse tube mounting (left end) and geared rotor drive (at right end). Cross sectional view of this oscillator is shown below



The characteristic impedance of a butterfly section may be varied for example from 30 to 150 ohms resulting in a 2 to 1 frequency variation. In order to make the frequency variation linear with respect to the rotation angle the rotor has to be suitably shaped. The Q of these circuits is from 200 to 350.

Oscillators using these circuits are being designed for laboratory use as signal generators in the range from a few hundred to a few thousand megacycles.

In order to provide oscillation in some of the ranges covered it is necessary to supply feedback in variable amounts. Several designs have been used for accomplishing this. The best consisted of projections connected to the rotor passing near adjustable metal fingers connected to the cathode tube. While this feedback coupling affected tuning range, the final result was a wide range oscillator of extreme simplicity and ruggedness and having a high order of stability. With the type 2C40 lighthouse tubes power outputs were approximately .15 to .3 w.

The Aurora and Geomagnetism

by C. W. Gartlein
Department of Physics
Cornell University

Although study of the aurora is at present a task of physicists rather than radio engineers, its profound influence on propagation of electromagnetic waves is well-known. That there is a general relationship between geomagnetism, the aurora and sunspots, has been evident from statistical data obtained from many sources, when they are compared on an annual basis. With daily and monthly averages the finer details of the solar and magnetic intensity observations can be correlated.

It is not possible to predict

ROCHESTER CONVENTION

auroral displays with a high degree of precision; 70% accuracy is considered good. March, April, August, and September may be called the "aurora months" although displays are a more frequent phenomenon than is generally believed and one out of every five or ten nights affords some kind of auroral display to the trained observer, during the peak years. Aurora cycles are almost identical with sunspot cycles.

Spectrograms show that the discharges take place in oxygen and nitrogen and the aurora does seem to extend to the upper regions of the atmosphere where hydrogen and helium may be present.

Electronic instruments are finding increasing application in study of the aurora. A differential amplifier is under development which will balance out the lunar illumination which masks less intense auroral displays. Light entering the main and the ambient light phototubes are alternately chopped mechanically to obtain an interrupted signal for study. The resulting output is expected to afford a sensitive measure of auroral intensity even during full moon. It is believed that auroral research may ultimately clear up many of the problems of UHF propagation.

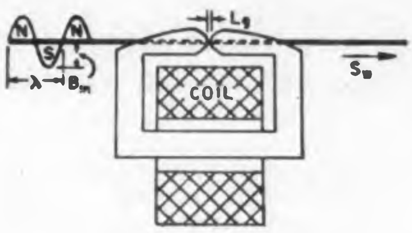
High Quality Sound Recording on Magnetic Wire

by L. C. Holmes
Stromberg-Carlson Company

A flexible laboratory recorder and reproducer was demonstrated by Mr. Holmes. By means of this instrument sounds and music can be recorded and immediately reproduced through a linear amplifier.

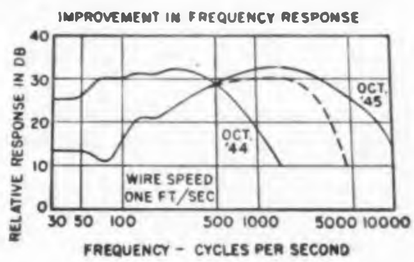
Studies made with this setup have demonstrated the limitations of wire recording and have permitted improvements to be obtained. Fig. 1 pictures the type of head used and indicates in the equation the dependence of output voltage on flux, speed of wire, length of air gap and wave length of sound signal.

Application of supersonic ac bias to the recording head to produce a linear transfer characteristic was mentioned. The effect of wire speed was discussed and the fact demonstrated that while low speeds of 1 foot per minute were possible, the



$$E = KB_m S_w \sin \frac{\pi L_g}{\lambda}$$

Cross sectional view of a typical magnetizing or pickup head. The output voltage delivered is shown in the equation. Improvements in the magnetic properties of wire and efficiency of head have brought about the improvements shown below



high notes were at first greatly attenuated. Speeds of 2 feet per minute were suggested as giving better results. The improvements obtained in the art in the last year are shown in Fig. 2.

It was noted that the wire used was of major importance and should be of unusual coercive force.

The Future of Radar

by L. A. Du Bridge
Radiation Lab.
Cambridge, Mass.

Radar has important peace-time applications in both sea and air navigation. The Loran (long-range navigation) system is already available over a large portion of the surface of the earth and doubtless will completely displace celestial navigation in the future. Underwater sound systems will also grow in importance as a navigational aid.

The present air-ground communication system will undergo many changes and improvements when the newer military equipment technics are completely made available to the CAA. For example directional noise-free microwave aero communication will be the order of the day. Spectrum space allows multitudes of microwave channels, and the line-of-sight range constitutes an advantage in that confusion will not arise among pilots hundreds of miles away.

Present-day equipment has its field of application, but it is now forced into applications better served by microwave systems. Automatic microwave apparatus of great frequency stability has been completely worked out in laboratories, and some has even found its way into the field.

Radar will take much of the danger and guesswork out of the airway pilot's job, when applied to his problems. Equipment aboard the plane, particularly the small plane, need not be elaborate. Actually, with some systems under investigation the pilot can be given voiced instructions into a safe landing under most difficult storm conditions, by a ground operator watching his every movement by radar.

In another proposal it would be possible to install a viewing tube and receiver in the plane, which can tune in and repeat the information collected by ground radar installations within the range, allowing the pilot to also see what the traffic control tower sees.

A strong argument for aerial radar is the fact that radio beams may fail in bad thunderstorms, since with certain types of equipment it may "home" to the storm, rather than to the source of the beam. Radar would supplement radio beams and to make flying safer under difficult conditions. Microwave Early Warning (MEW)

(Continued on page 80)

RADAR IS CONVENTION HIGHLIGHT

Despite all that is known and that has been printed on Radar, that subject appeared most intriguing of the many that went to make up the two-day program. This applies particularly to micro-wave equipments, still pretty much under military wraps. Great fields for the application of such apparatus particularly for ship and iarplane navigation are envisioned; engineers look for quick development along these lines.

Report on Rochester Continued on Pages 78, 79, 80, 81, etc.

Rochester Meeting

TROPOSPHERIC STUD

Usable signal obtained 85-90% of time on 45.5 mc but only 50% of time on 91 mc—Rural coverage endangered

● 45.5 mc is much better for FM than is 91 mc, according to the result of tests which have been made with equipment supplied by the Milwaukee Journal and the Zenith Radio Corp., Chicago. The results of the tests were checked by a representative of the Federal Communications Commission, by Stuart L. Bailey of Jansky and Bailey, Washington, and by Maj. Edwin H. Armstrong.

An analysis of the recordings indicates:

1. The signal obtained on 91 mc is less than predicted by theory, and the signal obtained on 45.5 mc is greater than predicted by theory, over an airline distance of 76 miles.

2. When compared according to FCC standards, the 45.5-mc signal averages three and one-half times the average 91-mc signal.

3. Actual microvolts of signal at the receiver terminals is approximately seven times greater at 45.5 mc than at 91 mc, because of the difference in antenna lengths (2/1); recordings were made in microvolts per meter.

4. The power ratio difference at the two frequencies is 49/1; that is, a transmitter 76 miles distant, operating on 10 kw at 45.5 mc, is equivalent, from a service standpoint, to a 500 kw 91 mc transmitter at the same location.

5. With noise factors considered, to provide equivalent service the 91 mc transmitter would require a power between 100-200 kw as compared with 10 kw for a 45.5 mc transmitter.

FCC checks equipment

An industry meeting was called by George Adair, chief engineer of the FCC, May 24, 1945, to discuss plans for monitoring operation of transmitters in the frequency range of 40-100 mc.

The Milwaukee Journal volunteered at the meeting to operate simultaneously on 45.5 mc and 91 mc; Zenith Radio Corp. volunteered to establish a receiver location to monitor these transmissions.

Transmitters were located at Richfield, Wis. WMFM, the FM station of the Milwaukee Journal, operated on 45.5 mc, and W9XK,

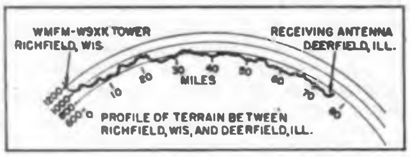


Fig. 1. Low rolling hills rise between transmitting and receiving antennas used in tests

an experimental 91-mc transmitter, used a directional antenna array on the WMFM tower.

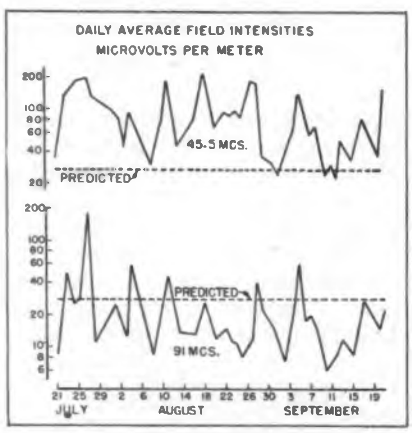
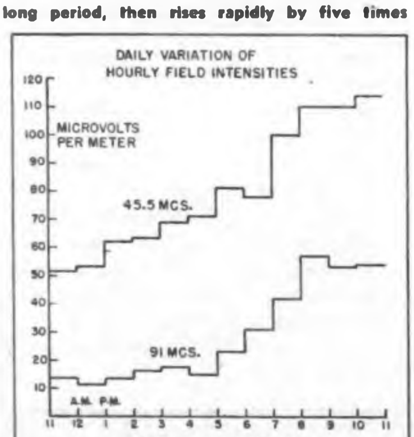


Fig. 2. 91 mc field intensities show greater variation and lower average value than 45.5 mc

The 45.5-mc antenna was a two-bay turnstile with a power gain of 1.23, mounted 230 ft. above the ground. The 91-mc array consisted

Fig. 3. 91 mc field intensity remains low for long period, then rises rapidly by five times



of a 60° corner reflector with a power gain of about ten toward the receiving station. It was mounted approximately 40 ft. below the 45.5-mc antenna.

Receiving apparatus was at Deerfield, Ill., 76 miles distant. Equipment consisted of a Hallicrafters S27 receiver and an S36 receiver modified as recommended by the FCC, and with an additional rf stage with balanced input added to each receiver. Esterline-Angus meters were used for recording, and calibration was maintained with Ferris 18c signal generators. Regulated voltage supplies were used.

Receiving antennas were half-wave folded dipoles mounted 30 ft. above the ground on towers 20 ft. apart. Straight runs of 300-ohm Amphenol "dumbell" line connected antennas to receivers.

H-section attenuators were used between lead-ins and receiver input terminals to control signal variations. Attenuators and signal generators were wired permanently to switches so that calibrations could be checked frequently and recorder signals kept in the correct range. Tests were run from July 20 to September 21, 1945.

Profile of terrain between Richfield and Deerfield is shown in Fig. 1. Except in the immediate vicinity of the transmitters, which were on top of a hill, the terrain is fairly flat, with low rolling hills. Height of the transmitter above the terrain is 500 ft. by FCC standards, and field intensities to be expected with

Fig. 4. Maximum, minimum, and average field intensities are reasonably uniform for 45.5 mc

F FM TRANSMISSION

a receiving antenna 30 ft. high at a distance of 76 miles, and with a transmitter power of 35 kw, are: 26.9 μv/m at 45.5 mc, and 27.8 μv/m at 91 mc.

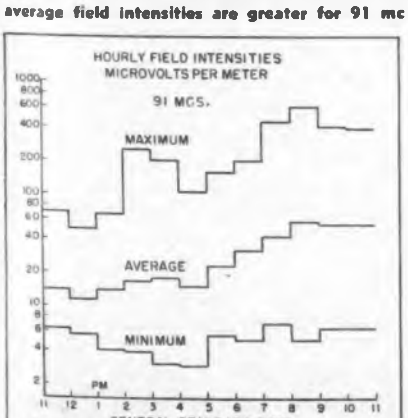
The observed field intensities show that the average 45.5-mc signal is well above the predicted value, while the 91-mc signal is below the predicted value most of the time. These field intensities are shown in Fig. 2, where the dotted lines indicate predicted values and the plotted field intensities are averaged over each day of operation. In general, the peaks of both curves coincide, with the 91-mc intensities showing a greater variation between maxima and minima. This is expected, since tropospheric refractive effects are greater as the frequency is increased.

Field intensities

Average hourly field intensities are plotted against time of day in Fig. 3. The 45.5-mc signal rises at a fairly uniform rate with a total variation of two to one. The 91-mc signal, on the other hand, remains low and constant until about five o'clock, when it rises rapidly to a magnitude nearly five times its original value.

In Fig. 4, the same curve for 45.5 mc is plotted on a log scale, showing maximum and minimum observed hourly signals. Maximum variation is 30/1, and the maximum signal observed on an hourly average was 450 μv/m. These observations for 91-mc transmissions are plotted in Fig. 5, and it is seen that the maximum variation for this frequency is approximately 120/1, between 8 and 9 in the evening. Maximum hourly intensity observed was 600 μv/m, which is 30% higher than the maximum observed on 45.5 mc.

Fig. 5. Variations of maximum, minimum, and average field intensities are greater for 91 mc



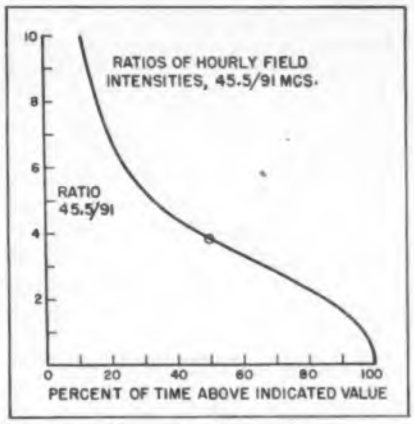


Fig. 6. Ratio of field intensities is not unity but 3.8/1 for 50% of the time at 45.5 mc

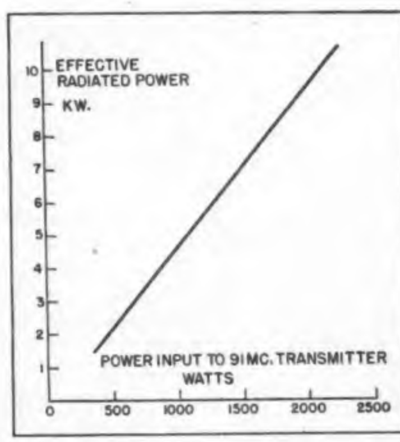


Fig. 8. Radiated vs. input power of 91 mc transmitter; power was corrected to 45 5-mc power

A time analysis of the ratio of hourly signals was made, and the result is shown in Fig. 6. In obtaining the curve, the ratio of the 45.5-mc field to the 91-mc field was calculated for each hour of operation, and the resulting tabulation was analyzed in terms of the percentage of time that the ratio was above various given values. With two such variable quantities, hourly ratios may be expected to show a very wide spread, as is observed in Fig. 6, where the ratios range from 20 to less than one. It is seen that for at least 50% of the time, the ratio of the 45-mc field to the 91-mc field is 3.8, rather than unity as would be predicted on the basis of theory.

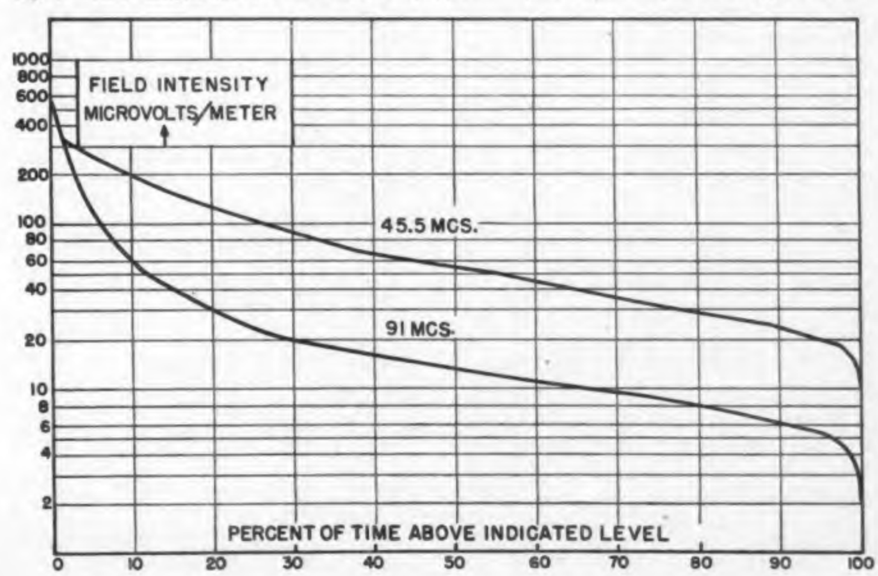
Reduction of data

A similar time analysis of hourly field intensities is shown in Fig. 7. The interesting conclusion is drawn that for 50% of the time, the 45.5-mc field is at least 54 μv/m, while the 91-mc field is only 13 μv/m, or down approximately four times.

To obtain field intensities from the recorder tapes, it was necessary to determine the factor by which the signal generator calibrations should be multiplied to yield actual field intensities at the antennas.

(*Continued on page 144*)

Fig. 7. Time analysis shows 91-mc signal only ¼ intensity of 45.5-mc signal for 50% total time



REPORT ON ROCHESTER

(Continued from page 77)

systems have been worked out for traffic control purposes and will fill important functions in the complete coordinating systems when air traffic becomes dense and schedules are carried out despite any weather conditions.

Adoption, however, of radar and microwave systems is a job calling for close cooperation and appreciative understanding by all concerned of the contributions which these war-born devices stand ready to provide to navigation in general.

Germanium Crystals

by Edward Cornelius
Sylvania Electric Products, Inc.

The utilization of contact rectifiers such as silicon and germanium was found to be of great importance in the UHF range beyond the capabilities of tube rectifiers. This type of structure was produced in the form shown in Fig. 1 designating the type 1N 34.

Germanium is never found in a free state, but occurs as germanium dioxide which is reduced with hydrogen. Upon melting and cooling the resulting powder forms crystals of the diamond type, the resistivity of which is relatively high at room temperature. In the melting process, however, a small amount of tin is added forming an alloy which has improved rectification properties at a somewhat lower resistance. The melted alloy is cut into wafers approximately .015 in. thick and polished on one side. This thin wafer is sliced into ⅛ in. squares and mounted as shown in Fig. 1. A tungsten wire contact having a prescribed contour and pressure is applied to the center of this disk. Fig. 2 indicates the blocking characteristics. It will be noted that it will handle higher inverse peak voltages than other common types of rectifiers.

At some voltages, characteristic of the particular unit, usually greater than 75 but less than 200 volts, the characteristic departs from the exponential form. The dynamic resistance becomes zero and then negative as the current is increased so that the voltage developed across the unit decreases. This action is analogous to that in the forward direction in being temperature dependent. In fact, if one uses the proper scale multiplying factor, the two curves of forward and blocking currents will be very nearly identical.

There are many uses that suggest themselves for these crystals. Some of these are as modulators, voltage regulators, low frequency oscillators, d.c. restorers, and polarizing devices.

As a non-linear device the germanium crystal diode is readily adapted to modulator and demodulator circuits. The portion of the curve in which the dynamic resistance becomes zero or negative may be used for voltage regulation. Suitable characteristics for this use

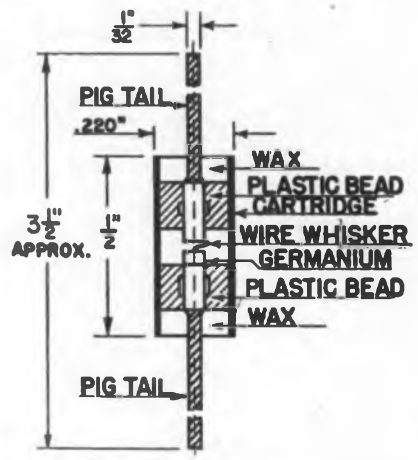


Fig. 1—Section of the Germanium crystal detector showing construction and mounting method

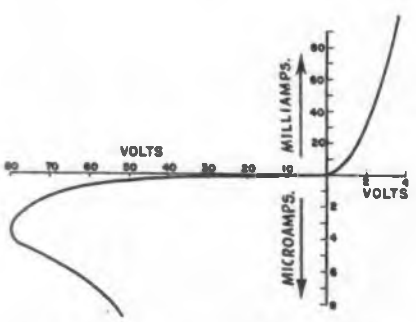
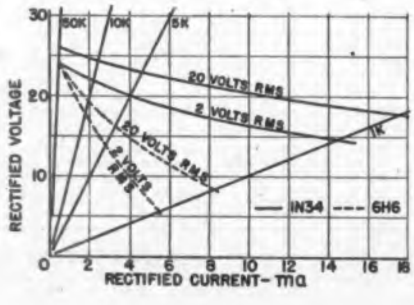


Fig. 2—Blocking characteristics of the Germanium crystal

Fig. 3—Comparison between blocking characteristics of Germanium crystal and 6H6 tube



are most often obtained when the peak voltage (blocking) is relatively low (20 to 50 volts). If necessary, a small positive series resistance may be added to correct the negative dynamic resistance to zero. The advantages of this regulator over the gaseous discharge type are freedom from flicker, absence of high firing voltages, and compactness, although large changes in ambient temperature and excessive currents will affect the regulation and life of the unit. Normal currents for regulator use are 7 to 30 ma. d.c.

It was reported that the type 1N 34 germanium crystal diode offers many physical and electrical advantages. Diminutive weight and size are mandatory in most portable and airborne equipment, and are indicated in many control devices. Economy of space and material is furthered by the absence of heater supplies and attendant high voltage insulation. Simplification of wiring and an overall reduction of ground capacity result in improved circuit performance, particularly at high frequencies. At any frequency, hum and noise due to diode a.c. heater supplies are excluded.

In Fig. 3 a comparison is made between the 1N 34 rectifier and a type 6H6 vacuum tube diode. The former shows an advantage at low values of load resistances. These resistors are highly independent of the operating temperature at the rectifying surface. Very high temperatures may be produced at the contact point if an appreciable current is passed through the unit. The resistance in the blocking direction has a negative coefficient in that an increase in temperature will cause a decrease in the blocking direction characteristics. This property suggests many uses other than detectors or rectifiers such as voltage regulators and low frequency oscillators.

FM Tests

Statement by FCC

The report made by C. W. Carnahan of Zenith Radio Corp., covering a series of tests intended to determine the relative advantages of 45.5 and 91 mc transmission for FM, is published on preceding pages of this issue. Although a representative of Federal Communications Commission had been invited to attend the session for the purpose of discussing the report FCC was not represented. However, FCC had previously made public a statement categorically denying the importance of the tests, stating that tests made at its Laurel, Maryland, laboratory had established the exact opposite of claims made by the Zenith engineers.

"The FCC tests show that the conclusions which have been drawn from the Zenith tests are not sound," stated FCC. "Moreover, it is misleading to discuss only one phase of the problem, namely power, which can be greatly reduced if antenna structures are designed for high gain and placed at high locations."

"Field intensity measurements of a low-band FM station and a high-band station, of comparable power, both located in Washington," the statement said, "showed negligible difference in signal strength at the FCC laboratory, a distance of approximately twenty miles, in spite of the fact that the low-band station W3XO enjoys the distinct advantage of having an antenna more than 200 feet higher above sea level than W3XL."

The commission engineers held that if the antennas were of the same height the field strength of the station operating in the new high FM band would exceed that of the old FM band station.

The commission "recognized" that neither its own nor the Zenith tests were conclusive.

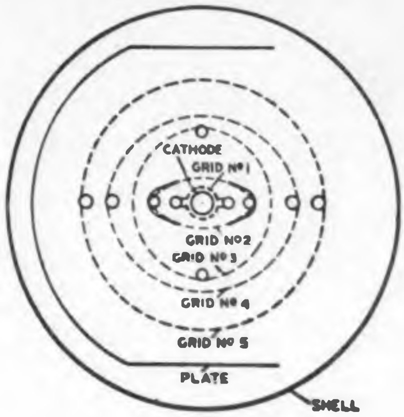
"Subsequent tests," it was stated, "may establish that somewhat higher power might be desirable in the new band. However, there is no warrant for any such conclusion on the basis of the limited data now available."

From what is known, the commission went on, it appears that power requirements for the new band would be substantially the same as requirements for the old band.

Major Armstrong appeared and strongly supported the contentions of the Zenith engineers, stating that the tests had "finally resolved the controversy between the commission's expert, K. M. Norton, and himself calling the FCC Laurel tests "meaningless".

"The whole point of this discussion is that at distances over fifty miles, where the service is really needed, the lower band is the best," he continued.

"These are the distances over which the Zenith tests were made, namely, seventy-five miles. The commission's engineering department knows that this is so, for it has been recording signals from New York stations operating in the higher frequency band at its monitoring station at Andalusia, Pa., also over a distance of seventy-five miles. The measurements obtained at this distance confirm the Zenith measurements."



Arrangement of elements in 6SB7Y converter tube

Recent Developments in Converter Tubes

by W. A. Harris and R. F. Dunn
Radio Corp. of America

Better signal-to-noise ratio and higher transconductance are realized in the 6SB7Y metal tube, a new converter type, when compared with the 6SA7. The spacing of the elements and the number of turns are different. This has made it possible to obtain stable oscillator circuits in the new FM band.

The distribution of the various elements in this tube is seen in sketch. The oscillator grid current need not be very high, and the voltage on the cathode is relatively low. Plate current is not much larger than for the 6SA7, but the cutoff is sharper than that of the older tube. AC voltage on the cathode acts like dc bias on the signal grid, and too high cathode voltage will reduce the gain accordingly.

The new tube can be used with 6SK7 tubes in the intermediate frequency amplifier, if circuit arrangements are made to apply approximately half the AVC bias voltage available to the 6SK7 system to the 6SB7Y, whereupon proper AVC action is obtained.

Cutoff characteristics are balanced with 6SG7 tubes in the if system and the same AVC voltage may be used for both converter and if stages. When two or three if stages are used, less overall bias is required.

The need for lower power outputs from the oscillator section is emphasized, a suitable range of values being from 0.5 to 1.0 v.

Calculations indicate a noise level equivalent to a resistance of 87,000 ohms, although the actual value is probably somewhat lower. The increase in total noise over circuit noise is only two or three db when the new tube is used.

War Influence on Acoustic Trends

by Hugh S. Knowles
Jensen Radio Manufacturing Co.
Chicago, Illinois

Battle conditions present the problem of transmitting intelligence through very high noise levels. Quality is secondary and this fact has resulted in the "Donald Duck" type of transmission. Power-limited loudspeaker systems, particularly, make limited frequency ranges desirable and necessary.

Ear plugs to attenuate both the noise field and intelligence energy by 30 db greatly improve the ability to distinguish messages, assist in avoiding ear trauma, and improve recovery time.

In many services the noise field may be approximately 120 db, leaving a 10-db range below the normal 130 db threshold of pain to get the message across. To best utilize this 10 db margin, careful attention must be given to the quality of the transmission.

In high-power loudspeaker systems ("bull-horns") the desirable qualities of laminated phenolics for diaphragm application was proved: They are not susceptible to corrosion and have good fatigue and tear strength, although they are at present too expensive for many peacetime applications.

However, some of their benefits may be obtained by using relatively inexpensive impregnants which increase the tear strength of paper diaphragms. With new types of adhesives which have been developed, voice coils are more firmly attached to diaphragms.

Mounting of "bull-horns" in the vicinity of large-caliber guns necessitated development of acoustic valves to prevent high pressure waves developed during gunfire from rupturing diaphragms.

When the explosive wave from the gun muzzle impinges upon the valve, closure occurs before diaphragm rupture, and the interior of the speaker remains sealed off until the explosive wave recedes. Waves of either compression or rarefaction operate to close the acoustic valve. Normal operation of

(Continued on page 192)

PULSE POSITION

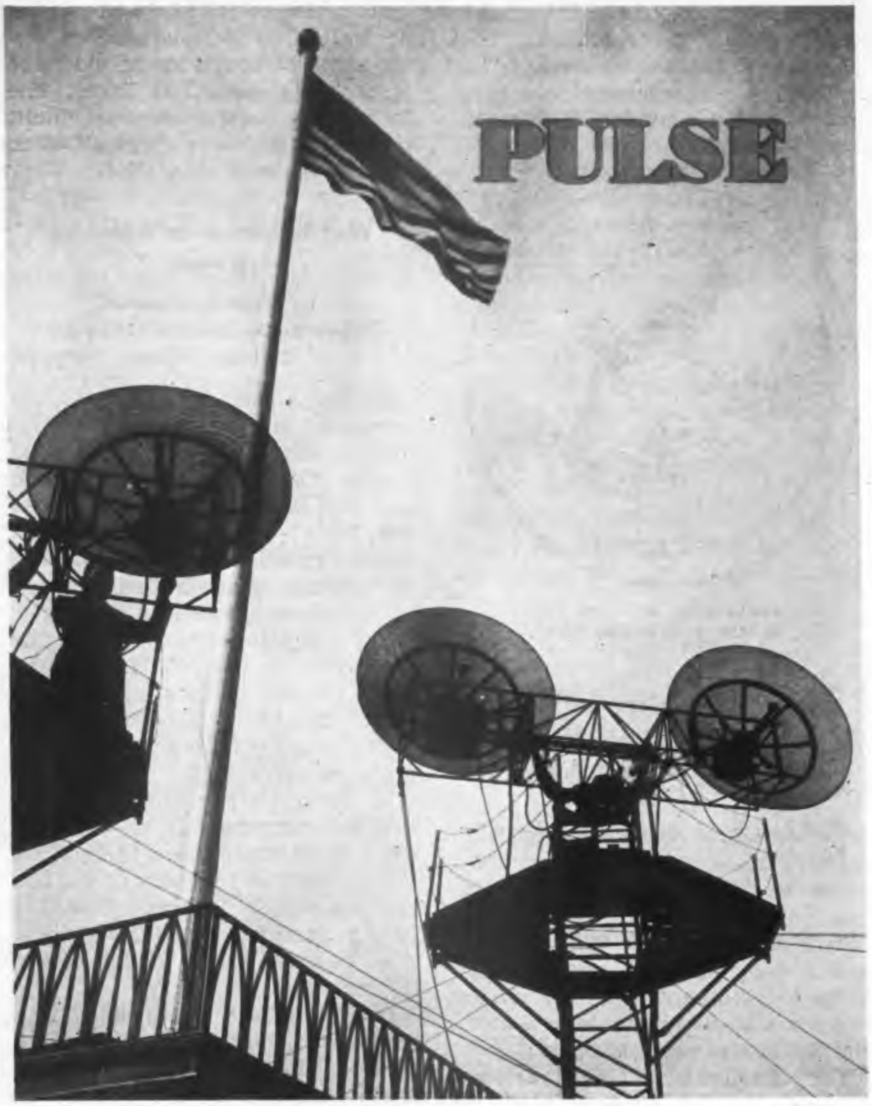


Fig. 2. Parabolic reflectors used as part of the antenna structure for pulse time system. The assemblies which generate the microwaves are housed in metal cases behind the parabolas

● Pulse - time transmission* in which the time of occurrence of carrier pulses is advanced for positive and retarded for negative portions of the signal wave, may evidently be achieved by variously designed equipment. One of the methods which has been carried to an advanced stage of development by the Bell Telephone Laboratories provides eight two-way voice, telegraph , or facsimile channels. Pulsing apparatus is mounted in racks shown in Fig. 1. Microwave assemblies which generate the radio link are housed in metal cases behind the parabolic reflectors shown in Fig. 2.

The heart of the transmitting section of the multiplex unit shown in block diagram, Fig. 4, is the 8-kc oscillator stage V51A. The oscillator stage, in conjunction with oscillator clipper V51B, determines the recurrence frequency of the marker and channel pulses, and provides a waveform suitable for starting the channel pulse generators and the marker generator. Marker generator V41B converts the leading edge of the negative half of the square wave from V51B into a 4-microsecond marker pulse which is amplified by marker amplifier V32A and is then fed to video amplifier No. 1 (V32B).

Exciter V41A for channels No. 2, 4, and 6, and exciter V45B for channels No. 3 and 5 function similarly to the marker generator stage. The two exciters produce a positive going, 2-microsecond pulse which also corresponds to the leading edge of the negative half of the square wave from V51B. The positive pulse output of V41A is fed to the position modulator stages of channels No. 2, 4, and 6, where the pulse is used to trigger a multivibrator circuit.

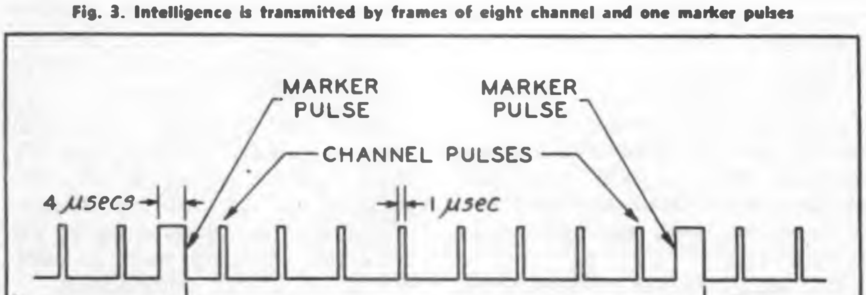
In exactly the same manner, the output pulse of exciter V45B triggers a multivibrator in the position modulator circuits for channels No. 3 and 5. No exciter stage is used for channels No. 1, 7, and 8. The channel No. 1 position modulator is started directly from the leading edge of the negative half of the square wave, while the position modulator circuits for channels No. 7 and 8 are started directly from the leading edge of the positive half of the square wave.

Starting the position modulators or channels No. 7 and 8 on the positive half rather than on the negative half of the square wave provides approximately a 35-microsecond delay from the marker pulse. This allows sufficient time for the multivibrator circuits to return to normal between successive frames.

The voice-frequency (v-f) channels are amplified by the eight voice amplifier stages (Fig. 4) before application to their respective posi-

*"Pulse-Time Modulation for Multiple Transmission", Electronic Industries, November 1945, p. 90.

Fig. 3. Intelligence is transmitted by frames of eight channel and one marker pulses



MODULATION TECHNIC

By clipping sine waves into square form, altering their length and differentiating, pulses are obtained at varying times

tion modulator stages. In the position modulator stages, the voice signals determine the length of the square wave developed by the multivibrator circuit. This variable trailing edge of the square wave is then converted into a 1-microsecond pulse whose position with respect to the marker pulse varies correspondingly.

The position-modulated pulse outputs for channels No. 2, 4, 6, and 8 are applied to even clipper stage V46A; the outputs for channels No. 1, 3, 5, and 7 are applied to odd clipper stage V46B. The clipper stages shape the channel pulses before application to even and odd video amplifier stages V36A and V36B, respectively. The output of these two amplifier stages is combined with the marker pulse from marker amplifier V32A producing an array of marker and channel pulses (Fig. 3).

Amplifiers

The combined output of the marker and channel pulse amplifiers is then further amplified by the two video amplifier stages, V32B and V33, before application to the radio transmitter on the antenna tower.

The marker pulse and eight channel pulses from the multiplex transmitting section are amplified and shaped by two additional video amplifier stages in the radio transmitter (Fig. 4). The positive going pulses from video amplifier No. 2 (V2) are applied to modulator V3 which functions as a pulse amplifier for supplying plate power impulses to ultra-high-frequency oscillator tube V5.

Oscillator tube V5 will oscillate only during the short periods of the power impulses from the modulator tube. Thus the output of the oscillator tube is a series of rf pulses corresponding to the marker pulse and eight channel pulses developed in the multiplex unit. These rf pulses are conducted by a section of waveguide to the transmitting parabolic reflector where the rf energy is radiated into space as a directional beam toward the receiving station.

A portion of the transmitted energy is picked up and rectified by the monitor crystal rectifier in the transmitter so that the transmitted pulses may be viewed on the screen of a test oscilloscope to insure that the transmitting components are operating satisfactorily.

The transmitting multiplex performs the following functions:

(1) Channel pulses are generated at the proper intervals for eight channels.

(2) The v-f signal for each of the eight channels is coupled to the channel pulse generators so that the position of each channel pulse is determined by the amplitude of the input signal to that channel.

(3) The frequency range of the input signal is limited to about 3,000 cycles by a low-pass filter.

(4) The maximum amplitude of the input signal is limited by peak-chopping in the channel input circuit.

(5) Provision is made for ringing on each of the eight channels.

The recurrence frequency is 8,000 cycles per second, which gives a 125-microsecond duration for each cycle or frame. The channel pulses have a width of approximately 1 microsecond (average about 1.1 microseconds), and are assigned a time interval of 15 microseconds. Maximum modulation is less than ± 6 microseconds from the mean position.

Assuming perfect alignment, this leaves a 2-microsecond clear space between adjacent pulses when each pulse has maximum modulation. To maintain synchronism of the receiver, a marker pulse is sent before each group of eight channel pulses. The marker pulse is 4 microseconds long, so that it may be readily separated from the channel pulses. Since the marker pulse is unmodulated, it requires no extra space.

A simplified schematic diagram

Fig. 1. Multiplexing and pulse positioning equipment is mounted in racks shown below

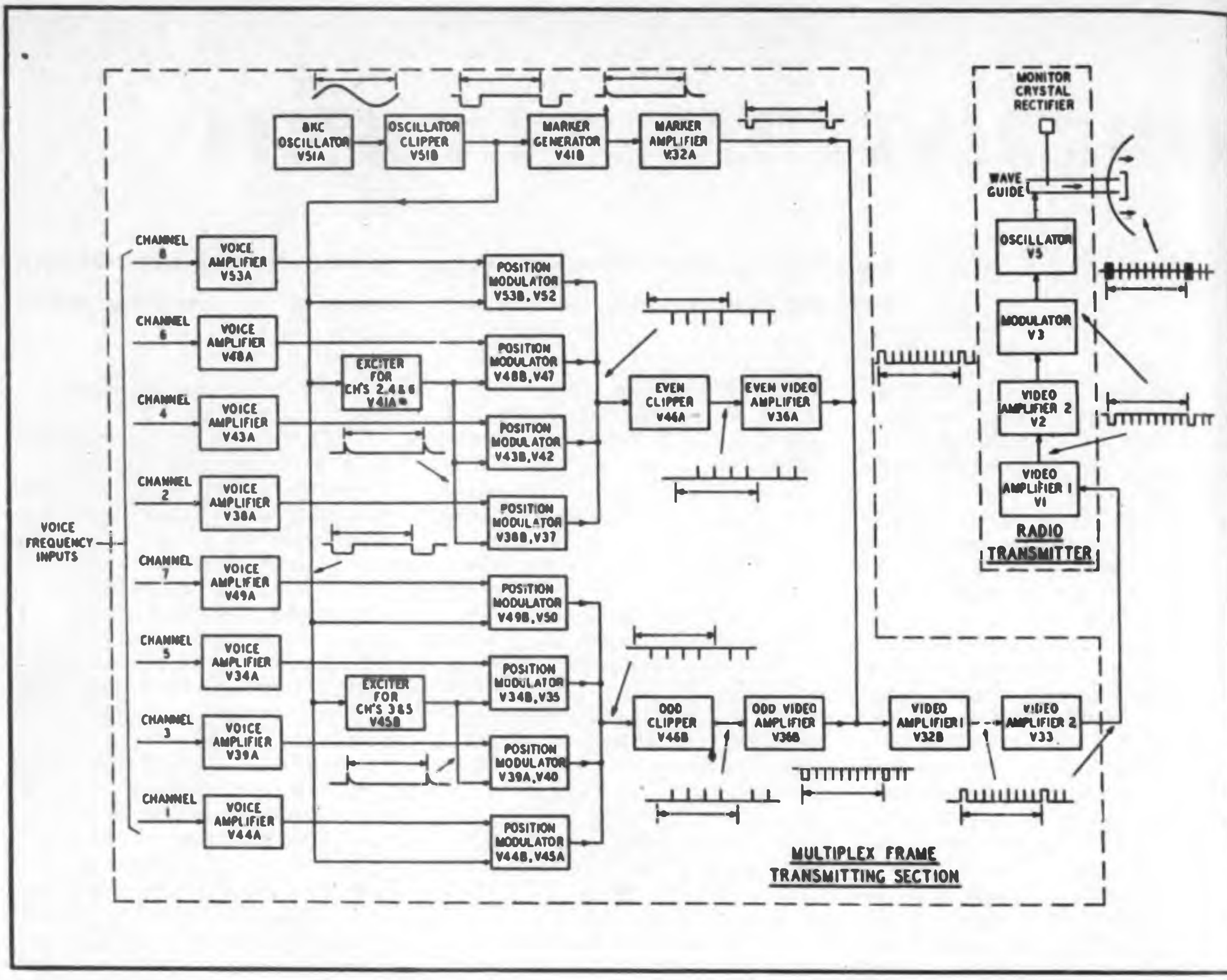


Fig. 4. Block diagram of the transmitting section showing the progressive shaping of the original 8 kc sine wave producing desired channel pulses

of the transmitting multiplex is given in Fig. 5. Refer to this diagram along with the simplified circuit schematics during the following theoretical analysis.

Oscillator (8-Kc)

The function of the oscillator circuit is to determine the recurrence frequency and provide a waveform suitable for starting the eight pulse position modulator circuits and the marker pulse generator. The relaxation circuits used as position modulators require at least 15 or 20 microseconds to recover before they are pulsed again.

The position modulator multivibrators for channels No. 2 to 6 are started at the same time as the marker pulse. The sweep generators for channels No. 7 and 8 are delayed and are started at a time between the second and third channel pulses. To accomplish this, the desired waveshape from the oscillator is substantially rectangular with a negative portion lasting 35 microseconds and a positive portion lasting 90 microseconds. Channel No. 1 is treated in an entirely different manner.

Double triode tube JAN-6SL7GT (V51) is used for the 8-kc oscillator and oscillator clipper. The feedback is through oscillator coil T22 of such inductance as to tune with a 0.02-mf capacitor (C144) to 8,000 cycles. The Q of the circuit at 8,000 cycles is about 100. This provides considerable excess gain so that the voltage feedback is large. Grid leak resistor R248 and capacitor C143 provide the required limiting and result in a large rectified bias so that the plate current flows for less than one-half cycle.

The ratio of the time when plate current is flowing to the time when it is cut off is controlled by the series and shunt resistances. The voltage taken across cathode resistor R246 is of approximately the desired shape but does not have the desired steepness of sides. Clipping by the second section of double triode tube V51B gives the desired waveshape. The amplitude of the square wave is about 50 volts.

The marker generator tube V41A is a pentode (one-half of Tube JAN-12L8GT) operated at reduced plate voltage so that its amplification for positive changes of grid potential is small. The grid is held normally positive by connection through a 1-megohm resistor (R243) and potentiometer P9 with a total resistance of 1 megohm. The grid is coupled through 10-mmf capacitor C111 to the 8-kc oscillator clipper output.

Marker generator details

Capacitor C111, resistor R243, and potentiometer P9, form a differentiating circuit producing a negative and positive pulse corresponding to the leading and trailing edges of the negative portion of the square wave. Since the grid of the marker generator tube V41A is returned to the +300-volt supply, the tube will normally be heavily conducting and the differentiated positive pulse will cause practically no increase in plate current. The negative pulse, however, will drive the grid negative thereby momentarily reducing the plate current flow and producing a positive pulse in the plate circuit.

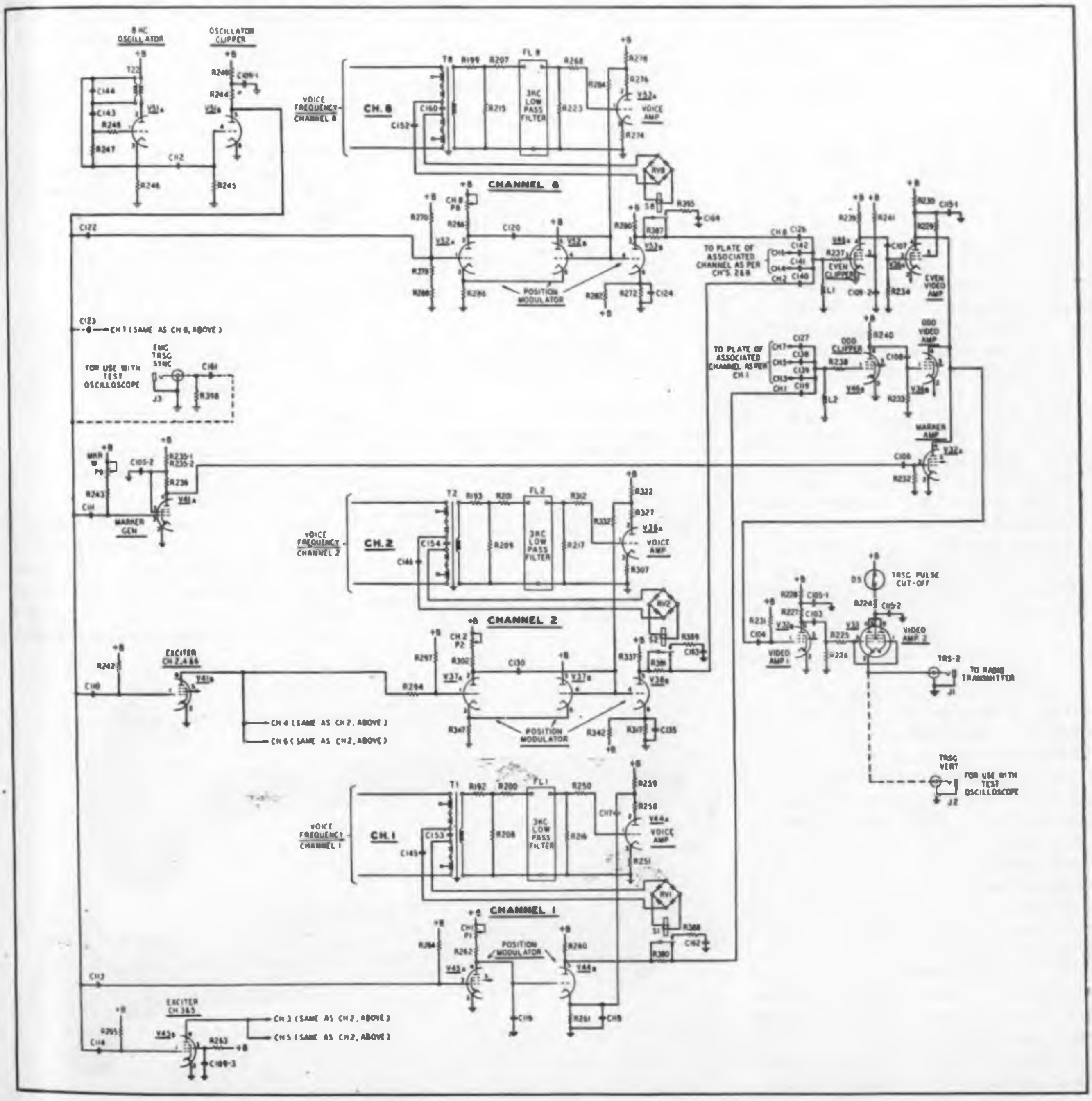
Since the grid is driven only about 40 volts negative and the grid leak is connected to +300 volts, the time required for the grid to become positive again is about one-eighth the time constant of the circuit. The output is a nearly rectangular pulse about 4 microseconds long at this point and is further clipped in marker amplifier tube V32A.

The time constant of the differentiating circuit (and thus the width of the marker pulse) is adjustable by means of potentiometer P9. At the output of marker amplifier tube V32A the marker pulse is mixed with the channel pulses from the even video amplifier and odd video amplifier.

Exciters

Channel pulse generators for channels No. 2, 3, 4, 5, and 6 are started at the same time as the marker pulse. The exciters are used to produce a positive pulse for this purpose. One exciter tube, V41B, is used for channels No. 2, 4, and 6; a second exciter tube, V45B, is used for channels No. 3 and 5. The input circuit of the exciters is a differentiating circuit similar to that used in the marker generator, except that the time constants are so chosen as to give a pulse length of approximately 2 microseconds. The grids of the two tubes are returned to the +300-volt supply so that these tubes are normally heavily conducting. The differentiated positive pulse has little effect on the plate current flow; however, the negative pulse will reduce the plate current momentarily, thereby producing a positive pulse in the plate circuit. The outputs of the exciters are connected to the pulse position modulator stages for channels No. 2-6.

Fig. 5. Simplified schematic diagram showing in detail some of the features of the transmitting multiplex. The klystron circuit is separate.



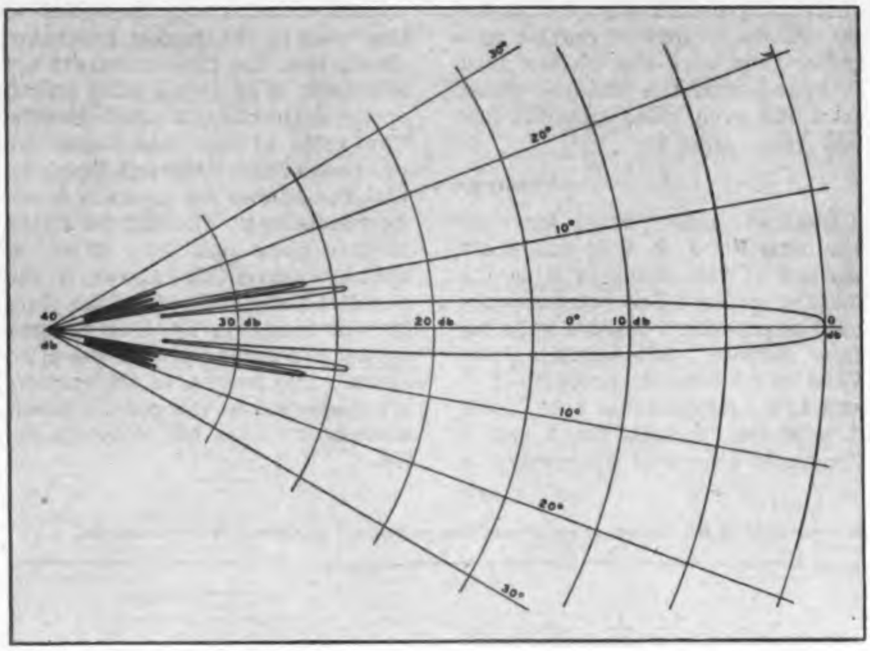


Fig. 8. Antenna radiation pattern showing extreme directivity and consequent high gain

Eight similar voice amplifiers are used in the transmitting multiplex, one for each channel. The voice frequencies are applied through repeater coil T2 and through a 3-kc low-pass filter to the grid of the amplifier tube. The filter transmits all frequencies below about 3 kc and attenuates the higher frequencies, thereby reducing beat tones if carrier-derived v-f circuits are used. The amplifier circuit is operated essentially as a Class A amplifier with negative feedback developed across the unbypassed cathode resistor R307 to stabilize the gain of the stage. The output voltage is taken across 10/1 voltage divider R327-R322 in the plate circuit and is applied to the position modulator circuit associated with that channel. Ringing is accomplished by means of a bridge rectifier circuit.

Voice amplifier

The pulse position modulator consists of double triode Tube JAN-6SL7GT connected as a biased multivibrator, and a triode section of a similar tube used as a pulse generator. The circuit potentials of multivibrator V52A and V52B are so fixed that free oscillation without excitation is impossible. The two cathodes of V52 are connected together and through resistor R286 to ground (Fig. 5). The grid of the second section (V52B) is held positive through resistors R284 and R278 so that the cathode potential is about +50 volts with respect to ground. Since the plate of V52B is connected to the +300-volt supply, this section of the tube will normally conduct heavily, causing approximately a 50-volt drop across cathode resistor R286.

The grid of V52A is biased at approximately +35 volts by the voltage divider (R270, R378, and R288). Thus the grid of the first half of the multivibrator will be 15 volts negative with respect to its cathodes which is sufficient to bias this section of the tube past cut-off. Application of a short positive pulse, in excess of 15 volts, to the first grid will make it sufficiently positive so that plate current can flow. This drops the plate voltage of V52A and thereby reduces the grid potential of V52B through coupling capacitor C120. Common cathode resistor R286 completes the positive feedback loop.

When the plate current drops in V52B, the cathode potential also drops thereby removing the bias on V52A so that steady plate current will now flow in V52A, even after the initiating pulse has ceased. This condition will persist until current flowing through 3.3-megohm resistor R284 charges coupling capacitor C120 sufficiently to permit the grid potential of V52B to return to a value which will again permit plate current to flow in this section of the tube. When this condition is reached, positive feedback results in a very rapid transfer back to the original conditions. Even a small negative pulse applied to the first grid during the time after it is struck by the positive pulse, and before the second transfer takes place, will result in premature transfer.

The time which elapses between the starting pulse and the point at which the multivibrator returns to normal, depends on a number of factors. Assume that in the rest condition the potential of the grid

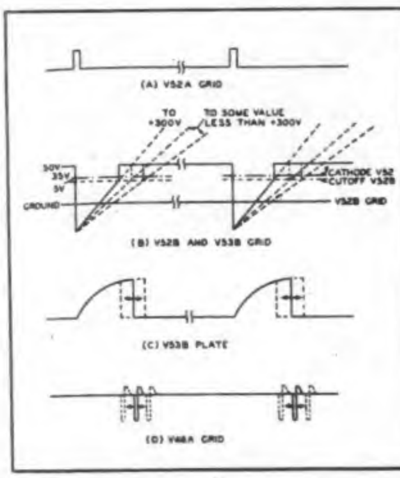


Fig. 6. Manner of forming pulses by changing multivibrator period and then differentiating the leading and tail edges of the wave

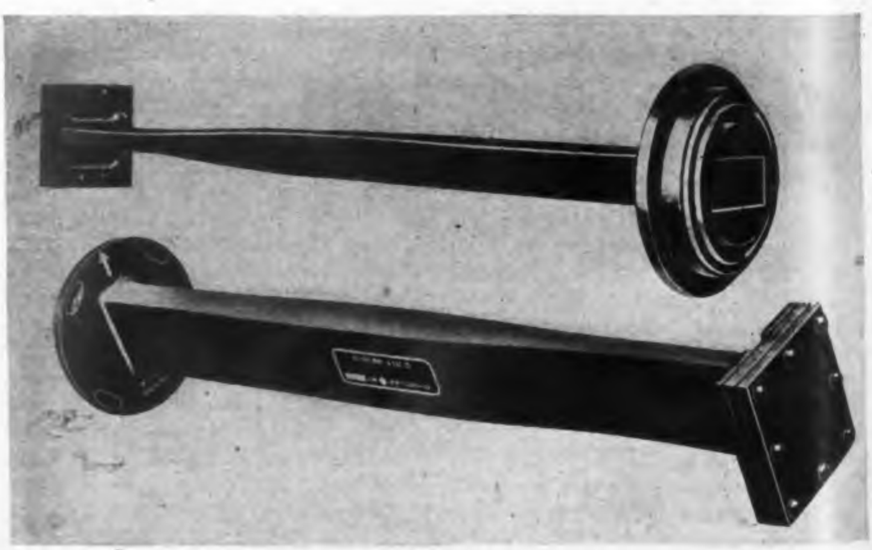


Fig. 7. Views of both ends of the wave guide. Waves coming out of the guide are reflected by flat end plate through oval holes toward parabola

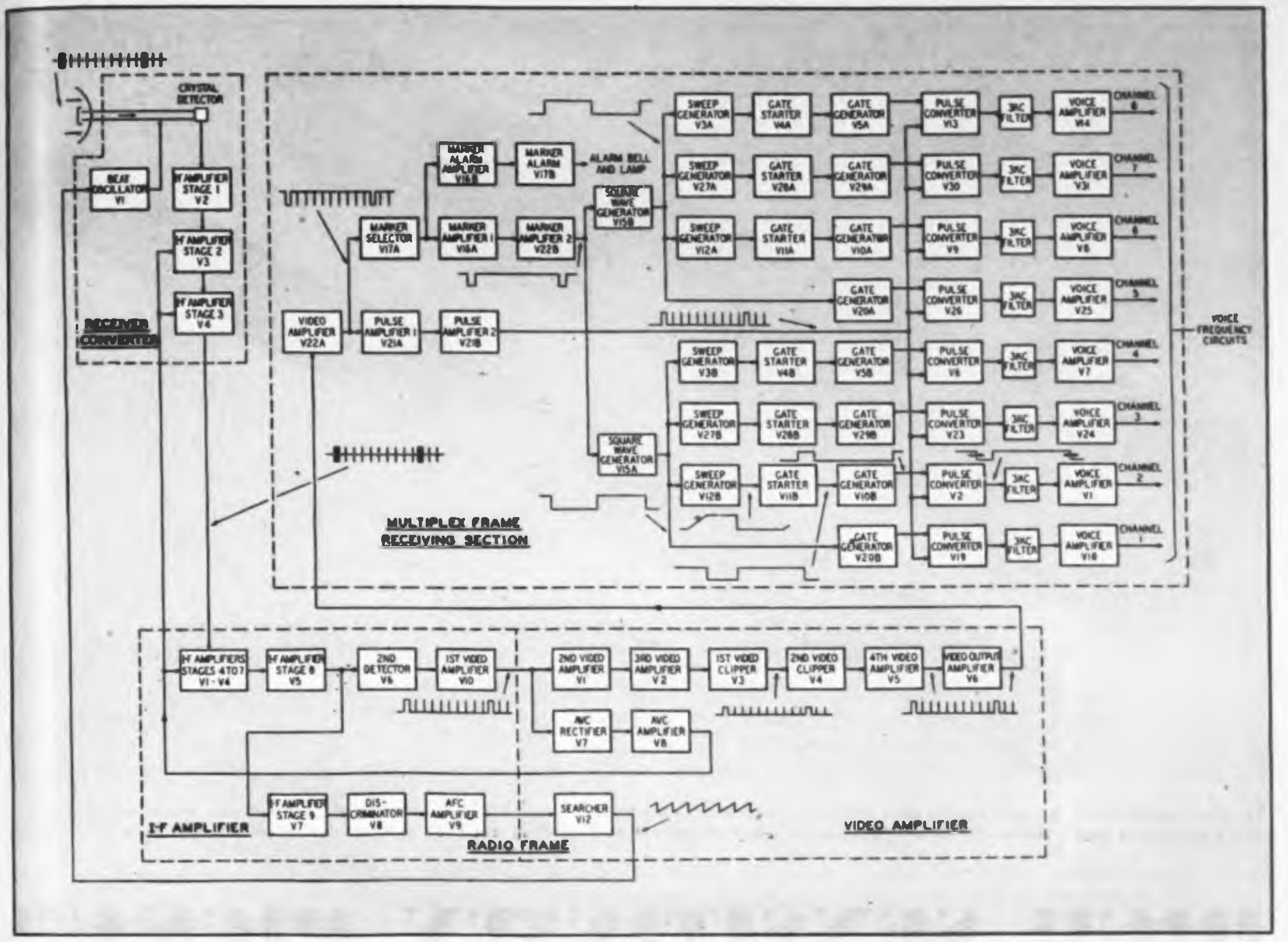


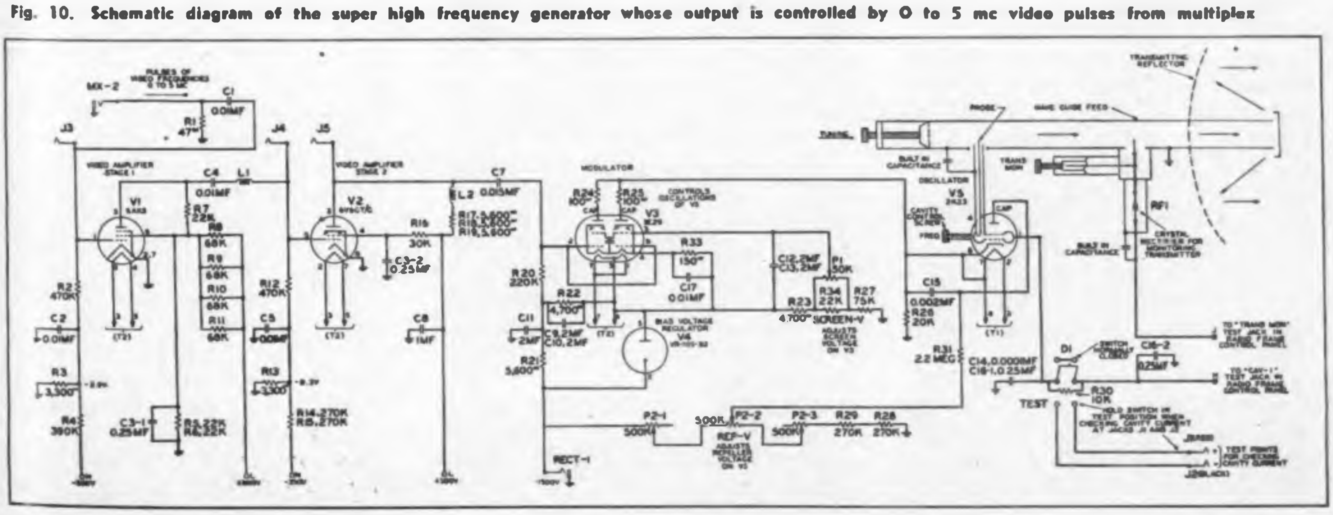
Fig. 9. Block diagram of receiver showing the transformation of the time modulated pulses back into the voice frequency currents. A local klystron oscillator establishes fields in the wave guide which are combined with incoming waves to form a beat frequency in the crystal detector

and cathode of V52B is +50 volts, and the steady potential of the grid of V52A is +35 volts. If the grid of V52B is returned through 3.3 megohms (R284 in series with R278) to +300 volts, the grid current will be 76 microamperes. After the starting pulse, the current in the plate of V52A will be 1.30 ma. The net change of current in the combined circuit is 1.22 ma (1.30—0.076). As a result, the grid of V52B will drop 82 volts (from +50 v to —32 v with respect to ground) for a plate load resistance of 67,000 ohms (47,000 ohms in resistor R266 plus 20,000 ohms in potentiometer P8). Assuming that —5 volts are required to cut off the plate current in V52B, and noting that the cathode potential has dropped 15 volts (from +50 volts to +35 volts), note that the bias exceeds that required for cut-off by 62 volts (Fig. 6 (B)).

Since the grid of V52B is connected to +300 volts through 3.3-megohm resistor R284, the voltage starts rising exponentially toward 300 volts; when the potential reaches +30 volts, V52B is no longer cut off and plate current will again flow, returning the multivibrator to its original condition. The time required is 21% of the time constant of the circuit.

(*Continued on page* 180)

Fig. 10. Schematic diagram of the super high frequency generator whose output is controlled by O to 5 mc video pulses from multiplex



The new tube is similar in appearance to older Orthicons except that at the base end there has been added an electron multiplier which, among other new design features, is largely responsible for greatly increased sensitivity and output permitting operation with a fraction of the light heretofore required

HIGH SENSITIVITY PICKUP

"Image Orthicon", using secondary emission amplification, is 100 times more sensitive than previous television camera eyes

● One of television's principal bugaboos, the problem of adequate lighting at last has been solved with a new tube called the "Image Orthicon". This tube, about 100 times more sensitive than the ordinary television pickup tube has been shown to be capable of televising persons by the light of a single candle six feet away.

From a practical standpoint of course this means that outdoor scenes can be photographed at all times of the day and that the camera can be taken into banquets, convention halls and other places where previously required intense studio illumination could not be provided. It also means that actors in a studio will no longer wilt under batteries of powerful floodlamps.

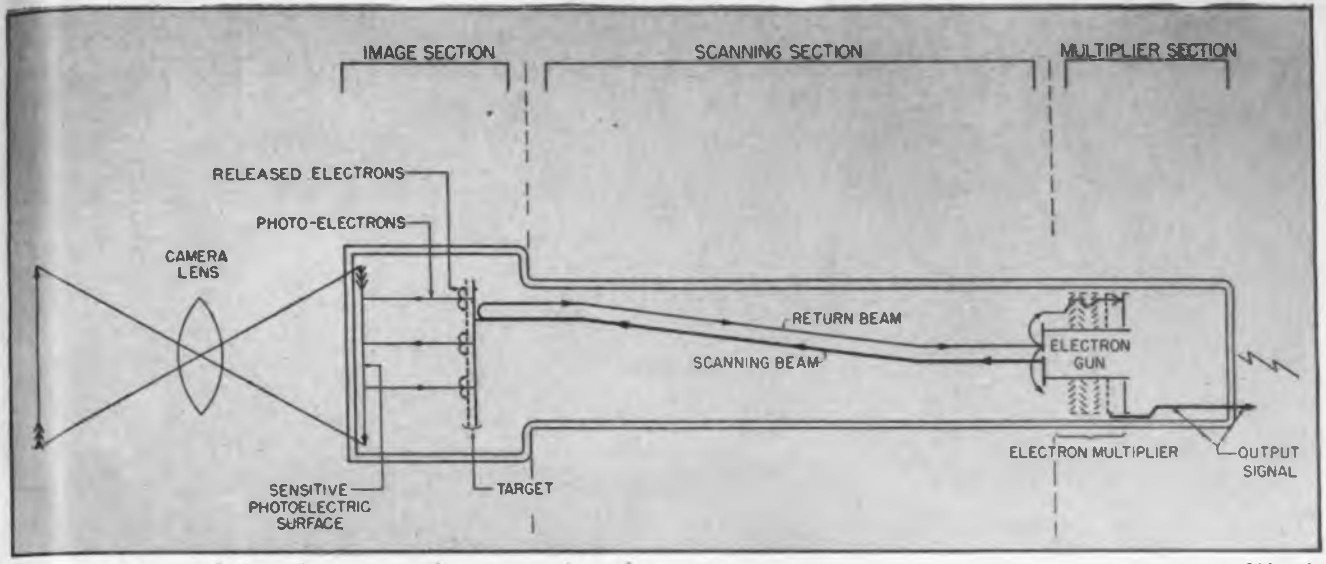
The tube is about 15 in. long overall and 3 in. in diameter at its head end. There, immediately inside the glass envelope is located a photosensitive emitting surface deposited on a thin glass plate. Light from the televised object is focused on this surface by means of an ordinary camera lens. The photoelectric surface emits electrons when light impinges on it and by means of a 300-volt potential on a grid behind the face, these electrons are attracted to a target consisting of another non-conducting plate about an inch and a half behind the photo-electric surface. An electromagnetic field keeps the electrons on parallel courses.

When the accelerated photo electrons strike the target they cause the emission of a greater quantity of secondary electrons. There remains a pattern of positive charges on the target due to the deficiency of negative electrons. This pattern corresponds to the pattern of light from the scene.

At the rear end of the tube there is an electron gun which produces a beam of electrons exactly like a cathode-ray tube gun. By means of a deflection system the beam of electrons is caused to sweep back and forth over the rear of the target. As explained above this target has positive charges on its surface whose distribution and intensity form the pattern of the picture being televised.

The electron beam has only sufficient velocity to approach the target and then turn around and come back to the attracting positive accelerating plate of the electron gun. However, when the scanning beam moves over a portion of the target containing a positive charge, the additional attraction of the target for the electron beam is sufficient to cause the beam to deposit a few electrons to neutralize this positive charge. The current returning to the accelerating plate of the electron gun then is modulated by the positive charge intensity of the target.

This modulated returning beam strikes the forward surface of the



Light from the object is focused on the sensitive photoelectric surface at the front end of the tube, causing it to emit electrons. A 300 volt screen accelerates these toward the target where they cause emission of secondary electrons, leaving a positive charge. A low energy cathode ray beam scans the target, leaving electrons only where positive charges are located on the target, being thereby modulated. Then the beam returns to the gun where it strikes the front of the accelerating electrode again causing secondary electron emission. These secondary electrons are attracted successively to three plates in the multiplier. New secondary electrons emitted at each plate amplify the stream to create greatly increased output signal

electron gun and causes the emission of secondary electrons which are attracted and accelerated by plates of an electron multiplier. The positive potential from plate to plate is 100 volts and as the electrons strike they cause the emission of a substantially greater number of secondary electrons. When the stream of electrons is finally drawn off on the surface from which the output signal is taken it has been amplified very substantially.

In order to prevent the electrons from passing through the holes in the electron multiplier without hitting the plates, the holes are cut at an angle in the form of louvres.

As can be seen from the description this tube is a delicately adjusted mechanism. Not only must the electron beam be of exactly the right strength, but the material from which the target is made must be such as to permit the positive charges to migrate from the front where they are created to the rear where they are scanned. The conductivity must not be so great, however, as to permit the charges to drift around on the surface thus spoiling the image.

Credit for the tube development goes to three members of the research staff of the Radio Corporation of America, namely, Dr. Albert Rose of Middletown, New York; Dr. Paul K. Weimer of Wabash, Indiana and Dr. Harold B. Law of Kent, Ohio. The project is a continuation of RCA Laboratories work on the pickup tube over the past 20 years under the direction of Dr. V. K. Zworykin, associate director of the RCA Laboratories. The work has been headed by E. W. Engstrom, research director, RCA Laboratories, Princeton, N. J. Much use was made of this tube during the war in military work.

RADIO CONTROL OF GERMAN V-2 ROCKETS

Examination of the German V-2 long range rockets has shown that to a certain extent they were controlled by radio during flight. The control section which was placed immediately behind the war head and forward of the fuel tanks and burner mechanism consisted of gyroscopes for control of the missile in azimuth and pitch together with their electrical mixer and amplifier systems. In addition there was a radio receiving set adapted to receive a signal of approximately 48.2 mc. This contained a local oscillator whose output of 23.8 mc was doubled and mixed with the incoming signal to produce an intermediate frequency of 450 kc.

Two audio modulation frequencies, 45 cycles and 8,000 cycles were used. It appears that the signal from the transmitter was emitted in the form of a dual beam similar to a directional beam for aircraft navigation. After reception, amplification and detection this yielded plus or minus output. This output was added to the output of the azimuth gyro and the combined voltages went to a servo circuit which controlled the azimuth steering vanes.

Construction of the radio controlled bomb

In the early rockets the fuel supply was cut off at the proper moment by means of radio. the flight of the rocket apparently being followed by a radar set. Later models, however, dispensed with the radio fuel cutoff and used an integrating accelerometer.

The radio control applied to azimuth steering only and had no direct connection with range or elevation angle. When a rocket had traveled some distance and it became apparent by radar observation that a correction was needed the radio link was used to furnish this.

100 MILLION VOLT ELECTRON ACCELERATOR

Electron circularly accelerated in a glass doughnut finally hit a tungsten target, producing 100 Mev X-rays which come out horizontally through the small bakelite specimen holder at the center of the picture. The two halves of the field coils are being viewed by Dr. Charlton and W. F. Westendorp

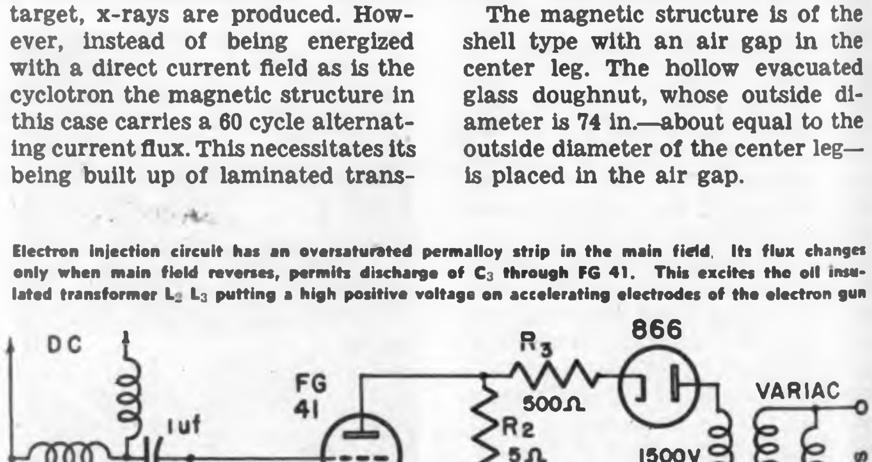
• Ever since Roentgen discovered X-rays fifty years ago there has been an almost continuous search for more powerful rays, that is, rays with greater and greater penetrating ability. In building a 100-million volt x-ray machine at Schenectady, the General Electric Company in one large step has approached the ultimate possibility in this respect.

Immediate dividends have appeared in three forms: much better industrial radiography of massive sections, a degree of deep tissue irradiation hitherto unavailable to the medical profession and a new and extremely powerful tool for fundamental research in nuclear physics.

In physical aspect the 100-million volt x-ray machine is similar to a cyclotron, its main feature being a large electromagnet of about 130 tons weight. This is used to accelerate magnetically a stream of electrons circulating through a hollow evacuated glass toroid or doughnut. When the stream hits a tungsten target, x-rays are produced. However, instead of being energized with a direct current field as is the cyclotron the magnetic structure in this case carries a 60 cycle alternating current flux. This necessitates its being built up of laminated transformer steel instead of being cast.

The magnetic structure is of the shell type with an air gap in the center leg. The hollow evacuated glass doughnut, whose outside diameter is 74 in.—about equal to the outside diameter of the center leg—is placed in the air gap.

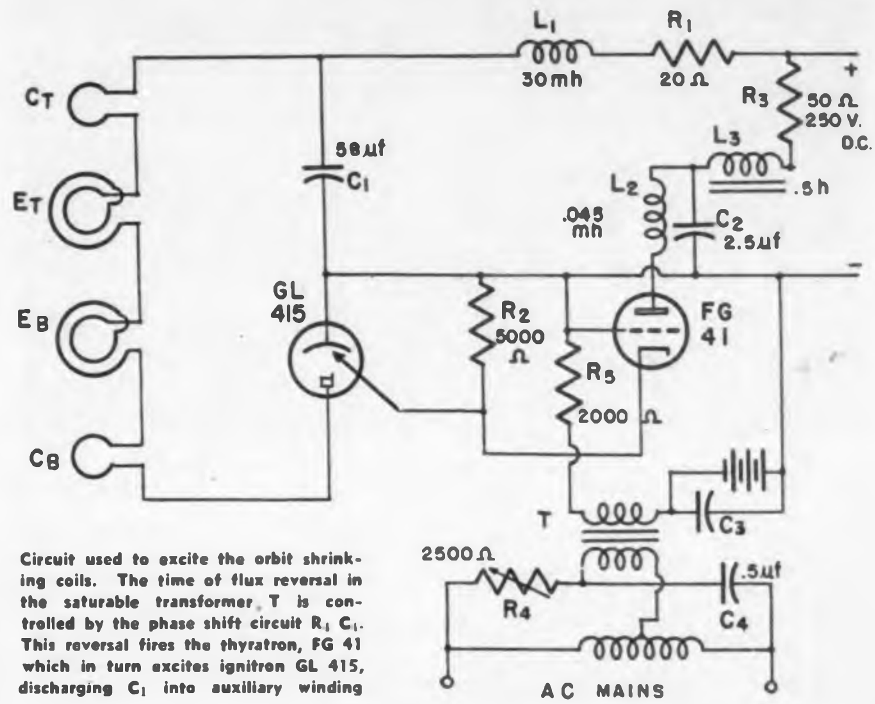
Electron injection circuit has an oversaturated permalloy strip in the main field. Its flux changes only when main field reverses, permits discharge of C_3 through FG 41. This excites the oil insulated transformer L_2 L_3 putting a high positive voltage on accelerating electrodes of the electron gun



★ *Features of design and construction of apparatus for developing high electron velocities and super X-rays* ★

Surrounding the center leg of the core are two coils, one on top and one on the bottom, each of forty turns of cable carrying a maximum of one thousand amperes. This produces a field in the plane midway between the pole pieces whose intensity varies inversely as the ¾ power of the radius and is about 4000 gauss at the electron orbit (66 in. dia.).

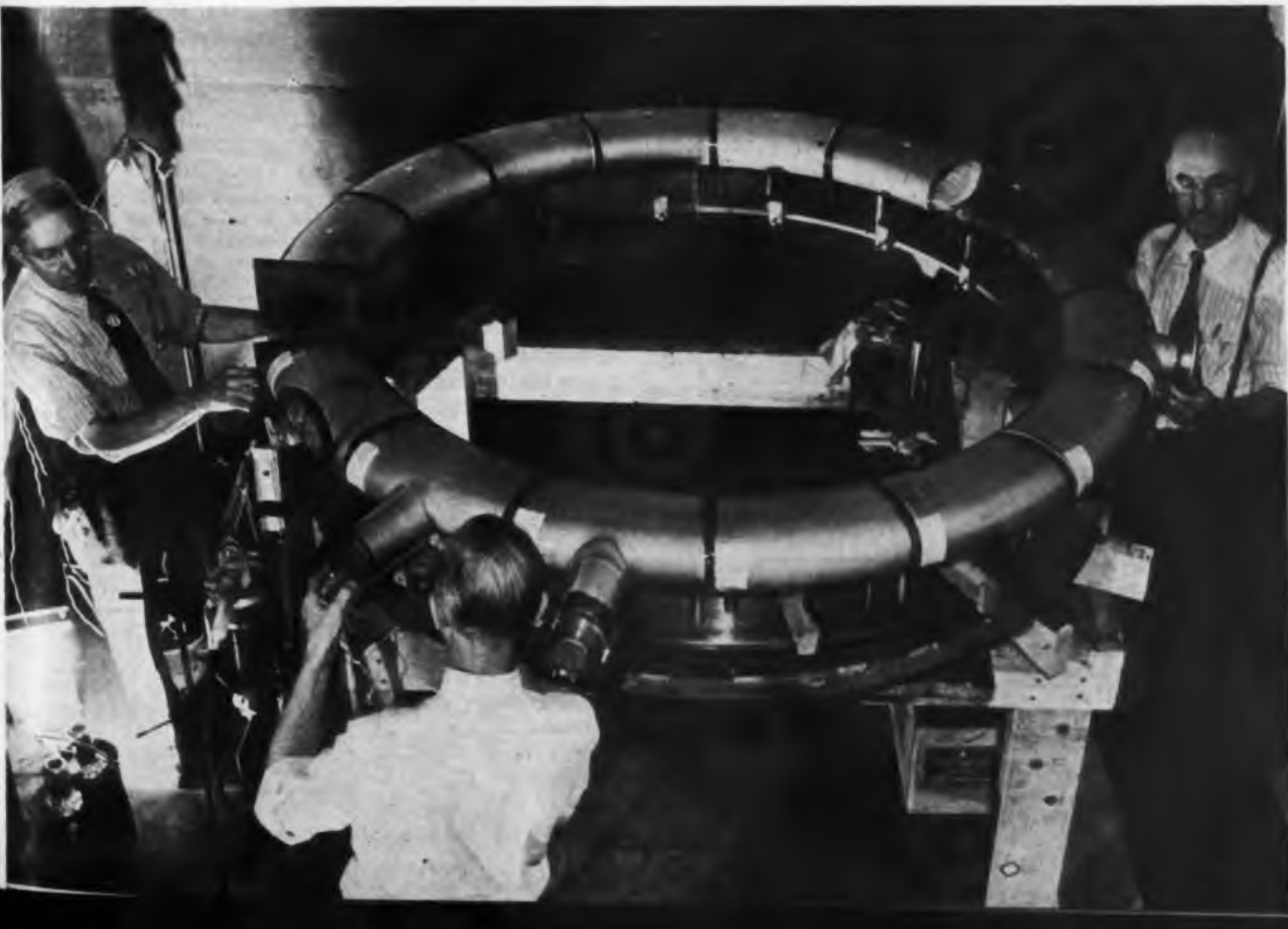
Electrons are introduced from an electron gun into the hollow glass toroid at a velocity produced by 50 to 70 kilovolts accelerating potential. As the flux through the center of the toroid (I.D. 57 in.) rises from zero to its maximum value during a ¼ cycle period, it accelerates the electrons at the average rate of 400 volts per revolution. The electrons are kept going in a circular path through the evacuated space of the glass toroid by the portion of the magnetic field which passes through the glass. The ¾ power relationship of the field strength to the radius is such as to keep the electrons sharply focused in the orbit.



Circuit used to excite the orbit shrinking coils. The time of flux reversal in the saturable transformer T is controlled by the phase shift circuit R_1 C_1. This reversal fires the thyratron, FG 41 which in turn excites ignitron GL 415, discharging C_1 into auxiliary winding

Due to the high rate of acceleration of the electrons, they make 250,000 revolutions in ¼ cycle, going about 800 miles. Since the average acceleration is 400 volts per revolution, the total electron voltage produced is 100 million (Mev.).

The glass doughnut prior to installation in place. Made of ¼ in. thick glass, the sections are merely butted together and sealed with red glyptal.
Cross section through the glass toroid at the target support point. The orbit shrinks 2¾ in. when the contraction coils are energized



Bank of capacitors used to bring the power factor of the magnet energizing circuit up to unity. About 1,000 amperes are supplied and the resonant voltage is 4,000. Coils dissipate 120 kw

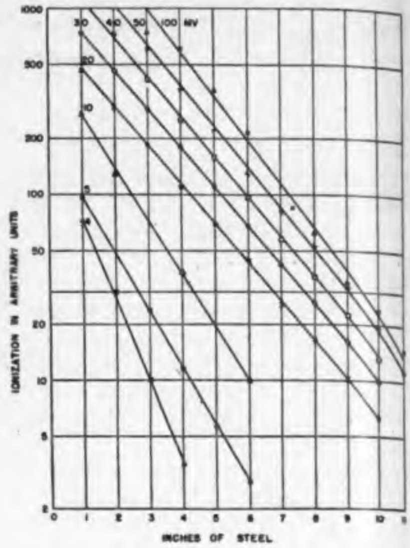


Fig. 12. Intensity of X-ray transmission through steel plates of various thicknes:

A tungsten wire target is mounted in the glass toroid at a radial distance 2¾ in. smaller than that of the electron orbit. By means of an ignitron whose discharge time is regulated by a saturable transformer in a phase shift circuit, a heavy pulse of current from a 58 uf capacitor is introduced into an auxiliary winding which is parallel to the main windings on the center leg of the transformer core. This pulse changes the ¾ power relationship of the magnetic field strength to the radius and causes a contraction in the orbit of the electron stream. After a few microseconds the electron orbit has decreased enough to start glancing off the tungsten target. This produces the powerful 100 Mev x-ray beam.

The direction of emission of the x-ray is the same as the direction of motion of the electrons at the time they strike the target. The

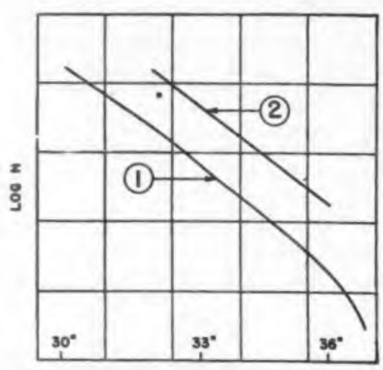
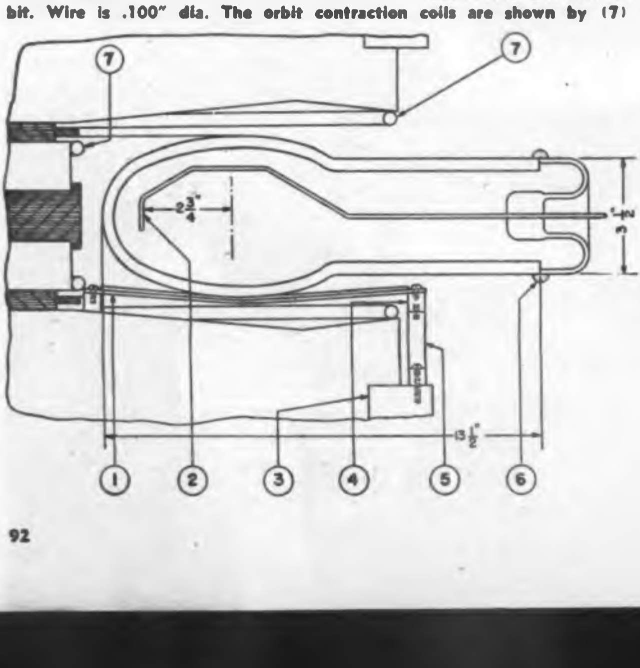


Fig. 9. Field intensity as a function of orbit radius. 1 shows measured data, 2 desired slope

energy is concentrated in an extremely narrow beam (3.7 deg. at the half power points). Many interesting phenomena have been observed with these new powerful x-rays and some of them have not yet been completely investigated. For example, calculations and measurements show that the mass of the electrons at 100 Mev is about 200 times their mass at rest. These fast-moving electrons, however, radiate their energy while in motion and this places a limit on the time during which they can be accelerated. The exact manner in which their energy is radiated is unknown and is presently the

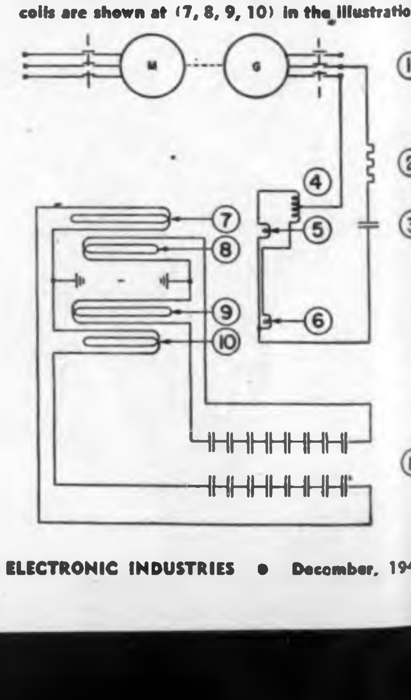
Fig. 10. Tungsten wire target and its relation to the normal electron orbit. Wire is .100" dia. The orbit contraction coils are shown by (7)



subject of research. When the electrons have been accelerated enough to have an energy of 100 Mev their velocity closely approaches the velocity of light.

A number of cloud chamber studies have been made with these x-rays. These indicate the presence of particles moving with widely varying velocities all the way up to 100 Mev. A number of pairs of particles have been observed to diverge in the magnetic field of the cloud chamber, one-half the pair curving to the right and the other half to the left. These are considered to be pairs of positive and negative electrons and their origin is rather obscure. One theory advanced is that the x-rays upon striking a substance transform part of their energy into matter in the form of positrons and negatrons.

Fig. 11. Main power circuits. One phase of a three phase M-G set is used to supply four turn input windings 5 and 6. Separate outer and inner sections of upper and lower main coils are shown at (7, 8, 9, 10) in the illustration



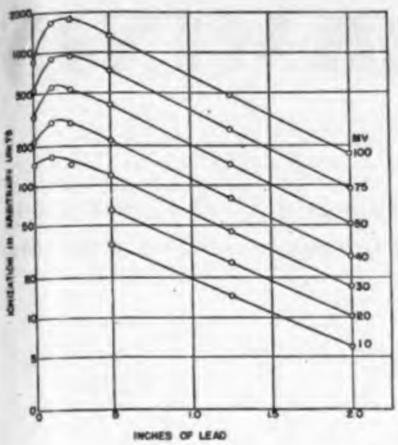


Fig. 13. Intensity of X-ray transmission through lead plates of various thickness

In the beam of this high power x-ray, all substances become radioactive. This is because unstable isotopes are formed. These transmute to other materials with accompanying alpha, beta and gamma radiations.

Under the guidance of Dr. C. G. Suits, vice president and director of the G. E. Research Laboratories, Dr. E. E. Charlton, head of the x-ray section and Mr. W. F. Westendorp, developed this new x-ray machine.

The design followed a 1937 patent of M. Steenbeck and much theoretical and practical development work done by D. W. Kerst in 1940 and 1941 on 2.3 and 20 million volt machines.

The magnet itself is made of .014 in. 4½% silicon steel sheets bonded into slabs by means of a solventless varnish which is polymerized by baking. These slabs, 7 in. thick are then held together by tie rods.

The shape of the pole faces is critical and was obtained by making ⅛ and ¼ scale models of solid steel.

The conditions for obtaining a stable circular orbit for the electrons under the influence of an increasing alternating current field can be calculated quite simply from fundamental concepts. The force F on an electron of charge e moving with velocity v in an electromagnetic field of intensity H is HeV. This produces an acceleration

$$\frac{HeV}{m},\ m$$

being the mass of the electron. Since in a circular path of radius R the acceleration equal to

$$\frac{V^2}{R},\ \text{this}$$

can be equated to

$$\frac{HeV}{m}\ \text{and an}$$

expression derived for the momentum mv. Since it is also known that the electric field vector at the path of motion integrated along the path length is equal to the time rate of change of the flux linking the path, the following relationship can be derived:

$$mv = eHR \qquad (1)$$

The electric field vector

$$E\varphi = \frac{1}{2\pi R}\frac{d\phi}{dt} \qquad (2)$$

multiplying by e one obtains Force, F =

$$eE\varphi = \frac{e}{2\pi R}\frac{d\phi}{dt} = \frac{d}{dt}(mv)$$

integrating

$$mv = \frac{e}{2\pi R}(\phi_{max} - \phi_0) \qquad (3)$$

combining (1) and (3)

$$\phi_{max} = 2\pi R^2 H_{max}$$

The last equation shows that in order to obtain a stable circular electron orbit the flux through the orbit should be equal to twice the magnetic flux density at the orbit

(*Continued on page* 164)

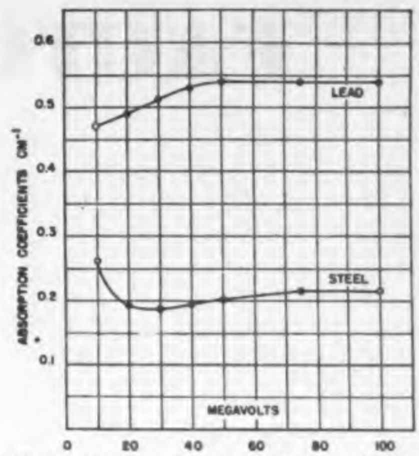


Fig. 14. Absorption coefficients calculated from Figs. 12, 13 plotted against voltage x 10⁶

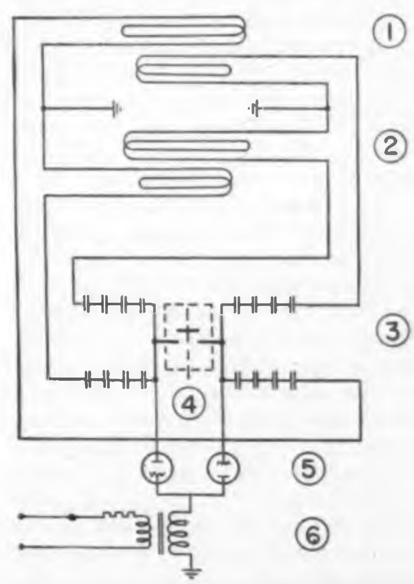
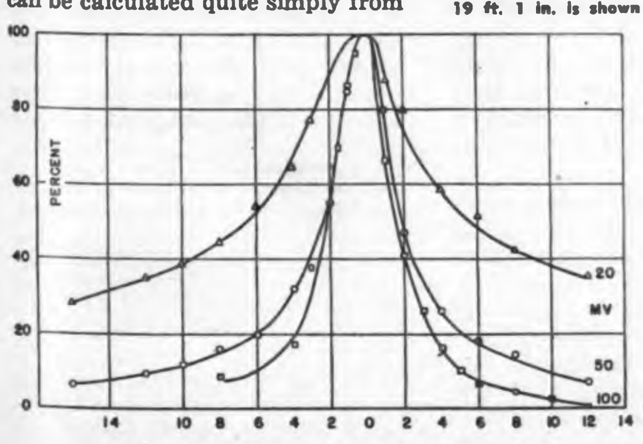
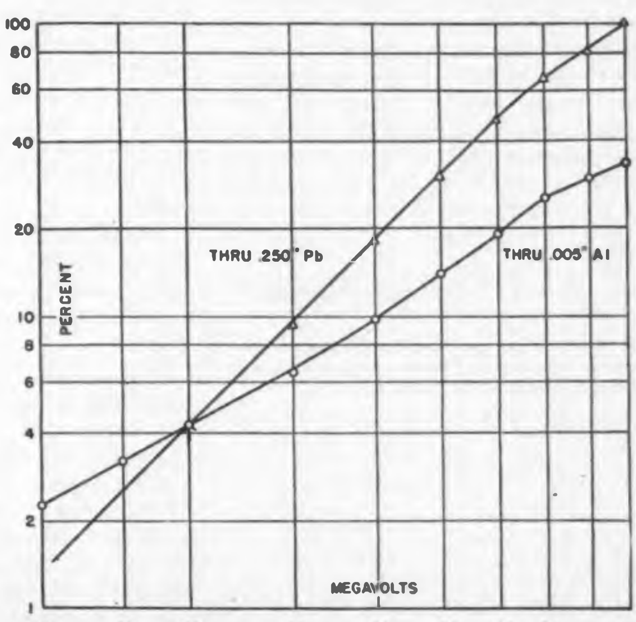


Fig. 18. Connections for pulse operation. Oil circuit breaker and kenotrons are at 4 and 5

Fig. 15, 16. Right. Ionization chamber intensities at 150 cm. through lead and aluminum. Below. Beam distribution at 19 ft. 1 in. is shown





FACTORS DETERMININ

By JOHN F. DREYER, JR.*

Specific information covering operating technics that will improve efficiency and lengthen the normal life expectancy

• No one expects the family doctor to issue a life guarantee of seventy years when a new child is delivered. Any individual's life span is determined by such an infinite variety of circumstances, that individual guarantees are impossible, and the same applies to some extent in the case of large vacuum tubes.

A few are lost in shipment, a few fail after short operating periods, many operate for their normal life span or beyond. A few fail prematurely due to a wide variety of causes other than normal aging.

In general a vacuum tube consists of (1) an envelope capable of maintaining a vacuum for an indefinite time. Such envelopes are usually made of glass with metallic leads sealed through glass to make connection to the internal elements In the case of the larger units, it is desirable that the envelope be a composite structure of glass and metal. The metallic part, usually copper, forms one of the electrical elements of the tube—the anode, and permits the disposal of the heat generated.

This external element must be cooled and this is done either by operating it in a water jacket with a steady flow of cooling water or by providing it with multiple cooling fins and supplying a steady flow of air from a blower.

The ability to dissipate the heat produced within the tube is the factor which usually determines its power rating. Other factors such as the emission current and the maximum allowable voltage are geared to the dissipating ability in the design of the device.

*A report initiated and sponsored by the Joint Electron Tube Engineering Council (JETEC).

Fig. 2—Tube cost per hour, for the same power output, decreases as filament temperatures are reduced, despite initial higher tube costs

NO OF TUBES (892 R)	FILAMENT VOLTAGE REL TO NORMAL	TUBE COST DOLLARS	NORMAL LIFE EXPECTANCY HOURS	TUBE COST PER HR OF OPER. CENTS
1	1.00	$190	3300	5.8¢
2	0.91	$380	9900	3.8¢
4	0.84	$760	26400	2.9¢

Within the envelope, there is the cathode or electron emitter. This element does not last indefinitely and its eventual failure is the main factor which determines the normal life span of the device.

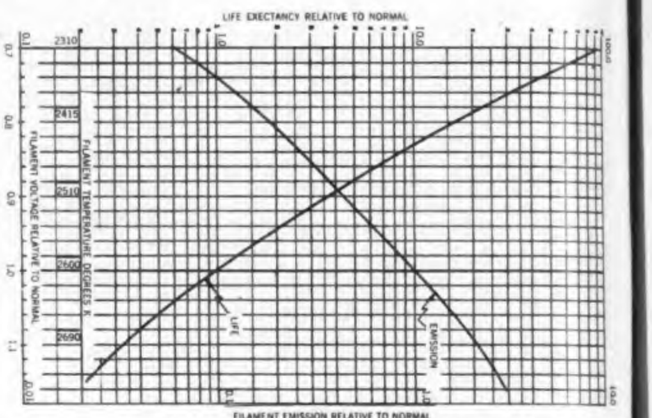


Fig. 1—Chart showing life expectancy of tungsten filament (892) tube and the extent to which life may be extended by reducing filament heat

There are three types of emitters:

1. Filaments of pure metals (usually tungsten).
2. Oxide-coated cathodes.
3. Metal filaments with an adsorbed monatomic film of the electo-positive metals (thoriated tungsten filaments).

The No. 2 and No. 3 types at present most generally are used in low power vacuum tubes because of their higher emission efficiency. So far, they have not been found to stand up well in high power, high voltage applications.

The emitter most generally used in high-power tubes is a tungsten filament. Its performance, with regard to emission of electrons and life are well known and will be considered later in more detail.

The control elements of vacuum tubes are most generally grids or meshes of metal interposed between the emitter and the collector or anode.

The latter, in the case of a tube whose envelope is predominantly glass, most frequently is made of graphite or of a metal such as tantalum.

The emission and life of a tungsten filament are much affected by the presence of certain gases. All of the gases, such as oxygen, nitrogen, carbon dioxide, water-vapor and hydrocarbons, which can combine with the filament, so change the surface of the emitter, that the emission current is reduced.

Even the inert gases, if present, affect emitter life in that at the voltages used, ionization takes place and the relatively heavy, positive ions bombard the filament, causing its normal rate of vaporization to be greatly increased.

The final and most carefully guarded step in the manufacture of a given design of tube is the removal of the gas. Prior to the assembly of the internal structure, it may be assumed that the parts have been carefully cleaned by chemical and mechanical means and in some cases by heating to high temperatures in an atmosphere of hydrogen. During the pumping process, these internal parts, as well as the envelope, are heated to a point higher than will ever be experienced in normal use.

This is necessary because gas molecules are occluded on both glass and metallic surfaces and can only be driven off and removed by the pump after these surfaces are heated. If in the use of the tube, temperatures greater than these attained at the pumps are reached,

Fig. 3—Analysis of cost based on power and tube replacements, with one, two and four tubes at three rates of cost for power per kwh

NO. OF TUBES (SEE FIG. 2)	FILAMENT POWER kw	TOTAL POWER FILAMENT PLUS CONSTANT PLATE—16.6 Kw	COST PER KW HR POWER + TUBE REPLACEMENT AT AVG. ENERGY PER KW HR CENTS: 3¢	2¢	1¢
1	1.65	18.25	7.88¢	4.25¢	2.41¢
2	2.85	19.45	8.16¢	4.27¢	2.32¢
4	5.08	21.68	8.97¢	4.63¢	2.46¢

NDUSTRIAL TUBE LIFE

DUTY %	TIME UNITS ON	TIME UNITS OFF	AVERAGE RATE OF FILAMENT EVAPORATION REL. TO NORMAL	LIFE EXPECTANCY HOURS
100%	1	0	1.0	3300
50%	1	1	0.53	6200
25%	1	3	0.30	11000

Fig. 5—Effectiveness in increasing tube life by reducing filament voltage during "off" periods

small amounts of these occluded gases are further liberated. This small amount of gas will then adversely affect the life of the emitter and will reduce its voltage capabilities.

Abnormal Failures

If we define the normal life of a vacuum tube as the time in which the filament is reduced in size by natural evaporation to some fraction of its original diameter (usually 0.9), then we may consider abnormal failures in two classes. First —Premature loss of filament emission, usually due to the presence of small but excessive amounts of gas. Second—Total and sudden failure, due either to internal arc-over, puncture of the envelope or mechanical failure.

Overheating is frequently the cause of both of these types of abnormal failures. Overheating to a small extent, usually causes the liberation of only small amounts of gas internally and results in a reduction of the filament emission life.

Excessive overheating may cause immediate failure by any one of several means: Sometimes, the grid elements may be overloaded to the extent that they vaporize, or the presence of the metallic ions with a high voltage on the anode may cause a violent arc-over with mechanical destruction of the filaments and the grid.

Overheating of the glass may cause it to soften to the extent that a "suck-in" occurs with consequent destruction.

Severe leakage at the metal to glass seals, either where the filament and grid-leads enter the glass or where the glass is attached to the copper anode, may be caused by overheating. Metal to glass seals are of a type in which a metal or alloy is carefully selected to have the same co-efficient of thermal expansion as the glass. In copper to glass seals, this is not the case but the arrangement is such as to allow sufficient flexibility in the copper so that differences in expansion do not cause over-straining of the glass.

Common Failures

Failure at the seals may be caused by a sudden change in temperature, or thermal shock because the metal or alloy may not be perfectly matched to the glass with respect to thermal expansion. In the case of the copper seal, a sudden appearance of thermal stresses may cause breakage which would not occur if these same stresses occurred at a slower rate.

Some of the failures of course, occur in handling, either in shipment, or from their removal from the equipment for cleaning or for rotation. Operating personnel therefor must be moderately dextrous and well trained to prevent tube breakage in handling.

A fairly common cause of failure, is trouble at the external filament terminals. The larger tubes are heated by rather high currents, sometimes of the order of 100 amperes, or more. The tube is provided with flexible external leads with a solder lug at the end or with fixed metal studs to which some form of connector, a part of the equipment, must be fastened. It is essential that this connection be electrically good or else high power loss occurs at the poor contact with consequent overheating and sometimes failure of the filament seal. In some designs of connector, in order to assure good contact, a wrench or screwdriver must be used when tubes are replaced or rotated.

Careless handling of these terminals may cause breakage or internal distortions which will result in shortened life without being apparent by immediate failure.

Overheating

Most of the other premature failures are due to overheating. Industrial equipment generally subjects tubes to much greater chance of overheating than does communications equipment. In the latter, the load is usually stable, so that adjustments of the operating conditions can be made and maintained with great accuracy. In the case of industrial equipment, however, the loads may vary from time to time, even during a matter of seconds. Unless satisfactory, automatic adjusting means are provided or large factors of safety used, the chance for simple overload is greatly increased.

The second cause of overheating is the failure or deterioration of the cooling means. In the case of water-

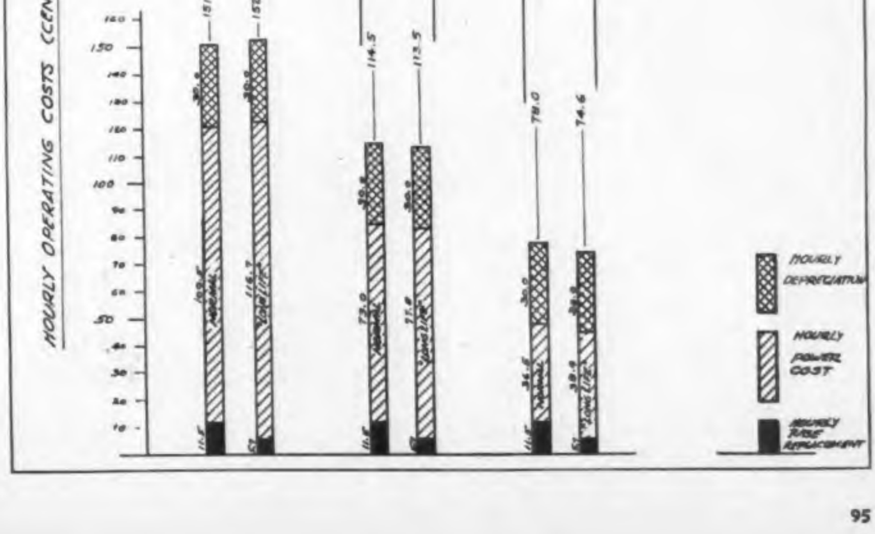


Fig. 4—Analysis of hourly operating costs of an average 20 kw industrial heating unit, comparing the ordinary type of tube with the "long life" type, the latter showing only a slight advantage when energy costs are at the minimum. Otherwise ordinary tube costs less to operate

cooled tubes, this may be caused by impurities in the water which form scale in the tube water jacket. In the case of air-cooled tubes, the cause is usually the clogging of air-filters. Continuous equipment improvement is to be expected in the provision of automatic means for guarding against these and other causes of overheating. Here again, tubes in industrial equipment are likely to give much greater trouble than those in a communications transmitter. Since the water supply is not likely to be as carefully scrutinized, and in the case of air-cooling, the equipment must frequently be used in factory atmospheres with very high dust content. Also, the operating personnel usually is not specifically trained in electronics, as is the case with communication station operators.

Overheating of certain parts of the glass envelope also may cause failure although it may be assumed that in a properly designed equipment the dielectric stress and high frequency potential across any points in the glass is low enough to prevent excessive heating.

During use, however, conditions may arise which greatly increase these stresses. For example, changes in the loading may sometimes cause the production of very high parasitic frequencies, which often may be present without detection. The presence of higher frequencies of sufficient intensity, will in themselves, cause much greater and perhaps excessive dielectric heating of the glass. Also, the presence of these higher (unwanted) frequencies will cause increase of the circulating currents which flow in the internal capacitance of the tube. These currents are directly proportional to the frequency. Such circulating currents may cause overheating due to the ohmic resistance of the lead-ins and so cause failure at the seal.

More obscurely, by some electron-optical focusing effects a stream of electrons from the filament may take a path so as to bombard a small surface of the glass envelope and cause local overheating and puncture. When the tube is used at its normal operating frequency, the standing waves are long enough so that such electron paths are not possible.

In the normal life of a tube, evaporation from the filament may cause the deposition on the internal glass of a metallic film. This film may be so placed with regard to external conductors that excessively high dielectric stresses occur in the glass at the edges of these films. Here again, the intense dielectric heating softens the glass and a puncture may result. Also metallic films may be caused by the overheating of other metallic parts within the tube.

Tungsten filaments are universally used in high-power vacuum tubes because of the extremely high melting point of this metal and because high emission can be obtained with operating temperatures well below the melting point. However, tungsten is a brittle metal and subject to fatigue under prolonged, variable stress. For this reason, filaments may be broken, short of their normal life span by fatigue due to vibration.

Normal Tungsten Life

The normal life span of a tungsten filament tube may be increased almost without limit by reducing the operating temperature of the filament. This results, however, in reduced filament efficiency and the proper tube design is then dictated by considering tube replacement costs along with total operating costs. To explore this matter, comprehensive data on emission, rate of evaporation and heating power of tungsten filament were consulted. In considering this the type of 892 tube was taken as typical and Fig. 1 was prepared.

Referring to the figure which is specifically for a certain 892 tube but which applies generally to other tubes of the tungsten filament type one may see that the life is greatly increased as the operating temperature is lowered. Note that at 0.9 normal filament voltage the life is 3.5 times normal. The filament emission varies in the opposite direction and, for example, at .9 normal voltage, approximately 43% of normal emission is obtained. Going in the other direction a 10% increase in filament voltage gives about twice the emission but at the expense of a decrease in the life to approximately 32% of normal.

This emphatically points to the necessity for careful adjustment and maintenance of the filament operating voltage. It should be emphasized at this point that users or designers should not, in the attempt to obtain long life, lower the filament voltage to a point where insufficient emission is obtained. Under most operating conditions this would lower the power output and cause marked lowering of the plate circuit efficiency. This latter might cause rapid failure due to overheating.

A natural question immediately arises as to the proper operating

(*Continued on page* 148)

ARC TRANSMITTER TO ATOM SMASHER

It is interesting to realize that equipment designed for military use in World War One helped contribute to the research which led to that epic development of World War Two—the atomic bomb. The giant magnetic field pieces used in two of the largest atom smashers in the United States were originally designed for use by the U. S. Navy in

1000 kw arc transmitter radio stations. One of these arc transmitters operated for many years at Annapolis, Md., and later, after vacuum tubes had replaced arc equipment, the heavy steel castings of the field pieces were turned over to Dr. J. H. Dunning of Columbia University for construction of a cyclotron. A second set of castings was to be used by the U. S. Navy for a transmitter at Bordeaux, France; but the cessation of hostilities in 1919 made the installation of that station unnecessary.

Several years after the end of the first World War Federal Telegraph Co., now known as the Federal Telephone and Radio Company, which had designed the arc transmitters for both of these stations, donated the second set of magnetic field pieces for research by Dr. Ernest O. Lawrence of the University of California in his work on atom-smashing. Federal also wound the coils for these huge electromagnets under Dr. Lawrence's direction.

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RADIO PIONEERS' PARTY

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Nearly 1000 persons intimately connected with the radio industry gathered at New York's Hotel Commodore on November 8 for IRE's New York Section Radio Pioneer's Party. A few of those who attended:

1—W. G. H. Finch (Finch Telecommunications); Lt. Col. T. N. McRae; R. E. Mathes, Lt. Com. USNR
2—Roger M. Wise (Sylvania); H. Sadenwater (RCA); Paul Godley
3—Allen B. DuMont (DuMont Labs.); Louis G. Pacent (Pacent Engineering)
4—Maj. E. H. Armstrong; George Lewis (Federal); Dr. William L. Everitt (President, IRE); H. B. Richmond (General Radio)
5—Ivan V. Easton (General Radio); G. L. Beers (RCA); Chas. Guthrie (U. S. Shipping Board); Dr. G. C. Southworth (Bell Tel. Labs.)
6—J. Cimorelli (RCA Radiotron); Dr. A. E. Harrison (Sperry Gyroscope); Dr. George B. Hoadley (Brooklyn Polytechnic Institute)
7—R. A. Farella (Signal Corps); F. L. Creager (RCA)
8—J. Q. Stansfield (Bendix); Dean Babbitt (Sonotone); Dr. B. E. Shackelford (RCA)
9—Dr. Greibach (Sonotone); I. I. Schachtel (Sonotone); Dr. Frederick A. Kolster
10—Ralph Langley (Hazeltine); George Connor (Sylvania); Virgil Graham (Sylvania); Harold A. Wheeer (Hazeltine)

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LABORATORY KEYHOLE

Current Research that Forecasts Future Electronic Developments

PICTURING ENERGY DISTRIBUTION—One industrial laboratory has an interesting electronic spectrograph by means of which a picture of the distribution of energy over the spectrum is made to appear on the face of a CRO tube. Either transmitted or reflected light from the object under analysis is expanded into a spectrum and swept over a photocell. The response actuates the 'scope.

MORE EFFICIENT "GETTERS"—Zirconium powder has been used as a getter in electronic tubes for some time. However experiments are now going forward to incorporate it in sheet form in the tube structure so that it can continuously remove gases. One tube maker has welded about ½ sq. in. of three mil zirconium sheet to the element support and thereby found tube emission increases during the first 100-200 hours of operation: Another interesting application is as an aid in originally outgassing vacuum tubes. By passing the outgoing gas through a bulb containing a coil of heated zirconium wire, the pumping time is cut in half.

EXAMINING SCALE IN BOILERS—The problem of corrosion products and boiler scales in heat-exchangers is quite a critical one. Scale can be identified chemically and spectrographically. Such information, however, is inadequate since it does not indicate the form in which the scale exists. X-ray diffraction analysis can uniquely and quantitatively establish the constituent of the polymorphic material, permitting correct pre-treatment of the water and indicating the concentration of acid required to remove the scale.

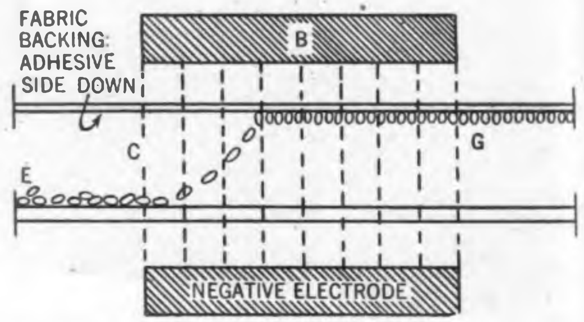
ELECTRICAL BURNS—Workers in laboratories, especially dealing with high frequency oscillators, often get severe burns when handling leads carrying high frequency currents. The skin usually turns white around the burn, and heals very much more slowly than ordinary burns and wounds. The reason for this apparently is that the dead skin, if it is left in place, "poisons" the wound. In the case of such a burn the first thing to do is to remove thoroughly all burned skin regardless of how painful this may be at the moment. One way is to use soap and water and a nail brush. The wound is then dressed in the ordinary way. It will be found that it will heal much quicker after this preliminary treatment.

ANIMATED CARTOONS—Still a dark mystery in the land of Superman and Mickey Mouse, some preliminary work already is being done on electronic control for the movement of the characters used in filming animated cartoons. New electronic device is expected to reduce the huge number of individual drawings needed for usual cartoon "short."

300,000,000 KC—The Varian brothers of Sperry Gyroscope Corp.'s Garden City, Long Island research laboratories, famed as the inventors of the Klystron tube, are conducting experiments on frequency multiplication. From a starting point of 300 mc generated by ordinary oscillators, they have found that frequencies can be obtained as high as 300,000 mc by using three-decade multiplier Klystrons in cascade. This UHF of 300,000 mc represents a wavelength of one millimeter.

2-MC EGGS!—A high-frequency device for sterilizing eggs is under development at the University of California Farm, Davis, Calif. Following the diathermy principle, the device produces oscillations that cook an egg hard in about 9 minutes. But with only a ten-second exposure, the egg germ is killed, giving better keeping quality; certain bacteria on the shell are also destroyed; the egg's albumen is slightly stiffened, so that when broken in the pan, the yolk stands out above it. If brought to a commercial stage, the device is expected to improve keeping quality and appearance of eggs, and fit in with preservation.

TESTING BLEACHING SUBSTANCES—There are comparatively few clays that are decolorizing materials or can act as such after suitable treatment. X-ray diffraction analysis can be used to identify these substances. Such evaluation of a clay before elaborate and time-consuming activation procedures are undertaken, is highly desirable. Carbon content, particle size, degree of hydration, and presence or absence of major contaminants are some of the pertinent data obtainable.



ELECTROSTATIC PLUSH—A method of coating fabrics with cloth fibers, making the fibers stand stiffly vertical under electrical attraction until gripped firmly and held by cement, is the subject of experiments at Schenectady laboratories. The fibers, piled on a belt (E) pass under charged plate (B) behind the textile, which attracts them so violently as to implant the ends in the cement, meanwhile holding them outstretched by electrostatic attraction (G). By stenciling adhesives on the cloth, special designs can be superimposed, resembling fine embroidery. Process may be applied to clothing, curtains, mats, carpets, and upholstering.

"LEAF FUSES—ACH DU LIEBER!"—During the 1944 Battle of the Bulge, Germany's battalions suddenly began to be decimated by shells which exploded at treetop level, spreading destruction and death. Puzzled Heinie officers concluded that a new highly-sensitive contact fuse, which exploded shells on contact with top leaves or twigs, was being used. Shells, of course, were fitted with the new "radio-echo" proximity fuses, set to explode 40 ft. from any solid object, whether airplane or ground. These new fuses had originally been scheduled for first use in January, 1945, but had to be thrown into the hurried countermeasure to combat the December, 1944, Bulge attack.

ECHO NAVIGATION—Puget Sound steamer pilots have worked out surprising accuracy of steering through fog, by listening to shore echoes. In fog-saturated air, the sound of the whistle speeds at 1000 ft. per second, indicating actual distances to shore. But further, a "sizzling" echo means low coast; "solid" echo indicates high head-land. "Concentrated" echoes from special echo-board markers, signal dangerous rocks or shoals.

AMAZING "AZON"—Radio-controlled bombs with right-left steering, used to destroy the Avisio Viaduct near Rome and to cripple enemy supply lines through the Brenner Pass and in Burma, were developed under the project name of "Azon." In one case it is known that, first using ordinary bombing, thirty attempts were made to destroy a three-span bridge, without success. Came the Azon boys and at first try, a bomb was laid neatly on the center of each span! "Mission completed, 100%."

PATENTS FOR SALE—The U. S. Patent Office now offers patentees the privilege of announcing in the official Register conditions under which rights are for sale or lease, together with a description of the patent. No charge is being made for this service. Some unused inventions have already been thus advertised. Radio railroad-crossing warning offered in last month's issue, provided for receiver in automobile, tuned to transmitters at crossing, and arranged to set car brake, if disregarded.

SPECTRAL ABERRATION FRINGES — Optical researchers are becoming interested in C. A. Birch-Field's Iriscope—an assembly of concentric colored rings which makes possible the projection of black-and-white photographic negatives in natural color. This device uses the spectral aberration color fringes which have been introduced by poorly designed and only partly corrected camera lenses. As to its television possibilities, Patent No. 1,958,606, covering magnetic scanning (Zeeman phase rotation) issued to Birch-Field, has been further developed in conjunction with the Iriscope principles, and has possibilities in color television, according to the inventor.

ELECTRONIC POTENTIOMETER is a new type of cathode-ray tube now in limited production. With a wire resistor stretched across the screen end of the tube, the electron beam provides visual-trace indication and, by its position on this resistive strip, gives the added feature of a high-speed potentiometer type of control. This new tube is being developed for industrial test equipment.

TELEVISION PROJECTILE is one of the fantastic experiments they still talk about over cocktails in Washington's Cosmos Club. A television transmitter was actually built into a big shell, which in turn was guided by radio from point at which the operator viewed the video picture. Electronic apparatus all worked OK but unexpected difficulty came in human operator's slowness of reactions in interpreting tele picture and guiding projectile accordingly. Human reactions were just too slow!

PHOTO-ELECTRIC DETECTIVE—Dr. C. W. Gartlein of Cornell has devised a photocell device which automatically counts meteors, recording their duration and brightness. Two photocells in a balanced circuit are aimed at different parts of the sky. When either one is excited by illumination brighter than the other, a recording stylus is operated. The device successfully measured the 1945 Perseid display.

RADAR TO PREDICT WEATHER—Advance information on the approach of storms in the Pacific was obtained by setting radar apparatus on distant cloudbanks, some 200 miles away. Thus storms could be seen approaching long before otherwise evident. The 450-lb. radar apparatus was set up to scan the complete horizon, tracking storm-clouds from all quarters.

MOISTURE-PROOFING RESIN—A moisture-proof coating and impregnant for electrical apparatus is "Fosterite," a polymerized resin developed by Newton C. Foster of the Westinghouse Research Laboratories. Before polymerization, this material is almost as fluid as water, and consequently, completely fills all interstices in coils, even spaces in fibrous materials. Containing no solvents, no capillaries are formed when the resin is polymerized by heat treatment. Fosterite-treated transformers are subjected to immersion, tested, and considered to have failed if insulation resistance to ground or between windings falls below 2,000 megohms. Resistance values as high as 1,000,000 megohms are reported.

RADAR SURVEYING is a new problem put up to one radar manufacturer. Target would be a metal signboard reflector, 15 ft. square, 30 miles distant. At such distance manufacturer guaranteed accuracy within 50 ft., which is greater than could be attained by tapes or other measuring devices. Application is still in discussion stage.

BROAD-BAND TELE TUNER—A new resonant circuit design for television receivers, termed "inductuner" is being sponsored by the DuMont laboratories. Ernest A. Marx, general manager of the television division, describes it as a broad-band device with continuous coverage from 44 to 216 mc.

MEASURES, COUNTER-MEASURES, AND COUNTER-COUNTER-MEASURES

Engineers who worked on the "proximity fuse," radar, and other radical developments of the war, reveal that even after these new electronic miracles were pretty well worked out, actual use invariably was held up until a second group of researchers and inventors had tackled the problem of all the counter-measures which the enemy might use to thwart the original weapon.

But the precautions didn't stop even there. For a third group of specialists was then assigned the task of "countering" the work of the counter-measure inventors. So that when the original weapon went into action (1) our side knew pretty well what the enemy might try to do to defeat the new device, and (2) we had, all ready, means to defeat the enemy's counter-measures!

Here's a lesson for laboratory men—in peace as well as in war: Always be ready with a counter-measure, too! This lesson, if new to engineers, is a lesson already old in the annals of both military and business strategy.

PHOSPHORS AND THEI

By IRVING KRUSHEL
North American Philips Co., Inc., Dobbs Ferry, N. Y.

Part 1 of a study of the manufacture, applicatio

> **One of the most important features of television is the change of modulated electrical energy into light energy defining the original picture. This is done in the cathode ray television tube by unique crystalline substances known as phosphors.**
>
> **The phenomenon by which phosphors convert the energy of the electron beam into light is known as luminescence. Fluorescence is luminescence which ends when the excitation is removed. Phosphorescence is luminescence which endures beyond the period of excitation. The time distinction is about 10^{-8} seconds or the time necessary for an excited electron or ion to return to a normal state.**
>
> **The first artificial phosphor was accidentally prepared about 1600 by an alchemist of Bologna who was seeking to extract gold from some strange stones he had found. The result was not gold but a material which could glow in the dark after it had been held in sunlight. This Stone of Bologna was widely known and the cause of great wonderment. It soon received the name 'phosphor,' which is derived from the Greek and means light bearer.**

● For a long time the phenomenon of luminescence was an interesting but useless curiosity. About the middle of the nineteenth century Becquerel (1) did some intensive investigations on phosphorescence, measuring the wavelength of the exciting and emitted light. At about the same time Stokes (2) made some interesting findings, one of which was the fact that the wavelength of the emitted light was always greater than the wavelength of the exciting light. Finally toward the close of the nineteenth century first Verneuil (3) and then Lenard (4) discovered the true activating function of the impurity in a phosphor.

While these investigations were giving to the world a better understanding of luminescence, phosphors were being put to use by researchers working with X-rays and radioactivity. The first men to use cathode rays to excite luminescence in phosphors were Goldstein (5) and Crooks (6). Their devices were perfected by many men following, among them being Braun and Wehnelt. In 1907 the first cathode ray television tube using a phosphor screen was patented by the Russian scientist, Rosing. It was not until the beginning of electronic television that the greatest strides were made in television cathode ray tubes. During the early 1930's German engineers developed good direct viewing television tubes and Dutch engineers of the Philips companies greatly advanced projection television.

There is a large amount of literature describing the preparation and characteristics of various inorganic phosphors, but as yet there is no adequate explanation for the phenomena of luminescence. The following theory is mentioned so that some appreciation of these very complex phenomena will be had.

The atom consists of a nucleus surrounded by a system of electrons which move about the nucleus in orbits of definite energy levels E_0, E_1, E_2, etc. When energy (light quanta, moving electrons) is made to impinge upon matter (atoms in a stationary state having a certain constant energy) it will be absorbed only if it has sufficient energy to cause energy transitions in the atom. When this occurs the electron will leave its normal orbit and move into one of higher energy. The atom as a whole thus changes its energy and passes from one stationary state to another, or from the normal to the excited state. The emission of light is due to the return of the excited atom to its normal state, i.e., the electrons return to the normal state with the emission of energy according to the equation (8) $E_2 - E_1 = h\nu$ where h = Planck's constant 6.624 x 10^{-27} erg-sec ν = frequency of radiation in reciprocal seconds.

Phosphors used in television cathode ray tubes are inorganic, crystalline materials. Such crystalline materials have a definite, symmetrical crystal lattice with atoms or ions at definite geometric points in this lattice. Atoms and ions at such points are about 10^{-8} cm apart, but in an impure phosphor crystal there may also be impurity atoms at points in between the normal lattice points, or they may be normal lattice points that are empty. Electrons may then move not only from one level to another

(Radio Mfr's Ass'n) RMA Designation	Substance	Activator	Formula	Fluorescent Color	Phophorescence (seconds)
P1	Zinc silicate	Manganese	$Zn_2SiO_4.Mn$	Green	medium 0.03-0.05
P2	Zinc sulfide	Copper	$ZnS.Cu$	Blue-Green	long
P3	Zinc beryllium silicate	Manganese	$Zn\,Be\,SiO_3.Mn$	Yellow-Green	medium 0.05
P4	P3 and zinc sulfide	Silver	$ZnS.Ag$ + P3	White	short 0.005
P5	Calcium tungstate	———	$Ca\,WO_4$	Blue	very short 5u sec.
P6	Zinc sulfide	Silver	$ZnS.Ag$		medium 0.005
	Zinc cadmium sulfide	Silver	$ZnCdS.Ag$	White	
P7	Zinc sulfide	Silver	$ZnS.Ag$	Blue	medium 0.005
	Zinc cadmium sulfide	Copper	$ZnCdS.Cu$	Yellow	long
P11	Zinc sulfide	Silver with a nickel quencher	$ZnS.Ag.Ni$	Blue	very short 10u sec.

BEHAVIOR IN TELEVISION

rties of phosphors in relation to television needs

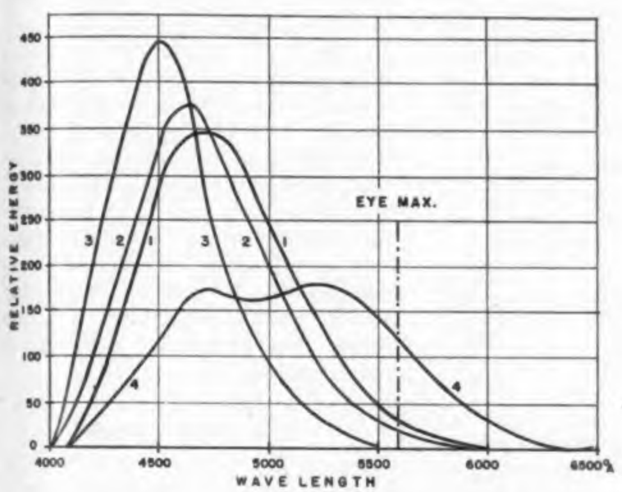


Fig. 1. Emission spectra of zinc sulphide phosphors (Ref. 14). Curves 1, 2, 3 show influence of silver content, 4 of copper

Curve	Temp.	Weston	Nat. Color	Lum. Color
1. ZnS (no activator)	940°c—2 hr	100%	White	Lt. Blue
2. ZnS 0.002% Ag	"	71.5	"	" "
3. ZnS 0.032% Ag	"	34.0	"	Blue
4. ZnS 0.001% Cu	"	140	Lt. Green	Lt. Green

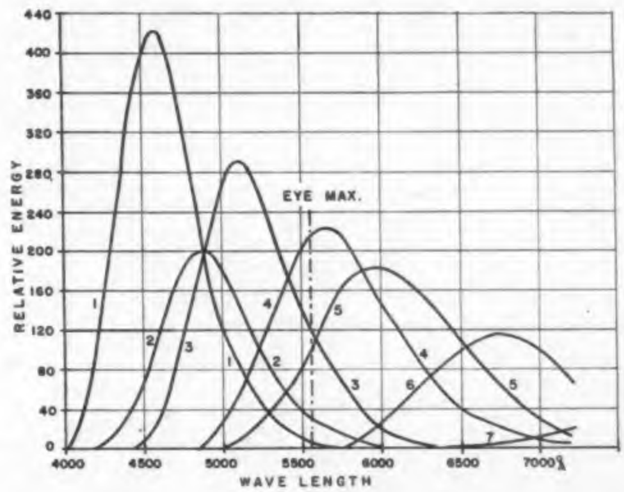


Fig. 2. Spectral distribution of energy and visibility of the zinc sulphide—zinc cadmium sulphide phosphor system (Ref. 19)

Curve	Temp.		Nat. Color	
1 ZnS: 0.008% Ag	940°—2 hr	43.6	White	Lt. Blue
2 ZnS(80) CdS(20):0.01% Ag	"	63.4	Lt. Grn. White	Vy Lt. Bl. Grn.
3 ZnS(60) CdS(40): "	"	156.0	Vy Lt. Green	Vy Lt. Cr. Grn.
4. ZnS(50) CdS(50): "	"	235.0	Lt. Yellow	Lt. Gr. Yellow
5 ZnS(40) CdS(60): "	"	150.0	Lt Cream Yel.	Lt. Yel. Orange
6 ZnS(20) CdS(80): "	"	22.0	Tan Orange	Lt. Red
7 CdS: 0.02% Ag	"	—	Lt. Br. Orange	Red

in one atom, but may also move from one ion to another. The normal electron processes of emission and absorption thereby become complex and more difficult to interpret.

When atoms and ions are so close together the effect they have upon each other is very great. The electrostatic forces exerted by the ions change the potential energy of the electrons in such ions. Energy levels are thus broadened and readjusted. Partial overlapping of electron orbits may occur causing subdivision of levels to a larger number of sublevels and such a group of sublevels which are formed from one atom level is termed an energy band. Further disturbances of energy levels occur when instead of regular spaced atoms or ions of the base materials of the phosphor there are empty sites in the crystal structure, caused by deviation in the stoichiometric (chemical weight relation) composition, or where foreign ions of the impurity activator take positions at crystal lattice sites or positions in between sites of the base materials.

The absorption mechanism in such complex crystal structure is similar to that described previously for atoms. For absorption, the quantum size of the incident energy must correspond to the energy difference between an occupied band from which the electron moves to the unoccupied band to which the electron goes. Absorption may be due to ions, atoms, or both.

Fluorescence

Fluorescence takes place when phosphor crystals are irradiated with radiation of the proper frequency (ultra-violet light); or when X-rays, alpha particles, or electrons impinge upon them. Some of the energy causes oscillations of atoms and ions (vibration of the crystal lattice) throughout the crystal (thermal agitation). Electron shifts occur throughout the crystal structure with the absorption of energy. The return of the electron is complex and associated with this is an emission of energy in amounts smaller than what was absorbed, or in the case of irradiation by ultra-violet light the frequency of the emitted light is lower than the frequency of the absorbed light (2). When atoms of the crystal possess energy of vibration at the time of excitation the emitted light may have a frequency higher than that of the light absorbed. The efficiencies of fluorescence by the exciting media listed above are approximately

X-rays ....from 1- 5%
electrons ....from 5-10%
ultra-violet light...up to 70%
alpha particles ....about 80%

Absorption bands which cause fluorescence are formed in the crystal by:

(a) local stoichiometric aberrations (local excess of atoms),

(b) impurities (activator atoms) taking the place of base materials at normal lattice points in the crystal,

(c) impurities (activator atoms) taking positions in between base material atoms occupying normal points of the crystal lattice structure.

All of these defects in the crystal may be termed fluorescent or active centers and it is believed that luminescence is due to electron shifts in these parts of the crystal. These defects are a small fraction of the crystal sub-units (ions, atoms), and if the luminescent yield of all of these units is considered then the energy of luminescence would be much smaller than it actually is.

A great deal of the energy absorbed by the phosphor crystal is absorbed by the atoms and ions of the base materials. Much of this is dissipated as heat in the crystal but to account for the energy of luminescence some of this absorbed energy must in some way be transferred to the active fluorescent centers. Frenkel (10) proposed the excitron or excitation wave, which is a coupling of an ion and electron, as the agent for the transfer of this energy.

When the return of an electron in or to an active center is longer than that required by the normal electron return process of about 10^{-8} seconds the phenomenon is known as phosphorescence. This is due to a slow transfer of energy from the excited crystal to the returning electron and also to the side tracking and trapping of electrons slowing the process of return to the normal state.

Manufacture of phosphors

The luminescent characteristics of most phosphors are due to the incorporation in the crystal structure of a minute amount of impurity known as activator. Small changes in the concentration and kind of the activator impurity may cause great changes in these characteristics. To manufacture phosphors which have uniform spectral and phosphorescent characteristics there must be a very exact control of the amount and type of impurity activator in the phosphor crystal. In the case of sulfide phosphors elaborate and extended methods of purification of the raw materials are necessary for impurity elimination.

Since such purifications are usually done from solution the water used in the chemical processing must be highly purified and closely controlled. Some phosphors can have their luminescent characteristics altered by an impurity concentration of one part per million and therefore the atmosphere of a phosphor manufacturing plant must be thoroughly cleaned. Finally the type of equipment used must be carefully considered in light of the rigid purity required in the finished product.

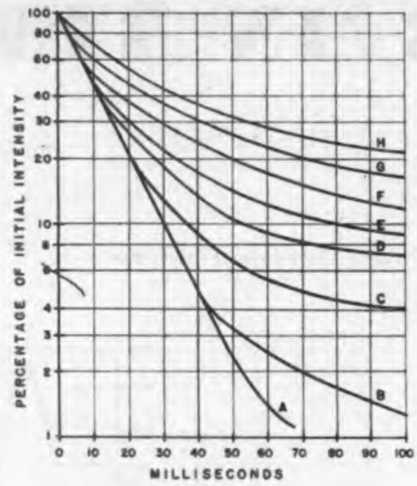


Fig. 3. Decay in phosphorescence of zinc silicate phosphors as percentage of initial intensity

A. $Zn_2SiO_4.Mn$
B. " $.SiO_2$
C. " .Mn (Quenched)
D. " $.SiO_2.Mn$ + .002 per cent As_2O_3
E. " " " .005 " " "
F. " " " .01 " " "
G. " " " .05 " " "
H. " " " .50 " " "

Sulfides

Sulfide phosphors are the most important type used in the cathode ray television tube, and they are the most difficult to manufacture. They are made by the purification of a solution of the desired metallic salt to the point of spectroscopic purity. This is accomplished by the repeated application of routine methods of chemical purification which involves oxidation and precipitation of such impurities as iron and nickel, and may involve electrodeposition of any copper contaminant. Removal of iron impurity:

$$Fe^{++} + H_2O_2 \rightarrow Fe^{+++}$$
$$Fe^{+++} + NH_4OH \rightarrow Fe(OH)_3 \downarrow$$

The sulfide is then precipitated by the addition of purified ammonium hydrosulfide slightly in excess of the stoichiometric quantity necessary for complete precipitation, or by the passage of hydrogen sulfide into the solution. Buffering such a solution to obtain quantitative precipitation of the sulfide may be necessary if hydrogen sulfide is used. Finally the activator impurity in exact concentration is added. This may be done by the addition of a solution of the soluble salt of the activator to the purified solution before the precipitation of the sulfide, or the precipitate may be dried and the ac-

Fig. 4a. The dependence of the emission spectrum of zinc beryllium silicate on manganese concentration. Curves 2 and 3 have respectively three times and nine times as much manganese as the phosphor in curve 1. The shift toward orange in the color spectrum is quite noticeable

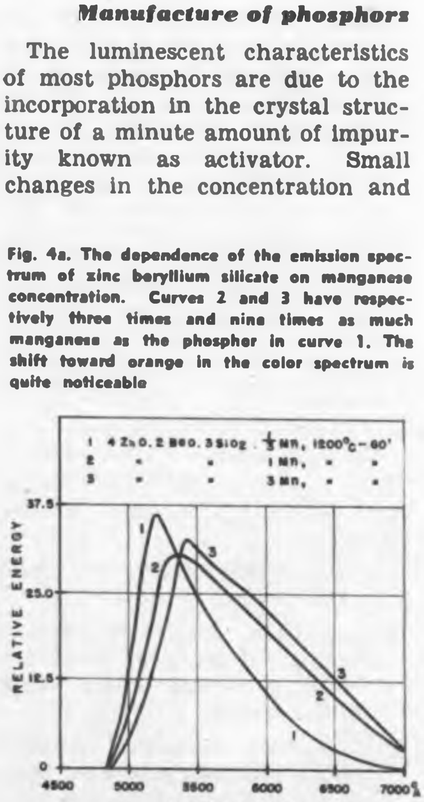


Fig. 4b. The dependence of the emission spectrum of zinc beryllium silicate on beryllium concentration. The phosphor in curve 1 has no beryllium content, while curves 2 and 3 have progressively more. The effect is to cause a pronounced shift toward the orange end of the spectrum

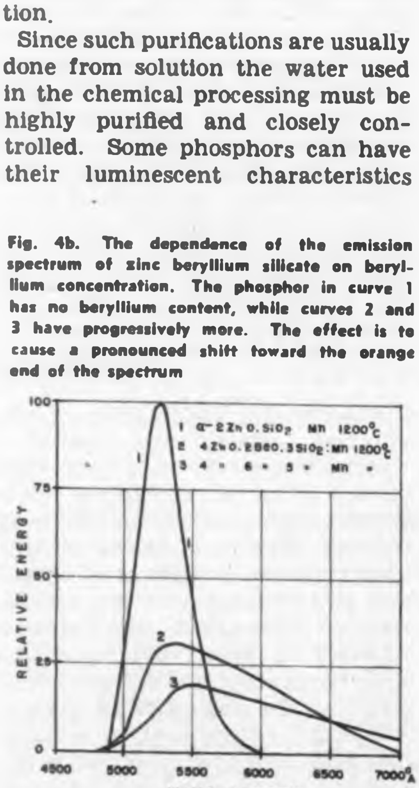
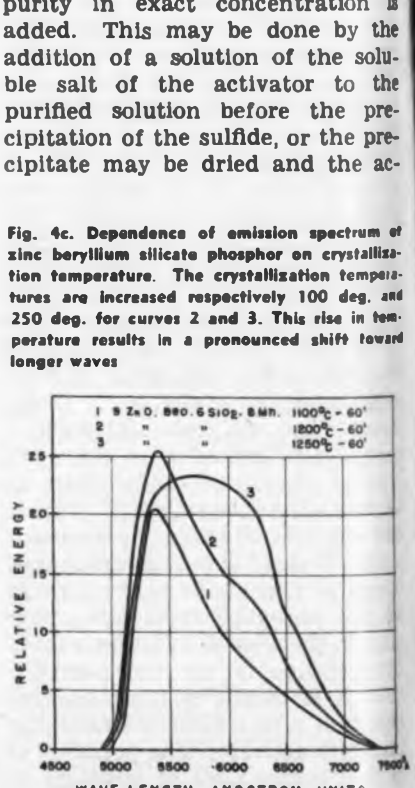


Fig. 4c. Dependence of emission spectrum of zinc beryllium silicate phosphor on crystallization temperature. The crystallization temperatures are increased respectively 100 deg. and 250 deg. for curves 2 and 3. This rise in temperature results in a pronounced shift toward longer waves



tivator then mixed into a suspension of the sulfide. Precipitation and activation of sulfide

$$Zn\,SO_4 + H_2S \rightarrow Zn\,S\downarrow + H_2SO_4$$
$$2Ag^{+} + S^{=} \rightarrow Ag_2\,S\downarrow$$

Flux may be added to the mixture at this point to aid in the crystallization at high temperatures. About 2% of sodium chloride is very effective for this purpose.

The dried sulfide, activated and fluxed, is fired at 800°-1100° for a period of about one hour in a furnace having air or preferably an inert gas such as nitrogen as an atmosphere to prevent oxidation of the sulfide. During this firing treatment the impurity moves to occupy important points in the crystal structure being formed and the phosphor thus gains its luminescent characteristics: (non-luminescent) Zn S + Activator Ag_2S

$$\xrightarrow[\text{1 hour}]{1100^\circ\ C} \text{Zns.Ag (luminescent).}$$

Unactivated zinc sulfide fluoresces pale blue. Activation with about .00001% of silver will shift the fluorescence towards the deeper blue while about 0.001% of copper will shift the fluorescence towards the green and also impart a long phosphorescence to the phosphor (Fig. 1). Nickel in very small concentrations will "quench" the phosphorescence of ZnS.Cu (11). Zinc and cadmium sulfides can be mixed in all proportions and be activated with copper or silver giving fluorescence from blue to red (Fig. 2).

Fig. 12. Kettle being used by author to mix phosphor components

Silicate phosphors

Silicate phosphors are an important phosphor type which are more easily prepared than sulfides. They are sturdier than sulfides in that they are less apt to burn under intense electron bombardment and stand up better during the processing required for tube manufacture.

Silicate phosphors are made by mixing stoichiometric proportions of the substances going into the formula, i.e., for willemite 2 moles of zinc oxide and 1 mole of silicon dioxide, and then adding manganese to the extent of 0.1% to 1% of the formula weight. A satisfactory formula for the preparation of green fluorescing zinc ortho silicate) (willemite) is: Zinc oxide—55 grams, silicon dioxide—25 grams, manganous carbonate—0.30 grams.

The mixture is fired for about 1 to 2 hours at 1200° C and the following reaction takes place: $2\ ZnO + SiO_2 + Mn^{++} \rightarrow Zn_2\ SiO_4.Mn$. The time and temperature of the firing may be varied to obtain the particle size desired.

Willemite so prepared has a medium persistence which can be greatly increased by the addition of about 0.4% arsenic oxide when the concentration of manganese is 3% or less (Fig. 3), and can be quenched by lithium chloride (12). Zinc orthosilicate can also be made to fluoresce blue (no activator used) or red (if the silicate is rapidly cooled from 1200° C by quenching in cold water) (13).

The addition of beryllium to zinc orthosilicate (2 grams of beryllium oxide) for the above formula, before firing, will shift the fluorescent color from green to yellow. The color may be varied by varying the

Fig. 11. Autoclaves used in the precipitation of raw phosphor materials

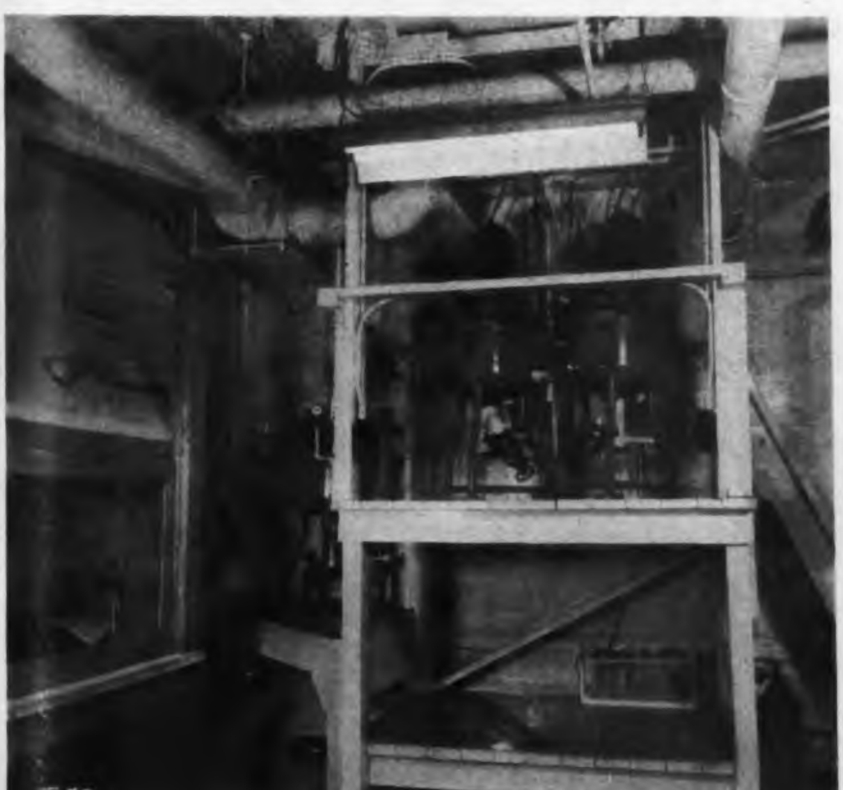


Fig. 13. High temperature firing of phosphor materials in inert atmosphere

amounts of beryllium and manganese used and also by changing the temperature of firing. Increasing the proportion of manganese, beryllium, and increasing the firing temperature will shift the color of fluorescence towards the orange (Fig. 4a, b, c). Increasing the proportion of beryllium decreases the efficiency (14).

Cadmium may be substituted for beryllium in varying proportions all yielding an orange or yellow fluorescing material with a moderate phosphorescence.

Tungstates

Tungstates are the least important of the phosphor groups used in cathode ray tubes. They have rugged characteristics similar to silicates and also are easily prepared with the purity conditions for preparation being not too severe.

Tungstates may be prepared by precipitation from solution or by the dry mixing of the components of the formula. Mixing of a soluble tungstate with a solution of the cation desired (magnesium or calcium) will precipitate the very insolube tungstate: $Ca(NO_3)_2 + NaWO_4 \rightarrow CaWO_4 + 2NaNO_3$

By proper regulation of the solution temperature and the rate of mixing, the particle size of the calcium tungstate may be controlled closely. Repeated washings will remove the sodium nitrate and the precipitate is dried and then fired at 900°-1100° C for 1 to 2 hours.

Calcium tungstate belongs to that group of phosphors which does not need an activator for its fluorescent characteristics. Its phosphorescent characteristics are dependent though upon the impurity activator. Though calcium tungstate is not sensitive to many impurities a small concentration of lead (greater than 1%) will lower its efficiency (15).

From the foregoing description of the manufacture of specific phosphor types one can glean the steps and general methods involved. They are:

1. Purification of raw materials —Consideration must be given here not only to the purification procedures but also to all the factors which might contaminate the phosphor. The spectrograph is used alongside the preparation procedures to check the purity at all stages of the processing. Continuous conductivity measurements of the water used must be made. The atmosphere of the plant must be purified to remove all contaminants. At the phosphor laboratory of North American Philips, Dobbs Ferry, N. Y., the laboratory air is purified by electrostatic means. Furthermore, the laboratory is held at a positive pressure with respect to the surrounding sections to prevent suck-in of unfiltered air.

2. Precipitation of the raw phosphor material or mixing of the phosphor components. The method of precipitation determines the quantity of the phosphor yield and greatly influence the quality. This part of the procedure is very flexible and can be adjusted to change the physical and luminescent characteristics of the finished phosphor. The activating impurity may be coprecipitated with the base material or may be added to the dried precipitate. Autoclaves and kettles are shown in Figs. 11 and 12.

Fig. 14. "Sealing in", or connecting the glass of the stem to the bulb

Fluxing the material at this point adds to the mixture to be fired a substance which helps in the crystallization and phosphor formation during firing thus yielding a more efficient product. For sulfides, about 1% of sodium chloride is effective in speeding the crystallization process and aiding the movement of the impurity activator into the crystal lattice.

3. Firing of the phosphor raw material (non-luminescent) to yield the luminescent phosphor. All artificial phosphors must be fired to impart the desired luminescent characteristics to them. This is done at high temperatures (800°-1300° C) preferably in an inert (non-oxidizing) atmosphere, see Fig. 13. It is during this process that the crystal is formed and the activating impurity enters the crystal forming impurity centers. In the case of calcium tungstate where no activator is used it is commonly accepted that lattice irregularities occur during the crystallization and these defects serve as centers of luminescence.

The temperature of firing may vary widely among different phosphor groups and in a single phosphor type. The time of firing may also vary very widely. The particle size and luminescent characteristics of the finished phosphor are dependent upon the firing schedule. As a rule the higher the firing temperature or the longer the time of firing the larger will be the particle size and the stronger will be the tendency towards vitrification. The firing schedule is entirely empirical and must be determined for each phosphor in the basis of the product desired.

The three phosphor groups discussed, i.e., silicates, tungstates, and sulfides are the most important artificial phosphors. They are the only types used in cathode ray tubes.

At the present time two types of white television screens are being used and both types consist of two phosphors, one luminescing blue and the other yellow, carefully mixed to give a proper white color. These have RMA (Radio Manufacturers Ass'n) designations of phosphor 4 (P4) and phosphor 6 (P6). Table 1 gives the formulas, activators, and characteristics of these phosphors and others used for cathode ray tube screens.

Screen types

Phosphor 1 (P1)—is commonly used in the oscillograph. It was used on early types of television tubes.

Phosphor 2 (P2)—is used where the phosphorescence of the screen is needed to hold transient phenomena for comparison with previous effects.

Phosphor 3 (P3)—was used in early television tubes and at present is the yellow component of the P4 television screen.

Phosphor 4 (P4)—this is the common white television screen and is favored in America.

Phosphor 5 (P5)—used for observing and photographing high speed phenomena without blurring because of the very short persistence of this screen.

Phosphor 6 (P6)—an all sulfide television screen in which the yellow component is zinc cadmium sulfide and the blue component is the same as that used in P4.

Phosphor 7 (P7)—this screen is the radar screen and is used to relate intermittent pulses of excitation. It is composed of two sulfides, zinc cadmium sulfide copper activated (ZnCdS.Cu), which has a long persistence and zinc sulfide of the P4 screen. The screen is so prepared that the zinc cadmium sulfide is first deposited on the bulb and then the zinc sulfide is deposited on it without mixing the two components. The screen operates in this fashion. The electron beam excites the zinc sulfide causing the emission of blue light. The light can be absorbed by the zinc cadmium sulfide which is excited, in turn giving off yellow light, but much more slowly. The zinc sulfide is cathodoluminescent and the zinc cadmium sulfide photoluminescent. During operation the screen is continually being excited to a low light emitting level. Reflections from objects under observance appear as bright areas on a dim screen.

Phosphor 11 (P11)—used for purposes similar to P5, but having a much higher efficiency than P5 material.

Of the many luminescent substances known only a small number can meet the requirements of a television cathode ray tube. A phosphor must not only perform

(Continued on page 132)

Fig. 15—The bulb is outgassed by heating in an oven at 400 deg. C.

Fig. 16—A short aging process stabilizes the finished product.

PRINCIPLES OF LORA

By RICHARD W. KENYON

War developed navigational aid permits surface ships or aircraft to locate themselves accurately by radio signal

● The name Loran is derived from LOng RAnge Navigation and is descriptive of a system that enables a surface ship or an aircraft to determine its position by radio, without the necessity of radio transmissions from the craft itself.

A complete Loran system consists of a number of pairs of pulse transmitters located on the coast-line, and a receiver and indicator on the ship or aircraft. As in radar, the Loran system depends upon the fact that radio signals travel with a constant velocity. The distance between the shore transmitter and the receiver therefore is directly proportional to the time required for the reception of the signal. Position is determined by comparing arrival times of received pulses of radio frequency energy with charts prepared for the particular area which correlate time and position.

Operating principle

If two Loran transmitting stations, separated by several hundred miles, emit omni-directional signals, it is obvious that if signal pulses were transmitted at the same instant and received at the same time, the surface ship must be located somewhere on the perpendicular bisector of the baseline between the stations. When the travel time of the signals is not equal, then the ship is closer to one transmitter than to the other and the navigator must consult charts supplied for the particular area.

Loran transmitters, as indicated in Fig. 1, are the foci of a family of hyperbolas drawn as lines of constant time difference between the received pulses. Loran receivers and indicators measure directly the difference in time of arrival of radio signals from a pair of Loran transmitting stations.

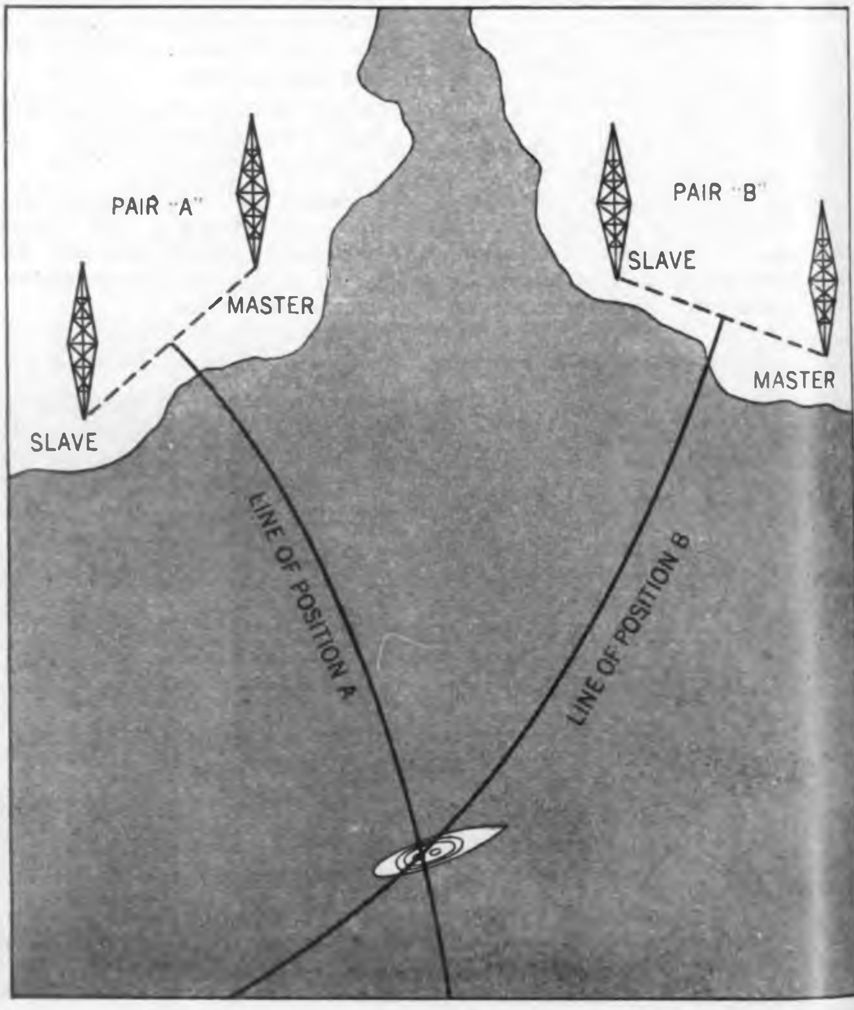
In the simple example given, an ambiguity arises as to what point on the hyperbola the ship is located. The situation may be clarified by the introduction of a second pair of Loran transmitters, which will provide a second line of position. The intersection of the two lines of position determines a "fix," as shown in Fig. 1.

The shore transmitters in a Loran system send pulses of identical shape timed to have a repetition rate near 30 CPS. In practice the pulses from a pair of stations, known as a master station and a slave station, are not transmitted simultaneously. The slave station signal is delayed a finite amount so that it will always arrive last at a receiver. The amount of delay needs to be at least equal to the radio signal travel time of the baseline between the two stations, but usually is considerably more. This delay eliminates the ambiguity mentioned in the previous paragraph.

The frequencies used for transmission are less than 5 mc. Ranges of 500 to 700 nautical miles may be expected during the daytime, and up to 1400 nautical miles at night.

Sky wave transmission is depended upon for the additional night range. This leads to complex pulse patterns. Instead of single pulses,

Fig. 1—Hyperbolic curves connecting points with an equal time difference of pulse arrival, show path on which craft might be located on map. A fix is obtained by intersection of two curves



AN POSITION LOCATION

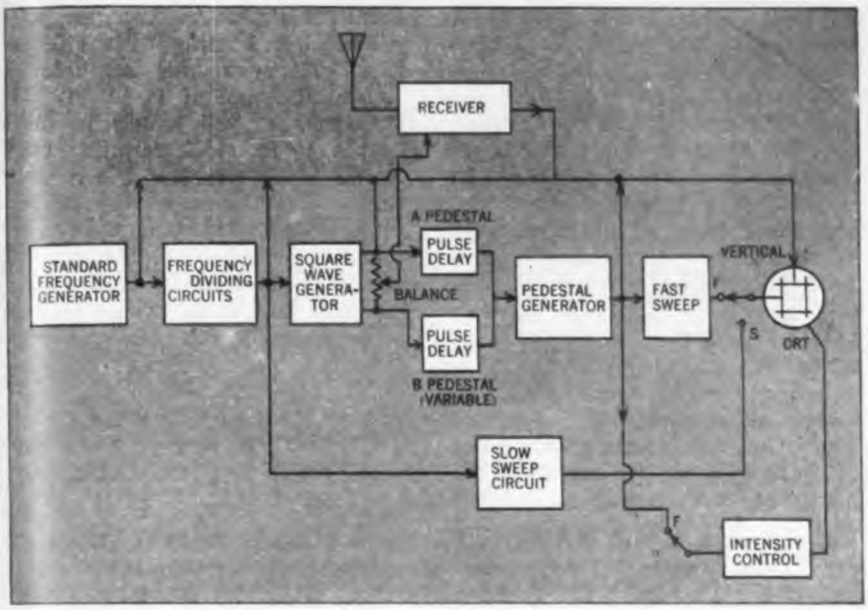
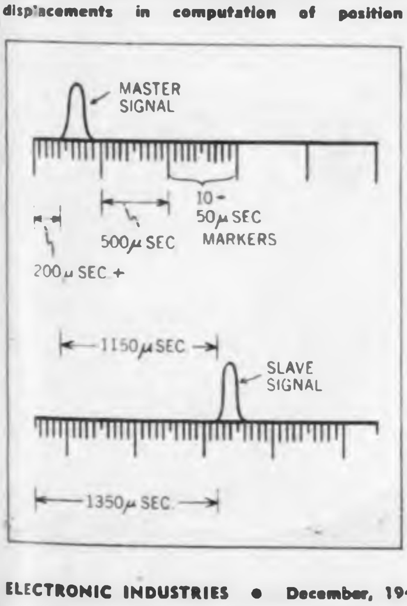


Fig. 2—This is a block diagram of a typcal Loran receiver, which converts the time intervals between pulses to a highly precise positional displacement on a cathode ray tube viewing screen

as in the case of ground wave reception, a train of pulses will result from ionosphere reflection. The first pulse of a train is the ground wave signal, which must be used for accuracy in position determination.

The Loran indicator measures the time of arrival of the radio signals from the transmitters. A superheterodyne receiver, conventional in design, introduces the signals into the indicator. The receiver if is 80 kc wide, and has a gain of about 10^7. A separate tube controls the receiver gain from the indicator control panel. A functional

Fig. 4—The pattern of these pedestals is expanded for more precise determination of time displacements in computation of position



block diagram of the receiver indicator is shown in Fig. 2.

The indicator is a cathode ray oscillograph with two horizontal sweeps displaced one above the other. The upper horizontal trace is for the master station pulse while the lower trace shows the slave pulses.

The vertically displaced horizontal traces permit convenient comparison of time differences between master station or A pulse and the slave or B pulse. The left end of the lower or B trace represents the same time instant as the right end of the upper trace.

A system of internally generated pulses applied to the vertical deflection plates of the indicator act as time markers and permit measurement of interval between A and B pulses.

The standard frequency generator is crystal controlled at 100 kc. The output of this stage is applied to the frequency divider circuits which are of the blocking oscillator type. The resulting sharp pulses are superimposed on the trace at 10, 50, and 500 microsecond intervals. Output pulses from the frequency divider circuits are used to trip the slow-sweep circuit, thereby providing an oscilloscope horizontal sweep of exactly twice the pulse repetition rate of the transmitter. A square wave generator produces a square wave of one-half the sweep frequency. This output is impressed

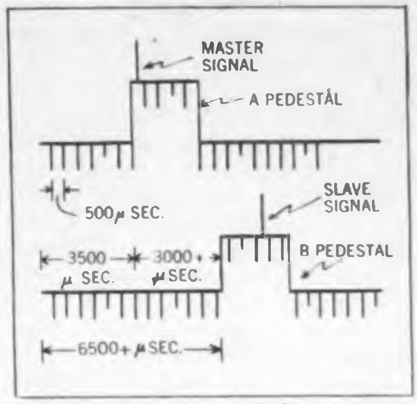


Fig. 3—Here is shown a typical screen pattern in which the two pulses are received on pedestals to form two parallel horizontal traces

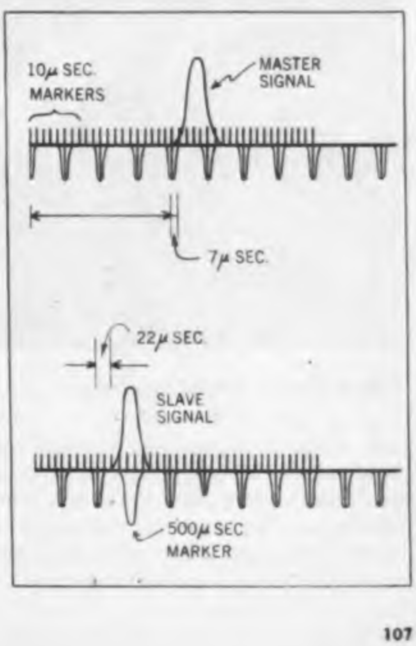
in the vertical deflection plates of the oscilloscope to separate the two horizontal traces.

The square wave output is also applied to A and B pedestal delay circuits. The pulses from the A and B delay circuits time a pedestal generator which produces a "step" on each horizontal trace. The length of this pedestal is variable from 225 to 2500 microseconds, depending on the measurement desired. The A pedestal is fixed in position while the B has a variable time delay range with respect to A of approximately 10,000 microseconds.

The purpose of the pedestal on each trace is to create a "time zone" into which the A and B pulse can be placed by manipulation of the position of the B pedestal. Once these time zones are established,

(*Continued on page 138*)

Fig. 5 shows further enlargement of the particular 500 microsecond interval, with expansions made by the oscilloscope sweep



TUBES ON THE JOB

Tool Brazing by H F

Induction heating is being used by the Reed Roller Bit Co., Houston, Texas, for brazing tungsten alloy tips to single point tools. This work was formerly done with acetylene torches and a single tool heating operation required several minutes. The long heat period needed, resulted in considerable overheating of the tungsten with a tendency for the tip to dull quickly or break in service. High frequency heating has not only reduced the heat period to 30 seconds, but the life of the tool has been lengthened because the tungsten tip remains comparatively cool during the brazing operation.

The work coil on this standard Westinghouse 10 kw induction heating unit consists of two separate coils in series. One coil is of six turns wound on a 2 in. x 2 in. square, and the second is approximately 1½ in. x 2 in. This duplex coil combination permits the operator to handle several sizes of tools without previous sorting. Automatic timing gives exact control of the 1400 degree heat and a uniform brazing job is turned out. The unit is used both for removing tips already dulled by wear and brazing new tips on the tools.

Operator brazing tungsten alloy tip on steel tool; two work coils eliminate need of tool-size sorting, thereby speeding up production

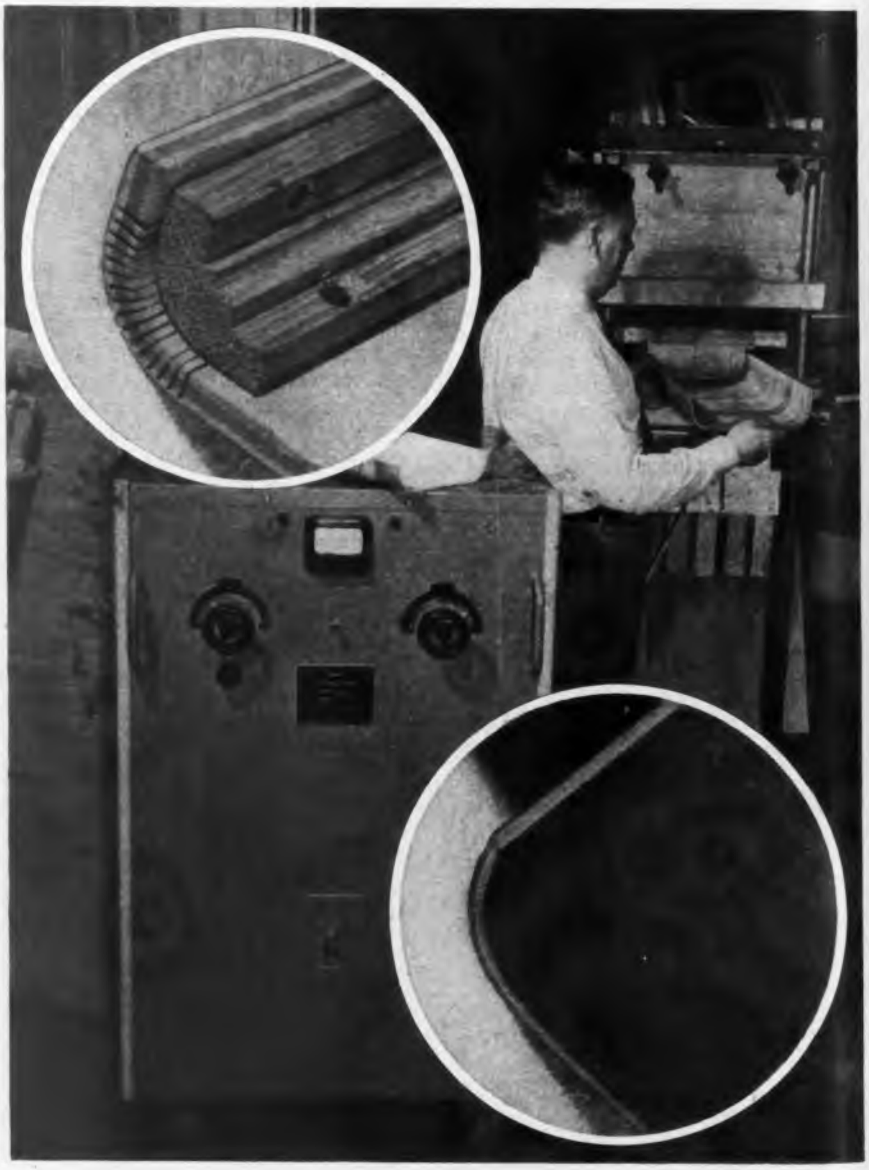
Furniture Fabrication

At a sharp reduction of costs and with improved constructional detail the Huntington Furniture Co., Huntington, Ind., is now using electronic heat in fabrication of wood furniture. Production costs on a "waterfall" bed dropped 43% with a daily operational economy of $160; while on a "waterfall" bureau top, the saving is $112 a day or 23%.

Waterfall furniture, so called because the grain of the wood resembles the flow of water usually is constructed of veneer paneling. In order to develop the curve or bend, the panel must be heavily scored on the concave side of the bending area. This is generally done by parallel saw cuttings almost through to the front side of the veneer. After this "Kerfing" operation is done, the wood is made pliable in steam molds and the required curves are set in the wood under pressure. When the curved panel has cooled, reinforcements have to be laid into the reverse side of the bend for structural strength.

Dielectric heating with a Model 29 x 0 Thermex unit has allowed the substitution of ¼ in. plywood for these curved panels in place of the ½ in. stock formerly used. It has also eliminated the need of the scoring operation and the reinforcement strip. And finally curing time has been reduced to seven minutes. Tests show that the ¼ in. panel set with electronic heat is structurally stronger and considerably more durable than the ½ in. panel curved by the older method. High frequency electronic heating also prevents surface hardening, scorching and checking.

Fabrication of furniture on "waterfall" bed. Insets show products formed by old and new methods; above, obsolete "kerfing" operation; below, electronic heating produces superior product from thinner stock. Electronic heating results in stronger and more durable furniture



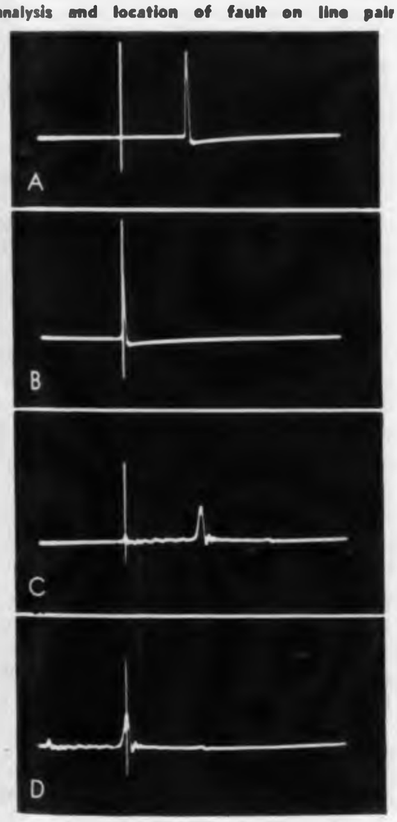
Pulse Echo Fault Testing

A new piece of test equipment has been developed which will look into faulty transmission lines and apparatus, and indicate not only the type of trouble being experienced but also its approximate distance from the testing point. Appropriately enough, it is called a Lookator.

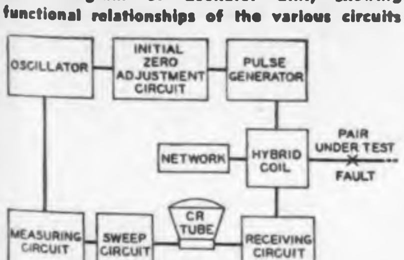
Pulses travel along the line to the impedance irregularity caused by the fault. They are reflected, and return along the line to the Lookator, where they enter the receiving amplifier, appearing as a vertical deflection on the screen of a cathode ray tube. A second output of the oscillator feeds through the measuring circuit into the sweep circuit, where it controls the frequency of the horizontal sweep. The zero adjusting circuit and the measuring circuit permit the phase of the voltage supplied to the pulse generator and sweep circuits to be controlled individually. Consequently, the time at which functions in both the sending and the sweep circuits take place can be adjusted as desired with respect to each other. Since the oscillator frequency is fixed, a measure of the difference in phase between the ac voltages controlling the electrical events in the two circuits will be a measure of the time required for the pulse to travel from the Lookator to the fault and back again.

Fig. 1—Front view of Lookator unit with cover removed. Viewing tube is mounted over dial

Fig. 2—Successive traces observed during analysis and location of fault on line pair



Block diagram of Lookator unit, showing functional relationships of the various circuits



The actual measuring procedure is simple. By reference to Fig. 1 it will be seen that there are three control dials, a large Measure dial in the center, an Adjust Initial Zero on the left and an Adjust Receive knob. After the device has been turned on but before the line to be tested is connected, a trace appears on the cathode ray tube screen as is shown in Fig. 2A This sharp up peak is the measuring pulse passing across the hybrid coil because of poor impedance matching of the network against the open circuited line terminals. The height of the up peak can be set by the Adjust Receive knob. Next the large Measure dial is set on zero and Adjust Initial Zero knob turned until the up peak moves behind the vertical index line marked on the cathode ray tube (Fig. 2B). When the circuit to be tested is connected to the Lookator, the original pulse at its normal position is greatly reduced. This is caused by the increased loss across the hybrid coil resulting from the connected test line now balancing the network unit.

If a fault is present (Fig. 2C), it will appear in some characteristic fashion on the trace and in a position along the trace that represents the distance to it. To measure this distance the Measure dial is turned until the trouble pattern aligns with the index line. This is shown in Fig. 2D.

The Measure dial is substantially linear and calibrated in time divisions. By the use of compensating graphs showing the relationship of these time-value scale divisions to actual distances, on various type of facilities, the computation of the distance to any observed fault from the testing point can be readily made.

Warming Explosives with HF

Heating explosives is a ticklish business—but it must be done in making rocket powder, since the powder must be heated before molding into required shape.

To heat rocket powder in an oven with reasonable safety takes 24 hours or more. To heat the same powder with radio heat takes only 10 minutes. The electronic energy is easier to control, heats more uniformly, provides excellent results. Several RCA electronic generators were used in this important phase of armament production. The rocket powder, in rolls about 10 inches in diameter and 10 inches long, is placed between metal plates, and high-frequency electricity applied. The same technique, already applied in removing the kink from rayon yarns, can be used in treating many other substances.

Neon Tubes as Novel Traffic Light

In Geelong, Victoria, Australia, a new type of traffic light, devised by the city engineer, Ian McDonald, is being tried out. Five red and five green neon tubes, each fifteen inches long, are arranged horizontally about three inches apart.

Assuming that the five red lights have just appeared, at the end of ten seconds the top light goes out, at the end of five seconds the second bar disappears and then every five seconds a red bar goes out until, at the end of thirty seconds, the last red bar disappears. Immediately the five green bars appear and go out in turn, one every five seconds. A time cycle of thirty seconds normally applies to each phase but this can be varied. The advantage of this system is that waiting or approaching traffic can ascertain the time still available before a change occurs.

TRANSITRON OSCILLATO

By **WERNER MULLER**
Consultant, New York

Obtaining uniformity and constancy at frequencies variable between 40 and 175 kc—Design and construction

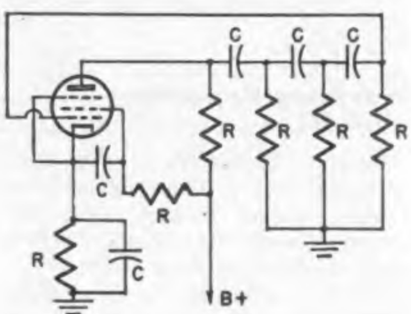


Fig. 1—Phase shift oscillator, found stable up to 12 kc but erratic at higher frequencies

● The demands being made on electronic tube circuits in both the industrial and the communication fields are such as to require careful consideration of stability in nearly every case. This matter of circuit stability and constancy of frequency becomes most important in oscillators.

While the performance characteristics of a fixed frequency oscillator may be rigid and still be met by the use of temperature controlled crystals, for a variable frequency oscillator a much different technic must be resorted to. The following description of an oscillator which has a variable frequency range from 40 kc to 175 kc will point out some of the items which demand attention in obtaining uniformity and constancy. These rules hold equally well in any other common frequency range.

The requirements for the particular oscillators which will be described here were as follows; be continuously variable over a wide frequency range (40 kc to 175 kc); a stability of ± 4 cycles at any set frequency within the oscillator tuning range and at any ambient temperature between —40° C to + 60° C, and with a line voltage variation of ± 25%.

The oscillator must be simple, so as to enable commercial manufacture and compact with overall dimensions to fit within 19 in. x 9 in. x 7 in., and rugged enough for continuous performance.

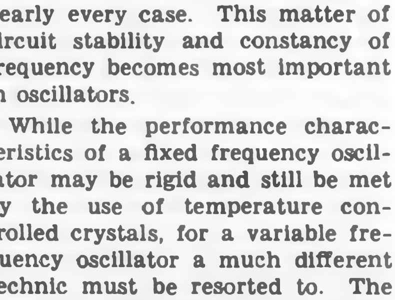
It follows from the given demands that a certain analysis had to be made to establish the factors that will satisfy all these points.

The problem resolved itself into two main issues:

1—The proper type oscillator circuit.

2—The mechanical aspects of the final arrangement.

Fig. 2—Experimental electron-coupled oscillator with high C/L ratio and high Q inductance



Circuits examined

A search was made among the numerous types of oscillator circuits to find a circuit that would satisfy the conditions. Three types of circuits appeared as the main possibilities: phase shift oscillator, the electron-coupled oscillator (ECO), and the negative transconductance type of oscillator. No complete data, pertaining to actual performance similar to the demands could be found among the numerous articles that had been published. Invariably such data showed close results might be obtained from any of the three circuits. The actual results as to how many cycles per second any of the three oscillators might drift from any given set frequency had to be determined in a laboratory set-up.

The results obtained from each of these circuits will be briefly summarized, and the circuit selected will be completely described. It may be mentioned at this time, that all results given are as accurate and consistent as obtainable in a good laboratory set-up, utilizing standard instruments for making all measurements. All deviation readings were made by the zero beat method against a General Radio primary standard.

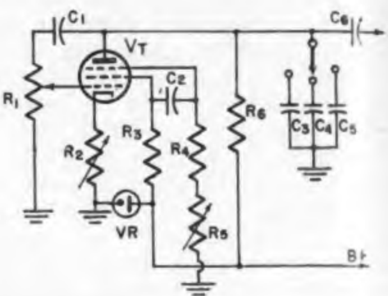


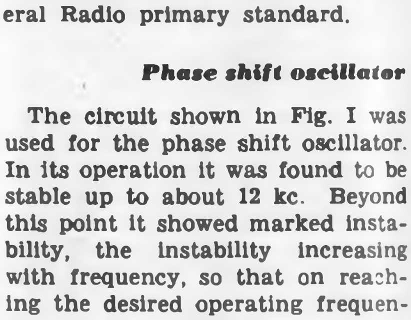
Fig. 3—Preliminary transitron circuit using only RC constants resulted in very poor stability

Phase shift oscillator

The circuit shown in Fig. I was used for the phase shift oscillator. In its operation it was found to be stable up to about 12 kc. Beyond this point it showed marked instability, the instability increasing with frequency, so that on reaching the desired operating frequencies, 40 kc to 175 kc, no circuit constants could be found that would cause the circuit to function better. The instability was of an erratic nature and not a consistent shift. Oscillations as high at 300 kc were produced.

The deviation of frequency experienced (even at a constant ambient temperature and no line voltage change), was anything

Fig. 4—Modifications in the circuit of Fig. 3, shown here, resulted in considerable improvement in frequency and amplitude stability



OR HIGH STABILITY

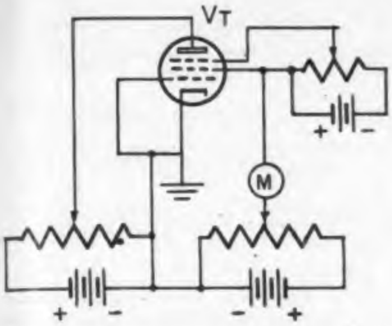


Fig. 5—Characteristic checking circuit used in determining negative resistance slope of tubes

from two cycles to fifty cycles. A small change in line voltage caused a departure of several hundred cycles at a frequency of 100 kc. In addition its mechanical construction was not simple.

The results with the electron-coupled oscillator were more gratifying. The experimental circuit used is shown in Fig. 2. To obtain high stability, a high ratio of C/L and a high Q inductance in the resonant circuit were used. The specified frequency range was easily covered. With a 25% line voltage variation, the frequency deviation at 100 kc was not more than 1.2 cycles and at 150 kc it was 2.5 cycles. With a change of ambient temperature of + 25° C, a frequency change of .002% per degree C was observed. Tube replacement had little effect on frequency, causing only a change of ± 3 cycles, as noted by exchanging ten tubes with the original tube. The output wave form, however, was slightly distorted, due to harmonic content and necessitated a tuned plate circuit. This increases the mechanical problems and decreases simplicity. Based upon these findings, further consideration of this circuit for use was temporarily abandoned.

There are several types described by various authors, of which the dynatron and transitron are perhaps the most widely known. From the engineering data available, the dynatron circuit was disregarded, since its operation depended on secondary emission which is subject to change with tube aging. The application of the transitron circuit appeared to provide the necessary characteristics.

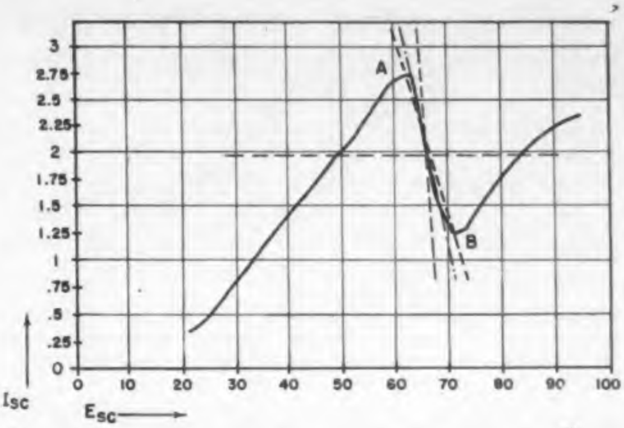


Fig. 6—Graph showing the static characteristics of the tube finally selected for the oscillator, a 6SK7

In studying the underlying principles of the transitron oscillator it became apparent that for the practical purposes demanded it showed the best possibilities.[1]

The possibility of using only RC constants for the oscillating circuit was deemed of value, some additional sources pointing to this fact.[2] The use of only RC elements in an oscillating circuit would naturally simplify operational matters, as well as constructional matters. A preliminary circuit was therefore set up as in Fig. 3. R_5 functioned as a fine frequency control and C_3, C_4, C_5, as a rough frequency control. Zero beat was obtained at 50 kc and the waveform was observed on an oscillograph. The stability of the circuit was poor; deviation up to several hundred cycles were noted. Incorporation of a voltage regulator did not improve matters.

Investigation showed that the instability was produced by the distorted waveform in the output, which had a large harmonic content. The variation of R_1 and R_2 in Fig. 3 did not improve the output waveform nor did close adjustments of other circuit parameters. Therefore, the pure RC application for the oscillator tank circuit constants was discarded.

Using the transitron circuits of Fig. 3, a number of changes were made, which resulted in the circuit as shown in Fig. 4. R_3 of Fig. 3 was replaced by an inductance L_1, and capacitor C. The plate circuit is by-passed by an 0.25 mfd. capacitor. A variable capacitor, C_1, was connected across the suppressor resistor for tuning the oscillator.

In the initial operation of the circuit good results were experienced, with L_1 equal to 8.3 mh and C_1 equal to 1200 mmfd. The coil used consisted of 400 turns on

[1]Reich "Application of Electron Tubes".
[2]Puckle "Trigger Circuits".

Fig. 7—Coupling of the load through an amplifier and cathode follower reduced reflections

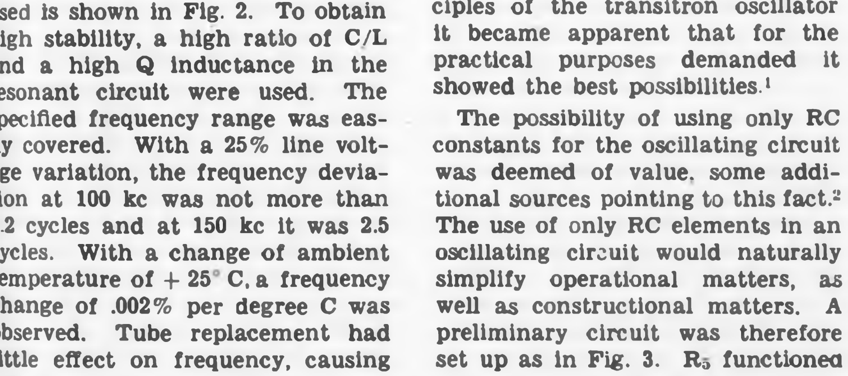
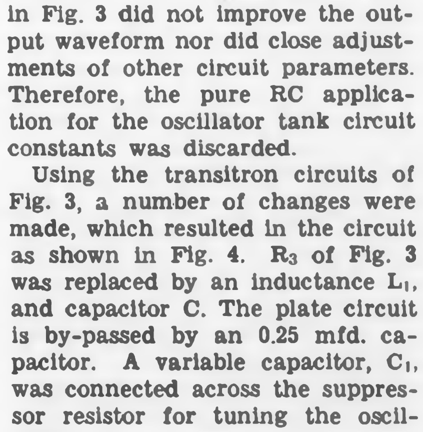


Fig. 8—Changing ground conditions on the chassis to B+ point gave notable improvements



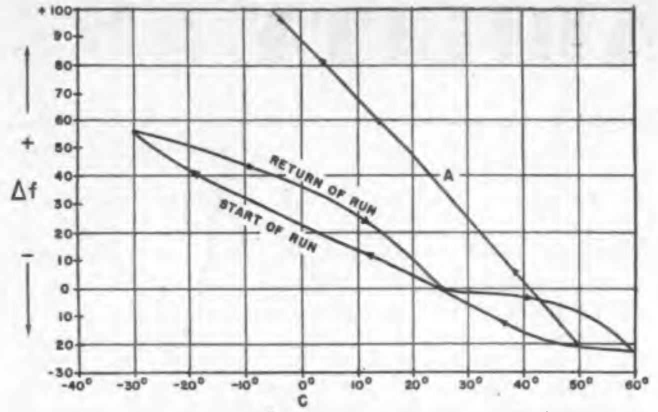


Fig. 9—Lower curve shows wide variation due to the mechanical support difficulties of the variable capacitor. With a single-end mounting initial and re-run (curve A) showed considerable improvement

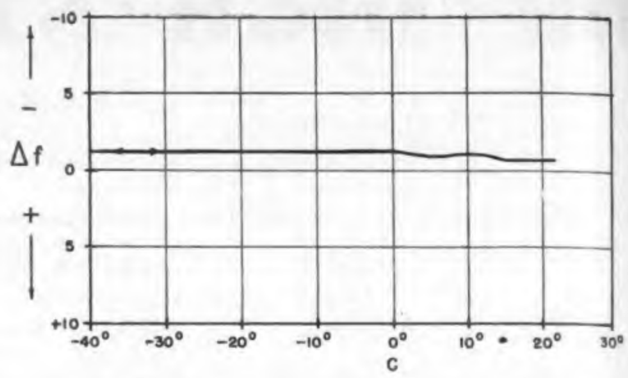


Fig. 10—Stability curve obtained with tuning elements under temperature control. The f and C are isolated from the chassis holding the oscillator tube. Here the run and return run are identical

a ⅜ in. diameter bobbin, of 19/41 Litz DSC. The observed waveform was slightly distorted. For good sine wave production a high Q circuit with a high C/L ratio was essential maintaining the correct operating point on the tube characteristic curve. Reducing L to 0.25 mh from its original value of 8.5 mh improved the waveform to a point where distortion was not observed on the oscillogram. C_1 was increased to a value of 0.046 mfd.

The stability measurements at ambient temperature of + 25° C for a period of 48 hours was ± 1 cycle. Changing the B supply and filament supply simultaneously ± 50% caused a change of less than 0.005 at 50 kc. These values given are the optimum values used and found workable. Any further increase in C_1 or decrease in L_1 stopped oscillations.

A variety of different tube types were tested, such as the 6SJ7, 1852/6AC7, 6J7, 954, 956, 837, etc. A variation in performance was noted, the negative resistance varied between tube types, although for same types, such as the 6SK7, any interchange from one tube to another showed that out of 25 tubes, 24 worked and oscillated ± 0.1 cycle of the set frequency. One showed erratic behavior but a reduction of C_1 produced normal operation.

Having established the desired stability with line voltage changes, a temperature test was made, the change in ambient temperature being from —10 deg. C to +60 deg. C. The maximum deviation was ± 4 cycles, at 50 kc.

A major problem was the large amount of C (.046 mfd.) to be made variable. Obviously the change required, 40 kc to 175 kc, necessitated an exceptionally large variable capacitor, in addition to a variable inductance. From the practical angle this did not seem advisable, and a number of measurements of C_1 and L_1 were made to determine a possible combination permitting coverage with a single control. The limits for LC were obtained by substituting various tubes for the same LC setting and noting oscillation effects.

Acorns are stable

The 956 acorn tube can be mentioned as an exceptionally stable tube in an oscillator using the transitron principle. In the experimental setup this tube showed good performance and excellent waveform, but with very low amplitude.

The circuit shown in Fig. 5 was used to determine the negative resistance slope of the tubes. Fig. 6 shows the graph as obtained from the tube finally selected for the oscillator, namely, a 6SK7. The curve shown was obtained under static conditions.

Operating points on the steep slope are difficult to measure because during the measurement, the action of the screen current is not a gradual one, but rather a sudden shift from the point A to point B. The factor δ obtained between point A and B determines the negative resistance. δ equals E_{sc} change versus I_{sc} change. For oscillation δ must be equal to or greater than the product of LC.

A number of measurements on coils showed that the actual Q necessary was not too critical, and a Q of 80 to 90 seemed to be sufficient to give good performance. Coils having a Q of 100 at 50 kc showed very little improvement over coils having a lower value. Oscillations were produced with coils having a Q ranging from 15 to 200. A significant observation was that the high Q coil caused a tendency toward instability with respect to supply voltage variations. To eliminate any possible unforseen operational problems from the data observed, a compromise value for L and C was reached. L_1 was fixexd at 0.48 mh and C was 0.021 mfd to give a frequency of 50 kc.

The coil L_1 was constructed in two sections (universal wound) 0.125 mh per section and so arranged as to permit series or parallel operation. With C equal to 0.021 mfd as the fixed unit, the variable C_1 was chosen to be equal to 1500 mmfd. This permitted a 1.2 kc tuning range at the lowest frequency, 42 kc. (L sections in series). To operate at higher frequencies a series of other fixed values could be connected into the circuit, thus gradually extending the circuit to 110 kc. At this point the coil connections are changed over to parallel operation and again

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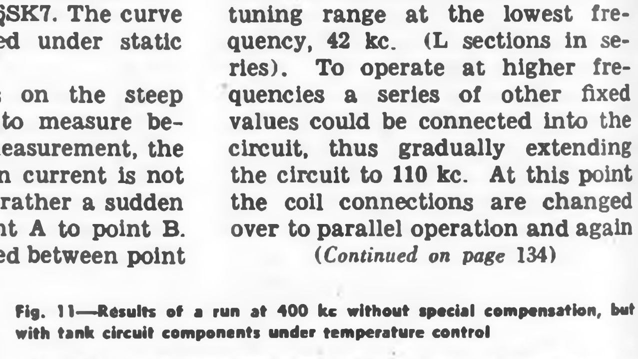
Fig. 11—Results of a run at 400 kc without special compensation, but with tank circuit components under temperature control



SURVEY of WIDE READING

Electronic news in the world's press. Review of engineering, scientific and industrial journals, here and abroad

Polarized Radiation

J. Grosskopf and K. Vogt (Hochfrequenztechnik und Elektroakustik, Berlin, Vol. 62, Nov. 1943).

A method for the generation of polarized radiation is proposed which is based on the properties of a horizontal dipole antenna arranged in close proximity to the ground.

Inspection of the formulae in this case shows that the vertical, radial and azimuthal components E_s, E_r and E_ϕ of the electric field strength depend on the azimuth ϕ which is the angle between the direction of the dipole and the direction of the reference point with respect to the center of the dipole antenna. (See Fig. 1.) In the directions ϕ equal to zero and 180 deg., the radiation will be horizontally polarized, in the directions ϕ equal to 90 deg. and 270 deg., the radiation will be vertically polarized and have an additional radial component. At intermediate position, an elliptically polarized radiation is obtained the plane of polarization in space being dependent on the radial component. These theoretical conclusions were supported by experiments.

Experiments

A horizontal dipole antenna, 9.3 meters long, was mounted 3.4 meters above ground so that it could be rotated around a vertical axis. The measuring instrument was located at a distance of 50 meters, it being 2.3 meters above ground. The frequency used was 14 mc. Fig. 2 illustrates the experimental results; for any azimuth ϕ as center half the polarization ellipsoid is plotted. This is a projection of the polarization ellipsoid onto a plane at right angles to the direction of propagation. A radial component of the field, not taken into account in this representation, would cause a rotation of the plane of the ellipsoid.

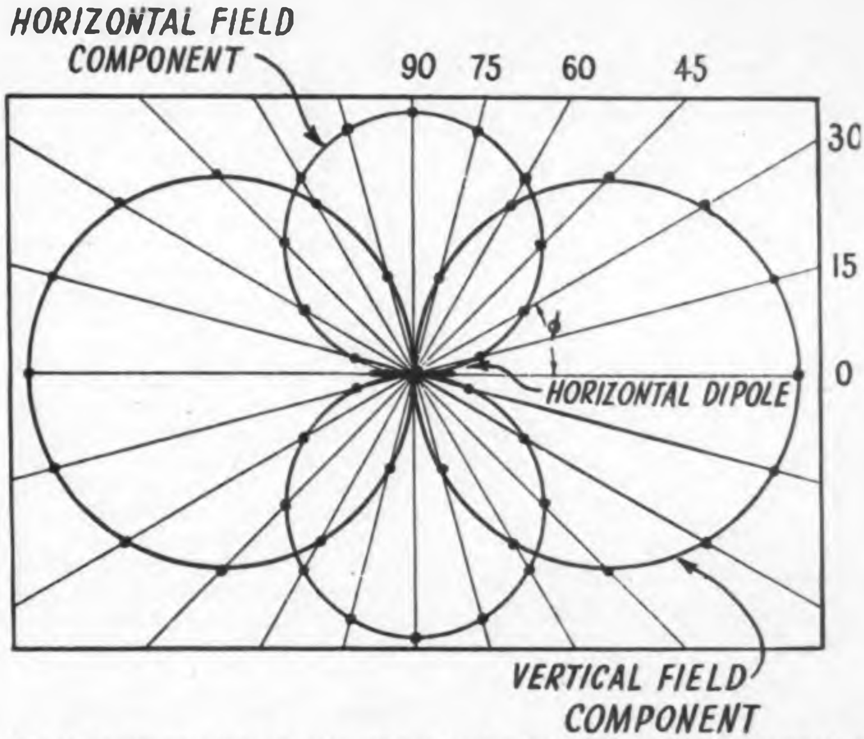
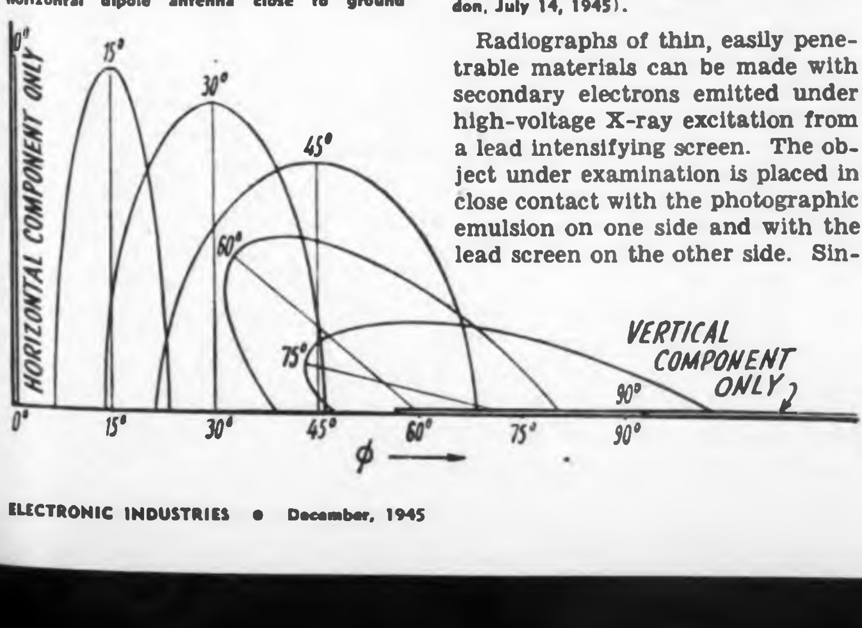


Fig. 1—Directional pattern of horizontal and vertical field components of horizontal dipole

Fig. 2—Polarization ellipsoids measured with horizontal dipole antenna close to ground



Secondary Electron Radiography

H. S. Tasker and S. W. Towers (Nature, London, July 14, 1945).

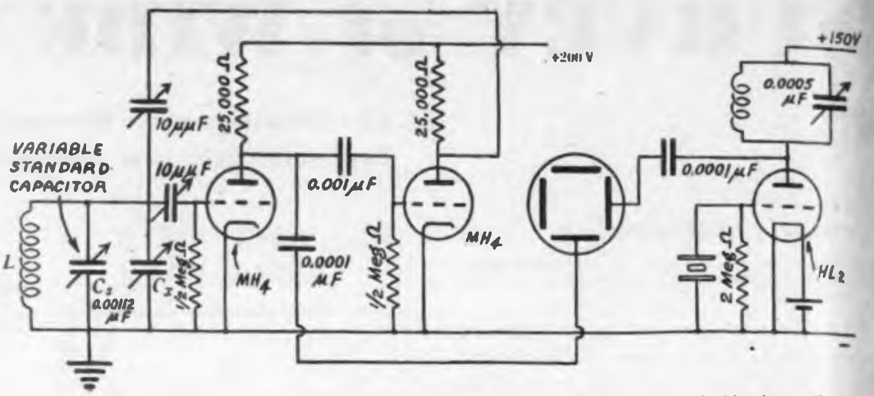
Radiographs of thin, easily penetrable materials can be made with secondary electrons emitted under high-voltage X-ray excitation from a lead intensifying screen. The object under examination is placed in close contact with the photographic emulsion on one side and with the lead screen on the other side. Single-coated film is preferable to double-coated as the electrons from the lead are almost completely absorbed by the film base and consequently affect only one emulsion. The second emulsion therefore only serves to increase the fog on the film due to the direct action of the X-rays. 150 kv X-rays can be employed, but better results are obtained at 200 kv.

Suitable materials for radiography by this technique include paper, plastic materials and certain botanical subjects. The method is particularly sensitive to differences in thickness, and records of paper structure, watermarks, and in some cases erasures, may be obtained from printed paper without interference from the printing since many printing inks give no radiographic image.

Reactance Meter

F. H. Gage (Journal of Scientific Instruments, London, July, 1945).

An apparatus for the measurement of capacitances or inductances is proposed to be used in instances when simplicity is more important than high sensitivity or accuracy.



Simple reactance meter comparing resonant frequencies by observation of Lissajous figures

To calibrate C_x, it is placed at its zero setting and C_s near its maximum setting. C_s is adjusted until a stationary Lissajous figure is observed; its reading is noted. C_x is now moved to the next calibration point and C_s adjusted to give the same Lissajous figure as before. The difference between the two readings on C_s gives the difference in the capacitance for the two positions on C_x. With care, it is possible to keep an approximately stationary figure on the screen by simultaneously adjusting both capacitors. This is useful if a high-ratio figure is observed. The residual capacitance of C_x can be found by ascertaining the difference on C_s, when C_x, already at its zero reading, is removed.

The frequency of the crystal oscillator has to be known if the inductance of coil L is to be determined. C_x is then omitted from the circuit. The procedure is obvious.

Instrument for Geophysical Prospecting

R. Guelke, Ph.D., Department of Electrical Engineering, University of Cape Town, South Africa (Journal of Scientific Instruments, London, August, 1945).

A method of geophysical prospecting, based on measuring the impedance of the ground, permits conclusions as to the presence of metal underneath the surface, the extent of the metallic ore layer and its location. Audio frequency current is passed through a long, straight wire stretched on the surface across the region to be investigated and two pick-up coils are placed at distant points on the ground. The amplitude and phase of the induced electromotive force in these two coils depend on the presence of metallic bodies buried in the ground. A number of measurements is made, coil 2 being placed on the point previously occupied by coil 1, and a graph of the relative intensity and phase shift is made over the region of interest.

Details of the audio frequency, vacuum tube generator, including the values of the components, are given; a tuning fork is used for frequency stabilization. The outputs of the coils are compared in a tuned bridge circuit, amplified, rectified and balance in the bridge indicated by a meter. A diagram of this circuit is also given and component values are noted in the article.

Square-Wave Generator

R. K. McCombs and F. C. Walz (Review of Scientific Instruments, September 1945).

The apparatus, designed for medical purposes, provides square-wave pulses of independently adjustable frequency, amplitude and pulse length. The frequency range is controlled by the potentiometer R_1 and extends from one cycle in several minutes to 20,000 cycles per second.

Tube T_3 is operated as a cathode follower. Its purpose is to couple amplifier T_1 to the saw-tooth generator without abstracting any energy, for this would cause frequency disturbances. Thyratron T_5 serves as a trigger. Position of potentiometer R_5 controls the pulse length from a minimum of 1/10 of a cycle to any desired value by varying both the grid bias of T_5 and the amplitude of the saw-tooth input. The magnitude of the output current may be changed by potentiometer R_8. T_6 being a pentode, the output current will be practically independent of the plate potential and consequently of the resistance of the subject in the output circuit.

With the maximum amplitude of 2 milliamperes, the resistance of the subject under treatment may be as great as 200,000 ohms; smaller amplitudes or a slight modification of the circuit permits the allowable resistance to be increased. Calibration procedure of the circuit is described in detail.

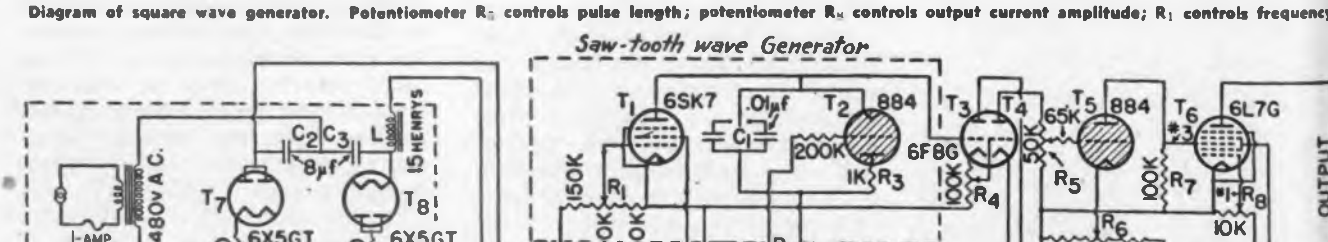
Loran System

L. S. Harley (Electronic Engineering, London, October, 1945).

The method is based on the fact that if two pulses are emitted from two spaced transmitters, the difference in time at which these pulses arrive at a receiver is an indication of the difference in distance of the receiver, which may be mounted on aircraft, from the two transmitter stations, respectively.

(*Continued on page* 140)

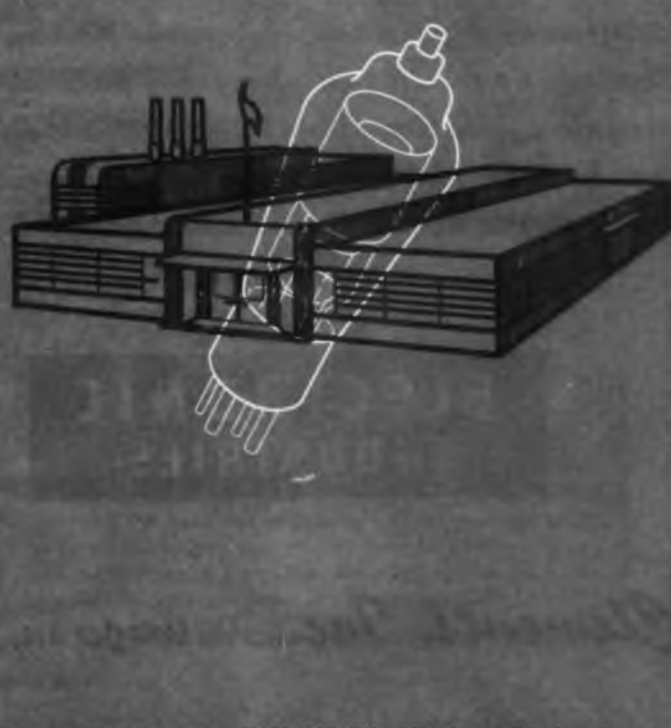
Diagram of square wave generator. Potentiometer R_5 controls pulse length; potentiometer R_8 controls output current amplitude; R_1 controls frequency



1945

ELECTRONIC ENGINEERING

DIRECTORY



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1945 ELECTRONIC ENGINEERING DIRECTORY

Believing that a directory is only as useful as its index, Electronic Industries has thoroughly cross-referenced all product listings under their various common names.

This is the only double-indexed directory of radio-electronic-television sources of supply. It is the most complete and up-to-date, having been totally compiled since VJ-Day. There is a special alphabetical listing of manufacturers for use as a "Finding List" in the event that you know a manufacturer's name and wish to know his product.

To find the manufacturer of any product, look first in the Index, beginning on this page. For example, "Counters, electronic 12-C", means that under Section 12, "Electronic Control Equipment", the letter "C" after a manufacturer's name indicates his ability to supply electronic counting devices.

USE THIS INDEX FOR QUICK REFERENCE

A

PRODUCT	CLASSIFICATION
Acoustic chambers	36-CH
Acoustic materials	35-AM
Acoustic phonographs	33-HW
Acrylics	27-A
Adhesives	25-A
Adjusting shims, speaker	36-S
Air cell batteries	4-AC
Air cleaners	19-AC
Aircraft landing control	30-ALC
Aircraft receivers	31-AL
Air capacitors, fixed	6-A
Airplane antenna	1-AA
Air trimmer capacitors	7-A
Alarms, boiler level	12-B
Alarms, burglar	12-AS
Albums, record	33-RA
Alundum grain	17-AG
Alignment tools	15-AT
All-wave (home)	1-AW
Alnico magnets	21-PM
Alternators	23-A
Altimeters (electronic)	30-AL
Aluminum	21-A
Aluminum tubing	21-AT
Amateur receivers	31-A
Amateur transmitters	39-A
AM combination receivers	31-PR
AM console receivers	31-PR
AM portable receivers	31-BP
AM-FM combination receivers	31-FM
Ammeters, indicating	20-A
Ammeters & milliammeters, recording	20-AF
Amplifiers, mobile	35-M
Amplifiers, musical instr.	35-E
Amplifiers, power	35-PA
Amplifiers, servo	12-SA
Amplifiers, speech input	39-SA
Amplifiers, voltage	35-PRE
Analyzers, color	18-C
Analyzers, gas	18-GA
Analyzers, harmonic	20-HA
Analyzers, internal combustion	13-IC
Analyzers, pulse	18-PA
Analyzers, radio set	20-R
Analyzers, surface	18-SM
Aniline-formaldehyde resin	27-AF
Annunciators	35-B
Anodes, graphite	41-AG
Anodes, metal	41-AM
Anoxia photometers	13-AP
Antenna kits	1-K
Antenna masts, home	1-T
Antenna reeling equipment	1-AR
Antenna transmission cable (rec)	42-AN
Antenna transmission cable (tr)	42-ANT
Antenna wire (receiving)	42-A
Antenna wire (transmitting)	42-AT
Assemblies, cable	42-CA
Attenuation meters	20-AM
Attenuators (precision)	34-A
Audiometers	13-A
Audio oscillators	18-SA
Audio transformers (receiving)	38-A
Auto antennas	1-A
Auto. code senders	39-AC
Automatic alarm receivers	31-AL
Automatic record changers	33-ARC
Automatic riveter	19-R
Automatic tuning units, mechanical	2-MS
Automatic tuning units, motor driven	2-PM
Automobile receivers	31-AU
Auto transformers	38-AU
Aviation receivers	31-AN
Aviation (xmitters)	39-AV

B

PRODUCT	CLASSIFICATION
Baffles, speaker	36-B
Balances, electronic	18-EB
Ballast tubes (regulating)	40-B
Ball bearings	21-BG
Band switches, receiver	37-W
Band switches, transmitter	37-WT
Barium	21-BA
Batteries, air cell	4-AC
Batteries, bias cell	4-BC
Batteries, dry cell	4-DC
Batteries, hearing aid	4-HB
Batteries, radio dry	4-R
Batteries, standard cells	4-C
Batteries, storage	4-S
Batteries, storage-non-spill	4-SN
Battery eliminators	29-BE
Battery portable receivers	31-BP
Battery testers	20-BT
Beads, insulating	17-IB
Bearing metals, porous	21-PB
Bearings	21-BG
Bell, buzzers	35-B
Bellows, metal	21-MB
Belts, dial	10-DC
Bench lathes	19-L
Beryllium	21-BR
Bias cell batteries	4-BC
Binding posts	16-BP
Bins & racks	5-B
Blades, hacksaw	15-HB
Blower units	19-B
Blueprint machines	11-BM
Boiler level alarms	12-B
Bolometers	18-R
Bombarders, V. T.	41-G
Bonded mica	17-BM
Brackets, mounting	16-MB
Brakes, metal forming	19-MF
Brass	21-B
Brass tubing	21-BT
Brazing compounds, silver	21-SB
Bridge transformers	38-B
Bridges	20-B
Broadcast monitor equip	39-TM
Broadcast studio equip.	39-SE
Broadcast transcriptions	33-BT
Broadcast (xmitters)	39-BC
Buffers and grinders	19-G
Bulbs, glass V.T.	41-GB
Burglar alarms	12-AS
Bushings, metallized	17-MB
Buzzers	35-B

C

PRODUCT	CLASSIFICATION
Cabinet molders, plastic	28-C
Cabinets, metal	5-M
Cabinets, plastic	28-C
Cabinets, salt-spray	18-SC
Cabinets, temperature control test	18-TT
Cabinets, wood	5-W
Cable, assemblies	42-CA
Cable, clamps	16-CC
Cable, coaxial	42-CC
Cable, connectors	16-C
Cable, insulated	42-IC
Cable, microphone	42-MC
Cable, shielded	42-S
Cable, shielded ignition	42-SI
Cable, UHF	42-SD
Cables, dial	10-DC
Calibrators	18-CA
Calibrators, pulse	18-PC
Call letter tabs	10-CL
Camera portable	31-CP
Can liners	17-CL
Capacitance relays	37-CR
Capacitance standards	6-ST
Capacitor checkers	18-C
Capacitor paper	17-CP
Capacitor specialties	18-C
Capacitors, air trimmer	7-A
Capacitors, ceramic trimmer	7-CT
Capacitors, compressed gas filled	7-CG
Capacitors, mica trimmer	7-M
Capacitors, neutralizing	7-N
Capacitors, precision	7-P
Capacitors, receiver tuning	7-RT
Capacitors, transmitter tuning	7-TT
Capacitors, vacuum	7-V
Capacity bridges	20-B
Capacity decade boxes	18-DC
Carbon & Graphite	21-CA
Carbon microphones	22-CAR
Cardiograph, electronic	13-EC
Carrier current systems	35-CC
Carrying bags	5-CB
Car-top speaker racks	35-CR
Cases, portable set	5-PC
Cast resin	27-CR
Castings, die	21-DC
Cathode ray oscillographs	18-O
Cathode ray tubes	40-CR
Cellulose acetate	27-C
Cellulose acetate butyrate	27-CB
Cellulose nitrate	27-CN
Cement	25-C
Ceramic insulated capacitors	6-C
Ceramic parts	17-C
Ceramic trimmer capacitors	7-CT
Changers, auto. record	33-ARC
Chassis	5-C
Chassis holders	15-CH
Chemicals, miscellaneous	25-MC
Chokes, filter	38-C
Chokes, R. F.	8-CH
Circle cutters	15-HC
Circuit analyzers	20-R
Circuit breakers	37-CB
Citizens' radio communication	39-CR
Clamps, antenna grounding	1-G
Clamps, cable	16-CC
Clamps, tube	16-TC
Cleaners, air	19-AC
Clips, grid	16-GC

PRODUCT	CLASSIFICATION
Clips, spring	16-SC
Cloth, tracing	11-TC
Cloths, speaker grille	36-GC
Coatings, insulating	17-IC
Coaxial cable	42-CC
Coaxial cable fittings	16-CF
Code recorders	32-CR
Code transmitters	39-CW
Coil dopes	25-CD
Coil forms	8-F
Coil insulating tape	17-ST
Coil shields	16-CS
Coil winding machines	19-CW
Coils, speaker field	36-F
Coils, special	18-L
Coin record players	33-CM
Color analyzers	20-C
Combustion controls	12-IC
Commercial receivers, AM	31-CA
Commercial receivers, FM	31-CF
Communication receivers, AM	31-CA
Communication receivers, FM	31-CF
Communicators, interoffice	35-I
Compressed gas	6-G
Compressed gas filled capacitors	7-CG
Condenser microphones	22-CON
Conductivity controls	12-CC
Cones, speaker	36-C
Connectors, cable	16-C
Connectors, tube	16-TB
Console receivers	31-PR
Construction kits	31-CK
Contact microphones	22-CT
Contact points	16-CM
Control consoles	39-CC
Control tubes, voltage	40-VC
Controls, servo	12-SC
Converters	23-CON
Converters, FM receiver	31-FV
Copper tubing	21-CT
Cords attachment	42-CO
Cords, dial	10-DC
Cords, resistance	42-RC
Core materials, laminated	21-CM
Core materials, powdered	21-CP
Cortical stimulator	13-C
Cosmic ray tubes	40-GM
Counters, electric	37-C
Counters, electronic	12-C
Counters, Geiger-Mueller	18-GM
Counters, impulse	20-IC
Counters, traffic	12-TR
Counting devices	12-C
Couplings	16-CP
Crackle finishes	25-WF
Cradles, chassis	15-CH
Crystal calibrators	18-CA
Crystal cartridges	9-C
Crystal electrodes	9-CE
Crystal grinders	19-CG
Crystal headphones	36-HC
Crystal holder	9-H
Crystal I. F. Filter	9-S
Crystal lapping discs	19-LD
Crystal microphones	22-CRY
Crystal ovens, temp. controlled	9-T
Crystal production equipment	9-CP
Crystal saw blades	19-C
Crystal speakers	36-CS
Crystals, dial	10-C
Crystals, quartz	9-QC
Crystals, rochelle salt	9-R
Crystals, tourmaline	9-TO
Current transformers	38-T
Cutters, hand	15-SC
Cutters, hole	15-HC
Cutting heads	32-CH
Cutting machines for quartz	19-QC

D

DC generators	23-DC
Decade boxes, capacity	18-DC
Decade boxes, inductance	18-DI
Decade boxes, resistance	18-RD
Decalcomanias	10-DE
Decibel meters	20-OM
Deflection yokes	38-DY
Demagnetizers	15-DM
Densitometers, photo-elect	20-PE
Detectors, lie	13-L
Dial cables & belts	10-DC
Dial crystals	10-C
Dial drive rubbers	10-DR
Dial escutcheons	10-E
Dial lamps	10-L
Dial light assem.	10-PL
Dial locks	10-DL
Dial pointers	10-P
Dial scales	11-F
Dials, complete	10-D
Dials, telephone	10-T
Diathermy	13-D
Die castings	21-DC
Dielectric heating	13-HD
Dies	19-D
Differential relays	37-DR
Dimension controls	12-DC
Dimension gauges, electric	20-EG
Direction finding receivers	31-DF
Direction finding transmitters	39-DF
Directional antennas	1-LA
Discs (blank)	32-D
Distortion meters	20-D
Door controls	12-D
Dopes, coil	25-CD

PRODUCT	CLASSIFICATION
Drafting instruments	11-DI
Drafting tables	11-DT
Drawing papers	11-D
Drill press	19-P
Drills, electric	15-D
Drills, hand	15-HD
Drills, twist	15-T
Drive rubbers	10-DR
Drives, worm	10-WD
Dry cell batteries	4-DC
Dry electrolytic capacitors	6-ED
Drying, infra-red equipment	13-ID
Dummy antenna	1-DA
Dynamic headphones	36-HD
Dynamic microphones	22-DYN
Dynamotors	23-DYN

E

Earphones, crystal	36-HC
Electric counters	37-C
Electric dimension gauge	20-EG
Electric drills	15-D
Electric erasers	11-EE
Electric etchers	15-EE
Electric furnaces	19-E
Electric generators, AC	23-A
Electric generators, DC	23-DC
Electric micrometer	20-EM
Electric motors	23-M
Electric phonographs	33-EL
Electric power plants	23-AC
Electric wave filters	18-E
Electro-cardiograph	13-EC
Electrodes, crystal	9-CE
Electrodes, welding	19-PW
Electro-dynamic speakers	36-D
Electro-encephalograph	13-EE
Electrolytic dry	6-ED
Electrolytic wet	6-EW
Electronic balances	18-EB
Electronic battery chargers	3-VC
Electronic hygrometers	20-EH
Electronic megaphones	35-EM
Electronic musical equip.	35-E
Electronic switches	18-ES
Electronic tube rectifiers	29-VT
Electronic viscosimeters	20-VC
Electronic voltmeters	20-VT
Electron microscopes	13-E
Electron multiplier tubes	40-EM
Electroplater	15-E
Electro-sedative gen.	13-EG
Electro-shock machines	13-S
Electrostatic VM	20-E
Enamels	25-E
Encephalograph, electronic	13-EE
Engraving machines	19-EM
Envelopes, glass, V.T.	41-GB
Equalizers recording	32-E
Equalizing filters	18-EF
Erasers, electric	11-EE
Escutcheons	10-E
Etchers, electric	15-EE
Ethyl cellulose	27-EC
Exciters, photo-cell	26-L
Exposure meters	20-L
Extruded shapes, plastic	28-E
Eyelets	16-FA

F

Fabricators, plastic	28-F
Fabrics, varnished	17-VF
Face plates, tuning dial	11-E
Faces or scales	10-F
Facilities for mfg.	19-MG
Facsimile (home)	31-FH
Facsimile (radiophoto)	31-FR
Facsimile transmitters	39-FAC
Farm radios	31-F
Fasteners	16-FA
Feeder spreaders	1-FS
Felt-flock turntable	33-F
Fence controller transformers	38-FA
Fibre	17-F
Fibre-glass	17-FG
Field coils, speaker	36-F
Field exciters, speaker	36-FE
Field strength meters	20-F
Filament wire	42-FW
Film recorders	32-F
Filter chokes	38-C
Filter, crystal, I. F.	9-S
Filters, equalizing	18-EF
Filters, power supply	24-P
Filters, R. F. noise	24-S
Filters, wave	18-E
Fixed composition resistors	34-FC
Fixed frequency receivers	31-FF
Fixed wirewound resistors	34-FW
Flashlight storage batteries	4-SN
Flat woven cable	42-FL
Flaw detectors, metal	13-MF
Flexible couplings	23-F
Flexible metal hose	21-H
Flexible shaft control heads	14-CH
Flexible shaft control units (complete)	14-CU
Flexible shaft fittings	14-F
Flexible shafts	14-FS
Float switch	37-F
Flow controls	12-F
Fluorescent lamp starters	37-FS
Fluorescent lamp units	6-FS

PRODUCT	CLASSIFICATION
Fluorescent materials	41-F
Fluorescent reactors	38-R
Fluoroscope screens	13-F
Flux, fluid	15-SF
Flux, paste	15-SP
FM-AM combination receivers	31-FM
FM antennas	1-TL
FM converters	31-FV
FM receivers, home	31-FM
FM signal generators	18-SF
FM transmitters	39-FM
Foils, tin, lead, etc.	21-FO
Frequency calibrators	18-CA
Frequency changers, vibrators	29-VF
Frequency deviation monitors	20-FO
Frequency measuring devices	20-FM
Frequency meters	20-FM
Frequency monitors	20-FR
Frequency records	33-FR
Frequency response recorders	20-FS
Frequency spectrum analyzers	18-RA
Frequency standard crystals	9-F
Frequency standards	9-F
Friction tape	17-FT
Furnaces, electric	19-E
Fused quartz parts	41-Q
Fuse holders	16-FH
Fuses	16-F

G

Galvanometers	20-G
Galvanometers, recording	18-OD
Gas analyzers	18-GA
Gas engine chargers	3-G
Gas engine generators	23-ENG
Gaseous tubes, special	40-G
Gases, rare, for V.T.	41-RG
Gas filled capacitors	6-G
Gaskets	16-GA
Gauges	15-G
Gauges, ionization	20-IG
Gauges, vacuum	20-VG
Geared tuning units	2-GC
Gears	16-GE
Geiger-Mueller counter	18-GM
Geiger-Mueller tubes	40-GM
Generator controls, electronic	12-MC
Generators, AC electric	23-A
Generators, audio frequency	18-SA
Generators, gas engine	23-ENG
Generators, hand cranked	23-HC
Generators, high frequency	23-HF
Generators, pulse	18-PG
Generators, radio frequency	18-SR
Generators, square wave	18-SW
Generators, video pattern	18-VP
Geophysical instruments	13-GI
Germicidal lamps	13-GL
Getters	41-G
Glass capacitors	6-G
Glass bonded mica	17-GM
Glass tubing	17-G
Glue	25-A
Grading & sorting controls	12-G
Graphic recorders	32-RG
Graphite	21-CA
Graphite anodes	41-AG
Greases, vacuum	25-VG
Grid clips	16-GC
Grid & supports	41-GS
Grille cloths, speaker	36-GC
Grinders	19-G
Grinders, crystal	19-G
Grommets	16-G
Ground clamps	1-G
Grounding springs	1-GS
Guy wire	42-G

H

Hacksaw blades	15-HB
Hammers, plastic	15-H
Hand cranked chargers	3-HC
Hand cranked gen.	23-HC
Hand cranked power units	29-HC
Hand drills	15-HD
Hand micrometers	15-HM
Hand telephone sets	22-T
Hand wound phonographs	33-HW
Handi-talkies	39-CR
Handles, leather	5-L
Harmonic analyzers	20-HA
Harmonic generators	18-MV
Harness, radio	42-H
Headphones, crystal	36-HC
Headphones, dynamic	36-HD
Headphones, hearing aid	36-HA
Headphones, magnetic	36-HM
Hearing aid batteries	4-HB
Hearing aid headphones	36-HA
Hearing aid microphones	22-HA
Hearing aids	35-H
Heat treating controls	12-HC
Heat treating equipment	19-E
Heating, dielectric	13-HD
Heating, induction	13-I
Hermetic seals, V.T.	41-TS
HF assemblies	1-HF
HF generators	23-HF

PRODUCT	CLASSIFICATION
High frequency heating	13-HD
High frequency induction heating	13-I
High frequency resis. slug	34-HR
High frequency speakers, crystal	36-CS
High volt testers breakdown	20-B
High voltage wire	42-HV
Hinges, cabinet hdwe.	16-H
Holders, crystal	9-H
Holders, fuse	16-FH
Hole cutters	15-HC
Hook-up wire	42-HU
Horns, speaker	36-PH
Hose, metal	21-H
Humidity controls	12-H
Hygrometers, electronic	20-EH

I

I. F. coils	8-IF
I. F. filter crystals	9-S
Ignition cable, shielded	42-SI
Impedence bridges	20-B
Impregnating equipment	19-IM
Impulse counter	20-IC
Indicators, pressure	20-PM
Indicators, radar proximity	30-PI
Indicators, servo	12-SI
Indicators, temperature	13-TI
Inductance decade boxes	18-DI
Inductance specialties	18-L
Inductance standards	18-L
Inductance trimmer units	2-IT
Induction heating	13-I
Industrial capacitors	6-I
Industrial fixed resistors	34-I
Industrial and power rectifiers	40-I
Infra-red drying equipment	13-ID
Inks, marking	25-M
Inspection lenses	15-L
Inspection mirrors	15-M
Instrument parts	20-MP
Insulated cable	42-IC
Insulated wire	42-HU
Insulating beads	17-IB
Insulation coatings	17-IC
Insulating compounds	25-I
Insulating machines, wire	19-WI
Insulating tape for coils	17-ST
Insulation, fibre	17-F
Insulation, fibre-glass	17-FG
Insulation, mica	17-M
Insulation, paper	17-P
Insulation, plastic	17-PL
Insulation, rubber	17-RI
Insulation, silicone	17-SM
Insulation testers	20-IT
Insulators	1-I
Insulators, ceramic	17-C
Insulators, stand-off	17-SO
Intercommunicators	35-I
Interference analyzers	24-IA
Interference locators	24-I
Internal combustion analyzers	13-IC
Intrusion alarms	12-AS
Inverters	29-INV
Ionization gauges	20-IG
Iron (SVEA metal)	21-I
Irons, soldering	15-SI
Isolation transformers	38-B

J

Jacks	16-J
Jewel pilot lights	10-JL
Jigs and fixtures	19-J

K

Key switch	37-SK
Keys, code	39-K
Kits, antenna	1-K
Kits, receiver construction	31-CK
Klystron tubes	40-VM
Knife switches	37-SK
Knob puller	15-KP
Knob springs	10-KS
Knobs, molded	10-KM
Knobs, wooden	10-KW

L

Lacquers	25-L
Laminated core materials	21-CM
Laminates	27-L
Lamps, dial	10-L
Lamps, exciter	26-L
Lamps, germicidal	13-GL
Landing controls, aircraft	30-ALC
Lapping discs, crystal	19-LD
Lathes, bench	19-L
LC meters	20-WM
Lead foil	21-FO
Lead screws, recording	32-S
Lead, tin alloys	21-LT
Leads, V.T. sealed	41-TS
Leather handles, straps	5-L
Lenses	18-LE
Lenses, inspection	15-L
Lever controls	12-L
Lie detectors	13-L
Light intensity	20-I
Light meters	20-I
Light supplies, photo elect.	26-L

PRODUCT	CLASSIFICATION
Lighting controls	12-LC
Lighting equipment	11-L
Lightning arresters	1-L
Lights, pilot	10-JL
Line cords	42-CO
Line cords, resistance	42-RC
Links, solderless	16-LI
Litzendraht wire	42-L
Locator, metal	13-ML
Lock nuts	16-NL
Lock washers	16-WL
Locks, dial	10-P
Locks, shaft	10-SL
Loop antennas	1-LA
Loud speaker baffles	36-B
Loud speaker cabinets	36-CH
Loud speaker cones	36-C
Loud speaker field coils	36-F
Loud speaker, crystal	36-CS
Loud speakers, electrodynamic	36-D
Loud speakers, magnetic	36-M
Loud speakers, permanent magnet	36-PM
Lubricants, special	25-SL
Lugs, soldering	16-SL
Lugs, solderless	16-L

M

PRODUCT	CLASSIFICATION
Machine safety controls	12-MS
Magnesium alloys	21-MA
Magnet wire	42-M
Magnetic headphones	36-HM
Magnetic speakers	36-M
Magnetic wire recorders	32-MT
Magnetron tubes	40-VM
Magnets, permanent	21-PM
Magnifiers	18-LE
Marine receivers	31-M
Marine navigational radar	30-MN
Marine (xmitters)	39-M
Markers, X-ray pattern	19-X
Marking inks	25-M
Marking and numbering machines	19-MN
Master systems	1-MS
Masts, home antenna	1-T
Mechanical automatic selectors	2-MS
Megaphones, electronic	35-EM
Megohm meters	20-MO
Melamines	27-M
Mercury arc rectifiers	29-MA
Mercury relays	37-M
Mercury switches	37-MS
Metal anodes	41-AM
Metal bellows	21-MB
Metal cabinets	5-M
Metal coated steel	21-CS
Metal finishing service	21-MF
Metal flaw detection	13-MF
Metal forming equipment	19-MF
Metal locator	13-ML
Metal stampings	21-S
Metal tubing	21-ML
Metals	21
Metallic rectifier chargers	3-MC
Metallic rectifiers	29-M
Metallized bushings	17-MB
Meter calibrators	18-CA
Meter parts	20-MP
Meteorological trans. & rec.	13-M
Meters, distortion	20-D
Meters, frequency deviation	20-FO
Meters, light	20-L
Mfg. facilities	19-MG
Mica	6-M
Mica	17-M
Mica, bonded	17-BM
Mica, glass bonded	17-GM
Mica parts	41-M
Mica trimmer capacitors	7-M
Micrometers, electric	20-EM
Micrometers, hand	15-HM
Microphone cable	42-MC
Microphone connectors	22-CTR
Microphone springs	22-SPR
Microphone stands	22-STD
Microphone transformers	38-MT
Microphones, carbon	22-CAR
Microphones, condenser	22-CON
Microphones, contact	22-CT
Microphones, crystal	22-CRY
Microphones, dynamic	22-DYN
Microphones, hearing aid	22-HA
Microphones, velocity	22-VEL
Microscopes, electron	13-E
Mike cable	42-MC
Mike cable transformers	38-MT
Miniature control motors	23-MM
Miniature tubes	40-MT
Mirrors, inspection	15-M
Mobile amplifiers	35-M
Mobile transceivers	39-AU
Modulation meters	20-MM
Moisture meters	13-MM
Moisture proofing compounds	25-WC
Molding compounds, record	32-RP
Molding presses	19-MP
Molybdenum	21-M
Monitor equip., bdcst.	39-TM
Monitors, deviation	20-FO
Motor generator chargers	3-MG
Motor & generator controls	12-MC
Motor starters	23-MS
Motors	23-M
Motors, automatic tuning	2-M
Motors, remote control	23-MM
Motors, selsyn	23-S
Motors, turntable	23-T
Mounting brackets	16-MB
Mountings, shockproof	16-SM
Multi-meters	20-M
Multiplier, electron tube	40-FM
Multivibrators	18-MV
Musical instr. amplifiers	35-E
Musical instruments, electronic	35-E

N

PRODUCT	CLASSIFICATION
Name plates	10-N
Navigational radar	30-MN
Needles	33-N
Needles (cutting)	32-CN
Neg. temp. coeff. resis.	34-N
Neon test lights	20-N
Neutralizing capacitors	7-N
Nickel	21-N
Nickel tubing	21-NT
Noise meters	24-IA
Noise locators	24-I
Numbering machines	19-MN
Nuts	16-N
Nuts, lock and self-locking	16-NL

O

PRODUCT	CLASSIFICATION
Ohmmeters	20-O
Oil	6-O
Optical equipment	18-OE
Oscillator crystals	9-F
Oscillators, audio	18-SA
Oscillators, frequency modulated	18-SF
Oscillators, tuning fork	18-TO
Oscillators, ultrasonic	18-SO
Oscillators, video-range	18-VO
Oscillographs, cathode ray	18-O
Oscillographs, direct-writing	18-OD
Oscilloscopes (radar)	30-O
Outlets	1-O
Output meters	20-OM

P

PRODUCT	CLASSIFICATION
Package wrapping controls	12-P
Paging systems	35-I
Paint	25-P
Panel signal lights	10-S
Panels	5-P
Panoramic receivers	31-PN
Panoramic indicators	18-RA
Paper capacitors	6-P
Paper	17-P
Paper, capacitor	17-CP
Paper, drafting	11-D
Paper, sensitized	11-SP
Paper tubing	17-PT
Parts bins	5-B
Parts molders, plastic	28-P
Pattern markers, X-Ray	19-X
P. E. densitometers	20-PE
Pencils and accessories	11-P
Pens, drafting	11-DI
Permanent magnets	21-PM
PH meters	20-PH
Phantom antennas	1-DA
Phase angle meters	20-P
Phenols	27-PH
Phono pickups, crystal	33-PC
Phono pickups, dynamic	33-D
Phono pickups, magnetic	33-PM
Phonograph motors	23-T
Phonograph needles	33-N
Phonograph records	33-R
Phonograph turntables	33-TT
Phonographs, electric	33-EL
Phonographs, hand wound	33-HW
Phono-radio combinations	31-PR
Phosphor bronze	21-SC
Photo-cell relays	26-R
Photo cells	26-PC
Photo-electric controls	26-EE
Photometers	26-PM
Photometers, anoxia	13-AP
Phototubes	40-PH
Pickups (crystal)	33-PC
Pickups (dynamic)	33-D
Pickups (magnetic)	33-PM
Pilot light assemblies	16-PL
Pilot lights	10-JL
Pin straightener	15-TS
Pins, solderless	16-PS
Pins, vacuum tube base	41-BP
Plan-position indicators	30-PPI
Plastic cabinets	28-C
Plastic fabricators	28-F
Plastic, laminated	27-L
Plastic materials	27
Plastic molders	28-P
Plastic molding presses	19-MP
Plastics	17-PL
Plastics, extruded	28-E
Platers, electric	15-E
Plates, escutcheon	10-E
Plates, name	10-N
Plating services	21-MF
Platinum	21-P
Pliers	15-P
Plug-in condensers	6-PF
Plug-in resistors (tubes)	34-PT
Plug-in transformers	38-PT
Plugs	16-P
PM drivers	36-PD
PM dynamic speakers	36-PM
Pocket radios	31-CP
Points, contact	16-CM
Polarized relays	37-RP
Police receivers	31-PL
Police (xmitters)	39-P
Polyethylene	27-PE
Polystyrene	27-P
Polystyrene insulated cap.	6-PO
Porous bearing metals	21-PB
Portable AM-FM receivers	31-BP
Portable radios, battery	31-BP
Portable radios, pocket	31-CP
Portable set cases	5-PC
Portable transceivers	39-CR
Position controls	12-PC
Potentiometers, slide-wire	34-S
Potentiometers, variable	34-V
Pots, solder	15-ST
Powdered iron cores	21-CP
Powdered metal press	19-PM
Power amplifiers	35-PA
Power filter chokes	38-C
Power filters	24-P
Power level meters	20-OM
Power plants	23-AC
Power, receiving-transmitting transformers	38-P
Power rectifier tubes	40-I
Power rheostats	34-PR
Power supplies, regulated	18-PR
Power supplies, unregulated	18-PU
Power supplies, vibrator	29-VP
Preamplifiers	35-PRE
Precision capacitors	7-P
Precision resistors	34-PRE
Preforms, record	32-RP
Presses, plastic molding	19-MP
Presses, powdered metal	19-PM
Presses, punch	19-PP
Pressure controls	12-VC
Pressure measurements	20-PM
Pressure switch	37-PS
Pressure welding electrodes	19-PW
Print making machines	11-BM
Printing controls	12-PT
Projector horns	36-PH
Proximity indicators	30-PI
Public address amplifiers	35-PA
Pulse generators	18-PG
Pumps, vacuum	19-VP
Punch press	19-PP
Punches	15-PU
Push button switch	37-PB
Push button trimmer units (complete)	2-PT
Push button tuners (complete, motor driven)	2-PM
Pyrometers	20-T

Q

PRODUCT	CLASSIFICATION
Q meter	20-QE
Quartz crystals	9-QC
Quartz cutting machines	19-QC
Quartz, fused parts	41-Q
Quartz, raw	9-Q

R

PRODUCT	CLASSIFICATION
Racks	5-R
Racks, car-top speaker	35-CR
Radar, aircraft landing	30-ALC
Radar altimeters	30-AL
Radar, navigational	30-MN
Radar oscilloscopes	30-O
Radar receivers	30-R
Radar repeaters	30-RP
Radio dry batteries	4-R
Radio harness	42-H
Radio receivers, AM home	31-PR
Radio set analyzers	20-R
Radio set filters	24-S
Radio spectrum analyzers	18-RA
Radio-phono combinations	31-PR
Radiophoto receivers	31-FR
Radiophoto transmitters	39-FAC
Radio-recorder combinations	31-RC
Radios, AM-FM comb.	31-FM
Radios, farm	31-F
Radioteletype transmitters	39-RT
Radio-television comb.	31-TC
Railroad receivers	31-RR
Railroad antennas	1-RR
Rare gases	41-RG
Ratchet wrenches	15-RW
Raw quartz	9-Q
Razon receivers	30-R
RCM radar receivers	30-R
Reactors, fluorescent	38-R
Receiver-recorder combinations	31-RC
Receiver tuning capacitors	7-RT
Receivers, AM home	31-PR
Receivers, console home	31-PR
Receivers, direction finder	31-DF
Receivers, fixed frequency	31-FF
Receivers, marine	31-M
Receivers, panoramic	31-PN
Receivers, police	31-PL
Receivers, radio-phono comb.	31-PR
Receivers, railroad	31-RR
Receivers (RGM, razon, X band)	30-R
Receivers, table AM	31-PR
Receiving tubes	40-R
Receptacles, plug	16-J
Record changers, auto	33-ARC
Record compounds	33-RC
Record players, coin	33-CM
Record players, hand-wound	33-HW
Record players, transcription	33-TR
Record preforms and molding compounds	32-RP
Record pressers	33-RM
Recorder-radio combinations	31-RC
Recorders, code	32-CR
Recorders, dielectric const.	20-DC
Recorders, film	32-F
Recorders, frequency response	20-FR
Recorders, graphic	32-RG
Recorders, magnetic wire	32-MT
Recorders, sound level	20-S
Recording cutters	32-CH
Recording discs	32-D
Recording equalizers	32-E
Recording machine assm.	32-RA
Recording machines	32-RM
Recording motors	32-TT
Recording needles	32-CN
Recording services	33-RS
Recording turntables	32-TT
Records	33-R
Records, freq. test	33-FR
Records, sound effect	33-S
Rectifier power units	29-PU
Rectifier tubes, industrial	40-I
Rectifiers, battery electric	3-VC
Rectifiers, electronic	29-VT
Rectifiers, mercury arc	29-MA
Rectifiers, metallic	29-M
Reflection meters	20-RM
Regulated power supplies	18-PR
Regulating transformers	38-VR
Regulating tubes	40-B
Regulator tubes, voltage	40-VC
Relays	37-R
Relays, capacitor	37-CR
Relays, differential	37-DR
Relays, mercury	37-M
Relays, photo-cell	26-R
Relays, polarized	37-RP
Relays, stepping	37-SR
Relays, time delay	37-TD
Reliefs, strain	16-ST
Remote control motors	23-MM
Remote control tuners	2-R
Remote controllers	35-RC
Repairing, vacuum tube	41-TR
Repeaters, radar	30-RP
Resins	25-R
Resins, cast	27-CR
Resins, vinyl	27-V
Resistance cords	42-RC
Resistance decade boxes	18-RD
Resistance specialties	18-R
Resistance standards	34-PRE
Resistance wire	42-R
Resistors, fixed composition	34-FC
Resistors, fixed wirewound	34-FW
Resistors, high freq. slugs	34-HR
Resistors, neg. coeff.	34-N
Resistors, plug-in	34-PT
Resistors, precision	34-PRE
Resistors, variable	34-V
Resonators, UHF	41-C
Retaining rings	16-RR
R. F. chokes (receiving)	8-CH
R. F. chokes (transmitting)	8-RT
R. F. coils (receiving)	8-RF
R. F. coils (transmitting)	8-T
R. F. oscillators	18-SR
Rheostats, power	34-PR
Ribbon microphones	22-VEL
Rings, retaining	16-RR
Riveter, automatic	19-R
Rivets	16-R
Rochelle salt crystals	9-R
Rotary beam	1-RB
Rotary selector switches	37-SL
Rotatable transformers	38-RT
Rubber, dial drive	10-DR
Rubber insulation	17-RI
Rubber shielding	16-SR

S

PRODUCT	CLASSIFICATION
Safety control, machine	12-MS
Safety interlocks	37-S
Safety terminals	16-STE
Salt-spray cabinets	18-SC
Saw blades, crystal	19-C
Scales, dial	10-F
Scales & tapes	15-SA
Screen, wire	21-WC
Screens, X-ray fluoroscope	13-F
Screw machine products	21-SP
Screwdrivers	15-SD
Screws	16-S
Screws, self-tapping	16-SS
Screws, set	16-ST
Sedative generator, electronic	13-EG
Selenium cells	26-PC
Self locking nuts	16-NL
Self-tapping screws	16-SS
Selsyns, etc.	23-S
Sensitized papers	11-SP

PRODUCT	CLASSIFICATION
Servo amplifiers	12-SA
Servo control systems	12-SI
Servo inuicating systems	12-SI
Set analyzers	20-R
Set screws	16-ST
Shaft locks	10-SL
Shafts, flexible	14-FS
Shake tables	19-VC
Sheet metal	21-SH
Shielded ignition wire	42-SI
Shielded wire	42-S
Shielding, rubber	16-SR
Shielding, wire	42-WS
Shields, coil	16-CS
Shields, tube	16-TS
Shims, speaker adjusting	36-S
Shock machines, electronic	13-S
Shockproof mounts	16-SM
Short wave antennas	1-HF
Short wave diathermy	13-D
Side cutters	15-SC
Signal generators, A.F.	18-SA
Signal generators, F.M.	18-SF
Signal generators, R.F.	18-SR
Signal generators, video pattern	18-VP
Signal generators, video-range	18-VO
Signal lights, panel	10-S
Signal tracers	20-SG
Silicone compounds	27-S
Silicone materials	17-SM
Silver brazing alloys	21-SB
Silver & compounds	21-AG
Silvered mica	6-S
Slide switches	37-SS
Slide-wire potentiometers	34-S
Smoke density controls	12-S
Socket wrenches	15-SW
Sockets, dial light	10-PL
Sockets, tube	16-SKT
Solder	15-S
Solder flux, liquid	15-SF
Solder flux, paste	15-SP
Solder pots	15-ST
Soldering iron stands	15-SS
Soldering iron tips	15-SE
Soldering irons (etc.)	15-SI
Soldering lugs	16-SL
Soldering machines	19-SM
Solderless links	16-LI
Solderless lugs	L
Solderless pins	16-PS
Solenoid valves	12-SV
Solenoids	37-SO
Solid dielectric-UHF wire	42-SD
Solvents	25-S
Sorting controls, electronic	12-G
Sound effect records	33-S
Sound level meters & recorders	20-S
Sound recording machines, prof.	32-RM
Sound systems (complete)	35-SS
Spark plug suppressors	34-SU
Speaker baffles	36-B
Speaker cabinets	36-CH
Speaker cones	36-C
Speaker field coils	36-F
Speaker field exciters	36-FE
Speaker grille cloths	36-GC
Speaker racks, car-top	35-CR
Speaker shims, adjusting	36-S
Speaker stands	36-ST
Speakers, crystal	36-CS
Speakers, electrodynamic	36-D
Speakers, magnetic	36-M
Speakers, PM dynamic	36-PM
Special gaseous tubes	40-G
Special lubricants	25-SL
Special tubes	40-ST
Spectographic equipment	18-S
Speech amplifiers	39-SA
Speech input consoles	39-CC
Spot welders	19-S
Spring clips	16-SC
Spring contact metals	21-SC
Spring motors, phono	33-HW
Spring testing equip.	20-ST
Springs	16-SP
Springs, antenna grounding	1-GS
Springs, knob	10-KS
Square wave gen.	18-SW
Stainless steel	21-ST
Stamped parts, tube	41-S
Stampings	21-S
Standard capacitors	6-ST
Standard cells	4-C
Standard inductors	18-L
Standard resistors	34-PRE
Stand-off insulators	17-SO
Stand-offs, antenna	1-I
Stands, soldering iron	15-SS
Stands, speaker	36-ST
Staple driver	15-SH
Starters, fluorescent lamp	6-FS
Starters, fluorescent lamp	37-FS
Starters, motor	23-MS
Steel, metal coated	21-CS
Steel, stainless	21-ST
Steel tubing	21-FT
Stepping relays	37-SR
Stethaphones	22-S
Stethegraphs and stethophones	13-ST
Stimulators, cortical	13-C
Stools	11-ST
Storage batteries	4-S
Storage-non-spill batteries	4-SN
Strain gauges	19-SG
Strain reliefs	16-ST
Straps, leather	5-L
Strippers, wire	15-WS
Strips, terminal	16-T
Stroboscopes	18-ST
Studio control consoles	39-CC
Studio equipment	39-SE
Studios, recording	33-RS
Styli, recording	32-CN
Sun lamps	13-GL
Suppressor resistors	34-SU
Surface analyzers	18-SM
SVEA metal	21-I
Switch, pressure operated	37-PS
Switches, electronic	18-ES
Switches, float type	37-F
Switches, key	37-SK
Switches, knife	37-SK
Switches, mercury	37-MS
Switches, push-button	37-PB
Switches, receiver band	37-W
Switches, rotary	37-SL
Switches, slide	37-SS
Switches, solenoid	37-SO
Switches, thermal	37-T
Switches, time	37-TE
Switches, toggle	37-TO
Switches, transmitter band	37-WT
Switches, tuning	2-S
Switches, vacuum	37-V

T

PRODUCT	CLASSIFICATION
Table model receivers	31-PR
Tables, drafting	11-DT
Tabs, call letter	10-CL
Tachometer	20-TA
Tachometer, stroboscopic	18-ST
Tantalum	21-TA
Tape, coil insulating	17-ST
Tape, friction	17-FT
Tapes, measuring	15-TS
Telegraph keys	39-K
Telephone dials	10-T
Telephone handsets	22-T
Teletype, radio	39-RT
Television combinations	31-TC
Television converters	31-TV
Television & FM antennas	1-TL
Television receivers	31-TC
Television transmitters	39-T
Television tubes	40-TT
Temperature compens. cap.	6-TC
Temperature controls	12-TC
Temperature indicators	13-TI
Temperature indicators, elect.	20-T
Temperature test cabinets	18-TT
Terminal strips	16-T
Terminals	16-TE
Terminals, safety	16-STE
Test records, phono	33-FR
Testers, battery	20-BT
Testers, insulation	20-IT
Testers, tube	20-TT
Thermal switches	37-T
Thermistors	18-R
Thermocouples	20-TH
Thermometers & pyrometers	20-T
Thermostatic metals	21-TM
Time controls	12-TI
Time delay relays	37-TD
Time measurement	20-TM
Timers	37-TE
Tin alloys	21-LT
Tinfoil	21-FO
Tips, soldering iron	15-SE
Toggle switches	37-TO
Tourmaline crystals	9-TO
Towers & supports (home)	1-T
Tracing cloth	11-TC
Traffic controls	12-TR
Transceivers, mobile	39-AU
Transceivers, portable	39-CR
Transcriptions, broadcast	33-BT
Transformer coils & windings	38-CW
Transformers, audio	38-A
Transformers, auto	38-AU
Transformers, current	38-T
Transformers, plug in	38-PT
Transformers, power	38-P
Transformers, welding	38-WT
Translators, FM receiver	31-FV
Trans. measuring set	20-TR
Transcription record players	33-TR
Transmission cable, antenna	42-AN
Transmission monitor equip.	39-TM
Transmitter keys	39-K
Transmitter tuning capacitors	7-TT
Transmitters, amateur	39-A
Transmitters, aviation	39-AV
Transmitters, broadcast	39-BC
Transmitters, code	39-CW
Transmitters, direction finding	39-DF
Transmitters, facsimile	39-FAC
Transmitters, F. M.	39-FM
Transmitters, marine	39-M
Transmitters, police	39-P
Transmitters, television	39-T
Transmitting	6-T
Transmitting tubes	40-T
Trays & tote baskets	5-T
Trimmer capacitors, air	7-A
Trimmer capacitors, ceramic	7-OT
Trimmer capacitors, mica	7-M
Trimmer condenser units	2-CU
Trimmer units, inductance	2-IT
Tube base pins	41-BP
Tube bases	41-B
Tube cavities	41-C
Tube clamps	16-TC
Tube connectors	16-TB
Tube grids	41-GS
Tube pin straightener	15-TS
Tube pullers	15-TP
Tube repairing	41-TR
Tube seal leads	41-TS
Tube shields	16-TS
Tube sockets	16-SKT
Tube testers	20-TT
Tubes, bases	41-B
Tubes, glass bulbs	41-GB
Tubes, television types	40-TT
Tubes, transmitting	40-T
Tubing, aluminum	21-AT
Tubing, brass	21-BT
Tubing, copper	21-CT
Tubing, glass	17-G
Tubing, monel metal	21-ML
Tubing, nickel	21-NT
Tubing, paper	17-PT
Tubing, steel	21-FT
Tubing, varnished	17-T
Tungsten	21-T
Tuning capacitors, receiver	7-FT
Tuning capacitors, transmitter	7-TT
Tuning fork oscillators	18-TO
Tuning forks	20-TF
Tuning motors	2-M
Tuning units, geared	2-GC
Tuning units, mechanical auto.	2-MS
Tuning units, remote	2-R
Turntable felt, phono	33-F
Turntable motors	23-T
Turntables	33-TT
Turntables, recording	32-TT
Twist drills	15-T

U

PRODUCT	CLASSIFICATION
UHF antennas	1-RA
UHF cable	42-SD
UHF cavities	41-C
UHF wave guides	42-W
Ultrasonic oscillators	18-SO
Ultra violet generators	13-GL
Urea	27-U

V

PRODUCT	CLASSIFICATION
Vacuum capacitors	7-V
Vacuum cond.	6-V
Vacuum gauges	20-VG
Vacuum greases	25-VG
Vacuum pumps	19-VP
Vacuum switches	37-V
Vacuum tube bases	41-B
Vacuum tube getters	41-G
Vacuum tube grids	41-GS
Vacuum tube machinery	19-VM
Vacuum tube mica parts	41-M
Vac. tube voltmeters	20-VT
Vacuum tubes, miniature	40-MT
Vacuum tubes, receiving	40-R
Vacuum tubes, special	40-ST
Vacuum tubes, television	40-TT
Vacuum tubes, transmitting	40-T
Valves, solenoid	12-SV
Variable resistors	34-V
Varnish	25-V
Varnished fabrics	17-VF
Varnished tubing	17-T
Velocity microphones	22-VEL
Velocity modulated tubes	40-VM
Ventilators	19-B
Vest pocket receivers	31-CP
Vibration analyzers	20-VM
Vibration control equipment	19-VC
Vibration measuring equip.	20-VM
Vibration testers	19-VC
Vibrator freq. changers	29-VF
Vibrator power packs	29-VP
Vibrator rectifier chargers	3-V
Vibrators	29-V
Video pattern generators	18-VP
Video-range oscillators	18-VO
Vinyl resins	27-V
Viscosimeters	20-VC
Vises	15-V
Voltage amplifiers	35-PRE
Voltage control tubes	40-VC
Voltage regulating transformers	38-VR
Voltage regulator tubes	40-VC
Voltage regulators	29-VR
Voltmeters	20-V
Voltmeters, electrostatic	20-E
Voltmeters, vacuum tube	20-VT
Volume controls	34-VC
Volume indicators	20-VI
Vu meters	20-OM

W

PRODUCT	CLASSIFICATION
Walkie-talkies	39-CR
Washers, brass	16-WB
Washers, felt	16-WF
Washers, fibre	16-FW
Washers, lock	16-WL
Washers, plastic	16WP
Washers, rubber	16-WR
Waterproofing comp.	25-WC
Watt-hour meters	20-WH
Watt meters	20-W
Wave analyzers	20-WA
Wave change switches (receiver)	37-W
Wave change switches (transmitter)	37-WT
Wave filters	18-E
Wave guides	42-W
Wave meters	20-WM
Wax	25-W
Weight controls	12-WC
Welders, spot	19-S
Welding controls	12-WE
Welding transformers	38-WT
Wet electrolytic capacitors	6-EW
Wheatstone bridges	20-B
Wind driven chargers	3-W
Wind velocity meter	13-WM
Winders, coil	19-CW
Windings, transformer	38-CW
Windows, dial	10-C
Wire antenna (receiving)	42-A
Wire antenna (transmitting)	42-AT
Wire, hook-up	42-HU
Wire insulating machine	19-WI
Wire, guy	42-G
Wire, high voltage	42-HV
Wire, litzendraht	42-L
Wire, magnet	42-M
Wire recorders	32-MT
Wire, resistance	42-R
Wire screen cloth	21-WC
Wire, shielded	42-S
Wire, shielded ignition	42-SI
Wire shielding	42-WS
Wire strippers	15-WS
Wood cabinets	5-W
Worm drives, dial	10-WD
Wrapping controls, package	12-P
Wrenches, ratchet	15-RW
Wrenches, socket	15-SW
Wrinkle finish	25-WF

X

PRODUCT	CLASSIFICATION
X band receivers	30-R
X-Ray diffraction equipment	13-XD
X-Ray fluoroscope screens	13-F
X-Ray inspection machines	13-X
X-Ray intensity meters	13-XM
X-Ray, pattern markers	19-X
X-Ray screen & filters	13-XS
X-Ray tubes	40-X

Y

PRODUCT	CLASSIFICATION
Yokes, deflection	38-DY

Z

PRODUCT	CLASSIFICATION
Zirconium	21-Z

THIS DIRECTORY IS DOUBLE INDEXED

***Product Index*—refers you to the page on which manufacturers in a certain category are listed.**

***Alphabetical Index*—gives you a complete "Finding List" and refers you to the main classification under which a manufacturer is listed.**

ELECTRONIC ENGINEERING DIRECTORY

Listings of all products and items entering into radio, radar, and industrial electronic equipment

(1) Antennas & Accessories

Airplane antenna	AA
All-wave (home)	AW
Antenna reeling equipment	AR
Auto	A
Dummy antenna	DA
Feeder spreaders	FS
Ground clamps	G
Grounding springs	GS
HF assemblies	HF
Insulators	I
Kits	K
Lightning arresters	L
Loop antennas	LA
Master systems	MS
Outlets	O
Railroad	RR
Rotary beam	RB
Television & FM	TL
Towers & Supports (home)	T

Aeronautical Radio Mfg. Co., 155 First St., Mineola, L. I., N. Y.—AA, I, LA
Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—LA
Aireon Mfg. Corp., Fairfax & Funston Rds., Kansas City 15, Kan.—AA, LA
Airplane & Marine Instruments, Inc., Clearfield, Pa.—LA, RR
Airtronics Development Corp., 131-133 E. Third St., Dayton 2, Ohio—HF
Alpha Wire Corp., 50 Howard St., New York 13, N. Y. G, I, K, L, MS, TL
American Bridge Co., Frick Bldg., Pittsburgh, Pa.—TL, T
American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22, Ill.—MS
American Communications Corp., 306 Broadway, New York, N. Y.— A, W, G, K, LA. MS, O
American Radio Hardware Co., 152-4 MacQuesten Parkway, S., Mt. Vernon, N. Y.—I
Amy, Aceves & King, Inc., 11 W. 42nd St., New York 18, N. Y.—"Multicoupler"—AW, MS, O, TL
Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.—AW
Andrew Co., 363 E. 75th St., Chicago 19, Ill.—HF
Ansonia Electrical Co., 63 Main St., Ansonia, Conn.—TL
Atlas Products Corp., 30 Rockefeller Plaza, New York 20, N. Y.—G
Atlas Sound Corp., 1443 39th St., Brooklyn 18, N. Y. TL, T
Barker & Williamson, Upper Darby, Pa.—DA, FS, HF, I, K, LA, MS, RB, TL
Bassett, Rex, Inc., 307-11 N. W. 1st Ave., Ft. Lauderdale, Fla.—AA, LA
Belden Mfg. Co., P. O. Box 5070A, Chicago 80, Ill.—AW, G, I, K, L
Bendix Aviation Corp., Bendix Radio Div., E. Joppa Rd., Baltimore, Md.—RR
Birco—Birnbach Radio Co.
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N. Y.—"Birco"—AW, FS, G, I, K, L, TL
Bittermann Electric Co., 50 Henry St., Brooklyn 2, N. Y.—LA
Blaw Knox Co., Blaw Knox Div., Box 1198, Pittsburgh 30, Pa.—TL, T
Charles J. Bodnar Co., 68 Marbledale Rd., Tuckahoe 7, N. Y.—"BRL"—TL
Brach Mfg. Corp., L. S., 55 Dickerson St., Newark 4, N. J.—AW, A, HF, TL, T
BRL—Charles J. Bodnar Co.
Bud Radio, Inc, 2118 E. 55th St., Cleveland 3, Ohio—FS, I
Burton-Rogers Co., 857 Boylston St., Boston 16, Mass.—A
Carborundum Co., Globar Div., Niagara Falls, N. Y.—DA, L
Centralab Div. of Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—I
Clampipe—Mueller Electric Co.
Columbia Wire & Supply Co., 4106 N. Pulaski Rd., Chicago 41, Ill.—AW, K, TL
Commercial Radio Sound Corp., 575 Lexington Ave., New York 22, N. Y.—AW, MS, TL
Communication Parts, 1101 N. Paulina St., Chicago 22, Ill.—DA, HF, LA
Communications Co., Inc., 300 Greco Ave., Coral Gables 34, Fla.—AA, DA, LA, RR
Continental-Diamond Fibre Co., Newark 50, Del.—I
Copperweld Steel Co., Glassport, Pa.—AA, G
Cook Ceramic Mfg. Co., 500 Prospect St., Trenton, N. J.—I
Corning Glass Works, Corning, N. Y.—"Pyrex"—I
Cornish Wire Co., Inc., 15 Park Row, New York 7, N. Y.—"Noise-Master"—AW, G, HF, K, L
Dalmo Victor, Div. of Goldfield Consolidated Mines Co., 1414 El Camino Real, San Carlos, Calif.—AA
Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—AA, DA, HF
DeMornay-Budd, Inc., 475 Grand Concourse, New York 51, N. Y.—HF
Diamond Instrument Co., North Ave., Wakefield, Mass.—AA, DA
Dielectric Products Co., Inc., 125 Virginia Ave., Jersey City 5, N. J.—RB, TL
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—A, FS, G, O
Doolittle Radio, Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.—AA, A, HF
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—LA
D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—AW, LA
Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza, S., Long Island City 1, N. Y.—G, K
Electrical Reactance Corp., Franklinville, N. Y.—AW, A, LA
Electro-Marine Co., 274 Madison Ave., New York 16, N. Y.—HF, O
Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—AA
Electronic Plumbing Corp., 311 Nepperhan Ave., Yonkers 2, N. Y.—HF, TL
Electronic Research Corp., 2635 W. 19th St., Chicago 8, Ill.—TL
Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—HF
Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—AA
Elkay Radio Products, 305-9 E. Walnut St., Oglesby, Ill.—K
Erco Radio Laboratories, Inc., 231 Main St., Hempstead, L. I., N. Y.—AA, A, LA
Essex Electronics, 1060 Broad St., Newark 2, N. J.—LA
Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, L. I., N. Y.—LA
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—A, HF, RB, TL
Fischer-Smith, Inc., 162 State St., West Englewood, N. J.—A
Fleron, M. M., & Son, Inc., 113 N. Broad St., Trenton, N. J.—"Fleron"—AW, G, I, K, L, O, TL, T
Franklin Airloop Corp., 175 Varick St., New York 14, N. Y.—LA
Franklin Mfg. Corp., A. W., 175 Varick St., New York 14, N. Y.—LA
Gardiner Mfg. Co., 2711 Union St., Oakland 7, Calif.—T
Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—A, K, LA
General Ceramics & Steatite Corp., Crows Mill Rd., Keasbey, N. J.—I
General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—AR, LA
General Winding Co., 420 W. 45th St., New York 19, N. Y.—"Gen-Win"—AW, HF, TL
Gen-Win—General Winding Co.
Gussach Machined Products Co., 10-20 45th Rd., Long Island City 1, N. Y.—AA, AW, LA
Harco Tower, Inc., 1180 E. Broad St., Elizabeth 4, N. J.—TL, T
Hardwick, Hindle, Inc., 40 Hermon St., Newark 5, N. J.—DA
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—AW, LA, TL
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—AA, LA
Heath Co., 305 Territorial, Benton Harbor, Mich.—AA, AR, K, LA
Higgins Industries, Inc., 2221 Warwick Ave., Santa Monica, Calif.—HF
Howard Pacific Corp., 932 N. Western Ave., Los Angeles 27, Calif.—HF
ICA—Insuline Corp. of America
Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—"ICA"—AW, A, I, K, L, LA, TL
International Derrick & Equipment Co., 875 Michigan Ave., Columbus 8, Ohio—TL, T
International Products Corp., 2554 Greenmount Ave., Baltimore 18, Md.—AR, I.
Intex Co., 303 W. 42nd St., New York 18, N. Y.—A
Islip Radio Mfg. Corp., Islip, N. Y.—AA, AR, LA
Isolantite, Inc., 343 Cortlandt St., Belleville 9, N. J.—FS, HF, I
Jacksonville Metal Mfg. Co., 247 Riverside Ave., Jacksonville 4, Fla.—T
Jefferson, Inc., Ray, 40 E. Merrick Rd., Freeport, L. I., N. Y.—HF
J.F.D. Mfg. Co., 4117 Fort Hamilton Parkway, Brooklyn 19, N. Y.—"JFD"—AW, A, I, K, LA, TL
Johnson Co., E. F., Waseca, Minn.—DA, FS, I, RB
Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif.—A
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—G, L
Kent, Walter A., Co., 2826 W. 55th St., Chicago, Ill.—TL
Kings Electronics Co., 372 Classon Ave., Brooklyn 5, N. Y.—AA, DA, HF, I
Krischer Metal Products Co., 631-7 Kent Ave., Brooklyn 11, N. Y.—G
Lapp Insulator Co., Inc., 24 Craigie St., Le Roy, N. Y.—DA, FS, I
Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.—AA, AW, A, HF, TL
Lehigh Structural Steel Co., 17 Battery Place, New York, N. Y.—T
Lenoxite Division, Lenox, Inc., 65 Prince St., Trenton 5, N. J.—I
Lewyt Corp., 60 Broadway, Brooklyn 11, N. Y.—HF

ALPHABETICAL "FINDING LIST"— See Page D-48

An exclusive 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, addess, etc., use Alphabetical "Finding List" at end of this Product Section

Linge & Son, John E., Inc., 28th St. & Buren Ave., Camden, N. J.—TL

Link, Fred M., 125 W. 17th St, New York 11, N. Y.—A, HF, TL

Littelfuse, Inc., 4757 Ravenswood Ave., Chicago 40, Ill.—L

Locke Insulator Corp., P. O. Box 57, Baltimore 3, Md. —I

Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.—I

Maguire Industries, 1437 Railroad Ave., Bridgeport, Conn.—HF, RB

McInerney Plastics Co., 25 Commerce Ave., S.W., Grand Rapids 2, Mich.—I

Mec-Rad Division of Black Industries, 1400 E. 222nd St., Cleveland 17, Ohio—AA, HF, TL

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—LA

Mendelsohn Speedgun Co., 457 Bloomfield Ave., Bloomfield, N. J.—O

Millen Mfg. Co., James, Inc., 150 Exchange St., Malden 48, Mass.—DA, FS, HF, I

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—AA, AB

Mueller Electric Co., 1583 E. 31st St., Cleveland 14, Ohio—"Clampipe"—"Universal"—G

Multicoupler—Amy, Aceves & King

Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—LA

Mycalex Corp. of America, 60 Clifton Blvd., Clifton, N. J.—I

M & Z Industrial Development Co., 32 W. 12th St., Bayonne, N. J.—TL

National Ceramic Co., 400 Southard St., Trenton 2, N. J.—I

National Tile & Mfg. Co., 1200 E. 26th St., Anderson, Ind.—I

New England Radiocrafters, 1156 Commonwealth Ave., Boston 34, Mass.—HF

Noise-Master—Cornish Wire Co., Inc.

Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—HF

Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill.—DA

Pacific Clay Products, SteaPactite Div., 306 W. Ave. 26, Los Angeles 31, Calif.—I

Philson Mfg. Co., Inc., 156 Chambers St., New York 7, N. Y.—A, TL

Pilot Radio Corp., 37-06 36th St., Long Island City 1, N. Y.—AW

Pioneer Specialty Co., 5100 St. Jean Ave., Detroit 13, Mich.—A

Plymold Corp., Lawrence, Mass.—T

Porcelain Products, Inc., Findlay, Ohio—I

Precision Parts Co., 1200 North Main St., Ann Arbor, Mich.—LA

Premax Products, Div. Chisholm-Ryder Co., Inc., 4612 Highland Ave., Niagara Falls, N. Y.—AW, RB

Publix Metal Prod. Inc., 100 6th Ave., New York 13, N. Y.—RB

Pyrex—Corning Glass Works

Radex Corp., 53 W. Jackson Blvd., Chicago 4, Ill.—DA, LA

Radiart Corp., 3571 W. 62nd St., Cleveland 2, Ohio—A, TL

Radio Craftsman, 1341 S. Michigan Ave., Chicago 5, Ill.—LA

Radio Transceiver Laboratories, 8717 117th St., Richmond Hill, N. Y.—A, HF, RB

Raytron, Inc., 209 E. Washington Ave., Jackson, Mich. —HF, MS, O, TL, T

Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio—T

Rice's Sons, Bernard, 325 Fifth Ave., New York 16, N. Y.—AA, DA, HF, TL

Rogers Diesel & Aircraft Corp., 1120 Leggett Ave., New York 59, N. Y.—AR

Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—I

Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—AR

Schuttig & Co., Ninth & Kearny Sts., N.E., Washington 17, D. C.—HF

Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—AA

Selectar Mfg. Corp., 21-10 49th Ave., Long Island City 1, N. Y.—HF

Shakespeare Products Co., 241 E. Kalamazoo Ave., Kalamazoo, Mich.—AA, AW, AR, A, TL, T

Shur-Antenna-Mount, Inc., 272 Sea Cliff Ave., Sea Cliff, N. Y.—HF, MS, TL, T

Small Motors, Inc., 1322 Elston Ave., Chicago 22, Ill. —DA, LA

Snyder Mfg. Co., 22nd & Ontario Sts., Philadelphia 40, Pa.—A, G, T

Special Products Co., 9115 Brookville Rd., Silver Spring, Md.—A, TL

Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y. LA

Spirling Products Co., 64 Grand St., New York 13, N. Y.—AA, AW, AR, A, DA, FS, G, GS, HF, I, K, L, LA, MS, TL

Stamford Metal Specialty Co., 428 Broadway, New York 13, N. Y.—DA, G

Standard Engineering Laboratories, 40 S. Oak Knoll Ave., Pasadena 1, Calif.—HF, K, MS, TL

Standard Winding Co., 44-62 Johnes St., Newburgh, N. Y.—LA

States Co., 19 New Park Ave., Hartford 6, Conn.—DA

Stoddart Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—HF

Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—I

Summerill Tubing Co., Bridgeport, Pa.—AA, A

Superior Tube Co., Norristown, Pa.—AW, A, RB, TL

S-W Inductor Co., 1056 Wood St., Chicago 22, Ill. —AR, LA

Taco—Technical Appliance Corp.

Technical Appliance Corp., 516 W. 34th St., New York 1, N. Y.—"Taco"—AA, AW, DA, G, HF, I, K, L, MS, O, TL, T

Technical Radio Co., 275 9th St., San Francisco, Calif.—HF

Telicon Corp., 851 Madison Ave., New York 21, N. Y. —MS, TL

Thermionic Engineering Corp., 32 W. 12th St. Plant—631 Broadway, Bayonne, N. J.—HF, TL

Thompson Co., John E., 1440 W. 47th St., Chicago 9, Ill.—AW, RB, TL

Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York 14, N. Y.—DA, TL, T

Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.—G

Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill.—DA

U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—AW

Universal—Mueller Electric Co.

Universal Clay Products Co., 1523 First St., Sandusky, Ohio—I

Van Huffel Tube Corp., Warren, Ohio—AA

Vidal Research Corp., Central Airport, Camden 1, N. J. —T

Ward Products Corp., 1523 E. 45th St., Cleveland 3, Ohio—AW, A, TL

Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—I, O.

Wincharger Corp., E. 7th at Division, Sioux City 6, Iowa—HF, TL, T

Wind Turbine Co., West Chester, Pa.—K, TL, T

Winters & Crampton Corp., Grandville, Mich.—AA, A, HF, RB, TL

Workshop Associates, 66 Needham St., Newton Highlands 61, Mass.—AA, AW, A, DA, HF, K, LA, TL, T

USE THE INDEX

If you want to know what manufacturers make a certain type of product, use the Product Index to get the page on which the manufacturers are listed.

If you know a manufacturer's name and want to know his principal product, use the Alphabetical "Finding List" which follows the classified listings.

(2) Automatic Tuning Units & Parts

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

Acro Electric Co., 1305 Superior Ave., Cleveland 14, Ohio—S

Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—R

Aladdin Radio Industries, Inc., 225 W. Jackson Blvd., Chicago, Ill.—IT

Alliance Mfg. Co., Alliance, Ohio—M

American Radio Hardware Co., 152-4 MacQuesten Pkwy. S., Mt. Vernon, N. Y.—S

Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—R

Automatic Mfg. Corp., 900 Passaic Ave., East Newark, N. J.—IT, PT, CU

Barker & Williamson, Upper Darby, Pa.—GC, MS, PM, R, S

Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—IT

Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, N. Hollywood, Calif.—R

Centralab Div. of Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—S, CU

Cline Electric Mfg. Co., 4550 W. Lexington Ave., Chicago, Ill.—PM, R

Communication Parts, 1101 N. Paulina St., Chicago 22, Ill.—IT, PT

Croname, Inc., 3701 N. Ravenswood Ave., Chicago 13, Ill.—GC, MS, R

Diamond H—Hart Mfg. Co.

Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—MS, R, S

Doolittle Radio, Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.—R

Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza, S., Long Island City 1, N. Y.—R

Electrical Reactance Corp., Franklinville, N. Y.—MS, PM, PT, R, S, CU

Electro Motive Mfg. Co., South Park & John St., Willimantic, Conn.—CU

Essex Electronics, 1060 Broad St., Newark 2, N. J. —IT

Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y.—M

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—R, S

Fractional Motors Co., 1501 N. Halsted St., Chicago 22, Ill.—M

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—S

General Winding Co., 420 W. 45th St., New York 19, N. Y.—"Gen-Win"—PT

Gen-Win—General Winding Co.

Globe Industries, Inc., 125 Sunrise Place, Dayton 7, Ohio—M

Grayhill, 1 N. Pulaski Rd., Chicago 24, Ill.—S

Hart Mfg. Co., 110 Bartholomew Ave., Hartford 1, Conn.—R, S—"Diamond H" Switches

Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—CU

J.F.D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn 19, N. Y.—"JFD"—S

Kings Electronics Co., 372 Classon Ave., Brooklyn 5, N. Y.—CU

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—S

Kollsman Instrument Division, Square D Co., 88-08 45th Ave., Elmhurst, L. I., N. Y.—R, M

Kulka Electric Mfg. Co., 30 South St., Mt. Vernon, N. Y.—S

Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—MS

Lewis Engineering Co., 52 Rubber Ave., Naugatuck, Conn.—S

Madison Electrical Products Corp., 78 Main St., Madison, N. J.—"Mepco"—M

Mepco—Madison Electrical Products Corp.

Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—CU

Mallory, P. R., & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind.—"Yaxley"—"Mallory"—S

Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—CU

Monitor Controller Co., 51 S. Gay St., Baltimore 2, Md.—PM, S

Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—PT, S, CU

National Co., Inc., 61 Sherman St., Malden 48, Mass. —CU

New England Radiocrafters, 1156 Commonwealth Ave., Boston 34, Mass.—S

Oak Mfg. Co., 1260 Clybourn Ave., Chicago 10, Ill.—"Oak"—GC, MS, PM, S

Philharmonic Radio Corp., 528 E. 72nd St., New York 21, N. Y.—PM, R

Pilot Industries, Inc., 202 E. 44th St., New York 17, N. Y.—GC

Precision Parts Co., 1200 N. Main St., Ann Arbor, Mich.—IT, CU

Publix Metal Prod., Inc., 100 Sixth Ave., New York 13, N. Y.—GC

Radex Corp., 53 W. Jackson Blvd., Chicago 4, Ill.—M

Reeves Sound Laboratories, Div. Reeves-Ely Laboratories, Inc., 215 E. 91st St., New York 28, N. Y.—R

Self Winding Clock Co., Inc., 475 Fifth Ave., New York 17, N. Y.—GC, MS, PM, R, M

Shakespeare Products Co., 241 E. Kalamazoo Ave., Kalamazoo, Mich.—R

Sickles, F. W., Co., 165 Front St., Chicopee, Mass. —IT, PT, CU

Small Motors, Inc., 1322 Elston Ave., Chicago 22, Ill.—M

Smith, F. A., Mfg. Co., Union & Augusta, Rochester 2, N. Y.—M

Sorensen & Co., Inc., 375 Fairfield Ave., Stamford, Conn.—R

Stackpole Carbon Co., P. O. Box 327, St. Marys, Pa. —"Stackpole"—S

Stoddart Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—R

Stow Mfg. Co., Inc., Binghamton, N. Y.—R

S-W Inductor Co., 1056 Wood St., Chicago 22, Ill.—IT, PM

Taller & Cooper, 75 Front St., Brooklyn 1, N. Y.—GC, MS, PM, PT, R, S

Teleoptic Co., 1251 Mound Ave., Racine, Wis.—GC, S

Western Condenser Co., E. Walnut St., Watseka, Ill. —MS

Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—S

Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill.—R

Wilson Mfg. Co., Inc., 600 N. Andrews Ave., Ft. Lauderdale, Fla.—MS

Yardeny Laboratories, Inc., 105-107 Chambers St., New York 7, N. Y.—PM, R

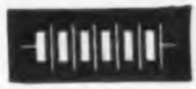
Yaxley—P. R. Mallory & Co., Inc.

(3) Battery Chargers

Electronic tube rectified VC
Gas engine driven .... G
Hand cranked .... HC
Metallic rectified .... MC
Motor generator .... MG
Vibrator rectified V
Wind driven .... W

Aarons Radio Corp., 125 E. 46th St., New York 17, N. Y.—V
Acme Electric & Mfg. Co., Cuba, N. Y.—MC
Acme Fire Alarm Co., Inc., 106 Seventh Ave., New York 11, N. Y.—MC
Allen Electric & Equipment Co., 2101-2117 N. Pitcher St., Kalamazoo 13-F, Mich.—VC, MC
Allis, Louis, Co., 427 E. Stewart St., Milwaukee 7, Wis.—MG
American Communications Corp., 306 Broadway, New York, N. Y.—VC, MC
American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—VC
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—"ATR"—MC, V
ATR—American Television & Radio Co.
Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—VC, MC
Automatic Electrical Devices Co., 324 E. 3rd St., Cincinnati 2, Ohio—MC
Barker & Williamson, Upper Darby, Pa.—VC, MC
Battery Boosters—Benwood Linze Co.
Benwood-Linze Co., 1815 Locust St., St. Louis 3, Mo.—"Battery-Boosters", "B-L"—MC
Biltmore Radio Corp., 15 Ave. A, New York 3, N. Y.—VC, MC
B-L—Benwood Linze Co.
Bogue Electric Co., 27 Kentucky Ave., Paterson 3, N. J.—MG
Brelco Corp., 55 Van Dam St., New York 13, N. Y.—VC
Briggs & Stratton Corp., 2711 N. 13th St., Milwaukee, Wis.—G
Burke Electric Co., 12th & Cranberry, Erie, Pa.—HC
Carpenter Mfg. Co., Master Light Bldg., Boston 45, Mass.—MC
Carson Machine & Supply Co., 202 S. E. 29th St., Oklahoma City 9, Okla.—G, MC, MG
Carter Motor Co., 1608 Milwaukee Ave., Chicago 47, Ill.—HC
Climax Engineering Co., Clinton, Iowa—G, MC
Communication Equipment & Engineering Co., 5646 W. Race St., Chicago 44, Ill.—VC
Control Corp., 718 Central Ave., Minneapolis 14, Minn.—MC
Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—HC
Delco Appliance Division, General Motors Corp., 391 Lyell Ave., Rochester 1, N. Y.—G
Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.—G, MG
Elcor, Inc., 1501 W. Congress St., Chicago 7, Ill.—G, HC, MG
Electric Heat Control Co., 9123 Inman Ave., Cleveland 5, Ohio—VC, MC
Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio—MG
Electrical Engrg. & Mfg. Corp., 4606 W. Jefferson Blvd., Los Angeles 16, Calif.—G
Electrical Facilities, Inc., 4224 Holden St., Oakland 8, Calif.—"Rexselen"—MC
Electrical Windings, Inc., 2015 N. Kolmar Ave., Chicago 39, Ill.—MC
Electricoil Transformer Co., 421 Canal St., New York 13, N. Y.—VC, MC
Electronic Laboratories, Inc., 122 W. New York St., Indianapolis 4, Ind.—V
Fansteel Metallurgical Corp., 2200 Sheridan Rd., North Chicago, Ill.—MC
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—MC
Flotrol—Lorain Products Corp.
France Mfg. Co., 10325 Berea Rd., Cleveland 2, Ohio—VC, V
Franklin Transformer Mfg. Co., 65 22nd Ave., N. E., Minneapolis 13, Minn.—MC, VC
Gardiner Mfg. Co., 2711 Union St., Oakland 7, Calif.—W
Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—G, HC, MG
General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.—VC, MC
Goodall Electric Mfg. Co., 3rd & Main St., Ogallala, Nebr.—VC
Hannon Electric Co., 1605 Waynesburg Rd., S.E., Canton, Ohio—VC, G, MC, MG
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.—MG
Hartman Corp. of America, 6417 Manchester, St. Louis 10, Mo.—G, MC, MG
Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—VC, MC
Hertner Elec. Co., 12690 Elmwood Ave., Cleveland 11, Ohio—G, MG
Horni Signal Mfg. Corp., 421 W. 54th St., New York 19, N. Y.—MC
Jacksonville Metal Mfg. Co., 247 Riverside Ave., Jacksonville 4, Fla.—VC, MG
Jacobsen Mfg. Co., 747 Washington Ave., Racine, Wis.—G
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—VC, G, MC, MG
Kohler Co., Kohler, Wis.—G
Laurehk Radio Mfg. Co., 3931 Monroe Ave., Wayne, Mich.—VC
Lorain Products Corp., 1122 F St., Lorain, Ohio—"Flotrol"—MC
Mallory, P. R., & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind.—MC
McColpin-Christie Corp., 4922 S. Figueroa St., Los Angeles 37, Calif.—VC, MC
Mellaphone Corp., 1462 E. Main St., Rochester 2, N. Y.—MC
Mohawk Electric Mfg. Co., 60 Howard St., Irvington 6, N. J.—VC, MC
North Electric Mfg. Co., Box 417, Galion, Ohio—MC
Onan, D. W., & Sons, 3216 Royalston Ave., Minneapolis 3, Minn.—G
Pincor—Pioneer Gen-E-Motor Corp.
Pioneer Gen-E-Motor Corp., 5841-49 Dickens Ave., Chicago 39, Ill.—"Pincor"—G
Point Mfg. Co., 5775 N. Ridge Ave., Chicago 26, Ill.—MC
Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—VC
Ready Power Co., 3826 Grand River Ave., Detroit, Mich.—G
Rectifier Engineering Co., 1809 E. 7th St., Los Angeles 21, Calif.—VC, MC, W
Rexselen—Electrical Facilities, Inc.
Richardson-Allen Corp., 15 W. 20th St., New York, N. Y.—VC
Rogers Diesel & Aircraft Corp., 1120 Leggett Ave., New York 59, N. Y.—VC, G, MG
Schauer Machine Co., 2060 Reading Rd., Cincinnati 2, Ohio—VC, MC
Selenium Corp. of America, 1719 W. Pico Blvd., Los Angeles 15, Calif.—MC
Sheldon Electric Co., Inc., 76 Colt St., Irvington 11, N. J.—VC
Sorgel Electric Co., 838 W. National Ave., Milwaukee 4, Wis.—VC, MC
Stancor—Standard Transformer Corp.
Standard Transformer Corp., 1500 N. Halsted St., Chicago 22, Ill.—"Stancor"—VC, MC
Stevens Arnold Co., 22 Elkins St., South Boston, Mass.—MC
United Transformer Corp., 150 Varick St., New York 13, N. Y.—MC
Universal Motor Co., 186 Harrison St., Oshkosh, Wis.—G
Warwick Mfg. Corp., 4640 W. Harrison St., Chicago 44, Ill.—HC
Westinghouse Elec. Corp., East Pittsburgh, Pa.—VC, MC, MG
Willard Storage Battery Co., 246-286 E. 131st St., Cleveland 1, Ohio—"Willard"—VC, MC
Wincharger Corp., E. 7th at Division, Sioux City 6, Iowa—MG, W

(4) Batteries, Dry & Wet



Air cell .... AC
Bias cell .... BC
Dry cell .... DC
Hearing aid .... HB
Radio dry batteries .... R
Standard cells C
Storage .... S
Storage—non-spill .... SN

Acme Battery Co., 59 Pearl St., Brooklyn 1, N. Y.—DC, R, C
Aeronautical Radio Mfg. Co., 155 First St., Mineola, L. I., N. Y.—S
Automatic Electrical Devices Co., 324 E. 3rd St., Cincinnati 2, Ohio—SN
Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—S
Bond Electric Corp., 275 Winchester Ave., New Haven 4, Conn.—DC, R
Bright Star Battery Co., 200 Crooks Ave., Clifton, N. J.—DC, HB, R
Bryant Mfg. Co., 401 N. Paulina St., Chicago, Ill.—S
Burgess Battery Co., Foot of Exchange, Freeport, Ill.—DC, HB, R, C
Carbone Corp., 400 Myrtle Ave., Boonton, N. J.—DC
Carpenter Mfg. Co., Master Light Bldg., Boston 45, Mass.—SN
Centralab, Div. of Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—S, SN
Cinch Mfg. Corp., Div. United-Carr Fastener Co., 2335 W. Van Buren St., Chicago, Ill.—BC
Edison, Thomas A., Inc., Emark Div., Plant No. 1, Belleville Tpke, Kearny, N. J.—DC, R, S
Electric Storage Battery Co., 19th St. & Allegheny Ave., Philadelphia 32, Pa.—"Exide"—S, SN
Eppley Laboratory, Inc., 12 Sheffield Ave., Newport, R. I.—C
Exide—Electric Storage Battery Co.
Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—S
General Dry Batteries, Inc., 13000 Athens Ave., Cleveland, Ohio—HB, DC, R
Gould Storage Battery Corp., 35 Neoga St., Depew, N. Y.—S
Hartman Corp. of America, 6417 Manchester, St. Louis 10, Mo.—S
Ideal Commutator Dresser Co., 5194 Park Ave., Sycamore, Ill.—SN
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—DC, S, SN
Mallory, P. R., & Co., 3029 E. Washington St., Indianapolis 6, Ind.—DC
Marathon Battery Co., Wausau, Wis.—DC, HB, R, C
Monark Battery Co., Inc., 1240 N. Homan Ave., Chicago, Ill.—"Monark"—S
National Battery Co., 1728 Roblyn Ave., St. Paul, Minn.—S
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.—AC, DC, HB, R, C
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—R, S
Prest-O-Lite Battery Co., Inc., P. O. Box 1655, Indianapolis, Ind.—S, SN
Ray-O-Vac Co., 2317 Winnebago St., Madison 4, Wis.—DC, HB, R
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—BC, DC, HB, R
Sturges Battery Co., Inc., 260 W. Broadway, New York, N. Y.—C, S, SN
Ucinite Co., Div. United-Carr Fastener Corp., Newtonville, Mass.—BC
United States Electric Mfg. Corp., 222 W. 14th St., New York 11, N. Y.—DC, R, C
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—S
Universal Battery Co., 3410 S. LaSalle St., Chicago, Ill.—S, SN
Willard Storage Battery Co., 246-286 E. 131st St., Cleveland 1, Ohio—"Willard"—DC, R, S, SN
Wincharger Corp., E. 7th at Division, Sioux City 6, Iowa—S

(5) Cabinets, Racks & Panels

Bins & racks .... B
Carrying bags .... CB
Chassis C
Leather handles—straps L
Metal cabinets .... M
Panels .... P
Plastic .... see PLASTIC MOLDERS
Portable set cases .... PC
Racks .... R
Trays & tote baskets .... T
Wood cabinets .... W

Aarons Radio Corp., 125 E. 46th St., New York 17, N. Y.—W
Abel & Bach, 1000 W. St. Paul Ave., Milwaukee, Wis.—PC
Acro Tool & Die Works, 4554 Broadway, Chicago 40, Ill.—C
Acromark Co., 9-13 Morrell St., Elizabeth 4, N. J.—P
Adler Mfg. Co., 2901 W. Chestnut St., Louisville 11, Ky.—W
Airplane & Marine Instruments, Inc., Clearfield, Pa.—C, M, P, R
All-Steel Equipment Co., 723 Griffith Ave., Aurora, Ill.—M
Aluminum Goods Mfg. Co., 1512 Washington St., Manitowoc, Wis.—C, M
American Central Mfg. Corp., 18th & Columbia Sts., Connersville, Ind.—M
American Communications Corp., 306 Broadway, New York, N. Y.—W
American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.—P
American Radio Hardware Co., 152 MacQuesten Pkwy., S., Mt. Vernon, N. Y.—C, P
Arkay Laboratories, Inc., 1570 S. First St., Milwaukee 4, Wis.—C, M, P
Aro Equipment Corp., Enterprise & Trevitt, Bryan, Ohio—M, R
Belber Trunk & Bag Co., Railroad Ave., Woodbury, N. J.—PC
Bitter, A., Construction Co., 721 E. 133rd St., New York, N. Y.—B, C, W
Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio—C, M, P, R
Cardwood Products Corp., 201 S. Second Ave., Mt. Vernon, N. Y.—CB, W

Castlewood Mfg. Co., 12th & Burnett Sts., Louisville, Ky.—W
Caswell-Runyan Co., Huntington, Ind.—W
Chicago Sound Systems, Inc., 2124 S. Michigan Ave., Chicago, Ill.—W
Churchill Cabinet Co., 2119 Churchill St., Chicago 47, Ill.—W
Cole Steel Equipment Co., 349 Broadway, New York 13, N. Y.—M, P
Collins Radio Co., Cedar Rapids, Iowa—M, R
Columbia Associates, 141 W. 24th St., New York, N. Y.—P, R, W
Columbia Metal Box Co., 260 E. 143rd St., New York 51, N. Y.—C, M, P, R
Commercial Metal Products Co., 2251 W. St. Paul Ave., Chicago 47, Ill.—C
Corry-Jamestown Mfg. Corp., 32 N. First Ave., Corry, Pa.—C, M, P
Croname, Inc., 3701 N. Ravenswood Ave., Chicago 13, Ill.—M, P
Custom Case Co., 104 Bleecker St., New York, N. Y.—PC
Dahlstrom Metallic Door Co., Buffalo & E. 2nd, Jamestown, N. Y.—C, M, P, R
Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—C, P, T, W
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—B, C, L, M, P
Doolittle Radio, Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.—C, M
Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—C
Edin Electronics Co., 207 Main St., Worcester, Mass.—C, M, P
Edwards, T. J., Inc., 210 South St., Boston 5, Mass.—P
Electrical Reactance Corp., Franklinville, N. Y.—P
Electro-Marine Co., 274 Madison Ave., New York 16, N. Y.—C, M
Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—C, P
Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—C, M, P
Electronic Supply Co., 207 Main St., Worcester 8, Mass.—C, P, R
Emerson Radio & Phonograph Corp., 111 8th Ave., New York 11, N. Y.—W
Erie Art Metal Co., 1602 E. 18th St., Erie, Pa.—C, P, M
Etched Products Corp., 39-01 Queens Blvd., Long Island City, N. Y.—P
Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, L. I., N. Y.—C
Fairfield Lumber Co., 1700 Post Rd., Fairfield, Conn.—B, P, R, T, W
Falstrom Co., Falstrom Ct., Passaic, N. J.—B, M, P
Feick Mfg. Div., Detroit Aircraft Prod., Inc., 10225 Meech Ave., Cleveland 5, Ohio—C, M, P, R
Flock Process Co., Velvetone Div., 3 Quincy St., Norwalk, Conn.—W
Gardiner Mfg. Co., 2711 Union St., Oakland 7, Calif.—C, M, R, T
Goat Metal Stampings, Inc., 314 Dean St., Brooklyn 17, N. Y.—C
Goodall Electric Mfg. Co., 3rd & Main St., Ogallala, Nebr.—B, M, P
Grammes, L. F., & Sons, Inc., 392 Union St., Allentown, Pa.—M, P, R
Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.—PC
Greenhut Insulation Co., 31 W. 21st St., New York, N. Y.—P
Haddorff Piano Co., 630 S. Wabash Ave., Chicago 5, Ill.—W
Hadley, Robert M., Co., 707 E. 61st St., Los Angeles 1, Calif.—C, M, P, R
Hall Co., Gordan L., Old Lyme, Conn.—B
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—C, M, P, W
Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—C, M, P
Heller, W. C., & Co., 1944 Caldwell St., Montpelier, Ohio—W
Hoffman Radio Corp., 3761 S. Hill St., Los Angeles 7, Calif.—W
Hofstatter's Sons, Inc., 42-53 24th St., Long Island City 1, N. Y.—P, PC, W
Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—C, M, P, R
ICA—Insuline Corp. of America
Illinois Cabinet Co., 2525 11th St., Rockford, Ill.—W
Illinois Wood Products Corp., 2512 S. Damen Ave. Chicago 8, Ill.—W
Industrial Fabricators, Inc., 1890 Carter Rd., Cleveland 13, Ohio—P, T
Insuline Corp. of America, 3602 35th Ave., Long Island City 10, N. Y.—"ICA"—C, M, P, R
Islip Radio Mfg. Corp., Islip, N. Y.—L, M, P, R
Jacksonville Metal Mfg. Co., 247 Riverside Ave., Jacksonville 4, Fla.—M, P, R
J.F.D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn 19, N. Y.—W
Johnson, E. F., Co., Waseca, Minn.—C, M, P, R
Karp Metal Products, 129 30th St., Brooklyn 32, N. Y.—B, CB, C, L, M, P, R, T
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—M, P, R, W
Keystone Electronics Co., 50 Franklin St., New York 13, N. Y.—P
Klise Mfg. Co., 50 Cottage Grove St., S.W., Grand Rapids 2, Mich.—P, R, W
Korrol Mfg. Co., 350 Greenwich St., New York 13, N. Y.—C, M, P, R
Kraus, Walter S., Co., 43-10 48th Ave., Woodside, L. I., N. Y.—M, W
Langevin Co., Inc., 37 W. 65th St., New York 23, N. Y.—M
Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.—P, W
Le Febure Corp., 716 Oakland Rd., N.E., Cedar Rapids, Iowa—M, W
Lewisburg Chair & Furniture Co., Lewisburg, Pa.—P, R, W
Lewyt Corp., 60 Broadway, Brooklyn 11, N. Y.—C, R
Lindsay & Lindsay, 222 W. Adams St., Chicago 6, Ill.—M
Lindsay & Thomas, Inc., 60 E. 42nd St., New York 17, N. Y.—M
Link, Fred M., 125 W. 17th St., New York 11, N. Y.—C, M
Long, L. J., Co., 186 Grand St., New York 13, N. Y.—C
Lorentzen, H. K., Inc., 391 W. Broadway, New York 12, N. Y.—C, M, P, R
Mayer Mfg. Corp., 45 Division Pl., Brooklyn 22, N. Y.—B, C, M, P
McInerney Plastics Co., 25 Commerce Ave., S.W., Grand Rapids 2, Mich.—T, W
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—C, M, P, R
Metallic Arts Co., 243 Broadway, Cambridge 39, Mass.—B, C, M, P, R
Meyers Safety Switch Co., Inc., 423 Tehama St., San Francisco 3, Calif.—M, P, R
Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—P
Millen, James, Mfg. Co., Inc., 150 Exchange St., Malden 48, Mass.—C, L, M, P, R
Milprint, Inc., 431 W. Florida St., Milwaukee 1, Wis.—CB
National Co., Inc., 61 Sherman St., Malden 48, Mass.—C, M, P, R
Neevel Mfg. Co., 1427 Chestnut St., Kansas City 1, Mo.—CB, PC, W
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles 7, Calif.—P, R
New England Etching & Plating Co., 25 Spring St., Holyoke, Mass.—P
New England Radiocrafters, 1156 Commonwealth Ave., Boston 34, Mass.—C, M, W
Olympic Tool & Mfg. Co., Inc., 39 Chambers St., New York 7, N. Y.—C, M, P
Paramount Radio Mfg. Co., 967 32nd St., Oakland 8, Calif.—P, R, W
Par Metal Products Co., 32-62 49th St., Long Island City, N. Y.—"Par-Met"—C, M, P, R
Paul & Beekman, Div. Portable Products Corp., 1801 Courtland St., Philadelphia 40, Pa.—C, M, P,
Penn Fibre & Specialty Co., 2024-30 E. Westmoreland St., Philadelphia 30, Pa.—P
Philco Corp., Tioga & "C" Sts., Philadelphia 34, Pa.—W
Porter Metal Products, 121 Ingraham St., Brooklyn 6, N. Y.—B, C, M, P, R, T
Premier Metal Etching Co., 2103 44th Ave., Long Island City 1, N. Y.—P
Purves Mfg. Co., 31 W. 11th St., Indianapolis, Ind.—W
Quality Hardware & Machine Corp., 5849 N. Ravenswood Ave., Chicago 26, Ill.—C
Radiad Service, 720 W. Schubert Ave., Chicago 14, Ill.—B, C, M
Radio Merchandise Sales, 550 Westchester Ave., New York 55, N. Y.—CB, W
Ra-Trom Corp., 78 W. 4th St., Boston 27, Mass.—C, M, P, R
Record-O-Vox, Inc., 721 N. Martel Ave., Hollywood 46, Calif.—CB, W
Redi-Rack Corp., 141 W. 24th St., New York, N. Y.—R
Rittenhouse, A. E., Co., Honeoye Falls, N. Y.—M
Sanders Bros. Mfg. Co., 409 W. Main St., Ottawa, Ill.—P, R, W
Schloss Bros., A., Corp., 801 E. 135th St., Bronx 54, N. Y.—W
Scovill Mfg. Co., 99 Mill St., Waterbury 91, Conn.—R
Screenmakers, Inc., 64 Fulton St., New York 7, N. Y.—C, M, P, W
Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—C, M, P, R, W
Security Steel Equipment Co., Avenel St., Avenel, N. J.—P, R, W
Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—M, P
Simpson, Mark, Mfg. Co., 188 W. 4th St., New York 14, N. Y.—W
Skydyne, Inc., River Rd., Port Jervis, N. Y.—M, P, W
Slater Corp., N. G., 3 W. 29th St., New York 1, N. Y.—P, R, W
Sparks Mfg. Co., Ltd., 318 Jefferson St., Newark 5, N. J.—P, R, W
Spencer Cardinal Corp., Box 751, Marion, Ind.—W
Spirling Products Co., 64 Grand St., New York 13, N. Y.—C, P
Stamford Metal Specialty Co., 428 Broadway, New York 13, N. Y.—C, M, P
Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—P
Standard Engineering Laboratories, 40 S. Oak Knoll Ave., Pasadena 1, Calif.—C, M, P, R
Standard Pressed Steel Co., Jenkintown, Pa.—T
Steger Furniture Mfg. Co., Steger, Ill.—P, R, W
Sun Shoe Mfg. Co., 617 N. Aberdeen St., Chicago 22, Ill.—CB, L
Tonk Mfg. Co., 1910 N. Magnolia St., Chicago, Ill.—W
United Radio Mfg. Co., 191 Greenwich St., New York, N. Y.—C, P
United States Trunk Co., Inc., 951 Broadway, Fall River, Mass.—PC, W
Vaughan Cabinet Co., 3810 N. Clark St., Chicago 13, Ill.—W
Vibraloc Mfg. Co., 3597 Mission St., San Francisco 10, Calif.—W
Victory Mfg. Co., 1722 W. Arcade Pl., Chicago 12, Ill.—PC
Wabash Cabinet Co., Wabash, Ind.—P, R, W
Wallace, Wm. T., Mfg. Co., Chili & Madison Aves., Peru, Ind.—W
Waterman Products Co., Inc., 1900 N. 6th St., Philadelphia 22, Pa.—P, R, W
Watterson Radio Mfg. Co., 2700 Swiss Ave., Dallas 1, Tex.—W
Wells Gardner & Co., 2701 N. Kildare Ave., Chicago 39, Ill.—W
White Research Associates, 899 Boylston St., Boston 15, Mass.—P, R, W
Woodcraft Corp., 501 Salzburg Ave., Bay City, Mich.—W
Worcester Pressed Steel Co., Worcester, Mass.—C, P

(6) Capacitors, Fixed

Air, fixed	A
Ceramic insulated	C
Compressed gas	G
Electrolytic dry	ED
Electrolytic wet	EW
Fluorescent lamp units	FS
Glass	G
Industrial	I
Mica	M
Oil	O
Paper	P
Plug-in condensers	PF
Polystyrene insulated	PO
Silvered mica	S
Standard	ST
Temperature compensated	TC
Transmitting	T
Vacuum cond.	V

Aerovox Corp., New Bedford, Mass.—C, ED, FS, I, M, P, PF, PO, S, TC, T, ST, O
Aircraft-Marine Products, Inc., 1523 N. 4th St., Harrisburg, Pa.—T
Aldine Paper Co., Inc., 535 Fifth Ave., New York 17, N. Y.—P
American Condenser Co., 4410 N. Ravenswood Ave., Chicago 40, Ill.—A, ED, P, PF, T, O
Atlas Condenser Products Co., 548 Westchester Ave., New York 55, N. Y.—ED, FS, P, O
Automatic Mfg. Corp., 900 Passaic Ave., East Newark, N. J.—C, S
Barker & Williamson, Upper Darby, Pa.—A, G, PF, T
Berger Electronics, 109-01, 72nd Rd., Forest Hills, N. Y.—EW, TC
Brown Engineering Co., 4635 S. E. Hawthorne Blvd., Portland 15, Ore.—ST
Capacitron Co., 849 N. Kedzie Ave., Chicago 51, Ill.—ED, FS, I, P, PF, T, C, EW, M, O
Cardwell, Allen D., Mfg. Corp., 81 Prospect St., Brooklyn 1, N. Y.—A, PF, T
Centralab, Div. Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—C, S, TC, T
Chicago Condenser Corp., 3255 W. Armitage Ave., Chicago 47, Ill.—FS, I, P
Collins Radio Co., Cedar Rapids, Iowa—T
Condenser Products Co., 1375 N. Branch St., Chicago 22, Ill.—FS, I, PO, T
Cornell-Dubilier Electric Corp., So. Plainfield, N. J.—ED, EW, FS, I, M, P, PF, S, ST, TC, T, O
Corning Glass Works, Corning, N. Y.—G, I, T
Cosmic Radio Corp., 699 E. 135th St., New York 54, N. Y.—ED, FS, P
Crystal Research Laboratories, Inc., 29 Allyn St., Hartford 3, Conn.—C, S, TC
Deutschmann, Tobe, Corp., Canton, Mass.—ED, EW, FS, I, M, P, PF, O
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—FS
Dumont Electric Co., 34 Hubert St., New York 13, N. Y.—ED, FS, I, M, P, S, ST, O
Eastern Electronics Corp., 41 Chestnut St., Newhaven, Conn.—ST
Ecco High Frequency Corp. 7020 Hudson Blvd., N. Bergen, N. J.—T
Eitel-McCullough, Inc., San Bruno, Calif.—V
Electrical Reactance Corp., Franklinville, N. Y.—C, FS, P, S, O
Electro Motive Mfg. Co., South Park & John St., Willimantic, Conn.—M, P, S

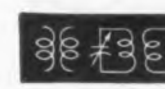
Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—C, ED, M, P
Erie Resistor Corp., 640 W. 12th St., Erie, Pa.—C, S, TC
Fansteel Metallurgical Corp., 2200 Sheridan Rd., North Chicago, Ill.—EW
Fast, John E., & Co., 3129 N. Crawford Ave., Chicago 41, Ill.—FS, I, P, PO, T, O
General Electric Co., 1 River Rd., Schenectady 5, N. Y.—V
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—ST
Girard-Hopkins, 1000 40th Ave., Oakland 1, Calif.—FS, I, P, PF, T, O
Glenn-Roberts Co., 3100 E. 10th St., Oakland 1, Calif.—I
Goodall Electric Mfg. Co., 3rd & Main St., Ogallala, Nebr.—M, P, ST
Gudeman Co., 361 W. Superior St., Chicago 10, Ill.—ED, I, P, PF, T, O
Guthman, Edwin I., & Co., Inc., 15 S. Throop St., Chicago 7, Ill.—P
Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N. Y.—A, T
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—ST
H. R. S. Products, 5707 W. Lake St., Chicago 44, Ill.—ED, FS, I, P, O
Illinois Condenser Co., 1160 N. Howe St., Chicago 10, Ill.—ED, EW, FS, I, P, PF, O
Industrial & Commercial Electronics, Belmont, Calif.—V
Industrial Condenser Corp., 3243 N. California Ave., Chicago 18, Ill.—ED, FS, I, P, PF, PO, ST, T, O
Industrial Instruments, Inc., 17 Pollock Ave., Jersey City, N. J.—ST
International Products Corp., 2554 Greenmount Ave., Baltimore 18, Md.—M
Intex Co., 303 W. 42nd St., New York 18, N. Y.—ED, P
Islip Radio Mfg. Corp., Islip, N. Y.—T
Jeffers Electronics, Hoover St., DuBois, Pa.—C
Jennings Radio Mfg. Co., 1098 E. William St., San Jose 12, Calif.—V
Johnson, E. F., Co., Waseca, Minn.—A, G, T
Kellogg Switchboard & Supply Co., 6650 S. Cicero, Chicago 38, Ill.—I, P, PF
Kidde, Walter & Co., Inc., 140 Cedar St., New York 6, N. Y.—G
Kilburn, J. R., Glass Co., Inc., 22 S. Worcester St., Chartley, Mass.—C
Lapp Insulator Co., Inc., 24 Craigie St., Le Roy, N. Y.—G, T
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia 44, Pa.—ST
Lenoxite Division, Lenox, Inc., 65 Prince St., Trenton 5, N. J.—C
Macallen Co., Macallen St., Boston 27, Mass.—M
Magnavox Co., Ft. Wayne 4, Ind.—ED
Mallory, P. R., & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind.—ED, P, O
Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—M
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn 6, N. Y.—C, ED, FS, I, M, P, PF, S, TC, T, O
Michigan Fluorescent Light Co., 71-77 S. Parke St., Pontiac, Mich.—FS
Millen, James, Mfg. Co., Inc., 150 Exchange St., Malden 48, Mass.—A, T
Milprint, Inc., 431 W. Florida St., Milwaukee 1, Wis.—P
Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—C, TC
National Ceramic Co., 400 Southard St., Trenton 2, N. J.—C
Noma Electric Corp., 55 W. 13th St., New York 11, N. Y.—M
O'Donnell, J. P., & Sons, 316 Stuart St., Boston 16, Mass.—FS, P
Philco Corp., Tioga & "C" Sts., Philadelphia 34, Pa.—C, ED, EW, M, P, S, O
Polymet Condenser Co., 699 E. 135th St., New York, N. Y.—ED, P
Potter Co., 1950 Sheridan Rd., North Chicago 1, Ill.—FS, I, P, ST, T, V, ED, O
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—I, T
Richardson-Allen Corp., 15 W. 20th St., New York 11, N. Y.—ST
Rothenstein, Albert, 135 Liberty St., New York 6, N. Y.—I, M, S, T
Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—PO
Sangamo Electric Co., 11th & Converse Sts., Springfield, Ill.—M
Sickles Co., F. W., 165 Front St., Chicopee, Mass.—A, S
Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—A, T
Solar Mfg. Corp., 285 Madison Ave., New York 17, N. Y.—ED, EW, FS, I, M, P, PF, PO, S, TC, T, O
Sprague Electric Co., 189 Beaver St., North Adams, Mass.—ED, FS, I, P, PF, S, ST, TC, T, O
Sprague Products Co., 89 Marshall St., North Adams, Mass.—C, ED, EW, FS, I, M, P, PF, S, T
Stackpole Carbon Co., P. O. Box 327, St. Marys, Pa.—PO
Technical Radio Co., 275 9th St., San Francisco, Calif.—A, T
Telecon Condenser Co., 3757 W. North Ave., Chicago 47, Ill.—FS, I, P, PF, ST, T, O
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—PO
Westinghouse Elec. Corp., East Pittsburgh, Pa.—I, T
Winslow Co., 9 Liberty St., Newark, N. J.—S
Winters & Crampton Corp., Grandville, Mich.—A, ST

(7) Capacitors, Variable

Air trimmer .... A
Ceramic trimmer .... CT
Compressed gas filled .... CG
Mica trimmer .... M
Neutralizing .... N
Precision .... P
Receiving tuning .... RT
Transmitting tuning .... TT
Vacuum V

American Steel Package Co., Defiance, Ohio—A, RT
Automatic Mfg. Corp., 900 Passaic Ave., East Newark, N. J.—A, CT, M, N
Baldwin Instrument Co., Oceanside, N. Y.—RT
Barker & Williamson, Upper Darby, Pa.—A, CG, N, P, TT
Berger Electronics, 109-01 72nd Rd., Forest Hills, N.Y.—CT, RT
Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio—"Bud"—A, N, P, RT, TT
Cardwell Mfg. Corp., Allen D., 81 Prospect St., Brooklyn 1, N. Y.—A, N, P, RT, TT
Centralab, Div. Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—CT
Ceramicon—Erie Resistor Corp.
Collins Radio Co., Cedar Rapids, Iowa—TT
Crystal Research Laboratories, Inc., 29 Allyn St., Hartford 3, Conn.—CT, M
Decatur Mfg. Co., Atlantic Ave., Brooklyn, N. Y.—TT
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—CG
Eimac—Eitel-McCullough, Inc.
Eitel-McCullough, Inc., San Bruno, Calif.—"Eimac"—V
Electrical Reactance Corp., Franklinville, N. Y.—CT, M, P
Electro Motive Mfg. Co., South Park & John St., Willimantic, Conn.—"Elmenco"—M
Elmenco—Electro Motive Mfg. Co.
Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—RT
Erie Resistor Corp., 640 W. 12th St., Erie, Pa.—"Ceramicon"—CT
Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, L. I., N. Y.—P, RT, TT
Federal Mfg. & Engineering Corp., 199-217 Steuben St., Brooklyn 5, N. Y.—P
General Ceramics & Steatite Corp., Crows Mill Rd., Keasbey, N. J.—CT
General Electric Co., Specialty Division, 1001 Wolf St., Syracuse, N. Y.—A
General Instrument Corp., 829 Newark Ave., Elizabeth 3, N. J.—"G.I."—RT, TT
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—"GR"—A, P
G. I.—General Instrument Corp.
G. R.—General Radio Co.
Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N. Y.—A, N, P, RT, TT
Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—A, CT, N, P, RT, TT
ICA—Insuline Corp. of America
Industrial & Commercial Electronics, Belmont, Calif.—TT
Insuline Corp. of America, 3602 35th Ave., Long Island City 10, N. Y.—"ICA"—RT
International Products Corp., 2554 Greenmount Ave., Baltimore 18, Md.—M
Islip Radio Mfg. Corp., Islip, N. Y.—TT
Jennings Radio Mfg. Co., 1098 E. William St., San Jose 12, Calif.—V
Johnson Co., E. F., Waseca, Minn.—"Johnson"—CG, N, TT
Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif.—TT
Kidde, Walter & Co., Inc., 140 Cedar St., New York 6, N. Y.—CG
Lapp Insulator Co., Inc., 24 Craigie St., Le Roy, N. Y.—CG, N, TT
Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.—M, RT
Macallen Co., Macallen St., Boston 27, Mass.—M
Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—A, RT
Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—A, CT
Meissner Mfg. Div., Maguire Industries, Inc., Mt. Carmel, Ill.—A
Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—M
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass.—A, M, N, P, RT, TT
National Ceramic Co., 400 Southard St., Trenton 2, N. J.—A, CT
National Co., Inc., 61 Sherman St., Malden 48, Mass.—"National"—A, CT, M, N, P, RT
North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—A
Oak Mfg. Co., 1260 Clybourn Ave., Chicago 10, Ill.—A, RT, TT
Philco Corp., Tioga & "C" Sts., Philadelphia 34, Pa.—CT, M, N, RT, A
Precision Parts Co., 1200 N. Main St., Ann Arbor, Mich.—M
Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—A, P
Radex Corp., 53 W. Jackson Blvd., Chicago 4, Ill.—M
Radio Condenser Co., Copewood & David, Camden, N. J.—"R.C.C."—RT
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—TT
R. C. C.—Radio Condenser Co.
Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—RT
Scovill Mfg. Co., 99 Mill St., Waterbury 91, Conn.—TT
Sickles, F. W., Co., 165 Front St., Chicopee, Mass.—A, M
Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—M, P
Solar Mfg. Corp., 285 Madison Ave., New York 17, N. Y.—"Solar"—M
Special Products Co., 9115 Brookville Rd., Silver Spring, Md.—CT
Technical Radio Co., 275 9th St., San Francisco, Calif.—P, RT, TT
Teleradio Engineering Corp., 99 Wall St., New York 5, N. Y.—A, CT, M, P, TT
Vokar Corp., 7300 Huron River Drive, Dexter, Mich.—A, CT, M
Western Condenser Co., E. Walnut St., Watseka, Ill.—RT, TT
Westinghouse Elec. Corp., East Pittsburgh, Pa.—TT
Winters & Crampton Corp., Grandville, Mich.—P, RT, TT

(8) Coils, RF & IF



Coil forms .... F
I F coils .... IF
R F chokes (receiving) .... CH
R F chokes (transmitting) .... RT
R F coils (receiving) .... RF
R F coils (transmitting) .... T

Aladdin Radio Industries, Inc., 225 W. Jackson Blvd., Chicago, Ill.—IF, CH, RF, T
Albion Coil Co., Albion, Ill.—IF, CH, RT, RF, T
Alden Products Co., 117 N. Main St., Brockton 64, Mass.—"Na-Ald"—F
American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22, Ill.—IF, CH, RT, RF, T
American Communications Corp., 306 Broadway, New York, N. Y.—CH, RT
Aray Mfg. & Supply Corp., 3105 Pine St., St. Louis 8, Mo.—F, T
Automatic Mfg. Corp., 900 Passaic Ave., East Newark, N. J.—F, IF, CH, RT, RF, T
Barker & Williamson, Upper Darby, Pa.—F, IF, CH, RT, RF, T
Bendix Radio, Div. of Bendix Aviation Corp., East Joppa Rd., Baltimore 4, Md.—IF, CH, RT, RF, T
Berger Electronics, 109-01 72nd Rd., Forest Hills, N. Y.—T
Bittermann Electric Co., 50 Henry St., Brooklyn 2, N. Y.—IF, CH, RT, RF, T
Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio—CH, RT
Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N. Y.—RT, T
Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.—IF
Carron Mfg. Co., 415 S. Aberdeen St., Chicago 7, Ill.—"Carron"—IF, CH, RT, RF, T
Climax Engineering Co., Clinton, Iowa—CH, RT
Clippard Instrument Laboratory, 1440 Chase Ave., Cincinnati 23, Ohio—F, IF, CH, RF
Collins Radio Co., Cedar Rapids, Iowa—RT, T
Communication Parts, 1101 N. Paulina St., Chicago 22, Ill.—F, IF, CH, RT, RF, T
Continental-Diamond Fibre Co., Newark 50, Del.—F
Control Corp., 718 Central Ave., Minneapolis 14, Minn.—CH, RT, RF, T
Corning Glass Works, Corning, N. Y.—F, RF, T
Coto-Coil Co., Inc., 65 Pavilion Ave., Providence 5, R. I.—IF, CH, RT, RF, T
Crowley, Henry L., & Co., Inc., 1 Central Ave., West Orange, N. J.—F

Davis, Dean W. & Co., Inc., 549 Fulton St., Chicago, Ill.—F

Drake, R. L., Co., 11 Longworth St., Dayton 2, Ohio—IF, CH, RT, RF, T

D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—F, IF, CH, RT, RF, T

Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—IF, RF

Electrical Insulating Co., Inc., 12 Vestry St., New York 13, N. Y.—F

Electrical Reactance Corp., Franklinville, N. Y.—IF, CH, RF

Electrical Windings, Inc., 2015 N. Kolmar Ave., Chicago 39, Ill.—F

Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—IF, CH, RF, T

Electronic Winding Co., 6227 Broadway, Chicago 40, Ill.—RF, T

Emerson Radio & Phonograph Corp., 111 Eighth Ave. New York 11, N. Y.—IF, CH, RF

Ensign Coil Co., 2516 S. Pulaski, Chicago 23, Ill.—RF

Erco Radio Laboratories, Inc., 231 Main St., Hempstead, N. Y.—F, IF, RT, RF, CH, T

Essex Electronics, 1060 Broad St., Newark 2, N. J.—F, IF, CH, RT, RF, T

Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y.—IF, CH, RT, RF, T

Fast, John E., & Co., 3129 N. Crawford Ave., Chicago 41, Ill.—CH

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—IF, CH, RT, RF, T

Fischer-Smith, Inc., 162 State St., West Englewood, N. J.—T

Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—IF, RF

General Electric Co., Specialty Division, 1001 Wolf St., Syracuse, N. Y.—IF

General Electric Co., Transmitter Division, Thompson Rd. Plant, Syracuse, N. Y.—RT, T

General Laminated Products, Inc., 2857 S. Halsted St., Chicago 8, Ill.—F

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—"G-R"—CH

General Transformer Corp., 1250 W. Van Buren St., Chicago 7, Ill.—F

General Winding Co., 420 W. 45th St., New York 19, N. Y.—"Gen-Win"—F, IF, CH, RT, RF, T

Gen-Win—General Winding Co.

G-R—General Radio Co.

Guthman & Co., Edwin I., Inc., 15 S. Throop St., Chicago 7, Ill.—IF, CH, RF

Hallicrafters Co., 2611 S. Indiana Ave., Chicago 16, Ill.—IF, RF

Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N. Y.—F, IF, RT

Hardwick, Hindle, Inc., 40 Hermon St., Newark 5, N. J.—CH

Harvey Machine Co., Inc., 62 Avalon Blvd., Los Angeles 3, Calif.—RF, T

Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—F, CH, RT, RF, T

Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—F, IF, CH, RT, RF, T

Howard Pacific Corp., 932 N. Western Ave., Los Angeles 27, Calif.—IF, CH, RT

Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—IF, RF

Industrial Electronics Corp., 80 Bank St., Newark, N. J.—IF, CH, RT, RF, T

Insulating Tube Co., Inc., 26 Cottage St., Poughkeepsie, N. Y.—F

International Products Corp., 2254 Greenmount Ave., Baltimore 18, Md.—F

Islip Radio Mfg. Corp., Islip, N. Y.—IF, CH, RT, RF, T

Isolantite, Inc., 343 Cortlandt St., Belleville 9, N. J.—F

Jeffers Electronics, Hoover St., DuBois, Pa.—IF, CH, RT

Jennings Radio Mfg. Co., 1098 E. William St., San Jose 12, Calif.—RF, T

Johnson Co., E. F., Waseca, Minn.—"Johnson"—F, RT, T

Lavoie Laboratories, Matawan—Freehold Rd., Morganville, N. J.—IF, RF

Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—RF

Lectrohm, Inc., 5125 W. 25th St., Cicero 50, Ill.—CH

Lenoxite Division, Lenox, Inc., 65 Prince St., Trenton 5, N. J.—F

Madison Electrical Products Corp., 78 Main St., Madison, N. J.—"Mepco"—IF, CH, RT, RF, T

McInerney Plastics Co., 25 Commerce Ave., S. W., Grand Rapids 2, Mich.—F

Mayfair Molded Products Corp., 4440 N. Elston Ave., Chicago 30, Ill.—F

Megard Corp. 1601 S. Burlington Ave., Los Angeles 6, Calif.—F, IF, CH, RT, RF, T

Meissner Mfg. Div., Maguire Industries, Inc., Mt. Carmel, Ill.—IF, CH, RT, RF, T

Micarta Fabricators, Inc., 5324 Ravenswood Ave., Chicago 40, Ill.—F

Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass.—F, IF, CH, RT, RF, T

Miller Co., J. W., 5917 S. Main St., Los Angeles 8, Calif.—"Miller"—IF, CH, RF

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—IF, RF, T

Monarch Mfg. Co., 2014 N. Major Ave., Chicago 39, Ill.—F, IF, CH, RT, RF, T

Monroe Coil Co., 2659 W. 19th St., Chicago, Ill.—IF

Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—F, IF, CH, RT, RF, T

Mycalex Corp. of America, 60 Clifton Blvd., Clifton, N. J.—F

Na-Ald—Alden Products Co.

National Co., Inc., 61 Sherman St., Malden 48, Mass.—"National"—"N-C"—F, IF, CH, RT, RF, T

National Tile & Mfg. Co., 1200 E. 26th St., Anderson, Ind.—F

N-C—National Company

New York Transformer Co., 26 Waverly Pl. New York 3, N. Y.—CH, RT, RF, T

Noblitt Sparks Industries, Inc., Columbus, Ind.—IF, CH, RF

Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill.—RT

Pacific Clay Products, SteaPACtite Div., 306 W. Ave. 26, Los Angeles 31, Calif.—F

Paramount Paper Tube Co., 801 Glasgow Ave., Ft. Wayne 4, Ind.—F

Peck Spring Co., 20 Grove St., Plainville, Conn.—F

Plastic Accessories, Inc., 460 Broome St., New York 13, N. Y.—F

Plax Corp., 133 Walnut St., Hartford 5, Conn.—F

Precision Paper Tube Co., 2035 W. Charleston St., Chicago 47, Ill.—F

Precision Parts Co., 1200 N. Main St., Ann Arbor, Mich.—IF, CH, RF

Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—RT

Printloid, Inc., 93 Mercer St., New York 12, N. Y.—F

Quad Mfg. Co., 462 N. Parkside Ave., Chicago 44, Ill.—F, IF, CH, RT, RF, T

Radex Corp., 53 W. Jackson Blvd., Chicago 4, Ill.—IF, CH, RT, RF, T

RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—F, IF, CH, RF

Riggs & Jeffreys, Inc., 73 Winthrop St., Newark 4, N. J.—F

Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—F

Santay Corp., 351 N. Crawford Ave., Chicago 24, Ill.—F

Saxonburg Potteries, Saxonburg, Pa.—F

Sickles Co., F. W., 165 Front St., Chicopee, Mass.—IF, CH, RF

Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—F, IF, CH, RT, RF, T

Speer Resistor Corp., Theresia St., St. Marys, Pa.—F

Standard Winding Co., 44-62 Johnes St., Newburgh, N. Y.—F, IF, CH, RT, RF, T

Stanwyck Winding Co., Newburgh, N. Y.—RF

Stockwell Transformer Corp., 295 N. State St., Concord, N. H.—IF, CH, RT, RF, T

Super Electric Products Corp., 1957 Summit Ave., Jersey City, N. J.—IF, RF

S-W Inductor Co., 1056 Wood St., Chicago 22, Ill.—F, IF, CH, RT, RF, T

Synthane Corp., Oaks, Pa.—F

Taylor Fibre Co., Norristown, Pa.—F

Technical Radio Co., 275—9th St., San Francisco, Calif.—RF

Thomas & Sons Co., R., Lisbon, Ohio—F

Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—RT

Victory Mfg. Co., 1722-24 W. Arcade Pl., Chicago 12, Ill.—F

Vokar Corp., 7300 Huron River Drive, Dexter, Mich.—IF, CH, RF

Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—F

Westinghouse Elec. Corp., East Pittsburgh, Pa.—F, CH, RT

Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—CH, RT

(9) Crystals & Accessories

Crystal cartridges	C
Crystal electrodes	CE
Crystal production equipment	CP
Frequency standard	F
Holders	H
I F filter	S
Quartz crystals	QC
Rochelle salt crystals	R
Temp. control ovens	T
Tourmaline	TO
Raw quartz	Q

Alreon Mfg. Corp., Fairfax & Funston Rds., Kansas City 15, Kansas—F, H

Alden Products Co., 117 N. Main St., Brockton 64, Mass.—H

American Gem & Pearl Co., 6 West 48th St., New York 19, N. Y.—QC, TO, Q

American Jewels Corp., 94 County St., Attleboro, Mass.—C

American Time Products, Inc., 580 Fifth Ave., New York 19, N. Y.—F

Astatic Corp., Harbor & Jackson, Conneaut, Ohio—C, R

Atlas Products Corp., 30 Rockefeller Plaza, New York 20, N. Y.—C, F

Barker & Williamson, Upper Darby, Pa.—F

Bassett, Inc., Rex, 307-09-11 N.W. 1st Ave., Ft. Lauderdale, Fla.—F, QC

Bliley Electric Co., Union Station Bldg., Erie, Pa.—F, H, S, T

Bodnar Co., Charles J., 68 Marbledale Rd., Tuckahoe 7, N. Y.—"BRL"—C

BRL-Bodnar Co., Charles J.

Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—F

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—R

Cadie Chemical Products, Inc., 621 Sixth Ave., New York 11, N. Y.—Q

Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.—C

Commercial Crystal Co., 110-114 N. Water St., Lancaster, Pa.—C, H

Conn Ltd., C. G., 1101 E. Beardsley Ave., Elkhart, Ind.—F

Crowley & Co., Inc., Henry L., 1 Central Ave., West Orange, N. J.—C

Cryco, Inc., 1516 Mission St., South Pasadena, Calif.—H

Crystal Laboratories, 801 West Maple St., Wichita 12, Kansas—C, F

Crystal Products Co., 1519 McGee St., Kansas City 8, Mo.—C, S, Q

Crystal Research Laboratories, Inc., 29 Allyn St., Hartford 3, Conn.—C, F, H, S, Q

Crystal Research Products, Dumont, N. J.—F, T

C. W. Mfg. Co., 3800 Brooklyn Ave., Los Angeles 33, Calif.—F, H, S, Q

Dallons Laboratories, 5066 Santa Monica Blvd., Los Angeles 27, Calif.—C, F, S

Diamond Drill Carbon Co., 53-63 Park Row, New York 7, N. Y.—Q

D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—H, S

Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—F

"Eidson's," 1309 N. Second St., Temple, Texas—CE, F

Electrical Products Corp., 920 30th St., Oakland, Calif.—QC

Electro Products Laboratories, 549 W. Randolph St., Chicago 6, Ill.—F

Electronic Measurements Co., Red Bank, N. J.—CP

Electronic Mechanics, Inc., 70 Clifton Blvd., Clifton, N. J.—H

Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—C, F, S, T

Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—F

Elematic Equipment Corp., 6046 S. Wentworth Ave., Chicago 21, Ill.—CP, F, T

Elkay Radio Products, 305-309 E. Walnut St., Oglesby, Ill.—C, S

Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—C

Erco Radio Laboratories, Inc., 231 Main St., Hempstead, N. Y.—F

Espey Mfg. Co., Inc., 33 West 46th St., New York 19, N. Y.—F

Federal Engineering Co., 37 Murray St., New York 7, N. Y.—F

Federal Telephone and Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—C, F, H, S, T

Ferris Instrument Co., 110 Cornelia St., Boonton, N. J.—F

Franklin Transformer Mfg. Co., 65 22nd Ave., N.E., Minneapolis 13, Minn.—F

Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14, Ill.—F

General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—F

General Crystal Corp., 1776 Foster Ave., Schenectady 8, N. Y.—F

General Electric Co.—Specialty Div., 1001 Wolf St., Syracuse, N. Y.—C, H

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—F, T

Gentleman Products Div. of Henney Motor Co., 1702 Cuming St., Omaha, Nebr.—F, S, Q

Gibbs & Co., Thomas B., Delavan, Wisc.—F

Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—C, F, H, T, Q

Hallicrafters Co., 2611 Indiana Ave., Chicago 16, Ill.—F

Henry Mfg. Co., 10860 Santa Monica Blvd., Los Angeles 25, Calif.—C, F, S

Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—F

Higgins Industries, Inc., 2221 Warwick Ave., Santa Monica, Calif.—C, F, S

Hipower Crystal Co., 2033 W. Charleston St., Chicago 47, Ill.—"Hipower"—F, S

Hoffman Co., P. R., 321 Cherry St., Carlisle, Pa.—CE, H, Q

Hollister Crystal Co., 1617 Pearl St., Boulder, Colo.—F, H

Holtzer-Cabot Div., of First Industrial Corp., 125 Amory St., Roxbury 19, Mass.—C

Howard Mfg. Corp., 1401 S. Main St., Council Bluffs, Iowa—H

Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—F, H, S, TO

Hoo & Sons, G. C., 133 N. Hanover St., Carlisle, Pa.—C

Instrument Glass & Mirror Co., 383 Pearl St., Brooklyn 1, N. Y.—CE

Isolantite, Inc., 343 Cortlandt St., Belleville 9, N. J.—H

Jefferson, Ray, Inc., 40 E. Merrick Rd., Freeport, L. I., N. Y.—F

Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif.—C

Kilburn Glass Co. Inc., J. R., 22 S. Worcester St., Chartley, Mass.—C

Knights Co., James, Sandwich, Ill.—C, F, H, S, T, Q

Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.—F

Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.—F

Lenoxite Division, Lenox Inc., 65 Prince St., Trenton 5, N. J.—H

Leuck Crystal Laboratory, 245 S. 11th St., Lincoln 8, Nebr.—F

Link, Fred M., 125 West 17th St., New York 11, N. Y.—C, T

Mayfair Molded Products Corp., 4440 N. Elston Ave., Chicago 30, Ill.—H

Megard Corp., 1601 S. Burlington St., Los Angeles 6, Calif.—F

Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass.—F

Molded Insulation Co.—Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—H

Monitor Piezo Products Co., 815 Fremont Ave., So. Pasadena, Calif.—C, F, H, S, T, Q

Monawatt Electric Corp., 66 Bissell St., Providence, R. I.—H

Mycalex Corp. of America, 60 Clifton Blvd., Clifton, N. J.—H

NA-ALD—Alden Products Co.

National Company, Inc., 61 Sherman St., Malden 48, Mass.—H, S

National Electronic Mfg. Corp., 22-78 Steinway St., Long Island City, N. Y.—H

National Gasket & Washer Mfg. Co., 122 E. 25th St., New York 10, N. Y.—H

National Scientific Products Co., 5012 N. Kedzie Ave., Chicago, Ill.—H

National Tile & Mfg. Co., 1200 E. 26th St., Anderson, Ind.—H

North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—C, F, S, Q, C

Nurnberg Thermometer Co., Inc., 112 Broadway, Cambridge 42, Mass.—T

Ogush, Inc., William B., 33 W. 60th St., New York 23, N. Y.—Q

Pacific Electronics, W. 1011-1013 First Ave., Spokane, Wash.—F

Pacific Radio Crystal Co., 1158 Sutter St., San Francisco, Calif.—QC

Peterson Radio Co., 2800 W. Broadway, Council Bluffs, Iowa—"P. R. Crystals"—F, H

Piezo Electric Products Co., 104 5th Ave., Baltimore 25, Maryland—F, S

P. R. Crystals—Peterson Radio Co.

Precision Piezo Service, 427 Mayflower St., Baton Rouge 10, La.—F, H, S, T

Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—C, F, H, S, T, TO, Q

Publix Metal Prod. Inc., 100 Sixth Ave., New York 13, N. Y.—C, H

Quartz Laboratories, Inc., 1513 Oak, Kansas City 8, Missouri— C, Q

Radio Specialty Mfg. Co., 403 N.W. 9th St., Portland 9, Ore.—F, H, S

R. E. C. Mfg. Corp., 1250 Highland St., Holliston, Mass.—H, T

Reeves Sound Labs., Div. of Reeves-Ely Laboratories, Inc., 215 E. 91st St., New York 28, N. Y.—C, F, H, S, TO

Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—H

Rice's Sons, Bernard, 325 Fifth Ave., New York 16, N. Y.—H

Ross Mfg. Co., 2241 S. Indiana Ave., Chicago, Ill.—H

Scientific Radio Products Co., 738 W. Broadway, Council Bluffs, Iowa—C, F, S

Shure Brothers, 225 W. Huron St., Chicago 10, Ill.—C

Standard Piezo Co., 127 Cedar St., Carlisle, Pa.—C, F, H, S

Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—H

Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—C

Telicon Corp., 851 Madison Ave., New York 21, N. Y.—F

Trent Co., Harold E., 5005 Wilde St., Philadelphia 27, Pa.—T

Union Piezo Corp., 701 McCarter Hwy., Newark 2, N. J.—C, F, H, S

Universal Television System, 112-114 W. 18th St., Kansas City, Mo.—C

Valpey Crystal Corp., Highland St., Holliston, Mass.—C, H, S, T

V Precision Instrument Mfg. Co. Inc., 57-02 Hoffman Dr., Elmhurst, N. Y.—F

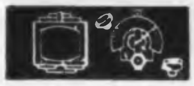
Walker, Inc., Robert, 403 W. 8th St., Los Angeles, Calif.—F, H

Westinghouse Elec. Corp., East Pittsburgh, Pa.—H

Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—C

Willson Plastics Div., Willson Magazine Camera Co., 6022 Media St., Philadelphia 31, Pa.—H

(10) Dials, Name Plates and Knobs



Call letter tabs	CL
Complete dials	D
Crystals	C
Decalcomanias	DE
Dial cables & belts	DC
Dial lamps	L
Dial light assemblies	PL
Dial locks	DL
Dial pointers	P
Drive rubbers	DR
Escutcheons	E
Faces or scales	F
Jewel pilot lights	JL
Knobs—molded	KM
Knob springs	KS
Knobs—wooden	KW
Name plates	N
Panel signal lights	S
Shaft lock	SL
Telephone dials	T
Worm drives	WD

Ace Mfg. Corp., Erie Ave., at K St., Philadelphia 24, Pa.—WD

Acme Fire Alarm Co. Inc., 106 Seventh Ave., New York 11, N. Y.—N

Acromark Co., 9-13 Morrell St., Elizabeth 4, N. J.—D, F, N, T

Aerolite Electronic Hardware Corp., 24 Cliff St., Jersey City 6, N. J.—L, PL, JL

Alden Products Co., 117 N. Main St., Brockton 64, Mass.—D, L, PL, JL, KM, S

Alpha Meter Service, 71 Nassau St., New York 7, N. Y.—F

American Dial Co. Inc., 450 W. 45th St., New York, N. Y.—F

American Emblem Co., Inc., Utica 1, N. Y.—E, N

American Insulator Corp., New Freedom, Pa.—F, KM, N

American Radio Hardware Co., 152-4 McQueston Pkwy., S., Mt. Vernon, N. Y.—"Arhco"—D, L, PL, P, DR, JL, S, SL

Arens Controls, Inc., 2253 S. Halsted St., Chicago 8, Ill.—KM

Arhco—American Radio Hardware Co.

Auburn Button Works, Inc., Auburn, N. Y.—KM

Austin Co., O., 335 Throop Ave., Brooklyn 21, N. Y.—D, DE, E, F, N

Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—T

Avery Adhesives, 453 E. 3rd St., Los Angeles 13, Calif.—N

Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.—C

Barker & Williamson, Upper Darby, Pa.—D, DL, SL, WD

Barnes Co., Wallace, P. O. Box 1521, Bristol, Conn.—KS

Bastian Bros. Co., 1600 N. Clinton Ave., Rochester, N. Y.—DE, E, F

Bend-A-Lite Plastics Div., 423 S. Honore St., Chicago 12, Ill.—E

Berger Electronics, 109-01 72nd Rd., Forest Hills, N. Y.—DC, KM

Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N. Y.—DC, KM, KW

Bostonian Process Co., 40 W. 13th St., New York 11, N. Y.—CL, F, N

Browne Electric Co., J., 3774 Surf Ave., Brooklyn 24, N. Y.—PL, JL, S

Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio "BUD"—D, PL, JL, KM, N

Cannon Electric Development Co., 3209 Humboldt St., Los Angeles 31, Calif.—S

Cardy-Lundmark Co., 1801 W. Byron St., Chicago 13, Ill.—CL, PL

Carlton Lamp Corp., 730 S. 13th St., Newark 3, N. J.—L

Chicago Die Mold Corp., 4001 Wrightwood Ave., Chicago 39, Ill.—KM

Cinch Mfg. Corp., Div. United-Carr Fastener Co., 2335 W. Van Buren St., Chicago, Ill.—KS

Cleveland Plastics, Inc., 1611 E. 21st St., Cleveland 14, Ohio—KM

Colonial Brass Co., 1900 Vine St., Middleboro, Mass.—N

Control Corp., 718 Central Ave., Minneapolis 14, Minn.—N

Croname, Inc., 3701 N. Ravenswood Ave., Chicago 13, Ill.—D, C, E, F, KM, N

Crystal Laboratories, 801 West Maple St., Wichita 12, Kan.—C

Cutler-Hammer Inc., 315 N. 12th St., Milwaukee 1, Wis.—KM

Davies Molding Co., Harry, 1428 N. Wells St., Chicago 10, Ill.—CL, KM

Dial Light Co. of America, Inc., 900 Broadway, New York 3, N. Y.—PL

Diemolding Corp., Rasbach St., Canastota, N. Y.—KM

Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—CL, D, P, F, KM, N

Drake Mfg. Co., 1713 W. Hubbard St., Chicago 22, Ill.—L, PL, JL, S

Dual Remote Control Co., 31776 Cowan Rd., Wayne, Mich.—KM

Eby Inc., Hugh H., 18 W. Chelten Ave., Philadelphia 44, Pa.—KM

Edwards, Inc., T. J., 210 South St., Boston 5, Mass.—N

Electric Coding Machine Co., 57 Franklin St., New York 13, N. Y.—F, N

Electrical Insulation Co., 12 Vestry St., New York 13, N. Y.—E, N

Electro-Marine Co., 274 Madison Ave., New York 16, N. Y.—N

Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—DL, P

Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—D, C, DC, L, PL, P, DR, F, JL, KM, KS, KW

Enameloid—Cloisonne—Gemloid Corp.

Erie Resistor Corp., 640 W. 12th St., Erie, Pa.—P, E, KM

Etched Products Corp., 39-01 Queens Blvd., Long Island City 4, N. Y.—D, P, E, F, N

Ever Ready Label Corp., 141-155 E. 25th St., New York 10, N. Y.—CL

Federal Screw Products Co., 224 W. Huron St., Chicago 10, Ill.—PL, JL, S

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—D, C, N, T

G. Felsenthal & Sons, 4108 W. Grand, Chicago 51, Ill.—D, C, E, F, KM, N

Flock Process Co.—Velvetone Div., 3 Quincy St., Norwalk, Conn.—D, E

GC—General Cement Mfg. Co.

Gemlite—Gemloid Corp.

Gemloid Corp., 7910-7930 Albion Ave., Elmhurst, L. I., N. Y.—"Enameloid-Cloisonne," "Gemlite"—D, P, E, KM, N

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—"G-C"—CL, C, DC, DL, DR, KM, KS, KW

General Electric Co., Lamp Dept., Nela Park, Cleveland 12, Ohio—L

General Electric Co.—Specialty Div., 1001 Wolf St., Syracuse, N. Y.—C, KM, S

General Electronics Mfg. Co., 2225 S. Hoover St., Los Angeles 7, Calif.—F

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—D, DL, KM, WD

Goodall Electric Mfg. Co., Third & Main St., Ogallala, Neb.—C, KM, N

Gordon Specialties Co., 823 R. Wabash Ave., Chicago 5, Ill.—D, KM, KW, N

Gothard Mfg. Co., 1300 N. Ninth St., Springfield, Ill.—L, PL

Grammes & Sons, Inc., L. F., 392 Union St., Allentown, Pa.—D, P, E, F, N

Greenhut Insulation Co., 31 W. 21st St., New York, N. Y.—E, F, N

Hart Mfg. Co., 110 Bartholomew Ave., Hartford 1, Conn.—JL, S

Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—SL

Herzog Miniature Lamp Works, 12-23 Jackson Ave., Long Island City 1, N. Y.—JL

Hopp Press, Inc., 460 W. 34th St., New York 1, N. Y.—CL, E, F, KM, N

ICA—Insuline Corp. of America

Imperial Molded Products Corp., 2925 W. Harrison St., Chicago 12, Ill.—KM

Industrial Screw & Supply Co., 717 W. Lake St., Chicago 6, Ill.—KM, KW

Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—"ICA"—CL, KM, N

International Merit Products Corp., 254 W. 54th St., New York 19, N. Y.—WD

J.F.D. Mfg Co., 4117 Fort Hamilton Parkway, Brooklyn 19, N. Y.—DC, KW

Johnson Co., E. F., Waseca, Minn.—KM

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—E, JL, KM, KW, N, S, T

Keystone Electronics Co., 50-52 Franklin St., New York 13, N. Y.—N

Kilburn Glass Co., Inc., J. R., 22 S. Worcester St., Chartley, Mass.—C, JL

Kirkland Co., H. R., 8-10 King St., Morristown, N. J.—L, PL, N

Kopp Glass, Inc., Swissvale, Pittsburgh, Pa.—PL, JL

Kulka Electric Mfg. Co., 30 South St., Mt. Vernon, N. Y.—PL

Kurz Kasch, Inc., Dayton 1, Ohio—P, KM

Long Island Engraving Co., 19 W. 21st St., New York 10, N. Y.—E, N

McInerney Plastics Co., 25 Commerce Ave., S.W., Grand Rapids 2, Mich.—CL, D, E, N

Maico Co., Inc., 21 N. Third St., Minneapolis, 1, Minn.—KM

Mayfair Molded Products Corp., 4440 N. Elston Ave., Chicago 30, Ill.—E, KM

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—D, F

Meyercord Co., 5323 W. Lake St., Chicago 44, Ill.—DE

Micarta Fabricators, Inc., 5324 Ravenswood Ave., Chicago 40, Ill.—PL

Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass.—DL, P, KM, SL, WD

Milprint Inc., 431 W. Florida St., Milwaukee 1, Wis.—N

Molded Insulation Co.—Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—KM

National Co. Inc., 61 Sherman St., Malden 48, Mass.—D, DL, F, KM, SL, WD

National Lock Co., 1902 Seventh St., Rockford, Ill.—E, KM, KW, N
National Molding Co., 2141 W. Washington Blvd., Los Angeles 7, Cal.—KM
New England Electrical Works, Inc., 385 Main St., Lisbon, N. H.—DC
New England Etching & Plating Co., 25 Spring St., Holyoke, Mass.—E, F
N.E. Radiocrafters, 1156 Commonwealth Ave., Boston 34, Mass.—D, P, F, KM
Norton Laboratories, Inc., 560 Mill St., Lockport, N. Y.—KM
Pan Electronics Laboratories, Inc., 500 Spring St., N.W., Atlanta, Ga.—C
Panelyte Div., St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.—N
Parisian Novelty Co., 3510 South Western Ave., Chicago 9, Ill.—CL, D, C, P, F
Peck Spring Co., 20 Grove St., Plainville, Conn.—KS
Peerless Roll Leaf Co., Inc., 4511 New York Ave., Union City, N. J.—N
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—PL
Photox Silk Screen Supply Co., 30 Irving Pl., New York 3, N. Y.—CL, D, F, N
Pilot Industries Inc., 202 E. 44th St., New York 17, N. Y.—D
Plastic Accessories, Inc., 460 Broome St., New York 13, N. Y.—CL, D, C, P, F, N
Plastic Fabricators Co., 440 Sansome St., San Francisco 11, Calif.—CL, E, F, N
Point Mfg. Co., 5775 N. Ridge Ave., Chicago 26, Ill.—F, JL, KM
Ports Mfg. Co., 3265 E. Belmont Ave., Fresno 3, Calif.—CL, N
Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—CL, C, L, PL, F, JL, KM, WD
Premier Metal Etching Co., 21-03 44th Ave., Long Island City 1, N. Y.—F, N
Printloid, Inc., 93 Mercer St., New York 12, N. Y.—CL, D, C, P, F, N
Publix Metal Prod. Inc., 100 Sixth Ave., New York 13, N. Y.—D
Radio Craftsmen, 1341 S. Michigan Ave., Chicago 5, Ill.—DL
Reiner Electronics Co., Inc., 152 W. 25th St., New York 1, N. Y.—KM
Remler Co. Ltd., 2101 Bryant St., San Francisco 10, Calif.—KM
Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.—D
Rhodes Mfg. Co., 1753 N. Honore St., Chicago, Ill.—KM, KW
Richardson Co., 27th & Lake Sts., Melrose Park, Ill.—D, KM
R-9 Crystal Co., Inc., 907 Penn Ave., Pittsburgh, Pa.—C
Santay Corp., 351 N. Crawford Ave., Chicago 24, Ill.—E, KM, N
Saxl Instrument Co., 38-40 James St., E. Providence 14, R. I.—N
Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"WALSCO"—DC, PL, DR, KS
Screenmakers, Inc., 64 Fulton St., New York 7, N. Y.—D, E, N
Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—PL, P, JL, S
Shakespeare Products Co., 241 E. Kalamazoo Ave., Kalamazoo, Mich.—E, KM
Signal Indicator Corp., 894 Broadway, New York, N. Y.—PL
Silk Screen Supplies, Inc., 33 Lafayette St., Brooklyn, N. Y.—F, N, CL
Sillcocks-Miller Co., 10 W. Parker Ave., Maplewood, N. J.—D, N
Silver Co., McMurdo, 1240 Main St., Hartford, 8, Conn.—D
Slater Corp., N. G., 3 W. 29th St., New York, N. Y.—D, C, N
Spirling Products Co., 64 Grand St., New York 13, N. Y.—DC, P, F, N
Standard Molding Corp., 460 Bacon St., Dayton 1, Ohio—P, E, KM, N
Standard Products Co., 505 Blvd. Bldg., Detroit 2, Mich.—CL, D, E, KM, N
Synthane Corp., Oaks, Pa.—D
Syracuse Ornamental Co., 581 S. Clinton St., Syracuse 2, N. Y.—"Syroco," "Syrocowood," "Woodite"—E, KW, N
Syroco—Syracuse Ornamental Co.
Syrocowood—Syracuse Ornamental Co.
Tingstol Co., 1461 W. Grand Ave., Chicago 22, Ill.—PL
Ten-Tex Corp., 245 Pearl St., N.W., Grand Rapids 2, Mich.—DC
Tung-Sol Lamp Works, Inc., 95 Eighth Ave., Newark 4, N. J.—L
Ucinite Co., Div. United-Carr Fastener Corp., Newtonville, Mass.—KS
United Radio Mfg. Co., 191 Greenwich St., New York N. Y.—N
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—D
Victory Mfg. Co., 1722-24 W. Arcade Place, Chicago 12, Ill.—P, E, KM
Walsco—Walter L. Schott Co.
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—D, P, E, KM
Westinghouse Elec. Corp., East Pittsburgh, Pa.—L, JL, KM, S, SL, WD
Wickwire Spencer Metallurgical Corp., 260 Sherman Ave., Newark 5, N. J.—KS
Willson Plastics Div., Willson Magazine Camera Co., 6022 Media St., Philadelphia 31, Pa.—CL, D, DE, E, F, KM, N

(11) Drafting Room Equipment

Drafting instruments	DI
Drawing tables	DT
Drawing papers	D
Electric erasers	EE
Lighting equipment	L
Pencils and accessories	P
Print making machines	BM
Sensitized papers	SP
Stools	ST
Tracing cloth	TC

Abott Transformer Co., Inc., 409 Lafayette St., New York 3, N. Y.—L
American Photocopy Equipment Co., 2849 N. Clark, Chicago 14, Ill.—BM, SP
Arkay Laboratories Inc., 1570 S. First St., Milwaukee 4, Wis.—BM
Arkwright Finishing Co., 76 Westminster St., Providence, R. I.—TC
Art Specialty Co., 3245 W. Lake St., Chicago, Ill.—"Flexo"—L
Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—L
Bruning Co., Inc., Charles, 4754 Montrose Ave., Chicago 41, Ill.— DI, DT, D, EE, L, P, BM, SP, ST, TC
Cardinell Corp., 15 Label St., Montclair, N. J.—DI, D, TC
Commercial Metal Products Co., 2251 W. St. Paul Ave., Chicago 47, Ill.—L
Dazor Mfg. Co., 4483 Duncan Ave., St. Louis 10, Mo.—L
Diehl Mfg. Co., Finderne Plant, Somerville, N. J.—L
Joseph Dixon Crucible Co., 167 Wayne St., Jersey City 3, N. J.—P
Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza So., Long Island City 1, N. Y.—L
Eagle Pencil Co., 703 E. 13th St., New York 9, N.Y.—P
Eraser Co., Inc., 231 W. Water St., Syracuse 2, N. Y.—P
Faber Co., Inc., A. W., 41 Dickerson St, Newark 4, N. J.—EE, P
Faber, Eberhard, Pencil Co., 37 Greenpoint Ave., Brooklyn 22, N. Y.—P
Flexo—Art Specialty Co.
Fostoria Pressed Steel Corp., Fostoria, Ohio—L
Gates & Co., Inc., Geo. W., Hempstead Turnpike & Lucille Ave., Franklin Square, L. I., N. Y.—L
General Electric Co., Lamp Dept., Nela Park, Cleveland 12, Ohio—L
General Pencil Co, 67 Fleet St., Jersey City 6, N. J.—P
Hamilton Mfg. Co., Two Rivers, Wis.—DT
Hampden Mfg. Co., Inc., 301 E. Fourth St., Plainfield, N. J.—P
Holliston Mills, Inc., Norwood, Mass.—"Microweave"—TC
Keuffel & Esser Co., 300 Adams St., Hoboken, N. J.—DI, DT, D, EE, SP, ST, TC
Keystone Electronics Co., 50-52 Franklin St., New York 13, N. Y.—L
Larrimore Sales Co., 311 Locust St., St. Louis 2, Mo.—L
McInerney Plastics Co., 25 Commerce Ave., S.W., Grand Rapids 2, Mich.—DI
Microweave—Holliston Mills, Inc.
Ozalid Products Division, General Aniline & Film Corp., Johnson City, N. Y.—BM
Peck & Harvey, 4327 Addison St., Chicago 41, Ill.—BM
Post Co., Frederick, 3650 N. Avondale, Chicago, Ill.—DT, D, EE, DI
Reliance Pencil Co., 22 S. 6th Ave., Mt. Vernon, N. Y.—P
Standard Pressed Steel Co., Jenkintown, Pa.—ST
Swivelier Co., 30 Irving Place, New York 3, N. Y.—L
Ullman Products Co., 857-61 4th Ave., Brooklyn 32, N. Y.—L
Wakefield Brass Co., F. W, Vermilion, Ohio—L
Westinghouse Electric Corp., East Pittsburgh, Pa.—L
Wheeler Reflector Co., 275 Congress St., Boston 10, Mass.—L
Wickes Brothers, Saginaw, Mich.—BM
Willson Plastics Division, Willson Magazine Camera Co., 6022 Media St., Philadelphia 31, Pa.—DI

(12) Electronic Control Equipment

(See also ELECTRONIC MEDICAL & INDUSTRIAL EQUIPMENT)

Boiler level alarms	B
Combustion	IC
Conductivity controls	CC
Counting devices	C
Dimension control	DC
Door control	D
Flow control	F
Grading & sorting controls	G
Heat treating controls	HC
Humidity controls	H
Intrusion alarm	AS
Level control	L
Lighting controls	LC
Machine safety control	MS
Motor & generator control	MC
Package wrapping control	P
Position control	PC
Pressure control	VC
Printing controls	PT
Servo amplifiers	SA
Servo control systems	SC
Servo indicating systems	SI
Smoke density controls	S
Solenoid valves	SV
Temperature controls	TC
Time controls	TI
Traffic	TR
Weight control	WC
Welding control	WE

Adam Electric Co., Frank, 3650 Windsor Place, St. Louis 13, Mo.—LC
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass.—MC
Agnew Electric Co., Milford, Mich.—WE
AIC—Atomic Instruments Co.
Alco Valve Co., 865 Kingsland, St. Louis 5, Mo.—L, SV
Allied Control Co., Inc., 2 East End Ave., New York 21, N. Y.—SV
Allis-Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1, Wis.—MC
American District Telegraph Co., 155 6th Avenue, New York 13, N. Y.—AS
American Electronics Co., 1935 Whitman Ave., Butte, Mont.—TI
American Radio Co., 611 E. Garfield Ave., Glendale, Calif.—C, D, MS, TC, TI
American Time Products, Inc., 580 5th Ave., New York 19, N. Y.—MC, TI
Amglo Corp., 4234 Lincoln Ave., Chicago 18, Ill.—AC, CC, D, LC, MC, TI, TR, WE
Arrow-Hart & Hegeman Elec. Co., 103 Hawthorn St., Hartford 6, Conn.—MC
Askania Regulator Co., 1603 So. Michigan Ave., Chicago 16, Ill.—IC, F, L, MC, VC, TC, WC
ATC—Automatic Temperature Control Co., Inc.
Atomic Instruments Co., 160 Charles St., Boston, Mass.—"AIC"—C
Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—DC, G, L, TI
Auth Electrical Specialty Co., Inc., 422 E. 53rd St., New York 22, N. Y.—C
Automatic Electric Mfg. Co., 10 State St., Mankato 1, Minn.—AS, TI
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.—SV
Automatic Temperature Control Co., Inc., 34 E. Logan St., Philadelphia 44, Pa.—"ATC"—IC, F, HC, L, VC, TC, TI
Aviometer Corp., 370 W. 35th St., New York 1, N. Y.—TI
Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio—B, IC, F, L, S, TC
Barber-Colman Co., River & Loomis Sts., Rockford, Ill. H, L, VC, SV, TC, TI
Barker & Williamson, Upper Darby, Pa.—AS, C, DC, D, G, MS, TI
Betts & Betts Corp., 551 W. 52nd St., New York 19, N. Y.—LC
Brelco Corp., 55 Van Dam St., New York 13, N. Y.—C, G, MS, S, TI, WC
Bristol Co., Waterbury, Conn.—F, HC, H, L, VC, TC TI
Browne Electric Co., J., 3774 Surf Ave., Brooklyn 24, N. Y.—HC, MS, MC, TC, TI, WE
Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—AS
Bruno-New York, Inc., Engineering Products Div., 351 4th Ave., New York 10, N. Y.—AS, C, MS, TI
Burke & James, Inc., 321 S. Wabash Ave., Chicago 4, Ill.—LC
Burling Instrument Co., 253 Springfield Ave., Newark 3, N. J.—TC
Burlington Instrument Co., North 4th St., Burlington, Iowa—MC, TI
Butte Electric & Mfg. Co., 124 Russ St., San Francisco, Calif.—AS, TR, C
Carpenter Mfg. Co., Master Light Bldg., Boston 48, Mass.—LC, TR
Carpenter Products, Inc., 85 Washburn St., Bridgeport, Conn.—WE
Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio—MC, TI, WE
Clark Radio Equipment Corp., 4313 Lincoln Ave., Chicago 18, Ill.—C, S
Clarostat Mfg. Corp., 285 N. 6th St., Brooklyn, N. Y.—MC
Cline Electric Mfg. Co., 4550 W. Lexington Ave., Chicago, Ill.—MC
Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.—"Fireye"—B, IC
Communications Co., Inc., 300 Greco Ave., Coral Gables 34, Fla.—TR
Conn Ltd., C. G., 1101 E. Beardsley Ave., Elkhart, Ind.—S
Conn. Tele. & Elec. Div., Great American Industries, Inc., Meriden 3, Conn.—AS

Cordox Western, Inc., 151 North Ave., Los Angeles 31, Calif.—IC

Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.—HC, MC, PC, TI, WE

Crystal Research Products, Dumont, N. J.—TC

Dalmo Victor, Div. of Goldfield Consolidated Mines Co., 1414 El Camino Real, San Carlos, Calif.—TC

Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—TC, TI

Dickson Co., 7420 Woodlawn Ave., Chicago 19, Ill.—HC, L, VC, TC

Dielectric Products Co., Inc., 125 Virginia Ave., Jersey City 5, N. J.—H

Dietz Mfg. Co, 2310 So. La Cienega Blvd., Los Angeles 34, Calif.—TC

Distillation Products, Inc., Vacuum Equipment Div., 755 Ridge Road West, Rochester 13, N. Y.—VC

Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—D, MS, PC, TR

Doolittle Radio, Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.—C

Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—B, IC, CC, C, DC, D, F, G, HC, H, L, LC, MS, MC, P, VC, S, TC, TI, TR, WC

Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.—F, L, SA, SC, SI

Electric Coding Machine Co., 57 Franklin St., New York 13, N. Y.—TI

Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4, Ohio—WE

Electric Eye Equipment Co., 6 West Fairchild St., Danville, Ill.—C, DC, F, G, PC

Electric Furnace Co., West Wilson St., Salem, Ohio—HC

Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio—LC, MC

Electrical Industries, Inc., 42 Summer Ave., Newark 4, N. J.—WE

Electro-Tech Equipment Co., 331 Canal St., New York 13, N. Y.—HC, MC, TC, TI

Electrocon Corp., 219 W. Sunrise Highway, Freeport, L. I., N. Y.—TI

Electron Equipment Corp., 917 Meridian Ave., So., Pasadena, Calif.—C, MS, MC, PC, WC

Electronic Apparatus, Inc., 347 Madison Ave., New York 17, N. Y.—IC, CC, C, DC, D, L, LC, S, TI, WC, WE

Electronic Control Corp., 1573 E. Forest Ave., Detroit, Mich.—AS, IC, C, DC, D, G, MS, S, TC, TI

Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—CC, DC, F, G, H, LC, MC, BC, WC

Electronic Processes Corp., 249 Richards Road, Ridgewood, N. J.—P

Electronic Radio Alarm, Inc., 1920 Lincoln-Liberty Bldg., Philadelphia 7, Pa.—AS

Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—TC

Electronic Research & Mfg. Corp., 5805 Hough Ave., Cleveland 3, Ohio—AS, L

Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—B, CC, C, G, HC, H, LC, MS, S, TI, WE

Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—C, L

Exact Weight Scale Co., 944 5th Ave., Columbus 8, Ohio—WC

Export Industries, 53 Downing St., New York 14, N. Y.—P

Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y.—F, MC

Federal Instrument Co., 3609 Cernon St., Long Island City, N. Y.—B, CC, DC, MS

Fireye—Combustion Control Corp.

Fischer & Porter Co., Hatboro, Pa.—F

Fischer-Smith, Inc., 162 State St., West Englewood, N. J.—IC, CC, C, H, L, S, TC, TI

Fish-Schurman Corp., 230 East 45th St., New York 17, N. Y.—PC, TI

Fisher Pierce Co., 74 Ceylon St., Boston 21, Mass.—CC, D, L, LC, P, TC, TI

Fisher Research Laboratory, 1961 University Ave., Palo Alto, Calif.—L

Foote Pierson & Co., Inc., 75 Hudson St., Newark 4, N. J.—DC

Fractional Motors Co., 1501 N. Halsted St., Chicago 22, Ill.—MC

Friez Instrument Div., Bendix Aviation Corp., Taylor Ave., near Loch Raven Blvd., Baltimore 4, Md.—H, TC

Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—AS, C, G, TI

General Aviation Equipment Co., Inc., 630 5th Ave., New York 20, N. Y.—MC

General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—C

General Control Co., 1200 Soldiers Field Rd., Boston 34, Mass.—C, G, LC, MS, P, S, TI

General Controls Co., 801 Allen Ave., Glendale 1, Calif.—SV, TC, TI

General Electric Co., Transmitter Div., Thompson Road Plant, Syracuse, N. Y.—HC

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—C

Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va.—C, MC

Glenn-Roberts Co., 3100 E. 10th St., Oakland 1, Calif.—WE

G-M Laboratories, Inc., 4300 N. Knox Ave., Chicago 41, Ill.—LC

Hansen Co., Wm., 165 Silverbrook Ave., Niles, Mich.—AS, C, D, MS, S

Hansen Mfg. Co., R. R. No. 1, Princeton 14, Ind.—SA, SC, SI

Haydon Mfg. Co, Inc, Forestville, Conn.—C, TI

Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—AS, C, DC, G, L, MS, TI

Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—F, HC, MS, VC, SV, TC, WE

Hertner Electric Co., 12690 Elmwood Ave., Cleveland 11, Ohio—MC

Hetherington & Son, Inc., Robert, 1216 Elmwood Ave., Sharon Hill, Pa.—C, SC

Hoffman Engineering Co., 458 Sexton Bldg., Minneapolis 4, Minn.—IC, C, DC, D, G, LC, MS, P, VC, PC, S, TI

Huber Radio Co., 260 S. Center St., Casper, Wyo.—LC, TC

Industrial Instruments, Inc., 17 Pollock Ave., Jersey City, N. J.—B, CC, F, H

J-B-T Instruments, Inc., 441 Chapel St., New Haven 8, Conn.—TI

Keeney & Co., Inc., J. H., 6610 S. Ashland Ave., Chicago 36, Ill.—C, TI

Kidde & Co., Inc., Walter, 140 Cedar St., New York 6, N. Y.—VC, SV

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—C

Kirkland Co., H. R., 8-10 King St., Morristown, N. J.—LC

Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—C, DC, LC, TC, TI

Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.—IC, CC, HC, H, S, TC

Lektra Labs., Inc., 30 E. 10th St., New York 3, N. Y.—TI

Leupold & Stevens Instruments, 4445 N.E. Glisan St., Portland 13, Ore.—B, F, L, VC

Lewis Engineering Co., 52 Rubber Ave., Naugatuck Conn.—TC

Lewyt Corp., 60 Broadway, Brooklyn 11, N. Y.—C, F, VC, S

Long Co., L. J., 186 Grand St., New York 13, N. Y.—TI

Lumenite Electronic Co., 407 S Dearborn St., Chicago 5, Ill.—B, CC, C, D, F, L, LC, MS, TI

Lyman Electronic Corp., 12 Cass St., Springfield, Mass.—C, HC, MS, MC, TI, WE

Magnetic Gauge Co., High & Bartges Sts., Akron 11, Ohio—DC

McClintock Co., O. B., 139 Lyndale Ave., N., Minneapolis 3, Minn.—AS

McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.—B

Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—C, DC, G

Megard Corp., 1601 S. Burlington Ave, Los Angeles 6, Calif.—AS, LC

Mercoid Corp., 4201 Belmont Ave., Chicago 41, Ill.—B, L, VC, TC

Merrifield & Son, J. D., 609 N. 9th St., Rocky Ford, Col.—P

Mettler Co., Lee B., 406 S. Main St., Los Angeles 13, Calif.—IC

Micro Switch Division of First Industrial Corp., Freeport, Ill.—TC

Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—C, DC, D, LC, MS, MC

Minneapolis-Honeywell Regulator Co., 2712 4th Ave., Minneapolis, Minn.—HC, MC, TC

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—AS, MS

Moulic Specialties Co., 1005-1007 W. Washington St., Bloomington, Ill.—TC, TI

Nelson Automatic Gauge Co., 402 Oklahoma Bldg., Tulsa 3, Okla.—L

Norton Electrical Instrument Co., 85 Hilliard St., Manchester, Conn.—HC

Nurnberg Thermometer Co., Inc., 112 Broadway, Cambridge 42, Mass.—TC

Offner Electronics Inc., 5320 N. Kedzie Ave., Chicago 25, Ill.—C, DC

Operadio Mfg. Co., St. Charles, Ill.—B, TI

Paragon Electric Co., 37 West Van Buren, Chicago 5, Ill.—TI

Phelon Co., R. E., 23 Northwood Ave., Springfield, Mass.—C

Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.—CC, C, D, L, LC, MS, MC, P, PC, S, TI, WC

Photovolt Corp., 35 Madison Ave., New York 16, N. Y.—PC, TI

Plating Processes Corp., 109 Lyman St., Holyoke, Mass.—B, C, DC, F, HC, L, VC, SV, TC

Point Mfg. Co., 5775 N. Ridge Ave., Chicago 26, Ill.—VC, TI

Polytron Corp., 401 Broadway, New York 13, N. Y.—C, G, S, TI

Portable Products Corp., C. J. Tagliabue Div., 550 Park Ave., Brooklyn 6, N. Y.—IC, HC, H, S, TC, TI

Potter Instrument Co., 136-56 Roosevelt Ave., Flushing, N. Y.—C, P, WE

Powers Electronic & Communication Co., New St., Glen Cove, N. Y.—TI

Precision Electronics Co., 815 Washington St., Newtonville 60, Mass.—TI

Process & Instruments, 60 Greenpoint Ave., Brooklyn 22, N. Y.—CC, F, L, VC, TC

Production Instrument Co., 702-20 W. Jackson Blvd., Chicago 6, Ill.—C, TI

Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.—WE

Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y.—HC

Radio Frequency Laboratories, Inc., Boonton, N. J.—C, F, PC

Rectifier Engineering Co., 1809 E. 7th St., Los Angeles 21, Calif.—AS, LC

Reeves Sound Labs., Div. of Reeves-Ely Lab., Inc., 215 E. 91st St., New York 28, N. Y.—DC, F, PC, SC, SI

Rehtron Corp., 4313 Lincoln Ave., Chicago 18, Ill.—AS, B, IC, CC, C, D, G, HC, H, LC, MS, MC, P, PC, S, TC, TI, TR, WC

Reliance Electric & Eng. Co., Ivanhoe Rd., Cleveland 10, Ohio—MC

Rhodes, Inc., M. H., 30 Bartholomew Ave., Hartford, Conn.—TI

Richardson-Allen Corp., 15 W. 20th St., New York, N. Y.—TI

Rieber, Inc., Frank, 11916 West Pico Blvd., Los Angeles 34, Calif.—TI

Riggs & Jeffrys, Inc., 73 Winthrop St., Newark 4, N. J.—TI

Robinette Co., W. C., 802 Fair Oaks Ave., South Pasadena, Calif.—MC

Rowe Radio Research Laboratory Co., 2422 N Pulaski Rd., Chicago 39, Ill.—AS, CC, C, G, VC, TI

Rubicon Co., Ridge Ave. at 35th St., Philadelphia 32, Pa.—CC

Sarco Co., Inc., 475 Fifth Ave., New York 17, N. Y.—TC

Schulmerich Electronics, Inc., 220-228 N. Main St., Sellersville, Pa.—AS

Sciaky Bros., 4915 W. 67th St., Chicago 38, Ill.—SV, TI, WE

Sherron Electronics Co., 1201 Flushing Ave., Brooklyn 6, N. Y.—CC, C, F, G, HC, L, TI, TR, WC, WE

Signal Engineering & Mfg. Co., 154 W. 14th St., New York 11, N. Y.—TI

Simonds Machine Co., Inc., 246-48 Worcester St., Southbridge, Mass.—MS

Smith Mfg. Co., Nathan R., 105 Pasadena Ave., South Pasadena, Calif.—SV

Special Electric Labs., 7657 S. Central Ave., Los Angeles 1, Calif.—TI

Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.—TC

Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y.—SA, SC, SI

Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—C, TI

Stanley Works, New Britain, Conn.—D

Stevenson, Jordan & Harrison, Inc. (Electronic Power Co.), 19 W. 44th St., New York 18, N. Y.—WE

Stoelting Co., C. H., 424 N. Homan Ave., Chicago 24, Ill.—TI

Struthers-Dunn Inc, 1321 Arch St., Philadelphia 7, Pa.—MS, MC

Superior Electric Co., Laurel St., Bristol, Conn.—HC, LC

Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—VC

Synchro Start Products, Inc., 221 E. Cullerton St., Chicago 16, Ill.—MS, MC

Taller & Cooper, 75 Front St., Brooklyn 1, N. Y.—C, PC, SA, SC, SI, S, TI, TR, WC

Task Electronics Co., 245 W. 54th St., New York, N. Y.—IC, C, DC, D, F, MC, S

Tech Laboratories, 337 Central Ave., Jersey City 7, N. J.—H

Techno-Scientific Co., 901 Nepperhan Ave., Yonkers 3, N. Y.—TC

Teleoptic Co., 1251 Mound Ave., Racine, Wis.—TI

Teleregister Corp., 157 Chambers St., New York 7, N. Y.—C

Televiso Products, Inc., 6533 Olmstead Ave., Chicago, Ill.—DC

Tenney Engineering Inc., 26 Avenue B, Newark 5, N. J.—HC, H, TC

Thwing Albert Instrument Co., Penn St. & Pulaski Ave., Philadelphia 44, Pa.—TC

Tork Clock Co., Inc., 1 Grove St., Mt. Vernon, N. Y.—TC, TI

Trimount Instrument Co, 37 W. Van Buren, Chicago 5, Ill.—B, CC, F, L, VC

Ulanet Co., George, 88 E. Kinney St., Newark 5, N. J.—TC, TI

United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—C, D, F, G, L, LC, MS, P, S, TC, TI

United Transformer Corp., 150 Varick St., New York 13, N. Y.—LC

Universal X-Ray Products, Inc., 1800 N. Francisco Ave., Chicago 47, Ill.—C

Valverde Laboratories, 252 Lafayette St., New York 12, N. Y.—HC, TC

Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio—C

Walker, Inc., Robert, 403 W. 8th St., Los Angeles 14, Calif—MC, S, TC

Wallace & Tiernan Products, Inc., Main & Mill Sts., Belleville 9, N. J.—TI

Ward Leonard Electric Co., 31 South Street, Mt. Vernon, N. Y.—LC, MC, TI

Weksler Thermometer Corp., 52 W. Houston St., New York, N. Y.—TC

Weltronic Co., 19500 W. 8 Mile Rd., Detroit 19, Mich.—MS, MC, TI, WE

Westinghouse Elec. Corporation, East Pittsburgh, Pa.—AS, B, C, DC, D, F, HC, H, L, LC, MS, MC, P, PC, S, SV, TC, TI, VC, WC, WE

Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—LC

Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill.—B, MS, TC

Wilson Mfg. Co., Inc., 600 N. Andrews Ave., Ft. Lauderdale, Fla.—LC, TI

World Wide Electronics, Inc., 72 E. 13th St., New York 3, N. Y.—CC, DC, H, S

Worner Electronic Devices, 609 W. Lake St., Chicago 6, Ill.—AS, IC, C, D, LC, MS, P, PC, S, WC

Wurlitzer Co., Rudolph, Niagara Falls Blvd., North Tonawanda, N. Y.—MC
Yardeny Laboratories, Inc., 105-107 Chambers St., New York 7, N. Y.—D, PC, TC
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St., York, Pa.—C

(13) Electronic Medical & Industrial Equipment & Accessories

(See also ELECTRONIC CONTROL EQUIPMENT)

Anoxia photometers	AP
Audiometers	A
Cortical stimulator	C
Diathermy	D
Dielectric heating	HD
Electro-cardiograph	EC
Electro-encephalograph	EE
Electro-sedative generator	EG
Electro-shock machines	S
Electron microscopes	E
Fluoroscope screens	F
Geophysical instruments	GI
Germicidal lamps	GL
Induction heating	I
Infra-red drying equipment	ID
Internal combustion analyzers	IC
Lie detectors	L
Metal flaw detection	MF
Metal locator	ML
Meteorological trans. & rec.	M
Moisture meters	MM
Stethographs and stethophones	ST
Temperature indicators	TI
Wind velocity meter	WM
X-Ray diffraction equipment	XD
X-Ray inspection machines	X
X-Ray intensity meters	XM
X-Ray screens & filters	XS

Abott Transformer Co., Inc., 409 Lafayette St., New York 3, N. Y.—GL
Aero Communications, Inc., 231 Main St., Hempstead, L. I., N. Y.—HD
Aircraft X-Ray Laboratories, 1600 E. 7th St., Los Angeles 21, Calif.—MF, XD, X
Airtronics Mfg. Co., 5145 W. San Fernando Rd., Los Angeles 26, Calif.—HD
Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.—I, HD
Allis Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1, Wis.—I, HD
Alnor—Illinois Testing Laboratories, Inc.
American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22, Ill.—HD
American Electronics Co., 1935 Whitman Ave., Butte, Mont.—ML
American Instrument Co., 8030-8050 Georgia Ave., Silver Spring, Md.—XD
American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—D, HD, GI, M, ST
Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—EC, EE, ST
Annis, R. B. Co., 1101 N. Delaware St., Indianapolis 2, Ind.—I
Associated Research, Inc., 231 S. Green St., Chicago 7, Ill.—GI, L
Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—EG
Aurex Corp., 1117 N. Franklin St., Chicago, Ill.—A
Barker & Williamson, Upper Darby, Pa.—D, HD, I, GI
Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—HD
Bogen, David Co., Inc., 663 Broadway, New York 12, N. Y.—D
Branston Electric Mfg. Co., 61-65 Gill Pl., Buffalo 13, N. Y.—D
Brelco Corp., 55 Van Dam St., New York 13, N. Y.—I
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—GI
Budd Induction Heating, Inc., 11811 Charleveaux St., Detroit, Mich.—HD, I
Bunnell, J. H. & Co., 81 Prospect St., Brooklyn 1, N. Y.—D, I
Burdick Corp., Milton, Wisc.—D, HD, EC, EG, S, ML
Burton Mfg. Co., 3855 N. Lincoln Ave., Chicago 13, Ill.—GI, GL
Cambridge Instrument Co., Inc., 3005 Grand Central Terminal, New York 17, N. Y.—ST, GI
Campbell X-Ray Corp., 2 Overland St., Boston 15, Mass.—D, HD, XO, X
Chicago Novelty Co., Inc., 1348 Newport Ave., Chicago, Ill.—GL
Cleveland Tungsten, Inc., 10200 Meech Ave., Cleveland 5, Ohio—D
Cleveland Wire Cloth & Mfg. Co., 3573 E. 78th St., Cleveland 5, Ohio—XS
Coleman Electric Co., 318 Madison St., Maywood, Ill.—AP, XM
Colloid Equipment Co., Inc., 50 Church St., New York 7, N. Y.—MM
Commercial Enclosed Fuse Co. of N. J., 1317 Willow Ave., Hoboken, N. J.—ID
Continental X-Ray Corp., 1536 N. Clybourne, Chicago, Ill.—D, X
Cover Dual Signal Systems, Inc., Div. of Electra Voice Corp., 5215-25 Ravenswood Ave., Chicago 40, Ill.—D
Crystal Research Products, Dumont, N. J.—D, S
Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis—HD
Cyclonics Mfg. Co., Inc., 3906 Hudson Blvd., Union City, N. J.—HD
Cyclotron Specialties Co., Moraga, Calif.—GI
Dallons Laboratories, 5066 Santa Monica Blvd., Los Angeles 27, Calif.—EG
DeWald Radio Mfg. Corp., 440 Lafayette St., New York 3, N. Y.—M
Dillon, W. C. & Co., Inc., 5410 W. Harrison St., Chicago 44, Ill.—ML
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—GL
Drake, E. L. Co., 11 Longworth St., Dayton 2, Ohio—A, D, HD, GI, I, L
Dumont, Allen B. Laboratories, Inc., 2 Main Ave., Passaic, N. J.—MF, ML
Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza S., Long Island City 1, N. Y.—ID
Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—A, D
Ecco High Frequency Electric Corp., 7020 Hudson Blvd., North Bergen, N. J.—HD, I
Edin Electronics Co., 207 Main St., Worcester, Mass.—D, EC, EE, GL, ST
Electric Heat Control Co., 9123 Inman Ave., Cleveland 5, Ohio—IC
Electro-Medical Laboratory, Inc., Holliston, Mass.—C, EC, EE, L, ST
Electro Physical Laboratories, 45 W. 18th St., New York 11, N. Y.—EC, EE, S
Electro Products Laboratories, 549 W. Randolph St., Chicago 6, Ill.—TC
Electron Equipment Corp., 917 Meridian Ave., South Pasadena, Calif.—HD
Electronic Corp. of America, 45 W. 18th St., New York 11, N. Y.—EC, EE, S
Electronic Engrg. Service & Laboratories, 114-38 Farmers Blvd., St. Albans 12, N. Y.—A, D, ST
Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—A, C, EC, I, ID, MF, ML
Electronic Measurements Co., Red Bank, N. J.—A
Electronic Processes Corp., 249 Richards Rd., Ridgewood, N. J.—HD
Electronic Research & Mfg. Corp., 5805 Hough Ave., Cleveland 3, Ohio—HD, I, MF
Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—D, HD, GI, I
Electronic Sound Engineering Co., 109 N. Dearborn St., Chicago 2, Ill.—GL
Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—EC, I, ML, ST
Electronic Supply Co., 207 Main St., Worcester 8, Mass.—HD
Engineering Laboratories, Inc., 610-624 E. 4th St., Tulsa 3, Okla.—EC, GI
Eppley Laboratory, Inc., 12 Sheffield Ave., Newport, R. I.—TI
Farrand Optical Co., Inc., Bronx Blvd. & E. 238th St., New York 66, N. Y.—E
Federal Electric Co., Inc., 8700 S. State St., Chicago, Ill.—HD
Federal Telephone & Radio Corp, 200 Mt. Pleasant Ave., Newark 4, N. J.—HD, I
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—GI
Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y.—X
Fischer, Robert A., 1720 Hillcrest Ave. Glendale 2, Calif.—D, GL, HD
Fisher Research Laboratory, 1961 University Ave., Palo Alto, Calif.—GI, ML
Fisher Scientific Co., 711 Forbes St., Pittsburgh, Pa.—ID
Fostoria Pressed Steel Corp., Fostoria, Ohio—ID
Freed Transformer Co., 72 Spring St., New York 12, N. Y.—D
Friez Instrument Div., Bendix Aviation Corp., Taylor Ave., near Loch Raven Blvd., Baltimore 4, Md.—M, WM
Garfield Medical Apparatus Co., 147 W. 22nd St., New York 11, N. Y.—D
Gates, Geo. W. & Co., Inc., Hempstead Turnpike & Lucille Ave., Franklin Sq., L. I. N. Y.—GL
Gem Radio & Television Co., 303 W. 42nd St., New York 18, N Y.—EC, I
General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—WM
General Electric Co., 1 River Road, Schenectady 5, N. Y.—I, HD
General Electric Co., Lamp Dept., Nela Park, Cleveland 12, Ohio—GL, ID
General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—A
General Electric Co., Transmitter Div., Thompson Road Plant, Syracuse, N. Y.—HD, I
General Electric X-Ray Corporation, 175 West Jackson Blvd., Chicago 4, Ill.—D, EC, XD, X, XS
Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va.—GI, ML, XM
G & G Precision Works, Inc., 5-33 48th Ave., Long Island City 1, N. Y.—EC
Girdler Corp., Thermex Div., 224 E. Broadway, Louisville 1, Ky.—HD
Globe Phone Mfg. Corp., 2 Linden St., Reading, Mass.—ML, ST
Gurley, W. & L. E., 514 Fulton St., Troy, N. Y.—M, WM
Hall, C. M., Lamp Co., 1035 E. Hancock Ave., Detroit 7, Mich.—ID
Hanovia Chemical & Mfg. Equipment, 233 N. J. R. R. Ave., Newark 5, N. J.—D, GL
Hart Moisture Gauges, Inc., 126 Liberty St., New York 6, N Y.—MM
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—GI
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—HD
Hathaway Instrument Co., 1315 S. Clarkson St., Denver 10, Col.—GI
H-B Instrument Co., 2524 N. Broad St., Philadelphia, 32, Pa.—TI
Heiland Research Corp., 130 E. Fifth Ave., Denver 9, Col.—GI
Henry Mfg. Co., 10860 Santa Monica Blvd., Los Angeles 25, Calif.—HD
Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—D, GI, L, XD, XM
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—A
Higgins Industries, Inc., 2221 Warwick Ave., Santa Monica, Calif.—D
Hoffman Engineering Corp., 458 Sexton Bldg., Minneapolis 4, Minn.—HD, S, I, MF
Huber Radio Co., 260 S. Center St., Casper, Wyo.—GL
Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—HD, I
Hunt, G. C. & Sons, 133 N. Hanover St., Carlisle, Pa.—HD
Illinois Testing Laboratories, Inc., 420 N. La Salle St., Chicago 10, Ill.—"Alnor"—ML, GI
Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill.—HD, I
Induction Heating Corp., 389 Lafayette St., New York 3, N. Y.—HD, I
Industrial Electronics Corp., 80 Bank St., Newark, N. J.—GL
Islip Radio Mfg. Corp., Islip, N. Y.—HD, I
Jarrell-Ash Co., 165 Newbury St., Boston 16, Mass.—XD
Johnson, E. F. Co., Waseca, Minn.—HD
Kahle Engineering Co., 1307 Seventh St., North Bergen, N. J.—HD
Kelley Koett Mfg. Co., 212 W. 4th St., Covington, Ky.—XD, X
Kluge Electronics Co., 1031 N. Alvarado St., Los Angeles 26, Calif.—HD, I
LaRose, W. T. & Associates, 635 Second Ave., Troy, N. Y.—HD
Laurehk Radio Mfg. Co., 3931 Monroe Ave., Wayne, Mich.—A, ST
Lavoie Laboratories, Matawan-Freehold Rd. Morganville, N. J.—EE, X
Lawton Products Co., Inc., 624 Madison Ave, New York 22, N. Y.—D, ML
Lektra Labs, Inc., 30 E. 10th St., New York 3, N. Y.—C, D, S
Lepel High Frequency Laboratories, Inc., 39 W 60th St., New York 23, N. Y.—HD, I
Leupold & Stevens Instruments, 4445 N. E. Glisan St., Portland, 13, Ore.—M
Liebel-Flarsheim Co., 303 W. Third St., Cincinnati 2, Ohio—D
Lincoln Electronics Corp., 653 11th Ave., New York 19, N. Y.—D, HD
Link, Fred M., 125 W. 17th St., New York 11, N. Y.—HD, I
Litton Engineering Laboratories, P. O. Box 749, Redwood City, Calif.—I
Long, L. J., Co., 186 Grand St., New York 13, N. Y.—HD, I
Lyman Electronic Corp., 12 Cass St., Springfield, Mass.—I
Magnaflux Corp., 5900 Northwest Highway, Chicago 31, Ill.—MF, ML
Magnetic Analysis Corp., 42-44 Twelfth St., Long Island City 1, N. Y.—MF, ML
Maico Co., Inc., 21 N. Third St., Minneapolis 1, Minn.—AP, A, S, L, ML, ST
Mattern, F. Mfg. Co., 4647 N. Cicero Ave., Chicago 30, Ill—XD, X
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—HD, S, I
Merit Short Wave Diathermy Co., 2758 Whittier Blvd., Los Angeles 23, Calif.—D, HD
McKesson Appliance Co., 2228 Ashland Ave., Toledo, Ohio—EC
McNeill Engineering Co., 4057 W. Van Buren St., Chicago, Ill.—S
Michigan Fluorescent Light Co., 71-77 S. Parke St., Pontiac, Mich.—GL, ID, XS
Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass.—GI
Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—EC, ST, WM
Miller, J. W. Co., 5917 S. Main St., Los Angeles 3, Calif.—D
Miller, William Corp, 362 Colorado St., Pasadena 1, Calif.—GI
Mineralight—Ultra-Violet Products, Inc.
Moisture Register Co., 133 N. Garfield, Alhambra, Calif.—MM

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa., D, HD, I
Mooradian High Frequency Labs., 137 Park Pl., Bogota, N. J.—D
Moulic Specialties Co., 1005-1007 W. Washington St., Bloomington, Ill.—L
Nalco—North American Electric Lamp Co.
Newman X-Ray Corp., 518 Hankes Ave., Aurora, Ill.—X
North American Electric Lamp Co., 1014 Tyler St., St. Louis 6, Mo.—"Nalco"—ID
North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—XD, X
Norton Electrical Instrument Co., 85 Hilliard St., Manchester, Conn.—TI
Northwest Syndicate, Inc., 711 St. Helens Ave., Tacoma 1, Wash.—D, HD
Offner Electronics, Inc., 5320 N. Kedzie Ave., Chicago 25, Ill.—EE, S
Ohio Crankshaft Co., Tocco Div., 3800 Harvard Ave., Cleveland 1, Ohio—I, HD
Operadio Mfg. Co., St. Charles, Ill.—HD
Parker Engineering Products Co., 16 W. 22nd St., New York, N. Y.—HD, L
Peerless Laboratories, 467 10th Ave., New York 18, N. Y.—D, X
Picker X-Ray Corp., 300 Fourth Ave., New York 10, N. Y.—XD, X, XM, XS
Polk Electronics, 119 Bleeker St., New York 12, N. Y.—D, HD, I
Professional Tool & Engineering Co., 615 S. Peoria St., Chicago, Ill.—XM, XS
Radio Craftsmen, 1341 S. Michigan Ave., Chicago 5, Ill.—HD
Radio Frequency Laboratories, Inc., Boonton, N. J.—GI, IC, ML
Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N. Y.—HD
Rahm Instruments, Inc., 12 W. Broadway, New York 7, N. Y.—C, EC, EE, EG, S, ST
Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—D, HD, I, X
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—HD, E, I, ML
Rehtron Corp., 4313 Lincoln Ave., Chicago 18, Ill.—ML
Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—HD
Ritter Co., Inc., Rochester 3, N. Y.—X
Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio—A, ST
Rogers Diesel & Aircraft Corp., 1120 Leggett Ave., New York 59, N. Y.—I
Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago 39, Ill.—GI, MF, ML, WM
Safety Electric Co., 110 S. Dearborn St., Chicago 3, Ill.—D, GL
St. John X-Ray Service, Inc., 30-20 Thomson Ave., Long Island City 1, N. Y.—XD, X, XS
Sanborn Co., 39 Osborn St., Cambridge 39, Mass.—EC
Saxl Instrument Co., 38-40 James St., East Providence 14, R. I.—GI, WM
"S" Corrugated Quenched Gap Co., Scientific Electric Div., 107 Monroe St., Garfield, N. J.—I, HD
Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—HD, I
Shakeproof, Inc., 2501 N. Keeler Ave., Chicago 39, Ill.—HD
Sherron Electronics Co., 1201 Flushing Ave., Brooklyn 6, N. Y.—HD
Shure Bros., 225 W. Huron St., Chicago 10, Ill.—ST
Smith, Nathan R. Mfg. Co., 105 Pasadena Ave., South Pasadena, Calif.—D
Sonotone Corp., Saw Mill River Rd., Elmsford, N. Y.—A
Sperry Products, Inc., 15th & Willow Ave., Hoboken, N. J.—MF
Standard Engineering Laboratories, 40 S. Oak Knoll Ave., Pasadena 1, Calif.—D, HD, I
Sterilaire—Ultra-Violet Products, Inc.
Stevens Arnold Co., 22 Elkins St., South Boston, Mass.—HD, I
Stoelting, C. H. Co., 424 N. Homan Ave., Chicago 24, Ill.—L
Stokes, F. J. Machine Co., 6054 Tabor Rd., Philadelphia 20, Pa.—HD
Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—HD
Terma Electric Co., 20 W. 22nd St., New York, N. Y.—D, I
Thermionic Engineering Corp., 32 W. 12th St., Bayonne, N. J.—D, HD, EC, EE
Thompson, John E. Co., 1440 W. 47th St., Chicago 9, Ill.—D, HD, I
Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York 14, N. Y.—D, EE, S, HD
Trimount Instrument Co., 37 W. Van Buren, Chicago 5, Ill.—GI
Trumbull Electric Mfg. Co., Woodford Ave., Plainville, Conn.—ID
Ultra-Violet Products, Inc., 5205 Santa Monica Blvd., Los Angeles 27, Calif.—"Sterilaire"—"Mineralight"—GL, MF
United Electronics Co., 42 Spring St., Newark 2, N. J.—D, HD, I
U. S. Television Mfg. Corp., 106 Seventh Ave., New York 11, N. Y.—D
Universal X-Ray Products, Inc., 1800 N. Francisco Ave., Chicago 47, Ill.—L, X, HD
Vacolite Co., 3001-3003 N. Henderson, Dallas, Tex.—A
Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio—X, XM
Weltronic Co., 19500 W. Eight Mile Rd., Detroit 19, Mich.—I, HD
Western Geophysical Co., 601 W. 5th St., Los Angeles 11, Calif.—GI
Westinghouse Electric Corp., 300 W. Baltimore St., Baltimore 3, Md.—I, HD
Westinghouse Electric Corp., East Pittsburgh, Pa.—D, HD, F, GL, I, ID, MF, XD, X, XM, XS
White Research, 899 Boylston St., Boston, Mass.—GI
World Wide Electronics, Inc., 72 E. 13th St., New York 3, N. Y.—D, HD, EC, EE, S, GL, I, MF, ML
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St, York, Pa.—D, GL

(14) Flexible Shaft Controls

Control units (complete)	CU
Control heads	CH
Fittings	F
Flexible shafts	FS

Aeronautical Radio Mfg. Co., 155 First St., Mineola, L. I., N Y.—CU, CH, F, FS
Arens Controls, Inc., 2253 S. Halsted St., Chicago 8, Ill.—CU
Barco Mfg. Co., 1801 Winnemac, Chicago 40, Ill.—F
Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—FS
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif.—CH
Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio—FS
Chicago Metal Hose Corp., Maywood, Ill.—F
Croname, Inc., 3701 N. Ravenswood Ave., Chicago 13, Ill.—CU, CH, F, FS
Foote Bros., Gear & Machine Corp., 5225 S. Western Blvd., Chicago 9, Ill.—F
Fuchs, Charles A., 13-15 Mollineaux Place, Roosevelt, L. I., N. Y.—F
Gussack Machined Products Co., 10-20 45th Rd., Long Island City 1, N. Y.—CU, F
J. F. D. Mfg. Co., 4111 Ft Hamilton Parkway, Brooklyn 19, N. Y.—FS
Lord Mfg. Co. 1635 W. 12th St., Erie, Pa.—FS
National Co., Inc., 61 Sherman St., Malden 48, Mass.—CU, CH, F, FS
Piezoelectric Corp., 110 E. 42nd St., New York 17, N. Y.—CH
Shakespeare Products Co., 241 E. Kalamazoo Ave., Kalamazoo, Mich.—CH, F, FS
Stewart Mfg. Corp., F. W., 4311-13 Ravenswood Ave., Chicago 13, Ill.—CU, CH, F, FS
Stow Mfg. Co., Binghamton, N. Y.—CU, CH, F, FS
Walker-Turner Co., Inc., 639 South Avenue, Plainfield, N. J.—CU, CH, F, FS
Waterproof Electric Co., 72 E. Verdugo Ave., Burbank, Calif.—F
White Dental Mfg. Co., S. S. Industrial Div., 10 E. 40th St., New York, N. Y.—FS

(15) Hand Tools

Alignment tools	AT
Chassis holders	CH
Demagnetizers	DM
Drills, electric	D
Electric etchers	EE
Electroplater	E
Flux, fluid	SF
Flux, paste	SP
Gages	G
Hand micrometers	HM
Hacksaw blades	HB
Hammers, plastic	H
Hand drills	HD
Hole cutters	HC
Inspection lenses	L
Inspection mirrors	M
Knob puller	KP
Pliers	P
Punches	PU
Ratchet wrenches	RW
Scales & tapes	SA
Screwdrivers	SD
Side cutters	SC
Socket wrenches	SW
Solder	S
Soldering irons	SI
Soldering iron stands	SS
Soldering iron tips	SE
Solder pots	ST
Staple driver	SH
Twist drills	T
Tube pin straightener	TS
Tube pullers	TP
Wire strippers	WS
Vises	V

Aarens Radio Corp., 125 E. 46th St., New York 17, N. Y.—CH, HM, SI
Ackermann, Steffan & Co., 4532 Palmer St., Chicago, Ill.—HB
Acromark Co., 9-13 Morrell St., Elizabeth 4, N. J.—PU
Acro Tool & Die Works, 4554 Broadway, Chicago 40, Ill.—CH
Aeroil Products Co., 5701 Park Ave., West New York, N. J.—ST
Aerolite Electronic Hardware Corp., 24 Cliff St., Jersey City 6, N. J.—AT
Alpha Metals, Inc., 363 Hudson Ave., Brooklyn 1, N. Y.—S
American Beauty—American Electrical Heater Co.
American Electrical Heater Co., 6110 Cass Ave., Detroit 2, Mich.—"American Beauty"—SI, SS, SE
American Radio Hardware Co., 152-4 MacQuesten Pkwy. S., Mt. Vernon, N. Y.—"Arhco"—AT, SD
American Solder & Flux Co., 2152 E. Norris St., Philadelphia 25, Pa.—SF, SP, S
Annis Co., R. B., 1101 N. Delaware St., Indianapolis 2, Ind.—DM, EE
Arhco—American Radio Hardware Co.
Austin Co., M. B., 108-116 S. Desplaines St., Chicago 6, Ill.—HB, SD
Baker Electronic Mfg. Co., 3017 Lyndale Ave. S., Minneapolis 8, Minn.—"Flash"—SF, SD, SI, SE
Baker Phillips Co., 1624 Chicago Ave. S., Minneapolis, Minn.—SI, SE
Bausch & Lomb Optical Co., Rochester 2, N. Y.—L
Belmont Smelting & Refining Works, 330 Belmont, Brooklyn 7, N. Y.—S
Billings & Spencer Co., 1 Laurel, Hartford 6, Conn.—"Billings"—AT, P, RW, SW, V
Black & Decker Mfg. Co., E. Pennsylvania Ave., Towson 4, Md—D, HC, SD
Bristol Co., Waterbury 91, Conn.—SW
Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.—SP, HB, S
Burgess Battery Co., Handicraft Div., Vibro Tool Dept., 180 N. Wabash Ave., Chicago 1, Ill.—EE
Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17, Ill.—V
Clark Electric Co., James Jr., 600 Bergman St., Louisville 2, Ky.—D, SD
Clark Co., Robert H., 9330 Santa Monica Blvd., Beverly Hills, Calif. —HC
Cole Radio Works, 86 Westville Ave., Caldwell, N. J.—SI, SS
Despatch Oven Co., 619 S. E. Eighth St., Minneapolis 14, Minn.—ST
Detroit Power Screw Driver Co., 2801 W. Fort St., Detroit, Mich.—SD
Disston & Sons, Inc., Henry, Tacony, Philadelphia 35, Pa.—HB, SD
Division Lead Co., 836 W. Kinzie St., Chicago 22, Ill.—SF, SP, S, WS
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—D, HD, SH
Drake Electric Works, Inc., 3654 Lincoln Ave., Chicago 13, Ill.—SI, SS, SE, ST
Dual Remote Control Co., 31776 Cowan Rd., Wayne, Mich.—SI
Eagle Electric Mfg. Co. Inc., 23-10 Bridge Plaza S., Long Island City 1, N. Y.—SI
Electric Soldering Iron Co., Inc., W. Elm St., Deep River, Conn.—"Esico"—SI, SS, SE, ST
Electro Mag. Mfg. Co., 610 N. Rockford Ave., Rockford, Ill.—EE
Eraser Co., Inc., 231 W. Water St., Syracuse 2, N. Y.—WS
Esico—Electric Soldering Iron Co. Inc.
Etched Products Corp., 39-01 Queens Blvd., Long Island City 4, N. Y.—SA
Fairmount Tool & Forging Co., 10611 Quincy Ave., Cleveland, Ohio—P, SD, SW
Farrelloy Co., 1243-45 N. 26th St., Philadelphia 21, Pa.—SF, SP, S
Federal Screw Products Co., 22 W. Huron St., Chicago 10, Ill.—SW, SE
Film Crafts Engineering Co., 36 W. 25th St., New York 10, N. Y.—HC
Flash—Baker Electronic Mfg. Co.
Forsberg Mfg. Co., 85 Walker St., Bridgeport, Conn.—HB, HD, SD
Fuchs, Charles A. 13-15 Mollineaux Pl., Roosevelt, L. I. N. Y.—PU
Gardiner Mfg. Co., 2711 Union St., Oakland 7, Calif.—AT, HC, PU, RW, SD, SW, SI, SS, SE, SH
Gardiner Metal Co., 4820 S. Campbell Ave., Chicago 32, Ill.—S
GC—General Cement Mfg. Co.
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—AT, CH, SP, KP, SW, TP, WS
General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—SI

Glaser Lead Co., Inc., 31 Wyckoff Ave., Brooklyn 27, N. Y.—SF, SP, S, SI
Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—DM, EE, SI, ST
Greenlee Tool Co., 12th St. & Columbia Ave., Rockford, Ill.—HC, PU, SD
Groves Corp., 42 N. Sprigg St., Cape Girardeau, Mo.—S
Handy & Harmon, 82 Fulton St., New York 7, N. Y.—SP
Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—DM
Hexacon Electric Co., 161 W. Clay Ave., Roselle Park, N. J.—SI, SS, SE
ICA—Insuline Corp. of America
Ideal Cummutator Dresser Co., 5194 Park Ave., Sycamore, Ill.—DM, SI, WS
Industrial Screw & Supply Co., 717 W. Lake St., Chicago 6, Ill.—HB, S
Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—AT, HC, PU, SD, SW, SI, SS, SE
Intex Co., 303 W. 42nd St., New York 18, N. Y.—D, EE, HM, HB, HD, T, V
Jones Motrola Corp., 432 Fairfield Ave., Stamford, Conn.—D
Kellems Co., Saugatuck, Conn.—TP
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—SF, SP, P, SD, S, SI, SS, SE, ST, WS
Kelnor Mfg. Co., 703 Market St., San Francisco 4, Calif.—SI
Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill.—SF, SP, S, SS
Keystone Electronics Co., 50-52 Franklin St., New York 13, N. Y.—AT
Kollath Mfg. Co., 4601 W. Addison St., Chicago, Ill.—SI, SS, SE, ST
Kraeuter & Co., Inc., 563 18th Ave., Newark, N. J.—P, PU
Larrimore Sales Co., 811 Locust St., St. Louis 2, Mo.—L, M
Lectrohm Inc., 5125 W. 25th St., Cicero 50, Ill.—"Lectrohm"—ST
Linick, Leslie L., 29 E. Madison St., Chicago, Ill.—E, SF, SD, S
Link, Fred M., 125 W. 17th St., New York, N. Y.—TP
Lufkin Rule Co., 1730 Hess Ave., Saginaw, Mich.—HM, SA
Luma Electric Equipment Co., P. O. Box 132, Toledo-1, Ohio—DM, EE, SI
Magnaflux Corp., 5900 Northwest Highway, Chicago 31, Ill.—DM
Martindale Electric Co., Box 617, Edgewater Br., Cleveland 7, Ohio—EE
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.—T
Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—TP
New England Etching & Plating Co., 25 Spring St., Holyoke, Mass.—SA
N. J. Jewelers Supply, 280 Plane St., Newark 2, N. J.—P
New York Solder Co., 15 Crosby St., New York, N. Y.—S
Park Metalware Co., Inc., Bank St., Orchard Park, N. Y.—AT, H, P, SD, SC, SW
Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.—PU, S
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—AT
Phonograph Needle Mfg. Co., Inc., 42-46 Dudley St., Providence 5, R. I.—SD
Pratt & Whitney, Div. of Niles-Bement-Pond Co., West Hartford, Conn.—G
Pyramid Products Co., 2224 S. State St. Chicago, Ill.—WS
Rajah Co., 58 Locust Ave., Bloomfield, N. J.—P
Rapid Electroplating Process, Inc., 1414 S. Wabash Ave., Chicago 5, Ill.—E
Richmont, Inc., 215 W. Seventh St., P. O. Box 6450, Los Angeles 55, Calif.—SD
Ruby Chemical Co., 68-70 McDowell St., Columbus 8, Ohio—"Rubyfluid"—SF, SP, S
Rubyfluid—Ruby Chemical Co.
George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y.—L
Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"Walsco"—AT, SW, SH
Simonds Machine Co., Inc., 246-48 Worcester St., Southbridge, Mass.—SC
Skyway Precision Tool Co., 3217 Casitas Ave., Los Angeles 26, Calif.—RW
Small Motors, Inc., 1322 Elston Ave., Chicago 22, Ill.—D
Smith Mfg. Co., Nathan R., 105 Pasadena Ave., S. Pasadena, Calif.—DM
Sound Equipment Corp., 3903 San Fernando Rd., Glendale 4, Calif.—SI, SS, SE, ST
Special Chemicals Co., 30 Irving Pl., New York 3, N. Y.—S
Special Products Co., 9115 Brookville Rd., Silver Spring, Md.—P
Speedway Mfg. Corp., 1834 S. 52nd Ave., Cicero 50, Ill.—D
Sperman Metal Specialties, 2199 E. 21st St., Brooklyn 29, N. Y.—DM
Spirling Products Co., 64 Grand St., New York 13, N. Y.—PU
Standard Molding Corp., 460 Bacon St., Dayton 1, Ohio—SD
Standard Pressed Steel Co., Jenkintown, Pa.—SW
Stanley Works, New Britain, Conn.—D, H, HD, HC, PU, SD, SI, SS, SE, T
Star Expansion Products Co., 147 Cedar St., New York 6, N. Y.—TS
Sta-Warm Electric Co., 333 N. Chestnut St., Ravenna, Ohio—ST
Stedman, Robert L., E. Main St., Oyster Bay, N. Y.—CH, TS
Stevens Walden, Inc., 475 Shrewsbury St., Worcester 4, Mass.—AT, HC, P, PU, RW, SD, SW
Stow Mfg. Co. Inc., Binghamton, N. Y.—D
Superior Flux Co., 913 Public Square Bldg., Cleveland 13, Ohio—SF, SP
Technical Radio Co., 275 9th St., San Francisco, Calif.—SI
Trent Co., Harold E., 5005 Wilde St., Philadelphia 27, Pa.—ST
Tuck Mfg. Co., 74 Ames St., Brockton 39, Mass.—SD
Tungsten Contact Mfg. Co., 7311 Cottage Ave., N. Bergen, N. J.—C, M
Tweezer-Weld Corp., 280 Plane St., Newark 2, N. J.—SI
Ullman Products Co., 857-61 Fourth Ave., Brooklyn 32, N. Y.—DM, L, M
Ungar Electrical Tools, Inc., 611 Ducommon St., Los Angeles, Calif.—SI
U. S. Electrical Tool Co., 1050 Findlay St., Cincinnati 41, Ohio—D
Utica Drop Forge & Tool Corp., 2415 Whitesboro St., Utica 4, N. Y.—RW, SC
Vaco Products Co., 317 E. Ontario St., Chicago, Ill.—SD, SW
Volynsky Mfg. Co., Inc., Boris M., 311 W. 66th St., New York 23, N. Y.—AT
Walsco— Walter L. Schott Co.
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—KP, SD
Weaver Specialty Co., 6344 Aurelia St., Pittsburgh 6, Pa.—SP
Weller Mfg. Co., 516 Northampton St., Easton, Pa.—SI
Westinghouse Elec. Corp., E. Pittsburgh, Pa.—SF, S, ST
World Wide Electronics, Inc., 72 E. 13th St., New York 3, N. Y.—DM
Wynn Mfg. Div., Hudson Supply Co., 401 N. 27th St., Richmond 23, Va.—AT, SE

(16) Hardware—Connectors and Miscellaneous Parts

Binding posts	BP
Cable clamps	CC
Cable connectors	C
Clips, spring	SC
Coaxial cable fittings	CF
Coil shields	CS
Contact points	CM
Couplings	CP
Fasteners	FA
Fuses	F
Fuse holders	FH
Gaskets	GA
Gears	GE
Grid clips	GC
Grommets	G
Hinges, cabinet hdwe.	H
Jacks	J
Mounting brackets	MB
Nuts	N
Nuts, lock and self-locking	NL
Pilot light assemblies	PL
Plugs	P
Retaining rings	RR
Rivets	R
Safety terminals	STE
Screws	S
Self-tapping screws	SS
Set screws	ST
Shielding, rubber	SR
Shockproof mounts	SM
Soldering lugs	SL
Solderless lugs	L
Solderless links	LI
Solderless pins	PS
Springs	SP
Strain reliefs	ST
Terminals	TE
Terminal strips	T
Tube shields	TS
Tube clamps	TC
Tube connectors	TB
Tube sockets	SKT
Washers, brass	WB
Washers, felt	WF
Washers, fibre	FW
Washers, lock	WL
Washers, plastic	WP
Washers, rubber	WR

Aarons Radio Corp., 125 E. 46th St., New York 17, N. Y.—J, SM
A.B.C. Products, Inc., 2131 Stoner Ave., W. Los Angeles 25, Calif.—C, J, P
Accurate Spring Mfg. Co., 3811 W. Lake St., Chicago 24, Ill.—SP
Ace Mfg. Corp., Erie Ave. at K St., Philadelphia 24, Pa.—BP, SC, CS, J, MB, STE, TE, T, TS, WB, GE
Adaptol Co., 260 Utica Ave., Brooklyn 13, N. Y.—TB
Aero Electric Corp., 6916 Romaine St., Los Angeles 38, Calif.—CC, C, CF
Aerolite Electronic Hardware Corp., 24 Cliff St., Jersey City 6, N. J.—CC, FH, GC, G, J, MB, P, STE, S, SS, SL, TE, T, FW
Aircraft-Marine Products, Inc., 1523 N. 4th St., Harrisburg, Pa.—L, PS, TE, T, TC, TB
Aircraft Screw Products Co., Inc., 47-23 35th St., Long Island City 1, N. Y.—STE, S
Alden Products Co., 117 N. Main St., Brockton 64, Mass.—C, FH, P, SR, ST, SKT
Allegheny Ludlum Steel Corp., Brackenridge, Pa.—CS, TS
Allmetal Screw Products Co., 33 Greene St., New York 13, N. Y.—NL, N, R, SS, S, WL
All-Steel Equipment Co., 723 Griffith Ave., Aurora, Ill.—CC, C, CP
All Weather Springs, 140 Cedar St., New York, N. Y.—SP
Aluminum Goods Mfg. Co., 1512 Washington St., Manitowoc, Wis.—CS, TS
Amalgamated Radio Television Corp., 476 Broadway, New York 13, N. Y.—J, P, T, SKT
American Brass Co., 414 Meadow St., Waterbury 88, Conn.—C, SC, GC, G, SL, TE, TS, WB
American Communications Corp., 306 Broadway, New York, N. Y.—BP
American Electronics Co., 216 Centre St., New York 13, N. Y.—CC, C, SC, CM, CP, FH, GA, GC, H, J, MB, P, RR, SL, L, LI, PS, SP, TE, T, TC, SKT, WB, FW, WP
American Materials Co., 150 Nassau St., New York 7, N. Y.—R
American Nut & Bolt Fastener Co., 2029 Doerr St., Pittsburgh 12, Pa.—WB, WL
American Phenolic Corp., 1830 S. 54th St., Cicero, Ill.—"Amphenol"—C, CF
American Radio Hardware Co., 152-4 MacQueston Pkwy. S., Mt. Vernon, N. Y.—BP, CC, C, SC, CP, GC, G, J, N, MB, NL, P, RR, R, STE, S, SS, SL, L, SP, TE, T, TC, SKT, WB, WF, FW, WL, WP, WR
American Screw Co., 21 Stevens St., Providence, R. I.—S, SS
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, Ohio—SP
Amphenol—American Phenolic Corp.
Arens Controls, Inc., 2253 S. Halsted St., Chicago 8, Ill.—CC, G
Armstrong Cork Co., Lancaster, Pa.—GA
Aro Equipment Corp., Enterprize & Trevitt, Bryan, Ohio—WR
Arrow-Hart & Hegeman Elec. Co., 103 Hawthorn St., Hartford 6, Conn.—P, T
Art Wire & Stamping Co., 227 High St., Newark 2, N. J.—SP
Astatic Corp., Cor. Harbor & Jackson Sts., Conneaut, Ohio—CF
Atlantic Screw Works, Inc., Hartford, Conn.—S
Atlas Products Corp., 30 Rockefeller Plaza, New York 20, N. Y.—CC, C, P, SL, L, TE
Austin Co., M. B., 108-116 S. Desplaines St., Chicago 6, Ill.—CC, C, NI
Baer Co., N. S., 9-11 Montgomery St., Hillside, N. J.—GA, T, FW, WP
Baker & Co., Inc., 113 Astor St., Newark 5, N. J.—CM
Barker & Williamson, Upper Darby, Pa.—C, CF, CP, GC, J, N, P, SL, TC, SKT
Barnes Co., Wallace, P. O. Box 1521, Bristol, Conn.—SP
Bead Chain Mfg. Co., 110 Mt. Grove St., Bridgeport 5, Conn.—J, PS, TE
Beaver Gear Works, Inc., 1025 Parmele St., Rockford, Ill.—GE
Bendix Radio Div., of Bendix Aviation Corp., E. Joppa Rd., Baltimore 4, Md.—SM
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N. Y.—CC, C, SC, CP, J, NL, N, P, S, SS, SL, PS, TE, T, TC, SKT, WB, WL
Birtcher Corp., 5087 Huntington Dr., Los Angeles 32, Calif.—TC
Boots Aircraft Nut Corp., New Canaan, Conn.—NL
Bowser, Inc., 1302 E. Creighton Ave., Ft. Wayne 2, Ind.—S
Brainin Co., C. S., 233 Spring St., New York 13, N. Y.—CM
Bristol Co., Waterbury 91, Conn.—S, ST
Brown Engineering Co., 4635 S. E. Hawthorne Blvd., Portland 15, Ore.—BP, CM, G
Browne Electric Co., J., 3774 Surf Ave., Brooklyn 14, N. Y.—F, FH
Buchmann Spark-Wheel Corp., 4-20 47th Ave., Long Island City 1, N. Y.—BP, C, CF, CM, CP, NL, N, P, STE, S, TE, WB
Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio—BP, GC, J, P, SL, L, TE, T, TS, SKT
Burke Electric Co., 12th & Cranberry, Erie, Pa.—TE, T
Burndy Engineering Co., Inc., 107 Bruckner Blvd., New York 54, N. Y.—L, LI, TE, T
Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.—"Buss"—F, FH
Callite Tungsten Corp., 540 39th St., Union City, N. J.—CM
Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.—SL, T
Camloc Fastener Corp., 420 Lexington Ave., New York 17, N. Y.—NL
Cannon Co., C. F., Springwater, N. Y.—CP

Cannon Electric Development Co., 3209 Humboldt St., Los Angeles 31, Calif.—CC, C, CF, TE, T

Cardwell Mfg. Corp., Allen D., 81 Prospect St., Brooklyn 1, N. Y.—CP, MB

Central Screw Co., 3511 Shields Ave., Chicago 9, Ill.—N, R, S, SS

Chancellor Products Corp., 1475 Chardon Road, Cleveland, Ohio—S

Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.—BP, C, SC, FH, G, N, R, S, WB

Cherry Rivet Co., 231 Winston St., Los Angeles 13, Calif.—R

Chicago Rivet & Machine Co., 9600 W. Jackson Blvd., Bellwood, Ill.—R

Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17, Ill.—C

Cinch Mfg. Corp., Div. United Carr Fastener Co., 2335 W. Van Buren St., Chicago, Ill.—GC, J, MB, SM, SL, L, TE, T, TS, TC, SKT

Cincinnati Electric Products, Carthage at Hannaford, Norwood, Cincinnati 12, Ohio—TE

Cleveland Tungsten, Inc., 10200 Meech Ave., Cleveland 5, Ohio—CM

Cline Electric Mfg. Co., 4550 W. Lexington Ave., Chicago, Ill.—T

Columbia Nut & Bolt Co., Inc., Bridgeport, Conn.—N

Columbia Wire & Supply Co., 4106 N. Pulaski Rd., Chicago 41, Ill.—P

Commercial Enclosed Fuse Co. of N. J., 1317 Willow Ave., Hoboken, N. J.—F

Communication Products, Inc., Route 36, Palmer Ave., Keansburg, N. J.—CF

Conn, Ltd., C. G., 1101 E. Beardsley Ave., Elkhart, Ind.—NL

Connecticut Telephone & Electric, Div. of Great American Industries, Inc., Meriden, Conn.—J, T

Connector Div., International Resistance Co., 401 N. Broad St., Philadelphia, Pa.—C, CF, P

Continental Screw Co., 459 Mt. Pleasant St., New Bedford, Mass.—BP, N, S, SS

Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.—J, TE, T

Corbin Screw Division, American Hardware Corp., High, Myrtle & Grove Sts., New Britain, Conn.—N, S, SS, WB

Cords Ltd., Inc., 126 Orchard St., Newark 5, N. J.—CC, C, CF, P, SR, ST

Corning Glass Works, Corning, N. Y.—SKT

Creative Plastics Corp., 963 Kent Ave., Brooklyn 5, N. Y.—G, T, WP

Crowley & Co., Inc., Henry L., 1 Central Ave., West Orange, N. J.—CF, T, SKT

Curtis Development & Mfg. Co., 3266 N. 33rd St., Milwaukee 10, Wis.—TE, T

De Mornay-Budd, Inc., 475 Grand Concourse, New York 51, N. Y.—CF

Diamond Instrument Co., North Avenue, Wakefield, Mass.—C, CF, CM

Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—CC, C, H

Duflex—Harris Products Co.

Dzus Fastener Co., Inc., John St., Babylon, N. Y.—NL

Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza S., Long Island City 1, N. Y.—F

Eastern Specialty Co., 3617 N. 8th St., Philadelphia 40, Pa.—BP, C, SL, L, TE

Eby Inc., Hugh H., 18 W. Chelten Ave., Philadelphia 44, Pa.—C, J, P, T, SKT

Edin Electronics Co., 207 Main St., Worcester, Mass.—MB

Eitel-McCullough, Inc., San Bruno, Calif.—CP

Elastic Stop Nut Corp. of America, 2330 Vauxhall Road, Union, N. J.—NL

Electrical Industries, Inc., 42 Summer Ave., Newark 4, N. J.—TE

Electrix Corp., 150 Middle St., Pawtucket, R. I.—P

Electro-Marine Co., 274 Madison Ave., New York 16, N. Y.—CC, CF, GA, SL

Electronic Mfg. Co., 339-347 W. 8th Ave., Dubuque, Iowa—TE, T, SKT

Electronic Plumbing Corp., 311 Nepperhan Ave., Yonkers 2, N. Y.—CF

Electronic Supply Co., 207 Main St., Worcester 8, Mass.—MB

Englewood Electrical Supply Co., 5801 S. Halsted St., Chicago, Ill.—C

Ericsson Screw Machine Products Co., Inc., 25 Lafayette St., Brooklyn 1, N. Y.—N, P, RR, R, S

Everlock—Thompson Bremer & Co.

Faber, Merle F., 35 Stillman St., San Francisco, Calif.—TB, GC

Fansteel Metallurgical Corp., 2200 Sheridan Rd., North Chicago, Ill.—CM

Federal Screw Products Co., 224 W. Huron St., Chicago 10, Ill.—CC, CM, FH, GC, G, NL, MB, N, R, S, SS, SM, SL, TE, T, WB, FW, WL, WR

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—J, MB

Felsenthal, G., & Sons, 4108 W. Grand, Chicago 51, Ill.—WP

Felt Products Mfg. Co., 1504 W. Carroll Ave., Chicago 7, Ill.—GA, WF, FW, WR

Fordham Mfg. Co., 2736 Creston Ave., New York 58, N. Y.—CM

Franklin Mfg. Corp., A. W., 175 Varick St., New York 14, N. Y.—BP, SC, GC, G, MB, SL, ST, TE, T, TS, TC, SKT, WB, FW, WP

Fuchs, Charles A., 13-15 Mollineaux Pl., Roosevelt, L. I., N. Y.—BP, C, CP, NL, N

Gardiner Mfg. Co., 2711 Union St., Oakland 7, Calif.—CC, H, NL, N, WB, WF, FW, WL, WP, WR

Garrett, George K., Co., Inc., D & Tioga Sts., Philadelphia 34, Pa.—CC, RR, SP, WL

Gear Specialties Co., 2635 W. Medill Ave., Chicago 47, Ill.—GE

G-C—General Cement Mfg. Co.

Gemloid Corp., 7910-30 Albion Ave., Elmhurst, L. I., N. Y.—WP

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—"G-C"—BP, CC, FH, GC, G, J, NL, MB, N, P, R, S, SS, SM, SL, L, SP, TE, SKT, WB, WF, FW, WL, WP, WR

General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.—"G-E"—CC, C, F, FH, NL, L

General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—C, TC, SKT

General Electronics, Inc., 101 Hazel St., Paterson, N. J. J, SKT

General Electronics Mfg. Co., 2225 S. Hoover St., Los Angeles 7, Calif.—P

General Laminated Products, Inc., 2857 S. Halsted St., Chicago 8, Ill.—SL, TE, T

General Plate Div., Metals & Controls Corp., Attleboro, Mass.—CM

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—BP, C, CF, CM, J, P

General Screw & Mfg. Co., 1228 W. Monroe St., Chicago 7, Ill.—S

General Tire & Rubber Co., Garfield, Wabash, Ind.—SR, SM, WR

Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va.—C, CF

Gibsiloy—Gibson Electric Co.

Gibson Electric Co., 8350 Frankstown Ave., Pittsburgh 21, Pa.—"Gibsiloy"—CM

Goat-Form-Fitting—Goat Metal Stampings, Inc.

Goat Metal Stampings, Inc., 314 Dean St., Brooklyn 17, N. Y.—"Goat-Form-Fitting"—TS

Gordon Specialties Co., 823 S. Wabash Ave., Chicago 5, Ill.—G

Grammes, L. F. & Sons, Inc., 392 Union St., Allentown, Pa.—CC, SC, G, H, RR, STE, SL, TE, WB

Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.—WR

Gray Mfg. Co., 16 Arbor St., Hartford, Conn.—GE

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—CF, J

Great Metal Mfg. Corp., 5-13 Wyckoff Ave., Brooklyn 6, N. Y.—MB

Greenhut Insulation Co., 31 W. 21st St., New York, N. Y.—T, FW, WP

Gregory Mfg. Co., 67 Franklin St., New Haven 11, Conn.—C, FH, SL, L

Guided Radio Corp., 161 Sixth Ave., New York 13, N. Y.—T

Gussack Machined Products Co., 10-20 45th Rd., Long Island City 1, N. Y.—BP, CC, C, CF, CP, NL, MB, N, P

Harper Co., H. M., 2620 Fletcher St., Chicago 18, Ill.—N, R, S, WB

Harris Products Co., 5105 Cowan Ave., Cleveland, Ohio—CP "Torflex," SM "Duflex"

Hartford Machine Screw Co., 476 Capitol Ave., Hartford 2, Conn.—BP, CP, NL, N, S, ST, WB, WL

Harwood Co., Div. Los Angeles Corp., 540 N. LaBrea St., Los Angeles, Calif.—C

Haskell Mfg. Co., William H., 24 Commerce St., Pawtucket, R. I.—N, S

Hassall, John, Inc., Clay & Oakland Sts., Brooklyn 22, N. Y.—R, S, WB

Heyman Mfg. Co., Michigan Ave., Kenilworth, N. J.—SL, ST, TE, WB, FW

High Tension Co., Inc., 36 N. Main St., Phillipsburg, N. J.—CC, C, SL, TE

Hunter Pressed Steel Co., Lansdale, Pa.—SP

Hubbell, Harvey, Inc., Barnum Sta., Bridgeport, Conn.—C, SKT

Hy-Pro Tool Co., New Bedford, Mass.—N, S, SS

ICA—Insuline Corp. of America

Industrial Screw & Supply Co., 717 W. Lake St., Chicago 6, Ill.—BP, SC, FH, GA, G, NL, N, R, S, SS, SR, SL, L, LI, PS, SP, TE, WB, WF, FW, WL, WP, WR

Industrial Synthetic Corp., 60 Woolsey St., Irvington 11, N. J.—"Synflex"—G, WP, WR

Instrument Specialties Co., Inc., Little Falls, N. J.—SP

Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—"ICA"—BP, CC, C, SC, CS, CP, FH, GC, G, J, NL, MB, N, P, R, STE, S, SS, SL, L, PS, TE, T, TS, SKT, WB, WF, FW, WL, WR

Insurok—Richardson Co.

International Merit Products Corp., 254 W. 54th St., New York 19, N. Y.—NL, R, S

International Screw Co., 9444 Roselawn Ave., Detroit, Mich.—S

Irvington Varnish & Insulator Co., 50 Argyle Terrace, Irvington 11, N. J.—WP

J.F.D. Mfg. Co., 4111 Ft. Hamilton Parkway, Brooklyn 19, N. Y.—C, P, TS, TC

Johns-Manville Sales Corp., 22 E. 40th St., New York 16, N. Y.—GA

Johnson Co., E. F., Waseca, Minn.—"Johnson"—CS, CP, FH, GC, J, P, STE, SL, TE, T, TS, TC, SKT, C, PL

Jones Co., Howard B., 2460 W. George St., Chicago 18, Ill.—C, FH, J, P

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—BP, CC, C, SC, CM, J, NL, MB, N, P, SL, L, TE, T, WB, WF, FW, WL, WP

Keystone Carbon Co., Inc., 1935 State St., St. Marys, Pa.—CM

Keystone Electronics Co., 50 Franklin St., New York 13, N. Y.—J, TE, T, WP

Kings Electronics Co., 372 Classon Ave., Brooklyn 5, N. Y.—CF

Kirkman Engineering Corp., 121 6th Ave., New York 13, N. Y.—F, FH

Kliegl Bros. Universal Electric Stage Lighting Co., Inc., 321 W. 50th St., New York 19, N. Y.—C, L

Kollath Mfg. Co., 4601 W. Addison St., Chicago, Ill.—BP, CC, C, SC, FH, MB, P, SL, WB, FW

Kolton Electric Mfg. Co., 123 New Jersey Railroad Ave., Newark 5, N. J.—C, FH, SL, L, TE, T

Krementz & Co., 49 Chestnut St., Newark 5, N. J.—TB

Krischer Metal Products Co., 631-637 Kent Ave., Brooklyn 11, N. Y.—BP, CC, C, SC, GC, H, WB

Kulka Electric Mfg. Co., Inc., 30 South St., Mount Vernon, N. Y.—CC, GC, SL, T, TC

Lamson & Sessions Co., 1971 W. 85th St., Cleveland, Ohio—S

Lapp Insulator Co., Inc., 24 Craigie St., Le Roy, N. Y.—CF

Lear, Inc., Piqua, Ohio—GE

Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.—SP

Lewis Engineering Co., 52 Rubber Ave., Naugatuck, Conn.—C, SL, TE

Littelfuse, Inc., 4757 Ravenswood Ave., Chicago 40, Ill.—F, FH, TE

Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.—CP, SM, WR

Manross, F. N. & Sons, Div. Associated Spring Corp., 76 South St., Bristol, Conn.—S

Manufacturers Screw Products, 216 W. Hubbard St., Chicago, Ill.—G, N, R, S, SS, TE, WB, WL

Martindale Electric Co., Box 617, Edgewater Branch, Cleveland 7, Ohio—FW

Mayfair Molded Products Corp., 4440 N. Elston Ave., Chicago 30, Ill.—TE, T, SKT, WP

McInerney Plastics Co., 25 Commerce Ave., S.W., Grand Rapids 2, Mich.—CS, GA, J, MB, RR, STE, T, FW, WP

Melrath Supply & Gasket Co., Tioga St. & Aramingo Ave., Philadelphia, Pa.—GA

Mendelsohn Speedgun Co., 457 Bloomfield Ave., Bloomfield, N. J.—C, CF, GA, J, N, P

Metallic Arts Co., 243 Broadway, Cambridge 39, Mass.—TS

Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—FW

Micarta Fabricators, Inc., 5324 Ravenswood Ave., Chicago 40, Ill.—T, WP

Milford Rivet & Machine Co., Eastern Div., Milford, Conn.—BP, C, G, J, R, S, SS

Millen, James, Mfg. Co., Inc., 150 Exchange St., Malden 48, Mass.—BP, CS, CP, GC, NL, STE, TE, T, TS, TC, SKT

Miller Co., J. W., 5917 S. Main St., Los Angeles 3, Calif.—"Miller"—T

Mines Equipment Co., 4215 Clayton Ave., St. Louis 10, Mo.—C

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—BP, CC, C, CF, CP, J, NL, PL, MB, P, RR, TE, T, WR

Monitor Controller Co., 51 S. Gay St., Baltimore 2, Md.—GC

Monowatt Electric Corp., 66 Bissell St., Providence, R. I.—C

Morse Co., Frank W., 301 Congress St., Boston 10, Mass.—CC, C, SC, PL

Mossman, Donald P., Inc., 612 N. Michigan Ave., Chicago 11, Ill.—J

Mueller Electric Co., 1583 E. 31st St., Cleveland 14, Ohio—"Universal"—SC

Multi Electrical Mfg. Co., 4223 W. Lake St., Chicago, Ill.—SC, FH, SL

National Co., Inc., 61 Sherman St., Malden 48, Mass.—BP, SC, CS, CM, CP, GC, J, NL, MB, P, STE, TS, SKT

National Fabricated Products, 2650 W. Belden Ave., Chicago 47, Ill.—C, CF, J, TE, T, SKT

National Gasket & Washer Mfg. Co., 122 E. 25th St., New York 10, N. Y.—GA, SR, WF, FW, WP, WR

National Lock Co., 1902 Seventh St., Rockford, Ill.—H, N, S, SS

National Lock Washer Co., 40 Hermon St., Newark, N. J.—WL, RR

National Molding Co., 2141 W. Washington Blvd., Los Angeles 7, Calif.—GA, SM, WP, WR

National Screw & Mfg. Co., 2440 E. 75th St., Cleveland 4, Ohio—NL, N, B, S, SS

National Vulcanized Fibre Co., Maryland Ave. & Beech St., Wilmington 99, Del.—T, FW, WP

New Britain Spring Co., 696 W. Main St., New Britain, Conn.—SP

New England Screw Co., Emerald St., Keene, New Hampshire—S

Ney, J. M., Co., 71 Elm St., Hartford 1, Conn.—CM

Northam Warren Corp., Barry Pl., Stamford, Conn.—CC, C, P

North Electric Mfg. Co., Box 417, Galion, Ohio—J, T

Oak Mfg. Co., 1260 Clybourn Ave., Chicago 10, Ill.—GE, CP

Ocram Corp., Auburn Rd., Seneca Falls, N. Y.—SM

Olympic Tool & Mfg. Co., Inc., 39 Chambers St., New York 7, N. Y.—T, TS

Palnut Co., 83 Cordier St., Irvington 11, N. J.—FA, N, WL

Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.—N, S, SS, ST

Pass & Seymour, Inc. Syracuse 9, N. Y.—P

Patton-MacGuyer Co., 17 Virginia Ave., Providence 5, R. I.—SL, L, TE

Paul & Beekman, Div. Portable Products Corp., 1801 Courtland St., Philadelphia 40, Pa.—CS, MB, TS, TC

Pawtucket Screw Co., Pawtucket, R. I.—S

Peck Spring Co., 20 Grove St., Plainville, Conn.—SC, G, SP

Peerless Laboratories, 467 Tenth Ave., New York 18, N. Y.—J, P
Penn Engineering & Mfg. Corp., Box 311, Doylestown, Pa.—NL
Penn Fibre & Specialty Co., 2024-2030 E. Westmoreland St., Philadelphia 34, Pa.—GA, G, T, WB, WF, FW, WL, WP, WR, GE
Penn-Union Electric Corp., 315 State St., Erie, Pa.—C, SC, CP, FH, GC, N, SL, T, WL
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.—NL, N, S, SS, WB
Phonograph Needle Mfg. Co., Inc., 42-46 Dudley St., Providence 5, R. I.—S
Piezo Mfg. Corp., 110 E. 42nd St., New York 17, N. Y.—CP
Pilot Industries, Inc., 202 E. 44th St., New York 17, N. Y.—BP, C, CF, CP, N, S, WB, FW
Plastic Accessories, Inc., 460 Broome St., New York 13, N. Y.—WP
Plax Corp., 133 Walnut St., Hartford 5, Conn.—WP
Plume & Atwood Mfg. Co., 470 Bank St., Waterbury 88, Conn.—FA, G, R
Porcelain Products, Inc., Findlay, Ohio—CC
Precision Radio Co., 210-220 N. Western Ave., Los Angeles 4, Calif.—P, T
Presto Electric Co., 4511 New York Ave., Union City, N. J.—J
Prestole Division, Detroit Harvester Co., 4500 Detroit Ave., Toledo 12, Ohio—CC, SC, FH, NL, MB, RR, SP
Printloid, Inc., 93 Mercer St., New York 12, N. Y.—WP
Progressive Mfg. Co., 52 Norwood St., Torrington, Conn.—N, R, S
Publix Metal Prod., Inc., 100 Sixth Ave., New York 13, N. Y.—SC, CS, TE
Pyle-National Co., 1334 N. Kostner Ave., Chicago 51, Ill.—C, P
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago 10, Ill.—MB, TE, WB, FW
Quaker City Gear Works, 1910 N. Front St., Philadelphia, Pa.—GE
Radex Corp., 53 W. Jackson Blvd., Chicago 4, Ill.—BP
Radio Frequency Laboratories, Inc., Boonton, N. J.—MB, N
Rajah Co., 53 Locust Ave., Bloomfield, N. J.—C
Rattan Mfg. Co., P. O. Box 1745, New Haven, Conn.—LI
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.—SP
Reading Screw Co., Norristown, Pa.—S
Reeder, J. L., 3047 N. Downer Ave., Milwaukee 11, Wis.—ST
Reliable Spring & Wire Forms Co., 3167 Fulton Rd., Cleveland 9, Ohio—SC, SP
Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—"Remler"—BP, C, P, TE, SKT
Richardson Co., Melrose Park, Ill.—"Insurok"—WP
Robinson Aviation, Inc., Teterboro Air Terminal, Teterboro, N. J.—SM
Rubb's Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago 14, Ill.—P, TE
Rusgreen Mfg. Co., 14262 Birwood Ave., Detroit 4, Mich.—C, SL, TE, T
Russell-Burdsall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y.—N, S
Russell & Stoll Co., 125 Barclay St., New York 7, N. Y.—J, P
St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.—WP
Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—TS
Saxonburg Potteries, Saxonburg, Pa.—CF
Schott, Walter L., Co., 9306 Santa Monica Blvd., Beverly Hills, Calif.—BP, CC, C, G, J, LN, NB, NL, P, RR, S, SS, SR, SM, SL, L, SP, ST, WB, WF, FW, WL, WP, WR
Scovill Mfg. Co., 99 Mill St., Waterbury 91 Conn.—G, P, RR, S, SS, TE, TS, WB
Sealol Corp., 45 Willard Ave., Providence 5, R. I.—CP
Selectar Mfg. Corp., 21-10 49th Ave., Long Island City 1, N. Y.—C, CF
Sexton Can Co., Inc., 31 Cross St., Everett 49, Mass.—CS, MB, TS
Shakeproof, Inc., 2501 N. Keeler Ave., Chicago 39, Ill.—SS, TE, WL, GE
Sherman Mfg. Co., H. B., 18 Barney St., Battle Creek, Mich.—C, SC, SL, L, TE
Shur-Antenna-Mount, Inc., 272 Sea Cliff Ave., Sea Cliff, N. Y.—MB
Shure Bros., 225 W. Huron St., Chicago 10, Ill.—C
Sickles, F. W. Co., 165 Front St., Chicopee, Mass.—CP
Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—SKT
Simmons Fastener Corp., N. Broadway, Albany 1, N. Y.—FA, N
Skydyne, Inc., River Rd., Port Jervis, N. Y.—SM
Sonotone Corp., Saw Mill River Rd., Elmsford, N. Y.—J
S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—SC
Southington Hardware Mfg. Co., Southington, Conn.—S
Spaulding Fibre Co., Inc., 310 Wheeler St., Tonawanda, N. Y.—GA, G, FW, WP
Sperman Metal Specialties, 2199 E. 21st St., Brooklyn 29, N. Y.—WB, FW, WP
Sperti, Inc., Beech & Kenilworth, Norwood Sta., Cincinnati 12, Ohio—TE
Spirling Products Co., 64 Grand St., New York 13, N. Y.—CC, C, SC, CS, FH, GA, GC, G, H, MB, RR, STE, SL, L, LI, SP, TE, T, TS, TC, WB, WF, FW, WL, WP, WR
Stamford Metal Specialty Co., 428 Broadway, New York 13, N. Y.—CC
Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—SC, J, P, L
Standard Locknut & Lockwasher, Inc., 33-35 St. Clair St., Indianapolis 4, Ind.—NL, WL
Standard Molding Corp., 460 Bacon St., Dayton 1, Ohio—G, WP
Standard Pressed Steel Co., Jenkintown, Pa.—N, NL, S
Stanley Works, New Britain, Conn.—H
States Co., 19 New Park Ave., Hartford 6, Conn.—BP, CC, C, SC, P, PS, T, TE
Stephens Mfg. Co., 10416 National Blvd., Los Angeles 34, Calif.—SL
Sterling Bolt Co., 209 W. Jackson Blvd., Chicago 6, Ill.—N, R, S, SS, WB, WL
Stewart Stamping Co., 630 Central Park Ave., Yonkers 4, N. Y.—CC, C, SC, MB, SL, L, TE, WB
Stimpson, Edwin B., Co., Inc., 70 Franklin Ave., Brooklyn 5, N. Y.—R, TE, WB
Stover Lock Nut & Machinery Corp., 101 Park Ave., New York 17, N. Y.—NL
Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—TE
Superior Carbon Products, Inc., 9117 George Ave., Cleveland 5, Ohio—CM
Synflex—Industrial Synthetics Corp.
Taller & Cooper, 75 Front St., Brooklyn 1, N. Y.—CF
Taylor Fibre Co., Norristown, Pa.—T, FW, WP
Telegraph Apparatus Co., 412 S. Green St., Chicago, Ill.—C, J, P
Teleoptic Co., 1251 Mound Ave., Racine, Wis.—BP, FH, MB, WB, GE
Thomas & Betts Co., 30-36 Butler St., Elizabeth 1, N. J.—CC, C, CF, CP, NL, L, ST, TE, T, WL
Thompson Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.—"Everlock"—WL
Thompson, George S. Corp., 5240 Huntington Drive, Los Angeles 32, Calif.—TC
Thwing Albert Instrument Co., Penn St. & Pulaski Ave., Philadelphia 44, Pa.—BP
Tinnerman Products, Inc., 2111 Fulton Rd., Cleveland 13, Ohio—CC, SC, NL, MB, N
Torflex—Harris Products Co.
Trico Fuse Mfg. Co., 2948 N. Fifth, Milwaukee 12, Wis.—F, FH
Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill.—J
Tubular Rivet & Stud Co., Wollaston 70, Mass.—R, TE
Tyer Rubber Co., Andover, Mass.—GA, SR, SM
Ucinite Co., Div. United-Carr Fastener Corp., Newtonville, Mass.—GC, J, MB, SM, SL, L, TE, T, TS, TC, SKT
Union Aircraft Products Corp., 245 E. 23rd St., New York 10, N. Y.—CP
United Radio Mfg. Co., 191 Greenwich St., New York, N. Y.—WP
United Screw & Bolt Corp., 2513 W. Cullerton St., Chicago 8, Ill.—N, S ,SS, WB
Universal—Mueller Electric Co.
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—C, CF, WR
Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—J, P
Vitroseal Corp., 342 Crescent Ave., Wyoming, Cincinnati 15, Ohio—TE, T
Volynsky, Boris M., Mfg. Co., Inc., 311 W. 66th St., New York 23, N. Y.—C
Waldes Koh-I-Noor, Inc., 47-10 Austel Pl., Long Island City 1, N. Y.—RR
Waltham Screw Co., 77 Rumford Ave., Waltham, Mass.—BP, CC, CF, CM, NL, N, P, RR, R, S
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—G, P, STE, SL, L, TE, T, SKT, WB, WP
Westinghouse Elec. Corp., East Pittsburgh, Pa.—CF, CM, SM, SL, T, SKT
Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—CF
Whitaker Cable Corp., N. Kansas City Sta., Kansas City 16, Mo.—TE
Whitehead Stamping Co., 1661 W. Lafayette Blvd., Detroit 16, Mich.—WB, FW
Wickwire Spencer, Metallurgical Corp., 260 Sherman Ave., Newark 5, N. J.—SC, GC, RR, SP
Willson Plastics Division, Willson Magazine Camera Co., 6022 Media St., Philadelphia 31, Pa.—T, WP
Wilmington Fibre Specialty Co., P. O. Drawer 1028, Wilmington 99, Del.—FW
Winters & Crampton Corp., Grandville, Mich.—H
Wisconsin Screw Co., 21st & Clark Sts., Racine, Wis.—BP, CM, CP, NL, N, P, RR, STE, S
Wolverine Bolt Co., 9685 Grinnell, Detroit, Mich.—S
Wood, C. D., Electric Co., Inc., 826 Broadway, New York 3, N. Y.—C
Wrought Washer Mfg. Co., 2100 S. Bay St., Milwaukee 7, Wis.—WB, FW, WL
Wynn Mfg. Division, Hudson Supply Co., 401 N. 27th St., Richmond 23, Va.—J, P
Ziarick Mfg. Corp., 285 Gerard Ave., New York 51, N. Y.—CC, SC, GC, SL, L, TE, WB

USE THE INDEX

If you want to know what manufacturers make a certain type of product, use the Product Index to get the page on which the manufacturers are listed.

If you know a manufacturer's name and want to know his principal product, use the Alphabetical "Finding List" which follows the classified listings.

(17) Insulation & Insulators

(See also PAINTS, CEMENT & INSULATING COMPOUNDS)

Alundum grain ....AG
Bonded mica....BM
Can liners CL
Ceramic parts....C
Capacitor paper ....CP
Coil insulation tape ....ST
Glass tubing ....G
Glass bonded mica ....GM
Fibre ....F
Insulating beads ....IB
Insulating coatings IC
Fibre-glass ....FG
Friction tape ....FT
Metallized bushings ....MB
Mica ....M
Paper ....P
Paper tubing ....PT
Plastics ....PL
Rubber insulation ....RI
Silicone materials ....SM
Stand-off insulators ....SO
Tubing (varnished) ....T
Varnished fabrics....VF

Acme Folding Box Co., Inc., 141 E. 25th St., New York 10, N. Y.—CL
Acme Wire Co., New Haven 14, Conn.—FG, P, VF
Akron Porcelain Co., Cory Ave., Akron 14, Ohio—C, SO
Aldine Paper Co., Inc., 535 Fifth Ave., New York 17, N. Y.—P
Alpha Wire Corp., 50 Howard St., New York 13, N. Y.—T
Alsimag—American Lava Corp.
American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.—RI
American Lava Corp., Chattanooga 5, Tenn.—"Alsimag"—C, IB, SO, MB
American Phenolic Corp., 1830 S. 54th St., Cicero, Ill.—"Amphenol"—C, IB, PL
American Products Mfg. Co., Oleander & Dublin Sts., New Orleans 18, La.—PL
American Radio Hardware Co., 152-4 MacQuesten Parkway S., Mt. Vernon, N. Y.—C, SO
Amphenol—American Phenolic Corp.
Arens Controls, Inc., 2253 S. Halsted St., Chicago 8, Ill.—RI, T
Armite—Spaulding Fibre Co., Inc.
Armstrong Cork Co., Lancaster, Pa.—RI
Ashville Mica Co., River Rd., Asheville, N. C.—BM, GM, M
Atlas Products Corp., 30 Rockefeller Plaza, New York 20, N. Y.—FG, T, VF
Auburn Button Works, Inc., Auburn, N. Y.—PL
Ault & Wiborg Div. of Interchemical Corp., 350 Fifth Ave., New York 1, N. Y.—IC
Baer Co., N. S., 9-11 Montgomery St., Hillside, N. J.—F, PL
Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.—"Bakelite", "Fenox", "Vinylite", "Vinyon", "Vinylseal", "Zerox"—ST, IC, PL
B & C Insulation Products, Inc., 261 Fifth Ave., New York, N. Y.—PL, T, VF
Bend-A-Lite Plastics Div., 423 S. Honore St., Chicago 12, Ill.—PL
Bentley-Harris Mfg. Co., Conshohocken, Pa.—"B-H"—G, T, VF
Berger Electronics, 109-01 72nd Rd. Forest Hills, N. Y.—BM, IB, PL
B-H—Bentley-Harris Mfg. Co.
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N. Y.—C, F, SO, T
Brand & Co., Wm., 276 Fourth Ave., New York 10, N. Y.—"Turbo"—BM, G, F, FG, M, P, T, VF
Brandywine Fibre Products Co., 14th & Walnut Sts., Wilmington, Del.—F
Brown Co., 500 Fifth Ave., New York 18, N. Y.—P
Burndy Engineering Co., Inc., 107 Bruckner Blvd., New York 54, N. Y.—PL
Carter Products Corp., 6921 Carnegie Ave., Cleveland 3, Ohio—PL
Celanese Plastics Corp., 180 Madison Ave., New York 16, N. Y.—ST, FT, PL
Central Paper Co., Inc., 2400 Lakeshore Drive, Muskegon, Mich.—P
Centralab Div. of Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—C, IB, SO
Clifton Products, Inc., Blackbrook Road, Painesville, Ohio—C
Colonial Kolonite Co., 2214 Armitage Ave., Chicago 47, Ill.—BM, F, FG, PL, T
Condenser Products Co., 1375 N. Branch St., Chicago 22, Ill.—SM
Continental-Diamond Fibre Co., Newark 50, Del.—"Dilecto"—BM, ST, F, FG, M, PL
Cook Ceramic Mfg. Co., 500 Prospect St., Trenton, N. J.—C, SO
Cords Ltd., Inc., 126 Orchard St., Newark 5, N. J.—RI
Corning Glass Works, Corning, N. Y.—G, SO
Crolite—Henry L. Crowley & Co.

Crowley & Co., Inc., Henry L., 1 Central Ave., West Orange, N. J.—"Crolite"—C, IB, SO, MB
Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.—PL
Davies Molding Co., Harry, 1428 N. Wells St., Chicago 10, Ill.—PL
Diemolding Corp., Rasbach St., Canastota, N. Y.—PL
Dilecto—Continental-Diamond Fibre Co.
Dobeckmun Co., 3301 Monroe Ave., Cleveland 13, Ohio—ST, F, P
Dow Corning Corp., Midland, Mich.—ST, FG, RI, T
Drakenfeld & Co., Inc., B. F., 45 Park Place, New York 7, N. Y.—C
Durez Plastics & Chemicals, Inc., 1926 Walck Rd., North Tonawanda, N. Y.—"Durez"—PL
Durite Plastics, 5000 Summerdale Ave., Philadelphia 24, Pa.—PL
Eclipse Moulded Products Co., 5150 N. 32nd St., Milwaukee 9, Wis.—PL
Edwards, Inc., T. J., 210 South St., Boston 5, Mass.—FG, PL
Electrical Insulation Co., 12 Vestry St., New York 13, N. Y.—PL, T
Electrical Reactance Corp., Franklinville, N. Y.—SO
Electronic Mfg. Co., 339-347 W. Eighth Ave., Dubuque, Iowa—F
Electronic Mechanics, Inc., 70 Clifton Blvd., Clifton, N. J.—GM
Electro-Technical Products, Inc., 115 Center St., Nutley 10, N. J.—ST, FG, P, VF
Empire—Mica Insulator Co.
Endurette Corp. of America, 45 W. 45th St., New York 19, N. Y.—VF
Erie Resistor Corp., 640 W. 12th St., Erie, Pa.—PL
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—C
Felsenthal & Sons, G., 4108 W. Grand, Chicago 51, Ill.—PL
Felt Products Mfg. Co., 1504 W. Carroll Ave., Chicago 7, Ill.—F, VF
Fenox—Bakelite Corp.
Ford Radio & Mica Corp., 536 63rd St., Brooklyn 20, N. Y.—M
Franklin Fibre-Lamitex Corp., Wilmington, Del.—F, PL
Fredericks Co., George E., Bethayres, Pa.—G
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—"G-C"—ST, G, F, FG, FT, P, PL, RI, T, VF
General Ceramics & Steatite Corp., Crows Mill Rd., Keasbey, N. J.—C, IB, SO
General Electronics, Inc., 101 Hazel St., Paterson, N. J.—GM, SO
General Laminated Products, Inc., 2857 S. Halsted St., Chicago 8, Ill.—PL
Goodrich Chemical Co., B. F., Rose Bldg., Cleveland 15, Ohio—PL
Greenhut Insulation Co., 31 W. 21st St., New York, N. Y.—F, PL
Hartford Machine Screw Co., 476 Capital Ave., Hartford 2, Conn.—PL
Hodgman Rubber Co., Framingham, Mass.—RI
ICA—Insuline Corp. of America
Imperial Molded Products Corp., 2925 W. Harrison St., Chicago 12, Ill.—PL
Imperial Porcelain Works, N. Y. Ave. & Mulberry St., Trenton, N. J.—C
Industrial Fabricators, Inc., 1890 Carter Rd., Cleveland 13, Ohio—F
Industrial Molded Products Co., 2035 Charleston St., Chicago, Ill.—PL
Industrial Screw & Supply Co., 717 W. Lake St., Chicago 6, Ill.—FT, PT, RI, T, VF, MB
Industrial Synthetics Corp. 60 Woolsey St., Irvington 11, N. J.—"Synflex"—PL, RI
Industrial Tape Corp., Highway No. 1, New Brunswick, N. J.—FT
Insl-X Co., Inc., 857 Meeker Ave., Brooklyn 22, N. Y.—PL
Insulating Fabricators of New England, Inc., 69 Grove St., Watertown, Mass.—F, PL
Insulating Tube Co., Inc., 26 Cottage St., Poughkeepsie, N. Y.—PT, PL
Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill.—BM, F, FG, FT, G, M, P, PT, RI, ST, T, VF
Insulation Products Co., 504 N. Richland St., Pittsburgh 8, Pa.—PL
Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—"ICA"—F, IB, FG, T, VF
Insurok—Richardson Co.
International Products Corp., 2254 Greenmount Ave., Baltimore 18, Md.—BM, GM, PL
Irvington Varnish & Insulator Co., 50 Argyle Terrace, Irvington 11, N. J.—"Irv-O-Volt"—CL, CP, ST, G, F, FG, P, PL, T, VF
Irv-O-Volt—Irvington Varnish & Insulator Co.
Isolantite, Inc., 343 Cortlandt St., Belleville 9, N. J.—C, IB, SO, MB
Johns-Manville Sales Corp., 22 E. 40th St., New York 16, N. Y.—F, P
Johnson Co., E. F., Waseca, Minn.—C, GM, SO
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—FT
Kilburn Glass Co., Inc., J. R., 22 S. Worcester St., Chartley, Mass.—C, IB
Kirchberger & Co., Inc., M., 1425 37th St., Brooklyn 18, N. Y.—C
Knox Porcelain Corp., Knoxville, Tenn.—C, SO
Kuhn & Jacob Molding & Tool Co., 1200 Southard St., Trenton, N. J.—PL
Lamicord—Mica Insulator Co.
Lapp Insulator Co., Inc., 24 Craigie St., LeRoy, N. Y.—C, SO
Lavite—D. M. Steward Mfg. Co.
Lenoxite Div., Lenox, Inc., 65 Prince St., Trenton 5, N. J.—C, IB, SO, MB
Locke Insulator Corp., P. O. Box 57, Baltimore 3, Md.—C, SO
Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.—RI
Macallen Co., Macallen St., Boston 27, Mass.—ST, GM FG, M, T
Maico Co., Inc., 21 N. Third St., Minneapolis 1, Minn.—PL
Manning, John A., Paper Co., Troy, N. Y.—F, P
Marblette Corp., 37-21 Thirtieth St., Long Island City
Mayfair Molded Products Corp., 4440 N. Elston Ave., Chicago 30, Ill.—PL
Metsch Refractories, E. Liverpool, Ohio—C
Mica Insulator Co., 200 Varick St., New York 14, N. Y.—"Micanite," "Empire," "Munsell," "Lamicord"—BM, CP, ST, GM, F, FG, FT, M, PL, T, VF
Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—BM, C, GM, F, FG, FT, M, P, PT, PL, T, VF
Micanite—Mica Insulator Co.
Micarta Fabricators, Inc., 5324 Ravenswood Ave., Chicago 40, Ill.—PL
Milham—Union Electrical Porcelain Works, Inc.
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass.—C, SO
Milprint, Inc., 431 W. Florida St., Milwaukee 1, Wis.—PL
Minn. Mining & Mfg. Co., 900 Facquier Ave., St. Paul 6, Minn.—ST
Mitchell Rand Insulation Co., 51 Murray St., New York 7, N. Y.—RM, ST, GM, F, FG, FT, M, P, PT, T, VF
Mueller Electric Co., 1583 E. 31st St., Cleveland 14, Ohio—RI
Munsell—Mica Insulator Co.
Munsell & Co., Eugene, 200 Varick St., New York 14, N. Y.—BM, M
Mycalex Corp. of America, 60 Clifton Blvd., Clifton, N. J.—C, GM, SO
National Ceramic Co., 400 Southard St., Trenton 2, N. J.—C, IB, SO
National Company, Inc., 61 Sherman St., Malden 48, Mass.—"N-C"—C, SO
National Fabricated Products, 2650 W. Belden Ave., Chicago 47, Ill.—C
National Molding Co., 2141 W. Washington Blvd., Los Angeles 7, Calif.—PL
National Porcelain Co., 400 Southard St., Trenton, N. J.—BC, IB, SO
National Tile & Mfg. Co., 1200 E. 26th St., Anderson, Ind.—C, IB, SO
National Varnished Products Corp., 211 Randolph Ave., Woodbridge, N. J.—T, VF
National Vulcanized Fibre Co., Maryland Ave., & Beech St., Wilmington 99, Del.—"Phenolite"—F, PL
N-C—National Company, Inc.
New England Mica Co., Waltham, Mass.—M
Norton Co., 1 New Bond St., Worcester 6, Mass.—AG
Norton Laboratories, Inc., 560 Mill St., Lockport, N. Y.—PL
Ogush, Wm. B., Inc., 33 W. 60th St., New York 23, N. Y.—BM, IB
Okonite Co., Passaic, N. J.—FT, RI
Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo 1, Ohio—ST, G, GM, F, IB, FG, FT, PL, SO, T, VF
Pacific Clay Products, SteaPACtite Div., 306 W. Ave. 26, Los Angeles 31, Calif.—"SteaPACtite"—C
Paper Manufacturers Co., 5th & Willow Sts., Philadelphia 23, Pa.—P
Parisian Novelty Co., 3510 S. Western Ave., Chicago 9, Ill.—PL
Pass & Seymour, Inc., Syracuse 9, N. Y.—C
Pemco Corp., 5601 Eastern Ave., Baltimore 24, Md.—C
Penn Fibre & Specialty Co., 2024 to 2030 E. Westmoreland St., Philadelphia 34, Pa.—F, P, PL
Phenolite—National Vulcanized Fibre Co.
Pierce Laboratory, Inc., Summit, N. J.—"Pierceway" PL
Plastic Accessories, Inc., 460 Broome St., New York 13, N. Y.—PL
Plating Processes Corp., 109 Lyman St., Holyoke, Mass.—MB
Plax Corporation, 133 Walnut St., Hartford 5, Conn.—PL
Porcelain Products, Inc., Findlay, Ohio—C, SO
Precision Paper Tube Co., 2035 W. Charleston St., Chicago 47, Ill.—CL, PT
Premax Products, Div., Chisholm-Ryder Co., Inc. 4612 Highland Ave., Niagara Falls, N. Y.—SO
Printloid, Inc., 93 Mercer St., New York 12, N. Y.—PL
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—C, IB, M
Richardson Co., Melrose Park, Melrose Park, Ill.—"Insurok"—PL, RI
Rogan Bros., 2001 S. Michigan Ave., Chicago, Ill.—PL
Rogers Corp., Mill & Oakland Sts., Manchester, Conn.—CL, F, P, PL
Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.—PL
Ruberoid Co., 500 Fifth Ave., New York 18, N. Y.—ST, P
St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.—PL
Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—PL, T
Santay Corp., 351 N. Crawford Ave., Chicago 24, Ill.—PL
Saxonburg Potteries, Saxonburg, Pa.—C, IB, SO
Schweitzer Paper Co., 405 Lexington Ave., New York 17, N. Y.—CP, P
Southern Mica Co., Fairview & Steel Sts., Johnson City, Tenn.—M
Spaulding Fibre Co., Inc., 310 Wheeler St., Tonawanda, N. Y.—"Armite"—F, PL, T, VF
Special Chemicals Co., 1545 E. 16th St., Cleveland 14, Ohio—PL
Sperti, Inc., Beech & Kenilworth, Norwood Sta., Cincinnati 12, Ohio—G, IB
Sponge Rubber Products Co., Shelton, Conn.—RI
Square D Co., 6060 Rivard St., Detroit, Mich.—P
Standard Insulation Co., 75 Paterson Ave., East Rutherford, N. J.—P, VF
Standard Molding Corp., 460 Bacon St., Dayton 1, Ohio—PL
Star Porcelain Co., Muirhead Ave., Trenton 9, N. J.—C, SO
Steward Mfg. Co., D. M., E. 36th St., Chattanooga, Tenn.—"Lavite"—C
SteaPACtite—Pacific Clay Co.
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—C, IB, SO
Synflex—Industrial Synthetics Corp.
Synthane Corp., Oaks, Pa.—"Synthane"—PL
Tar Heel Mica Co., Plumtree, N. C.—BM, M
Taylor Fibre Co., Norristown, Pa.—F, P, PT, PL, T
Thomas & Sons Co., R., Lisbon, Ohio—C
Tingstol Co., 1461 W. Grand Ave., Chicago 22, Ill.—FG, PL
Traver Corp., 358-368 W. Ontario St., Chicago 10, Ill.—PL
Turbo—Wm. Brand & Co.
Tyer Rubber Co., Andover, Mass.—RI
Union Elec. Porcelain Works, Inc., Vam St., Trenton 5, N. J.—"Milham"—C
United Mineral & Chemical Co., 16 Hudson St., New York 13, N. Y.—M
U. S. Plastics Corp., 1752 W. Grand Ave., Chicago, Ill.—BM, M, PL
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—FT, RI
Varflex Corp., N. Jay St., Rome, N. Y.—FG, PL, T, VF
Vinylite—Bakelite Corp.
Vinyon—Bakelite Corp.
Vinylseal—Bakelite Corp.
Washington Porcelain Co., Washington, N. J.—SO
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—IB, PL, MB
Westinghouse Elec. Corp., East Pittsburgh, Pa.—BM, C, ST, GM, F, FG, FT, M, P, PL, SM, SO, VF, MB
Wilmington Fibre Specialty Co., P. O. Drawer 1028, Wilmington 99, Del.—F, P, PL
Wind Turbine Co., West Chester, Pa.—SO
Wright & Sons Co., Wm. E., Industrial Textile Div., West Warren, Mass.—ST
Zyrox—Bakelite Corp.

(18) Laboratory Equipment

(See also MEASURING INSTRUMENTS)

Calibrators ..... CA
Capacitor specialties C
Decade boxes, capacity ..... DC
Decade boxes, inductance ..... DI
Decade boxes, resistance ..... RD
Electric wave filters ..... E
Electronic balances ..... EB
Electronic switches ..... ES
Equalizing filters ..... EF
Gas analyzers ..... GA
Geiger-Mueller counter ..... GM
Inductance specialties L
Lenses ..... LE
Multivibrators ..... MV
Optical equipment ..... OE
Oscillographs, direct-writing ..... OD
Oscillographs, cathode ray ..... O
Power supplies, regulated ..... PR
Power supplies, unregulated ..... PU
Pulse generators ..... PG
Radio spectrum analyzers ..... RA
Resistance specialties ..... R
Salt-spray cabinets ..... SC
Signal generators, AF ..... SA
Signal generators, FM ..... SF
Signal generators, RF ..... SR
Spectographic equipment ..... S
Square wave generators ..... SW
Stroboscopes ..... ST
Surface analyzers ..... SM
Temperature test cabinets ..... TT
Tuning fork oscillators ..... TO
Ultrasonic oscillators ..... SO
Video pattern generators ..... VP
Video-range oscillators ..... VO

Abott Transformer Co., Inc., 409 Lafayette St., New York 3, N. Y.—ES, L
Advance Research Corp., 37 W. 57th St., New York 19, N. Y.—E, EF, RA
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass.—C, DC, R
AIC—Atomic Instruments Co.

Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—SA

Aircraft-Marine Products, Inc., 1523 N. 4th St., Harrisburg, Pa.—E

Airdesign & Fabrication, Inc., 241 Fairfield Ave., Upper Darby, Pa.—EF

Airtronics Development Corp., 131-133 E. Third St., Dayton 2, Ohio—SR

Alden Products Co., 117 N. Main St., Brockton 64, Mass.—MV, TO

All American Tool & Mfg. Co., 1014 W. Fullerton Ave., Chicago 14, Ill.—MV

American Instrument Co., 8030-8050 Georgia Ave., Silver Spring, Md.—DC, RD, TT, SC, TO

American Lens Co., Inc., 45 Lispenard St., New York 13, N. Y.—OE

American Optical Co., Scientific Instrument Div., 19 Doat St., Buffalo 11, N. Y.—LE, OE

American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—SW, SA

American Television Laboratories, Inc., 433 E. Erie St., Chicago 11, Ill.—O

American Time Products, Inc., 580 Fifth Ave., New York 19, N. Y.—MV, SA, TO

Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—E, EF, SO

Annis, R. B. Co., 1101 N. Delaware St., Indianapolis 2, Ind.—O

Applied Research Laboratories, 4336 San Fernando Rd., Glendale 4, Calif.—S

Associated Research, Inc., 231 S. Green St., Chicago 7, Ill.—"Vibrotest"—R, ST

Atomic Instruments Co., 160 Charles St., Boston, Mass.—"AIC"—GM

Audio Development Co., 2833 13th Ave. S., Minneapolis 7, Minn.—EF

Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—EF, MV, SW, SA

Baker & Co., Inc., 113 Astor St., Newark 5, N. J.—GA

Baker Instrument Co., 310 Main St., Orange, N. J.—OE, TT, S

Ballantine Laboratories, Inc., Boonton, N. J.—R

Barker & Williamson, Upper Darby, Pa.—EB, ES, EF, GA, L, MV, SW, SA, SR, SO

Bausch & Lomb Optical Co., Rochester 2, N. Y.—LE, OE, S

Belmont Radio Corp., 5921 W. Dickens Ave., Chicago 39, Ill.—O, SR

Bend-A-Lite Plastics Division, 423 S. Honore St., Chicago 12, Ill.—GA

Bludworth Marine, Div. National-Simplex-Bludworth, Inc.,100 Gold St., New York 7, N. Y.—SO

Boonton Radio Corp., 518 Main St., Boonton, N. J.—"Q-Meter"—"QX Checker"—SF, VO

Boulin Instrument Corp., 65 Madison Ave., New York 16, N. Y.—ST

Bowser, Inc., 1302 E. Creighton Ave., Ft. Wayne 2, Ind.—TT

Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—CA

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—OD, SM

Burke & James, Inc., 321 S. Wabash Ave., Chicago 4, Ill.—OE

Cambridge Instrument Co., Inc., 3005 Grand Central Terminal, New York 17, N. Y.—RD, GA, OD, TO

Carborundum Co., Globar Div., Buffalo Ave., Niagara Falls, N. Y.—R

Cardwell, Allen D. Mfg. Corp., 81 Prospect St., Brooklyn 1, N. Y.—C

Carrier Corp., S. Geddes St., Syracuse, N. Y.—TT

Centralab, Division Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—C

Central Scientific Co., 1700 Irving Park Rd., Chicago 13, Ill.—GA

Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—RD

Clarostat Mfg. Corp., 285 N. 6th St., Brooklyn N. Y.—RD

Clough-Brengle Co., 6014 Broadway, Chicago 40, Ill.—O, SA, SR

Collins Radio Co., Cedar Rapids, Iowa, EF, MV

Commercial Research Laboratories, Inc., 20 Bartlett Ave., Detroit 3, Mich.—O

Communication Equipment & Engineering Co., 5646 W. Race St., Chicago 44, Ill.—E, L

Communication Measurements Laboratory, 120 Greenwich St. New York 6, N. Y.—PR, ST

Communication Parts, 1101 N. Paulina St., Chicago 22, Ill.—RD, EF, L

Communications Equipment Corp., 134 W. Colorado St., Pasadena 1, Calif.—PU

Conn, C. G., Ltd., 1101 E. Beardsley Ave., Elkhart, Ind.—ST

Consolidated Engineering Corp., Pasadena 1, Calif.—S

Cordex Western, Inc., 151 North Ave., Los Angeles 31, Calif.—GA

Cornell-Dubilier Electric Corp., South Plainfield, N. J.—C, DC

Corning Glass Works, Corning, N. Y.—C

Crystal Research Products, Dumont, N. J.—MV, SR, SO

Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.—ES

Cyclotron Specialties Co., Moraga, Calif.—GM

Daven Co., 191 Central Ave., Newark 4, N. J.—RD

Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—GA, OE, R

Deepfreeze Div., Motor Products Corp., 2301 Davis St., North Chicago, Ill.—TT

DeMornay-Budd, Inc., 475 Grand Concourse, New York 51, N. Y.—RA, SW, SR

Determohm—Ohmite Mfg. Co.

Deutschmann, Tobe, Corp., Canton, Mass.—C, E, L

Dietert, Harry W., Co., 9330 Roselawn Ave., Detroit 4, Mich.—S

Distillation Products, Inc., 755 Ridge Road W., Rochester 13, N. Y.—GA, OE

Drake, R. L., Co., 11 Longworth St., Dayton 2, Ohio—E, EF, GA, L, MV, R, SO

Dumont, Allen B., Laboratories, Inc., 2 Main Ave., Passaic, N. J.—ES, O

Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—DC, RD, E, ES, O, SW, SA

Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—RD, ES, R, SA, SR, L

Eastern Specialty Co., 3617 N. 8th St., Philadelphia 40, Pa.—R

Eastman Kodak Co., Rochester 4, N. Y.—OE

Electric Heat Control Co., 9123 Inman Ave., Cleveland 5, Ohio—GA

Electrical Reactance Corp., Franklinville, N. Y.—C

Electro-Medical Laboratory, Inc., Holliston, Mass.—OD

Electro-Tech Equipment Co., 331 Canal St., New York 13, N. Y.—RD, O, R

Electronic Engineering Co., 3223 W. Armitage Ave., Chicago 47, Ill.—L

Electronic Engrg. Service & Labs., 114-38 Farmers Blvd., St. Albans 12, N. Y.—ES, EF, MV, O, R, SW, SA, SR

Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—E, ES, EF, MV, S, ST

Electronic Measurements Co., Red Bank, N. J.—EB, MV, O, PR, RA, SW, SA, SR, SO

Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—ES, O, S, SW, SA, SR

Electronic Transformer Co., 207 W. 25th St., New York, N. Y.—L

Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—O, PR, S, SO

Engelhard, Charles, Inc., 233 N. J. R. R. Ave., Newark 5, N. J.—GA

Engineering Laboratories, Inc., 610-624 E. 4th St., Tulsa 3, Okla.—OD, S

Farrand Optical Co., Inc., Bronx Blvd. & E. 238th St., New York 66, N. Y.—OE, LE

Federal Mfg. & Engineering Corp., 199-217 Steuben St., Brooklyn 5, N. Y.—SR, OE

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—E, ES, L, R

Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—E, EF, L

Ferris Instrument Co., 110 Cornelia St., Boonton, N. J.—CA, SR

Film Crafts Engineering Co., 36 W. 25th St., New York 10, N. Y.—LE, OE, ST

Fischer-Smith, Inc., 162 State St., West Englewood, N. J.—EB, GA

Fisher Research Laboratory, 1961 University Ave., Palo Alto, Calif.—EB

Fisher Scientific Co., 711 Forbes St., Pittsburgh, Pa.—GA, OE

Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.—LE, OE

Flashtron—Thordarson Electric Mfg. Co.

Freed Transformer Co., 72 Spring St., New York 12, N. Y.—E, EF

Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14, Ill.—LE, OE, S

Gamma Instrument Co., Inc., 95 Madison Ave., New York 16, N. Y.—OE

Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—MV, SR

Gates, George W. & Co., Inc., Lucille Ave. & Hempstead Tpke., Franklin Square, L. I., N. Y.—OE

Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—ES, O, SW, SA, SR

General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—SR

General Control Co., 1200 Soldiers Field Rd., Boston 34, Mass.—ES

General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—C, ES, SW, SA, SR

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—C, DC, RD, E, GM, L, MV, O, R, SA, SR, ST, SO, TO

Geophysical Instrument Co. 1820 N. Nash St., Arlington, Va.—GM, LE, MV, OE, SW

G & G Precision Works, Inc., 5-33 48th Ave., Long Island City 1, N. Y.—OE

Goodall Electric Mfg. Co., Third & Main Sts., Ogallala, Neb.—C, MV

Gussack Machined Products Co., 10-20 45th Rd., Long Island City 1, N. Y.—OE, SO

Gyro Balance Corp., 119 E. 36th St., New York 16, N. Y.—EB

Hallicrafters Co., 2611 S. Indiana Ave., Chicago 16, Ill.—MV

Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N. Y.—C

Hardwick, Hindle, Inc., 40 Hermon St., Newark 5, N. J.—R

Harvey-Wells Electronics, North St., Southbridge, Mass.—DC, RD, L

Hathaway Instrument Co., 1315 S. Clarkson St., Denver, Col.—OD, TO

Heiland Research Corp., 130 E. Fifth Ave., Denver 9, Col.—GA, OD, O

Helipot Corp., 1015 Mission St., So. Pasadena, Calif.—S

Herbach & Rademan Co., Mfg. Division, 517 Ludlow, Philadelphia 6, Pa.—RD, ES, GM, L, MV, R, SW, SA, SR, TO

Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—E, ES, L

Herron Optical Co., 705 W. Jefferson Blvd., Los Angeles 7, Calif.—OE

Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—ES, L, MV, RA, SW, SA, SR, SO, VO

Hickok Electrical Instrument Co., 10514 Dupont, Cleveland 8, Ohio—O, SA, SR

Hollywood Transformer Co., 645 N. Martel Ave., Los Angeles 36, Calif.—E, EF, L

Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—FF, L, MV, SO

Industrial Filter & Pump Mfg. Co., 1621-25 W. Carroll Ave., Chicago 12, Ill.—SC

Industrial Instruments, Inc., 17 Pollock Ave., Jersey City, N. J.—C, DC, RD, L, R

Instrument Glass & Mirror Co., 383 Pearl St., Brooklyn 1, N. Y.—LE

Instrument Optics Co., 1872 Genesee St., Buffalo 11, N. Y.—OE

Intex Co., 303 W. 42nd St., New York 18, N. Y.—C

Islip Radio Mfg. Corp., Islip, N. Y.—EB, MV

Jackson Electrical Instrument Co., 18 S. Patterson Blvd., Dayton, Ohio—SR, O, SA

Jefferson, Ray, Inc., 40 E. Merrick Rd., Freeport, L. I., N. Y.—MV

Jensen Radio Mfg. Co., 6601 S. Laramie Ave., Chicago 38, Ill.—EF

Jerome Engineering Co., Massapequa, L. I., N. Y.—OE

J.F.D. Mfg. Co., 4111 Ft. Hamilton Parkway, Brooklyn 19, N. Y.—ST

Kenyon Transformer Co., Inc., 840 Barry St., New York 59, N. Y.—E, EF

Keystone Carbon Co., Inc., 1935 State St., St. Marys, Pa.—R

Kilburn, J. R., Glass Co., Inc., 22 S. Worcester St., Chartley, Mass.—LE

Kirkland, H. R. Co., 8-10 King St., Morristown, N. J.—LE

Knights, James Co., 131 S. Wells St., Sandwich, Ill.—OE

Kold-Hold Mfg. Co., 424 N. Grand Ave., Lansing 4, Mich.—TT

Lane-Wells Co., 5610 S. Soto St., Los Angeles 11, Calif.—O

Larrimore Sales Co., 311 Locust St., St. Louis 2, Mo.—OE

Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.—SR

Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—L, MV, SW, SR

Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia 44, Pa.—DC, RD, GA, S, L

Leitz, E., Inc., 730 Fifth Ave., New York 19, N. Y.—LE, OE

Lewis Engineering Co., 52 Rubber Ave., Naugatuck, Conn.—DC, RD, ES

Lyman Electronic Corp., 12 Cass St., Springfield, Mass.—ES, MV

Maberg Optical, Inc., 235 E. 45th St., New York 17, N. Y.—OE

Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—C, E, EB, ES, O, R, SW, BO, PG, SA

Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—SR

Measurements Corp., 116 Monroe St., Boonton, N. J.—CA, PG, SF, SR, SW, VP

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—EF

Millen, James Mfg. Co., Inc., 150 Exchange St., Malden 48, Mass.—MV, O, RA

Miller, J. W. Co., 5917 S. Main St., Los Angeles 3, Calif.—L

Miller, William Corp., 362 Colorado St., Pasadena 2, Calif.—OE, OD

Miller Electro-Research Labs., 3460 S. 16th St., Milwaukee 7, Wis.—RD

Mogey, William & Sons, Inc., Interhaven Ave., Plainfield, N. J.—LE, OE

Monarch Mfg. Co., 2014 N. Major Ave., Chicago 39, Ill.—"Monarch"—MV, SR

Monitor Piezo Products Co., 815 Fremont Ave., So. Pasadena, Calif.—MV, SR

Moulic Specialties Co., 1005-1007 W. Washington St., Bloomington, Ill.—O

National Co., Inc., 61 Sherman St., Malden 48, Mass.—O

New York Transformer Co., 26 Waverly Pl., New York 3, N. Y.—CA, DI, L

Nilsson Electrical Laboratory, Inc., 103 Lafayette St., New York 13, N. Y.—R

North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—GM, S

Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—E, EF

Northern Laboratories, Ltd., 3-01 27th Ave., Long Island City 2, N. Y.—TT

Nurnberg Thermometer Co., Inc., 112 Broadway, Cambridge 42, Mass.—TT

Offner Electronics, Inc., 5320 N. Kedzie Ave., Chicago 25, Ill.—OD

Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill.—"Determohm"—RD, R

Pacific Electronics, W. 1011 First Ave., Spokane 5, Wash.—MV

Panoramic Radio Corp., 242-250 W. 55th St., New York 19, N. Y.—RA

Parker Engineering Products Co., 16 W. 22nd St., New York, N. Y.—OE, R

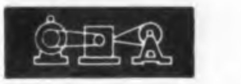
Peerless Electrical Products Co., 6920-7004 McKinley Ave., Los Angeles 1, Calif.—EF

Perkin-Elmer Corp., 535 Hope St., Glenbrook, Conn.—LE, OE, S

Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—O

Philharmonic Radio Corp., 528 E. 72nd St., New York 21, N. Y.—O, SW
Physicists Research Co., 343 S. Main St., Ann Arbor, Mich.—SA
Pittsburgh Equitable Meter Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.—GA
Plating Processes Corp., 109 Lyman St., Holyoke, Mass.—ES
Polytron Corp., 401 Broadway, New York 13, N. Y.—O, RA, SW, SA, SR
Potter Instrument Co., 136-56 Roosevelt Ave., Flushing, L. I., N. Y.—MV
Precision Apparatus Co., 92-27 Horace Harding Blvd., Elmhurst, L. I., N. Y.—SR
Precision Electronics Co., 815 Washington St., Newtonville 60, Mass.—SR
Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill.—GA, SC
Process & Instruments, 60 Greenpoint Ave., Brooklyn 22, N. Y.—GA
Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y.—OE
Q Meter—Boonton Radio Corp.
QX Checker—Boonton Radio Corp.
Radio Frequency Laboratories, Inc., Boonton, N. J.—SO
Radio Specialty Mfg. Co., 403 N.W. 9th St., Portland 9, Ore.—MV, SR
Radio Television Institute, Inc., 480 Lexington Ave., New York 17, N. Y.—PR
Rahm Instruments, Inc., 12 W. Broadway, New York 7, N. Y.—OD
Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—SR
Raytron, Inc., 209 E. Washington Ave., Jackson, Mich.—SR
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—O, SW, SA, SR
Reeves Sound Laboratories, Div. Reeves-Ely Laboratories, Inc., 215 E. 91st St., New York 28, N. Y.—SO
Reiner Electronics Co., Inc., 152 W. 25th St., New York 1, N. Y.—SW
Revco, Inc., Refrigeration Div., Deerfield, Mich.—TT
Richardson-Allen Corp., 15 W. 20th St., New York 11, N. Y.—L
Rieber, Frank, Inc., 11916 W. Pico Blvd., Los Angeles 34, Calif.—E, EF, O, SR, TO
Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio—LE, TO
Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago 39, Ill.—O
Rubicon Co., Ridge Ave. at 35th St., Philadelphia 32, Pa.—RD, GA, R
Savlion Laboratories, Inc., 1025 Broad St., Newark 2, N. J.—R
Sav-Way Industries, P. O. Box 117, Harper Sta., Detroit 13, Mich.—SM
Saxl Instrument Co., 38-40 James St., East Providence 14, R. I.—C, LE, OE, TT, SM
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.—OE
Scientific Radio Products Co., 738 W. Broadway, Council Bluffs, Iowa—CA, SR
Scientific Service Laboratories, 2225 S. Hoover St., Los Angeles 7, Calif.—SA, SR
Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—RD
Sherron Electronics Co., 1201 Flushing Ave., Brooklyn 6, N. Y.—C, EB, GA, R, L
Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—SW, SA
Simonds Machine Co., Inc., 246-48 Worcester St., Southbridge, Mass.—OE
Sipp-Eastwood Corp., 39 Keen St., Paterson, N. J.—CW
Skydyne, Inc., River Rd., Port Jervis, N. Y.—TT
Solar Mfg. Corp., 285 Madison Ave., New York 17, N. Y.—C
S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—LE, OE
Square D Co., 6060 Rivard St., Detroit 11, Mich.—OE
Standard Instruments Corp., 568 Prospect Ave., New York 55, N. Y.—DC, DI, RD
States Co., 19 New Park Ave., Hartford 6, Conn.—R
Sta-Warm Electric Co., 333 N. Chestnut St., Ravenna, Ohio—OE
Stoelting, C. H. Co., 424 N. Homan Ave., Chicago 24, Ill.—GA, GM
Supreme Instruments Corp., Greenwood, Miss.—"Supreme"—SR
Swain Nelson Co., 2320 Glenview Ave., Glenview, Ill.—LE, OE
S-W Inductor Co., 1056 N. Wood St., Chicago 22, Ill.—L
Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—C, ES, O, RA, SR, ST
Takk Corp., 28 W. Market St., Newark, Ohio—PU
Taller & Cooper, 75 Front St., Brooklyn 1, N. Y.—EB, GA
Tech Laboratories, 337 Central Ave., Jersey City 7, N. J.—RD, R, SO
Technical Apparatus Co., 1171 Tremont St., Boston 20, Mass.—C, DC, O, SA
Technical Devices Corp., Beaufort & Eagle Rock Ave., Roseland, N. J.—SR
Teleregister Corp., 157 Chambers St., New York 7, N. Y.—ST
Tenney Engineering, Inc., 26 Ave. B, Newark 5, N. J.—TT
Thompson, John E. Co., 1440 W. 47th St., Chicago 9, Ill.—MV, O, SW, SA, SR
Thordarson Electric Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—"Flashtron"—EF
Thwing, Albert, Instrument Co., Penn St. & Pulaski Ave., Philadelphia 44, Pa.—DC, RD, ES
Times Telephoto Equipment, Inc., 229 W. 43rd St., New York 18, N. Y.—OE, TO
Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York 14, N. Y.—SO
Trefz Mfg. Co., 38-11 Main St., Flushing, L. I., N. Y.—R
Triplett Electrical Instrument Co., Harmon Rd., Bluffton, Ohio—SR
Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill.—O, SA, SR
Ullman Products Co., 857-61 4th Ave., Brooklyn 32, N. Y.—OE
Union Electronics Corp., 38-01 Queens Blvd., Long Island City, N. Y.—SA, SR
United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—ES
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—SM
U. S. Television Mfg. Corp., 106 Seventh Ave., New York 11, N. Y.—SR, VP
United Transformer Corp., 150 Varick St., New York 13, N. Y.—E, EF, L
Vacolite Co., 3001-3003 N. Henderson, Dallas, Tex.—SA
Valpey Crystal Corp., Highland St., Holliston, Mass.—OE
Vibrotest—Associated Research, Inc.
Walker, Robert, Inc., 403 W. 8th St., Los Angeles 14, Calif.—C, ES, MV, S
Ward Leonard Electric Co., 31 South St., Mt. Vernon, N. Y.—R
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—LE
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa.—O, SW, SA, SR, ST
Watlow Electric Mfg. Co., 1320 N. 23rd St., St. Louis 6, Mo.—R
Waugh Laboratories, 420 Lexington Ave., New York 17, N. Y.—L
Weber Co., Earl, 4352 W. Roosevelt Ave., Chicago, Ill.—SR
Welch, W. M. Mfg. Co., 1515 Sedgwick St., Chicago 10, Ill.—O, ST
Weltronic Co., 19500 W. Eight Mile Rd., Detroit 19, Mich.—S
Westinghouse Electric Corp., Meter Div., 95 Orange St., Newark 1, N. J.—OD
Westinghouse Electric Corp., East Pittsburgh, Pa.—C, GA, OD, O, TT, R, SW, ST, SO, SM
Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—L
Winslow Co., 9 Liberty St., Newark 5, N. J.—DC, RD, GA, R
Winters & Crampton Corp., Grandville, Mich.—C
World Wide Electronics, Inc., 72 E. 13th St., New York 3, N. Y.—EB, L
York Electric & Machine Co., Carrillotone Div., 30-34 N. Penn St., York, Pa.—TT, SM
Zeiss, Carl, Inc., 485 Fifth Ave., New York 17, N. Y.—OE
Zenith Optical Laboratory, 123 W. 64th St., New York 23, N. Y.—OE

(19) Machinery & Production Equipment



Air cleaners	AC
Bench lathes	L
Blower units	B
Buffers and grinders	G
Coil winding machines	CW
Crystal grinders	CG
Crystal lapping discs	LD
Crystal saw blades	C
Dies	D
Drill press	P
Electric furnaces	E
Engraving machines	EM
Impregnating equipment	IM
Jigs and fixtures	J
Marking and numbering machines	MN
Metal forming equipment	MF
Mfg. facilities	MG
Molding presses	MP
Powdered metal press	PM
Pressure welding electrodes	PW
Punch press	PP
Quartz cutting machines	QC
Riveter, automatic	R
Soldering machines	SM
Spot welders	S
Strain gages	SG
Vacuum pumps	VP
Vacuum tube machinery	VM
Vibration control equipment	VC
Wire insulating machine	WI
X-Ray, pattern markers	X

Ace Mfg. Corp., Erie Ave. at "K" St., Philadelphia 24, Pa.—D, J
Acme-Danneman Co., Inc., 203-205 Lafayette St., New York 12, N. Y.—D, J
Acme Tool & Die Co., 426 Ingle St., Evansville 8, Ind.—D, J
Acromark Co., 9-13 Morrell St., Elizabeth 4, N. J.—D, J, MN
Acro Tool & Die Works, 4554 Broadway, Chicago 40, Ill.—J
Agnew Electric Co., Milford, Mich.—S
Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.—VM
Aircraft & Diesel Equipment Corp., 4401 N. Ravenswood Ave., Chicago 40, Ill.—B
Air-Maze Corp., 5200 Harvard Ave., Cleveland 5, Ohio—AC
Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.—E
Allen Electric & Equipment Co., 2101-2117 N. Pitcher St., Kalamazoo 13-f, Mich.—S
Allis-Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1, Wis.—VP
All-Steel Equipment Co., 723 Griffith Ave., Aurora, Ill.—MF
American Electric Fusion Corp., 2610 W. Diversey Ave., Chicago 47, Ill.—S
American Instrument Co., 8030 Georgia Ave., Silver Spring, Md.—SG
Ams, Max, Machine Co., Foot of Scofield Ave., Bridgeport 5, Conn.—MF
Andrews & Perillo, 39-30 Crescent St., Long Island City, N. Y.—D, J, MF
Annis, R. B., Company, 1101 N. Delaware St., Indianapolis 2, Ind.—MN, VC
Arnessen Electric Co., Inc., 116 Broad St., New York 4, N. Y.—D, J
Atlas Metal Stamping Co., 3801 Castor Ave., Philadelphia 24, Pa.—D, J
Austin, O., Co., 335 Throop Ave., Brooklyn 21, N. Y.—MN
Auto Engraver Co., 1776 Broadway, New York 19, N. Y.—EM
Automatic Mfg. Corp., 900 Passaic Ave., East Newark, N. J.—PP
Baird Machine Co., 1700 Stratford Ave., Stratford 8, Conn.—MF
Baker Instrument Co., 310 Main St., Orange, N. J.—E
Baldwin Locomotive Works, Baldwin Southwark Div., Paschall P. O., Philadelphia 42, Pa.—MP, PM, SG
Barrett, Leon J. Co., P. O. Box 378, Worcester 1, Mass.—IM
Barry, L. N. Co., 179 Sidney St., Cambridge 39, Mass.—VC
Bear Mfg. Co., Rock Island, Ill.—VC
Bellows Co., 861 E. Tallmadge Ave., Akron 10, Ohio—AC, B
Bennel Machine Co., Inc., 20 Grand Ave., Brooklyn, N. Y.—J, MF
Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—CW, MN
Black & Decker Mfg. Co., E. Pennsylvania Ave., Towson 4, Md.—G
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn 32, N. Y.—MF, MP, PM
Browne, J. Electric Co., 3774 Surf Ave., Brooklyn 24, N. Y.—MF, R
Brush Development Co, 3405 Perkins Ave., Cleveland 14, Ohio—SG
Burgess Battery Co., Handicraft Div., Vibro Tool Dept., 180 N. Wabash Ave., Chicago 1, Ill.—MN
Callite Tungsten Corp., 540 39th St., Union City, N. J.—PW
Carpenter Products, Inc., 85 Washburn St., Bridgeport, Conn.—S
Central Scientific Co., 1700 Irving Park Rd., Chicago 13, Ill.—VP
Chicago Rivet & Machine Co., 9600 W. Jackson Blvd., Bellwood, Ill.—MF
Clark, Jas. Jr. Elec Co., 600 Bergman St., Louisville 2, Ky.—G
Clark, Robert H. Co., 9330 Santa Monica Blvd., Beverly Hills, Calif.—QC
Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio—S
Congress Tool & Die Co., Congress Die Casting Div., 3750 E. Outer Dr., Detroit, Mich.—D, J, MF
Consolidated Diamond Tool Co., 320 Yonkers Ave., Yonkers, N. Y.—C
Consolidated Engineering Corp., Pasadena 1, Calif.—SG
Crescent Industries, Inc., 4140 Belmont Ave., Chicago 41, Ill.—D
Dallons Laboratories, 5066 Santa Monica Blvd., Los Angeles 27, Calif.—E
Daly Machine & Tool Works, 923 Frelinghuysen Ave., Newark, N. J.—J
Davidson Fan Co., 213 California St., Newton, Mass.—B
Davies, Harry, Molding Co., 1428 N. Wells St., Chicago 10, Ill.—J
Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—D, J
Denham & Co., Book Bldg., Detroit 26, Mich.—MN
DeSanno, A. P. & Son, Inc., Phoenixville, Pa.—G
Despatch Oven Co., 619 S.E. Eighth St., Minneapolis 14, Minn.—E
Diehl Mfg. Co., Finderne Plant, Somerville, N. J.—B, G

Distillation Products, Inc., Vacuum Equipment Div., 755 Ridge Road W., Rochester 13, N. Y.—IM, VP, VM
Do-All Co., 1301 Washington Ave., S., Minneapolis 4, Minn.—D, MF, G, MN
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—D, P, E, J, MN, MF, MP, S
Dynamic Air Engineering, Inc., 1619 S. Alameda St., Los Angeles 21, Calif.—B
Ecco High Frequency Corp., 7020 Hudson Blvd., North Bergen, N. J.—VM
Edwards, T. J., Inc., 210 South St., Boston 5, Mass.—D, MN
Eisler Engineering Co., 750 S. 13th St., Newark 3, N. J.—B, CW, E, PW, S, VP, VM
Eitel-McCullough, Inc., San Bruno, Calif.—VP
Electric Coding Machine Co., 57 Franklin St., New York 13, N. Y.—MN
Electric Furnace Co., West Wilson St., Salem, Ohio—E
Electric Heat Control Co., 9123 Inman Ave., Cleveland 5, Ohio—S
Electrix Corp., 150 Middle St., Pawtucket, R. I.—D, J, MF
Electro Mag. Mfg. Co., 610 N. Rockford Ave., Rockford, Ill.—MN
Electronic Mfg. Co., 20 Orange St., Newark 2, N. J.—D, J, VM
Ess Instrument Co., 963 Washington St., Bergenfield, N. J.—SM
Felker DiMet—Felker Mfg. Co.
Felker Mfg. Co., 1128 Border Ave., Torrance, Calif.—"Felker DiMet"—LD, C, QC
Foredom Electric Co., 27 Park Place, New York 7, N. Y.—G
Foxboro Co., Foxboro, Mass.—SG
Fredericks, George E. Co., Bethayres, Pa.—VP
Fuchs, Charles A., 13-15 Mollineaux Pl., Roosevelt, L. I., N. Y.—J
Gardiner Mfg. Co., 2711 Union St., Oakland 7, Calif.—G, CW, J, MF
Gatti, Aurele M., Inc., 1909 Liberty St., Trenton 9, N. J.—G
General Electric Co., 1 River Rd., Schenectady 5, N. Y.—SG
General Tire & Rubber Co., Garfield, Wabash, Ind.—VC
General Winding Co., 420 W. 45th St., New York 19, N. Y.—CW, IM
Giannini, G. M. & Co., Inc., Autoflight Instrument Div., 4522 Lankershim Blvd., N. Hollywood, Calif.—SG
Gisholt Machine Co., 1125 E. Washington Ave., Madison 3, Wis.—J, MF, VC
Goodall Electric Mfg. Co., 3rd & Main Sts., Ogallala, Neb.—AC, CW, CG, LD, C, P, IM, J, MN, MF, MP, QC, SM, S, VM, VC
Graham Rotary File Co., 4816 Tacony St., Philadelphia 37, Pa.—G
Hadley, Robert M. Co., 707-711 E. 61st St., Los Angeles 1, Calif.—CW, D, J
Hannon Electric Co., 1605 Waynesburg Rd., S.E., Canton, Ohio—AC, B, G, CW, E
Harper Electric Furnace Corp., Niagara Falls, N. Y.—E
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—D, J
Hathaway Instrument Co., 1315 S. Clarkson St., Denver 10, Colo.—SG
Haydu Bros., P. O. Box 1226, Plainfield, N. J.—B, VP, VM
Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N Y.—S
Hoffman, P. R., Co., 321 Cherry St., Carlisle, Pa.—CG, LD, QC
Hovis Screwlock Co., 8100 E. Nine Mile Rd., Van Dyke, Mich.—D
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio—PM
Hydraulic Tool & Die Corp., 4625 Third Ave., New York 57, N. Y.—D, J
Ideal Commutator Dresser Co., 5194 Park Ave., Sycamore, Ill.—AC, B, CW
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago 41, Ill.—B
Infra-Red Engineers & Designers, E. 73rd & Grand Ave., Cleveland 4, Ohio—E
International Machine Works, 2027 48th St., North Bergen, N. J.—VP, VM
Johns-Manville Sales Corp., 22 E. 40th St., New York 16, N. Y.—VC
Kaddis, A. G., Screw Products Co., Inc., 42 Allen St., Rochester 8, N. Y.—MG
Kahle Engineering Co., 1307 7th St., North Bergen, N. J.—E, MN, VP, VM
Keystone Electronics Co., 50-52 Franklin St., New York 13, N. Y.—J
Kinney Mfg. Co., 3595 Washington St., Boston 30, Mass.—VP
Knight, H. W., & Son, Inc., 96 State St., Seneca Falls, N. Y.—X
Kollath Mfg. Co., 4601 W. Addison St., Chicago, Ill.—D, J, MF
Kux Machine Co., 3040 W. Harrison St., Chicago 24, Ill.—MF, MP, PM
Leiman Bros., Inc., 203 Christie St., Newark 5, N. J.—B, CG, VP
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., New York 23, N. Y.—E
Lewyt Corp., 60 Broadway, Brooklyn 11, N. Y.—MG
Linick, Leslie L., 29 E. Madison St., Chicago, Ill.—L, MF
Litton Engineering Laboratories, P. O. Box 749, Redwood City, Calif.— S, VP, VM
Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.—VC
L-R Mfg. Co., Div. of Ripley Co., 65 New Litchfield St, Torrington, Conn.—B
Luma Electric Equipment Co., P. O. Box 132, Toledo 1, Ohio—MN
Lyman Electronic Corp., 12 Cass St., Springfield, Mass.—J
Magnetic Products Co., Norwalk, Conn.—CW
Mallory, P. R. & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind.—PW
Markem Machine Co., Emerald St., Keene, N H.—MN
Marlboro Tool & Mfg. Co., Charles St. & New Brunswick Ave., Matawan, N. J.—VM
Martindale Electric Co., Box 617, Edgewater Branch, Cleveland 7, Ohio—G
Mattern, F. Mfg. Co., 4647 N. Sicero Ave., Chicago 30, Ill.—X
Matthews, Jas. H. & Co., 3729 Belmont Ave., Chicago 18, Ill.—D, J, MN
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—CW
Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass.—CW, EM
Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—CW
Milford Rivet & Machine Co., Eastern Div., Milford, Conn.—R
Mogey, William & Sons, Inc., Interhaven Ave., Plainfield, N. J.—G
Monitor Piezo Products Co., 815 Fremont Ave., So. Pasadena, Calif.—C, LD, CG
Montgomery Bros., 20 E. Jackson Blvd., Chicago, Ill.—AC
Morey Machinery Co., Inc., 4-57 26th Ave., Astoria 2, L. I., N. Y.—L
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.—D
National Gasket & Washer Mfg. Co., 122 E. 25th St., New York 10, N. Y.—LD
National Research Corp., 100 Brookline Ave., Boston 15, Mass.—IM, VP, VM
N. J. Jewelers Supply, 280 Plane St., Newark 2, N. J.—S
New Jersey Machine Corp., Willow Ave. at 16th St., Hoboken, N. J.—MN, VP
New Method Steel Stamps, Inc., 147 Jos. Campau St., Detroit 7, Mich.—MN
New York Blower Co., 3155 S. Shields, Chicago, Ill.—B
North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—D
Norton Co., 1 New Bond St., Worcester 6, Mass.—G, CG, C
Numberall Stamp & Tool Co., Huguenot Park, Staten Island 12, N. Y.—MN
Nurnberg Thermometer Co., Inc., 112 Broadway, Cambridge 42, Mass.—IM, VP
OK Machine Co., 2131 Fairfield Ave., Ft. Wayne 6, Ind.—D, J, MF
O'Neil-Irwin Mfg. Co., 316 Eighth Ave. S, Minneapolis 15, Minn.—MF
Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.—PP
Peerless Roll Leaf Co., Inc., 4511 New York Ave., Union City, N. J.—MN
Penn Fibre & Specialty Co., 2024 to 2030 E. Westmoreland St., Philadelphia 34, Pa.—P
Pratt & Whitney, Div. of Niles-Bement-Pond Co., West Hartford, Conn.—L, SG
Preco, Inc., 960 E. 61st St., Los Angeles 1, Calif.—MP
Preis, H. P., Engraving Machine Co., 155 Summit St., Newark 4, N. J.—G, EM, MN
Process & Instruments, 60 Greenpoint Ave., Brooklyn 22, N. Y.—E
Production Devices, Inc., N. William St., Whitehall, N. Y.—J, MF, MP
Production Engineering Corp., 666 Van Houten Ave., Passaic, N. J.—IM
Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.—S

USE THE INDEX

If you want to know what manufacturers make a certain type of product, use the Product Index to get the page on which the manufacturers are listed.

If you know a manufacturer's name and want to know his principal product, use the Alphabetical "Finding List" which follows the classified listings.

Quad Mfg. Co., 462 N. Parkside Ave., Chicago 44, Ill.—CW, D
Quality Hardware & Machine Corp., 5849 N. Ravenswood Ave., Chicago 26, Ill.—C, J
Radiad Service, 720 W. Schubert Ave., Chicago 14, Ill.—D, J
Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—S
RCA Victor Div., Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—E, J, MN, MF, VM
Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—D
Reynolds Electric Co., 2650 W. Congress St., Chicago 12, Ill.—G
Rice's Sons, Bernard, 325 Fifth Ave., New York 16, N. Y.—J
Robinson Aviation, Inc., Teterboro Air Terminal, Teterboro, N. J.—VC
Savlion Laboratories, Inc., 1025 Broad St., Newark 2, N. J.—VP, PM
Sav-Way Industries, P. O. Box 117, Harper Station, Detroit 13, Mich.—G, MP
Saxl Instrument Co., 38-40 James St., East Providence 14, R. I.—J, SG
Schauer Machine Co., 2060 Reading Rd., Cincinnati 2, Ohio—G
Sciaky Bros., 4915 W. 67th St., Chicago 38, Ill.—S
Sexton Can Co., Inc., 31 Cross St., Everett 49, Mass.—MF
Sherron Electronics Co., 1201 Flushing Ave., Brooklyn 6, N. Y.—MG
Simonds Machine Co., Inc., 246-48 Worcester St., Southbridge, Mass.—D, J
Sittler Mfg. Corp., 18 N. Ada St., Chicago 7, Ill.—G
Smith, F. A., Mfg. Co., Union & Augusta, Rochester 2, N. Y.—B
Smith, Nathan R. Mfg. Co., 105 Pasadena Ave., South Pasadena, Calif.—D
Special Devices Co., Farmington Ave., Berlin, Conn.—P, J
Special Machine Tool Engrg. Works, 132 Lafayette St., New York 13, N. Y.—MG
Sperman Metal Specialties, 2199 E. 21st St., Brooklyn 29, N. Y.—D, J, MF
Spirling Products Co., 64 Grand St., New York 13, N. Y.—D, J
Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, Ohio—AC, L, G
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.—CW, MF
Starrett, L. S., Co., Athol, Mass.—SG
Sta-Warm Electric Co., 333 N. Chestnut St., Ravenna, Ohio—IM
Stedman, Robert L., E. Main St., Oyster Bay, N. Y.—J
Stevens Machinery Co., 1461 W. Grand Ave., Chicago 22, Ill.—CW
Stevenson, Jordan & Harrison, Inc. (Electronic Power Co.), 19 W. 44th St., New York 18, N. Y.—S
Stokes, F. J., Machine Co., 6054 Tabor Rd., Philadelphia 20, Pa.—MP, PM, VP
Stricker-Brunhuber Co., 19 W. 24th St., New York 10, N. Y.—J
Sturtevant, B. F., Co., Damon, Hyde Park, Boston 36, Mass.—B
Swanson Tool & Machine Products, 810-14 E. 8th St., Erie, Pa.—D, J, VM
Taylor-Winfield Corp., 1052 Mahoning Ave., N.W., Warren, Ohio—S
Thermo Electric Mfg. Co., 480 W. Locust St., Dubuque, Iowa—E
Thomas & Skinner Steel Products Co., 1120 E. 23rd St., Indianapolis 5, Ind.—D
Trane Co., 3rd & Cameron Ave., LaCrosse, Wis.—B
Trent, Harold E., Co., 5005 Wilde St., Philadelphia 27, Pa.—E, VM
Tubular Rivet & Stud Co., Wollaston 70, Mass.—R
Tweezer-Weld Corp., 280 Plane St., Newark 2, N. J.—S
U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Calif.—G
U. S. Electrical Tool Co, 1050 Findlay St., Cincinnati 14, Ohio—G
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—VC
U. S. Tool Co., Inc., 255 N. 18th St., Ampere, N. J.—MF
Universal Winding Co., 1655 Elmwood Ave., Cranston 7, R. I.—CW
Universal X-Ray Products, Inc., 1800 N. Francisco Ave., Chicago 47, Ill.—VP, VM
Vacuum Engineering Div., National Research Corp., 100 Brookline Ave., Boston 15, Mass.—VP
Volynsky, Boris M., Mfg. Co., Inc., 311 W. 66th St., New York 23, N. Y.—L, J, QC
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.—CG
Wadsworth Watch Case Co., Inc., Dayton, Ky.—D, I
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.—L, G, P
Waugh Laboratories, 420 Lexington Ave., New York 17, N. Y.—VC, SG
Welch, W. M., Mfg. Co., 1515 Sedgwick St., Chicago 10, Ill.—VP
Westinghouse Elec. Corp., East Pittsburgh, Pa.—AC, B, E, J, PW, S, VP, VC, X, L
Whistler, S. B., & Sons, Inc., 752 Military Rd., Buffalo 17, N. Y.—D
Wiedemann Machine Co., 1815 W. Sedgley Ave., Philadelphia 32, Pa.—PP
Wincharger Corp., E. 7th at Division, Sioux City 6, Iowa—G
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St., York, Pa.—MN

(20) Measurement & Test Equipment

Ammeters, indicating .... A
Ammeters & milliammeters, recording .... AF
Attenuation meters .... AM
Battery testers .... BT
Bridges .... B
Color analyzers C
Distortion meters .... D
Electric dimension gage .... EG
Electric micrometer .... EM
Electronic hygrometers .... EH
Electronic viscosimeters VC
Electrostatic VM .... E
Field strength meters .... F
Frequency measuring devices .... FM
Frequency monitors .... FR
Frequency response recorders .... FS
Galvanometers .... G
Harmonic analyzers .... HA
High volt breakdown testers .... H
Impulse counter IC
Instrument parts .... MP
Insulation testers .... IT
Ionization gages .... IG
Light intensity L
Megohm meters .... MO
Modulation meters .... MM
Multi-meters .... M
Neon test lights .... N
Ohmmeters .... O
Output meters .... OM
PE densitometers .... PE
PH meters .... PH
Pressure measurements .... PM
Phase angle meters .... P
Q meter .... QE
Radio set analyzers .... R
Reflection meters .... RM
Signal tracers .... SG
Sound level meters & recorders .... S
Spring testing equip. .... ST
Tachometer .... TA
Thermocouples .... TH
Thermometers & pyrometers .... T
Time measurement .... TM
Trans. measuring set .... TR
Tube testers .... TT
Tuning forks .... TF
Vacuum gages .... VG
Vac. tube voltmeters .... VT
Vibration measuring equip. .... VM
Volume indicators VI
Voltmeters V
Watt-hour meters .... WH
Watt meters .... W
Wave analyzers .... WA
Wave meters .... WM

Ace Mfg. Corp., Erie Ave. at K St., Philadelphia 24, Pa.—MP
Adrem Co., 143 Newbury St., Boston 16, Mass.—TT
Advance Research Corp., 37 W. 57th St., New York 19, N. Y.—C, L, RM, S, WA
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass.—B, H, IT, MO
Airplane & Marine Instruments, Inc., Clearfield, Pa.—B, F, WM
All American Tool & Mfg. Co., 1014 W. Fullerton Ave., Chicago 14, Ill.—VM
Allen Electric & Equipment Co., 2101-2117 N. Pitcher St., Kalamazoo 13-F, Mich.—BT, PM, TA, VG
Alnor—Illinois Testing Laboratories, Inc.
American Communications Corp., 306 Broadway, New York, N. Y.—IT
American Electronics, 37 E. 18th St., New York 3, N. Y.—TT
American Instrument Co., 8030-8050 Georgia Ave., Silver Spring, Md.—H, MO
American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—B, P, QE, VT
American Thermo-Electric Co., 67 E. 8th St., New York 3, N. Y.—TH
American Time Products, Inc., 580 Fifth Ave., New York 19, N. Y.—TM, TF
American Transformer Co., Inc., 178 Emmet St., Newark 5, N. J.—H
Amglo Corp., 4224 Lincoln Ave., Chicago 18, Ill.—MM, M, T
Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—H, P, VI
Andrew Co., 363 E. 75th St., Chicago 19, Ill.—P
Annis, R. B. Co., 1101 N. Delaware St., Indianapolis 2, Ind.—PM, TR, VM
Applied Research Laboratories, 4336 San Fernando Rd., Glendale 4, Calif.—PE
Askania Regulator Co., 1603 S. Michigan Ave., Chicago 16, Ill.—PM
Associated Research, Inc., 231 S. Green St., Chicago 7, Ill.—A, H, IT, MO, M, O, TA
Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—AF, EG, FS, S, TR
Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—IC
Automatic Pump & Softener Corp., 2412 Grant St., Rockford, Ill.—C
Automatic Temperature Control Co., Inc., 34 E. Logan St., Philadelphia 44, Pa.—TM
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio—"Pyrotron"—T
Baker & Co., Inc., 113 Astor St., Newark 5, N. J.—TH
Baker Instrument Co., 310 Main St., Orange, N. J.—C
Baldwin Locomotive Works, Baldwin Southwark Div., Paschall P. O., Philadelphia 42, Pa.—B, PM, ST
Ballantine Laboratories, Inc., Boonton, N. J.—VT, V
Barber, Alfred W. Laboratories, 34-04 Francis Lewis Blvd., Flushing, L. I., N. Y.—VT
Barker & Williamson, Upper Darby, Pa.—D, E, F, FM, VT, VI, WM
Barnes, Wallace Co., P. O. Box 1521, Bristol, Conn.—MP
Bay Products Corp., 171 Camden St., Boston 18, Mass.—TM
Bendix Radio Division, Bendix Aviation Corp., East Joppa Rd., Baltimore 4, Md.—F, FM, P
Biddle, James G. Co., 1211 Arch St., Philadelphia 7, Pa.—FM, IT, MO, O, TA
Bird, Richard H., 23 Moody St., Waltham, Mass.—MP
Boes, W. W. Co., 3001 Salem Ave., Dayton 3, Ohio—A, G, L, O, TH, V, VI
Boonton Radio Corp., 518 Main St., Boonton, N. J.—QE
Boulin Instrument Corp., 65 Madison Ave., New York 16, N. Y.—TA
Bowser, Inc., 1302 E. Creighton Ave., Ft. Wayne 2, Ind.—VI
Bristol Co., Waterbury 91, Conn.—AF, PH, PM, TA, TH, T, TM, TR, VG, V
Brown Engineering Co., 4635 S. E. Hawthorne Blvd., Portland 15, Ore.—B
Brown Instrument Co., Div. Minneapolis-Honeywell Regulator Co., 4515 Wayne Ave., Philadelphia 44, Pa.—TA, TN, T, TH
Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—C, FM, FR
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—G, PM, TR
Bunnell, J. H. & Co., 81 Prospect St., Brooklyn 1, N. Y.—TF
Burlington Instrument Co., N. Fourth St., Burlington, Iowa—A, M, S, VI, V
Burnett, Wm. W. L. Radio Lab., 4814 Idaho St., San Diego 4, Calif.—FM
Burton-Rogers Co., 857 Boylston St., Boston 16, Mass.—A, B, H
Cambridge Instrument Co., Inc., 3005 Grand Central Terminal, New York 17, N. Y.—B, E, G, PH, T, TF, VM
Cardwell, Allen D. Mfg. Corp., 81 Prospect St., Brooklyn 1, N. Y.—FM
Carson Micrometer Corp., P. O. Box 57, Little Falls, N. J.—EM
Centralab Division, Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—BT
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—AM, B, TR, VI
Clippard Instrument Laboratory, 1440 Chase Ave., Cincinnati 23, Ohio—A, MP
Clough-Brengle Co., 6014 N. Broadway, Chicago 40, Ill.—A, B, M, O, TR, TT, V
Coleman Electric Co., 318 Madison St., Maywood, Ill.—PH
Collins Radio Co., Cedar Rapids, Iowa—FM, VI
Colloid Equipment Co., Inc., 50 Church St., New York 7, N. Y.—PH
Columbia Electric Mfg. Co., 4519 Hamilton Ave., N. E., Cleveland 14, Ohio—"Tong Test"—A
Commercial Research Labs., Inc., 20 Bartlett Ave., Detroit 3, Mich.—PH
Communication Equipment & Engineering Co., 5646 W. Race St., Chicago 44, Ill.—AM, TR
Communication Measurements Laboratory, 120 Greenwich St., New York 6, N. Y.—B, G, IT, MO, R
Communication Parts, 1101 N. Paulina St., Chicago 22, Ill.—QE
Communications Equipment Corp., 134 W. Colorado St., Pasadena 1, Calif.—VM
Conant Electrical Laboratories, 6500 "O" St., Lincoln 5, Nebr.—MP
Conn, C. G. Ltd., 1101 E. Beardsley Ave., Elkhart, Ind.—FM, TA, VM
Connecticut Telephone & Electric, Div. Great American Industries, Inc., Meriden, Conn.—IT, N
Consolidated Engineering Corp., Pasadena 1, Calif.—VM
Continental Electric Co., 715 Hamilton St., Geneva, Ill.—VG
Corbin Screw Division, American Hardware Corp., High, Myrtle & Grove Sts., New Britain, Conn.—TA
Cornell-Dubilier Electric Corp., So. Plainfield, N. J.—B
Cover Dual Signal Systems, Inc., Div. Electra-Voice Corp., 5215 N. Ravenswood Ave., Chicago 40, Ill.—B
Cramer, R. W. Co., Inc., Centerbrook, Conn.—TM
Crystal Research Laboratories, Inc., 29 Allyn St., Hartford 3, Conn.—FM
Crystal Research Products, Dumont, N. J.—FM
Cyclotron Specialties Co., Moraga, Calif.—IC, TM
Daven Co., 191 Central Ave., Newark 4, N. J.—AM, FM, OM, TR, VI
Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—H, IT, M, O, R, TT, VG, VT
DeJur Amsco Corp., Northern Blvd. at 45th St., Long Island City 1, N. Y.—A, L, V
DeMornay-Budd, Inc., 475 Grand Concourse, New York 51, N. Y.—AM, FM, WM
Deutschmann, Tobe Corp., Canton, Mass.—AM, B, FM, FS, H, MO
DeWald Radio Mfg. Corp., 440 Lafayette St., New York 3, N. Y.—FM, M
Diamond Instrument Co., North Ave., Wakefield, Mass.—FM, WM
Dickson Co., 7420 Woodlawn Ave., Chicago 19, Ill.—T
Dietert, Harry W. Co., 9330 Roselawn Ave., Detroit 4, Mich.—PE
Dillon, W. C. & Co., Inc., 5410 W. Harrison St., Chicago 44, Ill.—ST, T
Distillation Products, Inc., Vacuum Equipment Div., 755 Ridge Road, W., Rochester 13, N. Y.—IC, IG, TH, VG
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—A, B, MP
Dongan Electric Mfg. Co., 2987 Franklin St., Detroit 7, Mich.—IT
Doolittle Radio, Inc., 7421-23 S. Loomis Blvd., Chicago 36, Ill.—D, FM
Drake, R. L. Co., 11 Longworth St., Dayton 2, Ohio—EH, E, F, IG, PH, P
Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—B, FM, M
Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—B, FM, M, O, QE, R, S, TT, VT, VI, V
Eastern Specialty Co., 3617 N. 8th St., Philadelphia 40, Pa.—MP, WH
Ecco High Frequency Corp., 7020 Hudson Blvd., North Bergen, N. J.—VG
Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.—PM
Eitel-McCullough, Inc., San Bruno, Calif.—IG
Electric Heat Control Co., 9123 Inman Ave., Cleveland 5, Ohio—BT, H, TA
Electrical Facilities, Inc., 4224 Holden St., Oakland 8, Calif.—V
Electro Products Laboratory, 549 W. Randolph St., Chicago 6, Ill.—FM, PM, VM
Electro-Tech Equipment Co., 331 Canal St., New York 13, N. Y.—A, AF, BT, B, FM, FS, G, H, MP, IT, L, MO, M, O, PH, P, R, TA, TH, T, TM, TT, VT, VI, V, WH, W
Electronic Development Co., 1336 N. Saddle Creek Rd., Omaha 3, Nebr.—A, AF, AM, BT, EG, EM, G, MO, M, O, R, TA, TH, T, V
Electronic Engrg. Service & Labs., 114-38 Farmers Blvd., St. Albans 12, L. I., N. Y.—B, F, FM, QE, VT
Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—B, C, EG, EM, FM, IC, L, PM, TM, VM
Electronic Measurements Co., Red Bank, N. J.—D, F, FM, H, QE, R, TM, VT, WA
Electronic Plumbing Corp., 311 Nepperhan Ave., Yonkers 2, N. Y.—WM
Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—B, F, FM, MO, M, O, PH, P, VG, VT, WM
Electronic Research & Mfg. Corp., 5805 Hough Ave., Cleveland 3, Ohio—VT
Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—F, FM, R, TR, VT, WM
Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—F
Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—MP, PM, TA, TT, VM
Elematic Equipment Corp., 6046 S. Wentworth Ave., Chicago 21, Ill.—AF, T
Elgin National Watch Co., 107 National St., Elgin, Ill.—MP
Engelhard, Charles, Inc., 233 N. J. R. R. Ave., Newark 5, N. J.—AF, TH, T, G, V
Engineering Laboratories, Inc., 610-624 E. 4th St., Tulsa 3, Okla.—VC, FM, FS, G, MP, IG, PM, S, VM
Eppley Laboratory, Inc., 12 Sheffield Ave., Newport, R. I.—B, TH
Erco Radio Laboratories, Inc., 231 Main St., Hempstead, L. I., N. Y.—FM, WM
Ericsson Screw Machine Products Co., Inc., 25 Lafayette St., Brooklyn 1, N. Y.—MP
Espey Mfg. Co., Inc., 33 W. 46th St., New York 19, N. Y.—O, R, TT, VT, WM
Esterline-Angus Co., Inc., P. O. Box 596, Indianapolis, Ind.—A, TM, V, W
Fada Radio & Electric Mfg. Co., Inc., 30-20 Thomson Ave., Long Island City 1, N. Y.—F, FM, O, VT, VI
Farrand Optical Co., Inc., Bronx Blvd. & E. 238th St., New York 66, N. Y.—PE
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—AM, BT, TR, TT
Felsenthal, G. & Sons, 4108 W. Grand, Chicago 51, Ill.—MP
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—A, E, H, IT, V, WH
Ferris Instrument Co., 110 Cornelia St., Boonton, N. J.—F, FM, VT, V
Field Electrical Instrument Co., 109 E. 184th St., New York 53, N. Y.—TH
Film Crafts Engineering Co., 36 W. 25th St., New York 10, N. Y.—G, PE
Fischer-Smith, Inc., 162 State St., West Englewood, N. J.—TA
Fisher Scientific Co., 711 Forbes St., Pittsburgh, Pa.—PH, G
Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.—C, RM
Ford Radio & Mica Corp., 536 63rd St., Brooklyn 20, N. Y.—BT
Fordham Mfg. Co., 2736 Creston Ave., New York 58, N. Y.—BT, N
Fredericks, George E. Co., Bethayres, Pa.—IG, VG
Freed Radio Corp., 200 Hudson St., New York, N. Y.—F

Freed Transformer Co., 72 Spring St., New York 12, N. Y.—B, D, MO

Friez Instrument Div., Bendix Aviation Corp., Taylor Ave. near Loch Raven Blvd., Baltimore 4, Md.—T

Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14, Ill.—TM, TF

Gamma Instrument Co., Inc., 95 Madison Ave., New York, N. Y.—PH

Gardner, Henry A. Laboratory, Inc., 4723 Elm St., Bethesda 14, Md.—RM

Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—FM

Gatti, Aurele M. Inc., 1909 Liberty St., Trenton 9, N. J.—MP

Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—BT, B, F, FM, M, N, O, TT, VT, V, WM

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—N

General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—FM, L, QE, TT

General Control Co., 1200 Soldiers Field Rd., Boston 34, Mass.—EG, EM

General Electric Co., 1 River Rd., Schenectady 5, N. Y.—VG, OM

General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.—BT

General Electric Co., Nela Specialty District, 1 Newark St., Hoboken, N. J.—N

General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—F, FM, M, B, TH, TT, WM

General Electronic Mfg. Co., 2225 S. Hoover St., Los Angeles 7, Calif.—OM, TH, O, A

General Electronics, Inc., 101 Hazel St., Paterson, N. J.—IG

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—AM, B, D, FM, IC, MP, IT, MO, S, TA, TM, TF, VT, VM, V, WA, WM, MM, OM

Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va.—G, MP, VM

Gibbs, Thomas B. & Co., Delaven, Wis.—TF

Giannini, G. M. & Co., Inc., Autoflight Instrument Div., 4522 Lankershim Blvd., North Hollywood, Calif.—G

Gisholt Machine Co., 1125 E. Washington Ave., Madison 3, Wis.—VM

Globe Industries, Inc., 125 Sunrise Pl., Dayton 7, Ohio—AM, WM

G-M Laboratories, Inc., 4300 N. Knox Ave., Chicago 41, Ill.—A, G, V

G. M. Mfg. Co., 50 W. Third St., New York 12, N. Y.—T

Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—FM, FS, ST, OM

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—FM, S

Grenby Mfg. Co., Plainville, Conn.—B, D, FM, O, VT, WA, QE

Gruen Watch Co., Time Hill, Cincinnati, Ohio—M

Gurley, W. & L. E., 514 Fulton St., Troy, New York—TA

Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N. Y.—FM

Hanovia Chemical & Mfg. Equipment, 233 N. J. R. R. Ave., Newark 5, N. J.—L

Hart Moisture Gauges, Inc., 126 Liberty St., New York 6, N. Y.—MO, O

Hartford Machine Screw Co., 476 Capitol Ave., Hartford 2, Conn.—MP

Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—G, WM

Hasler-Tel Co., 34 Vesey St., New York 7, N. Y.—TA

Hathaway Instrument Co., 1315 S. Clarkson St., Denver, Col.—EG, EM, G, PM, TM, TF, VM

Hayden Mfg. Co., Inc., Forestville, Conn.—TM

Haydu Bros., P. O. Box 1226, Plainfield, N. J.—N, VG

Heiland Research Corp., 130 E. Fifth Ave., Denver 9, Colo.—G

Helipot Corp., 1015 Mission St., So. Pasadena, Calif.—PH

Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—B, D, FM, H, IC, IT, IG, PH, TM, VT

Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—PM

Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif.—D, FM, S, TA, TM, TR, VT, VM, WA, WM

Heyer Products, Inc., 471 Cortlandt St., Belleville 9, N. J.—BT

Hickok Electrical Instrument Co., 10514 Dupont, Cleveland 8, Ohio—A, FM, G, M, O, R, S, TA, TH, TT, VT, VI, V, W

Higgins Industries Inc., 2221 Warwick Ave., Santa Monica, Calif.—WM

Hoffman Engineering Corp., 458 Sexton Bldg., Minneapolis 4, Minn.—C, TM

Hoffman Radio Corp., 3761 S. Hill St., Los Angeles 7, Calif.—FM

Holtzer-Cabot, Div. First Industrial Corp., 125 Amory St., Roxbury 19, Mass.—IT, MO

Hoskins Mfg. Co., 4445 Lawton Ave., Detroit 8, Mich.—TH

Huber Radio Co., 260 S. Center St., Casper, Wyo.—VM

Ideal Commutator Dresser Co., 5194 Park Ave., Sycamore, Ill.—IT, TA

Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.—"Alnor"—TH, T

Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J.—B, H, IT, MO, MP, O, VT

Industrial Timer Corp., 115 Edison Pl., Newark 5, N. J.—TM

Industrial Transformer Corp., 2540 Belmont Ave., New York 58, N. Y.—IT

Instrument Electronics, 253-21 Northern Blvd., Little Neck, L. I., N. Y.—VT, V

Intex Co., 303 W. 42nd St., New York 18, N. Y.—M, N

Islip Radio Mfg. Corp., Islip, N. Y.—FM, IT

Jackson Electrical Instrument Co., 18 S. Patterson Blvd., Dayton, Ohio—B, C, M, TT

Jarrell-Ash Co., 165 Newbury St., Boston 16, Mass.—G

J-B-T Instruments, Inc., 441 Chapel St., New Haven 8, Conn.—A, FM, G, O, TH, T, TM, V

Jefferson, Ray, Inc., 40 E. Merrick Rd., Freeport, L. I., N. Y.—F, FM

Jennings Radio Mfg. Co., 1096 E. William St., San Jose 12, Calif.—TH

Johnson, E. F., Co., Waseca, Minn.—PH

Jones Motrola Corp., 432 Fairfield Ave., Stamford, Conn.—TA

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—BT, B, FM

Klett Mfg. Co., 179 E. 87th St., New York, N. Y.—C

Kluge Electronics Co., 1031 N. Alvarado St., Los Angeles 26, Calif.—FM

Knights, James, Co., Sandwich, Ill.—FM

L.A.B. Corp., 31 Union Pl., Summit, N. J.—IC, VM

Lamphin Laboratories, Bradenton, Fla.—FM

Lane-Wells Co., 5610 S. Soto St., Los Angeles 11, Calif.—VM

Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.—FM, WM

Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—FM, QE, VT, WM

Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.—B, FM, FS, G, IT, L, O, PH, P, TH, TM

Leitz, E., Inc., 730 Fifth Ave., New York 19, N. Y.—C, PE, PH

Lektra Labs., Inc., 30 E. 10th St., New York 3, N. Y.—TM

Lenkurt Electric Co., 1138 Howard St., San Francisco 3, Calif.—TR

Lepel High Frequency Laboratories, Inc., 39 W. 60th St., New York 23, N. Y.—IT, VG

Lewis Engineering Co., 52 Rubber Ave., Naugatuck, Conn.—A, G, O, TH, T, V

Link, Fred M., 125 W. 17th St., New York 11, N. Y.—FM, M

Link Engineering Co., 13581 Elmira St., Detroit 27, Mich.—ST

Littelfuse, Inc., 4757 Ravenswood Ave., Chicago 40, Ill.—N, TH

Litton Engineering Laboratories, P. O. Box 749, Redwood City, Calif.—IG

Lumenite Electric Co., 407 S. Dearborn St., Chicago 5, Ill.—TM

Lyman Electronic Corp., 12 Cass St., Springfield, Mass.—H, N, O, TT, VT

McClintock, O. B., Co., 139 Lyndale Ave., N., Minneapolis 3, Minn.—A, G, MP, M, O, S, V

McColpin-Christie Corp., 4922 S. Figueroa St., Los Angeles 37, Calif.—BT

Madison Electrical Products Corp., 78 Main St., Madison, N. J.—"Mepco"—FM, IT, R, TH, TT, VT

Magnaflux Corp., 5900 Northwest Hghwy., Chicago 31, Ill.—F

Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—B, FM, MO, VT, W, WM, MM

Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—FM

Marion Electrical Instrument Co., Canal St., Manchester, N. H.—A, F, MP, L, MO, O, VI, V

Marshall Radio Engineering Laboratories, 5760 Lemp Ave., North Hollywood, Calif.—F, FM

Martindale Electric Co., Box 617, Edgewater Branch, Cleveland 7, Ohio—O

MB Mfg. Co., Inc., Instrument Div., 250 Dodge Ave., East Haven 12, Conn.—A, AM, BT, G, MP, M, O, QE, S, VM, V

Measurements Corp., 116 Monroe St., Boonton, N. J.—AM, B, F, IT, MO, O, VT, VM, V, WM

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—D, FM, H, TR

Meissner Mfg. Div., Maguire Industries, Inc., Mt. Carmel, Ill.—R

Mendelsohn Speedgun Co., 457 Bloomfield Ave., Bloomfield, N. J.—TM

Mepco—Madison Electrical Products Corp.

Meters, Inc., 915 Riveria Dr., Indianapolis 5, Ind.—A, G, S, V

Metron Instrument Co., 432 Lincoln St., Denver 9, Colo.—EM, TA

Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass.—HA, WM

Millico—M. A. Miller Mfg. Co.

Millen, James, Mfg. Co., Inc., 150 Exchange St., Malden 48, Mass.—FM, WM

Miller, M. A., Mfg. Co., 1169 E. 43rd St., Chicago 15, Ill.—"Millco"—MP

Miller, William Corp., 362 Colorado St., Pasadena 2, Calif.—G, VM

Monarch Mfg. Co., 2014 N. Major Ave., Chicago 39, Ill.—D, VI, OM

Monitor Piezo Products Co., 815 Fremont Ave., So. Pasadena, Calif.—FM, WM

Moulic Specialties Co., 1005-1007 W. Washington St., Bloomington, Ill.—VT

M & Z Industrial Development Co., 32 W. 12th St., Bayonne, N. J.—B, H, IT, MO, VT, V

National Instrument Co., 246 Walnut St., Newtonville 60, Mass.—TM

National Research Corp., Vacuum Engineering Div., 100 Brookline Ave., Boston 15, Mass.—VG

National Union Radio Corp., 15 Washington St., Newark 2, N. J.—VG

Niagara Electrical Instrument Co., 204-210 Franklin St., Buffalo 2, N. Y.—W

Nilsson Electrical Laboratory, Inc., 103 Lafayette St., New York 13, N. Y.—G, MP, MO, O

North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—FM

Northern Laboratories, Ltd., 3101 27th Ave., Long Island City 2, N. Y.—H

Norton Electrical Instrument Co., 85 Hilliard St., Manchester, Conn.—A, BT, B, O, V

Nurnberg Thermometer Co., Inc., 112 Broadway, Cambridge 42, Mass.—P

Offner Electronics, Inc., 5320 N. Kedzie Ave., Chicago 25, Ill.—VM

Pacific Electronics, Sprague at Jefferson St., Spokane, Wash.—F, FM

Panoramic Radio Corp., 242-250 W. 55th St., New York 19, N. Y.—F, FM, WA

Partlow Corp., 2 Campton Rd., New Hartford, N. Y.—T

Permo, Inc., 6415 Ravenswood Ave., Chicago 26, Ill.—MP

Pfaltz & Bauer, Inc., 350 Fifth Ave., New York, N. Y.—C, G

Pfanstiehl Chemical Co., 104 Lakeview Ave., Waukegan, Ill.—MP

Phelon, R. E., Co., 23 Northwood Ave., Springfield, Mass.—TA

Philco Corp., Tioga & "C" Sts., Philadelphia 34, Pa.—M, O, R, VT, V

Photovolt Corp., 35 Madison Ave., New York 16, N. Y.—C, L, PE, RM

Polytron Corp., 401 Broadway, New York 13, N. Y.—FM, H, IG, S

Portable Products Corp., C. J. Tagliabue Div., 550 Park Ave., Brooklyn 5, N. Y.—G, PH, TH

Potter Instrument Co., 136-56 Roosevelt Ave., Flushing, L. I., N. Y.—FM, IC, TA, TM

Powers Electronic & Communication Co., New St., Glen Cove, N. Y.—S

Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.—T

Precision Apparatus Co., 92-27 Horace Harding Blvd., Elmhurst, L. I., N. Y.—A, BT, MO, M, O, R, TT, VT, VI, V

Precision Products Co., 26 Bedford St., Waltham 54, Mass.—MP

Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill.—T

Process & Instruments, 60 Greenpoint Ave., Brooklyn 22, N. Y.—PH

Pyro—Pyrometer Instrument Co.

Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y.—"Pyro"—T

Pyrotron—Bailey Meter Co.

Radio City Products Co., 127 W. 26th St., New York 1, N. Y.—B, M, O, R, TT, VT, V

Radio Craftsmen, 1341 S. Michigan Ave., Chicago 5, Ill.—TT

Radio Frequency Laboratories, Inc., Boonton, N. J.—IC, L, VT

Radio Specialty Mfg. Co., 403 N. W. 9th St., Portland 9, Ore.—FM

Radiotechnic Laboratory, 1328 Sherman Ave., Evanston, Ill.—TT

Radio Transceiver Laboratories, 8717 117th St., Richmond Hill, N. Y.—F, FM

Rascher & Betzold, Inc., 730 N. Franklin St., Chicago 10, Ill.—F, PH

Rawson Electrical Instrument Co., 116 Potter St., Cambridge 42, Mass.—A, E, M, TH, TM, V, W

RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—D, F, FM, FS, R, S, TT, VG, VI

Readrite Meter Works, 136 E. College Ave., Bluffton, Ohio—A, V

Rectifier Engineering Co., 1809 E. 7th St., Los Angeles 21, Calif.—BT

Rehtron Corp., 4313 Lincoln Ave., Chicago 18, Ill.—B, F, M, S, VT, VM

Reiner Electronics Co., Inc., 152 W. 25th St., New York 1, N. Y.—FM, M, R, VT

Rek-O-Kut Co., 146 Grand St., New York 13, N. Y.—VI

Reliance Electric & Engineering Co., Ivanhoe Rd., Cleveland 10, Ohio—TA

Rice's, Bernard Sons, 325 Fifth Ave., New York 16, N. Y.—WM

Richards, Arklay S., Co., Inc., 78 Winchester St., Newton Highlands 61, Mass.—TH

Rieber, Frank, Inc., 11916 W. Pico Blvd., Los Angeles 34, Calif.—FM, TM, TF, VT, WM

Riggs & Jeffreys, Inc., 73 Winthrop St., Newark 4, N. J.—AM

Riverbank Laboratories, Geneva, Ill.—TF

Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio—FM, FS, PM, S

Robson-Burgess Co., 5002 N. 30th St., Omaha 11, Nebr.—M, TT

Roller-Smith Div., Realty & Industrial Corp., 1760 W. Market St., Bethlehem, Pa.—A, N, T, V, W

Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago 39, Ill.—E, IC, MO, O, PM, ST, TA, TM, VT, VM

Rubicon Co., Ridge Ave. at 35th St., Philadelphia 32, Pa.—B, C, G

Sanborn Co., 39 Osborne St., Cambridge 39, Mass.—G

Sangamo Electric Co., 11th & Converse Sts., Springfield, Ill.—A, TA, WH

Savtion Laboratories, Inc., 1025 Broad St., Newark 2, N. J.—IG, VG

Saxl Instrument Co., 38-40 James St., East Providence 14, R. I.—EG, EM, VC
Schuttig & Co., 9th & Kearny Sts., N. E., Washington 17, D. C.—FM, WM
Scientific Radio Products Co., 738 W. Broadway, Council Bluffs, Iowa—O, VT, V
Scientific Service Laboratories, 222 S. Hoover St., Los Angeles 7, Calif.—SG, VT, L, G, A, PH
Scovill Mfg. Co., 99 Mill St., Waterbury 91, Conn.—MP
Senn Corp., New Augusta, Ind.—EG, EM
Sensitive Research Instrument Co., 9-11 Elm Ave., Mt. Vernon, N. Y.—G, TH, V, W
Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—G, MO
Sherron Electronics Co., 1201 Flushing Ave., Brooklyn 6, N. Y.—H, IT, PH, R, ST, B, D, HA, QU
Shure Bros., 225 W. Huron St., Chicago 10, Ill.—VM
Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—B, FM, M, O, VT
Simmonds Aerocessories, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—MM
Simpson Electric Co., 5216 W. Kinzie St., Chicago, Ill.—A, G, M, V, O, R, TT
Solar Mfg. Corp., 285 Madison Ave., New York 17, N. Y.—B
Sorensen & Co., 375 Fairfield Ave., Stamford, Conn.—FM, PH
S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—S
Sound Apparatus Co., 233 Broadway, New York 7, N. Y.—FS, S, VT
Special Electric Labs., 7657 S. Central Ave., Los Angeles 1, Calif.—FM
Special Products Co., 9215 Brookville Rd., Silver Spring, Md.—SG
Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y.—F
Spirling Products Co., 64 Grand St., New York 13, N. Y.—MP
Sprague Products Co., North Adams, Mass.—B
Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—IC, TA, TM
Standard Instruments Corp., 568 Prospect Ave., New York 55, N. Y.—B
Standard Piezo Co., 127 Cedar St., Carlisle, Pa.—FM
Steel, Herman D., Co., Lafayette Bldg., Philadelphia 6, Pa.—MP
Sterling Mfg. Co., 9205 Detroit Ave., Cleveland 2, Ohio—A, V, BT
Stewart-Warner Alemite Corp., 1826 Diversey Pkwy., Chicago 14, Ill.—A, TA
Sticht, Herman H., Co., Inc., 27 Park Pl., New York 7, N. Y.—A, AF, B, E, IT, MO, O, TA, V, WH, W
Stoddart Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—F
Stoelting, C. H., Co., 424 N. Homan Ave., Chicago 24, Ill.—VG, TF
Stokes, F. J., Machine Co., 6054 Tabor Rd., Philadelphia 20, Pa.—VG
Stokes, Jos., Rubber Co., Taylor & Webster Sts., Trenton 4, N. J.—TF
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—TH
Sun Mfg. Co., 6323 Avondale Ave., Chicago 31, Ill.—A, G, MO, O, S, TA, TH, VG, V
Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—TH
Superior Instruments Co., 227 Fulton St., New York 7, N. Y.—A, O, VT, V
Supreme Instruments Corp., Greenwood, Miss.—A, BT, M, MO, O, R, SG, TT, V, VT
Swiss Jewel Co., Lafayette Bldg., Philadelphia 6, Pa.—MP
Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—A, EM, FM, IG, PE, PM, TH, TT, VG, VT
Takk Corp., 28 W. Market St., Newark, Ohio—IT, MO
Taller & Cooper, 75 Front St., Brooklyn 1, N. Y.—D, IC, TM
Taylor Tubes, Inc., 2312 Wabansia Ave., Chicago 47, Ill.—IG, VG
Tech Laboratories, 337 Central Ave., Jersey City 7, N. J.—AM, B, DC, EH, VC, MO
Technical Apparatus Co., 1171 Tremont St., Boston 20, Mass.—H, IT, MO, TT, VT
Technical Devices Corp., Beaufort & Eagle Rock Ave., Roseland, N. J.—VT
Techno-Scientific Co., 901 Nepperhan Ave., Yonkers 3, N. Y.—EH
Teleoptic Co., 1251 Mound Ave., Racine, Wis.—MP
Teleregister Corp., 157 Chambers St., New York 7, N. Y.—TM
Televiso Products, Inc., 6533 Olmstead Ave., Chicago, Ill.—B, FM, WA, VM, VT
Telicon Corp., 851 Madison Ave., New York 21, N. Y.—FM
Thermionic Engineering Corp., 32 W. 12th St., Bayonne, N. J.—B, H, IG
Thompson, John E. Co., 1440 W. 47th St., Chicago 9, Ill.—E, M, O, VT
Thwing-Albert Instrument Co., Penn St., & Pulaski Ave., Philadelphia 44, Pa.—AF, B, G, MP, O, PH, TH, T
Tong-Test—Columbia Electric Mfg. Co.
Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York 14, N. Y.—F, FM, H, S, VI, WM
Trimount Instrument Co., 37 W. Van Buren, Chicago 5, Ill.—PM, TM, VM
Triplett Electrical Instrument Co., Harmon Rd., Bluffton, Ohio—A, M, O, R, S, TH, TT, V, W
Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill.—BT, M, O, R, TT
Universal Electronic Labs., Inc., 64 Grand St., New York 13, N. Y.—B
Universal X-Ray Products, Inc., 1800 N. Francisco Ave., Chicago 47, Ill.—TH, TM, TF, VG
U. S. Gauge Co., Sellersville, Pa.—A, BT, PM, T, VG, V
U. S. Television Corp., 106 Seventh Ave., New York 11, N. Y.—IT
Wadsworth Watch Case Co., Inc., Dayton, Ky.—MP
Walker, Robert, Inc., 403 W. 8th St., Los Angeles 14, Calif.—FM, FR, M, O, PM, TH
Wallace & Tiernan Products, Inc., Main & Mill Sts., Belleville 9, N. J.—PH
Warren Telechron Co., Ashland, Mass.—TM
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—MP
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa.—B, D, VT, W, WA
Waugh Laboratories, 420 Lexington Ave., New York 17, N. Y.—EG
Weksler Thermometer Corp., 52 W. Houston St., New York, N. Y.—PM, T, VG
Welch, W. M. Mfg. Co., 1515 Sedgwick St., Chicago 10, Ill.—A, G, M, O, PH, S, TA, TF, VG, WH, W
Weltronic Co., 19500 W. Eight Mile Rd., Detroit 19, Mich.—IC, TA, TT
Western Electric Co., 195 Broadway, New York 7, N. Y.—S
Westinghouse Elec. Corp., Meter Div., 95 Orange St., Newark 1, N. J.—A, AF, E, M, O, P, R, TA, TH, TM, V, WH, W
Westinghouse Elec. Corp. East Pittsburgh, Pa.—A, AF, AM, BT, EG, EM, E, F, FM, FS, G, H, IC, MP, IT, IG, MO, M, O, PE, P, S, TA, TH, TM, VM, VI, V, WH, W
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—A, AM, BT, FM, G, IT, L, MO, M, O, P, R, S, TA, T, TT, VI, V, W
Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—FM, MP, WM
Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill.—A
White Research, 899 Boylston St., Boston Mass.—VT
Winslow Co., 9 Liberty St., Newark 5, N. J.—B, G, IG, MO, O, PH, TH, T, VG
Zernickow, O. Co., 15 Park Row, New York 7, N. Y.—TA

(21) Metal for Radio

Aluminum	A
Aluminum tubing	AT
Barium	BA
Bearings	BG
Beryllium	BR
Brass	B
Brass tubing	BT
Carbon & Graphite	CA
Copper tubing	CT
Core materials, laminated	CM
Core materials, powdered	CP
Die castings	DC
Flexible metal hose	H
Foils, tin, lead, etc.	FO
Iron (SVEA metal)	I
Lead, tin aloys	LT
Magnesium alloys	MA
Metal bellows	MB
Metal coated steel	CS
Metal finishing service	MF
Molybdenum	M
Monel tubings	ML
Nickel	N
Nickel tubing	NT
Permanent magnets	PM
Platinum	P
Porous bearing metals	PB
Screw machine products	SP
Sheet metal	SH
Silver brazing alloys	SB
Silver & compounds	AG
Spring contact metals	SC
Stampings	S
Stainless steel	ST
Steel tubing	FT
Tantalum	TA
Thermostatic metals	TM
Tungsten	T
Wire screen cloth	WC
Zirconium	Z

Ace Mfg. Corp., Erie Ave. at "K" St., Philadelphia 24, Pa.—LG, S
Acklin Stamping Co., 1923 Nebraska Ave., Toledo 7, Ohio—S
Acme Tool & Die Co., 426 Ingle St., Evansville 8, Ind.—S
Adel Precision Products Corp., 10777 Van Owen St., Burbank, Calif.—S
Aircraft-Marine Products, Inc., 1523 N. 4th St., Harrisburg, Pa.—S
Aircraft Screw Products Co., Inc., 47-23 35th St., Long Island City 1, N. Y.—SP
Allegheny Ludlum Steel Corp., Brackenridge, Pa.—CM, ST
Allmetal Screw Products Co., 33 Greene St., New York 13, N. Y.—SP
Alpha Metals, Inc., 363 Hudson Ave., Brooklyn 1, N. Y.—FO, LT
Aluminum Co. of America, Oliver Bldg., Pittsburgh, Pa.—A, AT, MA
Aluminum Finishing Corp., 1119 E. 22nd St., Indianapolis 2, Ind.—A, MF
Aluminum Goods Mfg. Co., 1512 Washington St., Manitowoc, Wis.—S
American Brass Co., 414 Meadow St., Waterbury 88, Conn.—B, BT, CT, DC, H, S
American Electro Metal Corp., 320 Yonkers Ave., Yonkers, N. Y.—M, T
American Materials Co., 150 Nassau St., New York 7, N. Y.—A, AT, BG, B, BT, CT, ST, FT
American Nut & Bolt Fastener Co., 2029 Doerr St., Pittsburgh 12, Pa.—S
American Platinum Works, N. J. R. R. Ave. at Oliver St., Newark 5, N. J.—SB, AG, P
American Radio Hardware Co, 152-4 MacQueston Pkwy. S., Mt. Vernon, N. Y.—SP, SC, S
American Rolling Mill Co., Curtis St., Middletown, Ohio—CM, CS, ST
Andrews & Perillo, 39-30 Crescent St., Long Island City, N. Y.—S
Apollo Metal Works, S. Oak Park Ave. at 66th Pl., Chicago 49, Ill.—CS
Arnold Engineering Co., 147 E. Ontario St., Chicago 11, Ill.—PM
Atlas Metal Stamping Co., 3801 Castor Ave., Philadelphia 24, Pa.—S
Auburn Heights Mfg. Co., 2481 Leach Rd., Pontiac, Mich.—SP
Austin, O., Co., 335 Throop Ave., Brooklyn, N. Y.—S
Bailey Co., Inc, 21 Water St., Amesbury, Mass.—S
Baker & Co., Inc., 113 Astor St., Newark 5, N. J.—P, SB, AG, TM, WC
Barnes Co., Wallace, P. O. Box 1521, Bristol, Conn.—S
Bay State Stamping Co., 380 Chandler St., Worcester 1, Mass.—S
Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—CM, PM
Belmont Smelting & Refining Works, 330 Belmont Ave., Brooklyn 7, N. Y.—A, BA, BR, B, DC, FO, LT, MA, M, N, SB, TA, T
Bird, Richard H., 23 Moody St., Waltham, Mass.—BG
Bossert Co., Inc., 1002 Oswego St., Utica 1, N. Y.—S, ST
Brainin, C. S. Co., 233 Spring St., New York 13, N. Y.—TM
Bridgeport Brass Co., Grand St., Bridgeport 2, Conn.—B, CT
Buchmann Spark-Wheel Corp., 4-20 47th Ave., Long Island City 1, N. Y.—SP
Bundy Tubing Co., 10951 Hern Ave., Detroit 13, Mich.—ML, NT, FT
Bunting Brass & Bronze Co., 715 Spencer St., Toledo 9, Ohio—BG
Bussey Pen Products Co., 5151 W. 65th St., Chicago 38, Ill.—S, WC
Callite Tungsten Corp., 540 39th St., Union City, N. J.—M, NT, SP, SB, AG, SC, TM, T
Carbone Corp., 400 Myrtle Ave., Boonton, N. J.—CA
Chace Co., Wm., 1630 Beard Ave., Detroit 9, Mich.—MA
Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.—B, BT, CT, DC, SP, S, WC
Chicago Metal Hose Corp., 1315 S. Third Ave., Maywood, Ill.—CT, H, MB
Cinaudagraph Corp., 2 Selleck St., Stamford, Conn.—PM
Cleveland Tungsten, Inc., 10200 Meech Ave., Cleveland 5, Ohio.—T
Cleveland Wire Cloth & Mfg. Co., 3573 E. 78th St., Cleveland 5, Ohio—WC
Clifton Products, Inc., Blackbrook Rd., Painesville, Ohio—BR
Cohn, Sigmund & Co., 44 Gold St., New York 7, N. Y.—P
Congress Tool & Die Co., Congress Die Casting Div., 3750 E. Outer Dr., Detroit, Mich.—DC, S
Contract Specialties Co., 1743 Labrosse St., Detroit 16, Mich.—S
Corbin Screw Div., American Hardware Corp., High, Myrtle & Grove Sts., New Britain, Conn.—SP
Crescent Industries, Inc., 4140 Belmont Ave., Chicago 41, Ill.—S
Crowley, Henry L. & Co., Inc., 1 Central Ave., West Orange, N. J.—BG, CM, CP, PM, PB
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N. Y.—PM, ST
Cundy-Bettoney Co., Inc., Bradlee St., Hyde Park, Boston 36, Mass.—SP
Dahlstrom Metallic Door Co., Buffalo & E. Second, Jamestown, N. Y.—S
Dalmo Victor, Div. of Goldfield Consolidated Mines Co., 1414 El Camino Real, San Carlos, Calif.—MA
Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—S
Dayton Rogers Mfg. Co., 2835 Twelfth Ave. S., Minneapolis 7, Minn.—S
Diebel Die & Mfg. Co., 3658 N. Lincoln Ave., Chicago 13, Ill.—S
Disston, Henry & Sons, Inc., Tacony, Philadelphia 35, Pa.—ST
Division Lead Co., 836 W. Kinzie St., Chicago 22, Ill.—DC, FO, LT, SB, AG
Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—A, BG, B, DC, LT, MA, MF, S

Dollin Corp., 600 S. 21st St., Irvington 11, N. J.—DC
Dover Industries, Inc., 2029 N. Campbell Ave., Chicago, Ill.—CS, MF
Dow Chemical Co., Midland, Mich.—MA
Driver-Harris Co., Middlesex St., Harrison, N. J.—N
Easyflow—Handy & Harman
Edwards, T. J., Inc., 210 South St., Boston 5, Mass.—S
Electronic Supply Co., 207 Main St., Worcester 8, Mass.—S
Engineering Co., 27 Wright St., Newark, N. J.—SP, S
Ericsson Screw Machine Products Co., Inc., 25 Lafayette St., Brooklyn 1, N. Y.—SP
Fafnir Bearing Co., Booth St., New Britain, Conn.—BG
Fairmont Aluminum Co., Fairmont, W. Va.—A, AT
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.—CP, M, SC, TA, T
Fischman Co., 10th St., & Allegheny Ave., Philadelphia 33, Pa.—B, S, ST
Follansbee Steel Corp., 3rd & Liberty Ave., Pittsburgh, Pa.—SH
Foote Mineral Co., 12 E. Chelten Ave., Philadelphia 44, Pa.—M, ST, T, Z
Gardiner Mfg. Co., 2711 Union St., Oakland 7, Calif.—S
Gardiner Metal Co., 4820 S. Campbell Ave., Chicago 32, Ill.—LT
General Aniline & Film Corp., Special Products Sales Dept., 270 Park Ave., New York 17, N. Y.—CP
General Magnetic Corp., 2126 E. Fort St., Detroit 7, Mich.—PM
General Plate Div., Metals & Controls Corp., Attleboro, Mass.—TM, CS, SC
Glaser Lead Co., Inc., 31 Wyckoff Ave., Brooklyn 27, N. Y.—FO, LT, SB
Goat Metal Stampings, Inc., 314 Dean St., Brooklyn 17, N. Y.—S
Goldsmith Bros. Smelting & Refining Co., 58 E. Washington St., Chicago 2, Ill.—BG, P, SB, AG
Grammes, L. F. & Sons, Inc., 392 Union St., Allentown, Pa.—S
Graphalloy—Graphite Metallizing Corp.
Graphite Metallizing Corp., 1055 Nepperhan Ave., Yonkers, N. Y.—"Graphalloy"—CA
Great Metal Mfg. Corp., 5-13 Wyckoff Ave., Brooklyn 6, N. Y.—S
Greene, C. G., Mfg. Co., Warren, Pa.—S
Gregory Mfg. Co., 67 Franklin St., New Haven 11, Conn.—S
Greist Mfg. Co., 430 Blake St., New Haven 15, Conn.—SP, S
Gussack Machined Products Co., 10-20 45th Rd., Long Island City 1, N. Y.—SP, S
Hall, C. M. Lamp Co., 1035 E. Hancock Ave., Detroit 7, Mich.—DC, S
Handy & Harman, 82 Fulton St., New York 7, N. Y.—"Easyflow"—SB, AG
Hardware Specialties Mfg. Co., P. O. Box 844, Bridgeport 1, Conn.—SP, S
Hartford Machine Screw Co., 476 Capitol Ave., Hartford 2, Conn.—SP
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—SP, S
Haydu Bros., P. O. Box 1226, Plainfield, N. J.—M, N, S, T
Heyman Mfg. Co., Michigan Ave., Kenilworth, N. J.—S
High Tension Co., Inc., 36 N. Main St., Phillipsburg, N. J.—CT
Hommel Co., O., 209 Fourth Ave., Pittsburgh, Pa.—FO, SB, AG
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit 8, Mich.—N
Hunter Pressed Steel Co., Lansdale, Pa.—S
Hydraulic Tool & Die Corp., 4625 Third Ave., New York 57, N. Y.—S
ICA—Insuline Corp. of America
Indiana Steel Products Co., 6 N. Michigan, Chicago 2, Ill.—PM
Industrial Screw & Supply Co., 717 W. Lake St., Chicago 6, Ill.—SP, S
Instrument Glass & Mirror Co., 383 Pearl St., Brooklyn 1, N. Y.—MF
Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—"ICA"—A, CS, S
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.—ML, N, NT
Jelliff, C. O. Mfg. Corp., Pequot Rd., Southport, Conn.—WC
Johnston Tin Foil & Metal Co., 6100 S. Broadway, St. Louis 11, Mo.—FO
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—CM, S
Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill.—LT
Keystone Carbon Co. Inc., 1935 State St., St. Marys, Pa.—CA, PB
Keystone Electronics Co., 50-52 Franklin St., New York 13, N. Y.—SP
King Laboratories, Inc., 205 Oneida St., Syracuse 4, N. Y.—BA, MA, S, ST
Kling Metal Spinning Co., 174 Centre St., New York 13, N. Y.—S
Kollath Mfg. Co., 4601 W. Addison St., Chicago, Ill.—SP, S
Kolton Electric Mfg. Co., 123 New Jersey Railroad Ave., Newark 5, N. J.—S
Krischer Metal Products Co., 631-637 Kent Ave., Brooklyn 11, N. Y.—S
Landis & Gyr, Inc., 104 Fifth Ave., New York, N. Y.—BG
Lansing Stamping Co., 1159 S. Pennsylvania Ave., Lansing, Mich.—S
Linick, Leslie L., 29 E. Madison St., Chicago, Ill.—SB
Little Falls Alloys, Inc., 189 Caldwell Ave., Paterson 1, N. J.—BR, CT
Machlett Laboratories, Inc., 1063 Hope St., Springdale, Conn.—BR
Magna Mfg. Co., Inc., 444 Madison Ave., New York 22, N. Y.—A
Makepeace, D. E. Co., Pine & Dunham Sts., Attleboro, Mass.—CM, P, SB, AG, SC
Mallory, P. R., & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind.—M, SC, T
Matthews & Co., Jas. H., 3729 Belmont Ave., Chicago 18, Ill.—DC, S
Mendelsohn Speedgun Co., 457 Bloomfield Ave., Bloomfield, N. J.—BT
Mepham, Geo. S. Corp., 2001 Lynch Ave., E. St. Louis, Ill.—"Mepham"—CP
Metal Textile Corp., 4 Central Ave., West Orange, N. J.—WC
Meyers Safety Switch Co., Inc., 423 Tehama St., San Francisco 3, Calif.—S
Micro-Ferrocart Div., Maguire Industries, Inc., Fairfield Ave., Stamford, Conn.—CP, PB, SP, ST
Mid-West Screw Products Co., 3662 Park Ave., St. Louis 10, Mo.—SP
Miniature Precision Bearings, Carpenter St., Keene, N. H.—BG
National Carbon Co., Inc., 30 E. 42nd St., New York 18, N. Y.—CA
National Die Casting Co., 600 N. Albany Ave., Chicago 12, Ill.—DC
National Moldite Co., 25 Montgomery St., Hillside 5, N. H.—CM, CP
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland 4, Ohio—SP
Ney, J. M. Co., 71 Elm St., Hartford 1, Conn.—P
Noblitt Sparks Industries, Inc., Columbus, Ind.—S
North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—M, T
Northern Mfg. Co., Inc., 36 Spring St., Newark 2, N. J.—T
Oiljak Mfg. Co., Inc., Montclair, N. J.—S, MF
OK Machine Co., 2131 Fairfield Ave., Ft. Wayne 6, Ind.—SP, S
Olympic Tool & Mfg. Co., Inc., 39 Chambers St., New York 7, N. Y—S
Orange Screen Co., 615 Valley St., Maplewood, N. J.—S
Oscap Mfg Co., Inc., 207 W. Saratoga St., Baltimore 1, Md.—P, AG
Paraloy Co., 600 S. Michigan Ave., Chicago 5, Ill.—P, SB, AG
Patent Button Co., 41 Brown St., Waterbury 88, Conn.—MF
Patton-MacGuyer Co., 17 Virginia Ave., Providence 5, R. I.—S
Paul & Beekman, Div. of Portable Products Corp., 1801 Courtland St., Philadelphia 40, Pa.—S
Peck Spring Co., 20 Grove St., Plainville, Conn.—SP
Penn Fibre & Specialty Co., 2024 to 2030 E. Westmoreland St., Philadelphia 34, Pa.—S
Phelps Dodge Copper Products Corp., 40 Wall St., New York 5, N. Y.—BT, CT, NT
Philadelphia Rust Proof Co., 3227 Frankford Ave., Philadelphia 34, Pa.—MF
Pilot Industries, Inc., 202 E. 44th St., New York 17, N. Y.—SP
Plastic Metals, Inc., 155 Bridge St., Johnstown, Pa.—CP, I, PB
Plume & Atwood Mfg. Co., 470 Bank St., Waterbury 88, Conn.—B, S
Pollak Mfg. Co., Arlington, N. J.—S
Porter Metal Products, 121 Ingraham St., Brooklyn 6, N. Y.—S
Precimet Laboratories, 64 Fulton St., New York 7, N. Y.—MF
Precision Tube Co., 3828 Terrace St., Philadelphia 28, Pa.—AT, BT, CT, NT
Pyroferric Co., 175 Varick St., New York 14, N. Y.—CP
Quality Hardware & Machine Corp., 5849 N. Ravenswood Ave., Chicago 26, Ill.—S
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.—S
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—CS, MF, M, N, P, T
Red Arrow Electric Corp., 100 Colt St., Irvington 11, N. J.—S
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio—CM, CS, FT
Revere Copper & Brass, Inc., 230 Park Ave., New York 32, N. Y.—A, AT, B, BT, CT, MA, SB, S, FT
Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.—A, AT, FO
Riverside Metal Co., Riverside, N. J.—BR, SC, TM
Rusgreen Mfg. Co., 14262 Birwood Ave., Detroit 4, Mich.—S
Rustless Iron & Steel Corp., 3408 E. Chase St., Baltimore 13, Md.—ST
Santay Corp., 351 N. Crawford Ave., Chicago 24, Ill.—S
Scovill Mfg. Co., 99 Mill St., Waterbury 91, Conn.—B, BT, CT, SP, S
Screenmakers, Inc., 64 Fulton St., New York 7, N. Y.—MF
Sexton Can Co., Inc., 31 Cross St., Everett 49, Mass.—S
Speer Carbon Co., St. Marys, Pa.—CA
Speer Resistor Corp., Theresia St., St. Marys, Pa.—CP
Spencer Wire Co., 68 Pleasant St., W. Brookfield, Mass.—BR, ST
Sperman Metal Specialties, 2199 E. 21st St., Brooklyn 29, N. Y.—S
Stackpole Carbon Co., P. O. Box 327, St. Marys, Pa.—CA
Stamford Metal Specialty Co., 428 Broadway, New York 13, N. Y.—S
Standard Engineering Laboratories, 40 S. Oak Knoll Ave., Pasadena 1, Calif.—S
Steel Mill Div., Simmonds Saw & Steel Co., Lockport, N. Y.—PM
Stewart-Warner Alemite Corp., 1826 Diversey Pkwy., Chicago 14, Ill.—DC, SP, S
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.—CA
Superior Tube Co., Norristown, Pa.—AT, CT, I, ML, NT, ST, FT
Summerill Tubing Co., Bridgeport, Pa.—CS, ML, N, NT, FT
Swartzbaugh Mfg. Co., 1336 W. Bancroft St., Toledo 6, Ohio—S
Swedish Iron & Steel Corp., 17 Battery Pl., New York, N. Y.—I, PM
Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—T
Synthane Corp., Oaks, Pa.—SP
Tage Steel & Wire Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn.—ST
Taylor Wharton Iron & Steel Co., High Bridge, N. J.—PM
Thermador Electric Mfg. Co., 5119 S. Riverside Dr., Los Angeles 22, Calif.—S
Thomas & Skinner Steel Products Co., 1120 E. 23rd St., Indianapolis 5, Ind.—CM, PM, S
Titan Metal Mfg. Co., Bellefonte, Pa.—DC, SP
Torit Mfg. Co., 292 Walnut St., St. Paul 2, Minn.—MF
Tubing Seal-Cap, Inc., P. O. Box 6450, Metropolitan Station, Los Angeles 55, Calif.—SP
Tubular Rivet & Stud Co., Wollaston 70, Mass.—SP
Uniform Tubes, Shurs Lane & Lauriston St., Philadelphia 28, Pa.—AT, BT, CT, NT, FT
United Radio Mfg. Co., 191 Greenwich St., New York, N. Y.—A
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—CT
Van Huffel Tube Corp., Warren, Ohio—FT
Veeder-Root, Inc., Hartford, Conn.—DC
Wadsworth Watch Case Co., Inc., Dayton, Ky.—S, SP
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—S
Webster-Chicago Corp., 5622 Bloomingdale Ave., Chicago 39, Ill.—S
Weirton Steel Co., Electrical Dept., Main St., Weirton, W. Va.—FO
Warner, R. D. Co., Inc., 295 Fifth Ave., New York 16, N. Y.—A, AT
Western Brass Mills, East Alton, Ill.—B, S
Westinghouse Elec. Corp., East Pittsburgh, Pa.—BG, CM, LT, M, SB, TM, T
Whitehead Stamping Co., 1661 W. Lafayette Blvd., Detroit 16, Mich.—S
Wickwire Spencer Metallurgical Corp., 260 Sherman Ave., Newark 5, N. J.—M, ST, T, WC
Wildberg Bros. Smelting & Refining Co., 742 Market St., San Francisco 2, Calif.—P, SB, AG
Willor Mfg. Corp., 794 E. 140th St., New York 54, N. Y.—CS, S
Wilson, H. A. Co., 105 Chestnut St., Newark 5, N. J.—P, AG, TM, T
Winslow Co., 9 Liberty St., Newark 5, N. J.—AG
Worcester Pressed Steel Co., Worcester, Mass.—S
Wrought Washer Mfg. Co., 2100 South Bay St., Milwaukee 7, Wis.—S
Wynn Mfg. Div., Hudson Supply Co., 401 N. 27th St., Richmond 23, Va.—SP
Youngstown Pressed Steel Co., Warren, Ohio—S

(22) Microphones

Carbon	CAR
Condenser	CON
Connectors	CTR
Contact	CT
Crystal	CRY
Dynamic	DYN
Hearing aid microphones	HA
Springs	SPR
Stands	STD
Stethophones	S
Telephone handsets	T
Velocity	VEL

American Earphone Co., 10 E. 43rd St., New York 17, N. Y.—CAR
American Microphone Co., Inc., 1917 S. Western Ave., Los Angeles, Calif.—CAR, CON, CTR, CRY, DYN, SPR, STD, VEL
Amperite Co., 561 Broadway, New York, N. Y.—CTR, CT, DYN, STD, VEL
Art Specialty Co., 3245 W. Lake St., Chicago, Ill.—STD
Astatic Corp., Cor. Harbor & Jackson Sts., Conneaut, Ohio—CT, CRY, DYN, STD

Atlas Sound Corp., 1443 39th St., Brooklyn 18, N. Y.—STD

Auth Electric Specialty Co., Inc., 422-430 E. 53rd St., New York 22, N. Y.—T

Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—CAR, T

Aviometer Corp., 370 W. 35th St., New York 1, N. Y.—CAR, CON, CTR, CT, DYN, S, T

Barker & Williamson, Upper Darby, Pa.—CON

Barnes Co., Wallace, P. O. Box 1521, Bristol, Conn.—SPR

Bell & Howell Co., 7100 McCormick Rd., Chicago 45, Ill.—CRY

Bendix Radio Division, Bendix Aviation Corp., East Joppa Rd., Baltimore 4, Md.—CAR, DYN, T

Berger Electronics, 109-01 72nd Rd., Forest Hills, N. Y.—CON, DYN

Bogen, David Co., Inc., 663 Broadway, New York 12, N. Y.—STD

Boom Electric & Amplifier Co., Inc., 1227 W. Washington Blvd., Chicago 7, Ill.—DYN

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—CRY, HA, STD

Cambridge Instrument Co., Inc., 3005 Grand Central Terminal, New York 17, N. Y.—S

Connecticut Telephone & Electric, Div. Great American Industries, Inc., Meriden, Conn.—CAR, T

Dazor Mfg. Co., 4483 Duncan Ave., St. Louis 10, Mo.—STD

Eastern Mike-Stand Co., 56 Christopher Ave., Brooklyn 12, N. Y.—STD

Electronic Plumbing Corp., 311 Nepperhan Ave., Yonkers 2, N. Y.—CTR

Electro-Voice, Inc., 1239 S. Bend Ave., South Bend 24, Ind.—CAR, CON, CTR, CT, CRY, DYN, SPR, STD, S, T, VEL

Erwood Co., 223 W. Erie St., Chicago 10, Ill.—CRY, DYN, STD

Executone, Inc., 415 Lexington Ave., New York 17, N. Y.—DYN, STD

Faraday Electric Corp., Adrian, Mich.—T

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—CAR, T

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—CAR, SPR

Globe Phone Mfg. Corp., 2 Linden St., Reading, Mass.—CAR

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—CAR, CON, DYN, STD, T, VEL

Hunter Pressed Steel Co., Lansdale, Pa.—SPR

Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif.—CAR

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—CAR, CON, CTR, CT, SPR, STD, T

Kliegl Bros. Universal Electric Stage Lighting Co., Inc., 321 W. 50th St., New York 19, N. Y.—CTR

Lektra Labs., Inc., 30 E. 10th St., New York 3, N. Y.—DYN

Magnavox Co., Ft. Wayne 4, Ind.—CAR

Manross, F. N. & Sons, Div. Associated Spring Corp., Bristol, Conn.—SPR

Meletron Corp., 950 N. Highland Ave., Los Angeles 38, Calif.—STD

Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—CAR, CON, CT, DYN, STD, T

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—T

Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles 7, Calif.—CT, CRY, DYN, STD, VEL

North Electric Mfg. Co., Box 417, Galion, Ohio—T

Olympic Tool & Mfg. Co., Inc., 39 Chambers St., New York 7, N. Y.—STD

Operadio Mfg. Co., St. Charles, Ill.—DYN

Permoflux Corp., 4900 W. Grand Ave., Chicago 39, Ill.—DYN, T

Powers Electronic & Communication Co., New St., Glen Cove, N. Y.—DYN

Racon Electric Co., Inc., 52 E. 19th St., New York 3, N. Y.—DYN, STD*

Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill.—CRY, DYN, VEL

RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—CAR, CTR, CRY, DYN, STD, VEL

Reeves Sound Laboratories, Div. Reeves-Ely Laboratories, Inc., 215 E. 91st St., New York 28, N. Y.—STD

Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—DYN, T

Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio—S

Shure Bros., 225 W. Huron St., Chicago 10, Ill.—"Unidyne"—"Uniplex"—CAR, CTR, CRY, DYN, HA, STD, S

Simpson, Mark Mfg. Co., 188 W. 4th St., New York 14, N. Y.—STD

Sonata Products Co., 624 S. Michigan Ave., Chicago 5, Ill.—CAR

Sonotone Corp., Saw Mill River Rd., Elmsford, N. Y.—CT, CRY

Special Products Co., 9115 Brookville Rd., Silver Spring, Md.—STD

Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y.—CAR, CTR, CRY, DYN, STD, T, VEL

Trimm, Inc., 1770 W. Berteau Ave., Chicago 13, Ill.—STD

Turner Co., 909 17th St., N.E., Cedar Rapids, Iowa—CT, CRY, DYN, HA, STD, T

Unidyne—Shure Bros.

Uniplex—Shure Bros.

Universal Microphone Co., 424 Warren Lane, Inglewood, Calif.—CAR, DYN, STD, T, VEL

University Laboratories, 225 Varick St., New York 14, N. Y.—CAR, DYN

Waltham Screw Co., 77 Rumford Ave., Waltham, Mass.—CTR

Western Electric Co., 195 Broadway, New York 7, N. Y.—DYN

Western Sound & Electric Laboratories, Inc., 3512 W. St. Paul Ave., Milwaukee, Wis.—STD

(23) Motors & Generators

Alternators	A
Converters	CON
DC generators	DC
Dynamotors	DYN
Flexible couplings	F
Gas engines	ENG
Hand cranked generators	HC
HF generator	HF
Miniature control motors	MM
Motor starters	MS
Motors	M
Power plants	AC
Selsyns, etc.	S
Turntable motors	T

Aerovox Corp., New Bedford, Mass.—MS

Air-Way Electric Appliance Corp., 2101 Auburn Ave., Toledo 1, Ohio—A, CON, DC, DYN, MM, M

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.—HF

Allen-Bradley Co., 136 W. Greenfield Ave., Milwaukee 4, Wis.—MS

Alliance Mfg. Co., Alliance, Ohio—MM, T

Allis-Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1, Wis.—A, CON, DC, MS, M

Allis Co., Louis, 427 E. Stewart St., Milwaukee 7, Wis.—A, CON, DC, M

Amglo Corp., 4224 Lincoln Ave., Chicago 18, Ill.—MM, M, T

Arnessen Electric Co., Inc., 116 Broad St., New York 4, N. Y.—DC, HC, HF, M, S

Atlas Aircraft Products Corp., 405 E. 42nd St., New York 17, N. Y.—A, DC, HC, M, AC

Barber-Colman Co., River & Loomis Sts., Rockford, Ill.—MM

Bendix Aviation Corp., Bendix Radio Div., East Joppa Rd., Baltimore 4, Md.—DYN, MM, S

Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, N. Hollywood, Calif.—DC, DYN, HC, MM, M

Bodine Electric Co., 2254 W. Ohio St., Chicago 12, Ill.—MM, M

Bogue Electric Co., 27 Kentucky Ave., Paterson 8, N. J.—A, CON, DC, DYN, HF, M, AC

Boonton Radio Corp., 518 Main St., Boonton, N. J.—CON

Boston Gear Works, Inc., 14 Hayward St., N. Quincy 71, Mass.—F

Browne Electric Co., J., 3774 Surf Ave., Brooklyn 24, N. Y.—MS

Brown-Brockmeyer Co., 1000 S. Smithville Rd., Dayton 1, Ohio—DC, DYN, M

Brujac Electronic Corp., 11 Park Pl., New York 7, N. Y.—HF

Buda Co., Harvey, Ill.—ENG, AC

Burke Electric Co., 12th & Cranberry, Erie, Pa.—A, CON, DC, DYN, HC, M

Carson Machine & Supply Co., 202 S.E. 29th St., Oklahoma City 9, Okla.—A, CON, ENG, AC

Carter Motor Co., 1608 Milwaukee Ave., Chicago 47, Ill.—A, CON, DC, DYN, HC, M

Caterpillar Tractor Co., Peoria 8, Ill.—AC

Century Electric Co., 1806 Pine St., St. Louis 3, Mo.—DC, M

Chicago Sound Systems, Inc., 2124 S. Michigan Ave., Chicago, Ill.—CON

Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio—MS

Climax Engineering Co., Clinton, Iowa—A, DC, ENG

Cline Electric Mfg. Co., 4550 W. Lexington Ave., Chicago, Ill.—MS

Columbia Electric Mfg. Co., 4519 Hamilton Ave., N.E., Cleveland 14, Ohio—A, DC, M

Communication Measurements Laboratory, 120 Greenwich St., New York 6, N. Y.—HF

Connecticut Telephone & Electric, Div. of Great American Industries, Inc., Meriden, Conn.—HC

Continental Electric Co., Inc., 325 Ferry St., Newark 5, N. J.—A, CON, DC, DYN, M, AC, T

Crystal Research Laboratories, Inc., 29 Allyn St., Hartford 3, Conn.—AC

Cutler-Hammer Inc., 315 N. 12th St., Milwaukee 1, Wis.—MS

Dalmo Victor, Div. Goldfield Consolidated Mines Co., 1414 El Camino Real, San Carlos, Calif.—MM, M

Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—HC

Delco Appliance Div., General Motors Corp., 391 Lyell Ave., Rochester 1, N. Y.—ENG, MM, M, AC

DeWalt Products Corp., Fountain Ave., Lancaster, Pa.—M

Diehl Mfg. Co., Finderne Plant, Somerville, N. J.—A, CON, DC, DYN, MM, M, S

Dumore Co., 1225 14th St., Racine, Wis.—M

Dynamic Air Engineering, Inc., 1619 S. Alameda St., Los Angeles 21, Calif.—M

Eastern Air Devices, Inc., 585 Dean St., Brooklyn 17, N. Y.—MM, M

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.—A, CON, DC, DYN, ENG, M, MM

Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—A, CON, DC, DYN, HC, HF, MM, M, AC

Electric Indicator Co., 23 Parker Ave., Stamford, Conn.—A, DC, HC, MM, M, S

Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio—A, CON, DC, M, AC

Electric Specialty Co., 214 South St., Stamford, Conn.—"Esco"—A, DC, M, S

Electron Equipment Corp., 917 Meridian Ave., So. Pasadena, Calif.—MS

Electronic Laboratories, Inc., 122 W. New York St., Indianapolis 4, Ind.—CON

Electronic Measurements Co., Red Bank, N. J.—HF

Emerson Electric Mfg. Co., 1824 Washington Ave., St. Louis 3, Mo.—M

Esco—Electric Specialty Co.

Fairbanks, Morse & Co., 606 S. Michigan Ave., Chicago, Ill.—M

Fairchild Camera & Instrument Corp., 8806 Van Wyck Blvd., Jamaica 1, N. Y.—DC, MM, T

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—DYN, HF, MS

Fractional Motors Co., 1501 N. Halsted St., Chicago 22, Ill.—DC, MS, M

Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—DC, ENG, HC, MS, T

Gaston Power Tools, 2659 W. 95th St., Chicago 42, Ill.—A, DC, ENG, HF, M, AC

General Aviation Equipment Co., Inc., 630 Fifth Ave., New York 20, N. Y.—A

General Industries Co., Taylor & Olive Sts., Elyria, Ohio—M, T

General Tire & Rubber Co., Garfield, Wabash, Ind.—F

Globe Industries, Inc., 125 Sunrise Place, Dayton 7, Ohio—MM, M

Great Lakes Electric Mfg. Co., 17 S. Desplaines St., Chicago 6, Ill.—A, CON, DC, HF

Hannon Electric Co., 1605 Waynesburg Rd., S.E., Canton, Ohio—F, MS

Hansen Mfg. Co., R.R. No. 1, Princeton 14, Ind.—MM, M

Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.—DC, M

Hartman Corp. of America, 6417 Manchester, St. Louis 10, Mo.—AC

Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—DC, MM

Haydon Mfg. Co., Inc., Forestville, Conn.—MM

Hertner Electric Co., 12690 Elmwood Ave., Cleveland 11, Ohio—A, CON, DC, M

Hobart Mfg. Co., Troy, Ohio—S

Holtzer-Cabot, Div. of First Industrial Corp., 125 Amory St., Roxbury 19, Mass.—A, DC, HC, MM, M

Homelite Corp., Riverdale Ave., Port Chester, N. Y.—DC, AC

Howell Electric Motors Co., Howell, Mich.—M

Imperial Electric Co., Ira & Edison Aves., Akron 9, Ohio—A, CON, DC, M

Jacobsen Mfg. Co., 747 Washington Ave., Racine, Wis.—A, DC, DYN, ENG, HF

Janette Mfg. Co., 556 W. Monroe St., Chicago 6, Ill.—A, CON, DC, DYN

Kato Engineering Co., 530 N. Front St., Mankato, Minn.—A, CON, DC, HF, M, AC

Kegron Mfg. Co. Inc., 18 W. 20th St., New York 11, N. Y.—MM, S

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—A, CON, DC, DYN, ENG, MS, M

Kohler Co., Kohler, Wis.—A, DC, ENG, AC

Kollsman Instrument Div. of Square D Co., 80-08 45th Ave., Elmhurst, N. Y.—A, MM, S

Kurz & Root Co., 214 Island St., Appleton, Wis.—A, DC

Leland Electric Co., 1501 Webster St., Dayton 4, Ohio—A, DC, HF, M, AC

Lorain Products Corp., 1122 F St., Lorain, Ohio—CON

Lord Mfg. Co., 1639 W. 12th St., Erie, Pa.—F

Magnetic Products Co., Norwalk, Conn.—M

Master Vibrator Co., 200 Davis Ave., Dayton 1, Ohio—A, ENG, AC

Metron—W. C. Robinette Co.

Micromotors—Redmond Co., A. G.

Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—F

Monitor Controller Co., 51 S. Gay St., Baltimore 2, Md.—MS

Ohio Electric Mfg. Co., 5961 Bellford Ave., Cleveland 4, Ohio—A, DC, DYN, M

Onan & Sons, D. W., 3216 Royalston Ave., Minneapolis 3, Minn.—A, CON, DC, ENG, AC

Oster Mfg. Co., John, 1530 Ann St., Racine, Wis.—MM, M

Pacific Sound Equipment Co., 130 N. Beaudry Ave., Los Angeles 12, Calif.—T

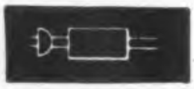
Phelon Co., R. E., 23 Northwood Ave., Springfield, Mass.—A

Pilot—F. A. Smith Mfg. Co.

Pioneer Gen-E-Motor Corp., 5841-49 Dickens Ave., Chicago 39, Ill.—CON, DC, DYN, MM, AC

Radex Corp., 53 W. Jackson Blvd., Chicago 4, Ill.—DYN, MM, M, T
Ready Power Co., 3826 Grand River Ave., Detroit, Mich.—AC
Redmond Co., A. G., Owosso, Mich.—"Micromotors"—DYN, M
Reliance Electric & Eng. Co., Ivanhoe Rd., Cleveland 10, Ohio—DC, M
Reynolds Electric Co., 2650 W. Congress St., Chicago 12, Ill.—M
Robinette Co., W. C., 802 Fair Oaks Ave., South Pasadena, Calif.—"Metron"—T
Rogers Diesel & Aircraft Corp., 1120 Leggett Ave., New York 59, N. Y.—A, DC, AC
Ruby Electric Co., 729 Seventh Ave., New York, N. Y.—CON, DC
Russell Electric Co., 340 W. Huron St., Chicago 10, Ill.—A, DYN, MM, M, T
Signal Electric Mfg. Co., 1939 Troam St., Menominee, Mich.—M
Simonds Machine Co., Inc., 246-48 Worcester St., Southbridge, Mass.—MS
Small Motors, Inc., 1322 Elston Ave., Chicago 22, Ill.—DYN, HC, MM, M, T
Smith Mfg. Co., F. A., Union & Augusta, Rochester 2, N. Y.—"Pilot"—M
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero 50, Ill.—MM, M, T
Star Electric Motor Co., 200 Bloomfield Ave., Bloomfield, N. J.—A, CON, DC, DYN, M
Sturtevant Co., B. F., Damon, Hyde Park, Boston 36, Mass.—DC, M, AC
Superior Electric Co., 1901 Indiana Ave., Chicago 16, Ill.—DC, HC
Terminal Products Co., 1 Main St., Racine, Wis.—DC, DYN, MM, M, T
Times Telephoto Equipment, Inc., 229 W. 43rd St., New York 18, N. Y.—MM
U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Calif.—M
U. S. Television Corp., 106 Seventh Ave., New York 11, N. Y.—A
Universal Electric Co., 300 E. Main St., Owosso, Mich.—MM, M
Universal Motor Company, 186 Harrison St., Oshkosh, Wis.—ENG, AC
Wagner Electric Corp., 6410 Plymouth Ave., St. Louis, Mo.—M
Walker, Inc., Robert, 403 W. 8th St., Los Angeles 14, Calif.—F, MS
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.—M
Warren Telechron Co., Ashland, Mass.—MM
Waters Conley Co., Rochester, Minn.—T
Webster-Chicago Corp., 5622 Bloomingdale Ave., Chicago 39, Ill.—T
Westinghouse Elec. Corp., East Pittsburgh, Pa.—A, CON, DC, DYN, HC, HF, MM, MS, M, AC, S
Wincharger Corp., E. 7th at Division, Sioux City 6, Iowa—A, CON, DC, DYN, M, T

(24) Noise Elimination Equipment



Interference analyzers .... **IA**
Interference locators .... **I**
Power filters .... **P**
Radio set filters .... **S**

Aarons Radio Corp., 125 E. 46th St., New York 17, N. Y.—I
Aeronautical Radio Mfg. Co., 155 First St., Mineola, L. I., N. Y.—P, S
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass.—IA, I, P, S
Ameco—American Electronics
American Communications Corp., 306 Broadway, New York, N. Y.—P, S
American Electronics, 37 E. 18th St., New York 3, N. Y.—"Ameco"—IA, I, P, S
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—P, S
American Transformer Co., Inc., 178 Emmet St., Newark 5, N. J.—S
Avia Products Co., 7266 Beverly Blvd., Los Angeles, Calif.—P, S
Barker & Williamson, Upper Darby, Pa.—I, P
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif.—S
Communication Parts, 1101 N. Paulina St., Chicago 22, Ill.—S
Cornell-Dubilier Electric Corp., S. Plainfield, N. J.—"Quietone"—IA, I, PS
Deutschmann Corp., Tobe, Canton, Mass.—IA, I, P, S
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—P, S
D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—P, S
Fast & Co., John E., 3129 N. Crawford Ave., Chicago 41, Ill.—S
Freed Transformer Co., 72 Spring St., New York 12, N. Y.—P
Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—P, S
General Winding Co., 420 W. 45th St., New York 19, N. Y.—S
Jefferson, Inc., Ray, 40 E. Merrick Rd., Freeport, L. I., N. Y.—P
Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.—P, S
Mallory & Co., Inc., P. R., 3029 E. Washington St., Indianapolis 6, Ind.—S
Measurements Corp., 116 Monroe St., Boonton, N. J.—IA
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—P, S
Miller Co., J. W., 5917 S. Main St., Los Angeles 3, Calif.—"Miller"—P, S
Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—P
Philco Corp., Tioga & C Sts., Philadelphia, Pa.—P, S
Point Mfg. Co., 5775 N. Ridge Ave., Chicago 26, Ill.—S
Quietone—Cornell-Dubilier Elec. Corp.
Radio Laboratories, Inc., 2701 California Ave., Seattle 6, Wash.—P, S
Solar Mfg. Corp., 285 Madison Ave., New York 17, N. Y.—P, S
Spirling Products Co., 64 Grand St., New York 13, N. Y.—S
Sprague Electric Co., 189 Beaver St., North Adams, Mass.—IA, I, P, S
Sprague Products Co., North Adams, Mass.—IA, I, P, S
Stoddart Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—I
S-W Inductor Co., 1056 N. Wood St., Chicago 22, Ill.—S
Technical Appliance Corp., 516 W. 34th St., New York 1, N. Y.—P, S
United Transformer Co., 150 Varick St., New York 13, N. Y.—P
Westinghouse Elec. Corp., East Pittsburgh, Pa.—P

(25) Paint, Cement & Insulating Compounds

Adhesives .... **A**
Cement .... **C**
Coil Dopes .... **CD**
Enamels .... **E**
Insulating compounds .... **I**
Lacquers .... **L**
Marking inks .... **M**
Misc. chemicals .... **MC**
Paint .... **P**
Resins .... **R**
Solvents .... **S**
Special lubricants .... **SL**
Vacuum greases .... **VG**
Varnish .... **V**
Waterproofing Compounds .... **WC**
Wax .... **W**
Wrinkle finish .... **WF**

Acheson Colloids Corp., Port Huron, Mich.—SL
Acme Wire Co., New Haven 14, Conn.—A, I, V
Acromark Co., 9-13 Morrell St., Elizabeth 4, N. J.—M
Advance Research Corp., 37 W. 57th St., New York 19, N. Y.—I, SL
Allied Asphalt & Mineral Corp., 217 Broadway, New York 7, N. Y.—I
Ambroid Co., Inc., 305 Franklin St., Boston 10, Mass.—A, C, S, WC
American Products Mfg. Co., Oleander & Dublin Sts., New Orleans 18, La.—A, C, CD, I, L, R, S, WC, W
Arco Co., 7301 Bessemer Ave., Cleveland 4, Ohio—A, C, CD, E, I, L, M, P, R, S, V, WC, WF
Ault & Wiborg, Div. of Interchemical Corp., 350 Fifth Ave., New York 1, N. Y.—E, L, M, P, R, V, WC, WF
Austin Co., O., 335 Throop Ave., Brooklyn 21, N. Y.—M
Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.—"Bakelite," "Fenox," "Vinylite," "Vinylseal," "Zyrox,"—A, C, I, R, V, WC, W
Baker Chemical Co., J. T., N. Broad St., Phillipsburg, N. J.—MC
Biwax Corp., 3445 Howard St., Skokie, Ill.—I, WC, W
Black Bear Co., Inc., 620 Fifth Ave., New York 20, N. Y.—SL
Cantol Wax Co., 211 N. Washington St., Bloomington, Ind.—I, WC, W
Cardinell Corp., 15 Label St., Montclair, N. J.—A
Catalin Corp., 1 Park Ave., New York 16, N. Y.—R
Clear Print—Phillips Process Co., Inc.
Clifton Products Inc, Blackbrook Rd., Painesville, Ohio—I
Crolite—Crowley & Co., Inc., Henry L.
Crowley & Co., Inc., Henry L., 1 Central Ave., West Orange, N. J.—"Crolite"—A, C
Day & Co., James B., 1872 Clybourn Ave., Chicago 14, Ill.—A, C, CD, E, I, L, P, WC, W
Devoe & Raynolds Co., Inc., P. O. Box 328, Louisville 1, Ky.—E, L, P, R, V, W, WF
Distillation Products Inc., 755 Ridge Rd. W., Rochester 13, N. Y.—SL, VG
Dolph Co., John C., 1060 Broad St., Newark 2, N. J.—A, C, E, I, L, S, V, WC, W
Dow Chemical Co., Midland, Mich.—S, MC
Dow Corning Corp., Midland, Mich.—I, P, R, SL, VG, V, WC
Durez Plastics & Chemicals Inc., 1926 Walck Rd., N. Tonawanda, N. Y.—A, R, V
Durite Plastics, 5000 Summerdale Ave., Philadelphia 24, Pa.—R
Egyptian Lacquer Mfg. Co., 1270 Sixth Ave., New York 20, N. Y.—E, L, S
Fansteel Metallurgical Corp., 2200 N. Sheridan Rd., N. Chicago, Ill.—MC
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—I
Fenox—Bakelite Corp.
Foote Mineral Co., 12 E. Chelten Ave., Philadelphia 44, Pa.—MC
Foster Co., Benjamin, 1411 Walnut St., Philadelphia 2, Pa.—A, C, E, I, M, P, WC
Gates, Geo W. Co., Inc., Hempstead Tpke. & Lucille Ave., Franklin Square, N. Y.—"Quartz-Etch"—MC
GC—General Cement Mfg. Co.
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—A, C, CD, E, I, L, M, P, R, S, SL, V, WC, W, WF
General Electric Co.— Specialty Div., 1001 Wolf St., Syracuse, N. Y.—C
Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y.—CD, I, R, SL, WC, W
Goldmark Wire Co., James, 116 West St., New York 7, N. Y.—C
Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.—C
Halowax Products Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.—W
Hansen Co., Wm., 165 Silverbrook Ave., Niles, Mich.—A, C, R, S, SL, WC, W, WF
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6, Ohio—S
Harvel—Irvington Varnish & Insulator Co.
Hilo Varnish Corp., 42-60 Stewart Ave., Brooklyn, N. Y.—E, L, P, V, WF
Horn Co., A. C., 43-36 Tenth St., Long Island City 1, N. Y.—E, L, P, V, WC, W, WF
Howe & French Inc., 99 Broad St., Boston 10, Mass.—A, C, CD, L, S, WC, WF
Insl-X Co., Inc., 857 Meeker Ave., Brooklyn 22, N. Y.—CD, I, L, R, V, WC
Insulation Mfrs. Corp., 565 W. Washington Blvd., Chicago 6, Ill.—C, CD, I, R, V
Interlake Chemical Corp.—Plastics Div., 1401 S. Circle Ave., Forest Park, Ill.—A, R
Irvington Varnish & Insulator Co., 50 Argyle Terrace, Irvington 11, N. J.—"Harvel," "Irvington"—A, C, E, I, L, P, R, V, WC
Joliet Chemicals Ltd., Industry Ave., Joliet, Ill.—WC
Keese Engineering Co., 7354-6-8 Santa Monica Blvd., Hollywood 46, Calif.—L, P
King Laboratories, Inc., 205 Oneida St., Syracuse 4, N. Y.—MC
Lacquer & Chemical Corp., 214 40th St., Brooklyn 32, N. Y.—C, CD, E, L, S, WC, WF
Libbey-Owens-Ford Glass Co.—Plaskon Div., 2112 Sylvan Ave., Toledo 6, Ohio—A, R
Linick, Leslie L., 29 E. Madison St., Chicago, Ill.—C, W
Lowe Bros. Co., 424 E. Third St., Dayton F2, Ohio—E, L, P, V, WF
Maas & Waldstein Co., 438 Riverside Ave., Newark 4, N. J.—A, C, CD, E, I, L, M, P, R, S, V, WC, W, WF
Marblette Corp., 37-21 30th St., Long Island City 1, N. Y.—A, C, I, L, R, V
Markem Machine Co., Emerald St., Keene, N. H.—M
Merck & Co., Inc., Rahway, N. J.—MC
Mica Insulator Co., 200 Varick St., New York 14, N. Y.—I, R, S, V
Midland Paint & Varnish Co., 9115 Reno Ave., Cleveland 5, Ohio—E, L, P, V, WF
Mitchell Rand Insulation Co., 51 Murray St., New York 7, N. Y.—I, P, W
Murphy Finishes Corp., 224 McWhorter St., Newark 1, N. J.—E, L, P, V, WF
National Co., Inc., 61 Sherman St., Malden 48, Mass.—CD
National Molding Co., 2141 W. Washington Blvd., Los Angeles 7, Calif.—A, C, CD, I, R, WC
N. E. Radiocrafters, 1156 Commonwealth Ave., Boston 34, Mass.—A, C, CD, L
New Wrinkle Inc., 1770 Springfield St., Dayton 3, Ohio—E, L, P, R, V, WF
Oakite Products Inc., 22 Thames St., New York 6, N. Y.—S
Pacific Clay Products, SteaPACtite Div., 306 W. Ave. 26, Los Angeles 31, Calif.—C
Paisley Products, Inc., 1770 Canalport Ave., Chicago 16, Ill.—A, C, R, WC
Patterson Screen Div., E. I. DuPont de Nemours & Co., Main St., Towanda, Pa.—MC
Pennsylvania Coal Products Co., Petrolia, Pa.—A, R
Phillips Process Co., Inc., 192 Mill St., Rochester 4, N. Y.—"Clear Print"—M

Pioneer Asphalt Co., 435 N. Michigan Ave., Chicago, Ill.—I. WC
Pittsburgh Equitable Meter Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.—SL
Pratt & Lambert Inc., 75 Tonawanda St., Buffalo 7, N. Y.—A, E, I, L, P, S, V, WF
Protectoseal Co., 1948 S. Western Ave., Chicago 8, Ill.—S
Quartz Etch—Geo. W. Gates Co., Inc.
Reichhold Chemicals Inc., 601 Woodward Heights Blvd., Detroit 20, Mich.—R
Reilly Tar & Chemical Corp., 1617 Merchants Bank Bldg., Indianapolis 4, Ind.—E, L, P, R, S, WC
Roxalin Flexible Finishes Inc., 800 Magnolia Ave., Elizabeth F, N. J.—A, CD, I, L, P, R, S, V, WC, WF
Sauereisen Cements Co., Sharpsburg Sta., Pittsburgh 15, Pa.—C, I
Schaar & Co., 754 W. Lexington St., Chicago, Ill.—MC
Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"Walsco"—A, C, CD, E, I, L, P, S, SL, VG, V, WF
Sherwin-Williams Co., 101 Prospect Ave., Cleveland, Ohio—E, I, L, P, R, S, V
Special Chemicals Co., 1545 E. 18th St., Cleveland 14, Ohio—A, R
Special Chemicals Co., 30 Irving Place, New York 3, N. Y.—P
Sprague Electric Co., 189 Beaver St., North Adams, Mass.—I
Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago, Ill.—W
Standard Varnish Works, 2600 Richmond Terrace, Staten Island 3, N. Y.—E, I, L, P, V, WC, W, WF
Stevenson Bro. & Co., 110 Race St., Philadelphia 6, Pa.—R, SL, WC, W
Stewart-Warner Alemite Corp., 1826 Diversey Pkwy., Chicago 14, Ill.—SL
Technic Inc., 39 Snow St., Providence 3, R. I.—WC
Transicoil Corp., 114 Worth St., New York 13, N. Y.—WC
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—C, L
Vinylite—Bakelite Corp.
Vinyseal—Bakelite Corp.
Walsco—Walter L. Schott Co.
Welch Mfg. Co., W. M., 1515 Sedgwick St., Chicago 10, Ill.—VG
Western Reserve Laboratories, 1440 W. 3rd St., Cleveland 13, Ohio—S
Westinghouse Electric Corp., East Pittsburgh, Pa.—E, I, L, R, SL, V, WC
Wynn Mfg. Div., Hudson Supply Co., 401 N. 27th St., Richmond 23, Va.—C, CD, S, W
Zons, F. W., 239 Centre St., New York, N. Y.—MC
Zophar Mills Inc., 112-130 26th St., Brooklyn 32, N. Y.—A, C, I, WC, W
Zyrox—Bakelite Corp.

(26) Photoelectric Equipment

Complete units	**EE**
Light supplies	**L**
Photo cells	**PC**
Photometers	**PM**
Relays	**R**

Aarons Radio Corp., 125 E. 46th St., New York 17, N. Y.—PC
Alden Products Co., 117 N. Main St., Brockton 64, Mass.—EE
Advance Electric & Relay Co., 1260 W. Second St., Los Angeles 26, Calif.—R
Allied Control Co., Inc., 2 East End Ave., New York 21, N. Y.—R
AMECO—American Electronics Co.
American Electronics Co., 37 E. 18th St., New York 3, N. Y.—"AMECO"—EE
American Instrument Co., 8030 Georgia Ave., Silver Spring, Md.—R
American Television Laboratories, Inc., 433 E. Erie St., Chicago 11, Ill.—PC
Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—L
Associated Research & Eng. Laboratories, 38 Brady St., San Francisco 3, Calif.—EE, L
Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—EE, R
Auth Electrical Specialty Co., Inc., 422 E. 53rd St., New York 22, N. Y.—R
Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—R
Barker & Williamson, Upper Darby, Pa.—EE
Bell & Howell Co., 7100 McCormick Rd., Chicago 45, Ill.—PM
Bradley Laboratories, Inc., 82 Meadow St., New Haven 10, Conn.—"Luxtron"—PC
Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N. Y.—R
Burton Mfg. Co., 3855 N. Lincoln Ave., Chicago 13, Ill.—L
Carlton Lamp Corp., 730 S. 13th St., Newark 3, N. J.—L
Cetron—Continental Electrical Co.
Clare & Co., C. P., 4719 Sunnyside Ave., Chicago 30, Ill.—R
Clark Radio Equipment Corp., 4313 Lincoln Ave., Chicago 18, Ill.—EE
Cline Electric Mfg. Co., 4550 W. Lexington Ave., Chicago, Ill.—EE
Coleman Electric Co., 318 Madison St., Maywood, Ill.—PM
Continental Electric Co., 715 Hamilton St., Geneva, Ill.—"Cetron"—PC
DeJur Amsco Corp., Northern Blvd. at 45th St., Long Island City 1, N. Y.—PC
Detect-O-Ray Co., 3836 Hull St., Skokie, Ill.—EE
Dietert Co., Harry W., 9330 Roselawn Ave., Detroit 4, Mich.—PM
Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—EE
Eby, Inc., Hugh H., 18 W. Chelten Ave., Philadelphia 44, Pa.—PC, R
Electric Eye Equipment Co., 6 W. Fairchild St., Danville, Ill.—R
Electro-Eye—Hansen Co., Wm.
Electronic Control Corp., 1573 E. Forest Ave., Detroit, Mich.—EE, R
Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—EE
Electronic Laboratory, 306 S. Edinburgh Ave., Los Angeles, Calif.—R
Electronic Products Co., 19 N. First St., Geneva, Ill.—R
Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—EE
Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—EE, R
Electro-Tech Equipment Co., 331 Canal St., New York 13, N. Y.—R
Ess Instrument Co., 963 Washington St., Bergenfield, N. J.—EE, R
Federal Instrument Co., 3917 47th Ave., Long Island City, N. Y.—R
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—PC, R
Fischer-Smith, Inc., 162 State St., West Englewood, N. J.—EE
Fisher Pierce Co., 74 Ceylon St., Boston 21, Mass.—EE, L, R
Gates & Co., Inc., Geo. W., Hempstead Tpke. & Lucille Ave., Franklin Sq., L. I., N. Y.—L
Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—EE
General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—EE
General Control Co., 1200 Soldiers Field Rd., Boston 34, Mass.—EE
General Electric Co., Lamp Dept., Nela Park, Cleveland 12, Ohio—L
General Electric Co., 1 River Rd., Schenectady 5, N. Y.—PC, R
General Scientific Corp., 4029 S. Kedzie Ave., Chicago, Ill.—"Lumotron"—PC
G-M Laboratories, Inc., 4300 N. Knox Ave., Chicago 41, Ill.—EE, PC, R
Goodall Electric Mfg. Co., 320 N. Spruce St., Ogallala, Neb.—R
Hanovia Chemical & Mfg. Equipment, 233 N.J.R.R. Ave., Newark 5, N. J.—EE, PM
Hansen Co., Wm., 165 Silverbook Ave., Niles, Mich.—"Electro-Eye", "Ordercall", "Radiocall"—EE
Haydon Mfg. Co., Inc., Forestville, Conn.—R
Herbach & Rademan Co., Mfg. Div., 517 Ludlow St., Philadelphia 6, Pa.—EE
Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio—PM
Hoffman Engineering Corp., 458 Sexton Bldg., Minneapolis 4, Minn.—EE
Industrial Electronics Corp., 80 Bank St., Newark, N. J.—R
Keeney & Co., Inc., J. H., 6610 S. Ashland Ave., Chicago 36, Ill.—EE
Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—EE
Leach Relay Co., 5915 Avalon Blvd., Los Angeles, Calif.—R
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.—PM
Leitz, Inc., E., 730 Fifth Ave., New York 19, N. Y.—PM
Lewyt Corp., 60 Broadway, Brooklyn 11, N. Y.—R
Long Co., L. J., 186 Grand St., New York 13, N. Y.—EE
Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5, Ill.—EE, L, R
Lumotron—General Scientific Corp.
Luxtron—Bradley Labs., Inc.

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

MB Mfg. Co., Inc., Instrument Division, "E" St., New Haven, Conn.—EE
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—EE, R
Mellaphone Corp., 1462 E. Main St., Rochester 3, N. Y.—EE
Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—EE, R
Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—R
National Union Radio Corp., 15 Washington St., Newark 2, N. J.—PC
North Electric Mfg. Co., Box 417, Galion, Ohio—R
Ordercall—Hansen Co., Wm.
Pacific Electronics, W. 1011-1013 First Ave., Spokane 5, Wash.—EE
Parker Engineering Products Co., 16 W. 22nd St., New York 10, N. Y.—R
Perkin-Elmer Corp., 535 Hope St., Glenbrook, Conn.—PM
Pfaltz & Bauer, Inc., 350 Fifth Ave., New York, N. Y.—EE, PC
Photoswitch, Inc., 77 Broadway, Cambridge, Mass.—EE, L
Photovolt Corp., 35 Madison Ave., New York 16, N. Y.—PC, PM
Photronic—Weston Electrical Instrument Corp.
Point Mfg. Co., 5775 N. Ridge Ave., Chicago 26, Ill.—PM
Potter & Brumfield Mfg. Co., Inc., 617 N. Gibson St., Princeton, Ind.—R
Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill.—L
Price Electric Corp., E. Church & Second Sts., Frederick, Md.—R
Radiant Lamp Corp., 300 Jelliff Ave., Newark, N. J.—L
Radiocall—Hansen Co., Wm.
Radio Frequency Laboratories, Inc., Boonton, N. J.—PM
Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill.—PC
Rehtron Corp., 4313 Lincoln Ave., Chicago 18, Ill.—EE, R
Rubicon Co., Ridge Ave. at 35th St., Philadelphia 32, Pa.—PM
Safety Electric Co., 110 S. Dearborn St., Chicago 3, Ill.—L
Selenium Corp. of America, 1719 W. Pico Blvd., Los Angeles 15, Calif.—PC
S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—L, PC
Staco—Standard Electrical Products Co.
Standard Electrical Products Co., 400 Linden Ave., Dayton 3, Ohio—"Staco"—R
Struthers-Dunn, Inc., 1321 Arch St., Philadelphia 7, Pa.—R
Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—L, PC
Task Electronics Co., 245 W. 54th St., New York, N. Y.—EE
Technical Products Co., 158 Madison Ave., Memphis, Tenn.—R
Times Telephoto Equipment, Inc., 229 W. 43rd St., New York 18, N. Y.—EE, PC
Tung-Sol Lamp Works, Inc., 95 Eighth Ave., Newark 4, N. J.—R
United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—EE, L, PC, R
Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio—PM
Ward Leonard Electric Co., 31 South St., Mt. Vernon, N. Y.—R
Westinghouse Elec. Corp., East Pittsburgh, Pa.—EE, L, PC, R
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—"Photronic"—PC, R
White Research, 899 Boylston St., Boston 15, Mass.—EE, R
Worner Electronic Devices, 609 W. Lake St., Chicago 6, Ill.—EE, L, PC, R

(27) Plastic Materials

Acrylics	**A**
Aniline-formaldehyde resin	**AF**
Cast resin	**CR**
Cellulose acetate	**C**
Celulose acetate butyrate	**CB**
Cellulose nitrate	**CN**
Ethyl cellulose	**EC**
Laminates	**L**
Melamines	**M**
Phenols	**PH**
Polyethylene	**PE**
Polystyrene	**P**
Silicone compounds	**S**
Urea	**U**
Vinyl resins	**V**

Acadia Synthetic Products Div., Western Felt Works, 4035 Ogden Ave., Chicago, Ill.—P
Alvar—Shawinigan Prod. Corp.
American Cyanamid Co., Plastics Division, 30 Rockefeller Plaza, New York 20, N. Y.—"Beetle"—M, U

American Molding Powder & Chemical Corp., 44 "U" St., Brooklyn, N. Y.—C

American Phenolic Corp., 1830 S. 54th St., Cicero, Ill.—"Amphenol"—PH, P

American Products Mfg. Co., Oleander & Dublin Sts., New Orleans 18, La.—C, CN, EC

Amphenol—American Phenolic Corp.

Arco Co., 7301 Bessemer Ave., Cleveland 4, Ohio—A, AF, CR, CN, EC, L, M, PH, P, U

Baer Co., N. S., 9-11 Montgomery St., Hillside, N. J. L, PH

Bakelite Corp., 30 E. 42nd St., New York 17, N. Y. —"Bakelite," "Vinylseal," "Vinylite," "Vinyon" —CR, PH, P, U, V

Baker Oil Tools, Inc., 6000 S. Boyle St., Los Angeles 11, Calif.—CR

Beetle—American Cyanamid Co.

Bend-A-Lite Plastics Division, 423 South Honore St., Chicago 12, Ill.—A, CR, C, CB, PH, P, V

Butacite—E. I. DuPont de Nemours & Co., Inc.

Butvar—Shawinigan Prod. Corp.

Catalin Corp., 1 Park Ave., New York 16, N. Y.—"Loalin"—CR, PH, P

Celanese Plastics Corp., 180 Madison Ave., New York 16, N. Y.—"Celluloid", "Lumarith"—C, CN, EC

Celeron—Continental Diamond Fibre Co.

Cellanite—Continental Diamond Fibre Co.

Celluoid—Celanese Plastics Corp.

Chemaco Corp., Berkley Heights, N. J.—C, EC, P, V

Coffite—Formica Insulation Co.

Colonial Kolonite Co., 2214 Armitage Ave., Chicago 47, Ill.—A, CR, C, L, PH, P

Condenser Products Co., 1375 N. Branch St., Chicago 22, Ill—S

Continental-Diamond Fibre Co., Newark 50, Del.—"Celeron", "Cellanite", "Dilectene", "Dilecto", "Vulcoid"—AF, L, M, PH

Cournand & Co., E. L., 3835 Ninth Ave., New York 34, N. Y.—A, C, CN, P

Creative Plastics Corp., 963 Kent Ave., Brooklyn 5, N. Y.—A, CR, L, PH

Dilectene—Continental-Diamond Fibre Co.

Dilecto—Continental-Diamond Fibre Co.

Dow Chemical Co., Midland, Mich.—"Ethocel", "Styron"—EC, P, V

Dow Corning Corp., Midland, Mich.—S

DuPont de Nemours Co., Inc., E. I., Plastics Dept., 626 Schuyler Ave., Arlington, N. J.—"Butacite", "Lucite", "Plastacele", "Pyralin"—A, CR, C, CN

Durez Plastics & Chemicals, Inc., 1926 Walck Rd., North Tonawanda, N. Y.—"Durez"—PH

Durite Plastics, 5000 Summerdale Ave., Philadelphia 24, Pa.—PH

Electrical Insulation Co., Inc., 12 Vestry St., New York 13, N. Y.—PH

Ethocel—Dow Chemical Co.

Extruded Plastics, Inc., New Canaan Ave., Norwalk, Conn.—C, CB, EC, P, V

Felsenthal & Sons, G., 4108 W. Grand, Chicago 51, Ill.—L

Fibestos—Monsanto Chemical Co.

Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati 32, Ohio—"Coffite" "Formica"—L, M, PH, U

Formvar—Shawinigan Prod. Corp.

Franklin Mfg. Corp., A. W., 175 Varick St., New York 14, N. Y.—L, PH

Franklin Fibre-Lamitex Corp., Wilmington, Del.—"Lamitex"—L, PH

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—C, EC, P

General Electric Co., 1 River Rd., Schenectady 5, N. Y. —S

General Electronic Chemical Dept., Plastics Div., 1 Plastics Ave., Pittsfield, Mass.—"Textolite"—L

General Laminated Products, Inc., 2857 S. Halsted St., Chicago 8, Ill.—L, PH

Gering Products, Inc., Kenilworth, N. J.—A, C, CB, CN, EC, P, V

Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y.—U

Goodrich Chemical Co., B. F., Rose Bldg., Cleveland 15, Ohio—"Koroseal"—CR, V

Hercules Powder Co., 900 Market St., Wilmington 99, Del.—"Herculoid"—C, EC, CN

Herculoid—Hercules Powder Co.

Heresite & Chemical Co., Manitowoc, Wis.—"Heresite" —CR, PH

Howard Mfg. Corp., 1401 S. Main St., Council Bluffs, Iowa—M, PH, U

Indur—Reilly Tar & Chemical Corp.

Industrial Synthetics Corp., 60 Woolsey St., Irvington 11, N. J.—C, CB, EC, V

Insulating Fabricators of New England, Inc., 69 Grove St., Watertown, Mass.—L, M, PH

Insulating Tube Co., Inc., 26 Cottage St., P. O. Box 1, Poughkeepsie, N. Y.—L

Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill.—L

Insulation Products Co., 504 North Richland St., Pittsburgh 8, Pa.—PH

Insurok—Richardson Co.

Interlake Chemical Corp., Plastics Div., 1401 S. Circle Ave., Forest Park, Ill.—CR, L, PH

Irvington Varnish & Insulator Co., 50 Argyle Terrace, Irvington 11, N. J.—PH

Keystone Electronics Co., 50-52 Franklin St., New York 13, N. Y.—L

Knoedler Chemical Co., 651 High St., Lancaster, Pa. —CR

Koroseal—Goodrich Co., B. F.

Lamicoid—Mica Insulator Co.

Lamitex—Franklin Fibre-Lamitex Corp.

Loalin—Catalin Corp.

Lucite—DuPont de Nemours Co., Inc., E. I.

Lumarith—Celanese Plastics Corp.

Lustron—Monsanto Chemical Co.

Libbey-Owens-Ford Glass Co., Plaskon Div., 2112 Sylvan Ave., Toledo 6, Ohio—M, U

Manufacturers Chemical Corp., Snyder Ave., Berkeley Heights, N. J.—C, EC, P, V

Marblette Corp., 37-21 Thirtieth St., Long Island City 1, N. Y.—"Marblette"—CR, PH

Mica Insulator Co., 200 Varick St., New York 14, N. Y.—"Lamicoid"—L, M, PH

Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—L

Micarta Fabricators, Inc., 5324 Ravenswood Ave., Chicago 40, Ill.—L, PH

Micarta—Westinghouse Elec. Corp.

Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—C, EC

Millen Mfg. Co., Inc., 150 Exchange St., Malden 48, Mass.—P

Milprint, Inc., 431 West Florida St., Milwaukee 1, Wis.—L

Monsanto Chemical Co., Plastics Div., 600 Monsanto Ave., Springfield 2, Mass.—"Fibestos," "Lustron," "Opalon," Resinox"—C, CN, M, PH, P, V

National Vulcanzied Fibre Co., Maryland Ave., & Beech St., Wilmington 99, Del.—"Phenolite"—L

Nixon Nitration Works, Nixon, N. J.—"Nixonite"—C, CN, EC

Nixonite—Nixon Nitration Works

Norton Laboratories, Inc., 560 Mill St., Lockport, N. Y.—A, C, EC, PH, P, U, V

Ohmoid—Wilmington Fibre Specialty Co.

Opalon—Monsanto Chemical Co.

Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo 1, Ohio—L

Panelyte—St. Regis Paper Co.

Parisian Novelty Co., 3510 South Western Ave., Chicago 9, Ill.—A, C, CN, L, M, PH, U

Penn Fibre & Specialty Co., 2024 to 2030 E. Westmoreland St., Philadelphia 34, Pa.—L

Pennsylvania Coal Products Co., Petrolia, Pa.—PH

Phenolite—National Vulcanized Fibre Co.

Plastacele—E. I. DuPont de Nemours & Co., Inc.

Plastic Fabricators Co., 440 Sansome St., San Francisco 11, Calif.—C, V

Plax Corporation, 133 Walnut St., Hartford 5, Conn. —C, CB, EC, P

Plexiglas—Rohm & Haas Co.

Precision Paper Tube Co., 2035 W. Charleston St., Chicago 47, Ill.—C, EC, P

Pyralin—E. I. DuPont de Nemours & Co., Inc

Reichhold Chemicals, Inc., 601 Woodward Heights Blvd., Detroit 20, Mich.—PH

Reilley Tar & Chemical Corp., 1617 Merchants Bank Bldg., Indianapolis 4, Ind.—"Indur"—PH

Resinox—Monsanto Chemical Co.

Resistoflex Corp., 39 Plansoen St., Belleville, N. J.—V

Richardson Co., 27th & Lake Sts., Melrose Park, Ill.—"Insurok"—L

Rogers Corporation, Mill & Oakland Sts., Manchester, Conn.—PH

Rohm & Haas Co., Washington Square, Philadelphia 5, Pa.—"Plexiglas"—A

St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.—"Panelyte"—L, M, PH, U

Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—CN, EC, P, V

Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—P

Shawinigan Products Corp., 350 Fifth Ave., New York, N. Y.—"Alvar," "Butvar," "Formvar"—V

Sillcocks-Miller Co., 10 West Parker Ave., Maplewood, N. J.—L

Spaulding Fibre Co., 310 Wheeler St., Tonawanda, N. Y.—"Spauldite"—C

Spauldite—Spaulding Fibre Co.

Special Chemicals Co., 1545 E. 18th St., Cleveland 14, Ohio—PH, V

Standard Products Co., 505 Blvd. Bldg., Detroit 2, Mich.—A, AF, CR, C, CB, CN, EC, L, M, PH, P, U, V

Stokes Rubber Co., Joseph, Trenton, N. J.—C., P

Styron—Dow Chemical Co.

Synthane Corp., Oaks, Pa.—"Synthane"—L, M, PH

Taylor Fibre Co., Norristown, Pa.—L

Tenite—Tennessee Eastman Corp.

Tennessee Eastman Corp., Kingsport, Tenn.—"Tenite" —C

Textolite—General Electric Co., Plastics Div.

Tingstol Co., 1461 W. Grand Ave., Chicago 22, Ill.—A, L

United Radio Mfg. Co., 191 Greenwich St., New York, N. Y.—PH

Varflex Corp., N. Jay St., Rome, N. Y.—V

Vinylite—Bakelite Corp.

Vinylseal—Bakelite Corp.

Vinyon—Bakelite Corp.

Vulcoid—Continental-Diamond Fibre Co.

Western Lithograph Co., 600 E. 2nd St., Los Angeles 54, Calif.—L

Westinghouse Elec. Corp., East Pittsburgh, Pa.—"Micarta"—L, M, PH, S, U

Wilmington Fibre Specialty Co., P. O. Drawer 1028, Wilmington 99, Del.—"Ohmoid"—L, PH

(28) Plastic Molders and Fabricators

Cabinet molders C
Extruded shapes .... E
Fabricators .... F
Parts molders .... P

A.B.C. Products Inc., 2131 Stoner Ave., West Los Angeles 25, Calif.—F

Adrem Co., 143 Newbury St., Boston 16, Mass.—P

Airtronics Development Corp., 131-133 E. 3rd St., Dayton 2, Ohio—P

Alden Products Co., 117 N. Main St., Brockton 64, Mass.—P

Allmetal Screw Products Co., 33 Greene St., New York 13, N. Y.—P

American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.—P

American Insulator Corp., New Freedom, Pa.—C, P

Anchor Plastics Co., 541 Canal St., New York, N. Y. —E

Atlas Products Corp., 30 Rockefeller Plaza, New York 20, N. Y.— C, E, F, P

Auburn Button Works, Inc., Auburn, N. Y.—C, E, P

Baer Co., N. S., 9-11 Montgomery St., Hillside, N. J. —F

Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.—"Bakelite"—P

Barker & Williamson, Upper Darby, Pa.—F

Bastian Bros. Co., 1600 N. Clinton Ave., Rochester, N. Y.—F

B & C Insulation Products Inc., 261 Fifth Ave., New York, N. Y

Bend-A-Lite Plastics Div., 423 S. Honore St., Chicago 12, Ill.—F

Boonton Molding Co., 326 Myrtle Ave., Boonton, N. J. —F, P

Brilhart Ltd., Arnold, 435 Middle Neck Rd., Great Neck, L. I., N. Y.—F, P

Burke Electric Co., 12th and Cranberry, Erie, Pa.—P

Burton Mfg. Co., 3855 N. Lincoln Ave., Chicago 13, Ill.—P

Carter Products Corp., 6921 Carnegie Ave., Cleveland 3, Ohio—E

Celluplastic Corp., 50 Ave., L., Newark, N. J.—E, F, P

Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.—E

Chicago Die Mold Corp., 4001 Wrightwood Ave., Chicago 39, Ill.—C, P

Chicago Molded Products Corp., 1020 N. Kolmar Ave., Chicago 51, Ill.—C, P

Cinch Mfg. Corp., Div. United-Carr Fastener Co., 2335 W. Van Buren St., Chicago, Ill.—E, F, P

Cleveland Plastics Inc., 1611 E. 21st St., Cleveland 14, Ohio—P

Colonial Kolonite Co., 2214 Armitage Ave., Chicago 47, Ill.—F

Consolidated Molded Products Corp., 309 Cherry St., Scranton 2, Pa.—C, P

Continental-Diamond Fibre Co., Newark 50, Del.—F, P

Cournand & Co., E. L., 3835 Ninth Ave., New York 34, N. Y.—F

Creative Plastics Corp., 963 Kent Ave., Brooklyn 5, N. Y.—C, F

Crowley & Co., Inc., Henry L., 1 Central Ave., West Orange, N. J.—E, P

Davies Molding Co., Harry, 1428 N. Wells St., Chicago 10, Ill.—C, F, P,

Davis Plastics Co., Joseph, Arlington, N. J.—EP

Dayton Insulating Molding Co., Dayton, Ohio—P

Diemolding Corp., Rasbach St., Canastota, N. Y.—P

Dillon Beck Mfg. Co., 103 Montgomery Ave., Irvington 11, N. J.—P

Eclipse Moulded Products Co., 5150 N. 32nd St., Milwaukee 9, Wis.—C, E, F, P

Edwards, Inc., T. J., 210 South St., Boston 5, Mass. —F

Electric Coding Machine Co., 57 Franklin St., New York 13, N. Y.—F

Electrical Insulation Co., Inc., 12 Vestry St., New York 13, N. Y.—F

Electronic Mfg. Co., 339-347 W. 8th Ave., Dubuque, Iowa—F

Electronic Processes Corp., 249 Richards Rd., Ridgewood, N. J.—F

Emeloid Co., Inc., Arlington, N. J.—F, P

Felsenthal, G., & Sons, 4108 W. Grand, Chicago 51, Ill.—F, P

Franklin, A. W., Mfg. Corp., 175 Varick St., New York 14, N. Y.—F, P

Franklin Fibre-Lamitex Corp., Wilmington, Del.—F

Gemloid Corp., 7910-7930 Albion Ave., Elmhurst, L. I., N. Y.—"Gemute"—E, F, P

Gemute—Gemloid Corp.

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—E

General Electronic Chemical Dept., Plastics Div., 1 Plastics Ave., Pittsfield, Mass.—E, P

General Industries Co., Taylor & Olive Sts., Elyria, Ohio—P

General Laminated Products, Inc., 2357 S. Halsted St., Chicago 8, Ill.—F
Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—E, P
Grayhill, 1 N. Pulaski Rd., Chicago 24, Ill.—P
Hawley Products Co., 333-339 N. 6th St., St. Charles, Ill.—C
Heath Co., 305 Territorial, Benton Harbor, Mich.—F
Hopp Press, Inc., 460 W. 34th St., New York 1, N. Y. —E, F, P
Howard Mfg. Corp, 1401 S. Main St., Council Bluffs, Iowa—C, P
Imperial Molded Products Corp., 2925 W. Harrison St., Chicago 12, Ill.—P
Industrial Fabricators, Inc., 1890 Carter Rd., Cleveland 13, Ohio—F
Industrial Molded Products Co., 2035 Charleston St., Chicago, Ill.—P
Industrial Synthetics Corp., 60 Woolsey St., Irvington 11, N. J.—"Synflex"—E
Insulating Tube Co., Inc., 26 Cottage St., P. O. Box 1, Poughkeepsie, N. Y.—E
Insulation Mfg. Co., 11 N. Y. Ave., Brooklyn 16, N. Y. —P
Insurok—Richardson Co.
International Products Corp., 2254 Greenmount Ave., Baltimore 18, Md.—F
Irvington Varnish & Insulator Co., 50 Argyle Terrace, Irvington 11, N. J.—E, F
Jorgensen Mfg. Co., 1547 W. Farms Rd., New York 60, N. Y.—F
Keasby & Mattison Co., Ambler, Pa.—P
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—P
Keystone Electronics Co., 50-52 Franklin St., New York 13, N. Y.—F
Kirk Molding Co., 142 Brook St., Clinton, Mass.—P
Klise Mfg. Co., 50 Cottage Grove St., S. W., Grand Rapids 2, Mich.—F
Kulka Electric Mfg. Co., Inc., 30 South St., Mt. Vernon, N. Y.—F, P
Kurz Kasch, Inc., Dayton 1, Ohio—C, P
LaRose, W. T., & Associates, 635 2nd Ave., Troy, N. Y.—P
Long Island Engraving Co., 19 W. 21st St., New York 10, N. Y.—F
Mack Molding Co., Wayne, N. J.—E, C, P
Maico Co., Inc., 21 N. Third St., Minneapolis 1, Minn.—C, E, F, P
Mastercraft Plastics Co., Inc., 95-01 150th St., Jamaica 4, N. Y.—F
Mayfair Molded Products Corp., 4440 N. Elston Ave., Chicago 30, Ill.—P
McInerney Plastics Co., 25 Commerce Ave., S. W., Grand Rapids 2, Mich.—FI
Metaplast Co., 205 W. 19th St., New York 11, N. Y. —F
Micarta Fabricators, Inc., 5324 Ravenswood Ave., Chicago 40, Ill.—F
Mills Corp., Elmer E., 153 W. Huron St., Chicago, Ill. —EP
Mitchell Rand Insulation Co., 51 Murray St., New York 7, N. Y.—E
Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—C, P
Mycalex Corp. of America, 60 Clifton Blvd., Clifton, N. J.—P
National Co., Inc., 61 Sherman St., Malden 48, Mass. —E
National Fabricated Products, 2650 W. Belden Ave., Chicago 47, Ill.—I
National Lock Co., 1902 Seventh St., Rockford, Ill. —C, P
National Molding Co., 2141 W. Washington Blvd., Los Angeles 7, Calif.—F, P
National Varnished Products Corp., 211 Randolph Ave., Woodbridge, N. J.—E
National Vulcanized Fibre Co., Maryland Ave. & Beech St., Wilmington 99, Del.—F
New England Radiocrafters, 1156 Commonwealth Ave., Boston 34, Mass.—F
Niagara Insul Bake Specialty Co., Inc., 483 Delaware Ave., Albany, N. Y.—P
Northeastern Plastics, 588 Commonwealth Ave., Boston 15, Mass.—P
Northern Industrial Chemical Co., 7-11 Elkins St., South Boston 27, Mass.—C, P
Norton Laboratories, Inc., 560 Mill St., Lockport, N. Y. —C, P
Olek, A. & Son, Inc., 4757-59 Melrose St., Philadelphia 37, Pa.—F
Oris Mfg. Co., Inc., Jackson St., Thomaston, Conn.—P
Panelyte—St. Regis Paper Co.
Parisian Novelty Co., 3510 S. Western Ave., Chicago 9, Ill.—F
Patent Button Co., 41 Brown St., Waterbury 88, Conn. —P
Peerless Roll Leaf Co., Inc., 4511 New York Ave., Union City, N. J.—F
Plastex Corp., 402 Mt. Vernon Ave., Columbus 3, Ohio —E, F
Plastic Accessories, Inc., 460 Broome St., New York 13, N. Y.—F
Plasticraft Products Co., 10 Hudson St., New York, N. Y.—F, P
Plastic Fabricators Co., 440 Sansome St., San Francisco 11, Calif.—F
Plastic Manufacturers, Inc., Fairfield Ave., Stamford, Conn.—P
Plastikmould—R. D. Werner Co., Inc.
Plastiktrim—R. D. Werner Co., Inc.
Plastoid Corp, 19 W. 44th St., New York 18, N. Y.—E
Plax Corp., 133 Walnut St., Hartford 5, Conn.—E, F
Plymold Corp., Lawrence, Mass.—F
Ports Mfg. Co., 3265 E. Belmont Ave., Fresno 3, Calif. —F
Precision Radio Co., 210-220 N. Western Ave., Los Angeles 4, Calif.—E, F, P
Printloid, Inc., 93 Mercer St., New York 12, N. Y.—F
Quad Mfg. Co., 462 N. Parkside Ave., Chicago 44, Ill. —F
Racon Electric Co., Inc., 52 E. 19th St., New York 3, N. Y.—E, F
R. E. C. Mfg. Corp., 1250 Highland St., Holliston, Mass. —F, P
Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—"Remler"—C, E, F, P
Rice's, Bernard Sons, 325 Fifth Ave., New York 16, N. Y.—F
Richardson Co., Melrose Park, Melrose Park, Ill.—"Insurok"—C, E, F, P
Rogan Bros., 2001 S. Michigan Ave., Chicago, Ill.—P
Rohden Mfg. Co., 1753 N. Honore St, Chicago 22, Ill. —P
Royal Moulding Co., 69 Gordon Ave., Providence 5, R. I.—P
St. Regis Paper Co., 230 Park Ave., New York 17, N. Y. —"Panelyte"—F, P
Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—E
Santay Corp., 351 N. Crawford Ave., Chicago 24, Ill. —C, P
Schott, Walter L. Co., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"Walsco"—E
Sillcocks-Miller Co., 10 W. Parker Ave., Maplewood, N. J.—F
Slater, N. G. Corp., 3 W. 29th St., New York, N. Y.—F
Spaulding Fibre Co., Inc., 310 Wheeler St., Tonawanda, N. Y.—F
Special Electric Labs., 7657 S. Central Ave., Los Angeles 1, Calif.—F
Sponge Rubber Products Co., Shelton, Conn.—P
Standard Molding Corp., 460 Bacon St., Dayton 1, Ohio—C, F, P
Standard Products Co., 505 Blvd. Bldg., Detroit 2, Mich.—C, E, F, P
Standard Technical Devices, Inc., 129 Livingston St., Brooklyn 2, N. Y.—F
Stedman, Robert L., E. Main St., Oyster Bay, N. Y.—F
Stricker-Brunhuber Co., 19 W. 24th St., New York 10, N. Y.—E
Synflex—Industrial Synthetics Corp.
Synthane Corp., Oaks, Pa.—F, P
Syracuse Ornamental Co., 581 S. Clinton St., Syracuse 2, N. Y.—C, P
Taylor Fibre Co., Norristown, Pa.—F, P
Tech Art Plastics Co., 41-01 36th Ave., Long Island City, N. Y.—C, E, P
Traver Corp., 358-368 W. Ontario St., Chicago 10, Ill.—F
Trimm, Inc., 1770 W. Berteau Ave., Chicago 13, Ill.—P
Tri-United Corp., 390 Nye Ave., Irvington 11, N. J. —C, P
Ucinite Co., Div. United-Carr Fastener Corp., Newtonville, Mass.—E, F, P
Union Insulating Co., Box 351, Parkersburg, W. Va.—P
U. S. Plastics Corp., 1752 W. Grand Ave., Chicago, Ill. —C, F, P
Universal Plastics Corp., New Brunswick, N. J.—C, F, P
Varflex Corp., N. Jay St., Rome, N. Y.—E
Victory Mfg. Co., 1722-24 W. Arcade Pl., Chicago 12, Ill.—C, P
Vidal Research Corp., Central Airport, Camden 1, N. J.—C
Walsco—Walter L. Schott Co.
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—C, P
Welsh, Wm. H. Co., 2241 S. Indiana Ave., Chicago 16, Ill.—P
Wernco—R. D. Werner Co., Inc.
Werner, R. D. Co., Inc., 295 Fifth Ave., New York 16, N. Y.—"Wernco"—"Plastiktrim"—"Plastikmould" —E, P
Westinghouse Elec. Corp., East Pittsburgh, Pa.—F, P
Wheeling Stamping Co., Wheeling, W. Va.—P
White, S. S. Dental Mfg. Co., Industrial Div., 10 E. 40th St., New York, N. Y.—P
Willson Plastics Division, Willson Magazine Camera Co., 6022 Media St., Philadelphia 31, Pa.—C, E, F, P
Wilmington Fibre Specialty Co., P. O. Drawer 1028, Wilmington 99, Del.—E, F
Windman Bros., 3325 Union Pacific Ave., Los Angeles 23, Calif.—C, P

This Directory Is Double-indexed

***Product Index*—refers you to the page on which manufacturers in a certain category are listed.**

***Alphabetical Index*—gives you a complete "Finding List" and refers you to the main classification under which a manufacturer is listed.**

(29) Power Rectifier Systems & Vibrators

Battery eliminators	BE
Electronic tube rectified	VT
Hand cranked units	HC
Inverters	INV
Mercury arc	MA
Metallic rectifiers	M
Rectifier power units	PU
Vibrator freq. changers	VF
Vibrator power packs	VP
Vibrators	V
Voltage regulators	VR

Aarons Radio Corp., 125 E. 46th St., New York 17, N. Y.—PU
Acme Electric & Mfg. Co., Cuba, N. Y.—VP
Acme Fire Alarm Co., Inc., 106 Seventh Ave., New York 11, N. Y.—M
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass. —VF, VP, V
Airplane & Marine Instruments, Inc., Clearfield, Pa.—BE, VT, PU, VP
Airtronics Development Corp., 131-133 E. 3rd St., Dayton 2, Ohio—BE, VT, PU
Ameco—American Electronics
American Commmunications Corp., 306 Broadway, New York, N. Y.—BE, VT, VR
American Electronics, 37 E. 18th St., New York 3, N. Y.—"Ameco"—VT, PU, VR
American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—VT, INV, M, PU, VR
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—BE, INV, M, PU, VF, VP, V
American Transformer Co., Inc., 178 Emmet St., Newark 5, N. J.—VT, PU, VR
Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—INV, PU, VR
Apex Electric Mfg. Co., 1070 E. 152nd St., Cleveland, Ohio—INV
Applied Research Laboratories, 4336 San Fernando Rd., Glendale 4, Calif.—PU, VR
Auto Radio Filterpac—Benwood Linze Co.
Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—BE
Barker & Williamson, Upper Darby, Pa.—VT, MA, PU
Benwood Linze Co., 1815 Locust St., St. Louis 3, Mo. —"Auto Radio Filterpac"—"B-L"—BE, M, PU
B-L—Benwood Linze Co.
Boonton Radio Corp., 518 Main St., Boonton, N. J. —PU
Bradley Laboratories, Inc., 82 Meadow St., New Haven 10, Conn.—M
Brelco Corp., 55 VanDam St., New York 13, N. Y. —VT, M, PU
Bunnell, J. H. & Co., 81 Prospect St., Brooklyn 1, N. Y.—PU
Burlington Instrument Co., N. Fourth St., Burlington, Iowa—VR
Carter Motor Co., 1608 Milwaukee Ave., Chicago 47, Ill.—HC, INV
Collins Radio Co., Cedar Rapids, Iowa—PU
Communication Measurements Laboratory, 120 Greenwich St., New York 6, N. Y.—VT
Communications Co., Inc., 300 Greco Ave., Coral Gables 34, Fla.—PU, VP
Conannt Electrical Laboratories, 6500 "O" St., Lincoln 5, Nebr.—M
Connecticut Telephone & Electric, Div. Great American Industries, Inc., Meriden 3, Conn.—BE, PU
Control Corp., 718 Central Ave., Minneapolis 14, Minn. —VR
Dietert, Harry W. Co., 9330 Roselawn Ave., Detroit 4, Mich.—VR
Drake, R. L. Co., 11 Longworth St., Dayton 2, Ohio —PU
Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—BE, VT
Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.—INV, VR
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill. —INV
Eleco—Electron Equipment Corp.
Electric Specialty Co., 214 South St., Stamford, Conn. —"Esco"—INV
Electrical Facilities, Inc., 4224 Holden St., Oakland 8, Calif.—"Rexselen"—M, PU
Electricoil Transformer Co., 421 Canal St., New York 13, N. Y.—BE, VT, M, PU
Electro Products Laboratory, 549 W. Randolph St., Chicago 6, Ill.—BE, VT, VP
Electron Equipment Corp., 917 Meridian Ave., So. Pasadena, Calif.—"Eleco"—VT, INV, MA, PU, VR
Electronic Control Corp., 1573 E. Forest Ave., Detroit, Mich.—VT
Electronic Enterprises, Inc., 65-67 Seventh Ave., Newark 4, N. J.—VT
Electronic Laboratories, Inc., 122 W. New York St., Indianapolis 4, Ind.—"Portapack", "Portapower"—INV, PU, VF, VP, V
Electronic Measurements Co., Red Bank, N. J.—BE, PU, VP, VR

Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—VP

Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—PU, VP, VR

Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—BE, VR

Electro-Tech Equipment Co., 331 Canal St., New York 13, N. Y.—VR

Fansteel Metallurgical Corp., 2200 Sheridan Rd., North Chicago, Ill.—BE, M, PU

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—BE, M, PU, VP, V

Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—BE, PU, VR

Ferris Instrument Co., 110 Cornelia St., Boonton, N. J. "Ferris"—VP

Fisher Research Laboratory, 1961 University Ave., Palo Alto, Calif.—VP

Flashtron—Thordarson Electric Mfg. Co.

Franklin Transformer Mfg. Co., 65 22nd Ave., N. E., Minneapolis 13, Minn.—M

Freed Transformer Co., 72 Spring St., New York 12, N. Y.—VR

Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—VR

General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—VT, PU, VP, VR

General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.—VT, M, VR

General Electric Co., Transmitter Div., Thompson Rd. Plant, Syracuse, N. Y.—PU

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—BE, PU

General Transformer Corp., 1250 W. Van Buren St., Chicago 7, Ill.—PU, VP

Gibbs, Thomas B. & Co., Delavan, Wis.—INV

Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—PU

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—PU

Green, W. Electric Co., Inc., 130 Cedar St., New York 6, N. Y.—VT, M, PU

Hannon Electric Co., 1605 Waynesburg Rd., S. E., Canton, Ohio—VT, M

Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—VR

Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—BE, VT, PU

Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—BE, PU

Holtzer-Cabot, Div. First Industrial Corp., 125 Amory St., Roxbury 19, Mass.—INV, VR

Horni Signal Mfg. Corp., 421 W. 54th St., New York 19, N. Y.—BE, M, PU, VR

Howard Pacific Corp., 932 N. Western Ave., Los Angeles 27, Calif.—VT

James Vibrapowr Co., 1551 Thomas St., Chicago 22, Ill.—VP, V

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—V

Kurman Electric Co., 35-18 37th St., Long Island City, N. Y.—V

Langevin Co., Inc., 37 W. 65th St., New York 23, N. Y.—VT, PU

LaRose, W. T. & Associates, 635 Second Ave., Troy, N. Y.—PU, VR

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.—INV

Link, Fred M., 125 W. 17th St., New York 11, N. Y.—VP

Lyman Electronic Corp., 12 Cass St., Springfield, Mass. —VT, PU, VR

Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—VP

Mallory, P. R. & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind.—"Mallory Dry Disc"—BE, M, PU, VP, V

Mallory Dry Disc—P. R. Mallory & Co., Inc.

Mattern, F., Mfg. Co., 4647 N. Cicero Ave., Chicago 30, Ill.—VT

McColpin-Christie Corp., 4922 S. Figueroa St., Los Angeles 37, Calif.—VT, M

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—PU

Mellaphone Corp., 1462 E. Main St., Rochester 2, N. Y.—BE, VT, MA, PU

Mohawk Electric Mfg. Co., 60-62 Howard St., Irvington 6, N. J.—M, PU

Moulic Specialties Co., 1005-1007 W. Washington St., Bloomington, Ill.—VT

M & Z Industrial Development Co., 32 W. 12th St., Bayonne, N. J.—PU, VR

National Co., Inc., 61 Sherman St., Malden 48, Mass. —BE, PU, VP

North Electric Mfg. Co., Box 417, Galion, Ohio—BE, M

Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—VT

Oak Mfg. Co., 1260 Clybourn Ave., Chicago 10, Ill. —"Oak"—INV, VP, V

Pioneer Gen-E-Motor Co., 5841 Dickens Ave., Chicago 39, Ill.—INV

Point Mfg. Co., 5775 N. Ridge Ave., Chicago 26, Ill. —BE, M

Portapower—Electronic Laboratories, Inc.

Portapack—Electronic Laboratories, Inc.

Precision Electronics Co., 815 Washington St., Newtonville 60, Mass.—VT, PU, VR

Radiart Corp., 3571 W. 62nd St., Cleveland 2, Ohio —"Vipower"—VT, VP, V

Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N. Y.—M

Radionic Controls, 8758 Belmont Ave., Chicago 18, Ill.—VR

Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass. —"Rectifilter"—BE, VT, PU, VR

Ready Power Co., 3826 Grand River Ave., Detroit, Mich.—PU

Rectifier Engineering Co., 1809 E. 7th St., Los Angeles 21, Calif.—VT, M, PU

Rectifilter—Raytheon Mfg. Co.

Rexselen—Electrical Facilities, Inc.

Richardson-Allen Corp., 15 W. 20th St., New York, N. Y.—INV, VT, BE, M, PU, VR

Russell Electric Co., 364 W. Huron St., Chicago 11, Ill.—INV

Schauer Machine Co., 2060 Reading Rd., Cincinnati 2, Ohio—BE, M, PU

Schuttig & Co., Ninth & Kearny Sts., N. E., Washington 17, D. C.—PU

Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—PU

Setchell Carlson, Inc., 2233 University Ave., St. Paul 4, Minn.—V

Small Motors, Inc., 1322 Elston Ave., Chicago 22, Ill. —INV

Sorensen & Co., Inc., 375 Fairfield Ave., Stamford, Conn.—VR

Sorgel Electric Co., 838 W. National Ave., Milwaukee 4, Wis.—VT, MA, M, PU

S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—VR

Stancor—Standard Transformer Corp.

Standard Transformer Corp., 1500 N. Halsted St., Chicago 22, Ill.—"Stancor"—BE, VT, M, PU

States Co., 19 New Park Ave., Hartford 6, Conn.—VR

Stephens Mfg. Co., 10416 National Blvd., Los Angeles 34, Calif.—PU

Takk Corp., 28 W. Market St., Newark, Ohio—VT

Technical Apparatus Co., 1171 Tremont St., Boston 20, Mass.—VT

Teleregister Corp., 157 Chambers St., New York 7, N. Y.—PU

Thermionic Engineering Corp., 32 W. 12th St., Bayonne, N. J.—PU

Thompson, John E., Co., 1440 W. 47th St., Chicago 9, Ill.—VT

Thordarson Electric Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—"Flashtron" —VR

Union Switch & Signal Co., Swissvale, Pa.—INV

U. S. Television Corp., 106 Seventh Ave., New York 11, N. Y.—VT, PU, VR

United Transformer Corp., 150 Varick St., New York 13, N. Y.—BE, VR

Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—V

Viber Co., 726 S. Flower St., Burbank, Calif.—V

Vipower—Radiart Co.

Vokar Corp., 7300 Huron River Drive, Dexter, Mich. —V

Ward Leonard Electric Co., 31 South St., Mt. Vernon, N. Y.—VR

Weltronic Co., 19500 W. Eight Mile Rd., Detroit 19, Mich.—BE, VT, VR

Westinghouse Elec. Corp., East Pittsburgh, Pa.—BE, VT, MA, M, PU, VR

Wincharger Corp., E. 7th at Division, Sioux City 6, Iowa—INV

(30) Radar Devices

Altimeters (electronic) .... AL
Aircraft Landing Control .... ALC
Marine Navigational .... MN
Plan-Position Indicators .... PPI
Proximity Indicators .... PI
Receivers (RCM, Razon, X Band) .... R
Repeaters .... RP
Oscilloscopes (Radar) .... O

Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—ALC

American Electronics, 37 E. 18th St., New York 3, N. Y.—AL

Bendix Radio Division, Bendix Aviation Corp., E. Joppa Rd., Baltimore 4, Md.—ALC

Bludworth Marine, Div. National-Simplex-Bludworth, Inc., 100 Gold St., New York 7, N. Y.—MN

DeMornay-Budd, Inc., 475 Grand Concourse, New York 51, N. Y.—MN

DuMont Laboratories, Inc., Allen B., 2 Main Ave., Passaic, N. J.—O, PPI, RP

Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, L. I., N. Y.—R

Farnsworth Telev. & Radio Corp., 3700 Pontiac St., Ft. Wayne, Ind.—R

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—R

Galvin Mfg. Corp., 4545 Augusta Blvd., Chicago 51, Ill.—R

General Electric Co., 1 River Rd., Schenectady 5, N. Y. —R

Gilfillan Bros., Inc., 1815 Venice Blvd., Los Angeles 6, Calif.—ALC

Hallicrafters Co., 2611 Indiana Ave., Chicago, Ill.—R

Hazeltine Electronics Corp., 1775 Broadway, New York, N. Y.—R

Panoramic Radio Corp., 242-250 W. 55th St., New York 19, N. Y.—PI

Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—ALC, PI, R

Radio Mfg. Engineers, Inc., 300-306 First Ave., Peoria 6, Ill.—R

Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass. —R

RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—R

Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y.—ALC, MN

Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y.—R

Submarine Signal Co., 160 State St., Boston, Mass.—R

U. S. Television Mfg. Corp., 106 Seventh Ave., New York 11, N. Y.—ALC, PI, R, O, RP, PPI

Western Electric Co., 195 Broadway, New York 7, N. Y.—R

Westinghouse Electric Corp., 300 W. Baltimore St., Baltimore 3, Md.—R

(31) Receivers, Home & Commercial

Amateur .... A
Automobile .... AU
Battery portable .... BP
Camera portable .... CP
Construction kits .... CK
Facsimile (home) .... FH
Farm .... F
FM-AM home combinations .... FM
FM Converters .... FV
Phono-radio combinations .... PR
Receivers, AM-FM .... FM
Recorder-radio combinations .... RC
Television combinations .... TC
Television converters .... TV

Automatic alarm .... AL
Aviation .... AN
Communication (AM) .... CA
Communication (FM) .... CF
Direction finding .... DF
Facsimile (radiophoto) .... FR
Fixed frequency .... FF
Marine .... M
Panoramic .... PN
Police .... PL
Railroad .... RR

In checking with manufacturers, we find that practically all manufacturers of home receivers are planning to produce both AM and FM; hence these types of receivers are not given separate classifications. Both types are designated by the symbol FM. However, when AM or FM is combined with phonographs or television, separate symbols are used for each.

Abbott Instrument, Inc., 8 W. 18th St., New York, N. Y.—CA

Admiral Corp., 3800 Cortland St., Chicago, Ill.—"Admiral"—FM, FV, PR, TC

Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—DF, FM, FV

Aireon Corp., Fairfax & Funston Rds., Kansas City, Kans.—PR

Air King Prod. Co., Inc., 1523 63rd St., Brooklyn, N. Y.—"Air King," "Pathe"—FM, FV, PR, TC

Airplane & Marine Instruments, Inc., Clearfield, Pa. —AN, DF, M, RR, AU, A

Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill.—CK, PR

American Communications Corp., 306 Broadway, New York, N. Y.—"American"—FM, FV, PR

American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—PR, CA, CF, FF

Andrea Radio Corp., 43-20 34th St., Long Island City, N. Y.—"Andrea"—FM, FV, PR, TC

Ansley Radio Corp., 21-10 49th Ave., Long Island City, N. Y.—"Ansley Dynaphone", "Ansley Dynatone"—FM, FV, PR, TC

Aolian—Radio Process Co.

Arcadia—Wells-Gardner & Co.
ARF Products, 7713 Lake St., River Forest, Ill.—FM, FV, PR
Arvin—Noblitt-Sparks Industries, Inc.
Autocrat Radio Co., 3855 N. Hamilton Ave., Chicago, Ill.—FM, FV, PR
Automatic Radio Mfg. Co., Inc., 122 Brookline Ave., Boston, Mass. "Automatic", "Tom Thumb"—FM, FV, PR
Automestic—Industrial Tool & Dye Works, Inc.
Aviola Radio Corp., 703 Ivy St., Glendale, Calif.—"Aviola"—FM, FV, PR, TV, A
Bassett, Inc., Rex, 311 N.W. 1st Ave., Fort Lauderdale, Fla.—AN, M, PL
Bell Radio & Television, 125 E. 46th St., New York 17, N. Y.—FM, FV, PR, TC
Belmont Radio Corp., 5921 W. Dickens Ave., Chicago, Ill.—"Belmont"—FM, FV, PR, TC, AU
Bendix Radio, Div. of Bendix Aviation Corp., East Joppa Rd., Baltimore, Md.—"Bendix Radio"—FM, FV, PR, TC, AN, CA, DF, FF, RR
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, No. Hollywood, Calif.—CA
Biltmore Radio Corp., 15 Ave. A, New York 3, N. Y.—BP, FM, FV, PR, RC, TC
Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—FM, FV, PR, TC, FF, A
Brunswick-Panatrope—Brunswick Radio & Telev. Div., Radio & Telev., Inc.
Brunswick Radio & Telev. Div., Radio & Television, Inc., 244 Madison Ave., New York 16, N. Y.—PR, TC
Calbest—V-lectrical Engineering Co.
Calvert Motors Associates, Ltd., 26 E. 25th St., Baltimore 18, Md.—AU, BP, PR
Capehart Div., Farnsworth Telev. & Radio Corp., 3700 Pontiac St., Fort Wayne, Ind.—"Capehart", "Capehart-Panamuse"—FM, FV, PR
Clarion—Warwick Mfg. Corp.
Collins Radio Co., 2920 First Ave., Cedar Rapids, Iowa—CA, M, A
Colonial Radio Corp., 254 Rano St., Buffalo, N. Y.—FM, FV, PR, TC, AU
Columbia Electronic, Inc., 185 E. 122nd St., New York, N. Y.—FM, FV, PR
Comco—Communications Co., Inc.
Communications Co., Inc., 300 Greco Ave., Coral Gables 34, Fla.—"Comco"—AN, CA, FF, RR
Communications Equipment Corp., 134 W. Colorado St., Pasadena 1, Calif.—CA, M, PL
Concert Master Radio & Tel. Co., 1800 Winnemac Ave., Chicago, Ill.—FM, FV, PR
Concord Radio Corp., 901 W. Jackson Blvd., Chicago 7, Ill.—PR, FM, FV
Coronet—Crystal Products Co.
Coronet Radio & Television Corp., Front St., Hempstead, L. I., N. Y.—FM, FV
Crosley Corp., 1329 Arlington St., Cincinnati, Ohio—FM, FV, PR, TC
Crystal Products Co., 1519 McGee Trafficway, Kansas City, Mo.—"Coronet"—FM, FV
Delco Radio, Div. of General Motors Corp., Kokomo, Ind.—"Delco Radio"—FM, FV, AU
DeWald Radio Mfg. Corp., 440 Lafayette St., New York, N. Y.—"DeWald"—FM, FV, PR, TC
DuMont Laboratories, Inc., Allen B., 2 Main Ave., Passaic, N. J.—"Dumont", "Teleset"—PR, TC
Dynaphone—Ansley Radio Corp.
Dynatone—Ansley Radio Corp.
Dynavox Corp., 40-35 21st St., Long Island City, N. Y.—FM, FV, PR
Eca Radio—Electronic Corp. of America
Echophone Radio Co., 2611 S. Indiana Ave., Chicago, Ill.—"Echophone"—FM, FV, PR, TC, AU, A
Eckco—Eckstein Radio & Television Co.
Eckstein Radio & Television Co., 1400 Harmon Pl., Minneapolis, Minn.—"Eckco", "Karadio", "L'Tatro"—FM, FV, PR, AU
Electrical Research & Mfg. Co., 3001 E. Pico Blvd., Los Angeles, Calif.—"Ermco"—FM, FV, PR
Electromatic Mfg. Co., 88 University Pl., New York, N. Y.—"Electromatic"—FM, FV, PR
Electronic Corp. of America, 45 W. 18th St., New York, N. Y.—"Eca Radio"—FM, FV, PR, TC
Electronic Devices Co., 601 W. 26th St., New York, N. Y.—FM, FV, PR, TC
Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—AN, DF
Electronic Engineers, 611 E. Garfield Ave., Garfield 5, Calif.—CA
Electronix—Megard Corp.
Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—BP, CP, F, PR, TC, FM, FV
Ermco—Electrical Research & Mfg. Co.
Espey Mfg. Co., Inc., 33 W. 46th St., New York, N. Y.—FM, FV, PR, TC
Fada Radio & Electric Mfg. Co., Inc., 30-20 Thomson Ave., Long Island City 1, N. Y.—"Fada"—F, FM, FV, PR, RC, TC
Farnsworth Television & Radio Corp., Fort Wayne 1, Ind.—"Farnsworth", "Capehart", "Capehart-Panamuse"—RR, FM, FV, PR, TC
Federal Telephone & Radio Corp., 591 Broad St., Newark, N. J.—"Federal"—FM, FV, PR, TC, AU, A
Finch Telecommunicatons, Inc., 10 E. 40th St., New York 16, N. Y.—FH
Fisher Radio Co., 41 E. 47th St., New York, N. Y.—FM, FV, TC, PR
Flush Wall Radio Co., 15 Washington St., Newark, N. J.—FM, FV
Franklin Photographic Industries, 223 W. Erie St., Chicago, Ill.—"Musitron"—PR
Freed-Eisemann—Freed Radio Corp.
Freed Radio Corp., 200 Hudson St., New York, N. Y.—"Freed-Eisemann"—FM, FV, PR, TC
Galvin Mfg. Corp., 4545 Augusta Blvd., Chicago, Ill.—"Motorola"—FM, FV, PR, TC, AU, A
Garod Radio Corp., 70 Washington St., Brooklyn, N. Y.—FM, FV, PR, TC
General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—DF
G-E—General Electric Co.
General Electric Co., Bridgeport, Conn.—"G-E"—FM, FV, PR, TC, AU, A
General Television & Radio Corp., 2701 Lehman Ct., Chicago, Ill.—"General Radio"—FM, FV, PR
Gilfillan Bros., 1815 Venice Blvd., Los Angeles, Calif.—"Gilfillan"—FM, FV, PR, TC
Globe Electronics, Inc., 225 W. 17th St., New York, N. Y.—FM, FV, PR
Grady Instrument Co., 11 Bailey Ave., Watertown, Mass.—DF
Gray Radio Co., 730 Okeechobee Rd., West Palm Beach, Fla.—DF, M
Hallicrafters Co., 2611 S. Indiana Ave., Chicago, Ill.—"Skyrider", "Hallicrafters"—A, BP, FM, FV, PR, TC, AN, CF, DF, FR, M, PN, PL, RR, CA
Hamilton Radio Corp., 510 6th Ave., New York, N. Y.—"Olympic"—BP, PR, FM, FV
Hammarlund Mfg. Co., 460 W. 34th St., New York, N. Y.—"Super-Pro"—A
Harcraft—Harvey Machine Co., Inc.
Harris Mfg. Co., 2422 W. 7th St., Los Angeles, Calif.—FM, FV, PR
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—"Harcraft"—DF, FM, FV, PR, TC
Harvey-Wells Electronics, Inc., Southbridge, Mass.—"Harvey-Wells"—PR, CA, AN, DF, FM, FV, A
Heath Co., 305 Territorial, Benton Harbor, Mich.—AN
Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—AN, CA, M, PL, FM, FV, A
Hoffman Radio Corp., 3430 S. Hill St., Los Angeles, Calif.—PR, FM, FV
Hollywood Electronics—Megard Corp.
Howard Pacific Corp., 932 N. Western Ave., Los Angeles 27, Calif.—AM
Howard Radio Co., 1735 Belmont Ave., Chicago, Ill.—FM, FV, PR, TC
Hudson American Corp., 25 W. 43rd St., New York, N. Y.—M, CA
Industrial Tool & Dye Works, Inc., Minneapolis, Minn.—"Industrial", "Automestic", "Mechanelec"—FM, FV, PR, TC, AU, A
International Detrola Corp., Beard Ave., Detroit, Mich.—FM, FV, PR, TC, AU
Jefferson, Ray, Inc., 40 E. Merrick Rd., Freeport, L. I., N. Y.—AU, DF, M
Jefferson-Travis Radio Mfg. Corp., 245 E. 23rd St., New York, N. Y.—AU, AN, CA, M
Jewel Radio Corp., 583 Sixth Ave., New York 11, N. Y.—FM, PR
Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif.—CA, M, PL, A
Karadio—Eckstein Radio & Television Co.
Keith Radio Products, Bedford, Ind.—"Keith"—FM, FV, PR
Kingston Radio Co., Inc., Kokomo, Ind.—FM, FV, PR
Laurehk Radio Mfg. Co., 3931 Monroe Ave., Wayne, Mich.—FM, FV, CP, PR
Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—AN
Learadio—Lear, Inc.
Lear, Inc., 230 E. Ohio St., Chicago, Ill.—"Learadio"—FM, FV, PR, TC
Lewyt Corp., 60 Broadway, Brooklyn 11, N. Y.—PR, TC, CF, FF
Lincoln Electronics Corp., 653 11th Ave., New York, N. Y.—FM, FV
Link, Fred M., 125 W. 17th St., New York, N. Y.—"Link Radio"—AU

Among the 200 or more receiver manufacturers listed here are many who manufacture some of their own parts for servicing as well as for set production. These manufacturers, or their distributors, therefore should be regarded as sources of supply for parts when original factory parts are desired. Other parts manufacturers specialize in producing what is commonly referred to as "exact duplicates". These lines include all items that are in more or less constant demand by parts jobbers, service dealers and maintenance men. Such products are listed under various classifications. The set manufacturers who make their own parts usually confine their parts distribution to their own exclusive set distributors.

L'Tatro—Eckstein Radio & Television Co.
Magnavox Co., 2131 Bueter Rd., Ft. Wayne 4, Ind.—FM, FV, PR, TC
Maguire Industries, 1437 Railroad Ave., Bridgeport, Conn.—RR, PN, AN, FV
Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—FM, FV, PR, TC, A, AN, M
Majestic Radio & Television Corp., St. Charles, Ill.—"Majestic Radio"—FM, FV, PR, TC
Marco Industries, 245 S. Beverly Dr., Beverly Hills, Calif.—FM, FV
Maritime Radio Co., 24 Whitehall St., New York, N. Y.—FM, FV, TC
Mason Radio Products Co., Kingston, N. Y.—"Mason"—FM, FV, PR
McGrade Mfg. Co., E. W., 406 W. 34th St., Kansas City, Mo.—FM, FV, PR, A
Mechanelec—Industrial Tool & Dye Works, Inc.
Meck Industries, John, Liberty at Pennsylvania, Plymouth, Ind.—PR, FM, FV
Medco Mfg. Co., 5 W. 45th St., New York, N. Y.—FM, FV, PR, TC, A
Megard Corp., 1601 S. Burlington Ave., Los Angeles, Calif.—"Hollywood Electronics", "Electronix"—FM, FV, PR, TC, A
Meissner Mfg. Div., Maguire Industries, Inc., 936 N. Michigan Ave., Chicago, Ill.—FM, FV, PR, TC, A
Midland Mfg. Co., Decorah, Iowa—"Midland"—FM, FV
Midwest Radio Corp., 909 Broadway, Cincinnati, Ohio—"Midwest"—FM, FV, PR, TC
Millen Mfg. Co., James, 150 Exchange St., Malden, Mass.—"James Millen"—A
Minerva Corp. of America, 238 William St., New York, N. Y.—FM, FV, PR, TC
Motorola—Galvin Mfg. Corp.
Music Master Radio Corp., 750 Main St., Hartford, Conn.—"Music Master"—FM, FV, PR, TC
Musitron—Franklin Photographic Industries
National Co., Inc., 61 Sherman St., Malden, Mass.—A, AN, CA
Noblitt-Sparks Industries, Inc., Columbus, Ind.—"Arvin"—FM, FV, PR, TC
Northern Radio Co., 2208 4th Ave., Seattle, Wash.—CA
Olympic—Hamilton Radio Corp.
Packard-Bell Co., 3443 Wilshire Blvd., Los Angeles, Calif.—"Packard-Bell", "Phonocord"—FM, FV, PR, TC
Packard Mfg. Corp., 2900 Columbia Ave., Indianapolis, Ind.—"Packard"—PR
Pan American Electric Co., Inc., 132 Front St., New York, N. Y.—FM, FV, TC
Panamuse—Farnsworth Television & Radio Corp.
Panoramic Radio Corp., 242-250 W. 55th St., New York 19, N. Y.—PN
Pathe—Air King Prod. Co., Inc.
Paulsen-Webber Cordage Corp., 176 John St., New York 7, N. Y.—DF
Philco Corp., Tioga and C Sts., Philadelphia 34, Pa.—FM, FV, PR, TC, AU, AN
Philharmonic Radio Corp., 528 E. 72nd St., New York, N. Y.—"Philharmonic"—FM, FV, PR, AU
Phonocord—Packard-Bell Co.
Pilot Radio Corp., 37-06 36th St., Long Island City 1, N. Y.—"Pilot Radio"—BP, FM, FV, PR, TC
Pitometer Log Corp., 237 Lafayette St., New York 12, N. Y.—DF
Precision Specialties, 210 N. Western Ave., Los Angeles, Calif.—FM, FV, PR, TC
Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—PR
Quality Industries, Electronic Dept., 25 E. Jackson Blvd., Chicago 4, Ill.—PR, RC
Radiola—RCA-Victor, Div. Radio Corp. of America
Radio Craftsmen, Inc., 1341 S. Michigan Ave., Chicago, Ill.—FM, FV
Radio Engineering Laboratories, Inc., 36th St., Long Island City, N. Y.—CA
Radio Frequency Laboratories, Inc., Boonton, N. J.—AV
Radio Mfg. Engineers, Inc., 300-306 First Ave., Peoria 6, Ill.—AN, FF
Radiomarine Corp. of America, 75 Varick St., New York 13, N. Y.—AL, DF, M
Radio Navigational Instrument Corp., 305 E. 63rd St., New York, N. Y.—PR, DF
Radio Process Co., 7618 Melrose Ave., Los Angeles, Calif.—"Aolian"—FM, FV, PR, TC
Radio Receptor Co., 251 W. 19th St., New York, N. Y.—CA
Ray Energy Radio & Television Corp., 32 W. 22nd St., New York, N. Y.—"Rayenergy"—FM, FV, PR, TC
RCA Victor Div., Radio Corp. of America, Camden, N. J.—"Radiola", "RCA Victor", "Victrola"—FM, FV, PR, TC, AU, A
Record-O-Vox, Inc., 721 N. Martel Ave., Hollywood 46, Calif.—FM, FV, PR
Regal Electronics Corp., 20 W. 20th St., New York, N. Y.—"Regal", "Ultradyne", "Tokfone"—FM, FV, PR, TC
Remler Co., Ltd., 2101 Bryant St., San Francisco, Calif.—FM, FV, PR
Rex Products Co., 1318 W. Randolph St., Chicago, Ill.—FM, FV, PR, TC
Richardson-Allen Corp., 15 W. 20th St., New York, N. Y.—CA, M
Rock-Ola Mfg. Corp., 800 N. Kedzie, Chicago, Ill.—RC
Sargent Co., E. M., 212 9th St., Oakland, Calif.—DF, CA
Schuttig & Co., 9th & Kearny Sts., N.E., Washington 17, D. C.—AN, TC

Scophony Corp. of America, 527 Fifth Ave., New York, N. Y.—TC

Scott Radio Labs, Inc., 4450 Ravenswood Ave., Chicago, Ill.—"Scott"—FM, FV, PR

Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—PR

Sentinel Radio Corp., 2020 Ridge Ave., Evanston, Ill.—"Sentinel"—BP, F, PR, FM, FV, TC

Setchell-Carlson, Inc., 2233 University Ave., St. Paul, Minn.—"Setchell-Carlson"—FM, FV

Sheridan Electronics Corp., 2850 S. Michigan Ave., Chicago, Ill.—"Sheridan", "Vogue"—FM, FV, PR

Signal Electronic & Mfg. Co., 114 E. 16th St., New York, N. Y.—FM, FV, PR, TC

Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—A, CK, CA

Skyrider—Hallicrafters Co.

Sonora Radio & Television Corp., 325 N. Hoyne Ave., Chicago, Ill.—"Sonora"—FM, FV, PR, TC, AU

Sonotone Corp., Saw Mill River Rd., Elmsford, N. Y.—CA

Sparks-Withington Co., Jackson, Mich.—"Sparton"—FM, FV, PR, TC, AU

Sparton—Sparks-Withington Co.

Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y.—AN, DF

Standard Engineering Laboratories, 40 S. Oak Knoll Ave., Pasadena 1, Calif.—A, FF

Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago, Ill.—FM, FV, PR, TC

Stoddard Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—AN

Stromberg-Carlson Co., 100 Carlson Rd., Rochester, N. Y.—"Stromberg-Carlson"—FM, FV, PR, TC

Super-Pro—Hammarlund Mfg. Co.

Symphonic Radio & Electronic Corp., Main St., Cambridge, Mass.—"Symphonic"—FM, FV, PR, TC

Taybern Equipment Co., 120 Greenwich St., New York, N. Y.—FM, FV, PR

Tech-Master Products Co., 123 Prince St., New York, N. Y.—FM, FV, PR

Technical Radio Co., 275 9th St., San Francisco, Calif.—CA

Teleset—Allen B. DuMont Laboratories, Inc.

Teletone Radio Co., 609 W. 51st St., New York 19, N. Y.—"Teletone"—FM, FV, PR

Telicon Corp., 851 Madison Ave., New York, N. Y.—"Telicon"—FM, FV, PR, TC

Temple—Templetone Radio Mfg. Corp.

Templetone Radio Mfg. Corp., New London, Conn.—"Temple"—FM, FV, PR, TC

Tokfone—Regal Electronics Corp.

Tom Thumb—Automatic Radio Mfg. Co., Inc.

Trav-Ler Karenola Radio & Tel. Corp., 571 W. Jackson, Chicago, Ill.—FM, FV, PR, TC

Trebor Radio Co., Box 497, Pasadena, Calif.—"Trebor"—FM, FV, PR

Troubador—Warwick Mfg. Corp.

Ultradyne—Regal Electronics Corp.

United Cinephone Co., Torrington, Conn.—FM, FV, PR

U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—DF

UST—U. S. Television Mfg. Co.

U. S. Television Mfg. Co., 106 7th Ave, New York, N. Y.—"UST"—FM, FV, PR, TC, FF

Victrola—RCA Victor Div., Radio Corp. of America

Viewtone Co., 203 E. 18th St., New York, N. Y.—"Viewtone"—FM, FV, PR, TC, BP

V-lectrical Engineering Co., 828 N. Highland Ave., Los Angeles, Calif.—"Calbest"—FM, FV, PR, TC

Vogue—Sheridan Electronics Corp.

Walker, Inc., 403 W. 8th St., Los Angeles, Calif.—FM, FV

Walsh Engineering Co., 34 DeHart Pl., Elizabeth 2, N. J.—FM, PR

Warwick Mfg. Corp., 4640 W. Harrison St., Chicago, Ill.—"Clarion", "Troubador", "Warwick"—FM, FV, PR, TC

Watterson Radio Mfg. Co., 2700 Swiss Ave., Dallas, Tex. "Watterson"—FM, FV, PR, F

Wells-Gardner & Co., 2701 N. Kildare Ave., Chicago, Ill.—"Wells-Gardner", "Arcadia"—FM, FV, PR, TC, AU

Western Electric Co., 195 Broadway, New York, N. Y.—AN, DF, FF, M, PL

Westinghouse Electric Corp., Receiver Div., Sunbury, Pa.—FM, FV, PR, TC

Whiting & Davis, Inc., 23 W. Bacon St., Plainville, Mass.—FM, FV

Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 1, Mo.—CA, FF

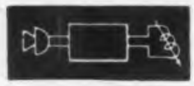
Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.—"Zenith Radio"—BP, CP, FM, FV, PR, TC, AU

This Directory Is Double-indexed

***Product Index*—refers you to the page on which manufacturers in a certain category are listed.**

***Alphabetical Index*—gives you a complete "Finding List" and refers you to the main classification under which a manufacturer is listed.**

(32) Recording Equipment & Blanks



Code recorders	CR
Cutting heads	CH
Discs (blank)	D
Equalizers	E
Film recorders	F
Graphic recorders	RG
Magnetic wire recorders	MT
Needles (cutting)	CN
Record preforms and molding compounds	RP
Recording machines	RM
Recording machine assemblies	RA
Screws (feed)	S
Turntables	TT

Acton Co., Inc., H. W., 370 7th Ave., New York 1, N. Y.—CN

Advance Recording Products Co., 36-12 34th St., Long Island City, N. Y.—D

Air King Products Co., Inc., 1523 63rd St., Brooklyn 19, N. Y.—RA

Aireon Mfg. Corp., Electronics Div., Fairfax & Funston Rds., Kansas City 15, Kans.—MT

Alden Products Co., 117 N. Main St., Brockton 64, Mass.—RG

Alliance Mfg. Co., Alliance, Ohio—TT

Allied Recording Products Co., 21-09 43rd Ave., Long Island City, N. Y.—CH, D, CN, RM, S, TT

Annis Co., R. B., 1101 N. Delaware St., Indianapolis 2, Ind.—RG

Ansley Radio Corp., 21-10 49th Ave., Long Island City 1, N. Y.—MT

Astatic Corp., Harbor & Jackson, Conneaut, Ohio—CH, MT

Audio Devices, Inc., 444 Madison Ave., New York 22, N. Y.—"Audiodiscs", "Audiopoints"—D, CN

Audiodiscs—Audio Devices, Inc.

Audiopoints—Audio Devices, Inc.

Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—RG

Autocrat Radio Co., 3855 N. Hamilton Ave., Chicago 18, Ill.—RM

Automatic Electric Co., 1033 W. Van Buren St., Chicago, Ill.—MT

Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.—D, RP

Barker & Williamson, Upper Darby, Pa.—E

Bell Sound Systems, Inc., 1183 Essex Ave., Columbus 8, Ohio—RM

Bendix Radio Division, Bendix Aviation Corp., E. Joppa Rd., Baltimore 4, Md.—MT

Berndt Corp., E. M., Auricon Div., 5515 Sunset Blvd., Hollywood 28, Calif.—F, RM, RA

Biltmore Radio Corp., 15 Ave. A, New York 3, N. Y.—MT, RM

Black Seal—Gould-Moody Co.

Boehme, H. O., 915 Broadway, New York 10, N. Y.—CR, RG

Bristol Co., Waterbury 91, Conn.—RG, S

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—"Soundmirror"—CH, MT

Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N. Y.—CR

Caltron Co., Div. Frank Rieber, Inc., 11916 W. Pico Blvd., Los Angeles 34, Calif.—E, CH, D, MT, RM,

Capitol Records, Inc., Sunset & Vine, Hollywood 28, Calif.—D

Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.—S

Commercial Radio Sound Corp., 575 Lexington Ave., New York 22, N. Y.—D, CN, RM, TT

Conn, Ltd., C. G., 1101 E. Beardsley Ave., Elkhart, Ind.—MT, RM

Continental Screw Co., New Bedford, Mass.—S

Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—F

Diacoustic Laboratory, 1678 Channing Way, Pasadena 3, Calif.—CH, CN, RA

Dickson Co., 7420 Woodlawn Ave., Chicago 19, Ill.—RG

Dictaphone Corp., 420 Lexington Ave., New York 17, N. Y.—RM

Duodisc—Duotone Co.

Duotone Co., 799 Broadway, New York 3, N. Y.—"Duodisc"—CH, D, CN, RA, TT

Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—RM

Eldeen Co., 504 N. Water St., Milwaukee 2, Wis.—CN

Electronic Engineering Service & Labs., 114-38 Farmers Blvd., St. Albans 12, N. Y.—E, RM, RA, TT

Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—E

Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—E

Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—F

Elgin National Watch Co., 107 National St., Elgin, Ill.—CN

Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—D, CN, RM, S, TT

Engineering Laboratories, Inc., 610-624 E. 4th St., Tulsa 3, Okla.—F, RG, RM

Ericsson Screw Machine Products Co., Inc., 25 Lafayette St., Brooklyn 1, N. Y.—S

Esterline-Angus Co., Inc., P. O. Box 596, Indianapolis 6, Ind.—RG

Fairchild Camera & Instrument Corp., 8806 Van Wyck Blvd., Jamaica 1, N. Y.—CH, E, RM, TT

Favorite Mfg. Co., 105 E. 12th St., New York 3, N. Y.—D

Federal Recorder Co., Inc., 630 S. Wabash Ave., Chicago 5, Ill.—D, RM

Film Crafts Engineering Co., 36 W. 25th St., New York 10, N. Y.—F

Gates Radio Co., 220 Hampshire St., Quincy, Ill.—E, RM, RA, TT

Gatti, Inc., Aurele M., 1909 Liberty St., Trenton 9, N. J.—CN

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—D, CN, S

General Electric Co., Receiver Div., 1285 Boston Ave., Bridgeport 2, Conn.—MT

General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—MT

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—RG

General Winding Co., 420 W. 45th St., New York 19, N. Y.—TT

Gentleman Products Div., Henney Motor Co., 1702 Cuming St., Omaha, Nebr.—RM

Globe Industries, Inc., 125 Sunrise Pl., Dayton 7, Ohio—RM, RA, TT

Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—F

Gould-Moody Co., 395 Broadway, New York 13, N. Y.—"Black Seal"—D, CN

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—D, E, TT

Gray Mfg. Co., 16 Arbor St., Hartford, Conn.—RM

Haddorff Piano Co., 630 S. Wabash Ave., Chicago 5, Ill.—D, RM

Hallicrafters Co., 2611 Indiana Ave., Chicago 16, Ill.—MT

Hammond Instrument Co., 2915 N. Western Ave., Chicago 18, Ill.—MT

Hart & Co., Inc., Frederick, 837 Main St., Poughkeepsie, N. Y.—CR, F, RM

Hartford Machine Screw Co., 476 Capitol Ave., Hartford 2, Conn.—S

Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—RA, TT

Hathaway Instrument Co., 1315 S. Clarkson St., Denver, Colo.—RG

Higgins Industries, Inc., 2221 Warwick Ave., Santa Monica, Calif.—MT, RM

Home Recording Co., 699 E. 135th St., Bronx 54, N. Y.—"Melodisc"—D

Hy-Pro Tool Co., New Bedford, Mass.—S

Industrial Screw & Supply Co., 717 W. Lake St., Chicago 6, Ill.—S

International Merit Products Corp., 254 W. 54th St., New York 19, N. Y.—CN, S

Jefferson-Travis Corp., 245 E. 23rd St., New York 10, N. Y.—F

J. F. D. Mfg. Co., 4117 Fort Hamilton Pkwy., Brooklyn 19, N. Y.—CN

Kluge Electronics Co., 1031 N. Alvarado St., Los Angeles 26, Calif.—MT

Lincoln Electronics Corp., 653 11th Ave., New York 19, N. Y.—MT

Manufacturers Screw Products, 216 W. Hubbard St., Chicago, Ill.—S

Mecanitron Corp., 711 Boylston St., Boston 16, Mass.—CR

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—E

Melodisc—Home Recording Co.

Melody Record Supply, Inc., 314 W. 52nd St., New York 19, N. Y.—CN

Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—CH, E, F, MT, CN, RM, RA

Millco—M. A. Miller Mfg. Co.

Miller Mfg. Co., M. A., 1169 E. 43rd St., Chicago 15, Ill.—"Millco"—CN

Mirror Record Corp., 1133 Broadway, New York, N. Y.—D, MT

Municipal Instrument Co., 3246 Cuyler Ave., Berwyn, Ill.—MT

National Gasket & Washer Mfg. Co., 122 E. 25th St., New York 10, N. Y.—D

National Screw & Mfg. Co., 2440 E. 75th St., Cleveland 4, Ohio—S

New England Screw Co., Emerald St., Keene, N. H.—S

Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—E, RM, RA

Pacific Sound Equipment Co., 130 N. Beaudry Ave., Los Angeles 12, Calif.—"Port-Elec"—RM, RA, TT

Packard Bell Co., 1115 S. Hope St., Los Angeles 15, Calif.—RM, MT

Paraloy Co., 600 S. Michigan Ave., Chicago 5, Ill.—CN, RM

Patrick's Industries, 897 W. Marshall Ave., Ferndale 20, Mich.—RM

Permo, Inc., 6415 Ravenswood Ave., Chicago 26, Ill.—"Permo Point"—CN

Permo Point—Permo, Inc.

Phonograph Needle Mfg. Co., Inc., 42-46 Dudley St., Providence 5, R. I.—S

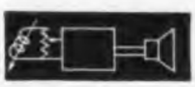
Plastic Fabricators Co., 440 Sansome St., San Francisco 11, Calif.—D

Poinsettia, Inc., Cedar Ave., Pitman, N. J.—RP

Port-Elec—Pacific Sound Equipment Co.

Presto Recording Corp., 242 W. 55th St., New York 19, N. Y.—CH, D, E, MT, CN, RM, RA, S, TT
Quality Industries, Electronic Dept., 25 E. Jackson Blvd., Chicago 4, Ill.—RM, RA
Radiad Service, 720 W. Schubert Ave., Chicago 14, Ill.—F, TT
Radiotechnic Laboratory, 1328 Sherman Ave., Evanston, Ill.—MT
Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—CR, MT, RM
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—"RCA"—CH, D, E, F, MT, CN, RM, RA, TT
RecorDisc Corp., 395 Broadway, New York, N. Y.—D, CN
Recordit Co., 315 N. 7th St., St. Louis 1, Mo.—D, CN, RM, TT
Record-O-Vox, Inc., 721 N. Martel Ave., Hollywood 46, Calif.—MT, RM
Recoton Corp., 212 5th Ave., New York N. Y.—D, CN
Reeves Sound Laboratories, Div. Reeves-Ely Laboratories, Inc., 215 E. 91st St., New York 28, N. Y.—F
Rek-O-Kut Co., 146 Grand St., New York 13, N. Y.—RM, TT
Riggs & Jeffreys, Inc., 73 Winthrop St., Newark 4, N. J.—RM
Robinette Co., W. C., 802 Fair Oaks Ave., South Pasadena, Calif.—RM, TT
Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio—RM, RA
Russell Electric Co., 340 W. Huron St., Chicago 10, Ill.—RA
St. George Recording Equipment Corp., 76 Varick St., New York, N. Y.—MT, F, RM
Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"Walsco"—S
Scott Radio Laboratories, Inc., E. H., 4450 Ravenswood Ave., Chicago 40, Ill.—MT
Scovill Mfg. Co., P. O. Box 98, Waterville 48, Conn.—S
Scully Machine Co., 62 Walter St., Bridgeport 8, Conn.—RM
Seeburg Corp., J. P., 1500 Dayton St., Chicago, Ill.—MT, RM
Shore Bros., 225 W. Huron St., Chicago 10, Ill.—CH, MT
Sillcocks-Miller Co., 10 W. Parker Ave., Maplewood, N. J.—D
Sonora Radio & Television Corp., 325 N. Hoyne Ave., Chicago 12, Ill.—MT
S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—F, RM
Sound Devices Co, Inc., 160 E. 116th St., New York, N. Y.—D
Soundmirror—Brush Development Co.
SoundScriber Corp., 82 Audubon St., New Haven 11, Conn.—RM
Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York 23, N. Y.—D, CN, RM, RA, S, TT
Stamford Metal Specialty Co., 428 Broadway, New York 13, N. Y.—S
Stephens Mfg. Co., 10416 National Blvd., Los Angeles 34, Calif.—E, F, CN, RM, RA, S, TT
Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y.—MT
United Cinephone Corp., 45 New Litchfield St., Torrington, Conn.—TT
U. S. Television Corp., 106 Seventh Ave., New York 11, N. Y.—MT
United Transformer Corp., 150 Varick St., New York 13, N. Y.—E
Universal Microphone Co., 424 Warren Lane, Inglewood, Calif.—CH, RA
Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—MT
V-M Corp., 4th & Park Sts., Benton Harbor, Mich.—RM, RA
Walsco—Walter L. Schott Co.
Webster-Chicago Corp., 5622 Bloomingdale Ave., Chicago 39, Ill.—MT
Webster Electric Co., 1900 Clark St., Racine, Wis.—CH, MT
Western Electric Co., 195 Broadway, New York 7, N. Y.—MT
Western Sound & Electric Laboratories, Inc., 3512 W. St. Paul Ave., Milwaukee, Wis.—RM
Whe-Gro Co., 3028 Locust St., St. Louis 3, Mo.—D, CN, RM, RA, S
Wilcox-Gay Corp., Charlotte, Mich.—"Wilcox-Gay"—D, CN, RM
Willson Plastics Division, Willson Magazine Camera Co., 6022 Media St., Philadelphia 31, Pa.—D
WiRecorder Corp., Stroh Bldg., Detroit, Mich.—MT
Wire Recorder Development Corp., Armour Research Foundation, 8 S. Michigan Ave., Chicago 3, Ill.—MT
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St., York, Pa.—RA, TT

(33) Records, Transcriptions & Playing Equipment



Automatic record changers .... ARC
Broadcast transcriptions .... BT
Coin record players .... CM
Electric phonographs .... EL
See also Receivers, AM-FM
Felt-flock, turntable .... F
Frequency records .... FR
Hand wound phonographs .... HW
Needles .... N
Pick-ups (crystal) .... PC
Pick-ups (dynamic) .... D
Pick-ups (magnetic) .... PM
Records .... R
Record compounds .... RC
Record pressers .... RM
Recording services .... RS
Sound effect records .... S
Transcription record players .... TR
Turntables .... TT

Acme Radio & Sound Labs., 3528 City Terr. Dr., Los Angeles, Calif.—RS
Acton Co., Inc., H. W., 370 7th Ave., New York 1, N. Y.—"Actone"—N
Actone—H. W. Acton Co., Inc.
Admiral Corp., 3800 W. Cortland St., Chicago 47, Ill.—ARC
Advance Research Corp., 37 W. 57th St., New York 19, N. Y.—ARC, CM
Adver-Disc Co., 500 N. Western Ave., Los Angeles, Calif.—RS
Advertisers Recording Service, Inc., 113 W. 57th St., New York, N. Y.—RS
Air-Check Co., 5546 Melrose Ave., Los Angeles, Calif.—RS
Aireon Mfg. Corp., Fairfax & Funston Rds., Kansas City 15, Kans.—ARC, CM
Alliance Mfg. Co., Alliance, Ohio—F, TT
Allied Record Mfg. Co., 1041 N. Las Palmas Ave., Los Angeles, Calif.—RS
American Products Mfg. Co., Oleander & Dublin Sts., New Orleans 18, La.—RC
Andrea Radio Corp., 43-20 34th St., Long Island City 1, N. Y.—ARC
ARA Records, 686 N. Robertson Blvd., Hollywood 46, Calif.—R
Arts Recording Co., Inc., 29 W. 57th St., New York, N. Y.—RS
Asch Recording Studios, 117 W. 46th St., New York 19, N. Y.—R, RS
Associated Recorders, 1511 N. Cahuenga, Los Angeles, Calif.—RS
Associated Studios, 6560 Hollywood Blvd., Los Angeles, Calif.—RS
Astatic Corp., Harbor & Jackson, Conneaut, Ohio—N, PC
Audak Co., 500 Fifth Ave., New York 18, N. Y.—"Audax"—PM
Audax—Audak Co.
Audio Devices, Inc., 444 Madison Ave., New York 22, N. Y.—"Audiopoint"—N
Audio Industries, Michigan City, Ind.—EL
Audiopoint—Audio Devices, Inc.
Audio-Scriptions, Inc., 1619 Broadway, New York, N. Y.—RS
Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—FR
Austin Co., O., 335 Throop Ave., Brooklyn 21, N. Y.—F
Aviola Radio Corp., 703 W. Ivy St., Glendale 4, Calif.—ARC
Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.—RC
Barker & Williamson, Upper Darby, Pa.—EL
Beacon Record Co., 331 W. 51st St., New York, N. Y.—R
Bell Sound Systems, Inc., 1183 Essex Ave., Columbus 3, Ohio—EL, TR, TT
Bibletone, 354 Fourth Ave., New York 10, N. Y.—R
Biltmore Radio Corp., 15 Ave. A, New York 3, N. Y.—CM, EL
Birch—Boetsch Bros.
Black & White Record Co., 2117 Foster Ave., Brooklyn, N. Y.—R
Blue Bird—RCA Victor
Blue Note Records, 2125 Third Ave., New York, N. Y.—R, RS
Boetsch Bros., 221 E. 144th St., New York 51, N. Y.—"Birch"—ARC, EL
Bogen Co., Inc., David, 663 Broadway, New York 12, N. Y.—EL, TR, TT
Bost Records Co., 29 W. 57th St., New York 19, N. Y.—R, RS
Bradley, Richard & Associates, 20 N. Wacker Dr., Chicago, Ill.—RS
Bronze Recording Studio, 623 E. Vernon, Los Angeles, Calif.—RS
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—PC
Caltron Co., Div. of Frank Rieber, Inc., 11916 W. Pico Blvd., Los Angeles 34, Calif.—PM
Capehart Div., Farnsworth Telev. & Radio Corp., 3700 Pontiac St., Fort Wayne, Ind.—CM
Capitol Records, Inc., Sunset & Vine, Hollywood 28, Calif.—BT, EL, N, R
Carnegie Hall Recording Co., Carnegie Hall, New York, N. Y.—RS
Cellusuede Products, Inc., 500 N. Madison St., Rockford, Ill.—F
Chicago Recording Co., 221 N. LaSalle St., Chicago, Ill.—RS
Chicago Recording Studios, Inc., 64 E. Jackson St., Chicago, Ill.—RS
Chicago Sound Systems Co., 2124 S. Michigan Ave., Chicago, Ill.—ARC
Christenson Recording Studios, 228 S. Wabash, Chicago, Ill.—RS
Cine-Mart, 55 W. 42nd St., New York, N. Y.—RS
Clark Radio Equipment Corp., 4313 Lincoln Ave., Chicago 18, Ill.—TR, TT
Classic Point—Eldeen Co.
Coda Record Co., 1291 Sixth Ave., New York 19, N. Y.—R
Columbia Recording Corp., 1473 Barnum Ave., Bridgeport 8, Conn.—"Columbia", "Masterworks", "Okeh"—FR, N, R, RC, S, RS
Columbia Recording Corp., 799 7th Ave., New York, N. Y.—RS
Comet Record Co., 420 Lexington Ave., New York, N. Y.—R
Commercial Radio Sound Corp., 575 Lexington Ave., New York 22, N. Y.—ARC, TR, TT
Commodore Record Co., 415 Lexington Ave., New York, N. Y.—R
Communicating Systems, Inc., 201-209 E. 18th St., New York 3, N. Y.—EL
Conn. Telephone & Electric Div., Great American Industries, 70 Britannia St., Meriden, Conn.—EL
Continental Record Co., Inc., 265 W. 54th St., New York 19, N. Y.—R, RC, RM
Contract Specialties Co., 1743 LaBrosse St., Detroit 16, Mich.—F
Cosmopolitan Records, Inc., 745 Fifth Ave., New York, N. Y.—R
Crescent Tool & Die Co., 4140 W. Belmont Ave., Chicago, Ill.—ARC
Criterion Products Co., 19 W. 44th St., New York, N. Y.—R
Davis Music Co., Inc., Joe, 331 W. 51st St., New York 19, N. Y.—R
Decca Records, Inc., 50 W. 57th St., New York 19, N. Y.—"Decca"—R, RS
Diacoustic Laboratory, 1678 Channing Way, Pasadena 3, Calif.—N
Duotone Co., 799 Broadway, New York 3, N. Y.—N, TT
D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—N
Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—EL, ARC
Eastern Sound Recording Co., 46 W. 84th St., New York, N. Y.—RS
Eccles Disc Recordings, Inc., 6233 Hollywood Blvd., Los Angeles, Calif.—RS
Eldeen Co., 504 N. Water St., Milwaukee 2, Wis.—"Classic Point", "Maestro Point", "Merit Point", "Victory Point"—N
Electromatic Mfg. Corp., 88 University Pl., New York 3, N. Y.—EL
Electronic Corp. of America, 45 W. 18th St., New York 11, N. Y.—EL
Electronic Engineering Service & Laboratories, 114-98 Farmers Blvd., St. Albans 12, N. Y.—TR, TT
Electro Recording & Broadcasting Studio, 310 N. Verdugo Rd., Glendale, Calif.—RS
Electro-Vox Recording Studios, 5546 Melrose Ave., Los Angeles, Calif.—RS
Elgin National Watch Co., 107 National St., Elgin, Ill.—N
Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—ARC, EL, N, PC, TT
Empire Broadcasting Corp., 480 Lexington Ave., New York, N. Y.—RS
Erwood Co., 223 W. Erie St., Chicago 10, Ill.—ARC, TR
Espey Mfg. Co., Inc., 33 W. 46th St, New York 19, N. Y.—EL
Fairchild Camera & Instrument Corp., 8806 Van Wyck Blvd., Jamaica 1, N. Y.—PC, D, TR, TT
Farnsworth Television & Radio Corp., Fort Wayne 1, Ind.—ARC
Fidelitone—Permo, Inc.
Film Crafts Engineering Co., 36 W. 25th St., New York 10, N. Y.—PM
Fischer, Carl, Inc., 119 W. 57th St., New York, N. Y.—RS
Flock Process Co., Velvetone Div., 3 Quincy St., Norwalk, Conn.—F, TT
Gala Record Co., 350 Broadway, New York, N. Y.—R
Galvin Mfg. Corp., 4545 Augusta Blvd., Chicago 51, Ill.—"Motorola"—ARC, N
Gamble Hinged Music Co., 228 S. Wabash, Chicago, Ill.—RS
Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—EL, F, TR, TT
Garrard Sales Corp., 401 Broadway, New York 13, N. Y.—ARC, EL, N, PC, PM, TR, TT
Gates Radio Co., 220 Hampshire St., Quincy, Ill.—TR, TT
Gatti, Aurele M., Inc., 1909 Liberty St., Trenton 9, N. J.—N
Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—EL
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—F, N
General Electric Co., Receiver Div., 1285 Boston Ave., Bridgeport 2, Conn.—EL
General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—PM
General Industries Co., Taylor & Olive Sts., Elyria, Ohio—ARC
General Instrument & Appliance Corp., 829 Newark Ave., Elizabeth 3, N. J.—ARC
General Phonograph Corp., Putnam, Conn.—N

Gentleman Products Div., Henney Motor Co., 1702 Cuming St., Omaha, Nebr.—EL
Glendale's Radio City, 310 N. Verdugo Rd., Glendale, Calif.—RS
Glenn Glen Sound Co., 1422 Lymn Pl., Los Angeles, Calif.—RS
Globe Industries, Inc., 125 Sunrise Pl., Dayton 7, Ohio—EL, TR, TT
Godfrey Manufacturing Co., 171 S. 2nd St., Milwaukee 4, Wis.—EL
Golden Point—Lowell Needle Co.
Goldentone—Lowell Needle Co.
Gould-Moody Co., 395 Broadway, New York 13, N. Y.—N
Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—D, TR, TT
Guild Records, 665 Fifth Ave., New York, N. Y.—R
Hallicrafters Co., 2611 S. Indiana Ave., Chicago 16, Ill.—EL
Hamilton Radio Corp., 510 Sixth Ave., New York 11, N. Y.—EL
Harmax Recording Studios, 1697 Broadway, New York, N. Y.—RS
Harmonia Records, 1328 Broadway, New York, N. Y.—R
Harrison Recording Studios, 1697 Broadway, New York, N. Y.—RS
Hartley-Holt, 730 Fifth Ave., New York 19, N. Y.—TR, TT
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—ARC, TT
Herback & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—EL, TR
Heroservice, 45 W. 45th St., New York 19, N. Y.—S
H. & H. Recording Co., 6306 S. Cottage Grove Ave., Chicago, Ill.—RS
Hilo—Shure Bros.
Hollywood Music Recdg. Studios, 6019 Hollywood Blvd., Los Angeles, Calif.—RS
Hollywood Recording, 6225 Sunset Blvd., Los Angees, Calif.—RS
H. T. Hit Service, 105 Court St., Brooklyn, N. Y.—R
Independent Music Co., 65 University Pl., New York, N. Y.—RS
International Detrola Corp., 1501 Beard St., Detroit, Mich.—ARC
International Merit Products Corp., 254 W. 54th St., New York 19, N. Y.—N
Jamboree Records, Inc., 1650 Broadway, New York 19, N. Y.—R
Jensen Industries, Inc., 737 N. Michigan Ave., Chicago 11, Ill.—N
Keeney & Co., Inc., J. H., 6610 S. Ashland Ave., Chicago 36, Ill.—CM
Keynote Recordings, Inc., 522 Fifth Ave., New York 18, N. Y.—R
Kismet Record Co., 227 E. 14th St., New York 3, N. Y.—R
Kuehn, J. J., Sound Film Lab., 728 W. Buckingham, Chicago, Ill.—RS
Lewis Sound Film Productions, 71 W. 45th St., New York, N. Y.—RS
Lincoln Electronics Corp., 653 11th Ave., New York, N. Y.—ARC, EL, TR
Lindam & Romaine Recording Studios, 1408 W. 48th St., Los Angeles, Calif.—RS
Literary Classics, Inc., 1780 Broadway, New York, N. Y.—RS
Lowell Needle Co., 1 Wildore St., Putnam, Conn.—"Goldenpoint", "Goldentone"—N
MacGregor, C. P., Sound Studios, 729 S. Western Ave., Los Angeles, Calif.—RS
Maestro Point—Eldeen Co.
Magnavox Co., Fort Wayne 4, Ind.—ARC, EL
Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—ARC
Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—ARC
Majestic Radio & Television Corp., St. Charles, Ill.—R
Maner Record Co., 5 Pomona Ave., Newark 3, N. J.—R
Masterworks—Columbia Recording Corp.
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—EL
Melody Record Supply, Inc., 314 W. 52nd St., New York 19, N. Y.—N
Mercury Recording Studio, 232 E. Erie, Chicago, Ill.—RS
Merit Point—Eldeen Co.
Metropolitan Recording Studios, 1697 Broadway, New York, N. Y.—RS
Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—CM, N, D, PM
Miller Mfg. Co., M. A., 1169 E. 43rd St., Chicago 15, Ill.—"Millco"—N
Milwaukee Stamping Co., 824 S. 72nd St., Milwaukee, Wis.—ARC
Motorola—Galvin Mfg. Corp.
Musette Publishers, Inc., 113 W. 57th St., New York 19, N. Y.—R
Musicraft Corp., 40 W. 46th St., New York 19, N. Y.—R
Music Sound Track Serv., Inc., 1600 Broadway, New York, N. Y.—RS
Musical Arts Recdg. Studios, Inc., 1780 Broadway, New York, N. Y.—RS
Mutual Recording Co., 5205 Hollywood Blvd., Los Angeles, Calif.—RS
Muzak Corp., 151 W. 46th St., New York, N. Y.—RS
Muzak Transcriptions, Inc., 221 N. LaSalle St., Chicago, Ill.—RS
National Broadcasting Co., Inc., 222 W. North Bank, Chicago, Ill.—RS
National Broadcasting Co., Inc., Sunset & Vine, Los Angeles, Calif.—RS
National Die Casting Co., 600 N. Albany Ave., Chicago 12, Ill.—ARC, CM
National Recdg. & Film Corp., 20 N. Wacker Dr., Chicago, Ill.—RS
National Records Co., 1841 Broadway, New York 23, N. Y.—R
National Vocarium, 610 5th Ave., New York, N. Y.—RS
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles 7, Calif.—CM, EL, TR, TT
Nola Studios, 113 W. 57th St., New York, N. Y.—RS
Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—EL, TR, TT
Oak Mfg. Co., 1260 Clybourn Ave., Chicago 10, Ill.—ARC
Okeh—Columbia Recording Corp.
Pacific Electronics, W. 1011-1013 First Ave., Spokane 5, Wash.—ARC, PC, TR
Pacific Sound Equipment Co., 130 N. Beaudry Ave., Los Angeles 12, Calif.—"Port-Elec."—EL, F, N, PC, PM, TR, TT
Paraloy Co., 600 S. Michigan Ave., Chicago 5, Ill.—N
Paramount Radio Sales & Serv., 3477 Broadway, New York, N. Y.—RS
Permo, Inc., 6415 Ravenswood Ave., Chicago 26, Ill.—"Fidelitone", "Permo Point"—N
Permo Point—Permo, Inc.
Personal Recording Studios, 113 W. 42nd St., New York, N. Y.—RS
Pfanstiehl Chemical Co., 104 Lakeview Ave., Waukegan, Ill.—N
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—ARC, EL, PC, D
Phonograph Needle Mfg. Co., Inc., 42-46 Dudley St., Providence 5, R. I.—"Supreme"—N
Phonola—Waters-Conley Co.
Phono-Rec. Mfg., Inc., 314 W. 52nd St., New York 19, N. Y.—N
Poinsettia, Inc., Cedar Ave., Pitman, N. J.—R, RC, RM
Port-Elec—Pacific Sound Equipment Co.
Precise Development Parts, 28 N. Loomis St., Chicago, Ill.—ARC
Precision Recording Co., 1912 S. Cursen Ave., Los Angeles, Calif.—RS
Presto Recording Corp., 242 W. 55th St., New York 19, N. Y.—N, PM, TR, TT
Radiad Service, 720 W. Schubert Ave., Chicago 14, Ill.—TR, TT
Radio Frequency Laboratories, Inc., Boonton, N. J.—EL
Radio Recorders, Inc., 7000 Santa Monica Blvd., Los Angeles, Calif.—RS
Radio Recording Studio, 1619 Broadway, New York, N. Y.—RS
Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill.—TR
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—ARC, EL, F, FR, N, PC, D, PM, R, RC, RM, S, TR, TT
RCA Victor Division, Victor Recording Studio, 155 E. 24th St., New York, N. Y.—RS
Recordit Co., 315 N. 7th St., St. Louis 1, Mo.—N, RC, S, TR, TT
Record-O-Shers Recording Studios, 6560 Hollywood Blvd., Los Angeles, Calif.—RS
Record-O-Vox, Inc., 721 N. Martel Ave., Hollywood 46, Calif.—ARC, EL, PC, CM
Recoton Corp., 212 5th Ave., New York, N. Y.—N
Red Seal—RCA Victor
Reeves Sound Studios, Inc., 1600 Broadway, New York, N. Y.—RS
Regal Electronics Corp., 20 W. 20th St., New York 11, N. Y.—TR
Rek-O-Kut Co., 146 Grand St., New York 13, N. Y.—TR, TT
Riggs & Jeffreys, Inc., 73 Winthrop St., Newark 4, N. J.—EL, TR
Robinette Co., W. C., 802 Fair Oaks Ave., South Pasadena, Calif.—TR, TT
Rockhill Radio, Inc., 18 E. 50th St., New York, N. Y.—RS
St. George Recording Equipment Corp., 76 Varick St., New York, N. Y.—PM
Sandwick Associates, L. M., 223 W. Erie St., Chicago 10, Ill.—EL, HW, TR, TT
Savoy Record Co., 58 Market St., Newark, N. J.—R
Sav-Way Industries, P. O. Box 117, Harper Sta., Detroit 13, Mich.—R
Schirmer, G., Inc., 3 E. 43rd St., New York, N. Y.—RS
Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"Walsco"—F, RC
Schulmerich Electronics, Inc., 220-228 N. Main St., Sellersville, Pa.—TR
Scranton Record Co., 300 Brook St., Scranton, Pa.—CM, R
Seeburg Corp., J. P., 1510 N. Dayton St., Chicago 22, Ill.—ARC, CM, EL
Seeco Records, Inc., 1393 Fifth Ave., New York 29, N. Y.—R
Seva Record Co., 45 E. 49th St., New York 17, N. Y.—R
Sheridan Electronics Corp., 2850 S. Michigan Ave., Chicago 16, Ill.—EL
Shure Bros., 225 W. Huron St., Chicago 10, Ill.—"Hilo"—"Zephyr"—N, PC
Signal Electronics, Inc., 114 E. 16th St., New York 3, N. Y.—EL
Simpson Mfg. Co., Mark, 188 W. 4th St., New York 14, N. .—ARC, EL, TR
Sonart Record Corp., 251 W. 42nd St., New York, N. Y.—R
Songcraft, Inc., 1650 Broadway, New York, N. Y.—RS
Sonora Products, Inc., 2023 W. Carroll Ave., Chicago 12, Ill.—R
Sorkin Music Co., 251 Fourth Ave., New York 10, N. Y.—"Beltone"—M
Sound-On-Film Recording Studios, 177 Madison Ave., New York, N. Y.—RS
Sound Workshop, 445 La Cienga Blvd., Los Angeles, Calif.—RS
Souvenir Recording Studio, 55 Olvera St., Los Angeles, Calif.—RS
Spanish Sound Studios, 41 E. 42nd St., New York, N. Y.—RS
Sparkes Mfg. Co., Ltd., 818 Jefferson St., Newark 5, N. J.—ARC
Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York 23, N. Y.—EL, N
Spot Film Productions, Inc., 339 E. 48th St., New York, N. Y.—RS
Standard Phonograph Co., 163 W. 23rd St., New York, N. Y.—R
Standard Radio, 1 E. 54th St., New York, N. Y.—RS
Standard Radio, 6404 Hollywood Blvd., Los Angeles, Calif.—RS
Starr Piano Co., 1344 S. Flower, Los Angeles, Calif.—RS
Stephens Mfg. Co., 10416 National Blvd., Los Angeles 34, Calif.—R, TR, TT
Sterling Record Co., 7 W. 46th St., New York, N. Y.—R
Studio & Artists Recorders, 6107 Sunset Blvd., Los Angeles, Calif.—RS
Supreme—Phonograph Needle Mfg. Co.
Sweum Studios, 636 S. Ardmore Ave., Los Angeles, Calif.—RS
Technical Radio Co., 275 9th St., San Francisco, Calif.—EL, PM, TR, TT
Tel-A-Recording, Inc., 2 W. 46th St., New York, N. Y.—RS
Telefilm, Inc., 6039 Hollywood Blvd., Los Angeles, Calif.—RS
Tone Products Corp. of America, 351 Fourth Ave., New York 10, N. Y.—EL, TR, TT
Toogood, L. S., Recording Co., 221 N. LaSalle St., Chicago, Ill.—RS
Transcription Broadcasting Studios, 1650 Broadway, New York, N. Y.—RS
Transcriptions, Inc., 29 W. 57th St., New York, N. Y.—RS
Turner Co., 909 17th St., N. E., Cedar Rapids, Iowa—PM
United Broadcasting Co., 201 N. Wells Ave., Chicago, Ill.—RS
United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—PM, TR, TT
United Loose Leaf Co., 233 Spring St., New York 13, N. Y.—RA
United Research Labs., 1650 Broadway, New York, N. Y.—RS
U. S. Record Corp., 400 Madison Ave., New York, N. Y.—RS
Universal Microphone Co., 424 Warren Lane, Inglewood, Calif.—FR
Universal Recorders, 6757 Hollywood Blvd., Los Angeles, Calif.—RS
Universal Recording Co., Inc., 1270 Sixth Ave., New York, N. Y.—RS
Urab Recording Studio, 245 W. 34th St., New York, N. Y.—RS
Victor—RCA Victor
V-M Corp., 4th & Park Sts., Benton Harbor, Mich.—ARC
Voice of the Church, 500 N. Western Ave., Los Angeles, Calif.—RS
Walsco—Walter L. Schott Co.
Warner Bros. Broadcasting Corp., 5833 Fernwood Ave., Los Angeles, Calif.—RS
Waters-Conley Co., Rochester, Minn.—"Phonola"—EL, HW, N
Webster-Chicago Corp., 5622 Bloomingdale Ave., Chicago 39, Ill.—ARC, EL
Webster Electric Co., 1900 Clark St., Racine, Wis.—PC, PM
Western Electric Co., 195 Broadway, New York 7, N. Y.—D, PM, TR
Western Sound & Electric Laboratories, Inc., 3512 W. St. Paul Ave., Milwaukee, Wis.—EL
Whe-Gro Co., 3028 Locust St., St. Louis 3, Mo.—EL, F, N, TT
Wilcox-Gay Corp., Charlotte, Mich.—ARC, N
Williams Mfg. Co., 161 W. Huron St., Chicago 10, Ill.—CM
Willson Plastics Div., Willson Magazine Camera Co., 6022 Media St., Philadelphia 31, Pa.—RM
WOR Recording Studios, 1440 Broadway, New York 18, N. Y.—R, RS
World Broadcasting System, Inc., 711 Fifth Ave., New York, N. Y.—RS
Worner Electronic Devices, 609 West Lake St., Chicago 6, Ill.—EL
Wurlitzer Co., Rudolph, Niagara Falls Bldg., No. Tonawanda, N. Y.—ARC, CM
Wynn Mfg. Div., Hudson Supply Co., 401 N. 27th St., Richmond 23, Va.—EL
York Electric & Machine Co., Carillotone Div., 90-98 N. Penn St., York, Pa.—EL

Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.—PC, TR

Zephyr—Shure Bros.

(34) Resistors & Volume Controls

Attenuators (precision) ....A
Fixed composition ....FC
Fixed wirewound ....FW
High frequency resis. slug ....HR
Industrial fixed I
Neg. temp. coeff. resis. ....N
Plug-in (tubes) ....PT
Power rheostats ....PR
Precision ....PRE
Slide-wire potentiometers ....S
Supressors ....SU
Variable V
Volume controls VC

Aerolite Electronic Hardware Corp., 24 Cliff St., Jersey City 6, N. J.—FW, S

Aerovox Corp., 740 Belleville Ave., New Bedford, Mass.—FC, FW, S

Allen-Bradley Co., 136 W. Greenfield Ave., Milwaukee 4, Wis.—"Bradleyometer", "Bradleyunit"—FC, PR, SU, V, VC

Alpha Meter Service, 71 Nassau St., New York 7, N. Y.—PRE

Amalgamated Electronics Associated, 60 E. 42nd St., New York 17, N. Y.—FW, I, PR, V, VC

American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22, Ill.—FW

Amperite Co., 561 Broadway, New York, N. Y.—V

Associated Research, Inc., 231 S. Green St., Chicago 7, Ill.—FW, PRE

Atlas Resistor Co., 423 Broome St., New York 13, N. Y.—"Atlas"—FW, V

Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—A

Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—FW

Barker & Williamson, Upper Darby, Pa.—FW, V

Biddle Co., James G., 1211 Arch St., Philadelphia 7, Pa.—PR

Bradleyometer—Allen-Bradley Co.

Bradleyunit—Allen-Bradley Co.

Brown Devil—Ohmite Mfg. Co.

Brown Engineering Co., 4635 S.E. Hawthorne Blvd., Portland 15, Ore.—FW, PRE, S, V

Candohms—Muter Co.

Carborundum Co., Globar Div., Buffalo Ave., Niagara Falls, N. Y.—FC, I, N, SU

Centralab Div. of Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—PR, V, VC

Chicago Telephone Supply Co., W. Beardsley Ave., Elkhart, Ind.—V, VC

Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—A, FW

Clarostat Mfg. Corp., 285 N. 6th St., Brooklyn, N. Y.—"Clarostat"—A, FC, FW, HR, I, N, PT, PR, PRE, V, VC

Collins Radio Co., Cedar Rapids, Iowa—A, VC

Conn, Ltd., C. G., 1101 E. Beardsley Ave., Elkhart, Ind.—E

Corning Glass Works, Corning, N. Y.—A

Corrib—Ohmite Mfg. Co.

Cover Dual Signal Systems, Inc., Div. Electra-Voice Corp., 5215 N. Ravenswood Ave., Chicago 40, Ill.—PRE

Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.—FW, I, PR, S

Daven Co., 191 Central Ave., Newark 4, N. J.—A, PRE, VC

Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—PRE

DeJur Amsco Corp., Northern Blvd. at 45th St., Long Island City 1, N. Y.—PR, PRE, V

Dividohm—Ohmite Mfg. Co.

Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza S., Long Island City 1, N. Y.—FW

Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—A, FW, N, PRE, S

Eastern Specialty Co., 3617 N. 8th St., Philadelphia 40, Pa.—PRE

Electrical Reactance Corp., 49 Elm St., Franklinville 3, N. Y.—FW, PRE, V

Electronic Components Co., 423 N. Western Ave., Los Angeles 4, Calif.—A

Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—A, FW

Electro-Tech Equipment Co., 331 Canal St., New York 13, N. Y.—FW, I, PR, PRE, S, V

Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—FC, FW, PT, VC

Erie Resistor Corp., 640 W. 12th St., Erie, Pa.—FC, SU

Ex-Stat—Tilton Electric Co.

Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y.—A, PRE, V

Gamewell Co., 1238 Chestnut St., Newton Upper Falls 64, Mass.—V

General Electronics Mfg. Co., 2225 S. Hoover St., Los Angeles 7, Calif.—FW, PRE

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—"G-R"—A, FW, HR, PR, PRE, S, V, VC

General Winding Co., 420 W. 45th St., New York 19, N. Y.—FW, PRE

Giannini & Co., Inc., G. M., Autoflight Instrument Div., 4522 Lankershim Blvd., North Hollywood, Calif.—V

G-M Laboratories, Inc., 4300 N. Knox Ave., Chicago 41, Ill.—S

Goodall Electric Mfg. Co., 3rd and Main St., Ogallala, Nebr.—FC

G-R—General Radio Co.

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—A

Groves Corp., 42 N. Sprigg St., Cape Girardeau, Mo.—FW, PRE, V

Haines Mfg. Co., 248-274 McKibbin St., Brooklyn 6, N. Y.—FW

Hanovia Chemical & Mfg. Equipment, 233 N. J. R. R. Ave., Newark 5, N. J.—FW

Hardwick, Hindle, Inc., 40 Hermon St., Newark 5, N. J.—FW, I, PR, PRE, S, V

Helipot Corp., 1015 Mission St., So. Pasadena, Calif.—PRE, S, V

Hickok Electrical Instrument Co., 10514 DuPont Ave., Cleveland, Ohio—PRE

Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—HR, I, N

Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J.—PRE

Instrument Resistors Co., 25 Amity St., Little Falls, N. J.—FW, I, PRE

International Resistance Co. 401 N. Broad St., Philadelphia 8, Pa.—"IRC"—A, FC, FW, HR, I, N, PR, PRE, S, SU, V, VC

IRC—International Resistance Co.

Jeffers Electronics, Hoover St., DuBois, Pa.—FW, N

J. F. D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn 19, N. Y.—"JFD"—PT, SU

Keystone Carbon Co., Inc., 1935 State St., St. Marys, Pa.—N

Lectrohm, Inc., 5125 W. 25th St., Cicero 50, Ill.—FW, V

Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia 44, Pa.—S, PRE

Lenoxite Div., Lenox, Inc., 65 Prince St., Trenton 5, N. J.—HR, PRE

Lewis Engineering Co., 52 Rubber Ave., Naugatuck, Conn.—S

Madison Electrical Products Corp., 78 Main St., Madison, N. J.—"Mepco"—FW, I, PRE

Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—HR

Mallory & Co., Inc., P. R., 3029 E. Washington St., Indianapolis 6, Ind.—A, FW, V, VC

Marion Electrical Instrument Co., Canal St., Manchester, N. H.—FW, PRE

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—A

Mepco—Madison Electrical Products Corp.

Microhm—Precision Resistor Co.

Miller Electro-Research Labs., 3460 S. 16th St., Milwaukee 7, Wis.—PRE

Milwaukee Resistor Co., 748 W. Virginia St., Milwaukee 4, Wis.—FW, I, V

Monitor Controller Co., 51 S. Gay St., Baltimore 2, Md.—FW, I, PR

Multivolt—Ohmite Mfg. Co.

Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—"Candohms", "Zipohms"—FW, V

National Electric Controller Co., 5307 Ravenswood Ave., Chicago, Ill.—"National"—PR

National Union Radio Corp., 15 Washington St., Newark 2, N. J.—VC

Nilsson Electrical Laboratory, Inc., 103 Lafayette St., New York 13, N. Y.—PRE

Ohio Carbon Co., 12508 Berea Rd., Cleveland 11, Ohio—FC, FW, SU

Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill.—"Brown Devil," "Corrib," "Dividohm," "Multivolt," "Riteohm," "Wirewatt"—FW, I, PR, PRE, S, SU, V

Ohmspun—States Co.

Precision Resistor Co., 334 Badger Ave., Newark, N. J.—"Microhm"—A, I, PR, PRE, RW, V

Presto Electric Co., 4511 New York Ave., Union City, N. J.—FW, PRE, S

Quad Mfg. Co., 462 N. Parkside Ave., Chicago 44, Ill.—A

Reimers Electric Appliance Co., 596 56th St., West New York, N. J.—FW, PRE

Rex Rheostat Co., 3 Foxhurst Rd., Baldwin, L. I., N. Y.—FW, I, PR, S, V

Richardson-Allen Corp., 15 W. 20th St., New York 11, N. Y.—PRE

Riteohm—Ohmite Mfg. Co.

Rubicon Co., Ridge Ave. at 35th St., Philadelphia 32, Pa.—FW, PRE

Scientific Radio Products Co., 738 W. Broadway, Council Bluffs, Iowa—PRE

Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—FW, PRE

Speer Resistor Corp., Theresia St., St. Marys, Pa.—FC, N

Sprague Electric Co., 189 Beaver St., North Adams, Mass.—FW, I, PRE

Sprague Products Co., North Adams, Mass.—FW, I, PRE

Stackpole Carbon Co., P. O. Box 327, St. Marys, Pa.—FC, SU, V, VC

States Co., 19 New Park Ave., Hartford 6, Conn.—"Ohmspun"—FW

Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—N

Tech Laboratories, 337 Central Ave., Jersey City 7, N. J.—A, VC

Techtmann Industries, Inc., 828 N. Broadway, Milwaukee 2, Wis.—I

Tilton Electric Corp., 23 E. 26th St., New York, N. Y. "Ex-Stat"—FW, SU, VC

Trefz Mfg. Co., 38-11 Main St., Flushing, N. Y.—FW, I, PT, V, VC

Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—FW, PT, V, VC

Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio—FC, PRE

Ward Leonard Electric Co., 31 South St., Mt. Vernon, N. Y.—FW, I, PR, S, V

Westinghouse Elec. Corp., East Pittsburgh, Pa.—FW, I, N, PR, PRE

Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—FW, HR

Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill.—S

White Dental Mfg. Co., S. S., Industrial Div., 10 E. 40th St., New York, N. Y.—FC

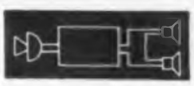
Winslow Co., 9 Liberty St., Newark 5, N. J.—PRE

Wirewatt—Ohmite Mfg. Co.

Wirt Co., 5221 Greene St., Philadelphia 44, Pa.—FW, I, SU, V, VC

Zipohms—The Muter Co.

(35) Sound Systems, Intercommunicators & Hearing Aids



Acoustic materials ....AM
Bell, buzzers ....B
Carrier current systems CC
Electronic megaphones ....EM
Electronic musical equip. ....E
Hearing aids ....H
Intercommunicators I
Mobile amplifiers ....M
Power amplifiers ....PA
Preamplifiers ....PRE
Remote controllers ....RC
Sound systems (complete) ....SS
Car-top speaker racks ....CR

Advance Research Corp., 37 W. 57th St., New York 19, N. Y.—AM

Airplane & Marine Instruments, Inc., Clearfield, Pa.—PA, PRE

Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill.—I, PA, PRE

Altec Lansing Corp., 1680 N. Vine St., Hollywood 28, Calif.—PA, PRE, SS

Ameco—American Electronics

American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22, Ill.—B, H, I

American Communications Corp., 306 Broadway, New York, N. Y.—EM, I, PA, PRE, SS

American Earphone Co., 10 E. 43rd St., New York 17, N. Y.—H

American Electronics, 37 E. 18th St., New York 3, N. Y.—"Ameco"—M, PA, PRE, SS

American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—PA, PRE, SS

Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—M, PA, PRE, SS

Ampro Corp., 2839-51 N. Western Ave., Chicago 18, Ill.—SS

Ansley Radio Corp., 21-10 49th Ave., Long Island City 1, N. Y.—E

Atlas—David Bogen Co., Inc.

Atlas Sound Corp., 1443 39th St., Brooklyn 18, N. Y.—CR, EM, PA, PRE, SS

Audiograph—John Meck Industries

Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—PRE, SS

Aurex Corp., 1117 N. Franklin St., Chicago, Ill.—H, PRE

Auth Electric Specialty Co., Inc., 422-430 E. 53rd St., New York 22, N. Y.—B, I, SS

Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—I

Aviola Radio Corp., 703 W. Ivy St., Glendale 4, Calif.—I, SS

Aviometer Corp., 370 W. 35th St., New York 1, N. Y.—I

Bank's Mfg. Co., 1105 W. Lawrence Ave., Chicago 40, Ill.—E, I, PA, PRE, RC, SS

Barker & Williamson, Upper Darby, Pa.—M, PA, PRE, RC

Belfone—Bell Sound Systems, Inc.

Bell & Howell Co., 7100 McCormick Rd., Chicago 45, Ill.—SS

Bell Sound Systems, Inc., 1183 Essex Ave., Columbus 3, Ohio—"Belfone"—E, I, M, PA, PRE, RC, SS

Bendix Radio Division, Bendix Aviation Corp., E. Joppa Rd., Baltimore 4, Md.—I, M

Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif.—I, M

Biltmore Radio Corp., 15 Ave. "A", New York 3, N. Y.—I, SS

Bogen Co., Inc., David, 663 Broadway, New York 12, N. Y.—"Atlas"—I, M, PA, PRE, RC, SS

Boom Electric & Amplifier Co., Inc., 1227 W. Washington Blvd., Chicago 7, Ill.—I, SS

Brelco Corp., 55 Van Dam St., New York 13, N. Y.—E, I, M, PA, PRE, RC, SS

Caltron Co., Div. Frank Rieber, Inc., 11916 W. Pico Blvd., Los Angeles 34, Calif.—PRE

Cambridge Instrument Co., Inc., 3005 Grand Central Terminal, New York 17, N. Y.—H

Chicago Sound Systems, Inc., 2124 S. Michigan Ave., Chicago, Ill.—M, SS

Clark Radio Equipment Corp., 4313 Lincoln Ave., Chicago 18, Ill.—M, PRE, SS

Cline Electric Mfg. Co., 4550 W. Lexington Ave., Chicago, Ill.—PA, RC

Collins Radio Co., Cedar Rapids, Iowa—PA, PRE

Commercial Radio Sound Corp., 575 Lexington Ave., New York 22, N. Y.—B, E, H, I, M, PA, PRE, RC, SS, CR

Commercial Research Laboratories, Inc., 20 Bartlett Ave., Detroit 3, Mich.—PRE

Communicating Systems, Inc., 201-209 E. 18th St., New York 3, N. Y.—I, PA, PRE, SS

Communication Equipment & Engineering Co., 5646 W. Race St., Chicago 44, Ill.—PA, SS

Communications Co., Inc., 300 Greco Ave., Coral Gables 34, Fla.—M, PA, PRE, RC

Concord Radio Corp., 901 W. Jackson Blvd., Chicago 7, Ill.—H, I, M, PA, PRE, SS

Connecticut Telephone & Electric, Div. Great American Industries, Inc., Meriden 3, Conn.—B, I

Convers-O-Call—National Inter-Communicating Systems

Cover Dual Signal Systems, Inc., Div. Electra-Voice Corp., 5215 N. Ravenswood Ave., Chicago 40, Ill.—RC

Dalmo Victor, Div. Goldfield Consolidated Mines Co., 1414 El Camino Real, San Carlos, Calif.—I, RC, SS

Dayton Acme Co., 930 York St., Cincinnati 14, Ohio—I

DeVry Corp., 1111 Armitage Ave., Chicago, Ill.—SS

Dilks, Inc., 520 West Ave., Norwalk, Conn.—PA, SS

Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—SS

Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—H, I, M, PA, PRE, RC, SS

Eckstein Radio & Television Co., 914-918 La Salle Ave., Minneapolis 2, Minn.—M, PA

Electro Products Laboratories, 549 W. Randolph St., Chicago 6, Ill.—RC

Electronic Apparatus, Inc., 347 Madison Ave., New York 17, N. Y.—I, M, PA, PRE, SS

Electronic Engineering Service & Laboratories, 114-38 Farmers Blvd., St. Albans 12, N. Y.—PA, PRE, SS

Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—E, RC

Electronic Mfg. Co., 339-347 W. Eighth Ave., Dubuque, Iowa—I, SS

Electronic Measurements Co., Red Bank, N. J.—PA, PRE

Electronic Sound Engineering Co., 109 N. Dearborn St., Chicago 2, Ill.—CC, E, H, I, PA, SS

Electronic Specialties Mfg. Co., 68 High St., Worcester 2, Mass.—I, M, PA, PRE, SS

Erwood Co., 223 W. Erie St., Chicago 10, Ill.—E, I, M, PA, PRE, RC, SS, CR

Executone, Inc., 415 Lexington Ave., New York 17, N. Y.—I, SS, E, I, PA

Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y.—PRE

Faraday Electric Corp., Adrian, Mich.—B

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—I, PRE

Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—"Ferranti"—M, PA, PRE

Flashtron—Thordarson Electric Mfg. Div.

Freed Transformer Co., 72 Spring St., New York 12, N. Y.—PA, PRE

Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—E, I, M, PA, PRE, SS

Gates Radio Co., 220 Hampshire St., Quincy, Ill.—PA, PRE, RC, SS

Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—I, PA, PRE, SS

General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—I

General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—I, M, PA, PRE, SS

Gentleman Products, Div. Henney Motor Co., 1702 Cuming St., Omaha, Nebr.—H, I, M, PA, PRE, RC, SS

Gibson, Inc., 225 Parson St., Kalamazoo 13F, Mich.—E

Globe Phone Mfg. Corp., 3 Linden St., Reading, Mass.—AM, B, H, PA, SS

Godfrey Mfg. Co., 171 S. 2nd St., Milwaukee 4, Wis.—I, PA, PRE, SS

Goodall Electric Mfg. Co., Third & Main Sts., Ogallala, Nebr.—SS

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—H, I, M, PA, PRE, SS

Guided Radio Corp., 161 Sixth Ave., New York 13, N. Y.—SS

Hallicrafters Co., 2611 S. Indiana Ave., Chicago 16, Ill.—M

Hammond Instrument Co., 2915 N. Western Ave., Chicago 18, Ill.—E

Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—M, PA, PRE, RC, SS

Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—M, PA, PRE

Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—E, M, PA, PRE, SS

Higgins Industries, Inc., 2221 Warwick Ave., Santa Monica, Calif.—M, PA, PRE, RC, SS

Hoffmann Corp., C. L., 436 Boulevard of the Allies, Pittsburgh, Pa.—H

Holland Sound Engineering, 3730 Division St., Chicago, Ill.—AM, E, I, M, PA, PRE, RC, SS

Holtzer-Cabot, Div. First Industrial Corp., 125 Amory St., Roxbury 19, Mass.—SS

Huber Radio Co., 260 S. Center St., Casper, Wyo.—CC

Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—M, PA, PRE, RC, SS

Industrial Transformer Corp., 2540 Belmont Ave., New York 58, N. Y.—PA, PRE, SS

Instrument Elecronics, 253-21 Northern Blvd., Little Neck, L. I., N. Y.—PRE

Intercall Systems, Inc., 201 Hickory St., Dayton, Ohio—I

Intex Co., 303 W. 42nd St., New York 18, N. Y.—PA, SS

Kegron Mfg. Co., Inc., 18 W. 20th St., New York 11, N. Y.—B, I, PA

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—B, I

Kinetic Electronics Corp., 235 E. 42nd St., New York 17, N. Y.—PA, SS

Kirkland Co., H. R., 8-10 King St., Morristown, N. J.—I

Kluge Electronics Co., 1031 N. Alvarado St., Los Angeles 26, Calif.—CC

Lake Mfg. Co., 2323 Chestnut St., Oakland 7, Calif.—"Voycall"—B, I

Langevin Co., Inc., 37 W. 65th St., New York 23, N. Y.—M, PA, PRE, RC, SS

Laurehk Radio Mfg. Co., 3931 Monroe Ave., Wayne, Mich.—"Laurehk"—H, PA

Lavoie Laboratories, Morganville, N. J.—I

Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—PA, PRE

Lektra Labs., Inc., 30 E. 10th St., New York 3, N. Y.—E, I

Lenkurt Electric Co., 1138 Howard St., San Francisco 3, Calif.—CC

Lincoln Electronics Corp., 653 11th Ave., New York, N. Y.—E, H, I, PA, PRE, SS

Lincrophone Co., Inc., 1661 Howard Ave., Utica 3, N. Y.—SS

Logan Co., Les., 530 Gough St., San Francisco 2, Calif.—"Speed-X"—B

Loge Sound Engineers, J. M., 986 S. Western Ave., Los Angeles 6, Calif.—I, M, PA, PRE, RC, SS

Long Co., L. J., 186 Grand St., New York 13, N. Y.—I

Lyman Electronic Corp., 12 Cass St., Springfield, Mass.—PA, PRE

Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—PA

Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—M, PA, PRE

Maico Co., Inc., 21 N. Third St., Minneapolis 1, Minn.—E, H, I, M, PRE, SS

Marshall Radio Engineering Laboratories, 5760 Lemp Ave., North Hollywood, Calif.—SS

Meck Industries, Inc., John, Liberty at Pennsylvania, Plymouth, Ind.—"Audiograph"—SS

Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—E, I, M, PA, PRE, SS

Miessner Inventions, Inc., Van Beuren Rd., Morristown, N. J.—E

Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—"Miles"—I, M, PA, PRE, RC, SS

Milprint, Inc., 431 W. Florida St., Milwaukee 1, Wis.—AM

Mohawk Electric Mfg. Co., 60-62 Howard St., Irvington 6, N. J.—B

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—I, M, PA, PRE, RC

Myers & Sons, E. A., 306 Beverly Rd., Pittsburgh 16, Pa.—"Radioear"—H

National Co., Inc., 61 Sherman St., Malden 48, Mass.—PA

National Inter-Communicating Systems, 2434 Montrose Ave., Chicago 18, Ill.—"Convers-O-Call"—I, PA, PRE, SS

Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles 7, Calif.—E, I, M, PA, PRE, RC, SS

North Electric Mfg. Co., Box 417, Galion, Ohio—I

Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—M, PA, PRE, SS

Ocram Corp., Auburn Rd., Seneca Falls, N. Y.—"Ocram"—B

Operadio Mfg. Co., St. Charles, Ill.—"Operadio"—B E, I, M, PA, PRE, RC, SS, CR

Otarion, Inc., 25 E. Washington St., Chicago, Ill.—H

Pacific Sound Equipment Co., 130 N. Beaudry Ave., Los Angeles 12, Calif.—SS

Paraloy Co., 600 S. Michigan Ave., Chicago 5, Ill.—SS

Polytron Corp., 401 Broadway, New York 13, N. Y.—I, PA, PRE

Powers Electronic & Communication Co., New St., Glen Cove N. Y.—EM, I, M, PA, PRE, SS

Presto Electric Co., 4511 New York Ave., Union City, N. J.—B, I

Racon Electric Co., Inc., 52 E. 19th St., New York 3, N. Y.—AM, I

Radiad Service, 720 W. Schubert Ave., Chicago 14, Ill.—SS

Radioear—E. A. Myers & Sons

Radio Frequency Laboratories, Inc., Boonton, N. J.—I

Radio Laboratories, Inc., 2701 California Ave., Seattle 6, Wash.—I, M, PA, SS, CR

Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill.—I, M, PA, PRE, SS

Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—I

RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—AM, E, H, I, M, PA, PRE, RC, SS, CR

Record-O-Vox, Inc., 721 N. Martel Ave., Hollywood 46, Calif.—PA, SS

Regal Electronics Corp., 20 W. 20th St., New York 11, N. Y.—I

Rehtron Corp., 4313 Lincoln Ave., Chicago 18, Ill.—M, PA, PRE, SS

Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—"Remler"—I, SS, M

Riggs & Jeffreys, Inc., 73 Winthrop St., Newark 4, N. J.—H, PA, PRE, SS

Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio—E, H

Ruby Electric Co., 729 Seventh Ave., New York, N. Y.—I, PA, SS

Saxl Instrument Co., 38-40 James St., East Providence 14, R. I.—H

Schulmerich Electronics, Inc., 220-228 No. Main St., Sellersville, Pa.—E, H, PA, PRE, SS

Scientific Radio Products Co., 738 W. Broadway, Council Bluffs, Iowa—CC

Selectrograph Mfg. Co., 502 W. Colo. Ave., Colorado Springs, Colo.—I

Select-O-Phone Co., Div. Screw Machine Products Co., Inc., 1012 Eddy St., Providence 5, R. I.—I

Setchell Carlson, Inc., 2233 University Ave., St. Paul 4, Minn.—"Setchell-Carlson"—M, PA, SS

Sheridan Electronics Corp., 2850 S. Michigan Ave., Chicago 16, Ill.—PA, PRE

Signal Engineering & Mfg. Co., 154 W. 14th St., New York 11, N. Y.—B, SS

Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—PA

Simpson Mfg. Co., Mark, 188 W. 4th St., New York 14, N. Y.—E, I, M, PA, PRE, RC, SS

Sonotone Corp., Saw Mill River Rd., Elmsford, N. Y.—H

S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—PA, PRE, SS

Sound Equipment Corp., 3903 San Fernando Rd., Glendale 4, Calif.—PA, SS

Speed-X—Les Logan Co.

Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—B

Standard Transformer Corp., 1500 N. Halsted St., Chicago 22, Ill.—H, PA

Stephens Mfg. Co., 10416 National Blvd., Los Angeles 34, Calif.—"Trusonic"—PA, PRE, SS

Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y.—"Stromberg-Carlson"—I, PA, PRE, SS, CR

Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—PA, PRE

Talk-A-Phone Mfg. Co., 1512 S. Pulaski Rd., Chicago 23, Ill.—I

Task Electronics Co., 245 W. 54th St., New York, N. Y.—E, I, M, SS

TelAutograph Corp., 16 W. 61st St., New York 23, N. Y.—I

Telemotor Corp., 260 5th Ave., New York, N. Y.—I

Telex Products Co., Minneapolis, Minn.—H, I

Thordarson Electric Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—"Tru-Fidelity," "Flashtron"—PA, PRE

Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York 14, N. Y.—PA, PRE, RC, SS

Trimm, Inc., 1770 W. Berteau Ave., Chicago 13, Ill.—H

Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill.—I, PA, PRE

Tru-Fidelity—Thordarson Electric Mfg. Div.

Trusonic—Stephens Mfg. Co.

Turner Co., 909 17th St., N. E., Cedar Rapids, Iowa—E

U. S. Television Mfg. Corp., 106 Seventh Ave., New York 11, N. Y.—I, PRE

Vac-O-Grip Co, 2025 Detroit Ave., Toledo 6, Ohio—CR

Vacolite Co., 3001-3 N. Henderson, Dallas, Tex.—H

Vibraloc Mfg. Co., 325 Miguel St., San Francisco, Calif.—I, PA, PRE, SS

Walsh Engineering Co., 34 De Hart Pl., Elizabeth 3, N. J.—PA

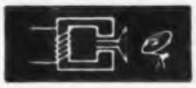
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa.—PA

Watterson Radio Mfg. Co., 2700 Swiss Ave., Dallas 1, Tex.—I, PA, SS

Webster Electric Co., 1900 Clark St., Racine, Wis.—I, M, PA, PRE, SS

Wellman Mfg. Co., 7122 Melrose Ave., Los Angeles 46, Calif.—M, PA, PRE, SS
Western Electric Co., 195 Broadway, New York 7, N. Y.—H, SS
Western Sound & Electric Laboratories, Inc., 3512 W. St. Paul Ave., Milwaukee, Wis.—E, I, M, PA, PRE, RC, SS
Westinghouse Elec. Corp., East Pittsburgh, Pa.—I, M, PA, PRE, RC
Werner Electronic Devices, 609 W. Lake St., Chicago 6, Ill.—I
Wurlitzer Co., Rudolph, Falls Blvd., North Tonawanda, N. Y.—E
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St., York, Pa.—PA, SS
Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.—H

(36) Speakers & Headphones



Acoustic chambers	CH
Baffles	B
Cones	C
Crystal headphones	HC
Crystal speakers	CS
Dynamic headphones	HD
Electro-dynamic speakers	D
Field coils	F
Field exciters	FE
Grille cloths	GC
Hearing aid headphones	HA
Magnetic speakers	M
Magnetic headphones	HM
PM drivers	PD
PM dynamic speakers	PM
Projector horns	PH
Shims, adjusting	S
Stands	ST

Acme Wire Co., New Haven 14, Conn.—F
Aireon Mfg. Corp., Fairfax & Funston Rds., Kansas City 15, Kans.—CH, B, C, D, PM, PH
Altec Lansing Corp., 1680 N. Vine St., Hollywood 28, Calif.—CH, D, M, PH
American Communications Corp., 306 Broadway, New York, N. Y.—CH, B, FE
American Earphone Co., 10 E. 43rd St., New York 17, N. Y.—HA
Astatic Corp., Harbor & Jackson, Conneaut, Ohio—HC, HA
Atlas Sound Corp., 1443 39th St., Brooklyn 18, N. Y.—CH, B, C, D, FE, GC, PD, PH, ST, PM
Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—CH
Aurex Corp., 1117 N. Franklin St., Chicago, Ill.—HC, HD, HM
Aviometer Corp., 370 W. 35th St., New York 1, N. Y.—HD, HM
Bell Sound Systems, Inc., 1183 Essex Ave., Columbus 3, Ohio—B, ST
Best Mfg. Co., Inc., 1200 Grove St., Irvington 11, N. J.—D, F, M
Bittermann Electric Co., 50 Henry St., Brooklyn 2, N. Y.—F
Bogen Co., Inc., David, 663 Broadway, New York 12, N. Y.—B
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—HC, CS, HA
Cannon Co., C. F., Springwater, N. Y.—HM
Carron Mfg. Co., 415 S. Aberdeen St., Chicago 7, Ill.—C, F, GC, S
Castlewood Mfg. Co., 12th & Burnett Sts., Louisville, Ky.—B, PH
Cellusuede Products, Inc., 500 N. Madison St., Rockford, Ill.—GC
Cinaudagraph Corp., 2 Selleck St., Stamford, Conn.—D, PM, PH
Cinaudagraph Speakers, Inc., 3911 S. Michigan Ave., Chicago, Ill.—D, M, PM
Clark Radio Equipment Corp., 4313 Lincoln Ave., Chicago 18, Ill.—CH
Commercial Radio Sound Corp., 575 Lexington Ave., New York 22, N. Y.—B, M, PH
Connecticut Telephone & Electric, Div. Great American Industries, Inc., Meriden 3, Conn.—HM
Consolidated Radio Products Co., 350 W. Erie St., Chicago 10, Ill.—D, HM, PM
Contract Specialties Co., 1743 Labrosse St., Detroit 16, Mich.—GC
Crescent Industries, Inc., 4140 Belmont Ave., Chicago 41, Ill.—D, PM
Dazor Mfg. Co., 4483 Duncan Ave., St. Louis 10, Mo.—ST
D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—D, F, PM
Electro Products Laboratories, 549 W. Randolph St., Chicago 6, Ill.—FE
Erwood Co., 223 W. Erie St., Chicago 10, Ill.—D, FE, HA, PD, PM, PH, ST
Fairfield Lumber Co., 1700 Post Rd., Fairfield, Conn.—B
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—HM, PM
Flock Process Co., Velvetone Div., 3 Quincy St., Norwalk, Conn.—GC
Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—PD, PH
G-C—General Cement Mfg. Co.
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—"G-C"—GC, S
General Electric Co., Receiver Div., 1285 Boston Ave., Bridgeport 2, Conn.—PM
General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—GC
General Instrument Corp., 829 Newark Ave., Elizabeth 3, N. J.—D, PM
Gentleman Products, Div. Henney Motor Co., 1702 Cuming St., Omaha, Nebr.—CH, B
Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—M, PH
Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—HM, PD, PM, PH
Guided Radio Corp., 161 Sixth Ave., New York 13, N. Y.—PM
Hallicrafters Co., 2611 S. Indiana Ave., Chicago 16, Ill.—PM
Hawley Products Co., 333-339 N. 6th St., St. Charles, Ill.—CH, B, C, PH
Illinois Wood Products Corp., 2512 S. Damen Ave., Chicago 8, Ill.—B
Industrial Fabricators, Inc., 1890 Carter Rd., Cleveland 13, Ohio—B
Industrial Transformer Corp., 2540 Belmont Ave., New York 58, N. Y.—F
Jensen Radio Mfg. Co., 6601 S. Laramie Ave., Chicago 38, Ill—CH, B, C, D, F, FE, PD, PM, PH, ST
J. F. D. Mfg. Co., 4111 Ft. Hamilton Parkway, Brooklyn 19, N. Y.—F
Langevin Co., Inc., 37 W. 65th St., New York 23, N. Y.—CH, PH
Magnavox Co., Ft. Wayne 4, Ind.—D, F, PD, PM
Maico Co., Inc., 21 N. Third St., Minneapolis 1, Minn.—HD, D, HA, HM
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—CH
Miles Reproducer Co., Inc., 812 Broadway, New York 3, N. Y.—CH, B, PH
Murdock Co., Wm. J., 182 Carter St., Chelsea 50, Mass.—HM
National Co., Inc., 61 Sherman St., Malden 48, Mass.—CH, B
National Molding Co., 2141 W. Washington Blvd., Los Angeles 7, Calif.—C
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles 7, Calif.—B, PD, PM, PH
Olek & Son, Inc., A., 4757-59 Melrose St., Philadelphia 37, Pa.—GC
Operadio Mfg. Co., St. Charles, Ill.—CH, B, C, HD, D, F, PD, PM, PH
Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—B, C, D, F, FE, HF, M, PD, PH, PM
Permoflux Corp., 4900 W. Grand Ave., Chicago 39, Ill.—HD, D, M, HM, PM
Powers Electronic & Communication Co., New St., Glen Cove, N. Y.—PH
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago 10, Ill.—S
Quam-Nichols Co., 33rd Place & Cottage Grove Ave., Chicago 16, Ill.—D, PM
Racon Electric Co., Inc., 52 E. 19th St., New York 3, N. Y.—CH, B, C, D, M, PD, PM, PH, ST
Radell Corp., 215 W. Michigan St., Indianapolis 2, Ind.—D, PM
Radio Speakers, Inc., 221 E. Cullerton St., Chicago, Ill.—HD, HM, D, PM
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden N. J.—C, F, PD, PM
Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—B, HD
Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio—CH, HA, HM
Rola Co., Inc., 2530 Superior Ave., Cleveland 14, Ohio—D, FE, PM
Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"Walsco"—GC, S
Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—D, PM
Shure Bros., 225 W. Huron St., Chicago 10, Ill.—HA, HM
Simpson Mfg. Co., Mark, 188 W. 4th St., New York 14, N. Y.—CH, B, PM, PH, ST
Smith Mfg. Co., Nathan R., 105 Pasadena Ave., South Pasadena, Calif.—F
Sonotone Corp., Saw Mill River Rd., Elmsford, N. Y.—HA, HM
S. O. S. Cinema Supply Corp., 449 W. 42nd St., New York 18, N. Y.—CH, B, FE
Stephens Mfg. Co., 10416 National Blvd., Los Angeles 34, Calif.—CH, B, D, F, PD, PM, PH
Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y.—CH, B, C, PD, PM, PH
Telex Products Co., Minneapolis, Minn.—HA, HM
Trimm, Inc., 1770 W. Berteau Ave., Chicago 13, Ill.—HD, HA, HM
University Laboratories, 225 Varick St., New York 14, N. Y.—CH, B, D, PD, PM, PH, ST
Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—CH, B, D, PD, PM, PH
Vibraloc Mfg. Co., 325 Miguel St., San Francisco, Calif.—CH, B
Walsco—Walter L. Schott Co.
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—F
Watterson Radio Mfg. Co., 2700 Swiss Ave., Dallas 1, Tex.—B
Welsh Co., Wm. H., 2241 S. Indiana Ave., Chicago 16, Ill.—C
Western Sound & Electric Laboratories, Inc., 3512 W. St. Paul Ave., Milwaukee, Wis.—B, S
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St., York, Pa.—CH, B

(37) Switches & Relays

Capacitance relays	CR
Circuit breakers	CB
Counters, electric	C
Differential relays	DR
Float switch	F
Fluorescent lamp starters	FS
Key switch	SK
Mercury relays	M
Mercury switches	MS
Polarized relays	RP
Pressure switch	PS
Push button	PB
Relays	R
Rotary selector switches	SL
Safety interlocks	S
Slide switches	SS
Solenoids	SO
Stepping relays	SR
Thermal switches	T
Time delay relays	TD
Timers	TE
Toggle switches	TO
Vacuum switches	V
Wave change (receiver)	W
Wave change (transmitter)	WT

Abott Tranformer Co., Inc., 403 Lafayette St., New York 3, N. Y.—FS, V
Acme Fire Alarm Co., Inc., 106 7th Ave., New York 11, N. Y.—R
Acro Electric Co., 1305 Superior Ave., Cleveland 14, Ohio—"Acrosnap"—PB, TO
Acrosnap—Acro Electric Co.
Adams & Westlake Co., N. Michigan, Elkhart, Ind.—M, MS, R, TD
Advance Electric & Relay Co., 1260 W. 2nd St., Los Angeles 26, Calif.—R, TD
Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—PS
Aireon Mfg. Corp., Fairfax & Funston Rds., Kansas City 15, Kans.—CB
Allen-Bradley Co., 136 W. Greenfield Ave., Milwaukee 4, Wis.—F, PS, PB, R, SO, TD, TE, V
Allied Control Co., Inc., 2 East End Ave., New York 21, N. Y.—R, RP, SO, SR, TD, TE
Allis-Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1, Wis.—R, SL
American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22, Ill.—R, SO
American Electronics Co., 216 Centre St., New York 13 N. Y.—SK, PB, R, T, TO
American Gas Accumulator Co., 1027 Newark Ave., Elizabeth 3, N. J.—TD
American Instrument Co., 8030 Georgia Ave., Silver Spring, Md.—R
American Television & Radio Co., 300 E. Fourth St., St. Paul 1, Minn.—SO
American Time Products, Inc., 580 Fifth Ave., New York 19, N. Y.—TE
American Type Founders, 11 W. 42nd St., New York,—TE
Amperite Co., 561 Broadway, New York, N. Y.—R, T, TE
Ansonia Clock Co., Inc., 103 Lafayette St., New York 13, N. Y.—TE
Aray Mfg. & Supply Co., 3107 Pine St., St. Louis 3, Mo.—CR, R
Arkay Laboratories, Inc., 1570 S. First St., Milwaukee 4, Wis.—TD
Ark-Les Switch Corp., 51 Water St., Watertown 72, Mass.—SL
Arrow-Hart & Hegeman Elec. Co., 103 Hawthorn St., Hartford 6, Conn.—F, FS, PB, R, SL, T, TO
Atlantic Engineering Products, 136 Liberty St., New York 6, N. Y.—R, SO
Austin Co., M. B., 108-116 S. Desplaines St., Chicago 6, Ill.—TE
Auth Electrical Specialty Co., Inc., 422 E. 53rd St., New York 22, N. Y.—C, R, SR, TE, DR, TD
Autocall Co., 1142 Tucker Ave., Shelby, Ohio—R, RP, SR, MS, TD
Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.—C, SK, M, RP, PB, R, SO, SR, TD, TO
Automatic Electric Mfg. Co., 10 State St., Mankato 1, Minn.—"Automatic"—RP, R, SO, TD, TE
Automatic Switch Co., 41 E. 11th St., New York 3, N. Y.—R, SO

Automatic Temperature Control Co., Inc., 34 E. Logan St., Philadelphia 44, Pa.—R, TD, TE

Aviometer Corp., 370 W. 35th St., New York 1, N. Y. —PB

Bacon Electric Timer Corp., 4513 Brooklyn Ave., Cleveland 9, Ohio—TE

Bank's Mfg. Co., 1105 W. Lawrence Ave., Chicago 40, Ill.—R

Barber-Colman Co., River & Loomis Sts., Rockford, Ill. R, RP, TE

Barker & Williamson, Upper Darby, Pa.—SL, WT

Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif.—V

Benwood-Linze Co., 1815 Locust St., St. Louis 3, Mo.—SL

Betts & Betts Corp., 551 W. 52nd St., New York 19, N. Y.—R, T, TD, TE

Birtcher Corp., 5087 Huntington Dr., Los Angeles 32, Calif.—R

Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N. Y.—PB, TO

Bristol Co., Waterbury 91, Conn.—TE

Brown Engineering Co., 4635 S.E. Hawthorne Blvd., Portland 15, Ore.—SL

Browne Electric Co., J., 3774 Surf Ave., Brooklyn 24, N. Y.—CB, FS, R, T, TD

Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—CR

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—TE

Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N. Y.—R

Burlington Instrument Corp., 214 N. 4th St., Burlington, Iowa—R, TD

Cannon Electric Development Co., 3209 Humboldt St., Los Angeles 31, Calif.—R, SO

Centralab Div., Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.—SL, TO, W, WT

Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—SL

Clare & Co., C. P., 612 N. Michigan Ave., Chicago 11, Ill.—SK, M, PB, R, SL, SR, TD

Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio—F, PB, R, SL, TD

Cole-Hersee Co., 54 Old Colony Ave., Boston 27, Mass.—TE

Collins Radio Co., Cedar Rapids, Iowa—WT

Connecticut Tele. & Elec. Div. of Great American Industries, Inc., Meriden 3, Conn.—SK, RP, PB, SL, SR

Continental X-Ray Corp., 1536 N. Clybourne, Chicago, Ill.—SL

Control Corp., 718 Central Ave., Minneapolis 14, Minn.—R, TE

Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.—PS, R, SO, T, TD, TO, V

Cover Dual Signal Systems, Inc., Div. of Electra Voice Corp., 5215-25 Ravenswood Ave., Chicago 40, Ill.—SR, SL, TD

Cramer Co., Inc., R. W., Centerbrook, Conn.—TD, TE

Curtis Development & Mfg. Co., 3266 N. 33rd St., Milwaukee 10, Wis.—T, TD

Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.—CB, C, F, PS, PB, R, SL, S, SO, T, TD, TE, TO, V

Cyclotron Specialties Co., Moraga, Calif.—TE

Daven Co., 191 Central Ave., Newark 4, N. J.—SL

Dayton Acme Co., 930 York St., Cincinnati 14, Ohio —T, TD

Diamond H—Hart Mfg. Co.

Dietz Mfg. Co., 2310 S. La Cienega Blvd., Los Angeles 34, Calif.—T, V

Distillation Products, Inc., Vacuum Equipment Div., 755 Ridge Road West, Rochester 13, N. Y.—R, V

Doehler-Jarvis Corp., Robertson St., Batavia, N. Y.—CB, SK, PB

Dual Remote Control Co., 31776 Cowan Road, Wayne, Mich.—R

Durakool, Inc., 1010 N. Main St., Elkhart, Ind. —M, MS

Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza S., Long Island City 1, N. Y.—PB

Eagle Signal Corp., 202 20th St., Moline, Ill.—PB, R, SR, TD, TE

Eastern Air Devices, Inc., 585 Dean St., Brooklyn 17, N. Y.—SO

Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—SL, W

Ecco High Frequency Corp., 7020 Hudson Blvd., North Bergen, N. J.—SL

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.—PS, R

Eimac—Eitel-McCullough, Inc.

Eitel-McCullough, Inc., San Bruno, Calif—"Eimac"—V

Electric Auto Lite Co., Port Huron, Mich.—R

Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4, Ohio—F, PS, PB, R, TD, TE

Electric Switch Corp., 14th at Union St., Columbus, Ind.—TE

Electrical Products Supply Co., 1140 Venice Blvd., Los Angeles 15, Calif.—R, TD

Electrical Windings, Inc., 2015 N. Kolmar Ave., Chicago 39, Ill.—SO

Electricoil Transformer Co., 421 Canal St., New York 13, N. Y.—SO

Electronic Control Corp., 1573 E. Forest St., Detroit, Mich.—TE

Electronic Measurements Co., Red Bank, N. J.—TE

Electronic Products Co., 111 E. Third St., Mt. Vernon, N Y.—V, TD

Electronic Products Co., 19 N. First St., Geneva, Ill.—TE

Electronic Sound Engineering Co., 109 N. Dearborn St., Chicago 2, Ill.—TE

Electro-Tech Equipment Co., 331 Canal St., New York 13, N. Y.—R, SL, SO, T, TD, TE

Engineering Laboratories, Inc., 610-624 E. 4th St., Tulsa 3, Okla.—RP, R, TD, TE

Faraday Electric Corp., Adrian, Mich.—R

Federal Anti-Capacity Switch Corp., 1200 Niagara St., Buffalo 13, N. Y.—SK

Federal Electric Co., 8700 S. State St., Chicago, Ill. —CB, FS

Federal Instrument Co., 3917 47th Ave., Long Island City, N. Y.—R

Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—C, SK, R, SL, SR, TD

Fenwal, Inc., Ashland, Mass.—T

Foxboro Co., Foxboro, Mass.—TE

Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago, Ill.—TE

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—PS, PB, TO

General Control Co., 1200 Soldiers Field Road, Boston 34, Mass.—C, SK, MS, PB, SL, TD, TE, W, WT

General Controls Co., 801 Allen Ave., Glendale, Calif.—R

General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.—FS, SK, MS, PB, SL, T, TO

General Electric Co., Specialty Div., 1001 Wolf St., Syracuse, N. Y.—SL, S

General Electric Co., Tube Div., 1 River Rd., Schenectady 5, N. Y.—V, TE, R, RP, TD

General Electric X-Ray Corp., 2012 Jackson Blvd., Chicago, Ill.—TE

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—"G-R," "Variac"—SL

General Time Instruments Corp., Seth Thomas Clocks Div., Thomaston, Conn.—TE

Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va.—R

Gibbs & Co., Thomas B., Div. of George W. Borg Corp., 814 Michigan St., Delavan, Wis.—"Gibbs"—TD

Gilbert Clock Co., Wm. M., Winsted, Conn.—TE

G-M Laboratories, Inc., 4300 N. Knox Ave., Chicago 41, Ill.—R, TD

Goodall Electric Mfg. Co., 3rd & Main Sts., Ogalalla, Neb.—FS

Gorrell & Gorrell, Haworth, N. J.—TE

G-R—General Radio Co.

Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—V

Grayhill, 1 N. Pulaski Rd., Chicago 24, Ill.—PB, R

Gregory Mfg. Co., 67 Franklin St., New Haven 11, Conn.—PS

Guardian Electric Mfg. Co., 1400 W. Washington Blvd., Chicago 7, Ill.—C, M, R, S, SO, SR, TD, TE

Hart Mfg. Co., 110 Bartholomew Ave., Hartford 1, Conn.—"Diamond H"—M, R, TO

Hartman Electrical Mfg. Co., 175 N. Diamond St., Mansfield, Ohio—RP, PB, R, T

Haydon Mfg. Co., Inc., Forestville, Conn.—TD, TE

H-B Instrument Co., 2524 N. Broad St., Philadelphia 32, Pa.—T

Heinemann Circuit Breaker Co., Trenton 2, N. J.—CB

Heinze Electric Co., Lowell, Mass.—R

Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—PS, SO, TE

Hetherington & Son, Inc., Robert, 1216 Elmwood Ave., Sharon Hill, Pa.—PB, SO, T

Holtzer Cabot Signal Div., 400 Stuart St., Boston 17, Mass.—R, TD

Industrial & Commercial Electronics, Belmont, Calif.—V

Industrial Electronics Corp., 80 Bank St., Newark, N. J.—CB, FS

Industrial Engineering Corp., Rea Bldg., Terre Haute, Ind.—TE

Industrial Timer Corp., 115 Edison Place, Newark 5, N. J.—C, TD, TE

Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—PB, TO

International Register Co., 2620 W. Washington Blvd., Chicago 12, Ill.—TD, TE

I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.—CB

J-B-T Instruments, Inc., 441 Chapel St., New Haven 8, Conn.—SL

Jefferson Electric Co., 25th Ave. & Madison St., Bellwood, Ill.—SO

Jennings Radio Mfg. Co., 1098 E. William St., San Jose 12, Calif.—R

J.F.D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn 19, N. Y.—SL, TO

Johnson Co., E. F., Waseca, Minn.—R

Keeney & Co., Inc., J. H., 6610 S. Ashland Ave., Chicago 36, Ill.—PB, R, SO, SR, TD, TE

Kegron Mfg. Co., Inc., 18 W. 20th St., New York 11, N. Y.—PS

Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—CB, SK, M, RP, PB, R, T, TD

Kidde & Co., Inc., Walter, 140 Cedar St., New York 6, N. Y.—PS

Kirkland Co., H. R., 8-10 King St., Morristown, N. J. —PB

Kolton Electric Mfg. Co., 123 New Jersey Railroad Ave., Newark 5, N. J.—CB

Kulka Electric Mfg. Co., Inc., 30 South St., Mt. Vernon, N. Y.—TO

Kurman Electric Co., 35-18 37th St., Long Island City, N. Y.—R, TD

Lake Mfg. Co., 2323 Chestnut St., Oakland 7, Calif.—R

Leach Relay Co., 5915 Avalon Blvd., Los Angeles, Calif.—R, TD

Lear, Inc., Piqua, Ohio—SO

Leich Electric Co., 565 W. Washington Blvd., Chicago 6, Ill.—R

Lektra Labs., Inc., 30 E. 10th St., New York 3, N. Y. —TD, TE

Leupold & Stevens Instruments, 4445 N.E. Glisan St., Portland 13, Ore.—F

Lewis Electronics, Inc., Los Gatos, Calif.—R

Lewis Engineering Co., 52 Rubber Ave., Naugatuck, Conn.—SL

Littelfuse, Inc., 4757 Ravenswood Ave., Chicago 40, Ill.—CB, MS, R

Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5, Ill.—C, F, TD, TE, R

Magnavox Co., Fort Wayne 4, Ind.—SO

Magnetic Gauge Co., 60 E. Bartges St., Akron, Ohio —TD

Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—TE

Maico Co., Inc., 25 N. Third St., Minneapolis, Minn. —R, SR

Mallory & Co., Inc., P. R., 3029 E. Washington St., Indianapolis 6, Ind.—PB, SL, TE

Mark Time—M. H. Rhodes, Inc.

Mattern Mfg. Co., F., 4647 N. Cicero Ave., Chicago 30, Ill.—SL

McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.—F

Megard Corp., 1601 S. Burlington St., Los Angeles 6, Calif.—TD, TE

Meletron Corp., 950 N. Highland Ave., Los Angeles 38, Calif.—PS, SO, TD, V

Mendelsohn Speedgun Co., 457 Bloomfield Ave., Bloomfield, N. J.—TE

Mercoid Corp., 4201 Belmont Ave., Chicago 41, Ill.—MS, PS, R

Meyers Safety Switch Co., Inc., 423 Tehama St., San Francisco 3, Calif.—SK

Michigan Fluorescent Light Co., 71-77 S. Parke St., Pontiac, Mich.—FS

Micro Switch Div. of First Industrial Corp., Freeport, Ill.—"Microswitch"—SK, PB, T

Miles Reproducer Co., Inc., 812 Broadway, New York, N. Y.—R

Minneapolis-Honeywell Reg. Co., 2753 Fourth Ave. S., Minneapolis, Minn.—R, TE

Mohawk Electric Mfg. Co., 60-62 Howard St., Irvington 6, N. J.—CB, F, R, SO, TD

Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—SK, PB

Monitor Controller Co., 51 S. Gay St., Baltimore 2, Md.—F, PB, R, SL, TD, TE, V

Mossman, Inc., Donald P., 612 N. Michigan Ave., Chicago 11, Ill.—R, SK, PB, SL

Mu-Switch Corp., 38 Pequit St., Canton, Mass.—SK, PS, PB, S, T

Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—"Muter"—PB, R

National Co., Inc., 61 Sherman St., Malden 48, Mass. —PB, W

National Research Corp., 100 Brookline Ave., Boston 15, Mass.—V

Naxon Utilities Corp., 2101-11 W. Walnut St., Chicago 12, Ill.—R

New England Radiocrafters, 1156 Comonwealth Ave., Boston 34, Mass.—SL

New Haven Clock Co., New Haven 4, Conn.—TD

North Electric Mfg. Co., Box 417, Galion, Ohio—M, R, SL, SR, TD, TE

Northwestern Clock Co., 514-15 Brown Bldg., Omaha, Neb.—TE

Oak Mfg. Co., 1260 Clybourn Ave., Chicago 10, Ill.—"Oak"—PB, R, SL, SR, W

Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill.—SL

Paragon Electric Co., 37 W. Van Buren, Chicago 5, Ill.—R, TE, TD

Paramount Electric Mfg. Co., 419 Tehama St., San Francisco, Calif.—TO

Parker Engineering Products Co., 16 W. 22nd St., New York, N. Y.—R

Partlow Corp., 2 Campton Rd., New Hartford, N. Y.—TD, TE

Pass & Seymour, Inc., Syracuse 9, N. Y.—SK, MS, PB

Peerless Laboratories, 467 10th Ave., New York 18, N. Y.—SL

Philadelphia Thermometer Co., 6th & Cayuga Sts., Philadelphia, Pa.—R, M

Philco Corp., Tioga and C Sts., Philadelphia 34, Pa.—SL, TO, W

Philharmonic Radio Corp., 528 E. 72nd St., New York 21, N. Y.—SL, TD

Phillips Control Corp., 612 N. Michigan Ave., Chicago 11, Ill.—SO

Photoswitch, Inc., 77 Broadway, Cambridge, Mass.—TD, TE

Photovolt Corp., 95 Madison Ave., New York 16, N. Y. —TD, TE

Pierce Laboratory, Inc., Summit, N. J.—"Pierceway" —CB, R

Pierceway—Pierce Laboratory, Inc.

Plating Processes Corp., 109 Lyman St., Holyoke, Mass.—F

Portable Products Co., C. J. Tagliabue Div., 550 Park Ave., Brooklyn 5, N. Y.—TE

Potter & Brumfield Mfg. Co., Inc., 617 N. Gibson St., Princeton, Ind.—R, TD

Potter Instrument Co., 136-56 Roosevelt Ave., Flushing, L. I., N. Y—TE

Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.—B, M, RP, TD
Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—T, TE
Presto Electric Co., 4511 New York Ave., Union City, N. J.—SK, PB
Price Electric Corp., East Church and 2nd Sts., Frederick, Md.—RP, R, SL, SO, SR, TD
Radio Frequency Laboratories, Inc., Boonton, N. J.—C
Radionic Controls, 3758 Belmont Ave., Chicago 18, Ill. —R, SO
Rawson Electrical Instrument Co., Inc., 110 Potter St., Cambridge 42, Mass.—TE
R-B-M Mfg. Co., Div. of Essex Wire Corp., Hanna St., Logansport, Ind.—CB, RP, PB, R, SO, TD, TO
Rehtron Corp., 4313 Lincoln Ave., Chicago 18, Ill.—TD
Reliance Automatic Lighting Co., 1927 Mead St., Racine, Wis.—TD, TE
Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—SK, R
Reynolds Electric Co., 2650 W. Congress St., Chicago 12, Ill.—T, TD, TE
Rhodes, Inc., M. H., 1 Hudson St., Hartford, Conn.—"Mark Time"—TD, TE
Richardson-Allen Corp., 15 W. 20th St., New York, N. Y.—TD, TE, WT
Rogers Precision Products Co., 270 Lafayette St., New York 12, N. Y.—CB, FS
Roller-Smith Div., Realty & Industrial Corp., 1760 W. Market St., Bethlehem, Pa.—CB, R, SL
Rowe Radio Research Laboratory Co., 2422 N. Pulaski Rd., Chicago 39, Ill.—TE
Rubicon Co., Ridge Ave. at 35th St., Philadelphia 32, Pa.—SL
Sangamo Electric Co., Springfield, Ill.—TE
Schaar & Co., 754 W. Lexington St., Chicago 7, Ill. —TE
Self Winding Clock Co., 205 Willoughby Ave., Brooklyn 5, N. Y.—TE
Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—"Shallcross"—SL
Sheldon Electric Co. Inc., 76 Coit St., Irvington 11, N. J.—FS
Sigma Instruments, Inc., 70 Ceylon St., Boston 21, Mass.—RP, R, TD
Signal Electric Mfg. Co., 1939 Troam St., Menominee, Mich.—CB, RP, R, TE
Signal Engineering & Mfg. Co., 154 W. 14th St., New York 11, N. Y.—RP, PB, R, SR, TD, TE
Simonds Machine Co., Inc., 246-48 Worcester St., Southbridge, Mass—PS
Smith Mfg. Co., F. A., Union & Augusta, Rochester 2, N. Y.—CB
Smith Mfg. Co., Nathan R., 105 Paadena Ave., South Pasadena, Calif.—PS, R, SO
Sorenson & Co., 375 Fairfield Ave., Stamford, Conn.—CR, R, TD, TE
Special Electric Labs., 7657 S. Central Ave., Los Angeles 1, Calif.—TE
Spencer Thermostat Co., 34 Forest St., Attleboro, Mass. —CB, T, TD
Sperti, Inc., Beech & Kenilworth, Norwood Sta., Cincinnati 12, Ohio—M, V, SO
Square D Co., 6060 Rivard St., Detroit 11, Mich. —R, TD
Stackpole Carbon Co., P. O. Box 327, St. Marys, Pa. —PB, SL
Staco—Standard Electrical Products Co.
Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—C, TE
Standard Electrical Products Co., 400 Linden Ave., Dayton 3, Ohio—"Staco"—R, TD
Stoelting Co., C. H., 424 N. Homan Ave., Chicago, Ill.—TE
Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y.—SK, R, SR, TD
Struthers-Dunn, Inc., 1321 Arch St., Philadelphia 7, Pa.—M, MS, RP, R, SO, SR, TD, TE
Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—CB
Taller & Cooper, 75 Front St., Brooklyn 1, N. Y.—C, SK, SL, TE
Taylor Tubes, Inc., 2312 Wabansia Ave., Chicago 47, Ill.—V
Tech Laboratories, 337 Central Ave., Jersey City 7, N. J.—"Tech-Lab"—SL, SO, SR
Technical Products Co., 158 Madison Ave. at 3rd St., Memphis, Tenn.—R, TE
Telegraph Apparatus Co., 412 S. Green St., Chicago, Ill.—SK
Teleoptic Co., 1251 Mound Ave., Racine, Wis.—TD, TE, TO
Teleregister Corp., 157 Chambers St., New York 7, N. Y.—C
Thermador Electric Mfg. Co., 5119 S. Riverside Drive, Los Angeles 22, Calif.—SO
Thompson Clock Co., H. C., 38 Federal St., Bristol, Conn.—TE
Thordarson Electric Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—R
Thwing-Albert Instrument Co., Penn St., & Pulaski Ave., Philadelphia 44, Pa.—SL
Tork Clock Co., 1 Grove St., Mt. Vernon, N. Y.—R, TE
Triplett Electrical Instrument Co., Harmon Rd., Bluffton, Ohio—R, SL
Trumbull Electric Mfg. Co., Woodford Ave., Plainville, Conn.—CB, PB, T
Tung-Sol Lamp Works, Inc., 95 Eighth Ave., Newark 4, N. J.—T
Tungsten Contact Mfg. Co., 7311 Cottage Ave., North Bergen, N. J.—R, SK
Ulanet Co., George, 88 E. Kinney St., Newark 5, N. J. T, TD, TE
Union Switch & Signal Co., Swissvale, Pa.—SR, RP, TD, TE
United Cinephone Corp., 65 New Litchfield St., Torrington, Conn.—R, TE
United Electric Controls Co., 71 A St., S. Boston 27, Mass.—PS, T
United Electronics Co., 42 Spring St., Newark 2, N. J. —V
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—R
Universal X-Ray Products, Inc., 1800 N. Francisco Ave., Chicago 47, Ill.—C, TE, V
Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—SK, PB, R, SL, TO
Variac—General Radio Co.
Veeder-Root, Inc., Hartford, Conn.—C
Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio—TD, V
Voker Corp., 7300 Huron River Dr., Dexter, Mich.—PB, SL, W
Wallace & Tiernan Products, Inc., Main & Mill Sts., Belleville 9, N. J.—R, TE
Ward Leonard Electric Co., 31 South St., Mt. Vernon, N. Y.—M, PB, R, SO, T, TD, SR
Warren Telechron Co., Ashland, Mass.—C, TE
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—SK, PB, TO
Wellman Mfg. Co., 7122 Melrose Ave., Los Angeles 46, Calif.—SO
Western Electric Co., Inc., 195 Broadway, New York 5, N. Y.—R
Western Electro-Mechanical Co., Inc., 300 Broadway, Oakland, Calif.—R
Westinghouse Electric Corp., East Pittsburgh, Pa. CB, FS, F, RP, R, PS, PB, SL, S, SO, T, TD, TE, TO, WT
Westinghouse Electric Corp., Meter Div., 95 Orange St., Newark 1, N. J.—R
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—R, TD
Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—SO
Williams Mfg. Co., 161 W. Huron St., Chicago 10, Ill. —R, SR
Wilson Mfg. Co., Inc., 600 N. Andrews Ave., Ft. Lauderdale, Fla.—TE
Wirt Co., 5221-27 Greene St., Philadelphia 14, Pa.—PB, SL, SS
World Wide Electronics, Inc., 72 E. 13th St., New York 3, N. Y.—SO
Worner Electronic Devices, 609 W. Lake St., Chicago 6, Ill.—TD

(38) Transformers & Chokes

Audio (receiving)	A
Auto transformers	AU
Bridge	B
Chokes	C
Coils & windings	CW
Current transformers	T
Deflection yokes	DY
Fence controllers	FA
Fluorescent reactors	R
Mike cable transformers	MT
Plug-in transformers	PT
Power, receiving-transmitting	P
Rotatable transformers	RT
Voltage regulating	VR
Welding transformers	WT

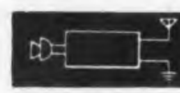
Abott Transformer Co., Inc., 409 Lafayette St., New York 3, N. Y.—A, AU, C, R, PT, P
ACA—Amplifier Co. of America
Acme Electric & Mfg. Co., Cuba, N. Y.—"Acme"—A, AU, C, FA, R, P, RT, VR, WT
Acme Wire Co., New Haven 14, Conn.—CW
Advance Transformer Co., 1161 W. Madison St., Chicago 7, Ill.—C, VR
Aerolite Electronic Hardware Corp., 24 Cliff St., Jersey City 6, N. J.—CW
Agnew Electric Co., Milford, Mich.—WT
Airdesign & Fabrication, Inc., 241 Fairfield Ave., Upper Darby, Pa.—A, P, C
Airtronics Development Corp., 131-133 E. Third St., Dayton 2, Ohio—C, CW, T, P
Altec Lansing Corp., 1680 N. Vine St., Hollywood 28, Calif.—AU, C, P
American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22, Ill.—A, AU, C, CW, T, R, P
American Communications Corp., 306 Broadway, New York, N. Y.—C
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—AU, C, CW, P
American Transformer Co., Inc., 178 Emmet St., Newark 5, N. J.—"Amertran"—A, AU, B, C, CW, T, R, P, VR, WT, MT, RT
Amertran—American Transformer Co.
Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—"ACA"—A, AU, B, C, CW, T, P, VR
Annis Co., R. B., 1101 N. Delaware St., Indianapolis 2, Ind.—C, T
Associated Research, Inc., 231 S. Green St., Chicago 7, Ill.—T
Atlantic Engineering Products, 136 Liberty St., New York 6, N. Y.—A, P
Auston Co., M. B., 108-116 S. Desplaines St., Chicago 6, Ill.—FA
Automatic Mfg. Corp., 900 Passaic Ave., East Newark, N. J.—AU, C, R, P
Benwood-Linze Co., 1815 Locust St., St. Louis 3, Mo. —A, C, T
Berger Electronics, 109-01 72nd Rd., Forest Hills, N. Y.—R
Best Mfg. Co., Inc., 1200 Grove St., Irvington 11, N. J.—A, AU, C, CW
Bittermann Electric Co., 50 Henry St., Brooklyn 2, N. Y.—AU, C, CW, T
Bogen Co., Inc., David, 663 Broadway, New York 12, N. Y.—A, C, P
Burnett Radio Laboratory, William W. L., 4814 Idaho St., San Diego 4, Calif.—AU, C
Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.—A, AU, C, CW, T, P
Campbell X-Ray Corp., 2 Overland St., Boston 15, Mass.—AU, CW, T, P, WT
Chicago Transformer Division, Essex Wire Corp., 3501 Addison St., Chicago 18, Ill.—"Chitran"—A, AU, B, C, T, FA, R, P, VR, WT
Chitran—Chicago Transformer Div. Essex Wire Co.
Clifton Products, Inc., Blackbrook Rd., Painesville, Ohio—R
Cole Radio Works, 86 Westville Ave., Caldwell, N. J. —P
Communication Parts, 1101 N. Paulina St., Chicago 22, Ill.—A, B, C, CW
Condenser Products Co., 1375 N. Branch St., Chicago 22, Ill.—R
Connecticut Telephone & Electric, Div. Great American Industries, Inc., Meriden 3, Conn.—R
Control Corp., 718 Central Ave., Minneapolis 14. Minn.—A, C, CW, P
Coto-Coil Co., Inc., 65 Pavillion Ave., Providence 5, R. I.—CW
Curtis Development & Mfg. Co., 3266 N. 33rd St., Milwaukee 10, Wis.—CW, T, FA
Davis & Co., Inc., Dean W., 549 Fulton St., Chicago, Ill.—AU, C, CW
Dinion Coil Co., Inc., North St., Caledonia, N. Y.—A, AU, C, CW, R, P
Dongan Electric Mfg. Co., 2987 Franklin St., Detroit 7, Mich.—A, AU, B, C, CW, T, FA, R, PT, P
D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—C, CW, T, DY, R
Eastern Specialty Co., 3617 N. 8th St., Philadelphia 40, Pa.—T
Ecco High Frequency Corp., 7020 Hudson Blvd., North Bergen, N. J.—AU, C, P
Eisler Engineering Co., 750 S. 13th St., Newark 3, N. J.—C, CW, VR, WT
Elco—Electron Equipment Corp.
Electric Heat Control Co., 9123 Inman Ave., Cleveland 5, Ohio—CW, FA, WT
Electrical Facilities, Inc., 4224 Holden St., Oakland 8, Calif.—T
Electrical Reactance Corp., 49 Elm St., Franklinville 3, N. Y.—C, CW
Electrical Specialty Co., 2304 Washington St., Boston 19, Mass.—A, AU, C, CW, P, VR
Electrical Windings, Inc., 2015 N. Kolmar Ave., Chicago 39, Ill.—A, AU, C, CW, P
Electricoil Transformer Co., 421 Canal St., New York 13, N. Y.—A, AU, B, C, CW, T, PT, P, WT
Electron Equipment Corp., 917 Meridian Ave., So. Pasadena, Calif.—"Elco"—P, VR
Electronic Components Co., 423 N. Western Ave., Los Angeles 4, Calif.—A, AU, C, CW, P
Electronic Engineering Co., 3223 W. Armitage Ave., Chicago 47, Ill.—VR
Electronic Transformer Co., 207 W. 25th St., New York 1, N. Y.—A, AU, B, C, CW, T, FA, MT, PT, P, RT, WT
Electro-Tech Equipment Co. 331 Canal St., New York 13, N. Y.—T, RT, VR
Electro-Voice, Inc., 1239 S. Bend Ave., South Bend 24, Ind.—MT
Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—A, C, MT, P
Ensign Coil Co., 2516 S. Pulaski, Chicago 23, Ill.—A, C, CW
Excel Transformer Co., 2567 38th Ave., Oakland 1, Calif.—A, AU, C, T, P
Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y.—A, AU, B, C, CW, T, MT, PT, P
Faraday Electric Corp., Adrian, Mich.—A
Fast & Co., John E., 3129 N. Crawford Ave., Chicago 41, Ill.—C
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—A, C, P
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—A, AU, B, C, CW, T, P, VR, WT
Foster Co., A. P., 630 Reading Rd., Reading, Cincinnati 15, Ohio—A, AU, C, CW, P
France Mfg. Co., 10325 Berea Rd., Cleveland 2, Ohio —T, FA, R
Franklin Transformer Mfg. Co., 65 22nd Ave., N. E., Minneapolis 13, Minn.—A, AU, C, CW, P, VR, WT
Freed Transformer Co., 72 Spring St., New York 12, N. Y.—A, AU, B, C, CW, T, P
Gardner Electric Mfg. Co., 4227 Hollis St., Emeryville 8, Calif.—AU, C, CW, P, RT, WT

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—"G-R"—"Variac"—AU, VR
General Transformer Corp., 1250 W. Van Buren St., Chicago 7, Ill.—"Streamliner"—A, AU, C, CW, T, FA, R, P
General Winding Co., 420 W. 45th St., New York 19, N. Y.—A, B, C, CW, T, R, MT, PT, P
Glenn-Roberts Co., 3100 E. Tenth St., Oakland 1, Calif.—WT
Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—P, VR, WT
G-R—General Radio Co.
Gracoil—Gramer Co.
Gramer Co., 2734 N. Pulaski Rd., Chicago 39, Ill.—"Gracoil"—A, AU, B, C, CW, FA, R, P
Guided Radio Corp., 161 Sixth Ave., New York 18, N. Y.—A
Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—AU, MT
Grayhill, 1 N. Pulaski Rd., Chicago 24, Ill.—CW
Guaranteed Products, Wellington 1, Ohio—FA
Gulow Corp., 26 Waverly Pl., New York 3, N. Y.—VR
Hadley Co., Robert M., 707-711 E. 61st St., Los Angeles 1, Calif.—A, AU, C, CW, FA, P
Halldorson Co., 4500 Ravenswood Ave., Chicago 40, Ill.—A, AU, C, CW, T, P, RT, VR, WT
Hannon Electric Co., 1605 Waynesburg Rd., S. E., Canton, Ohio—WT
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—P, VR
Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—A, AU, C, CW, T, P
Haydu Bros., P. O. Box 1226, Plainfield, N. J.—C
Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.—A, AU, C, CW, T, R, MT, PT, P, WT
Hollywood Transformer Co., 645 N. Martel Ave., Los Angeles 36, Calif.—A, C, CW
Howard Pacific Corp., 932 N. Western Ave., Los Angeles 27, Calif.—A, AU, C, CW, P
Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—A, AU, C, CW, R, P
Industrial Electronics Corp., 80 Bank St., Newark, N. J.—C, CW, R, PT
Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J.—B
Industrial Transformer Corp., 2540 Belmont Ave., New York 58, N. Y.—A, AU, B, C, CW, T, FA, R, MT, PT, P, RT, VR, WT
Insuline Corp. of America, 36-02 35th Ave., Long Island City 10, N. Y.—C, CW
Intex Co., 303 W. 42nd St., New York 18, N. Y.—CW
Islip Radio Mfg. Corp., Islip, N. Y.—A, AU, C, CW, P
Jefferson Electric Co., 25th Ave. & Madison St., Bellwood, Ill.—A, AU, C, FA, R, P
Kahle Engineering Co., 1307 7th St., North Bergen, N. J.—WT
Kegron Mfg. Co., Inc., 18 W 20th St., New York 11, N. Y.—A, AU, C, CW
Kenyon Transformer Co., Inc., 840 Barry St., New York 59, N. Y.—A, AU, B, C, CW, PT, P, WT
Kollsman Instrument Div., Square D Co., 80-08 45th Ave., Elmhurst, N. Y.—RT
Kuhlman Electric Co., 1000 26th, Bay City, Mich.—A, AU, B, C, T, P, WT
Kyle Corp., South Milwaukee, Wis.—A, AU, T, P, VR
Langevin Co., Inc., 37 W. 65th St., New York 23, N. Y.—A, AU, B, C, CW, T, P, RT
LaRose & Associates, W. T., 635 Second Ave., Troy, N. Y.—P
Magnetic Products Co., Norwalk, Conn.—CW, P
Magnetic Windings Co., Div. Essex Wire Corp., 416 S. 16th St., Easton, Pa.—A, C, CW, T, PT, P, WT
Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—A, AU, B, C, CW, T, MT, PT, P
Maico Co., Inc., 21 N. Third St., Minneapolis 1, Minn.—CW
Mattern Mfg. Co., F., 4647 N. Cicero Ave., Chicago 30, Ill.—P
Merit Coil & Transformer Corp., 4427 N. Clark St., Chicago 40, Ill.—A, AU, C, CW, T, R, MT, PT, P, RT, VR
Michigan Fluorescent Light Co., 71-77 S. Parke St., Pontiac, Mich.—R, PT
Miller Co., B. F., P. O. Box 56 B, Trenton, N. J.—AU, C, CW, P, T, VR
Miller Co., J. W., 5917 S. Main St., Los Angeles 3, Calif.—C, CW
Mohawk Electric Mfg. Co., 60-62 Howard St., Irvington 6, N. J.—AU, CW, T, WT
Moloney Electric Co., 5390 Bircher Blvd., St. Louis 20, Mo.—P
Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—C
National Co., Inc., 61 Sherman St., Malden 48, Mass.—"National"—A, AU, C, CW, P
Newark Transformer Co., 17 Frelinghuysen Ave., Newark 5, N. J.—C, CW, T, P, VR, WT
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles 7, Calif.—A, PT
New York Transformer Co., 26 Waverly Pl., New York 3, N. Y.—A, AU, C, CW, T, FA, R, MT, PT, P, VR, WT
Northern Communications Mfg. Co. 210 E. 40th St., New York 16, N. Y.—A, AU, B, C, CW, T, P
Nothelfer Winding Labs., 111 Albermarle Ave., Trenton 8, N. J.—AU, C, CW, T, P, WT
Ocram Corp., Auburn Rd., Seneca Falls, N. Y.—"Ocram"—AU, C, CW, VR
Operadio Mfg. Co., St. Charles, Ill.—A, C, CW
Osborne Transformer Corp., 948 E. Lafayette Ave., Detroit 7, Mich.—A, AU, C, CW, T, P

Peerless Electrical Products Co., 6920-7004 McKinley Ave., Los Angeles 1, Calif.—A, AU, B, C, CW, T, FA, R, MT, PT, P
Permoflux Corp., 4900 W. Grand Ave., Chicago 39, Ill—A, C
Potter Co., 1950 Sheridan Rd., North Chicago 1, Ill.—R
Price Electric Corp., East Church & Second Sts., Frederick, Md.—CW
Progressive Welder Co., 3050 E. Outer Dr., Detroit 12, Mich.—WT
Quad Mfg. Co., 462 N. Parkside Ave., Chicago 44, Ill.—C, CW
Radionic Controls, 3758 Belmont Ave., Chicago 18, Ill.—A, C, CW
Radionic Transformer Co., 411 S. Sangamon St., Chicago 7, Ill.—A, AU, C, CW, T, R, PT
Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—A, AU, B, C, CW, T, PT, P, VR, WT
Rectifier Engineering Co., 1809 E. 7th St., Los Angeles 21, Calif.—AU, C, CW
Red Arrow Electric Corp., 100 Colt St., Irvington 11, N. J.—A, AU, C, CW, T, MT, P, WT
Rittenhouse Co., A. E., Honeoye Falls, N. Y.—AU, CW, PT
Rogers Precision Products Co, 270 Lafayette St., New York 12, N. Y.—R, MT
Shure Bros., 225 W. Huron St., Chicago 10, Ill.—MT
Sitton Transformer Corp., 763 Tifton St., N. W., Atlanta, Ga.—AU, C, CW, T, R, PT, VR
Smith Mfg. Co., Nathan R., 105 Pasadena Ave., South Pasadena, Calif.—C, CW, R
Sola Electric Co., 2525 Clybourn Ave., Chicago 14, Ill., AU, R, VR
Sorensen & Co., Inc., 375 Fairfield Ave., Stamford, Conn.—A, AU, C, P, VR
Sorgel Electric Co., 838 W. National Ave., Milwaukee 4, Wis.—T, P, WT
Stancor—Standard Transformer Corp.
Standard Transformer Corp., 1500 N. Halsted St., Chicago 22, Ill.—"Stancor"—A, AU, C, CW, FA, R, P, VR, WT
States Co., 19 New Park Ave., Hartford 6, Conn.—AU, CW, VR, WT
Stockwell Transformer Corp., 295 N. State St., Concord, N. H.—A, AU, C, CW, T, R, MT, PT, P, RT, VR, WT
Streamliner—General Transformer Corp.

Super Electric Products Corp., 1957 Summit Ave., Jersey City, N. J.—A, C, CW, T, FA, R, MT, PT, P, RT, VR
Supreme Instruments Corp., Greenwood, Miss.—A
S-W Inductor Co., 1056 N. Wood St., Chicago 22, Ill.—CW
Swain Nelson Co., 2320 Glenview Ave., Glenview, Ill.—A, AU, C, P, VR
Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—R
Taylor Winfield Corp., 1052 Mahoning Ave., N. W., Warren, Ohio—AU, WT
Techno-Scientific Co., 901 Nepperhan Ave., Yonkers 3, N. Y.—VR
Telex Products Co., Minneapolis, Minn.—A, C
Thermador Electric Mfg. Co., 5119 S. Riverside Dr., Los Angeles 22, Calif.—A, AU, B, C, CW, T, FA, R, MT, PT, P
Thordarson Electric Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—"Thordarson"—A, AU, B, C, CW, T, MT, PT, P, VR, WT
Times Telephoto Equipment, Inc., 229 W. 43rd St., New York 18, N. Y.—A
Transicoil Corp., 114 Worth St., New York 13, N. Y.—AU, B, C, CW, T, P
U. S. Television Mfg. Corp., 106 Seventh Ave., New York 11, N. Y.—DY
United Transformer Corp., 150 Varick St., New York 13, N. Y.—"UTC"—A, AU, B, C, CW, T, FA, R, MT, PT, P, RT, VR, WT
Universal X-Ray Products, Inc., 1800 N. Francisco Ave., Chicago 47, Ill.—CW
Utah Radio Products Co., 812-20 N. Orleans St., Chicago 10, Ill.—A, AU, C, R, P, VR
UTC—United Transformer Corp.
Vacolite Co., 3001-3003 N. Henderson, Dallas, Tex.—A, C
Variac—General Radio Co.
Walker, Inc., Robert, 403 W. 8th St., Los Angeles 14, Calif.—AU, MT
Walsh Engineering Co., 34 De Hart Pl., Elizabeth 2, N. J.—A, AU, C, CW, P
Webster Electric Co., 1900 Clark St., Racine, Wis.—CW
Weller Mfg. Co., 516 Northampton St., Easton, Pa.—A, C, CW, P
Wheeler Insulated Wire Co., Inc., 378 Washington Ave., Bridgeport 4, Conn.—A, AU, C, CW R, P

(39) Transmitter & Transceiver Equipment



Amateur .... A
Auto code senders .... AC
Aviation (xmitters) .... AV
Broadcast (xmitters) .... BC
Citizens' radio communication .... CR
Code .... CW
Control consoles CC
Direction finding .... DF
Facsimile .... FAC
Frequency modulation .... FM
Keys .... K
Marine (xmitters) .... M
Police (xmitters) .... P
Radioteletype .... RT
Speech amplifiers .... SA
Studio equipment .... SE
Television transmitters .... T
Transmission monitor equip. .... TM

Abbott Instrument, Inc., 608 W. 18th St., New York 11, N. Y.—CR
Aeronautical Radio Mfg. Co., 155 First St., Mineola, L. I., N. Y.—AV
Air Communications, Inc., 2233 Grand Ave., Kansas City, Mo.—DF, AV
Aireon Mfg. Corp., Fairfax & Funston Rds., Kansas City 15, Kans.—AV, M, P
Airplane & Marine Instruments, Inc., Clearfield, Pa.—AV, DF, M, SA
Alden Products Co., 117 N. Main St., Brockton 64, Mass.—FAC
American Coil & Engineering Co., 1271 N. Hermitage Ave., Chicago 22. Ill.—AV, BC, P
American Communications Corp., 306 Broadway, New York, N. Y.—CC, SA
American Electronics, 37 E. 18th St., New York 3, N. Y.—FAC, SA, T
American Radio Co., 611 E. Garfield Ave., Glendale 5, Calif.—AV, BC, CC, M, P, SA
American Radio Hardware Co., 152-4 MacQueston Pkwy., S., Mt. Vernon, N. Y.—K
Amplifier Co. of America, 398 Broadway, New York 13, N. Y.—SA
Aviola Radio Corp., 703 W. Ivy St., Glendale 4, Calif.—AV, M
Barker & Williamson, Upper Darby, Pa.—AV, BC, M, P, RT, SA, T, TM

Bassett, Inc., Rex, 311 N. W. 1st Ave., Ft. Lauderdale, Fla.—AV, M, P
Bell Sound Systems, Inc., 1183 Essex Ave., Columbus 3, Ohio—SA
Bendix Radio Division, Bendix Aviation Corp., E. Joppa Rd., Baltimore 4, Md.—AV, CC, SA
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif.—AV
Bludworth Marine, Div. National-Simplex-Bludworth, Inc., 100 Gold St., New York 7, N. Y.—DF
Brelco Corp., 55 Van Dam St., New York 13, N. Y.—K, M, SA
Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N. Y.—AC, AV, BC, CC, FAC, K, M, P, RT, SA, T
Burnett Radio Laboratory, William W. L., 4814 Idaho St., San Diego 4, Calif.—M, P, TM
Clark Radio Equipment Corp., 4313 Lincoln Ave., Chicago 18, Ill.—CC, SA
Collins Radio Co., Cedar Rapids, Iowa—AV, BC, CC, M, P, SA
Communications Co., Inc., 300' Greco Ave., Coral Gables 34, Fla.—AV, CC, FM, K, M, P, TM
Communications Equipment Corp., 134 W. Colorado St., Pasadena 1, Calif.—A, M, P, SA
Cover Dual Signal Systems, Inc., Div. Electra Voice Corp., 5215 Ravenswood Ave., Chicago 40, Ill.—AV, P
Dahlstrom Metallic Door Co., Buffalo & E. Second, Jamestown, N. Y.—CC
DeMornay-Budd, Inc., 475 Grand Concourse, New York 51, N. Y.—AV
Doolittle Radio, Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.—AV, BC, CC, M, P, SA. TM
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—AV, FAC, M, TM
Dumont Laboratories, Inc., Allen B., 2 Main Ave., Passaic, N. J.—T, TM
Eastern Amplifier Corp., 794 E. 140th St., New York 54, N. Y.—SA
Eckstein Radio & Television Co., 914-18 La Salle Ave., Minneapolis 2, Minn.—SA
Electro-Medical Laboratory, Inc., Holliston, Mass.—K
Electronic Engineers, 611 E. Garfield Ave., Glendale 5, Calif.—AC, RT
Electronic Research Corp., 2655 W. 19th St., Chicago 8, Ill.—M, P, TM
Electronic Research & Mfg. Corp., 5805 Hough Ave., Cleveland 3, Ohio—AV, RT
Electronic Specialties Mfg. Co., 63 High St., Worcester 2, Mass.—A, CW
Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 26, Calif.—AV, DF
Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—SE, T
Erco Radio Laboratories, Inc., 231 Main St., Hempstead, N. Y.—AV, BC, CC, K, M, P, SA
Farnsworth Television & Radio Corp., Ft. Wayne 1, Ind.—AV, BC, M, P, T, TM
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—"Federal"—AV, BC, FAC, K, M, P, T

Finch Telecommunications, Inc., 10 E. 40th St., New York 16, N. Y.—FAC
Fisher Research Laboratory, 1961 University Ave., Palo Alto, Calif.—AV, M, P
Galvin Mfg. Corp., 4545 Augusta Blvd., Chicago 51, Ill.—"Motorola"—AV, CC, M, P
Garner Electronics Corp., 1100 W. Washington Blvd., Chicago 7, Ill.—M, P, SA
Gates Radio Co., 220 Hampshire St., Quincy, Ill.—AV, BC, M, P, SA, TM
Gem Radio & Television Co., 303 W. 42nd St., New York 18, N. Y.—A, M, CW
General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—DF, M, P
General Electric Co., Transmitter Div., Thompson Rd. Plant, Syracuse, N. Y.—AV, BC, CC, M, P, RT, SA, T, TM
Grady Instrument Co., 11 Bailey Ave., Watertown, Mass.—DF, M, P
Gray Radio Co., 730 Okeechobee Rd., West Palm Beach, Fla.—DF, M
Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—AV, BC, CC, M, P, SA, T, TM
Hallicrafters Co., 2611 Indiana Ave., Chicago 16, Ill.—A, AV, CR, DF, FM, M, P, CW, BC, SA, TM
Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N. Y—AV, BC, FAC, M, P, T, TM
Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles 3, Calif.—DF, M
Harvey Radio Laboratories, Inc., 447 Concord Ave., Cambridge 38, Mass.—M, P
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—AV, BC, CC, M, P, RT, T, SA
Hatcher & Fisk, Inc., 125 Kansas Ave., Topeka, Kans.—AV
Heath Co., 305 Territorial, Benton Harbor, Mich.—AV
Henry Mfg. Co., 10860 Santa Monica Blvd., Los Angeles 25, Calif.—M, P
Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa.—AV, BC, M, P, SA
Higgins Industries, Inc., 2221 Warwick Ave., Santa Monica, Calif.—M, P, SA
Howard Pacific Corp., 932 N. Western Ave., Los Angeles 27, Calif.—BC
Huber Radio Co., 260 S. Center St., Casper, Wyo.—P
Hudson American Corp., 25 W. 43rd St., New York 18, N. Y.—M, P, SA
Instructograph Co., 4701 Sheridan Rd., Chicago, Ill.—AC
Islip Radio Mfg. Corp., Beech St., Islip, N. Y.—AV, BC, M, P, SA, TM
Jefferson, Inc., Ray, 40 E. Merrick Rd., Freeport, L. I., N. Y.—M
Jefferson-Travis Corp., 245 E. 23rd St., New York 10, N. Y.—AV, M, P
Kaar Engineering Co., 619 Emerson St., Palo Alto, Calif.—M, P
Kellogg Swithboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—K
Kluge Electronics Co., 1031 N. Alvarado St., Los Angeles 26, Calif.—A, AV, BC, CC, M, P, SA, TM, CW
Langevin Co., Inc., 37 W. 65th St., New York 23, N. Y.—SA
Lavoie Laboratories, Morganville, N. J.—AV, TM, M, P
Lawton Products Co., Inc., 624 Madison Ave., New York 22, N. Y.—AV, M
Lear, Inc., 1480 Buchanan Ave., S. E., Grand Rapids 2, Mich.—AV
Lewyt Corp., 60 Broadway, Brooklyn 11, N. Y.—AV
Lincoln Electronics Corp., 653 11th Ave., New York, N. Y.—AV, BC, CC, M, P, SA, TM
Link, Fred M., 125 W. 17th St., New York 11, N. Y.—AV, BC, CC, P, RT, T
Logan Co., Les, 530 Gough St., San Francisco 2, Calif.—"Speed-X"—K
Long Co., L. J., 186 Grand St., New York 13, N. Y.—M
Maguire Industries, Inc., 1437 Railroad Ave., Bridgeport, Conn.—AV, SA
Maguire Industries, Inc., Electronics Div., 342 W. Putnam Ave., Greenwich, Conn.—AV, M, P
Marshall Radio Engineering Laboratories, 5760 Lemp Ave., North Hollywood, Calif.—CR, P
Megard Corp., 1601 S. Burlington Ave., Los Angeles 6, Calif.—CC, M, P, SA, TM
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass.—P, SA
Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—SA, TM
Motorola—Galvin Mfg. Corp.
National Co., Inc., 61 Sherman St., Malden 48, Mass.—SA, TM
Newcomb Audio Products Co., 2815 S. Hill St., Los Angeles 7, Calif.—SA
North Electric Mfg. Co., Box 417, Galion, Ohio—AC, K
Northern Communications Mfg. Co., 210 E. 40th St., New York 16, N. Y.—AV, SA
Oxford-Tartak Radio Corp., 3911 S. Michigan Ave., Chicago, Ill.—AV, BC, M, P, SA
Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—M
Press Wireless, Inc., 1475 Broadway, New York 18, N. Y.—AV, BC, CC, FAC, M, P, RT, SA, T, TM
Radio Engineering Labs., Inc., 35-64 36th St., Long Island City, N. Y.—FM
Radio Frequency Laboratories, Inc., Boonton, N. J.—AV
Radio Laboratories, Inc., 2701 California Ave., Seattle 6, Wash.—M
Radio Mfg. Engineers, Inc., 300-306 First Ave., Peoria 6, Ill.—AV
Radiomarine Corp. of America, 75 Varick St., New York 13, N. Y.—CW, DF, M
Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N. Y.—AV, BC
Radio Specialty Mfg. Co., 403 N. W. 9th St., Portland 9, Ore.—AU, TM
Radio Transceiver Laboratories, 8717 117th St., Richmond Hill, N. Y.—AU, BC, CR, P
Raytheon Mfg. Co., Transmitter Div., 7517 N. Clark St., Chicago 26, Ill.—AV, BC, CC, FAC, M, P, RT, SA, T, TM
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—AV, BC, CC, FAC, P, SA, T, TM
Rehtron Corp., 4313 Lincoln Ave., Chicago 18, Ill.—CC, SA, TM
Ruby Electric Co., 729 Seventh Ave., New York, N. Y.—M, SA
Sargent Co., E. M., 212 9th St., Oakland, Calif.—DF
Schuttig & Co., Ninth & Kearny Sts., N. E., Washington 17, D. C.—AV, RT, SA, TM
Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—AV, M, P
Selectograph Mfg. Co., 502 W. Colorado Ave., Colorado Springs, Colo.—AC
Silver Co., McMurdo, 1240 Main St., Hartford 3, Conn.—A, CW
Smith-Meeker Engrg. Co., 125 Barclay St., New York 7, N. Y.—M
Speed-X—Les Logan Co.
Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y.—AV, DF
Stancor—Standard Transformer Corp.
Standard Engineering Laboratories, 40 S. Oak Knoll Ave., Pasadena 1, Calif.—A, AU, AV, CC, P, CW
Standard Transformer Corp., 1500 N. Halsted St., Chicago 22, Ill.—"Stancor"—AV
Stephens Mfg. Co., 10416 National Blvd., Los Angeles 34, Calif.—SA
Stoddard Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—AV
Taller & Cooper, 75 Front St., Brooklyn 1, N. Y.—CC
Technical Radio Co., 275 9th St., San Francisco, Calif.—M, T
TelAutograph Corp., 16 W. 61st St., New York 23, N. Y.—FAC
Telegraph Apparatus Co., 325 W. Huron St., Chicago, Ill.—K
Temco—Transmitter Equipment Mfg. Co.
Thompson Co., John E., 1440 W. 47th St., Chicago 9, Ill.—T
Times Telephoto Equipment, Inc., 229 W. 43rd St., New York 18, N. Y.—FAC
Transmitter Equipment Mfg. Co., Inc., 345 Hudson St., New York 14, N. Y.—"Temco"—AV, BC, CC, FAC, M, P, RT, SA, T, TM
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—DF
U. S. Television Mfg. Corp., 106 Seventh Ave., New New York 11, N. Y.—CC, DF, FM, M, P, SA, T
Vibroplex Co., 833 Broadway, New York 3, N. Y.—K
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—K
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa.—BC, SA
Webster Electric Co., 1900 Clark St., Racine, Wis.—CC
Western Electric Co., 195 Broadway, New York 7, N. Y.—AV, BC, CC, DF, FM, M, P, RT, SA, SE, TM
Westinghouse Electric Corp., East Pittsburgh, Pa.—AV, BC, CC, M, SA, T, TM
Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 1, Mo.—AV, BC, CC, P
Wilson Mfg. Co., Inc., 600 N. Andrews Ave., Ft. Lauderdale, Fla.—AC
Winslow Co., 9 Liberty St., Newark 5, N. J.—K
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St., York, Pa.—SA

(40) Tubes

Ballast (regulating) .... B
Cathode ray .... CR
Electron multiplier .... EM
Geiger-Mueller tubes .... GM
Industrial and power rectifiers I
Miniature tubes .... MT
Phototubes .... PH
Receiving .... R
Special gaseous .... G
Special tubes .... ST
Television .... TT
Transmitting .... T
Velocity modulated .... VM
Voltage control VC
X-ray X

Abott Transformer Co., Inc., 409 Lafayette St., New York 3, N. Y.—G, ST, VC
Aireon Mfg. Corp., Fairfax & Funston Rds., Kansas City 15, Kans.—T
American Television Laboratories, Inc., 433 E. Erie St., Chicago 11, Ill.—CR, ST, TT
Amglo Corp., 4234 Lincoln Ave., Chicago 18, Ill.—B, CR, I, MT, PH, R, ST, TT, T, VC
Amperex Electronic Corp., 79 Washington St., Brooklyn 1, N. Y.—"Amperex"—CR, I, G, ST, TT, T
Amperite Co., 561 Broadway, New York, N. Y.—"Amperite"—B, VC
Askania Regulator Co., 1603 S. Michigan Ave., Chicago 16, Ill.—CR, ST
Atlantic Engineering Products, 136 Liberty St., New York 6, N. Y.—B, G, ST, VC
Aurex Corp., 1117 N. Franklin St., Chicago, Ill.—ST
Ballantine Laboratories, Inc., Boonton, N. J.—ST
Bell & Howell Co., 7100 McCormick Rd., Chicago 45, Ill.—PH
Cetron—Continental Electric Co.
Chatham Electronics, 475 Washington St., Newark 2, N. J.—I, G, T
Continental Electric Co., 715 Hamilton St., Geneva, Ill.—"Cetron"—I, PH, ST
Cyclotron Specialties Co., Moraga, Calif.—GM
Distillation Products, Inc., Vacuum Equipment Div., 755 Ridge Rd. W., Rochester 13, N. Y.—GM
Dumont Laboratories, Inc., Allen B., 2 Main Ave., Passaic, N. J.—CR, ST, TT
Eimac—Eitel-McCullough, Inc.
Eitel-McCullough, Inc., San Bruno, Calif.—I, T
Electronic Enterprises, Inc., 65-67 Seventh Ave., Newark 4, N. J.—B, I, ST, TT, T
Electronic Products Co., 111 E. Third St., Mt. Vernon, N. Y.—I, G, ST, T
Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—CR, ST, TT
Electrons, Inc., 127 Sussex Ave., Newark 4, N. J.—I, G
Farnsworth Television & Radio Corp., Ft. Wayne 1, Ind.—EM, PH, ST, TT
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—I, ST, TT, T, VC
Freeland & Olschner Products, Inc., 611 Baronne St., New Orleans 13, La.—T
Gates & Co., Inc., Geo. W., Hempstead Turnpike & Lucille Ave., Franklin Square, L. I., N. Y.—G
General Electric Co., Tube Div., 1 River Rd., Schenectady 5, N. Y.—B, CR, GM, I, MT, PH, R, G, ST, TT, T, VM, VC, X
General Electric X-Ray Corp., 175 W. Jackson Blvd., Chicago 4, Ill.—X
General Electronics, Inc., 101 Hazel St., Paterson, N. J.—B, I, ST, TT
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—ST
Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va.—GM
Goodall Electric Mfg. Co., Third & Main St., Ogallala, Nebr.—I
Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—R, T
Hanovia Chemical & Mfg. Equipment, 233 N. J. R. R. Ave., Newark 5, N. J.—G
Herbach & Rademan Co., Mfg. Div., 517 Ludlow, Philadelphia 6, Pa—GM
Heintz & Kaufman, Ltd., Tanforan Ave., S. San Francisco 4, Calif.—"HK"—I, ST, T, G
HK—Heintz & Kaufman, Ltd.
Huber Radio Co., 260 S. Center St., Casper, Wyo.—G
Hytron Radio & Electronics Corp., 76 Lafayette St., Salem, Mass.—"Hytron"—B, I, MT, R, ST, T
Industrial & Commercial Electronics, Belmont, Calif.—I, T
Jennings Radio Mfg. Co., 1098 E. William St., San Jose 12, Calif.—ST, T
J.F.D. Mfg. Co., 4111 Ft. Hamilton Parkway, Brooklyn 19, N. Y.—B
Ken-Rad Div., Electronics Dept., General Electric Co., Owensboro, Ky.—"Ken-Rad"—CR, R, ST, T
Kluge Electronics Co., 1031 N. Alvarado St., Los Angeles 26, Calif.—T
Kuthe Laboratories, Inc., 150 Summit St., Newark 4, N. J.—I, G, ST, T, VC
Lewis Electronics, 16 Lyndon Ave., Los Gatos, Calif.—CR, I, ST, T
Lexonite Division, Lenox, Inc., 65 Prince St., Trenton 5, N. J.—CR
Litton Engineering Laboratories, P. O. Box 749, Redwood City, Calif.—ST, T, VC
Machlett Laboratories, Inc., 1063 Hope St., Springdale, Conn.—I, ST, TT, T, X
Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—B
National Union Radio Corp., 15 Washington St., Newark 2, N. J.—B, CR, I, MT, PH, R, G, ST, TT, VC
North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—CR, GM, TT, X
Northern Mfg. Co., Inc., 36 Spring St., Newark 2, N. J.—CR
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—B, CR, MT, PH, R, G, ST, TT, VC
Picker X-Ray Corp., 300 Fourth Ave., New York 10, N. Y.—X
Polk Electronics, 119 Bleeker St., New York 12, N. Y.—ST
Radio Corp. of America, Tube Div., Harrison, N. J.—CR, EM, I, MT, PH, R, G, ST, TT, T, VC
Radiotron—Radio Corp. of America
Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill.—CR, PH, TT
Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—B, CR, I, MT, R, G, TT, T, VM, VC
Savlion Laboratories, Inc., 1025 Broad St., Newark 2, N. J.—I, G, ST, T
Sheldon Electric Co., Inc., 76 Colt St., Irvington 11, N. J.—I

Slater Electric & Mfg. Co., 728 Atlantic Ave., Brooklyn 17, N. Y.—"Slater"—B, ST, T
Sonotone Corp., Saw Mill River Rd., Elmsford, N. Y.—MT, ST
Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y.—ST, VM
Sperti, Inc., Beech & Kenilworth, Norwood Sta., Cincinnati 12, Ohio—CR, ST, T
Standard Arcturus Corp., 30-34 Court St., Newark 2, N. J.—MT, R, TT, T
Stevenson, Jordan & Harrison, Inc. (Electronic Power Co.), 19 W. 44th St., New York 18, N. Y.—I, G, ST
Sundt Engineering Co., 4763 Ravenswood Ave., Chicago, Ill.—ST
Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.—"Sylvania"—B, CR, I, MT, PH, R, G, ST, TT, T, VM, VC
Takk Corp., 28 W. Market St., Newark, Ohio—G
Taylor Tubes, Inc., 2312 Wabansia Ave., Chicago 47, Ill.—"Taylor"—B, I, G, ST, T, VC
Televiso Products, Inc., 6333 Olmstead Ave., Chicago, Ill.—I, T
Translite, Inc., 639-647 Kent Ave., Brooklyn 11, N. Y.—I, R
Tung-Sol Lamp Works, Inc., 95 Eighth Ave., Newark 4, N. J.—"Tung-Sol"—I, MT, R, ST, TT, T, VM
United Electronics Co., 42 Spring St., Newark 2, N. J.—I, G, ST, TT, T
Universal X-Ray Products, Inc., 1800 N. Francisco Ave., Chicago 47, Ill.—GM, ST, X
Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio—GM, MT, ST
Western Electric Co., 195 Broadway, New York 7, N. Y.—I, PH, R, ST, T
Westinghouse Elec. Corp., MacArthur Plaza, Bloomfield, N. J.—B, I, PH, G, ST, TT, T, VM, VC, X
Westinghouse Elec. Corp., East Pittsburgh, Pa.—B, GM, I, PH, G, ST, T, VM, VC, X

(41) Tube Parts

Anodes, graphite .... AG
Anodes, metal .... AM
Bases .... B
Base pins .... BP
Cavities C
Fluorescent materials .... F
Fused quartz parts .... Q
Getters .... G
Glass bulbs .... GB
Grid & supports .... GS
Mica parts .... M
Rare gases .... RG
Stamped parts .... S
Tube repairing .... TR
Tube seal leads .... TS

Ace Mfg. Corp., Erie Ave. at "K" St., Philadelphia 24, Pa.—S
Admak Mfg. Co., 44-46 Cordier St., Irvington, N. J.—AM, S
Alden Products Co., 117 N. Main St., Brockton 64, Mass.—B
Alpha Metals, Inc., 363 Hudson Ave., Brooklyn 1, N. Y.—AM
American Brass Co., 414 Meadow St., Waterbury 88, Conn.—AM, BP, S
American Gas & Chemical Co., Harrison, N. J.—RG
American Insulator Corp., New Freedom, Pa.—B
American Lava Corp., Chattanooga 5, Tenn.—B
American Radio Hardware Co., 152-4 MacQueston Parkway, S., Mt. Vernon, N. Y.—S
Art Wire & Stamping Co., 227 High St., Newark 2, N. J.—AM
Baker Chemical Co., J. T., North Broad St., Phillipsburg, N. J.—F
Barnes Co., Wallace, P. O. Box 1521, Bristol, Conn.—S
Bead Chain Mfg Co., 110 Mt. Grove St., Bridgeport 5, Conn.—BP, TS
Callite Tungsten Corp., 540 39th St., Union City, N. J.—AM, F, GS, S, TS, G
Cleveland Tungsten, Inc., 10200 Meech Ave., Cleveland 5, Ohio—GS, TS
Clifton Products, Inc., Blackbrook Rd., Painesville, Ohio—F
Corning Glass Works, Corning, N. Y.—GB
Crowley & Co., Inc., Henry L., 1 Central Ave., West Orange, N. J.—B
Driver Co., Wilbur B., 150 Riverside Ave., Newark 4, N. J.—AM
Du Pont de Nemours & Co., E. I., Patterson Screen Div., Main St., Towanda, Pa.—F
Eastern Engineering Co., 45 Fox St., New Haven 6, Conn.—B
Electronic Mfg. Co., 20 Orange St., Newark 2, N. J.—AM, B, BP, GS, S
Electronic Mechanics, Inc., 70 Clifton Blvd., Clifton, N. J.—B
Electronic Products Co., 111 E. Third St., Mt. Vernon, N. Y.—GB, TR, TS
Electronic Tube Corp., 1200 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa.—F
Engineering Co., 27 Wright St., Newark, N. J.—TS
Faber, Merle F., 35 Stillman St., San Francisco, Calif.—B
Fansteel Metallurgical Corp., 2200 Sheridan Rd., North Chicago, Ill.—AM, G, S, TS
Feick Mfg. Div., Detroit Aircraft Prods., Inc., 10225 Meech Ave., Cleveland 5, Ohio—S
Foote Mineral Co., 12 E. Chelten Ave., Philadelphia 44, Pa.—G
Ford Radio & Mica Corp., 536 63rd St., Brooklyn 20, N. Y.—M
Fordham Mfg. Co., 2736 Creston Ave., New York 58, N. Y.—BP
Freeland & Olschner Products, Inc., 611 Baronne St., New Orleans 13, La.—TR
General Ceramics & Steatite Corp., Crown Mill Rd., Keasbey, N. J.—B
General Electronics, Inc., 101 Hazel St., Paterson, N. J.—B
Glendale Vacuum Products Co., 8816 77th Ave., Brooklyn 27, N. Y.—TS
Goat Metal Stampings, Inc., 314 Dean St., Brooklyn 17, N. Y.—S
Hanovia Chemical & Mfg. Equipment, 233 N. J. R. R. Ave., Newark 5, N. J.—Q
Haydu Bros., P. O. Box 1226, Plainfield, N. J.—F, GS, RG, S
Hermaseal Co., Riverside Dr., Elkhart, Ind.—TS
Howard Mfg. Corp., 1401 S. Main St., Council Bluffs, Iowa—B
Hydraulic Tool & Die Corp., 4625 Third Ave., New York 57, N. Y.—S
Industrial Screw & Supply Co., 717 W. Lake St., Chicago 6, Ill.—BP, S
King Laboratories, Inc., 205 Oneida St., Syracuse 4, N. Y.—G, S
Kling Metal Spinning Co., 174 Center St., New York 13, N. Y.—S
Krementz & Co., 49 Chestnut St., Newark 5, N. J.—AM, BP, GS, S
Krischer Metal Products Co., 631-637 Kent Ave., Brooklyn 11, N. Y.—S
Lewis Electronics, 16 Lyndon Ave., Los Gatos, Calif.—TR
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.—RG
Litton Engineering Laboratories, P. O. Box 749, Redwood City, Calif.—GS, TS
Macallen Co., Macallen St., Boston 27, Mass.—M
Mica Insulator Co., 200 Varick St., New York 14, N. Y.—"Munsell"—M
Mica Products Mfg. Co., 69 Wooster St., New York 12, N. Y.—M
Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—B
Munsell—Mica Insulator Co.
Munsell & Co., Eugene, 200 Varick St., New York 14, N. Y.—M
Mycalex Corp. of America, 60 Clifton Blvd., Clifton, N. J.—B
National Carbon Co., Inc., 30 E. 42nd St., New York 18, N. Y.—AG
National Tile & Mfg. Co., 1200 E. 26th St., Anderson, Ind.—B
Norton Laboratories. Inc., 560 Mill St., Lockport, N. Y.—B
Phonograph Needle Mfg. Co., Inc., 42-46 Dudley St., Providence 5, R. I.—BP
Premier Crystal Laboratories, Inc., 63 Park Row, New York 7, N. Y.—Q
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—A, G, AM, B, BP, F, G, GB, GS, M, S, TS
Reliable Spring & Wire Forms Co., 3167 Fulton Rd., Cleveland 9, Ohio—S
Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif.—B
Rice's Sons, Bernard, 325 Fifth Ave., New York 16, N. Y.—AM, B, C, S
Savlion Laboratories, Inc., 1025 Broad St., Newark 2, N. J.—TR
Scovill Mfg. Co., 99 Mill St., Waterbury 91, Conn.—AM, S
Speer Carbon Co., St. Marys, Pa.—AG
Stackpole Carbon Co., P. O. Box 327, St. Marys, Pa.—AG
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.—B
Summerill Tubing Co., Bridgeport, Pa.—S
Superior Tube Co., Norristown, Pa.—AM
Sylvania Electric Products. Inc., 500 Fifth Ave., New York 18, N. Y.—AG, AM, B, BP, C, F, G, GS, M, RG, S, TS
Tar Heel Mica Co., Plumtree, N. C.—M
Teleoptic Co., 1251 Mound Ave., Racine, Wis.—BP
Waterbury Companies, Inc., 835 S. Main St., Waterbury 90, Conn.—B, S
Westinghouse Elec. Corp., East Pittsburgh, Pa.—AM, B, C, GS, S, TS
Wickwire Spencer Metallurgical Corp., 260 Sherman Ave., Newark 5, N. J.—GS
Winslow Co., 9 Liberty St., Newark 5, N. J.—S
York Electric & Machine Co., Carillotone Div., 30-34 N. Penn St., York, Pa.—AM, G, GS, M, TS
Zenith Optical Co., Unit of Polan Industries, Huntington 19, W. Va.—GB

(42) Wire & Cable

Antenna (receiving) .... A
Antenna (transmitting) .... AT
Antenna transmission cable (rec) .... AN
Antenna transmission cable (tr) .... ANT
Cable assemblies .... CA
Coaxial cable CC
Cords (attachment) .... CO
Filament wire .... FW
Flat woven cable .... FL
Guy .... G
High voltage .... HV
Hook-up .... HU
Insulated cable IC
Litzendraht L
Magnet .... M
Mike cable .... MC
Radio harness .... H
Resistance .... R
Resistance cords .... RC
Shielded .... S
Shielded ignition .... SI
Solid dielectric-UHF .... SD
Wave guides .... W
Wire shielding .... WS

A.B.C. Products, Inc., 2131 Stoner Ave., West Los Angeles 25, Calif.—CA
Accurate Insulated Wire Corp, 25 Fox St., New Haven 1, Conn.—CA, CO, HU, IC, MC, SI
Acme Wire Co., New Haven 14, Conn.—"Cottonite," "Enamelite," "Heatex," "Silkenite"—A, L, M
Acorn Insulated Wire Co., Inc., 225 King St., Brooklyn 31, N. Y.—CA, IC
Aeronautical Radio Mfg. Co., 155 First St., Mineola, L. I., N. Y.—A, AT, H, SI
Aircraft-Marine Products, Inc., 1523 N. 4th St., Harrisburg, Pa.—H
Alden Products Co., 117 N. Main St., Brockton 64, Mass.—CA, CO, FL, HV, HU, IC, H, RC, S, SI, WS
Allegheny Ludlum Steel Corp., Brackenridge, Pa.—R
Alpha Wire Corp., 50 Howard St., New York 13, N. Y.—AN, ANT, CA, CC, CO, FL, G, HU, IC, L, M, MC, H, RC, S, SI, WS
American Chain & Cable Co., Bridgeport 2, Conn.—G
American Electric Cable Co., 181 Appleton St., Holyoke, Mass.—CA, CO, FL, HV, HU, IC, MC, H, RC, S, SI, WS
American Phenolic Corp., 1830 S. 54th St., Cicero, Ill.—"Amphenol"—CC, CA, AN, ANT, SD
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, Ohio—CA, CC, CO, G, HV, HU, IC, M, MC, R, RC, S
Amphenol—American Phenolic Corp.
Amy, Aceves & King, Inc., 11 W. 42nd St., New York 18, N. Y.—"Multicoupler"—AN, CO
Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.—A, AT, CC, FL, HV, IC, L, M, MC, R, RC, S
Andrew Co., 363 E. 75th St., Chicago 19, Ill.—AT, CC, W
Ansonia Electrical Co., 63 Main St., Ansonia, Conn.—AN, ANT, CC, HV, HU, IC, MC, S, SD
Arrow-Hart & Hegeman Elec. Co., 103 Hawthorn St., Hartford 6, Conn.—CO
Art Wire & Stamping Co., 227 High St., Newark 2, N. J.—FW
Associated Research & Engineering Laboratories, 38 Brady St., San Francisco 3, Calif.—CA, H
Austin Co., M. B., 108-116 S. Desplaines St., Chicago 6, Ill.—IC
Barker & Williamson, Upper Darby, Pa.—A, AT, CA
Belden Mfg. Co., P. O. Box 5070A, Chicago 80, Ill.—A, AT, AN, ANT, CA, CC, CO, FL, HV, HU, IC, L, M, MC, H, RC, S, SI, WS
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif.—H
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N. Y.—A, AT, AN, ANT, CC, FW, FL, G, HV, HU, IC, M, MC, R, RC, S, SI, SD, WS
Branston Electric Mfg., Co., 61-65 Gill Pl., Buffalo 13, N. Y.—CA, H
Breeze Corporations, Inc., 24 S. Sixth St., Newark 7, N. J.—"Breeze Mark"—WS
Breeze Mark—Breeze Corporations, Inc.
Brown Co., 500 5th Ave., New York 18, N. Y.—WS
Bussey Pen Products Co., 5151 W. 65th St., Chicago 38, Ill.—G
Callite Tungsten Corp., 540 39th St., Union City, N. J. FW, CA
Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.—IC, M, WS
Chicago Metal Hose Corp., 1315 S. Third Ave., Maywood, Ill.—WS
Cohn & Co., Sigmund, 44 Gold St., New York 7, N. Y.—FW
Collyer Insulated Wire Co., 249 Roosevelt Ave., P. O. Box 61, Pawtucket, R. I.—CC, CO, IC, S
Columbia Wire & Supply Co., 4106 N. Pulaski Rd., Chicago 41, Ill.—A, AT, AN, ANT, CA, CO, FL, HV, HU, IC, MC, H, RC, S, WS
Commercial Radio Sound Corp., 575 Lexington Ave., New York 22, N. Y.—A, CC
Communication Equipment & Engineering Co., 5646 W. Race St., Chicago 44, Ill.—A, AT

Communication Products, Inc., Route 36, Palmer Ave., Keansburg, N. J.—CC
Connecticut Cable Corp., Jewett, Conn.—CA, CO, H, RC
Consolidated Wire & Assoc. Corp., 1635 S. Clinton St., Chicago, Ill.—A, AN, ANT, AT, CO, HU, IC, M, MC, RC, S, SI, WS
Copperweld Steel Co., Glassport, Pa.—A, AT, CC, G
Cords, Ltd., Inc., 126 Orchard St., Newark 5, N. J.—CA, CC, CO, H, RC, S, SI, WS
Cornish Wire Co., Inc., 15 Park Row, New York 7, N. Y.—"Corwico"—A, AT, CA, CO, G, HU, IC, MC, S
Corwico—Cornish Wire Co., Inc.
Cottonite—Acme Wire Co.
Couch Co., Inc., S. H., North Quincy 71, Mass.—IC
Crapo—Indiana Steel & Wire Co.
Crescent Co., Inc., Front St. & Central Ave., Pawtucket, R. I.—CA, CO, FL, IC, SI
Crystal Research Products, Dumont, N. J.—CA
DeMornay-Budd, Inc., 475 Grand Concourse, New York 51, N. Y.—W, CC
Diamond Wire & Cable Co., 128 E. 16th St., Chicago Heights, Ill.—A, CA, CO, HU, IC, MC, H, RC, S, WS
Doolittle Radio, Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.—AN, ANT, CC, AT, A, CA
Dow Corning Corp., Midland, Mich.—IC
Driver Co., Wilbur B., 150 Riverside Ave., Newark 4, N. J.—FW, R
Driver-Harris Co., Middlesex St., Harrison, N. J.—FW, R
D-X Radio Products Co., 1200 N. Claremont Ave., Chicago 22, Ill.—A
Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza, S., Long Island City 1, N. Y.—CA, CO
Eastern Electronics Corp., 41 Chestnut St., New Haven, Conn.—H
Eby, Inc., Hugh H., 18 W. Chelten Ave., Philadelphia 44, Pa.—CA, H
Edin Electronics Co., 207 Main St., Worcester, Mass.—H
Electric Auto-Lite Co., Wire & Cable Div., Port Huron, Mich.—CA, CO, FL, HV, HU, IC, M, MC, H, S, SI, WS
Electro-Marine Co., 274 Madison Ave., New York 16, N. Y.—A, AT, AN, CC
Electro-Voice, Inc., 1239 S. Bend Ave., South Bend 24, Ind.—MC
Electronic Mfg. Co., 339-347 W. Eighth Ave., Dubuque, Iowa—CO, H
Electronic Plumbing Corp., 311 Nepperhan Ave., Yonkers 2, N. Y.—W
Enamelite—Acme Wire Co.
Essex Wire Corp., 1601 Wall St., Ft. Wayne 6, Ind.—A, CA, CO, FL, HU, IC, L, M, MC, H, S, ST, WS
Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., Newark 4, N. J.—"Intelin"—A, AT, AN, ANT, CA, CC, FL, HV, HU, IC, H, S, SI, SD, CO, MC, H
Flexo Wire Co., 638 W. Genesee, Syracuse 1, N. Y.—A, AT, FL, WS
Franklin Mfg. Corp., A. W., 175 Varick St., New York 14, N. Y.—A
Gamewell Co., 1238 Chestnut St., Newton Upper Falls 64, Mass.—H
Gates & Co., Inc., Geo. W., Hempstead Tpke. & Lucille Ave., Franklin Square, L. I., N. Y.—CO
Gavitt Mfg. Co., Inc., Central St., Brookfield 1, Mass.—A, AN, HU, IC, MC, H, RC, S, WS
General Cable Corp., 420 Lexington Ave., New York 17, N. Y.—A, AT, AN, ANT, CO, HV, HU, IC, L, M, MC, S, SI
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—CO
General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.—CA, HU, IC, M, S, SI
General Insulated Wire Works, Inc., 69 Gordon Ave., Providence 5, R. I.—CA, CO, HU, IC, H, S, MC
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—CC
General Television & Radio Corp., 1240 N. Homan Ave., Chicago 51, Ill.—HC
Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va.—W
Goldmark Wire Co., James, 116 West St., New York 7, N. Y.—FL, L, M, R, WS
Graybar Electric Co., Inc., 420 Lexington Ave., New York 17, N. Y.—A, AT, AN, ANT, CA, CC, CO, FL, G, HU, M, MC, S, SD
Gussack Machined Products Co., 10-20 45th Rd., Long Island City, 1, N. Y.—A, CC
Guthman & Co., Inc., Edwin I., 15 S. Throop St., Chicago 7, Ill.—L, M
Hallett Mfg. Co., 603 S. Redondo Blvd., Inglewood, Calif.—SI
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—A, AT
Hatfield Wire & Cable Co., Div. Robinson Foundation, Inc., 605 Hillside Ave., Hillside, N. J.—IC
Hazard Insulated Wire Works, Div. Okonite Co., P. O. Box 630, Wilkes-Barre, Pa.—HV, IC
Heatex—Acme Wire Co.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit 8, Mich.—R
Howard Pacific Corp., 932 N. Western Ave., Los Angeles 27, Calif.—H
Hudson Wire Co., Winsted Div., 981 Main St., Winsted, Conn.—IC, L, M
INCA—Phelps Dodge Copper Products Corp.
Indiana Steel & Wire Co., 700 S. Council St., Muncie, Ind.—"Crapo"—G
Industrial Synthetics Corp., 60 Woolsey St., Irvington 11, N. J.—HU, H
Intelin—Federal Telephone & Radio Corp.
Isolantite, Inc., 343 Cortlandt St., Belleville 9, N. J.—CA, CC, W
Jelliff Mfg. Corp., C. O., Pequot Rd., Southport, Conn.—R
J.F.D. Mfg. Co., 4111 Ft. Hamilton Pkwy., Brooklyn 19, N. Y.—A, CO, FL, IC, MC, H, R, RC
Johnson Co., E. F., Waseca, Minn.—"Johnson"—AT, ANT, CC, SD
Keeney & Co., Inc., J. H., 6610 S. Ashland Ave., Chicago 36, Ill.—CA
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38, Ill.—CA, CO, FL, G, HU, IC, M, S
Kennecott Wire & Cable Co., Phillipsdale, R. I.—M
Kinetic Electronics Corp., 235 E. 42nd St., New York 17, N. Y.—CA, CO, H
King Laboratories, Inc., 205 Oneida St., Syracuse 4, N. Y.—FL
Kings Electronics Co., 372 Classon Ave., Brooklyn 5, N. Y.—A, AT, CA, W
Kraft & Kraft, Hicksville, N. Y.—H
Lapp Insulator Co., Inc., 24 Craigie St., LeRoy, N. Y.—CC, W
Lenz Lectric Mfg. Co., 1751 N. Western Ave., Chicago, Ill.—A, HU, IC, M, S
Lewis Engineering Co., 52 Rubber Ave., Naugatuck, Conn.—CA, CO, IC, H, RC, WS
Lowell Insulated Wire, 171 Lincoln St., Lowell, Mass.—A, CA, CO, HU, IC, MC
Makepeace Co., D. E., Vine & Dunham Sts., Attleboro, Mass.—W
Martins Instrument Co., Inc., 316 37th St., Brooklyn 17, N. Y.—H, CA
Meissner Mfg. Div., Maguire Industries, Inc., Mt. Carmel, Ill.—L
Miller Electric Co., 127 High St., Pawtucket, R. I.—CA, CO, H, WS
Mines Equipment Co., 4215 Clayton Ave., St. Louis 10, Mo.—CA
Molded Insulation Co., Aircraft Control Div., 335 E. Price St., Philadelphia 44, Pa.—H, W
Montgomery Co., Windsor Locks, Conn.—CO, R, RC
Multicoupler—Amy, Aceves & King, Inc.
National Molding Co., 2141 W. Washington Blvd., Los Angeles 7, Calif.—H
New England Electrical Works, Inc., 365 Main St., Lisbon, N. H.—A, FL, HU, IC, L, M, WS
Ney Co., J. M., 71 Elm St., Hartford 1, Conn.—R
Noma Electric Corp., 55 W. 13th St., New York 11, N. Y.—CC, CO, HV, IC, M
Nonotuck Mfg. Co., Water St., Holyoke, Mass.—FL, HU
North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—FW
Northern Electric Co., 5224 N. Kedzie, Chicago, Ill.—RC
Northern Mfg. Co., Inc., 36 Spring St., Newark 2, N. J.—FW
Okonite Co., Passaic, N. J.—AN, ANT, CC, CO, HV, IC, S, SI, SD
Packard Electric Division, General Motors Corp., Warren, Ohio—AN, CA, CO, HU, IC, H, S, SI, WS
Phelps Dodge Copper Products Corp., 40 Wall St., New York 5, N. Y.—"INCA"—AN, ANT, CC, HV, HU, IC, M, MC, S, SD
Pilot Industries, Inc., 202 E. 44th St., New York 17, N. Y.—CA, W
Plasticon—Plastic Wire & Cable Corp.
Plastic Wire & Cable Corp., 2 S. Golden St., Norwich, Conn.—"Plasticon"—TC, CO, HY, HU, IC, MC, S, SI, SD
Plastoid Corp., 19 W. 44th St., New York 18, N. Y.—CA, CC, CO, HV, HU, IC, H, S, WS
Porcelain Products, Inc., Parkersburg, W. Va.—G
Precision Tube Co., 3828 Terrace St., Philadelphia 28, Pa.—WS
Premax Products, Div. Chisholm-Ryder Co., Inc., 4612 Highland Ave., Niagara Falls, N. Y.—A, AT
Radex Corp., 53 W. Jackson Blvd., Chicago 4, Ill.—CC
RCA Victor Division, Radio Corp. of America, Front & Cooper Sts., Camden, N. J.—"RCA"—FW
Rea Magnet Wire Co., Inc., E. Pontiac St., Ft. Wayne, Ind.—M
Rhode Island Ins. Wire Co., Cranston, R. I.—HU, IC
Rice's Sons, Bernard, 325 Fifth Ave., New York 16, N. Y.—CA
Riggs & Jeffreys, Inc., 73 Winthrop St., Newark 4, N. J.—CA, H
Rittenhouse Co., A. E., Honeoye Falls, N. Y.—CA
Riverside Metal Co., Riverside, N. J.—R
Rockbestos Products Corp., 100 Mitchell Rd., New Haven 4, Conn.—HV, HU, IC, M, S
Roebling's Sons Co., John A., 640 S. Broad St., Trenton 2, N. J.—A, 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
Runzel Cord & Wire Co., 4727 W. Montrose Ave., Chicago 47, Ill.—CA, CO, HU, IC, H, WS
Rupp's Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago 14, Ill.—CA, CO, IC
Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.—CC, IC, WS
Schott Co., Walter L., 9306 Santa Monica Blvd., Beverly Hills, Calif.—"Walsco"—A, CA, CO, IC, H, RC
Searle Aero Industries, Inc., P. O. Box 111, Orange, Calif.—CA
Selectar Mfg. Corp., 21-10 49th Ave., Long Island City 1, N. Y.—CC
Shure Bros., 225 W. Huron St., Chicago 10, Ill.—MC
Silkenite—Acme Wire Co.
Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass.—CC, HV, IC, MC, S, SI, SD
Sittler Mfg. Corp., 18 N. Ada St., Chicago 7, Ill.—CO
Special Electric Labs., 7657 S. Central Ave., Los Angeles 1, Calif.—CA
Spencer Wire Co., 08 Pleasant St., W. Brookfield, Mass.—R, WS
Spirling Products Co., 64 Grand St., New York 13, N. Y.—A, AT, AN, ANT, CA, CO
Supreme Instruments Corp., Greenwood, Miss.—CA
Suprenant Electrical Insulation Co., 84 Purchase St., Boston 10, Mass.—HU
Swedish Iron & Steel Corp., 17 Battery Pl., New York, N. Y.—R
Sweeco Wire Co., 138 Rowley, Winsted, Conn.—L, M
S-W Inductor Co., 1056 N. Wood St., Chicago 22, Ill.—A
Thermionic Engineering Corp., 32 W. 12th St., Bayonne, N. J.—CA
Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.—"Waveflex"—W
Uniform Tubes, Shurs Lane & Lauriston St., Philadelphia 28, Pa.—CC, S, SI, WS
U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.—A, CA, CC, CO, HV, HU, M, H, S
Walsco—Walter L. Schott Co.
Waveflex—Titeflex, Inc.
Western Insulated Wire Co., 1001 E. 62nd St., Los Angeles 1, Calif.—CA, CO, HV, IC, MC, S, SI, WS
Westinghouse Elec. Corp., East Pittsburgh, Pa.—AT, FW, M, W
Weymouth Instrument Co., 1440 Commercial St., East Weymouth 89, Mass.—CC, CO, W
Wheeler Insulated Wire Co., Inc., 378 Washington Ave., Bridgeport 4, Conn.—L, M
Whitaker Cable Corp., Kansas City 16, Mo.—CA, IC, H
White Electric Cable Co., Maple Ave., Haverstraw, N. Y.—AN, ANT, CC, CO, FL, HU, IC, M, MC, S
Whitney Blake Co., 1565 Dixwell Ave., New Haven 14, Conn.—CC, CO, HU, IC, MC, S
Wickwire Spencer Metallurgical Corp., 260 Sherman Ave., Newark 5, N. J.—FL, FW
Wind Turbine Co., West Chester, Pa.—A, AT, G
Wood Electric Co., Inc., C. D., 826 Broadway, New York 3, N. Y.—CO

THIS DIRECTORY IS DOUBLE-INDEXED

***Product Index*—refers you to the page on which manufacturers in a certain category are listed.**

***Alphabetical Index*—gives you a complete "Finding List" and refers you to the main classification under which a manufacturer is listed.**

ALPHABETICAL FINDING LIST of Electronic Manufacturers

Use this list if you know the name of a company and want to learn one of its products. Most of the following companies manufacture more than one product

A

COMPANY	CLASSIFICATION
Aarons Radio Corp., New York, N. Y.	24
Abbott Instrument, Inc., New York, N. Y.	39
A.B.C. Products, Inc., W. Los Angeles, Cal.	28
Abel & Bach, Milwaukee, Wis.	5
Abott Transformer Co. Inc., New York, N. Y.	38
Acadia Synthetic Products Div. Western Felt Works, Chicago, Ill.	27
Accurate Insulated Wire Corp., New Haven, Conn.	42
Accurate Spring Mfg. Co., Chicago, Ill.	16
Ace Mfg. Corp., Philadelphia, Pa.	21
Acheson Colloids Corp., Port Huron, Mich.	25
Ackermann, Steffan & Co., Chicago, Ill.	15
Acklin Stamping Co., Toledo, Ohio	21
Acme Battery Co., Brooklyn, N. Y.	4
Acme-Danneman Co., Inc., New York, N. Y.	19
Acme Electric & Mfg. Co., Cuba, N. Y.	38
Acme Fire Alarm Co., Inc., New York, N. Y.	3
Acme Folding Box Co., Inc., New York, N. Y.	17
Acme Radio & Sound Labs., Los Angeles, Cal	33
Acme Tool & Die Co., Evansville, Ind	19
Acme Wire Co., New Haven, Conn.	42
Acorn Insulated Wire Co., Inc., Brooklyn, N. Y.	42
Acro Electric Co., Cleveland, Ohio	37
Acromark Co., Elizabeth, N. J.	2
Acro Tool & Die Works, Chicago, Ill.	15
Acton Co., Inc., H. W., New York, N. Y.	32
Adam Electric Co., Frank, St. Louis, Mo.	12
Adams & Westlake Co., Elkhart, Ind.	37
Adaptol Co., Brooklyn, N. Y.	16
Adel Precision Products Corp. Burbank, Cal.	21
Adler Mfg. Co., Louisville, Ky.	5
Admak Mfg. Co., Irvington, N. J.	41
Admiral Corp., Chicago, Ill.	31
Adrem Co., Boston, Mass.	28
Advance Electric & Relay Co., Los Angeles, Cal.	37
Advance Recording Products Co., Long Island City, N. Y.	32
Advance Research Corp., New York, N. Y.	18
Advance Transformer Co., Chicago, Ill.	38
Adver-Disc Co., Los Angeles, Cal.	33
Advertisers Recording Service, Inc., New York, N. Y.	33
Aero Communications, Inc., Hempstead, N. Y.	13
Aero Electric Corp., Los Angeles, Cal.	16
Aeroil Products Co., W. New York, N. J.	15
Aerolite Electronic Hardware Corp., Jersey City, N. J.	16
Aeronautical Radio Mfg. Co., Mineola, N. Y.	1
Aerovox Corp., New Bedford Mass.	6
Agnew Electric Co., Milford, Mich.	38
Airadio, Inc., Stamford, Conn.	16
Air Check Co., Los Angeles, Cal.	33
Air Communications, Inc., Kansas City, Mo.	30
Aircraft & Diesel Equipment Corp., Chicago, Ill.	19
Aircraft-Marine Products, Inc., Harrisburg, Pa.	6
Aircraft Radio Corp., Boonton, N. J.	39
Aircraft Screw Products Co., Inc. Long Island City, N. Y.	16
Aircraft X-Ray Laboratories, Los Angeles, Calif.	13
Airdesign & Fabrication, Inc., Upper Darby, Pa.	18
Aireon Mfg. Corp., Kansas City, Kans.	36
Air King Products Co., Inc., Brooklyn, N. Y.	31
Air-Maze Corp., Cleveland, Ohio	19
Airplane & Marine Instruments, Inc., Clearfield, Pa.	39
Air Reduction Sales Co., New York, N. Y.	19
Airtronics Development Corp., Dayton, Ohio	38
Airtronics Mfg. Co., Los Angeles, Cal.	13
Air-Way Electric Appliance Corp., Toledo, Ohio	23
Ajax Electrothermic Corp., Trenton, N. J.	13
Akron Porcelain Co., Akron, Ohio	17
Aladdin Radio Industries, Inc., Chicago, Ill.	2
Albion Coil Co., Albion, Ill.	8
Alco Valve Co., St. Louis, Mo.	12
Alden Products Co., Brockton, Mass.	16
Aldine Paper Co., Inc., New York, N. Y	6
All American Tool & Mfg. Co., Chicago, Ill.	18
Allegheny Ludlum Steel Corp., Brackenridge, Pa.	21
Allen-Bradley Co., Milwaukee, Wis.	23
Allen Electric & Equipment Co., Kalamazoo, Mich.	19
Alliance Mfg. Co., Alliance, Ohio	23
Allied Asphalt & Mineral Corp., New York, N. Y.	25
Allied Control Co., Inc., New York, N. Y.	37
Allied Record Mfg. Co. Los Angeles, Cal.	33
Allied Recording Products Co., Long Island City, N. Y.	32
Allis Co., Louis, Milwaukee, Wis.	23
Allis-Chalmers Mfg. Co., Milwaukee, Wis.	23
Allmetal Screw Products Co., New York, N. Y.	16
All-Steel Equipment Co., Aurora, Ill.	16
All Weather Springs, New York, N. Y.	16
Alpha Metals, Inc., Brooklyn, N. Y.	21
Alpha Meter Service, New York, N. Y.	10
Alpha Wire Corp., New York, N. Y.	42
Altec Lansing Corp., Hollywood, Cal.	38
Aluminum Co. of America, Pittsburgh, Pa.	21
Aluminum Finishing Corp., Indianapolis, Ind.	21
Aluminum Goods Mfg. Co., Manitowoc, Wis.	21
Amalgamated Electronics Associated, New York, N. Y.	34
Amalgamated Radio Television Corp., New York, N. Y.	16
Ambroid Co., Inc., Boston, Mass.	25
American Brass Co., Waterbury, Conn.	21
American Bridge Co., Pittsburgh, Pa.	1
American Central Mfg. Corp., Connersville, Ind.	5
American Chain & Cable Co., Bridgeport, Conn.	42
American Coil & Engineering Co., Chicago, Ill.	8
American Communications Corp., New York, N. Y.	38
American Condenser Co., Chicago, Ill.	6
American Cyanamid Co., New York, N. Y.	27
American Dial Co., Inc., New York, N. Y.	10
American District Telegraph Co., New York, N. Y.	12
American Earphone Co., New York, N. Y.	22
American Electric Cable Co., Holyoke, Mass.	42
American Electric Fusion Corp., Chicago, Ill.	19
American Electrical Heater Co., Detroit, Mich.	15
American Electro Metal Corp., Yonkers, N. Y.	21
American Electronics, New York, N. Y.	20
American Electronics Co., Butte, Mont.	12
American Electronics Co., New York, N. Y.	37
American Emblem Co., Inc., Utica, N. Y.	10
American Gas Accumulator Co., Elizabeth, N. J.	37
American Gas & Chemical Co., Harrison, N. J.	41
American Gem & Pearl Co., New York, N. Y.	9
American Hard Rubber Co., New York, N. Y.	17
American Instrument Co., Silver Spring, Md.	18
American Insulator Corp., New Freedom, Pa.	28
American Jewels Corp., Attleboro, Mass.	9
American Lava Corp., Chattanooga, Tenn.	17
American Lens Co., Inc., New York, N. Y.	18
American Materials Co., New York, N. Y.	16
American Microphone Co., Inc., Los Angeles, Cal.	22
American Molding Powder & Chemical Corp., Brooklyn, N. Y.	27
American Nut & Bolt Fastener Co., Pittsburgh, Pa.	16
American Optical Co., Buffalo, N. Y.	18
American Phenolic Corp., Cicero, Ill.	27
American Photocopy Equipment Co., Chicago, Ill.	11
American Platinum Works, Newark, N. J.	21
American Products Mfg. Co., New Orleans, La.	17
American Radio Co., Glendale, Cal.	39
American Radio Hardware Co., Mt. Vernon, N. Y.	16
American Rolling Mill Co., Middletown, Ohio	21
American Screw Co., Providence, R. I.	16
American Solder & Flux Co., Philadelphia, Pa.	15
American Steel Package Co., Defiance, Ohio	7
American Steel & Wire Co., Cleveland, Ohio	42
American Television & Radio Co., St. Paul, Minn.	38
American Thermo-Electric Co., New York. N. Y.	20
American Time Products, Inc., New York, N. Y.	12
American Transformer Co., Newark, N. J.	38
American Type Founders, New York, N. Y.	37
Amglo Corp., Chicago, Ill.	40
Amperex Electronic Corp., Brooklyn, N. Y.	40
Amperite Co., New York, N. Y.	22
Amplifier Co. of America, New York, N. Y.	38
Ampro Corp., Chicago, Ill.	35
Ams Machine Co., Max, Bridgeport, Conn.	19
Amy, Aceves & King, Inc., New York, N. Y.	1
Anaconda Wire & Cable Co., New York, N. Y.	42
Anchor Plastics Co., New York. N. Y.	28
Andrea Radio Corp., Long Island City, N. Y.	31
Andrew Co., Chicago, Ill.	42
Andrews & Perillo, Long Island City, N. Y.	19
Annis Co., R. B., Indianapolis, Ind.	38
Ansley Radio Corp., Long Island City, N. Y.	31
Ansonia Clock Co., Inc. New York, N. Y.	37
Ansonia Electrical Co., Ansonia, Conn.	42
Applied Research Labs., Glendale, Cal.	18
Apollo Metal Works, Chicago, Ill.	21
ARA Records, Hollywood, Calif.	33
Aray Mfg. & Supply Corp., St. Louis, Mo.	8
Arco Co., Cleveland, Ohio	25
Arens Controls, Inc., Chicago, Ill.	14
ARF Products, River Forest, Ill.	31
Arkay Labs., Inc., Milwaukee, Wis.	37
Ark-Les Switch Corp., Watertown, Mass.	37
Arkwright Finishing Co., Providence, R. I.	11
Armstrong Cork Co., Lancaster, Pa.	17
Arnessen Electric Co., Inc., New York, N. Y.	19
Arnold Engineering Co., Chicago, Ill.	21
Aro Equipment Corp., Bryan, Ohio	16
Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.	37
Art Specialty Co., Chicago, Ill.	11
Art Wire & Stamping Co., Newark, N. J.	42
Arts Recording Co., Inc., New York, N. Y.	33
Asch Recording Studios, New York, N. Y.	33
Asheville Mica Co., Asheville, N. C.	17
Askania Regulator Co., Chicago, Ill.	12
Associated Recorders, Los Angeles, Cal.	33
Associated Research, Inc., Chicago, Ill.	13
Associated Research & Engineering Labs, San Francisco, Cal.	26
Associated Studios, Los Angeles, Cal.	33
Astatic Corp., Conneaut, Ohio	22
Atlantic Engineering Products, New York, N. Y.	37
Atlantic Screw Works, Inc., Hartford, Conn.	16
Atlas Aircraft Products, Corp., New York, N. Y.	23
Atlas Condenser Products Co., New York, N. Y.	6
Atlas Metal Stamping Co., Philadelphia, Pa.	21
Atlas Products Corp., New York, N. Y.	1
Atlas Resistor Co., New York, N. Y.	34
Atlas Sound Corp., Brooklyn, N. Y.	22
Atomic Instruments Co., Boston, Mass.	18
Auburn Button Works, Inc., Auburn, N. Y.	17
Auburn Heights Mfg. Co., Pontiac, Mich.	21
Audak Co., New York, N. Y.	33
Audio Development Co., Minneapolis, Minn.	18
Audio Devices. Inc., New York, N. Y.	32
Audio Industries, Michigan City, Ind.	33
Audio-Scriptions. Inc., New York, N. Y.	33
Audio-Tone Oscillator Co., Bridgeport, Conn.	12
Ault & Wiborg Div. of Interchemical Corp., New York, N. Y.	17
Aurex Corp., Chicago, Ill.	35
Austin Co., M. B., Chicago, Ill.	15
Austin Co., O., Brooklyn, N. Y.	10
Auth Electrical Specialty Co., Inc., New York, N. Y.	12
Autocall Co., Shelby, Ohio	37
Autocrat Radio Co., Chicago, Ill.	31
Auto Engraver Co., New York, N. Y.	19
Automatic Electric Co., Chicago, Ill.	3
Automatic Electric Mfg. Co., Mankato, Minn.	12
Automatic Electrical Devices Co., Cincinnati, Ohio	3
Automatic Mfg. Corp., E. Newark, N. J.	38
Automatic Products Co., Milwaukee, Wis.	12
Automatic Pump & Softener Corp., Rockford, Ill.	20
Automatic Radio Mfg. Co., Inc. Boston, Mass.	31
Automatic Switch Co., New York, N. Y.	37

COMPANY — CLASSIFICATION

Automatic Temperature Control Co., Inc., Philadelphia, Pa. 37
Avery Adhesives, Los Angeles, Cal. .. 10
Avia Products, Co., Los Angeles, Cal. 24
Aviola Radio Corp., Glendale, Cal. .. 39
Aviometer Corp., New York, N. Y. .. 37

B

Bacon Electric Timer Corp. Cleveland, Ohio 37
Baer Co., N. S., Hillside, N. J. 17
Baley Co., Inc., Amesbury, Mass. .. 21
Bailey Meter Co., Cleveland, Ohio. . 12
Baird Machine Co., Stratford, Conn. 19
Bakelite Corp. Unit of Union Carbide & Carbon Corp., New York, N. Y... 17
Baker & Co., Inc., Newark, N. J. ... 21
Baker Chemical Co., J. T., Phillipsburg, N. J. 25
Baker Electronic Mfg. Co., Minneapolis, Minn. 15
Baker Instrument Co., Orange, N. J.. 18
Baker Oil Tools, Inc., Los Angeles, Cal. 27
Baker-Phillips Co., Minneapolis, Minn. 15
Baldwin Instrument Co., Oceanside, N. Y. 7
Baldwin Southwark Div. Baldwin Locomotive Works, Philadelphia, Pa. 19
Ballantine Labs., Inc., Boonton, N. J. 40
Bank's Mfg. Co., Chicago, Ill. 35
Barber Labs., Alfred W., Flushing, L. I., N. Y. 20
Barter Colman Co., Rockford, Ill. ... 23
Barco Mfg. Co., Chicago, Ill. 14
Barker & Williamson, Upper Darby, Pa. 8
Barnes Co., Wallace, Bristol, Conn.. 10
Barrett Co., Leon J., Worcester, Mass. 19
Barry Co., L. N., Cambridge, Mass..19
Bassett, Inc., Rex, Ft. Lauderdale, Fla. 31
Bastian Bros. Co., Rochester, N. Y... 10
Bausch & Lomb Optical Co., Rochester, N. Y. 18
Bay Products Corp., Boston, Mass.. 20
Bay State Stamping Co., Worcester, Mass. 21
B & C Insulation Products, Inc., New York, N. Y. 17
Beacon Record Co., New York, N. Y.. 33
Bead Chain Mfg. Co., Bridgeport, Conn. 16
Bear Mfg. Co., Rock Island, Ill..... 19
Beaver Gear Works, Inc., Rockford, Ill. 16
Belber Trunk & Bag Co., Woodbury, N. J. 5
Belden Mfg. Co., Chicago, Ill. 42
Bell & Howell Co., Chicago, Ill. ... 35
Bellows Co., Akron, Ohio 19
Bell Radio & Television, New York, N. Y. 31
Bell Sound Systems, Inc., Columbus, Ohio 35
Belmont Radio Corp., Chicago, Ill .. 31
Belmont Smelting & Refining Works, Brooklyn, N. Y. 21
Bend-A-Lite Plastics Div., Chicago, Ill. 17
Bendix Aviation Corp., N. Hollywood, Cal. 37
Bendix Radio Div. Bendix Aviation Corp., Baltimore, Md. 31
Bennel Machine Co., Inc., Brooklyn, N. Y. 19
Bentley-Harris Mfg. Co., Conshohocken, Pa. 17
Benwood Linze Co., St. Louis, Mo. .. 38
Berger Electronics, Forest Hills, N. Y. 22
Berndt Corp., E. M. Hollywood, Cal. 32
Best Mfg. Co., Inc., Irvington, N. J 36
Betts & Betts Corp., New York, N. Y. 12
Bibletone, New York, N. Y. 33
Biddle Co., James G., Philadelphia, Pa. 20
Billings & Spencer Co., Hartford, Conn. 15
Biltmore Radio Corp., New York, N. Y. 33
Bird, Richard H., Waltham, Mass.... 21
Birnbach Radio Co., Inc., New York, N. Y. 37
Birtcher Corp., Los Angeles, Cal. ... 16
Bitter Construction Co., A., New York, N. Y. 5
Bittermann Electric Co., Brooklyn, N. Y. 8
Biwax Corp., Skokie, Ill. 25
Black Bear Co., Inc., New York, N. Y. 25
Black & Decker Mfg. Co., Towson, Md. 15
Black & White Record Co., Brooklyn, N. Y. 33
Blaw-Knox, Co., Blawnox, Pa. 1
Biley Electric Co., Erie Pa. 9
Bliss Co., E. W., Brooklyn, N. Y. ... 19

COMPANY — CLASSIFICATION

Bludworth Marine, Div. of National-Simplex-Bludworth, Inc., New York 30
Blue Note Records, New York, N. Y.. 33
Bodine Electric Co., Chicago, Ill.... 23
Bodnar Co., Charles J., Tuckahoe, N. Y. 1
Boehme, H. O., New York, N. Y. .. 32
Boes Co., W. W., Dayton, Ohio 20
Boetsch Bros., New York, N. Y. ... 33
Bogen Co., Inc., David, New York, N. Y. 35
Bogue Electric Co., Paterson, N. J. .. 3
Bond Electric Corp., New Haven, Conn. 4
Boom Electric & Amplifier Co., Inc., Chicago, Ill. 22
Boonton Molding Co., Boonton, N. J. 28
Boonton Radio Corp., Boonton, N. J. 18
Boots Aircraft Nut Corp., New Canaan, Conn. 16
Bossert Co., Inc., Utica, N. Y. 21
Bost Records Co., New York, N. Y. 33
Bostitch, E. Greenwich, R. I. 15
Boston Gear Works, Inc., N. Quincy, Mass. 23
Bostonian Process Co., New York, N. Y. 10
Boulin Instrument Corp., New York, N. Y. 18
Bowser, Inc., Ft. Wayne, Ind. 18
Brach Mfg. Corp., L. S., Newark, N. J. 1
Bradley & Associates, Richard, Chicago, Ill. 33
Bradley Labs., Inc., New Haven, Conn. 26
Brainin Co., C. S., New York, N. Y... 16
Brand & Co., William, New York, N. Y. 17
Brandywine Fibre Products Co., Wilmington, Del. 17
Branston Electric Mfg. Co., Buffalo, N. Y. 13
Breeze Corps., Inc., Newark, N. J... 42
Brelco Corp., New York, N. Y. 3
Bridgeport Brass Co., Bridgeport, Conn. 21
Briggs & Stratton Corp., Milwaukee, Wis. 3
Bright Star Battery Co., Clifton, N. J. 4
Brilhart, Ltd., Arnold, Great Neck, N. Y. 28
Bristol Co., Waterbury, Conn. 15
Bronze Recording Studio, Los Angeles, Cal. 33
Brown-Brockmeyer Co., Dayton, Ohio 23
Brown Co., New York, N. Y. 17
Brown Enginering Co., Portland, Ore. 6
Brown Instrument Co., Div. of Minn. Honeywell, Philadelphia, Pa. 20
Browne Electric Co., J., Brooklyn, N. Y. 10
Browning Labs., Inc., Winchester, Mass 9
Bruning Co., Inc., Charles, Chicago, Ill. 11
Bruno-New York, Inc., Engineering Products Div., New York, N. Y. .. 12
Brunswick Radio & Telev. Div. Radio & Television, Inc., New York, N. Y. 31
Brush Development Co., Cleveland, Ohio 18
Bryant Mfg. Co., Chicago, Ill. 4
Buchmann Spark-Wheel Corp., Long Island City, N. Y. 16
Buda Co., Harvey, Ill. 23
Bud Radio, Inc., Cleveland, Ohio ... 1
Budd Induction Heating, Inc., Detroit, Mich. 13
Bundy Tubing Co., Detroit, Mich. .. 21
Bunnell & Co., J. H., Brooklyn, N. Y. 13
Bunting Brass & Bronze Co., Toledo, Ohio 21
Burdick Corp., Milton, Wis. 13
Burgess Battery Co., Freeport, Ill... 4
Burgess Battery Co. Handicraft Div. Vibro Tool Dept., Chicago, Ill. ... 15
Burke Electric Co., Erie, Pa. 3
Burke and James, Inc., Chicago, Ill. 12
Burling Instrument Co., Newark, N. J. 12
Burlington Instrument Co., Burlington, Iowa. 12
Burndy Engineering Co., Inc., New York, N. Y. 16
Burnett Radio Lab., William W. L., San Diego, Cal. 20
Burton Mfg. Co., Chicago, Ill....... 13
Burton-Rogers Co., Boston, Mass. ... 1
Bussey Pen Products Co., Chicago, Ill. 21
Bussmann Mfg. Co., St. Louis, Mo... 16
Butte Electric & Mfg. Co., San Francisco, Cal. 12

C

Cadle Chemical Products, Inc., New York, N. Y. 9
Callite Tungsten Corp., Union City, N. J. 16
Caltron Co., Div. of Frank Rieber, Inc., Los Angeles, Cal. 32

COMPANY — CLASSIFICATION

Calvert Motors Associates, Ltd., ... Baltimore, Md. 31
Cambridge Instrument Co., Inc., New York, N. Y. 13
Cambridge Thermionic Corp., Cambridge, Mass. 8
Camloc Fastener Corp., New York, N. Y. 16
Campbell X-Ray Corp., Boston, Mass. 38
Cannon Co., C. F., Springwater, N. Y. 36
Cannon Electric Development Co., Los Angeles, Cal. 37
Cantol Wax Co., Bloomington, Ind... 25
Capacitron Co., Chicago, Ill. 6
Capehart Div. Farnsworth Telev. & Radio Corp., Ft. Wayne, Ind. ... 31
Capitol Records, Inc., Hollywood, Cal. 33
Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y. .. 27
Carbone Corp., Boonton, N. J. 21
Carborundum Co., Globar Div., Niagara Falls, N. Y. 34
Cardinell Corp., Montclair, N. J. ... 11
Cardwell Mfg. Corp., Allen D., Brooklyn, N. Y. 6
Cardwood Products Corp., Mt. Vernon, N. Y. 5
Cardy-Lundmark Co., Chicago, Ill. .. 10
Carlton Lamp Corp., Newark, N. J. 10
Carnegie Hall Recording Co., New York, N. Y. 33
Carpenter Mfg Co., Boston, Mass. ... 3
Carpenter Products Co., Bridgeport, Conn. 12
Carrier Corp., Syracuse, N. Y. 18
Carron Mfg. Co., Chicago, Ill. 8
Carson Machine & Supply Co., Oklahoma City, Okla. 3
Carson Micrometer Corp., Little Falls, N. J. 20
Carter Motor Co., Chicago, Ill. 3
Carter Products Corp., Cleveland, Ohio 17
Castlewood Mfg. Co., Louisville, Ky.. 5
Caswell-Runyan Co., Huntington, Ind. 5
Catalin Corp., New York, N. Y. 25
Caterpillar Tractor Co., Peoria, Ill... 23
Celanese Plastics Corp., New York, N. Y. 17
Celluplastic Corp., Newark, N. J. ... 28
Cellusuede Product, Inc., Rockford, Ill. 33
Centralab Div. of Globe-Union Inc., Milwaukee, Wis. 1
Central Paper Co., Inc., Muskegon, Mich. 17
Central Scientific Co., Chicago, Ill. .. 18
Central Screw Co., Chicago, Ill 16
Century Electric Co., St. Louis, Mo. 23
Chace Co., Wm., Detroit, Mich. ... 21
Chancellor Products Corp., Cleveland, Ohio, ... 16
Chase Brass & Copper Co., Waterbury, Conn. 42
Chatham Electronics, Newark, N. J. 40
Chemaco, Berkley Heights, N. J. ... 27
Cherry Rivet Co., Los Angeles, Cal... 16
Chicago Condenser Corp., Chicago, Ill. 6
Chicago Die Mold Corp., Chicago, Ill. 28
Chicago Metal Hose Corp., Maywood, Ill. 21
Chicago Molded Products Corp., Chicago, Ill. 28
Chicago Recording Co., Chicago, Ill.. 33
Chicago Recording Studios, Inc., Chicago, Ill. 33
Chicago Rivet & Machine Co., Bellwood, Ill. 16
Chicago Sound Systems, Inc., Chicago, Ill. 35
Chicago Telephone Supply Co., Elkhart, Ind. 34
Chicago Tool & Engineering Co., Chicago, Ill. 15
Chicago Transformer Div., Essex Wire Corp., Chicago, Ill. 38
Christenson Recording Studios, Chicago, Ill. 33
Churchill Cabinet Co., Chicago, Ill... 5
Cinaudagraph Corp., Stamford, Conn. 35
Cinaudagraph Speaker, Inc. Chicago, Ill. 36
Cinch Mfg. Corp., Div. United-Carr Fastener Co., Chicago, Ill. 4
Cincinnati Electric Products, Cincinnati, Ohio 16
Cinema Engineering Co., Burbank, Cal. 34
Cine-Mart, New York, N. Y........ 33
Clare & Co., C. P., Chicago, Ill 37
Clark Electric Co., James Jr., Louisville, Ky 15
Clark Co., Robert H., Beverly Hills, Cal. 15
Clark Controller Co., Cleveland, Ohio 37
Clark Radio Equipment Corp., Chicago, Ill. 36
Clarostat Mfg. Corp., Brooklyn, N. Y. 34

COMPANY — CLASSIFICATION

Cleveland Plastics, Inc., Cleveland, Ohio 10
Cleveland Tungsten, Inc., Cleveland, Ohio 13
Cleveland Wire Cloth & Mfg. Co., Cleveland, Ohio 21
Clifton Products, Inc., Painesville, Ohio 17
Climax Engineering Co., Clinton, Iowa 3
Cline Electric Mfg. Co., Chicago, Ill. 12
Clippard Instrument Lab., Cincinnati, Ohio 8
Clough-Brengle Co., Chicago, Ill. ... 18
Coda Record Co., New York, N. Y. .. 33
Cohn Co., Sigmund, New York, N. Y. 21
Cole-Hersee Co., Boston, Mass. 37
Coleman Electric Co., Maywood, Ill. 13
Cole Radio Works, Caldwell, N. J. .. 15
Cole Steel Equipment Co., New York, N. Y. 5
Collins Radio Co., Cedar Rapids, Iowa 31
Colloid Equipment Co., New York, N. Y. 13
Collyer Insulated Wire Co., Inc., Pawtucket, R. I. 42
Colonial Brass Co., Middleboro, Mass. 10
Colonial Kolonite Co., Chicago, Ill. . 17
Colonial Radio Corp., Buffalo, N. Y. 31
Columbia Associates, New York, N. Y. 5
Columbia Electric Mfg. Co., Cleveland, Ohio 20
Columbia Electronic, Inc., New York, N. Y. 31
Columbia Metal Box Co., New York, N. Y. 5
Columbia Nut & Bolt Co., Inc., Bridgeport, Conn. 16
Columbia Recording Corp., New York, N. Y. 33
Columbia Wire & Supply Co., Chicago, Ill. 42
Combustion Control Corp., Cambridge, Mass. 12
Comet Record Co., New York, N. Y... 33
Commercial Crystal Co., Lancaster, Pa. 9
Commercial Enclosed Fuse Co. of N. J., Hoboken, N. J. 13
Commercial Metal Products Co., Chicago, Ill. 5
Commercial Radio Sound Corp., New York, N. Y. 35
Commercial Research Labs., Inc., Detroit, Mich. 18
Commodore Record Co., New York, N. Y. 33
Communicating Systems, Inc., New York. N. Y. 35
Communication Equipment & Engineering Co., Chicago, Ill. 35
Communication Measurements Lab., New York, N. Y. 20
Communication Parts, Chicago, Ill... 18
Communication Products, Inc., Keansburg, N. J. 16
Communications Co., Inc., Coral Gables, Fla. 31
Communications Equipment Corp., Pasadena, Cal. 39
Conant Electrical Labs., Lincoln, Neb. 20
Concert Master Rad. & Tel. Co., Chicago, Ill. 31
Concord Radio Corp., Chicago, Ill.... 35
Condenser Products Co., Chicago, Ill. 6
Congress Tool & Die Co., Detroit, Mich. 19
Conn. Cable Corp., Jewett City, Conn. 42
Conn, Ltd., C. G., Elkhart, Ind. 12
Conn. Tel. & Elec. Div., Great American Industries, Meriden, Conn. ... 38
Connector Div. International Resistance Co., Philadelphia, Pa. 16
Consolidated Diamond Tool Co., Yonkers, N. Y. 19
Consolidated Engineering Corp., Pasadena, Cal. 18
Consolidated Molded Products Corp., Scranton, Pa. 28
Consolidated Radio Products Co., Chicago, Ill. 36
Consolidated Wire & Assoc. Corp., Chicago, Ill. 42
Continental-Diamond Fibre Co., Newark, Dela. 17
Continental Electric Co., Geneva, Ill. 20
Continental Electric Co., Inc., Newark, N. J. 23
Continental Record Co., Inc., New York, N. Y. 33
Continental Screw Co., New Bedford, Mass. 16
Contract Specialties Co., Detroit, Mich. 21
Control Corp., Minneapolis, Minn. . 38
Cook Ceramic Mfg. Co., Trenton, N. J. 17
Cook Electric Co., Chicago, Ill. 16
Copperweld Steel Co., Glassport, Pa. 1
Corbin Screw Div. American Hardware Corp., New Britain, Conn. 16

COMPANY	CLASSIFICATION
Cordox Western, Inc., Los Angeles, Calif.	12
Cords Ltd., Inc., Newark, N. J.	16
Cornell-Dubilier Electric Corp., S. Plainfield, N. J.	6
Corning Glass Works, Corning, N. Y.	1
Cornish Wire Co., Inc., New York, N. Y.	42
Coronet Radio & Telev. Corp., Hempstead, N. Y.	31
Corry-Jamestown Mfg. Corp., Corry, Pa.	5
Cosmic Radio Corp., New York, N. Y.	6
Cosmopolitan Records, Inc., New York, N. Y.	33
Coto-Coil Co., Inc., Providence, R. I.	8
Couch Co., Inc., S. H., N. Quincy, Mass.	42
Cournand & Co., E. L., New York, N. Y.	27
Cover Dual Signal Systems, Inc., Div. Electra-Voice Corp., Chicago, Ill.	37
Cramer Co., Inc., R. W., Centerbrook, Conn.	37
Creative Plastics Corp., Brooklyn, N. Y.	27
Crescent Co., Inc., Pawtucket, R. I.	42
Crescent Industries, Inc., Chicago, Ill.	36
Crescent Tool & Die Co., Chicago, Ill.	33
Criterion Products Co., New York, N. Y.	33
Croname, Inc., Chicago, Ill.	10
Crosley Corp., Cincinnati, Ohio	31
Crowley & Co., Inc., Henry L., W. Orange, N. J.	17
Crucible Steel Co. of America, New York, N. Y.	21
Cryco, Inc., S. Pasadena, Cal.	9
Crystal Laboratories, Wichita, Kan.	9
Crystal Products Co., Kansas City, Mo.	9
Crystal Research Labs., Inc. Hartford, Conn.	6
Crystal Research Products, Dumont, N. J.	9
Cundy-Bettoney Co., Inc., Boston, Mass.	21
Curtis Development & Mfg. Co., Milwaukee, Wis.	37
Custom Case Co., New York, N. Y.	5
Cutler-Hammer, Inc., Milwaukee, Wis.	37
C. W. Mfg. Co., Los Angeles, Cal.	9
Cyclonics Mfg. Co., Inc., Union City, N. J.	13
Cyclotron Specialties Co., Moraga, Cal.	13

D

COMPANY	CLASSIFICATION
Dahlstrom Metallic Door Co., Jamestown, N. Y.	5
Dallons Labs., Los Angeles, Cal.	9
Dalmo Victor, Div. Goldfield Cons. Mines Co., San Carlos, Cal.	35
Daly Machine & Tool Works, Newark, N. J.	19
Daven Co., Newark, N. J.	18
Davidson Fan Co., Newton, Mass.	19
Davies Molding Co., Harry, Chicago, Ill.	10
Davis & Co. Inc., Dean W., Chicago, Ill.	38
Davis Music Co., Joe., New York, N. Y.	33
Davis Plastics Co., Joseph, Arlington, N. J.	28
Day & Co., James B., Chicago, Ill.	25
Dayton Acme Co., Cincinnati, Ohio	12
Dayton Insulating Molding Co., Dayton, Ohio	28
Dayton Rogers Mfg. Co., Minneapolis, Minn.	21
Dazor Mfg. Co., St. Louis, Mo.	11
Dearborn Glass Co., Chicago, Ill.	10
Decatur Mfg. Co., Brooklyn, N. Y.	7
Decca Records, Inc., New York, N. Y.	33
Deepfreeze Div. Motor Products Corp., N. Chicago, Ill.	18
DeJur Amsco Corp., Long Island City, N. Y.	20
Delco Appliance Div. General Motors Corp., Rochester, N. Y.	3
Delco Radio, Div. of General Motors Corp., Kokomo, Ind.	31
DeMornay-Budd, Inc., New York, N. Y.	1
Denham & Co., Detroit, Mich.	19
De Sanno & Son, Inc., A. P., Phoenixville, Pa.	19
Despatch Oven Co., Minneapolis, Minn.	15
Detect-O-Ray Co., Skokie, Ill.	26
Detroit Power Screw Driver Co., Detroit, Mich.	15
Deutschmann Corp., Tobe, Canton, Mass.	6
Devoe & Raynolds Co., Inc., Louisville, Ky.	25
DeVry Corp., Chicago, Ill.	35
DeWald Radio Mfg. Corp., New York, N. Y.	31
DeWalt Products Corp., Lancaster, Pa.	23
Diacoustic Lab., Pasadena, Cal.	32
Dial Light Co. of America Inc., New York, N. Y.	10
Diamond Drill Carbon Co., New York, N. Y.	9
Diamond Instrument Co., Wakefield, Mass.	1
Diamond Wire & Cable Co., Chicago Heights, Ill.	42
Dickson Co., Chicago, Ill.	12
Dictaphone Corp., New York, N. Y.	32
Diebel Die & Mfg. Co., Chicago, Ill.	21
Diehl Mfg. Co., Somerville, N. J.	19
Dielectric Products Co., Inc., Jersey City, N. J.	1
Dietert Co., Harry W., Detroit, Mich.	18
Dietz Mfg. Co., Los Angeles, Cal.	12
Dilks, Inc., Norwalk, Conn.	35
Dillon & Co., Inc., W. C., Chicago, Ill.	20
Dillon-Beck Mfg. Co., Irvington, N. J.	28
Dinion Coil Co., Inc., Caledonia, N. Y.	38
Disston & Sons Inc., Henry, Philadelphia, Pa.	15
Distillation Products, Inc., Vacuum Equipment Div., Rochester, N. Y.	12
Division Lead Co., Chicago, Ill.	15
Dixon Crucible Co., Joseph, Jersey City, N. J.	11
DoAll Co., Minneapolis, Minn	19
Dobeckmun Co., Cleveland, Ohio	17
Doehler-Jarvis Corp., Batavia, N. Y.	1
Dollin Corp., Irvington, N. J.	21
Dolph Co., John C., Newark, N. J.	25
Dongan Electric Mfg. Co., Detroit, Mich.	38
Doolittle Radio, Inc., Chicago, Ill.	39
Dover Industries, Inc., Chicago, Ill.	21
Dow Chemical Co., Midland, Mich.	21
Dow Corning Corp., Midland, Mich.	17
Drake Co., R. L., Dayton, Ohio	1
Drake Electric Works, Inc., Chicago, Ill.	15
Drake Mfg. Co., Chicago, Ill.	10
Drakenfeld & Co., Inc., B. F., New York, N. Y.	17
Driver Co., Wilbur B., Newark, N. J.	42
Driver Harris Co., Harrison, N. J.	21
Dual Remote Control Co., Wayne, Mich.	37
Dumont Electric Co., New York, N. Y.	6
DuMont Labs., Inc., Allen B., Passaic, N. J.	31
Dumore Co., Racine, Wis.	23
Duotone Co., New York, N. Y.	32
DuPont de Nemours Co., Inc., E. I., Plastics Dept., Arlington, N. J.	27
Durakool, Inc., Elkhart, Ind.	37
Durez Plastics & Chemicals Inc., N. Tonawanda, N. Y.	27
Durite Plastics, Philadelphia, Pa.	27
D-X Radio Products Co., Chicago, Ill.	36
Dynamic Air Engineering, Inc., Los Angeles, Cal.	19
Dynavox Corp., Long Island City, N. Y.	31
Dzus Fastener Co., Inc., Babylon, N. Y.	16

E

COMPANY	CLASSIFICATION
Eagle Electric Mfg. Co., Inc., Long Island City, N. Y.	1
Eagle Pencil Co., New York, N. Y.	11
Eagle Signal Corp., Moline, Ill.	37
Eastern Air Devices, Inc., Brooklyn, N. Y.	37
Eastern Amplifier Corp., New York, N. Y.	13
Eastern Electronics Corp., New Haven, Conn.	18
Eastern Engineering Co., New Haven, Conn.	41
Eastern Mike-Stand Co., Brooklyn, N. Y.	22
Eastern Sound Recording Co., New York, N. Y.	33
Eastern Specialty Co., Philadelphia, Pa.	16
Eberhard Faber Pencil Co., Brooklyn, N. Y.	11
Eby Inc., Hugh H., Philadelphia, Pa.	10
Eccles Disc. Recordings, Inc., Los Angeles, Calif.	33
Ecco High Frequency Corp., North Bergen, N. J.	6
Echophone Radio Co., Chicago, Ill.	31
Eckstein Radio & Television Co., Minneapolis, Minn.	35
Eclipse Moulded Products Co., Milwaukee, Wisc.	17
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.	12
Edin Electronics Co., Worcester, Mass.	5
Edison, Inc., Thomas A., Kearny, N. J.	4
Edwards, Inc., T. J., Boston, Mass.	5
Eyptian Lacquer Mfg. Co., New York, N. Y.	25
Eicor, Inc., Chicago, Ill.	3
"Eidson's", Temple, Texas	9
Eisler Engineering Co., Newark, N. J.	19
Eitel-McCullough, Inc., San Bruno, Calif.	40
Elastic Stop Nut Corp. of America, Union, N. J.	16
Eldeen Co., Milwaukee, Wis.	32
Electric Auto-Lite Co., Port Huron, Mich.	42
Electric Coding Machine Co., New York, N. Y.	12
Electric Controller & Mfg. Co., Cleveland, Ohio	12
Electric Eye Equipment Co., Danville, Ill.	26
Electric Furnace Co., Salem, Ohio	12
Electric Heat Control Co., Cleveland, Ohio	13
Electric Indicator Co., Stamford, Conn.	23
Electric Products Co., Cleveland, Ohio	12
Electric Soldering Iron Co. Inc., Deep River, Conn.	15
Electric Specialty Co., Stamford, Conn.	23
Electric Storage Battery Co., Philadelphia, Pa.	4
Electric Switch Corp., Columbus, Ind.	37
Electrical Engineering & Mfg. Corp., Los Angeles, Calif.	3
Electrical Facilities Inc., Oakland, Calif.	3
Electrical Industries, Inc., Newark, N. J.	12
Electrical Insulation Co., Inc., New York, N. Y.	17
Electrical Products Corp., Oakland, Calif.	9
Electrical Products Supply Co., Los Angeles, Calif.	37
Electrical Reactance Corp., Franklinville, N. Y.	1
Electrical Research & Mfg. Co., Los Angeles, Calif.	31
Electrical Specialty Co., Boston, Mass.	38
Electrical Windings, Inc., Chicago, Ill.	8
Electricoil Transformer Co., New York, N. Y.	38
Electrix Corp., Pawtucket, R. I.	19
Electrocon Corp., Freeport, N. Y.	12
Electro-Mag. Mfg. Co., Rockford, Ill.	15
Electro-Marine Co., New York, N. Y.	1
Electromatic Mfg. Corp., New York, N. Y.	31
Electro-Medical Laboratory, Inc., Holliston, Mass.	13
Electro Motive Mfg. Co., Inc., Willimantic, Conn.	2
Electro Physical Laboratories, New York, N. Y.	13
Electro Products Laboratories, Chicago, Ill.	13
Electro Recording & Broadcasting Studio, Glendale, Los Angeles, Calif.	33
Electro-Tech. Equipment Co., New York, N. Y.	12
Electro-Technical Products, Inc., Nutley, N. J.	17
Electro-Voice, Inc., South Bend, Ind.	22
Electro-Vox Recording Studios, Los Angeles, Calif.	33
Electron Equipment Corp., So. Pasadena, Calif.	12
Electronic Apparatus, Inc., New York, N. Y.	12
Electronic Components Co., Los Angeles, Calif.	34
Electronic Control Corp., Detroit, Mich.	12
Electronic Corp. of America, New York, N. Y.	13
Electronic Development Co., Omaha, Nebr.	20
Electronic Development Lab., New York, N. Y.	10
Electronic Devices Co., New York, N. Y.	31
Electronic Engineering Co., Chicago, Ill.	18
Electronic Engineering Service & Lab., St. Albans, N. Y.	13
Electronic Engineers, Glendale, Calif.	1
Electronic Enterprises Inc., Newark, N. J.	40
Electronic Laboratories, Inc., Indianapolis, Ind.	3
Electronic Mfg., Co., Dubuque, Iowa	16
Electronic Mfg. Co., Newark, N. J.	19
Electronic Measurements Co., Red Bank, N. J.	35
Electronic Mechanics, Inc., Clifton, N. J.	9
Electronic Plumbing Corp., Yonkers, N. Y.	1
Electronic Processes Corp., Ridgewood, N. J.	13
Electronic Products Co., Geneva, Ill.	37
Electronic Products Co., Mt. Vernon, N. Y.	37
Electronic Radio Alarm, Inc., Philadelphia, Pa.	12
Electronic Research & Mfg. Corp., Cleveland, Ohio	12
Electronic Research Corp., Chicago, Ill.	13
Electronic Sound Engineering Co., Chicago, Ill.	35
Electronic Specialties Mfg. Co., Worcester, Mass.	1
Electronic Specialty Co., Los Angeles, Calif	1
Electronic Supply Co., Worcester, Mass.	5
Electronic Transformer Co., New York, N. Y.	38
Electronic Tube Corp., Chestnut Hill, Philadelphia, Pa.	40
Electronic Winding Co., Chicago, Ill.	8
Electrons, Inc., Newark, N. J.	40
Elematic Equipment Corp., Chicago, Ill.	9
Elgin National Watch Co., Elgin, Ill.	20
Elkay Radio Products, Oglesby, Ill.	1
Emeloid Co., Inc., Arlington, N. J.	28
Emerson Electric Mfg. Co., St. Louis, Mo.	23
Emerson Radio & Phonograph Corp., New York, N. Y.	31
Empire Broadcasting Corp., New York, N. Y.	33
Endurette Corp. of America, New York, N. Y.	17
Engelhard, Inc., Charles, Newark, N. J.	18
Engineering Co., Newark, N. J.	21
Engineering Laboratories, Inc., Tulsa, Okla.	37
Englewood Electrical Supply Co., Chicago, Ill.	16
Ensign Coil Co., Chicago, Ill.	8
Eppley Laboratory Inc., Newport, R. I.	4
Eraser Co., Inc., Syracuse, N. Y.	11
Erco Radio Laboratories Inc., Hempstead, N. Y.	1
Ericsson Screw Machine Products Co., Inc., Brooklyn, N. Y.	16
Erie Art Metal Co., Erie, Pa.	5
Erie Resistor Corp., Erie, Pa.	6
Erwood Co., Chicago, Ill.	22
Espey Mfg. Co., Inc., New York, N. Y.	31
Ess Instrument Co., Bergenfield, N. J.	26
Essex Electronics, Newark, N. J.	1
Essex Wire Corp., Ft. Wayne, Ind.	42
Esterline-Angus Co., Inc., Indianapolis, Ind.	32
Etched Products Corp., Long Island City, N. Y.	10
Ever Ready Label Corp., New York, N. Y.	10
Exact Weight Scale Co., Columbus, Ohio	12
Excel Transformer Co., Oakland, Calif.	38
Executone Inc., New York, N. Y.	35
Export Industries, New York, N. Y.	12
Extruded Plastics, Inc., Norwalk, Conn.	27

F

COMPANY	CLASSIFICATION
Faber Co., Inc., A. W., Newark, N. J.	11
Faber, Merle F., San Francisco, Calif.	16
Fada Radio & Electric Mfg. Co., Inc., New York, N. Y.	31
Fafnir Bearing Co., New Britain, Conn.	21
Fairbanks, Morse & Co., Chicago, Ill.	23
Fairchild Camera & Instrument Corp., Jamaica, N. Y.	38
Fairfield Lumber Co., Fairfield, Conn.	5
Fairmont Aluminum Co., Fairmont, W. Va.	21
Fairmont Tool & Forging Co., Cleveland, Ohio	15

COMPANY	CLASSIFICATION
Falstrom Co., Passaic, N. J.	5
Fansteel Metallurgical Corp., North Chicago, Ill.	3
Faraday Electric Corp., Adrian, Mich.	22
Farnsworth Television & Radio Corp., Fort Wayne, Ind.	31
Farrand Optical Co., Inc., New York, N. Y.	13
Farrelloy Co., Philadelphia, Pa.	15
Fast, John E. & Co., Chicago, Ill.	6
Favorite Mfg. Co., N. Y., N. Y.	32
Federal Anti-Capacity Switch Corp., Buffalo, N. Y.	37
Federal Electric Inc., Chicago, Ill.	37
Federal Engineering Co., New York, N. Y.	9
Federal Instrument Co., Long Island City, N. Y.	12
Federal Mfg. & Eng. Corp., Brooklyn, N. Y.	7
Federal Recorder Co., Inc., Chicago, Ill.	32
Federal Screw Products Co., Chicago, Ill.	15
Federal Telephone & Radio Corp., Newark, N. J.	31
Feick Mfg. Div. of Detroit Aircraft Prods., Inc., Cleveland, Ohio	5
Felker Mfg. Co., Torrance, Calif.	19
Felsenthal & Sons, G., Chicago, Ill.	10
Felt Products Mfg. Co., Chicago, Ill.	16
Fenwal, Inc. Ashland, Mass.	37
Ferranti Electric, Inc., New York, N. Y.	18
Ferris Instrument Co., Boonton, N. J.	18
Field Electrical Instrument Co., New York, N. Y.	20
Film Crafts Engineering Co., New York, N. Y.	15
Finch Telecommunications, Inc., New York, N. Y.	39
Fischer, Carl, Inc., New York, N. Y.	33
Fischer, Robert A., Glendale, Calif.	13
Fischer & Porter Co., Hatboro, Pa.	12
Fischer-Smith, Inc., West Englewood, N. J.	1
Fischman Co., Philadelphia, Pa.	21
Fisher Pierce Co., Boston, Mass.	12
Fisher Radio Co., New York, N. Y.	31
Fisher Research Lab., Palo Alto, Calif	12
Fisher Scientific Co., Pittsburgh, Pa.	13
Fish-Schurman Corp., New York, N. Y.	12
Fleron & Son, Inc., M. M., Trenton, N. J.	1
Flexo Wire Co., Syracuse, N. Y.	42
Flock Process Co., Norwalk, Conn.	5
Flush Wall Radio Co., Newark, N. J.	31
Follansbee Steel Corp., Pittsburgh, Pa.	21
Foote Bros. Gear & Machine Corp., Chicago, Ill.	14
Foote Mineral Co., Philadelphia, Pa.	21
Foote Pierson & Co., Inc., Newark, N. J.	12
Fordham Mfg. Co., New York, N. Y.	16
Ford Radio & Mica Corp., Brooklyn, N. Y.	17
Foredom Electric Co., New York, N. Y.	19
Formica Insulation Co., Cincinnati, Ohio	27
Forsberg Mfg. Co., Bridgeport, Conn.	15
Foster Co., A. P., Cincinnati, Ohio	38
Foster Co., Benjamin, Philadelphia, Pa.	25
Fostoria Pressed Steel Corp., Fostoria, Ohio	13
Foxboro Co., Foxboro, Mass.	19
Fractional Motors Co., Chicago, Ill.	2
France Mfg. Co., Cleveland, Ohio	3
Franklin Airloop Corp., New York, N. Y.	1
Franklin Fibre Lamitex Corp., Wilmington, Dela.	17
Franklin Mfg. Corp., A. W., New York, N. Y.	1
Franklin Photographic Industries, Chicago, Ill.	31
Franklin Transformer Mfg. Co., Minneapolis, Minn.	38
Fredericks Co., George E., Bethayres, Pa.	17
Freed Radio Corp., New York, N. Y.	31
Freed Transformer Co., New York, N. Y.	38
Freeland & Olschner Products, Inc., New Orleans, La.	41
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.	12
Fuchs, Charles A., Roosevelt, L. I., N. Y.	16

G

COMPANY	CLASSIFICATION
Gaertner Scientific Corp., Chicago, Ill.	18
Gala Record Co., New York, N. Y.	33
Galvin Mfg. Corp., Chicago, Ill.	31
Gamble Hinged Music Co., Chicago, Ill.	33
Gamewell Co., Newton Upper Falls, Mass.	34
Gamma Instrument Co., Inc., New York, N. Y.	20
Gardiner Mfg. Co., Oakland, Calif.	1
Gardiner Metal Co., Chicago, Ill.	15
Gardner Electric Mfg. Co., Emeryville, Calif.	38
Gardner Laboratory, Inc., Henry A., Bethesda, Md.	20
Garfield Medical Apparatus Co., New York, N. Y.	13
Garner Electronics Corp., Chicago, Ill.	1
Garod Radio Corp., Brooklyn, N. Y.	31
Garrard Sales Corp., New York, N. Y.	33
Garrett Co. Inc., George K., Philadelphia, Pa.	16
Gaston Power Tools, Chicago, Ill.	23
Gates & Co., Inc., George W., Franklin Square, N. Y.	18
Gates Radio Co., Quincy, Ill.	32
Gatti, Inc., Aurele M., Trenton, N. J.	32
Gavitt Mfg. Co., Inc., Brookfield, Mass.	42
Gear Specialties Co., Chicago, Ill.	16
Gemloid Corp., Elmhurst, L. I., N. Y.	16
Gem Radio & Television Co., New York, N. Y.	35
General Aniline & Film Corp., New York, N. Y.	21
General Aviation Equipment Co., Inc., New York, N. Y.	12
General Cable Corp., New York, N. Y.	42
General Cement Mfg. Co., Rockford, Ill.	25
General Ceramics & Steatite Corp., Keasbey, N. J.	17
General Communication Co., Boston, Mass.	31
General Control Co., Boston, Mass.	37
General Controls Co., Glendale, Calif.	12
General Crystal Corp., Schenectady, N. Y.	9
General Dry Batteries, Inc., Cleveland, Ohio	4
General Electric Co., Bridgeport, Conn.	37
General Electric Co., Pittsfield, Mass.	27
General Electric Co., Hoboken, N. J.	20
General Electric Co., Schenectady, N. Y.	30
General Electric Co., Syracuse, N. Y.	7
General Electric Co., Cleveland, Ohio	13
General Electric X-Ray Corp., Chicago, Ill.	13
General Electronic Mfg. Co., Los Angeles, Calif.	10
General Electronics, Inc., Paterson, N. J.	40
General Industries Co., Elyria, Ohio	28
General Instrument Corp., Elizabeth, N. J.	36
General Insulated Wire Works, Inc., Providence, R. I.	42
General Laminated Products, Inc., Chicago, Ill.	8
General Magnetic Corp., Detroit, Mich.	21
General Pencil Co., Jersey City, N. J.	11
General Phonograph Corp., Putnam, Conn.	33
General Plate Div., Metals & Controls Corp., Attleboro, Mass.	16
General Radio Co., Cambridge, Mass.	6
General Scientific Corp., Chicago, Ill.	26
General Screw & Mfg. Co., Chicago, Ill.	16
General Television & Radio Corp., Chicago, Ill.	31
General Time Instruments Corp., Seth Thomas Clocks Div., Thomaston, Conn.	37
General Tire & Rubber Co., Wabash, Ind.	16
General Transformer Corp., Chicago, Ill.	38
General Winding Co., New York, N. Y.	8
Gentleman Products Div., Henney Motor Co., Omaha, Nebr.	9
Geophysical Instrument Co., Arlington, Va.	12
Gering Products, Inc., Kenilworth, N. J.	27
G. & G. Precision Works, Inc., Long Island City, N. Y.	13
Giannini & Co., Inc., G. M., N. Hollywood, Calif.	20
Gibbs & Co., Thomas B., Delavan, Wisc.	9
Gibson Electric Co., Pittsburgh, Pa.	16
Gibson, Inc., Kalamazoo, Mich.	35
Gilbert Clock Co., W. M., Winstead, Conn.	37
Gilfillan Bros., Inc., Los Angeles, Calif.	31
Girard-Hopkins, Oakland, Calif.	6
Girdler Corp., Louisville, Ky.	13
Gisholt Machine Co., Madison, Wisc.	19
Glaser Lead Co., Inc., Brooklyn, N. Y.	15
Glendale Vacuum Products Co., Brooklyn, N. Y.	41
Glendale's Radio City, Glendale, Calif.	33
Glenn Glen Sound Co., Los Angeles, Calif.	33
Glenn-Roberts Co., Oakland, Calif.	6
Globe Electronics, Inc., New York, N. Y.	31
Globe Industries, Inc., Dayton, Ohio	2
Globe Phone Mfg. Corp., Reading, Mass.	13
Glyco Products Co., Inc., Brooklyn, N. Y.	25
G-M Laboratories, Inc., Chicago, Ill.	20
G. M. Mfg. Co., New York, N. Y.	20
Goat Metal Stampings, Inc., Brooklyn, N. Y.	16
Godfrey Mfg. Co., Milwaukee, Wisc.	33
Goldmark Wire Co., James, New York, N. Y.	25
Goldsmith Bros., Smelting & Refining Co., Chicago, Ill.	21
Goodall Electric Mfg. Co., Ogallala, Nebr.	3
Goodrich Chemical Co., B. F., Cleveland, Ohio	17
Gordon Specialties Co., Chicago, Ill.	10
Gorrell & Gorrell, Haworth, N. J.	37
Gothard Mfg. Co., Springfield, Ill.	10
Gould-Moody Co., New York, N. Y.	32
Gould Storage Battery Corp., Depew, N. Y.	4
Grady Instrument Co., Watertown, Mass.	39
Graham Rotary File Co., Philadelphia, Pa.	19
Gramer Co., Chicago, Ill.	38
Grammes & Sons, Inc., L. F., Allentown, Pa.	10
Graphite Metallizing Corp., Yonkers, N. Y.	21
Graton & Knight Co., Worcester, Mass.	16
Graybar Electric Co. Inc., New York, N. Y.	16
Grayhill, Chicago, Ill.	2
Gray Mfg. Co., Hartford, Conn.	32
Gray Radio Co., W. Palm Beach, Fla.	31
Great Lakes Electric Mfg. Co., Chicago, Ill.	23
Great Metal Mfg. Corp., Brooklyn, N. Y.	21
Green Electric Co., Inc., W., New York, N. Y.	29
Greene Mfg. Co., C. G., Warren, Pa.	21
Greenhut Insulation Co., New York, N. Y.	5
Greenlee Tool Co., Rockford, Ill.	15
Gregory Mfg. Co., New Haven, Conn.	16
Greist Mfg. Co., New Haven, Conn.	21
Grenby Mfg. Co., Plainville, Conn.	20
Groves Corp., Cape Girardeau, Mo.	34
Gruen Watch Co., Cincinnati, Ohio	20
Guaranteed Products, Wellington, Ohio	38
Guardian Electric Mfg. Co., Chicago, Ill.	37
Gudeman Co., Chicago, Ill.	6
Guided Radio Corp., New York, N. Y.	16
Guild Records, New York, N. Y.	33
Gulow Corp., New York, N. Y.	38
Gurley, W. & L. E., Troy, N. Y.	13
Gussack Machined Products Co., Long Island City, N. Y.	1
Guthman & Co. Inc., Edwin I., Chicago, Ill.	6
Gyro-Balance Corp., New York, N. Y.	18

H

COMPANY	CLASSIFICATION
Haddorff Piano Co., Chicago, Ill.	32
Hadley Co., Robert M., Los Angeles, Calif.	5
Haines Mfg. Co., Brooklyn, N. Y.	34
Hall Co., Gordon L., Old Lyme, Conn.	5
Hall Lamp Co., C. M., Detroit, Mich.	21
Halldorsen Co., Chicago, Ill.	38
Hallett Mfg. Co., Inglewood, Calif	42
Hallicrafters Co., Chicago Ill.	31
Halowax Products Div., Union Carbide & Carbon Corp., New York, N. Y.	25
Hamilton Mfg. Co., Two Rivers, Wisc.	11
Hamilton Radio Corp., New York, N. Y.	31
Hammarlund Mfg Co., Inc., New York, N. Y.	31
Hammond Instrument Co., Chicago, Ill.	32
Hampden Mfg. Co., Inc., Plainfield, N. J.	11
Handy & Harman, New York, N. Y.	15
Hannon Electric Co., Canton, Ohio	3
Hanovia Chemical & Mfg. Equip., Newark, N. J.	13
Hansen Co., Wm., Niles, Mich.	12
Hansen Mfg. Co., Inc., Princeton, Ind.	23
Harco Tower, Inc., Elizabeth, N. J.	1
Hardware Specialties Mfg. Co., Bridgeport, Conn.	21
Hardwick, Hindle, Inc., Newark, N. J.	34
Harmax Recording Studios, New York, N. Y.	33
Harmonia Records, New York, N. Y.	33
Harnischfeger Corp., Milwaukee, Wisc.	3
Harper Electric Furnace Corp., Niagara Falls, N. Y.	19
Harper Co., H. M., Chicago, Ill.	16
Harris Mfg. Co., Los Angeles, Calif.	31
Harris Products Co., Cleveland, Ohio	16
Harrison Recording Studios, New York, N. Y.	33
Harshaw Chemical Co., Cleveland, Ohio	25
Hart & Co., Inc., Frederick, New York, N. Y.	32
Hart Mfg. Co., Hartford, Conn.	2
Hart Moisture Gauges, Inc., New York, N. Y.	20
Hartford Machine Screw Co., Hartford, Conn.	16
Hartley-Holt, New York, N. Y.	33
Hartman Corp. of America, St. Louis, Mo.	3
Hartman Electrical Mfg. Co., Mansfield, Ohio	37
Harvey Machine Co., Inc., Los Angeles, Calif.	1
Harvey Radio Laboratories, Inc., Cambridge, Mass.	38
Harvey-Wells Electronics, Inc., Southbridge, Mass.	1
Harwood Co., Div. Los Angeles Corp., Los Angeles, Calif.	16
Haskell Mfg. Co., William H., Pawtucket, R. I.	16
Hasler-Tel Co., New York, N. Y.	20
Hassall, Inc., John, Brooklyn, N. Y.	16
Hatcher & Fisk, Inc., Topeka, Kansas	39
Hatfield Wire Cable Co., Div. Robinson Foundation, Inc., Hillside, N. J.	42
Hathaway Instrument Co., Denver, Colo.	18
Hawley Product Co., St. Charles, Ill.	28
Haydon Mfg. Co., Inc., Forestville, Conn.	12
Haydu Bros., Plainfield, N. J.	19
Hazard Insulated Wire Works, Div. Okonite Co., Wilkes-Barre, Pa.	42
Hazeltine Electronics Corp., New York, N. Y.	30
H-B Instrument Co., Philadelphia, Pa.	37
Heath Co., Benton Harbor, Mich.	1
Heiland Research Corp., Denver, Colo.	13
Heinemann Circuit Breaker Co., Trenton, N. J	37
Heintz & Kaufman, Ltd., S., San Francisco, Calif.	40
Heinze Electric Co., Lowell, Mass.	37
Helipot Corp., S. Pasadena, Calif.	18
Heller & Co., W. C., Montpelier, Ohio	5
Henry Mfg. Co., Los Angeles, Calif.	9
Herbach & Rademan Co., Philadelphia, Pa.	12
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.	3
Hercules Powder Co., Wilmington, Dela.	27
Heresite & Chemical Co., Manitowoc, Wisc.	27
Hermaseal Co., Elkhart, Ind.	41
Hero Service Co., New York, N. Y.	33
Hertner Electric Co., Cleveland, Ohio	3
Herzog Miniature Lamp Works, Long Island City, N. Y.	10
Hetherington & Son, Inc., Robert, Sharon Hill, Pa.	12

COMPANY	CLASSIFICATION
Hewlett-Packard Co., Palo Alto, Calif.	13
Hexacon Electric Co., Roselle Park, N. J.	15
Heyer Products, Inc., Belleville, N. J.	20
Heyman Mfg. Co., Kenilworth, N. J.	16
H. & H. Recording Co., Chicago, Ill.	33
Hickok Electrical Instrument Co., Cleveland, Ohio	18
Higgins Industries, Inc., Santa Monica, Calif.	9
High Tension Co., Inc., Phillipsburg, N. J.	16
Hilo Varnish Corp., Brooklyn, N. Y.	25
Hipower Crystal Co., Chicago, Ill.	9
Hobart Mfg. Co., Troy, Ohio	23
Hodgman Rubber Co., Framingham, Mass.	17
Hoffman Co., P. R., Carlisle, Pa.	9
Hoffman Engineering Corp., Minneapolis, Minn.	12
Hoffman Radio Corp., Los Angeles, Calif.	31
Hofman Corp., C. L., Pittsburgh, Pa.	35
Hofstatter's Sons., Inc., Long Island City, N. Y.	5
Holland Sound Engineering, Chicago, Ill.	35
Hollister Crystal Co., Boulder, Colo.	9
Holliston Mills, Inc., Norwood, Mass.	11
Hollywood Music Recording Studios, Los Angeles, Calif.	33
Hollywood Recording Co., Los Angeles, Calif.	33
Hollywood Transformer Co., Los Angeles, Calif.	38
Holtzer-Cabot, Roxbury, Mass.	29
Homelite Corp., Port Chester, N. Y.	23
Home Recording Co., Bronx, N. Y.	32
Hommel Co., O., Pittburgh, Pa.	21
Hopp Press, Inc., New York, N. Y.	10
Horn Co., A. C., Long Island City, N. Y.	25
Horni Signal Mfg. Corp., New York, N. Y.	29
Hoskins Mfg. Co., Detroit, Mich.	42
Hovis Screwlock Co., Van Dyke, Mich.	19
Howard Mfg. Corp., Council Bluffs, Iowa	41
Howard Pacific Corp., Los Angeles, Calif.	31
Howard Radio Co., Chicago, Ill.	31
Howe & French, Inc., Boston, Mass.	25
Howell Electric Motors Co., Howell, Mich.	23
H.R.S. Products, Chicago, Ill.	6
H.T.Hit Service, Brooklyn, N. Y.	33
Hubbell, Inc., Harvey, Bridgeport, Conn.	16
Huber Radio Co., Casper, Wyo.	12
Hudson American Corp., New York, N. Y.	38
Hudson Wire Co., Winsted, Conn.	42
Hunt & Sons, G. C., Carlisle, Pa.	9
Hunter Pressed Steel Co., Lansdale, Pa.	21
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio	19
Hydraulic Tool & Die Corp., New York,	19
Hy-Pro Tool Co., New Bedford, Mass.	16
Hytron Radio & Electronics Corp., Salem, Mass.	40

I

COMPANY	CLASSIFICATION
Ideal Commutator Dresser Co., Sycamore, Ill.	4
Ilg Electric Ventilating Co., Chicago, Ill.	19
Illinois Cabinet Co., Rockford, Ill.	5
Illinois Condenser Co., Chicago, Ill.	6
Illinois Testing Laboratories, Chicano, Ill.	13
Illinois Tools Works, Chicago, Ill.	13
Illinois Wood Products Corp., Chicago, Ill.	5
Imperial Electric Co., Akron, Ohio	23
Imperial Molded Products Corp., Chicago, Ill.	10
Imperial Porcelain Works, Trenton, N. J.	17
Independent Music Co., New York, N. Y.	33
Indiana Steel Products Co., Chicago, Ill.	21
Indiana Steel & Wire Co., Muncie, Ind	42
Induction Heating Corp., New York, N. Y.	13
Industrial & Commerical Electronics, Belmont, Calif.	6
Industrial Condenser Corp., Chicago, Ill.	6
Industrial Electronics Corp., Newark, N. J.	38
Industrial Engineering Corp., Terre Haute, Indiana	37
Industrial Fabricators, Inc., Cleveland, Ohio	17
Industrial Filter & Pump Mfg. Co., Chicago, Ill.	18
Industrial Instruments, Inc., Jersey City, N. J.	6
Industrial Molded Products Co., Chicago, Ill.	17
Industrial Screw & Supply Co., Chicago, Ill.	16
Industrial Synthetics Corp., Irvington, N. J.	28
Industrial Tape Corp., New Brunswick, N. J.	17
Industrial Timer Corp., Newark, N. J.	37
Industrial Tool and Die Works, Inc. Minneapolis, Minn.	31
Industrial Transformer Corp., New York, N. Y.	38
Infra-Red Engineers & Designers, Cleveland, Ohio	19
Insl-X Co., Inc., Brooklyn, N. Y.	17
Instructograph Co., Chicago, Ill.	39
Instrument Electronics, Little Neck, N. Y.	20
Instrument Resistors Co., Little Falls, N. J.	34
Instrument Specialties Co., Inc., Little Falls, N. J.	16
Insulating Fabricators of New England, Inc., Watertown, Mass.	27
Insulating Tube Co., Inc., Poughkeepsie, N. Y.	8
Insulation Manufacturers Corp., Chicago, Ill.	17
Insulation Mfg. Co., Brooklyn, N. Y.	28
Insulation Products Co., Pittsburgh, Pa.	17
Insuline Corp. of America, Long Island City, N. Y.	37
Intercall Systems, Inc., Dayton, Ohio	35
Interlake Chemical Corp., Forest Park, Ill.	25
International Derrick & Equipment Co., Columbus, Ohio	1
International Detrola Corp., Detroit, Mich.	31
International Machine Works, North Bergen, N. J.	19
International Merit Products Corp., New York, N. Y.	16
International Nickel Co., Inc., New York, N. Y.	21
International Products Corp., Baltimore, Md.	1
International Register Co., Chicago, Ill.	37
International Resistance Co., Philadelphia, Pa.	34
International Screw Co., Detroit, Mich.	16
International Tel. & Tel. Co., New York, N. Y.	31
Intex Co., New York, N. Y.	1
Irvington Varnish & Insulator Co., Irvington, N. J.	17
Islip Radio Mfg. Corp., Islip, N. Y.	39
Isolantite, Inc., Belleville, N. J.	1
I-T-E Circuit Breaker Co., Philadelphia, Pa.	37

J

COMPANY	CLASSIFICATION
Jackson Electrical Instrument Co., Dayton, Ohio	18
Jacksonville Metal Mfg. Co., Jacksonville, Fla.	1
Jacobsen Mfg. Co., Racine, Wis.	23
Jamboree Records, Inc., New York, N. Y.	33
James Vibrapowr Co., Chicago, Ill.	29
Janette Mfg. Co., Chicago, Ill.	23
Jarrell-Ash Co., Boston, Mass.	13
J-B-T Instrument Inc., New Haven, Conn.	37
Jeffers Electronics, DuBois, Pa.	6
Jefferson, Inc., Ray, Freeport, N. Y.	31
Jefferson Electric Co., Bellwood, Ill.	37
Jefferson-Travis Corp., New York, N. Y.	31
Jelliff Mfg. Corp., C. O., Southport, Conn.	21
Jennings Radio Mfg. Co., San Jose, Calif.	6
Jensen Industries, Inc., Chicago, Ill.	33
Jensen Radio Mfg. Co., Chicago, Ill.	36
Jerome Engineering Co., Massapequa, N. Y.	18
Jewel Radio Corp., New York, N. Y.	31
J.F.D. Mfg. Co., Brooklyn, N. Y.	1
Johns-Manville Sales Corp., New York, N. Y.	17
Johnson Co., E. F., Waseca, Minn.	37
Johnston Tin Foil & Metal Co., St. Louis, Mo.	21
Joliet Chemicals, Ltd., Joliet, Ill.	25
Jones Motrola Corp., Stamford, Conn.	15
Jones Co., Howard B., Chicago, Ill.	16
Jorgensen Mfg. Co., New York, N. Y.	28

K

COMPANY	CLASSIFICATION
Kaar Engineering Co., Palo Alto, Calif.	1
Kaddis Screw Products Co., Inc. A. G., Rochester, N. Y.	19
Kahle Engineering Co., North Bergen, N. J.	19
Karp Metal Products Co., Brooklyn, N. Y.	5
Kato Engineering Co., Mankato, Minn.	23
Keasby & Mattison Co., Ambler, Pa.	28
Keeny & Co., Inc., J. H., Chicago, Ill.	12
Keese Engineering Co., Hollywood, Calif.	25
Kegron Mfg. Co., Inc., New York, N. Y.	23
Keith Radio Products, Bedford, Indiana	31
Kellems Co., Saugatuck, Conn.	15
Kelley-Koett Mfg. Co., Covington, Ky.	13
Kellogg Switchboard & Supply Co., Chicago, Ill.	1
Kelnor Mfg. Co., San Francisco, Calif.	15
Kennecott Wire & Cable Co., Philipsdale, R. I.	42
Ken-Rad Div., General Electric Co., Owensboro, Ky.	40
Kent Co., Walter A., Chicago, Ill.	1
Kenyon Transformer Co., Inc., New York, N. Y.	38
Kester Solder Co., Chicago, Ill.	21
Keuffel & Esser Co., Hoboken, N. J.	11
Keynote Recordings, Inc., New York, N. Y.	33
Keystone Carbon Co., Inc., St. Marys, Pa.	34
Keystone Electronics Co., New York, N. Y.	28
Kidde & Co., Inc., Walter, New York, N. Y.	37
Kilburn Glass Co., Inc., Chartley, Mass.	6
Kinetic Electronics Corp., New York, N. Y.	35
King Laboratories, Inc., Syracuse, N. Y.	21
Kings Electronics Co., Brooklyn, N. Y.	1
Kingston Radio Co., Inc., Kokomo, Indiana	31
Kinney Mfg. Co., Boston, Mass	19
Kirchberger & Co. Inc., M., Brooklyn, N. Y.	17
Kirkland Co., H. R., Morristown, N. J.	10
Kirkman Engineering Corp., New York, N. Y.	16
Kirk Molding Co., Clinton, Mass.	28
Kismet Record Co., New York, N. Y.	33
Klett Mfg. Co., New York, N. Y.	20
Kliegl Bros., Universal Electric Stage Lighting Co., Inc., New York, N. Y.	16
Kling Metal Spinning Co., New York, N. Y.	21
Klise Mfg. Co., Grand Rapids, Mich.	28
Kluge Electronics Co., Los Angeles, Calif.	13
Knight & Son, Inc., H. W., Seneca Falls, N. Y.	19
Knights Co., James, Sandwich, Ill.	9
Knoedler Chemical Co., Lancaster, Pa.	27
Knox Porcelain Corp. Knoxville, Tenn.	17
Kohler Co., Kohler, Wisc.	3
Kold-Hold Mfg. Co., Lansing, Mich.	18
Kollath Mfg. Co., Chicago, Ill.	15
Kollsman Instrument Div., Square D Co., Elmhurst, N. Y.	23
Kolton Electric Mfg. Co., Newark, N. J.	16
Kopp Glass, Inc., Swissvale, Pittsburgh, Pa.	10
Korrol Mfg. Co., New York, N. Y.	5
Kraeuter & Co., Inc., Newark, N. J.	15
Kraft & Kraft, Hicksville, N. Y.	42
Kraus Co., Walter S., Woodside, N. Y.	5
Krementz & Co., Newark N. J.	41
Krischer Metal Products Co., Brooklyn, N. Y.	16
Kuehn Sound Film Lab., Chicago, Ill.	33
Kuhlman Electric Co., Bay City, Mich.	38
Kuhn & Jacob Molding & Tool Co., Trenton, N. J.	17
Kulka Electric Mfg. Co., Inc., Mt. Vernon, N. Y.	2
Kurman Electric Co., Long Island City, N. Y.	29
Kurz-Kasch Inc., Dayton, Ohio	10
Kurz & Root Co., Appleton, Wisc.	23
Kuthe Laboratories, Inc., Newark, N. J.	40
Kux Machine Co., Chicago, Ill.	19
Kyle Corp., S. Milwaukee, Wisc.	38

L

COMPANY	CLASSIFICATION
L.A.B. Corp., Summit, N. J.	20
Lacquer & Chemical Corp., Brooklyn, N. Y.	25
Lake Mfg. Co., Oakland, Calif.	35
Lampkin Laboratories, Bradenton, Fla.	20
Lamson & Sessions Co., Cleveland, Ohio	16
Landis & Gyr, Inc., New York, N. Y.	21
Lane-Wells Co., Los Angeles, Calif.	18
Langevin Co., Inc., New York, N. Y.	39
Lansing Stamping Co., Lansing, Mich.	21
Lapp Insulator Co., LeRoy, N. Y.	17
LaRose & Associates, W. T., Troy, N. Y.	13
Larrimore Sales Co., St. Louis, Mo.	11
Laurehk Radio Mfg. Co., Wayne, Mich.	13
Lavoie Laboratories, Morganville, N. J.	7
Lawton Products Co., Inc., New York, N. Y.	2
Leach Relay Co., Los Angeles, Calif.	26
Lear, Inc., Piqua, Ohio	16
Lear, Inc., Chicago, Ill.	31
Lectrohm, Inc., Cicero, Ill.	34
Leeds & Northrup Co., Philadelphia, Pa.	12
Lee Spring Co., Inc., Brooklyn, N. Y.	16
LeFebure Corp., Cedar Rapids, Iowa	5
Lehigh Structural Steel Co., New York, N. Y.	1
Leich Electric Co., Chicago, Illinois	37
Leiman Bros., Inc., Newark, N. J.	19
Leitz, Inc., E., New York, N. Y.	18
Lektra Laboratories, Inc., New York, N. Y.	12
Leland Electric Co., Dayton, Ohio	23
Lenkurt Electric Co., San Francisco, Calif.	20
Lenoxite Div., Lenox Inc., Trenton, N. J.	17
Lenz Lectric Mfg. Co., Chicago, Ill.	42
Lepel High Frequency Laboratories, Inc., New York, N. Y.	13
Leuck Crystal Laboratory, Lincoln, Nebr.	9
Leupold & Stevens Instruments, Portland, Ore.	12
Lewis Electronics, Los Gatos, Calif.	40
Lewis Engineering Co., Naugatuck, Conn.	2
Lewis Sound Film Products, New York, N. Y.	33
Lewisburg Chair & Furniture Co., Lewisburg, Pa.	5
Lewyt Corp., Brooklyn, N. Y.	1
Liebel-Flarsheim Co., Cincinnati, Ohio	13
Lincoln Electronics Corp., New York, N. Y.	31
Lincrophone Co., Inc., Utica, N. Y.	35
Lindam & Romaine Recording Studios, Los Angeles, Calif.	33
Linde Air Products Co., New York, N. Y.	41
Lindsay & Lindsay, Chicago, Ill.	5
Lindsay & Thomas, Inc., New York, N. Y.	5
Lingo & Son, Inc., John E., Camden, N. J.	1
Linick, Leslie L., Chicago, Ill.	15
Link, Fred M., New York, N. Y.	39
Link Engineering Co., Detroit, Mich.	20
Literary Classics, Inc., New York, N. Y.	33
Littelfuse, Inc., Chicago Ill.	37
Little Falls Alloys, Inc., Paterson, N. J.	21
Litton Engineering Laboratories, Redwood City, Calif.	19
Lock Insulator Corp., Baltimore, Md.	17
Logan Co., Les., San Francisco, Calif.	35
Loge Sound Engineers, J. M., Los Angeles, Calif.	35
Long Co., Inc., L. J., New York, N. Y.	5
Long Island Engraving Co., New York, N. Y.	10
Lorain Products Corp. Lorain, Ohio	3
Lord Mfg. Co., Erie, Pa.	19
Lorentzen, Inc., H. K., New York, N. Y.	5
Lowe Bros. Co., Dayton, Ohio	25
Lowell Insulated Wire Co., Lowell, Mass.	42
Lowell Needle Co., Putnam, Conn.	33
L-R Mfg. Co., Div. Ripley Co., Torrington, Conn.	19
Lufkin Rule Co., Saginaw, Mich.	15
Luma Electric Eqipment Co., Toledo, Ohio	15
Lumenite Electronic Co., Chicago, Ill.	12
Lyman Electronic Corp., Springfield, Mass.	12

M

COMPANY	CLASSIFICATION
McClintock Co., O. B., Minneapolis, Minn.	12
McColpin-Christie Corp., Los Angeles, Calif.	3
McDonnell & Miller, Chicago, Ill.	12
McGrade Mfg. Co., E. W., Kansas City, Mo.	31
McInerney Plastics Co., Grand Rapids, Mich.	1
McKesson Appliance Co., Toledo, Ohio	13
McNeil Engineering Co., Chicago, Ill.	13
Maas & Waldstein Co., Newark, N. J.	25
Macallen Co., Boston, Mass.	6
Macgregor Sound Studios, C. P., Los Angeles, Calif.	33
Machlett Laboratories, Inc., Springdale, Conn.	40
Mack Molding Co., Wayne, N. J.	28
Madison Electrical Products Corp., Madison, N. J.	34
Magnaflux Corp., Chicago, Ill.	13
Magna Mfg. Co., Inc., New York, N. Y.	21
Magnavox Co., Fort Wayne, Ind.	31
Magnetic Analysis Corp., Long Island City, N. Y.	13
Magnetic Gauge Co., Akron, Ohio	12
Magnetic Products Co., Norwalk, Conn.	19
Magnetic Windings Co., Div. Essex Wire Corp., Easton, Pa.	38
Maguire Industries, Bridgeport, Conn.	1
Maguire Industries, Greenwich, Conn.	7
Maico Co., Inc., Minneapolis, Minn.	10
Majestic Radio & Television Corp., St. Charles, Ill.	31
Makepeace Co., D. E., Attleboro, Mass.	21
Mallory & Co., Inc., P. R., Indianapolis, Ind.	34
Manning Paper Co., John A., Troy, N. Y.	17
Manor Record Co., Newark, N. J.	33
Manross & Sons, F. N., Div. Associated Spring Corp., Bristol, Conn.	16
Manufacturers Chemical Corp., Berkeley Heights, N. J.	27
Manufacturers Screw Products, Chicago, Ill.	16
Marathon Battery Co., Wausau, Wisc.	4
Marblette Corp., Long Island City, N. Y.	17
Marco Industries, Beverly Hills, Calif.	31
Marion Electrical Instrument Co., Manchester, N. H.	20
Maritime Radio Co., New York, N. Y.	31
Marken Machine Co., Keene, N. H.	19
Marlboro Tool & Mfg. Co., Matawan, N. J.	19
Marshall Radio Engineering Laboratories, N. Hollywood, Calif.	20
Martindale Electric Co., Cleveland, Ohio	15
Martins Instrument Co., Inc., Brooklyn, N. Y.	42
Mason Radio Products Co., Kingston, N. Y.	31
Mastercraft Plastics Co., Inc., Jamaica, N. Y.	28
Master Vibrator Co., Dayton, Ohio	23
Mattern Mfg. Co., F., Chicago, Ill.	13
Matthews & Co., James H., Chicago, Ill	19
Mayer Mfg. Corp., Brooklyn, N. Y.	5
Mayfair Molded Products Corp., Chicago, Ill.	28
MB Mfg. Co., Inc., East Haven, Conn.	20
Measurements Corp., Boonton, N. J.	18
Mecanitron Corp., Boston, Mass.	32
Meck Industries, Inc., John, Plymouth, Ind.	35
Mec-Rad Div., Black Industries, Cleveland, Ohio	1
Medco Mfg. Co., New York, N. Y.	31
Megard Corp., Los Angeles, Calif.	1
Meissner Mfg. Div., Maguire Industries, Inc., Mt. Carmel, Ill.	7
Meletron Corp., Los Angeles, Calif.	37
Mellaphone Corp., Rochester, N. Y.	3
Melody Record Supply Inc., New York, N. Y.	32
Melrath Supply & Gasket Co., Philadelphia, Pa.	16
Mendelsohn Speedgun Co., Bloomfield, N. J.	1
Mepham Corp., Geo. S., E. St. Louis, Ill.	21
Merck & Co. Inc., Rahway, N. J.	25
Mercoid Corp., Chicago, Ill.	12
Mercury Recording Studio, Chicago, Ill.	33
Merit Coil & Transformer Corp., Chicago, Ill.	38
Merit Short Wave Diathermy Co., Los Angeles, Calif.	13
Metal Textile Corp., W. Orange, N. J.	21
Metallic Arts Co., Cambridge, Mass.	5
Metaplast Co., New York, N. Y.	28
Meters, Inc., Indianapolis, Ind.	20
Metron Instrument Co., Denver, Colo.	20
Metropolitan Recording Studios, New York, N. Y.	33
Metsch Refractories Co., E. Liverpool, Ohio	17
Mettler Co., Lee B., Los Angeles, Calif.	12
Meyercord Co., Chicago, Ill.	10
Meyers Safety Switch Co., Inc., San Francisco, Calif.	37
Mica Insulator Co., New York, N. Y.	17
Micamold Radio Corp., Brooklyn, N. Y.	6
Mica Products Mfg. Co., New York, N. Y.	6
Micarta Fabricators, Inc., Chicago, Ill.	8
Michigan Fluorescent Light Co., Pontiac, Mich.	6
Micro Instrument Co., Cambridge, Mass.	20
Micro-Ferrocart Div., Maguire Industries, Inc., Stamford, Conn.	21
Micro Switch Div., First Industrial Corp., Freeport, Ill.	37
Midland Mfg. Co., Decorah, Iowa	31
Midland Paint & Varnish Co., Cleveland, Ohio	25
Midwest Radio Corp., Cincinnati, Ohio	31
Mid-West Screw Products Co., St. Louis, Mo.	21
Miessner Inventions, Inc., Morristown, N. J.	35
Miles Reproducer Co., Inc., New York, N. Y.	22
Milford Rivet & Machine Co., Milford, Conn.	16
Millen Mfg. Co., Inc., James, Malden, Mass.	39
Miller Co., B. F., Trenton, N. J.	38
Miller Co., J. W., Los Angeles, Calif.	24
Miller Corp., Wm., Pasadena, Calif.	13
Miller Electric Co., Pawtucket, R. I.	42
Miller Electro-Research Laboratories, Milwaukee, Wisc.	34
Miller Mfg. Co., M. A., Chicago, Ill.	20
Mills Corp., Elmer E., Chicago, Ill.	28
Milprint, Inc., Milwaukee, Wisc.	6
Milwaukee Resistor Co., Milwaukee, Wisc.	34
Milwaukee Stamping Co., Milwaukee, Wisc.	33
Minerva Corp. of America, New York, N. Y.	31
Mines Equipment Co., St. Louis, Mo.	16
Miniature Precision Bearings, Keene, N. H.	21
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.	12
Minneapolis Mining & Mfg. Co., St. Paul, Minn.	17
Mirror Record Corp., New York, N. Y.	32
Mitchell-Rand Insulation Co., New York, N. Y.	17
Mogey & Sons, Inc., William, Plainfield, N. J.	18
Mohawk Electric Mfg. Co., Irvington, N. J.	3
Moisture Register Co., Alhambra, Calif.	13
Molded Insulation Co., Philadelphia, Pa.	28
Moloney Electric Co., St. Louis, Mo.	38
Monarch Mfg. Co., Chicago, Ill.	8
Monark Battery Co., Inc., Chicago, Ill.	4
Monitor Controller Co., Baltimore, Md.	23
Monitor Piezo Products Co., S. Pasadena, Calif.	9
Monowatt Electric Corp., Providence, R. I.	9
Monroe Coil Co., Chicago, Ill.	8
Monsanto Chemical Co., Springfield, Mass.	27
Montgomery Bros., Chicago, Ill.	19
Montgomery Co., Windsor Locks, Conn.	42
Mooradian High Frequency Laboratories, Bogota, N. J.	13
Morey Machinery Co., Inc., Astoria, N. Y.	19
Morse Co., Frank W., Boston, Mass.	16
Morse Twist Drill & Machine Co., New Bedford, Mass.	15
Mossman Inc., Donald P., Chicago, Ill.	37
Moulic Specialties Co., Bloomington, Ill.	12
Mueller Electric Co., Cleveland, Ohio	1
Multi Electrical Mfg. Co., Chicago, Ill.	16
Municipal Instrument Co., Berwyn, Ill.	32
Munsell & Co., Eugene, New York, N. Y.	17
Murdock Co., Wm. J., Chelsea, Mass.	36
Murphy Finishes Corp., Newark, N. J.	25
Musette Publishers, Inc., New York, N. Y.	33
Music Master Radio Corp., Hartford, Conn.	31
Music Sound Track Service Inc., New York, N. Y.	33
Musical Arts Recording Studios Inc., New York, N. Y.	33
Musicraft Corp., New York, N. Y.	33
Mu-Switch Corp., Canton, Mass.	37
Mute, Co., Chicago, Ill.	38
Mutual Recording Co., Los Angeles, Calif.	33
Muzak Corp., New York, N. Y.	33
Muzak Transcriptions, Inc., Chicago, Ill.	33
Mycalex Corp. of America, Clifton, N. J.	17
Myer & Sons, E. A., Pittsburgh, Pa.	35
M. & Z. Industrial Development Co., Bayonne, N. J.	1

N

COMPANY	CLASSIFICATION
National Battery Co., St. Paul, Minn.	4
National Broadcasting Co., Inc., Los Angeles, Calif.	33
National Broadcasting Co., Inc., Chicago, Ill.	33
National Carbon Co., Inc., New York, N. Y.	4
National Ceramic Co., Trenton, N. J.	17
National Company, Inc., Malden, Mass.	37
National Die Casting Co., Chicago, Ill.	21
National Electric Controller Co., Chicago, Ill.	34
National Electronic Mfg. Co., Long Island City, N. Y.	9
National Fabricated Products Co., Chicago, Ill.	28
National Gasket & Washer Mfg. Co., New York, N. Y.	16
National Instrument Co., Newtonville, Mass.	20
National Inter-Communicating Systems, Chicago, Ill.	35
National Lock Co., Rockford, Ill	16
National Lock Washer Co., Newark, N. J.	16
National Molding Co., Los Angeles, Calif.	28
National Moldite Co., Hillside, N. H.	21
National Porcelain Co., Trenton, N. J.	17
National Recording & Film Corp., Chicago, Ill.	33
National Records Co., New York, N. Y.	33
National Research Corp., Boston, Mass.	20
National Scientific Products Co., Chicago, Ill.	9
National Screw & Mfg. Co., Cleveland, Ohio	16
National Tile & Mfg. Co., Anderson, Ind.	17
National Union Radio Corp., Newark, N. J.	40
National Varnished Products Corp., Woodbridge, N. J.	17
National Vocarium, New York, N. Y.	33
National Vulcanized Fibre Co., Wilmington, Dela.	17
Naxon Utilities Corp., Chicago, Ill.	37
Neevel Mfg. Co., Kansas City, Mo.	5
Nelson Automatic Gauge Co., Tulsa, Okla.	12
Newark Transformer Co., Newark, N. J.	38
New Britain Spring Co., New Britain, Conn.	16
Newcomb Audio Products Co., Los Angeles, Calif.	22
New England Electrical Works, Inc., Lisbon, N. H.	10
New England Etching & Plating Co., Holyoke, Mass.	5
New England Mica Co., Waltham, Mass.	17
New England Radiocrafters, Boston, Mass.	1
New England Screw Co., Keene, N. H.	32
New Haven Clock Co., New Haven, Conn.	37
New Jersey Jewelers Supply, Newark, N. J.	19
New Jersey Machine Corp., Hoboken, N. J.	19
Newman X-Ray Corp., Aurora, Ill.	13
New Method Steel Stamps, Inc., Detroit, Mich.	19
New Wrinkle, Inc., Dayton, Ohio	25
New York Blower Co., Chicago, Ill.	19
New York Solder Co., New York, N. Y.	15
New York Transformer Co., New York, N. Y.	38
Ney Co., J. M., Hartford, Conn.	16
Niagara Electrical Instrument Co., Buffalo, N. Y.	20
Niagara Insul-Bake Specialty Co., Inc., Albany, N. Y.	28
Nilsson Electrical Laboratory, Inc., New York, N. Y.	20
Nixon Nitration Works, Nixon, N. J.	27
Noblitt Sparks Industries, Inc., Columbus, Ind.	31
Nola Studios, New York, N. Y.	33
Noma Electric Corp., New York, N. Y.	6
Nonotuck Mfg. Co., Holyoke, Mass.	42
North American Electric Lamp Co., St. Louis, Mo.	13
North American Philips Co., New York, N. Y.	7
Northam Warren Corp., Stamford, Conn.	16
Northeastern Plastics, Boston, Mass.	28
North Electric Mfg. Co., Galion, Ohio	3
Northern Communications Mfg. Co., New York, N. Y.	1
Northern Electric Co., Chicago, Ill.	42
Northern Industrial Chemical Co., S. Boston, Mass.	28
Northern Laboratories, Ltd., Long Island City, N. Y.	18
Northern Mfg. Co., Inc., Newark, N. J.	40
Northern Radio Co., Seattle Wash.	31
Northwest Syndicate, Inc., Tacoma, Wash.	13
Northwestern Clock Co., Omaha, Nebr.	37
Norton Co., Worcester, Mass.	17
Norton Electrical Instrument Co., Manchester, Conn.	20
Norton Laboratories, Inc., Lockport, N. Y.	10
Nothelfer Winding Laboratories, Trenton, N. J.	38
Numberall Stamp & Tool Co., Staten Island, N. Y.	19
Nurnberg Thermometer Co., Inc., Cambridge, Mass.	12

O

COMPANY	CLASSIFICATION
Oakite Products, Inc., New York, N. Y.	25
Oak Mfg. Co., Chicago, Ill.	2
Ocram Corp., Seneca Falls, N. Y.	38
O'Donnell & Sons, J. P., Boston, Mass.	6
Offner Electronics Inc., Chicago, Ill.	12
Ogush, Inc., Wm. B., New York, N. Y.	9
Ohio Carbon Co., Cleveland, Ohio	34
Ohio Crankshaft Co., Cleveland, Ohio	13
Ohio Electric Mfg. Co., Cleveland, Ohio	23
Ohmite Mfg. Co., Chicago, Ill.	1
Oiljak Mfg. Co., Inc., Montclair, N. J.	21
O. K. Machine Co., Fort Wayne, Ind.	19
Okonite Co., Passaic, N. J.	17
Olek & Son, Inc., A., Philadelphia, Pa.	36
Olympic Tool & Mfg. Co., Inc., New York, N. Y.	5
Onan & Sons, D. W., Minneapolis, Minn.	3
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.	19
Operadio Mfg. Co., St. Charles, Ill.	12
Orange Screen Co., Maplewood, N. J.	21
Oris Mfg. Co., Inc., Thomaston, Conn.	28
Osborne Transformer Corp., Detroit, Mich.	38
Oscap Mfg. Co., Inc., Baltimore, Md.	21
Oster Mfg. Co., John, Racine, Wisc.	23
Otarion, Inc., Chicago, Ill.	35
Owens-Corning Fiberglas Corp., Toledo, Ohio	17
Oxford Tartak Radio Corp., Chicago, Ill.	36
Ozalid Products Div., General Aniline & Film Corp., Johnson City, N. Y.	11

P

COMPANY	CLASSIFICATION
Pacific Clay Products, Los Angeles, Calif.	17
Pacific Electronics, Spokane, Wash.	18
Pacific Radio Crystal Co., San Francisco, Calif.	9
Pacific Sound Equipment Co., Los Angeles, Calif.	23
Packard-Bell Co., Los Angeles, Calif.	31
Packard Electric Div. General Motors Corp., Warren, Ohio	42
Packard Mfg. Corp., Indianapolis, Ind.	31
Paisley Products, Inc., Chicago, Ill.	25
Palnut Co., Irvington, N. J.	16

COMPANY	CLASSIFICATION
Pan American Electric Co., Inc., New York, N. Y.	31
Pan Electronics Laboratories, Inc., Atlanta, Ga.	9
Panoramic Radio Corp., New York, N. Y.	18
Paper Mfrs. Co., Philadelphia, Pa.	17
Paragon Electric Co., Chicago, Ill.	37
Paraloy Co., Chicago, Ill.	21
Paramount Electric Mfg. Co., San Francisco, Calif.	37
Paramount Paper Tube Co., Fort Wayne, Ind.	17
Paramount Radio Mfg. Co., Oakland, Calif.	5
Paramount Radio Sales & Service, New York, N. Y	33
Parisian Novelty Co., Chicago, Ill.	17
Park Metalware Co., Inc., Orchard Park, N. Y.	15
Parker Engineering Products Co., New York, N. Y.	18
Parker-Kalon Corp., New York, N. Y.	15
Par Metal Products Co., Long Island City, N. Y.	5
Partlow Corp., New Hartford, N. Y.	20
Pass & Seymour, Inc., Syracuse, N. Y.	17
Patent Button Co., Waterbury, Conn.	28
Patrick's Industries, Ferndale, Mich.	32
Patterson Screen Div., duPont de Nemours & Co., E. I., Towanda, Pa.	25
Patton-MacGuyer Co., Providence, R. I.	16
Paul & Beekman Div., Portable Products Corp., Philadelphia, Pa.	5
Paulsen-Webber Cordage Corp., New York, N. Y.	31
Pawtucket Screw Co., Pawtucket, R. I.	16
Peck & Harvey, Chicago, Ill.	11
Peck Spring Co., Plainville, Conn.	16
Peerless Electrical Products Co., Los Angeles, Calif.	18
Peerless Laboratories, New York, N. Y.	37
Peerless Roll Leaf Co., Inc., Union City, N. J.	19
Pemco Corp., Baltimore, Md.	17
Penn Engineering & Mfg. Corp., Doylestown, Pa.	16
Penn Fibre & Specialty Co., Philadelphia, Pa.	17
Pennsylvania Coal Products Co., Petrolia, Pa.	25
Penn-Union Electric Corp., Erie, Pa.	16
Perkin-Elmer Corp., Glenbrook, Conn.	18
Permo, Inc., Chicago, Ill.	20
Permoflux Corp., Chicago, Ill.	22
Personal Recording Studios, New York, N. Y.	33
Peterson Radio Co., Council Bluffs, Iowa	9
Pfanstiehl Chemical Co., Waukegan, Ill.	33
Phelon, Co., R. E., W. Springfield, Mass.	20
Phelps-Dodge Copper Products Corp., New York, N. Y.	21
Pheoll Mfg. Co., Chicago, Ill.	16
Philadelphia Rust Roof Co., Philadelphia, Pa.	21
Philadelphia Thermometer Co., Philadelphia, Pa.	37
Philco Corp., Philadelphia, Pa.	31
Philharmonic Radio Corp., New York, N. Y.	31
Phillips Control Corp., Chicago, Ill.	37
Phillips Process Co., Inc., Rochester, N. Y.	25
Philson Mfg. Co., Inc., New York, N. Y.	1
Phonograph Needle Mfg. Co., Inc., Providence, R. I.	33
Phono-Rec. Mfg. Inc., New York, N. Y.	33
Photoswitch, Inc., Cambridge, Mass.	12
Photovolt Corp., New York, N. Y.	12
Photox Silk Screen Supply Co., New York, N. Y.	10
Physicists Research Co., Ann Arbor, Mich.	18
Picker X-Ray Corp., New York, N. Y.	13
Pierce Laboratory, Inc., Summit, N. J.	17
Piezo Electric Products Co., Baltimore, Md.	9
Piezo Mfg. Corp., New York, N. Y.	16
Pilot Industries, Inc., New York, N. Y.	2
Pilot Radio Corp., Long Island City, N. Y.	31
Pioneer Asphalt Co., Chicago, Ill.	25
Pioneer Gen-E-Motor Corp., Chicago, Ill.	3
Pioneer Specialty Co., Detroit, Mich.	1
Pitometer Log Corp., New York, N. Y.	31
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.	18
Plaskon Div., Libbey-Owens Ford Glass Co., Toledo, Ohio	25
Plastex Corp., Columbus, Ohio	28
Plastic Accessories, Inc., New York, N. Y.	8
Plastic Fabricators Co., San Francisco, Calif.	10
Plastic Manufacturers, Inc., Stamford, Conn.	28
Plastic Metals, Inc., Johnstown, Pa.	21
Plasticraft Products Co., New York, N. Y.	28
Plastic Wire & Cable Corp., Norwich, Conn.	42
Plastoid Corp., New York, N. Y.	42
Plating Processes Corp., Holyoke, Mass.	17
Plax Corp., Hartford, Conn.	17
Plume & Atwood Mfg. Co., Waterbury, Conn.	16
Plymold Corp., Lawrence, Mass.	28
Poinsettia, Inc., Pitman, N. J.	33
Point Mfg. Co., Chicago, Ill.	3
Polk Electronics, New York, N. Y.	13
Pollak Mfg. Co., Arlington, N. J.	21
Polymet Condenser Co., New York, N. Y.	6
Polytron Corp., New York, N. Y.	12
Porcelain Products, Inc., Findlay, Ohio	17
Portable Products Corp., Tagliabue Div., C. J., Brooklyn, N. Y.	12
Porter Metal Products, Brooklyn, N. Y.	5
Ports Mfg. Co., Fresno, Calif.	10
Post Co., Frederick, Chicago, Ill.	11
Potter Co., N. Chicago, Ill.	6
Potter Instrument Co., Flushing, N. Y.	12
Potter & Brumfield Mfg. Co., Inc., Princeton, Ind.	26
Powers Electronic Communication Co., Glen Cove, N. Y.	12
Powers Regulator Co., Chicago, Ill.	20
Pratt & Lambert, Inc., Buffalo, N. Y.	25
Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn.	15
Precise Development Parts Co., Chicago, Ill.	33
Precimet Laboratories, New York, N. Y.	21
Precision Apparatus Co., Elmhurst, N. Y.	18
Precision Electronics Co., Newtonville, Mass.	12
Precision Paper Tube Co., Chicago, Ill.	17
Precision Parts Co., Ann Arbor, Mich.	1
Precision Piezo Service, Baton Rouge, La.	9
Precision Products Co., Waltham, Mass.	20
Precision Radio Co., Los Angeles, Calif.	16
Precision Recording Co., Los Angeles, Calif.	33
Precision Resistor Co., Newark, N. J.	34
Precision Scientific Co., Chicago, Ill.	18
Precision Specialties, Los Angeles, Calif.	31
Precision-Thermometer & Instrument Co., Philadelphia, Pa.	12
Precision Tube Co., Philadelphia, Pa.	21
Preis Engraving Machine Co., H. P., Newark, N. J.	19
Premax Products Div., Chisholm Ryder Co., Inc., Niagara Falls, N. Y.	1
Premier Crystal Laboratories Inc., New York, N. Y.	7
Premier Metal Etching Co., Long Island, N. Y.	5
Press Wireless, Inc., New York, N. Y.	39
Presto Electric Co., Union City, N. J.	34
Presto Recording Corp., New York, N. Y.	32
Prestole Div., Detroit Harvester Co., Toledo, Ohio	16
Prest-O-Lite Battery Co., Inc., Indianapolis, Ind.	4
Price Electric Corp., Frederick, Md.	37
Printloid, Inc., New York, N. Y.	17
Process & Instruments, Brooklyn, N. Y.	12
Production Devices, Inc., Whitehall, N. Y.	19
Production Engineering Corp., Passaic, N. J.	19
Production Instrument Co., Chicago, Ill.	12
Professional Tool & Engineering Co., Chicago, Ill.	12
Progressive Mfg. Co., Torrington, Conn.	16
Progressive Welder Co., Detroit, Mich.	12
Protectoseal Co., Chicago, Ill.	25
Publix Metal Products, Inc., New York, N. Y.	1
Purves Mfg. Co., Indianapolis, Ind.	5
Pyle National Co., Chicago, Ill.	16
Pyramid Products Co., Chicago, Ill.	15
Pyroferric Co, New York, N. Y.	21
Pyrometer Instrument Co., New York, N. Y.	12

Q

COMPANY	CLASSIFICATION
Quad Mfg. Co., Chicago, Ill.	8
Quadriga Mfg. Co., Chicago, Ill.	36
Quaker City Gear Works, Philadelphia, Pa.	16
Quality Hardware & Machine Corp., Chicago, Ill.	19
Quality Industries, Chicago, Ill.	31
Quam-Nichols Co., Chicago, Ill.	36
Quartz Laboratories, Inc., Kansas City, Mo.	9

R

COMPANY	CLASSIFICATION
Racon Electric Co., Inc., New York, N. Y.	22
Radell Corp., Indianapolis, Ind.	36
Radex Corp., Chicago, Ill.	7
Radiad Service, Chicago, Ill.	5
Radiant Lamp Corp., Newark, N. J.	26
Radiart Corp., Cleveland, Ohio	29
Radio City Products Co., New York, N. Y.	20
Radio Condenser Co., Camden, N. J.	7
Radio Corp. of America, Tube Div., Harrison, N. J.	40
Radio Craftsmen, Chicago, Ill.	1
Radio Engineering Laboratories, Inc., Long Island City, N. Y.	39
Radio Frequency Laboratories, Inc., Boonton, N. J.	12
Radio Laboratories, Inc., Seattle, Wash.	39
Radio Mfg. Engineers, Inc., Peoria, Ill.	31
Radiomarine Corp. of America, New York, N. Y.	31
Radio Merchandise Sales, New York, N. Y.	5
Radio Navigational Instrument Corp., New York, N. Y.	31
Radio Process Co., Los Angeles, Calif.	31
Radio Receptor Co., Inc., New York, N. Y.	39
Radio Recorders, Inc., Los Angeles, Calif.	33
Radio Recording Studio, New York, N. Y.	33
Radio Speakers, Inc., Chicago, Ill.	36
Radio Specialty Mfg. Co., Portland, Ore.	39
Radiotechnic Laboratory, Evanston, Ill.	20
Radio Television Institute, Inc., New York, N. Y.	18
Radio Transceiver Laboratories, Richmond Hill, N. Y.	20
Radionic Controls, Chicago, Ill.	38
Radionic Transformer Co., Chicago, Ill.	38
Rahm Instruments, Inc., New York, N. Y.	13
Rajah Co., Bloomfield, N. J.	16
Rapid Electroplating Process, Inc., Chicago, Ill.	15
Rascher & Betzold, Inc., Chicago, Ill.	20
Ra-Tron Corp., Boston, Mass.	5
Rattan Mfg. Co., New Haven, Conn.	16
Rauland Corp., Chicago, Ill.	22
Rawson Electrical Instrument Co., Cambridge, Mass.	20
Ray Energy Radio & Television Corp., New York, N. Y.	31
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.	16
Ray-O-Vac Co., Madison, Wisc.	4
Raytheon Mfg. Co., Chicago, Ill.	39
Raytheon Mfg. Co., Newton, Mass.	38
Raytron, Inc., Jackson, Mich.	18
R-B-M Mfg. Co., Div. Essex Wire Corp., Logansport, Ind.	37
RCA Victor Div., Radio Corp. of America, Camden, N. J.	31
RCA Victor Recording Studio, New York, N. Y.	33
Reading Screw Co., Norristown, Pa.	16
Readrite Meter Works, Bluffton, Ohio	20
Ready Power Co., Detroit, Mich.	23
Rea Magnet Wire Co. Inc., Fort Wayne, Ind.	42
R.E.C. Mfg. Corp., Holliston, Mass.	28
Recordisc Corp., New York, N. Y.	32
Recordit Co., St. Louis, Mo.	32
Record-O-Shers Recording Studios, Los Angeles, Calif.	33
Record-O-Vox, Inc., Hollywood, Calif.	31
Recoton Corp., New York, N. Y.	32
Rectifier Engineering Co., Los Angeles, Calif.	3
Red Arrow Electric Corp., Irvington, N. J.	38
Redi-Rack Corp., New York, N. Y.	5
Redmond Co., A. G., Owosso, Mich.	23
Reeder, J. L. Milwaukee, Wisc.	16
Reeves Sound Labs., Div. Reeves-Ely Laboratories, Inc., New York, N. Y.	12
Reeves Sound Studios, Inc., New York, N. Y.	33
Regal Electronics Corp., New York, N. Y.	35
Rehtron Corp., Chicago, Ill.	12
Reichhold Chemicals, Inc., Detroit, Mich	25
Reilly Tar & Chemical Corp., Indianapolis, Ind.	25
Reimers Electric Appliance Co., Inc., W. New York, N. J.	34
Reiner Electronics Co., Inc., New York, N. Y.	18
Rek-O-Kut Company, New York, N. Y.	32
Reliable Spring & Wire Forms Co., Cleveland, Ohio	41
Reliance Automatic Lighting Co., Racine, Wisc.	37
Reliance Electric & Engineering Co., Cleveland, Ohio	12
Reliance Pencil Co., Mt. Vernon, N. Y.	11
Remler Company Ltd., San Francisco, Calif.	37
Republic Steel Corp., Cleveland, Ohio	21
Resistoflex Corp., Belleville, N. J.	27
Revco Inc., Deerfield, Mich.	18
Revere Copper & Brass Inc., New York, N. Y.	21
Rex Products Co., Chicago, Ill.	31
Rex Rheostat Co., Baldwin, N. Y.	34
Reynolds Electric Co., Chicago, Ill.	37
Reynolds Metals Co., Louisville, Ky.	21
Rhode Island Insulated Wire Co., Cranston, R. I.	42
Rhodes, Inc., M. H., Hartford, Conn.	12
Rhodes Mfg. Co., Chicago, Ill.	10
Rice's Sons, Bernard, New York, N. Y.	28
Richards Co., Inc., Arklay S., Newton Highlands, Mass.	20
Richardson-Allen Corp., New York, N. Y.	34
Richardson Co., Melrose Park, Ill.	17
Richmont, Inc., Los Angeles, Calif.	15
Riggs & Jeffreys, Inc., Newark, N. J.	12
Rittenhouse Co., A. E., Honeoye Falls, N. Y.	38
Ritter Co., Inc., Rochester, N. Y.	13
Riverbank Laboratories, Geneva, Ill.	20
Riverside Metal Co., Riverside, N. J.	21
R-9 Crystal Co., Inc., Pittsburgh, Pa.	10
Robinette Co., W. C., S. Pasadena, Calif.	12
Robinson Aviation Inc., Teterboro, N. J.	16
Robinson-Houchin Optical Co., Columbus, Ohio	18
Robson-Burgess Co., Omaha, Nebr.	20
Rockbestos Products Corp., New Haven, Conn.	42
Rockhill Radio, Inc., New York, N. Y.	33
Rock-Ola Mfg. Corp., Chicago, Ill.	31
Roebling's Sons Co., John A., Trenton, N. J.	42
Rogan Bros., Chicago, Ill.	17
Rogers Corp., Manchester, Conn.	17
Rogers Diesel & Aircraft Corp., New York, N. Y.	23
Rogers Precision Products Co., New York, N. Y.	37
Rohden Mfg. Co., Chicago, Ill.	28
Rohm & Haas Co., Philadelphia, Pa.	17
Rola Co., Inc., Cleveland, Ohio	36
Roller-Smith Div., Realty & Industrial Corp., Bethlehem, Pa.	37
Rome Cable Corp, Rome, N. Y.	42
Ross Mfg. Co., Chicago, Ill	9
Rothenstein, Albert, New York, N. Y.	6
Rowe Radio Research Laboratory Co., Chicago, Ill.	12
Roxalin Flexible Finishes, Inc., Elizabeth, N. J.	25
Royal Electric Co., Inc., Pawtucket, R. I.	42
Royal Moulding Co., Providence, R. I.	28
Ruberoid Co., New York, N. Y.	17
Rubicon Co., Philadelphia, Pa.	12
Ruby Chemical Co., Columbus, Ohio	15
Ruby Electric Co., New York, N. Y.	23
Runzel Cord & Wire Co., Chicago, Ill.	42
Rupp's Assembling & Mfg. Works, Chicago, Ill.	42
Rusgreen Mfg. Co., Detroit, Mich.	21
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.	16
Russell Electric Co., Chicago, Ill.	23
Russell & Stoll Co., New York, N. Y.	16
Rustless Iron & Steel Corp., Baltimore, Md.	21

S

COMPANY	CLASSIFICATION
Safety Electric Co., Chicago, Ill.	13
St. George Recording Equipment Corp., New York, N. Y.	32

COMPANY	CLASSIFICATION
St. John X-Ray Service, Inc., Long Island City, N. Y.	13
St. Regis Paper Co., New York, N. Y.	17
Sanborn Co., Cambridge, Mass.	13
Sandee Mfg. Co., Chicago, Ill.	28
Sanders Bros. Mfg Co., Ottawa, Ill.	5
Sandwick Associates, L. M., Chicago, Ill.	33
Sangamo Electric Co., Springfield, Ill.	6
Santay Corp., Chicago, Ill	17
Sarco Co., Inc., New York, N. Y.	12
Sargent Co., E. M., Oakland, Calif.	31
Sauereisen Cements Co., Pittsburgh, Pa.	25
Savlion Laboratories, Inc., Newark, N. J.	41
Sav-Way Industries, Detroit, Mich.	18
Saxl Instruments Co., E. Providence, R. I.	20
Saxonburg Potteries, Saxonburg, Pa.	17
Schaar & Co., Chicago, Ill.	25
Schauer Machine Co., Cincinnati, Ohio	19
Scherr Co. Inc., George, New York, N. Y.	15
Schirmer Inc., G., New York, N. Y.	33
Schloss Bros., Bronx, N. Y.	5
Schott Co., Walter L., Beverly Hills, Calif.	36
Schulmerich Electronics, Inc., Sellersville, Pa.	35
Schutting & Co., Washington, D. C.	39
Schweitzer Paper Co., New York, N. Y.	17
Sciaky Bros., Chicago, Ill.	19
Scientific Radio Products Co., Council Bluffs, Iowa	9
Scientific Service Laboratories, Los Angeles, Calif.	18
Scophony Corp. of America, New York, N. Y.	31
"S" Corrugated Quenched Gap Co., Garfield, N. J.	13
Scott Radio Laboratories, Inc., E. H., Chicago, Ill.	32
Scoville Mfg. Co., Waterbury, Conn.	16
Scoville Mfg. Co., Waterville, Conn.	32
Scranton Record Co., Scranton, Pa.	33
Screenmakers, Inc., New York, N. Y.	10
Scully Machine Co., Bridgeport, Conn.	32
Sealol Corp., Providence, R. I.	16
Searle Aero Industries, Inc., Orange, Calif.	7
Security Steel Equipment Co., Avenel, N. J.	5
Seeburg Corp., J. P., Chicago, Ill.	32
Seeco Records, Inc., New York, N. Y.	33
Selectar Mfg. Corp., Long Island City, N. Y.	16
Select-O-Phone Co., Providence, R. I.	35
Selectograph Mfg. Co., Colorado Springs, Colo.	35
Selenium Corp. of America, Los Angeles, Calif.	3
Self Winding Clock Co., Brooklyn, N. Y.	2
Senn Corp., New Augusta, Ind.	20
Sensitive Research Instrument Co., Mt. Vernon, N. Y.	20
Sentinel Radio Corp., Evanston, Ill.	31
Setchell Carlson, Inc., St. Paul, Minn.	31
Seva Record Corp., New York, N. Y.	33
Sexton Can Co. Inc., Everett, Mass.	19
Shakeproof Inc., Chicago, Ill.	16
Shakespeare Products Co., Kalamazoo, Mich.	1
Shallcross Mfg. Co., Collingdale, Pa.	18
Shawinigan Products Corp., New York, N. Y.	27
Sheldon Electric Co., Inc., Irvington, N. J.	3
Sheridan Electronics Corp., Chicago, Ill.	33
Sherman Mfg. Co., H. B., Battle Creek, Mich.	16
Sherron Electronics Co., Brooklyn, N. Y.	12
Sherwin Williams Co., Cleveland, Ohio	25
Shur-Antenna-Mount, Inc., Sea Cliff, N. Y.	1
Shure Bros., Chicago, Ill.	38
Sickles Co., F. W., Chicopee, Mass.	6
Sigma Instruments, Inc., Boston, Mass.	37
Signal Electric Mfg. Co., Menominee, Mich.	23
Signal Electronics, Inc., New York, N. Y.	31
Signal Engineering & Mfg. Co., New York, N. Y.	37
Signal Indicator Corp., New York, N. Y.	10
Silk Screen Supplies, Inc., Brooklyn, N. Y.	10
Sillcocks-Miller Co., S. Orange, N. J.	28
Silver Co., McMurdo, Hartford, Conn.	7
Simmonds Aerocessories, Inc., New York, N. Y.	20
Simmonds Saw & Steel Co., Lockport, N. Y.	21
Simmons Fastener Corp., Albany, N. Y.	16
Simonds Machine Co., Inc., Southbridge, Mass.	15
Simplex Wire & Cable Co., Cambridge, Mass.	42
Simpson Electric Co., Chicago, Ill.	20
Simpson Mfg. Co., Mark, New York, N. Y.	35
Sipp-Eastwood Corp., Paterson, N. J.	18
Sittler Mfg. Corp., Chicago, Ill.	19
Sitton Transformer Corp., Atlanta, Ga.	38
Skydyne, Inc., Port Jervis, N. Y.	18
Skyway Precision Tool Co., Los Angeles, Calif.	15
Slater Corp., N. G., New York, N. Y.	10
Slater Electric & Mfg. Co., Brooklyn, N. Y.	40
Small Motors, Inc., Chicago, Ill.	2
Smith Mfg. Co., F. A., Rochester, N. Y.	2
Smith Mfg. Co., Nathan R., S. Pasadena, Calif.	12
Smith-Meeker Engineering Co., New York, N. Y.	39
Snyder Mfg. Co., Philadelphia, Pa.	1
Sola Electric Co., Chicago, Ill.	32
Solar Mfg. Corp., New York, N. Y.	6
Sonart Record Corp., New York, N. Y.	33
Sonata Products Co., Chicago, Ill.	22
Songcraft, Inc., New York, N. Y.	33
Sonora Products, Inc., Chicago, Ill.	33
Sonora Radio & Television Corp., Chicago, Ill.	31
Sonotone Corp., Elmsford, N. Y.	36
Sonatone Corp., New York, N. Y.	31
Sorensen & Co., Inc., Stamford, Conn.	2
Sorgel Electric Co., Milwaukee, Wisc.	3
Sorkin Music Co., New York, N. Y.	33
S.O.S. Cinema Supply Co., New York, N. Y.	18
Sound Apparatus Co., New York, N. Y.	20
Sound Devices Co., Inc., New York, N. Y.	32
Sound Equipment Corp., Glendale, Calif.	35
Sound-on-Film Recording Studios, New York, N. Y.	33
SoundScriber Corp., New Haven, Conn.	32
Sound Workshop, Los Angeles, Calif.	33
Southern Mica Co., Johnson City, Tenn.	17
Southington Hardware Mfg. Co., Southington, Conn.	16
Souvenir Recording Studio, Los Angeles, Calif.	33
Spanish Sound Studios, New York, N. Y.	33
Sparkes Mfg. Co., Ltd., Newark, N. J.	33
Sparkes Mfg. Co., Ltd., Newark, N. J.	5
Sparks-Withington Co., Jackson, Mich.	31
Spaulding Fibre Co., Inc., Tonawanda, N. Y.	17
Speak-O-Phone Recording & Equipment Co., New York, N. Y.	32
Special Chemicals Co., New York, N. Y.	25
Special Chemicals Co., Cleveland, Ohio	25
Special Electric Labs., Los Angeles, Calif.	42
Special Machine Tool Engineering Works, New York, N. Y.	19
Special Products Co., Silver Spring, Md.	7
Speedway Mfg. Co., Cicero, Ill.	15
Speer Carbon Co., St. Marys, Pa.	21
Speer Resistor Corp., St. Marys, Pa.	34
Spencer Cardinal Corp., Marion, Ind.	5
Spencer Thermostat Co., Attleboro, Mass.	37
Spencer Wire Co., W. Brookfield, Mass.	42
Sperman Metal Specialties, Brooklyn, N. Y.	21
Sperry Gyroscope Co., Inc., Great Neck, N. Y.	40
Sperry Products, Inc., Hoboken, N. J.	13
Spertl, Inc., Cincinnati, Ohio	40
Spirling Products Co., New York, N. Y.	1
Spot Film Productions, Inc., New York, N. Y.	33
Sponge Rubber Products Co., Shelton, Conn.	17
Sprague Electric Co., North Adams, Mass.	6
Sprague Products Co., North Adams, Mass.	6
Square D Co., Detroit Mich.	17
Stackpole Carbon Co., St. Marys, Pa.	6
Stamford Metal Specialty Co., New York, N. Y.	16
Standard Arcturus Corp., Newark, N. J.	40
Standard Electric Time Co., Springfield, Mass.	20
Standard Electrical Products Co., Dayton, Ohio	37
Standard Electrical Tool Co., Cincinnati, Ohio	19
Standard Engineering Laboratories, Pasadena, Calif.	39
Standard Instruments Corp., New York, N. Y.	20
Standard Insulation Co., E. Rutherford, N. J.	17
Standard Locknut & Lockwasher, Inc., Indianapolis, Ind.	16
Standard Machinery Co., Providence, R. I.	19
Standard Molding Corp., Dayton, Ohio	28
Standard Oil Co., (Indiana), Chicago, Ill.	25
Standard Phonograph Co., New York, N. Y.	33
Standard Piezo Co., Carlisle, Pa.	9
Standard Pressed Steel Co., Jenkintown, Pa.	16
Standard Products Co., Detroit, Mich.	10
Standard Radio, New York, N. Y.	33
Standard Radio, Los Angeles, Calif.	33
Standard Technical Devices, Inc., Brooklyn, N. Y.	28
Standard Transformer Corp., Chicago, Ill.	38
Standard Varnish Works, Staten Island, N. Y.	25
Standard Winding Co., Newburgh, N. Y.	8
Stanley Works, New Britain, Conn.	15
Stanwyck Winding Co., Newburgh, N. Y.	8
Star Electric Motor Co., Bloomfield, N. J.	23
Star Expansion Products Co., New York, N. Y.	15
Star Porcelain Co., Trenton, N. J.	17
Starr Piano Co., Los Angeles, Calif.	33
Starrett Co., L. S., Athol, Mass.	19
States Co., Hartford, Conn.	38
Sta-Warm Electric Co., Ravenna, Ohio	18
Stedman, Robert L., Oyster Bay, N. Y.	19
Steel Co., Herman D., Philadelphia, Pa.	20
Steger Furniture Mfg. Co., Steger, Ill.	5
Stephens Mfg. Co., Los Angeles, Calif.	35
Sterling Bolt Co., Chicago, Ill	16
Sterling Mfg. Co., Cleveland, Ohio	20
Sterling Record Co., New York, N. Y.	33
Stevens-Arnold Co., Inc., S. Boston, Mass.	13
Stevens Machinery Co., Chicago, Ill.	19
Stevens Walden, Inc., Worcester, Mass.	15
Stevenson Bros. & Co., Philadelphia, Pa.	25
Stevenson, Jordan & Harrison Inc., (Electronic Power Co.,) New York,	40
Steward Mfg. Co., D. M., Chattanooga, Tenn.	17
Stewart Mfg. Corp., F. W., Chicago, Ill.	14
Stewart Stamping Co, Yonkers, N. Y.	16
Stewart-Warner Alemite Corp., Chicago, Ill.	25
Sticht Co., Inc., Herman H., New York, N. Y.	20
Stimpson Co., Inc., Edwin B., Brooklyn, N. Y.	16
Stockwell Transformer Corp., Concord, N. H.	38
Stoddard Aircraft Radio Co., Hollywood, Calif.	2
Stoelting Co., C. H., Chicago, Ill.	13
Stokes Machine Co., F. J., Philadelphia, Pa.	19
Stokes Rubber Co., Joseph, Trenton, N. J.	27
Stover Lock Nut & Machinery Corp., New York, N. Y.	16
Stow Mfg. Co., Inc., Binghamton, N. Y.	14
Stricker-Brunhuber Co., New York, N. Y.	28
Stromberg-Carlson Co., Rochester, N. Y.	31
Struthers-Dunn, Inc., Philadelphia, Pa.	37
Studio & Artists Recorders, Los Angeles, Calif.	33
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.	17
Sturges Battery Co., Inc., New York, N. Y.	4
Sturtevant Co., B. F., Boston, Mass.	19
Submarine Signal Co., Boston, Mass.	30
Summerill Tubing Co., Bridgeport, Pa.	41
Sun Mfg. Co., Chicago, Ill.	20
Sun Shoe Mfg. Co., Chicago, Ill.	5
Sundt Engineering Co., Chicago, Ill.	37
Super Electric Products Corp., Jersey City, N. J.	38
Superior Carbon Products, Inc., Cleveland, Ohio	16
Superior Electric Co., Chicago, Ill.	23
Superior Electric Co., Bristol, Conn.	12
Superior Flake Graphite Co., Chicago, Ill.	21
Superior Flux Co., Cleveland, Ohio	15
Superior Instruments Co., New York, N. Y.	20
Superior Tube Co., Norristown, Pa.	41
Supreme Instruments Corp., Greenwood, Miss.	38
Suprenant Electrical Insulation Co., Boston, Mass.	42
Swain Nelson Co., Glenview, Ill.	38
Swanson Tool & Machine Products, Erie, Pa.	19
Swartzbaugh Mfg. Co., Toledo, Ohio.	21
Swedish Iron & Steel Corp., New York, N. Y.	21
Sweeco Wire Co., Winsted, Conn.	42
Sweum Studios, Los Angeles, Calif.	33
S-W Inductor Co., Chicago, Ill.	1
Swiss Jewell Co., Philadelphia, Pa.	20
Swivelier Co., New York, N. Y.	11
Sylvania Electronic Products, Inc., New York, N. Y.	40
Symphonic Radio & Electronic Corp., Cambridge, Mass.	31
Synchro-Start Products, Inc., Chicago, Ill.	12
Synthane Corp., Oaks, Pa.	17
Syracuse Ornamental Co., Syracuse, N. Y.	28

T

COMPANY	CLASSIFICATION
Takk Corp., Newark, Ohio	40
Tape Steel & Wire Div., American Chain & Cable Co., Inc., Bridgeport, Conn.	21
Talk-A-Phone Mfg. Co., Chicago, Ill.	35
Taller & Cooper, Brooklyn, N. Y.	37
Tar Heel Mica Co., Plumtree, N. Caro.	17
Task Electronics Co., New York, N. Y.	12
Tayburn Equipment Co., New York, N. Y.	31
Taylor Fibre Co., Norristown, Pa.	17
Taylor Tubes, Inc., Chicago, Ill.	40
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.	21
Taylor-Winfield Corp., Warren, Ohio.	19
Tech Art Plastics Co., Long Island City, N. Y.	28
Tech Laboratories, Jersey City, N. J.	18
Tech-Master Products Co., New York, N. Y.	31
Technic, Inc., Providence, R. I.	25
Technical Apparatus Co., Boston, Mass.	20
Technical Appliance Corp., New York, N. Y.	1
Technical Devices Corp., Roseland, N. J.	18
Technical Products Co., Memphis, Tenn.	37
Technical Radio Co., San Francisco, Calif.	1
Techno-Scientific Co., Yonkers, N. Y.	12
Techtmann Industries, Inc., Milwaukee, Wisc.	34
Tel-A-Recording, Inc., New York, N. Y.	33
TelAutograph Corp., New York, N. Y.	35
Telecon Condenser Co., Chicago, Ill.	6
Telefilm Inc., Los Angeles, Calif.	33
Telegraph Apparatus Co., Chicago, Ill.	39
Telemotor Corp., New York, N. Y.	35
Teleoptic Co., Racine, Wisc.	20
Teleradio Engineering Corp., New York, N. Y.	7
Teleregister Corp., New York, N. Y.	12
Teletone Radio Co., New York, N. Y.	31
Televiso Products, Inc., Chicago, Ill.	12
Telex Products Co., Minneapolis, Minn.	35
Tellcon Corp., New York, N. Y.	1
Templetone Radio Mfg. Corp., New London, Conn.	31
Tennessee Eastman Corp., Kingsport, Tenn.	27
Tenney Engineering, Inc., Newark, N. J.	12
Terma Electric Co., New York, N. Y.	13
Terminal Products Co., Racine, Wisc.	23
Thermador Electrical Mfg. Co., Inc., Los Angeles, Calif.	37
Thermionic Engineering Corp., Bayonne, N. J.	13
Thermo Electric Mfg. Co., Dubuque, Iowa	19
Thomas & Betts Co., Inc., Elizabeth, N. J.	16
Thomas & Skinner Steel Products Co., Indianapolis, Ind.	21
Thomas & Sons Co., R., Lisbon, Ohio	17
Thompson Bremer & Co., Chicago, Ill.	16

COMPANY CLASSIFICATION

- Thompson Corp., George S., Los Angeles, Calif. 16
- Thompson Clock Co., H. C., Bristol, Conn. 37
- Thompson Co., John E., Chicago, Ill. 1
- Thordarson Electric Mfg. Div., Maguire Industries, Inc., Chicago 38
- Thwing-Albert Instrument Co., Philadelphia, Pa. 12
- Tilton Electric Corp., New York, N. Y. 34
- Times Telephoto Equipment, Inc., New York, N. Y. 18
- Tingstol Co., Chicago, Ill. 17
- Tinnerman Products, Inc., Cleveland, Ohio 16
- Titan Metal Mfg. Co., Bellefonte, Pa. 21
- Titeflex, Inc., Newark, N. J. 42
- Tone Products Corp. of America, New York, N. Y. 33
- Tonk Mfg. Co., Chicago, Ill. 5
- Ton-Tex Corp., Grand Rapids, Mich.. 10
- Toogood Recording Co., L. S., Chicago, Ill. 33
- Torit Mfg. Co., St. Paul, Minn. 21
- Tork Clock Co., Inc., Mount Vernon, N. Y. 12
- Trane Co., LaCrosse, Wisc. 19
- Transcription Broadcasting Studios, New York, N. Y. 33
- Transcriptions Inc., New York N. Y. 33
- Transitroil Corp., New York, N. Y.... 25
- Translite, Inc., Brooklyn, N. Y..... 40
- Transmitter Equipment Mfg. Co., New York, N. Y. 39
- Traver Corp., Chicago, Ill 17
- Trav-Ler Karenola Radio & Television Corp., Chicago, Ill.... 31
- Trebor Radio Co., Pasadena, Calif... 31
- Trefz Mfg. Co., Flushing, N. Y. 18
- Trent Co., Harold E., Philadelhpia, Pa. 9
- Trico Fuse Mfg. Co., Milwaukee, Wisc. 16
- Trimm, Inc., Chicago, Ill. 22
- Trimount Instrument Co., Chicago, Ill. 12
- Triplett Electrical Instrument Co., Buffalo, Ohio 18
- Triumph Mfg. Co., Chicago, Ill. .. 1
- Tri-United Plastics Corp., Irvington, N. J. 28
- Trumbull Electric Mfg. Co., Plainville Conn. 37
- Tubing Seal-Cap, Inc., Los Angeles, Calif. 21
- Tubular Rivet & Stud Co., Wollaston, Mass. 16
- Tuck Mfg. Co., Brockton, Mass. 15
- Tung-Sol Lamp Works, Inc., Newark, N. J. 40
- Tungsten Contact Mfg. Co., N. Bergen, N. J. 38
- Turner Co., Cedar Rapids, Iowa 22
- Tweezer-Weld Corp., Newark, N. J... 15
- Tyer Rubber Co., Andover, Mass..... 17

U

- Ucinite Co. Civ., United-Carr Fastener Corp., Newtonville, Mass. 28
- Ulanet Co., George, Newark, N. J. .. 37
- Ullman Products Co., Brooklyn, N. Y. 11
- Ultra Violet Products Inc., Los Angeles, Calif. 13
- Ungar Electrical Tools, Inc., Los Angeles, Calif. 15
- Uniform Tubes, Philadelphia, Pa.... 21
- Union Aircraft Products Corp., New York, N. Y. 16
- Union Electrical Porcelain Works, Inc., Trenton, N. J. 17
- Union Electronics Corp., Long Island City, N. Y. 18
- Union Insulating Co., Parkersburg, W. Va. 28
- Union Piezo Corp., Newark, N. J.... 9
- Union Switch & Signal Co., Swissvale, Pa. 29
- United Broadcasting Co., Chicago, Ill. 33
- United Cinephone Corp., Torrington, Conn. 37
- United Electric Controls Co., S. Boston, Mass. 37
- United Electronics Co., Newark, N. J. 37
- United Loose Leaf Co., New York, N. Y. 33
- United Mineral & Chemical Co., New York, N. Y. 17
- United Radio Mfg. Co., New York, N. Y. 27
- United Research Labs., New York, N. Y. 33
- United Screw & Bolt Corp., Chicago, Ill 16
- U. S. Electric Mfg. Corp., New York, N. Y. 4
- U. S. Electrical Motors, Inc., Los Angeles, Calif. 19
- U. S. Electrical Tool Co., Cincinnati, Ohio 15

COMPANY CLASSIFICATION

- U. S. Gauge Co., Sellersville, Pa. ... 20
- U. S. Plastics Corp., Chicago, Ill. .. 28
- U. S. Record Corp., New York, N. Y.. 33
- U. S. Rubber Co, New York, N. Y. .. 17
- U. S. Television Mfg. Corp., New York, N. Y. 39
- U. S. Tool Co., Inc., Ampere, N. J. 19
- U. S. Trunk Co., Inc., Fall River, Mass. 5
- United Transformer Corp., New York, N. Y. 38
- Universal Battery Co., Chicago, Ill. 4
- Universal Clay Products Co., Sandusky, Ohio 1
- Universal Electric Co., Owosso, Mich. 23
- Universal Electronic Laboratories, Inc., New York, N. Y. 20
- Universal Microphone Co., Inglewood, Calif. 22
- Universal Motor Co., Oshkosh, Wisc. 23
- Universal Plastics Corp., New Brunswick, N. J. 28
- Universal Recorders, Los Angeles, Calif. 33
- Universal Recording Co., Inc., New York, N. Y. 33
- Universal Television System, Kansas City, Mo. 9
- Universal Winding Co., Cranston, R.I. 19
- Universal X-Ray Products, Inc., Chicago, Ill. 13
- University Laboratories, New York, N. Y. 22
- Urah Recording Studio, New York, N. Y. 33
- Utah Radio Products Co., Chicago, Ill. 36
- Utica Dron Forge & Tool Corp., Utica, N. Y. 15

V

- Vac-O-Grip Co., Toledo, Ohio 35
- Vacolite Co., Dallas, Texas 38
- Varo Products Co., Chicago, Ill. ... 15
- Valney Crystal Corp., Holliston, Mass 9
- Valverde Laboratories, New York, N. Y. 12
- Van Huffel Tube Corp., Warren, Ohio 21
- Varflex Corp., Rome, N. Y. 17
- Vaughan Cabinet Co., Chicago, Ill... 5
- Veeder-Root Inc., Hartford, Conn. .. 21
- Viber Co., Burbank, Calif. 29
- Vibraloc Mfg. Co., San Francisco, Calif. 35
- Vibroplex Co., New York, N. Y. 39
- Victoreen Instrument Co., Cleveland, Ohio 40
- Victory Mfg. Co., Chicago, Ill. 28
- Vidal Research Corp., Camden, N. J.. 28
- Viewtone Co., New York, N. Y. 31
- Vitroseal Corp., Cincinnati, Ohio .. 16
- V-lectrical Engineering Co., Los Angeles, Calif. 31
- V-M Corp., Benton Harbor, Mich. .. 32
- Voice of the Church, Los Angeles, Calif. 33
- Vokar Corp., Dexter, Mich. 37
- Boris M. Volyvsky Mfg. Co., Inc., New York, N. Y. 15
- Vonnegut Moulder Corp., Indianapolis, Ind. 19
- V Precision Instrument Mfg. Co., Inc., Elmhurst, N. Y. 9

W

- Wabash Cabinet Co., Wabash, Ind... 5
- Wadsworth Watch Case Co., Inc., Dayton, Ky 20
- Wagner Electric Corp., St. Louis, Mo. 23
- Wakefield Brass Co., F. W., Vermilion, Ohio 11
- Waldes Koh-I-Noor, Inc., Long Island City, N. Y. 16
- Walker, Inc., Los Angeles, Calif. 31
- Walker-Turner Co., Inc., Plainfield, N. J. 19
- Wallace Mfg. Co., Wm. T., Peru, Ind. 5
- Wallace & Tiernan Products, Inc., Belleville, N. J. 37
- Walsh Engineering Co., Elizabeth, N. J. 31
- Waltham Screw Co., Waltham, Mass. 22
- Ward Leonard Electric Co., Mount Vernon, N. Y. 37
- Ward Products Corp., Cleveland, Ohio 1
- Warner Bros. Broadcasting Corp., Los Angeles, Calif. 33
- Warren Telechron Co., Ashland, Mass. 37
- Warwick Mfg. Corp., Chicago, Ill. ... 3
- Washington Porcelain Co., Washington, N. J. 17
- Waterbury Companies, Inc., Waterbury, Conn. 6
- Waterman Products Co., Inc., Philadelphia, Pa. 39
- Waterproof Electric Co., Burbank, Calif. 14

COMPANY CLASSIFICATION

- Waters Conley Co., Rochester, Minn. 33
- Watlow Electric Mfg. Co., St. Louis, Mo. 18
- Watterson Radio Mfg. Co., Dallas, Texas 31
- Waugh Laboratories, New York, N. Y. 18
- Weaver Specialty Co., Pittsburgh, Pa. 15
- Webber Co., Earl, Chicago, Ill. 18
- Webster-Chicago Corp., Chicago, Ill. 33
- Webster Electric Co., Racine, Wisc. . 35
- Weirton Steel Co., Weirton, W. Va. 21
- Weksler Thermometer Corp., New York, N. Y. 12
- Welch Mfg. Co., W. M., Chicago, Ill. 18
- Weller Mfg. Co., Easton, Pa. 38
- Wellman Mfg. Co., Los Angeles, Calif. 37
- Wells-Gardner & Co., Chicago, Ill.. 31
- Welsh Co., Wm. H., Chicago, Ill... 28
- Weltronic Co., Detroit, Mich. 12
- Werner Co., Inc., R. D., New York, N. Y. 28
- Western Brass Mills, East Alton, Ill. 21
- Western Condenser Co., Watseka, Ill. 2
- Western Electric Co., New York, N. Y. 39
- Western Electro-Mechanical Co., Inc., Oakland, Calif. 37
- Western Geophysical Co., Los Angeles, Calif. 13
- Western Insulated Wire Co., Los Angeles, Calif. 42
- Western Lithograph Co., Los Angeles, Calif. 27
- Western Reserve Laboratories, Cleveland, Ohio 25
- Western Sound & Electric Labs., Inc., Milwaukee, Wisc. 35
- Westinghouse Electric Corp., Baltimore, Md. 13
- Westinghouse Electric Corp., Bloomfield, N. J. 40
- Westinghouse Electric & Mfg. Corp., Newark, N. J. 20
- Westinghouse Electric Corp., East Pittsburgh, Pa. 37
- Westinghouse Electric Corp., Sunbury, Pa. 31
- Weston Electrical Instrument Corp., Newark, N. J. 37
- Weymouth Instrument Co., E. Weymouth, Mass. 34
- Wheelco Instruments Co., Chicago, Ill. 34
- Wheeler Insulated Wire Co., Inc., Bridgeport, Conn. 42
- Wheeler Reflector Co., Boston, Mass. 11
- Wheeling Stamping Co., Wheeling, W. Va. 28
- Whe-Gro Co., St. Louis, Mo. 32
- Whistler & Sons, Inc., S. B., Buffalo, N. Y. 19
- Whitaker Cable Corp., Kansas City, Mo. 42
- White Dental Mfg. Co., S. S., New York, N. Y. 28
- White Electric Cable Co., Haverstraw, N. Y. 42
- White Research Associates, Boston, Mass. 13
- Whitehead Stamping Co., Detroit, Mich. 21
- Whiting & Davis, Inc., Plainville, Mass. 31
- Whitney Blake Co., Hamden, Conn. .. 42
- Wickes Bros., Saginaw, Mich. 11
- Wickwire Spencer Metallurgical Corp., Newark, N. J. 41
- Wiedemann Machine Co., Philadelphia, Pa. 19
- Wilcox Electric Co., Inc., Kansas City, Mo. 31
- Wilcox-Gay Corp., Charlotte, Mich. 32
- Wildberg Bros. Smelting & Refining Co., San Francisco, Calif. 21
- Willard Storage Battery Co., Cleveland, Ohio 4
- Williams Mfg. Co., Chicago, Ill. 37
- Willor Mfg. Co., New York, N. Y. .. 21
- Willson Magazine Camera Co., Plastics Div., Philadelphia, Pa. .. 28
- Wilmington Fibre Specialty Co., Wilmington, Dela. 17
- Wilson Co., H. A., Newark, N. J. .. 21
- Wilson Mfg. Co., Inc., Fort Lauderdale, Fla. 2
- Wincharger Corp., Sioux City, Iowa.. 4
- Windman Bros., Los Angeles, Calif... 28
- Wind Turbine Co., West Chester, Pa. 1
- Winslow Co., Newark, N. J. 18
- Winters & Crampton Corp., Grandville, Mich. 1
- WiRecorder Corp., Detroit, Mich... 32
- Wire Recorder Development Corp., Armour Research Foundation, Chicago, Ill. 32
- Wirt Company, Philadelphia, Pa. .. 34
- Wisconsin Screw Co., Racine, Wisc... 16
- Wolverine Bolt Co., Detroit Mich. .. 16
- Wood Electric Co., Inc., C. D., New York, N.Y. 42
- Woodcraft Corp., Bay City, Mich. .. 5

COMPANY CLASSIFICATION

- Worcester Pressed Steel Co., Worcester, Mass. 21
- WOR Recording Studios, New York, N. Y. 33
- Workshop Associates, Newton Highlands, Mass. 1
- World Broadcasting System, Inc., New York, N. Y. 33
- World Wide Electronics, Inc., New York, N. Y. 12
- Worner Electronic Devices, Chicago, Ill. 12
- Wright & Sons Co., Wm. E., W. Warren, Mass. 17
- Wrought Washer Mfg. Co., Milwaukee, Wisc. 16
- Wurlitzer Co., Rudolph, N. Tonawanda, N. Y. 35
- Wynn Mfg. Div., Hudson Supply Co., Richmond, Va. 15

Y

- Yardeny Laboratories, Inc., New York, N. Y. 2
- York Electric & Machine Co., Carillotone Div., York, Pa. 12
- Youngstown Pressed Steel Co., Warren, Ohio 21

Z

- Zeiss, Inc., Carl, New York, N. Y. .. 18
- Zenith Optical Co., Huntington, W. Va. 41
- Zenith Optical Laboratory, New York, N. Y. 18
- Zenith Radio Corp., Chicago, Ill. .. 31
- Zernickow Co., O., New York, N. Y.. 20
- Zierick Mfg. Corp., New York, N. Y.. 16
- Zons, F. W., New York, N. Y. 25
- Zophar Mills, Inc., Brooklyn, N. Y... 25

ELECTRONIC DISTRIBUTORS

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

- **Allied Radio Corp.**, 833 W. Jackson Blvd., Chicago 7, Ill.
- **Arrow Radio Co.**, 2205 W. Division St., Chicago 22, Ill.
- **Art Radio Corp.**, 115 Liberty St., New York 6, N. Y.
- **Bee Radio Sales**, 161 Washington St., New York, N. Y.
- **Boatman Radio Service**, 311 Main St., Columbus, Miss.
- **Burstein-Applebee Co.**, 1012 McGee St., Kansas City, Mo.
- **City Radio Co.**, E. Washington & 5th St., Phoenix, Ariz.
- **Concord Radio Corp.**, 901 W. Jackson Blvd., Chicago, Ill.
- **Dalis, Inc., H. L.**, 17 Union Square, W., New York, N. Y.
- **Edelman, Philip E.**, 4177 Garthwaite Ave., Los Angeles 43, Calif.
- **Harrison Radio Corp.**, 12 W. Broadway, New York 7, N. Y.
- **Harvey Radio Co.**, 103 W. 43rd St., New York 18, N. Y.
- **Houston Radio Supply Co., Inc.**, 910 Calhoun St., Houston, Tex.
- **Jesse Co.**, 2438 W. North Ave., Chicago 47, Ill.
- **McGee Radio & Electric Co.**, 1225 McGee St., Kansas City, Mo.
- **Olson Radio Warehouse**, 73 Mill St., Akron, Ohio
- **Radio Supply & Engineering Co., Inc.**, 128 Seldon Ave., Detroit 1, Mich.
- **Radionic Equipment Co.**, 170 Nassau St., New York 7, N. Y.
- **Radio Wire Television Corp.**, 100 6th Ave., New York, N. Y.
- **Sheffield Radio Co.**, 915 Belmont Ave., Chicago 14, Ill.
- **Sun Radio & Electronic Co.**, 212 Fulton St., New York, N. Y.
- **Terminal Radio Corp.**, 85 Cortlandt St., New York, N. Y.
- **Walker Jimieson, Inc.**, 311 S. Western Ave., Chicago 12, Ill.
- **Wedemeyer Electronic Supply Co.**, Ann Arbor, Mich.

This Electronic Engineering Directory is complete insofar as manufacturers and manufactured products are concerned and has been double indexed as a convenience for users. Four small sections including listings of Patent Attorneys, Associations, Consulting Engineers and Testing Laboratories will be included in the January issue of Electronic Industries. —Editors.

NEWS OF THE INDUSTRY

NAB-FMBI Merger Completed

The expected merger of the National Association of Broadcasters and FM Broadcasters, Inc., has been completed, with the formation of an FM Department as part of NAB. The new department will be directed by Robert T. Bartley, director of governmental relations for NAB. Myles Louckes, managing director of FMBI, has submitted his resignation and returned to private enterprise.

Organization procedure for the merger of FMBI and NAB was worked out by a joint committee which now automatically becomes the executive committee of NAB's new FM Department. The committee include: Walter J. Damm, FMBI president; three FMBI directors, John Shepherd, Yankee Network; Wayne Coy, WINX and W3XO; Gordon Gray, WSJS and WMIT; and three NAB directors, Frank Stanton, CBS; Paul W. Morency, WTIC; and Leslie G. Johnson, WHBF. The executive committee is to be headed by Mr. Damm. Also attending the merger meeting for NAB was Justin Miller, president, A. D. Willard Jr., executive vice president, and C. E. Arney, Jr., secretary and treasurer.

The new department will take up the activities of FMBI including the numbering downward of FM channels, numerical designation of frequencies on FM receiver dials, and completion of FM receiver sales information. The channel numbering idea starts with the highest frequency and working downward allowing consecutive numbering if the lower portion of the band is extended.

RCA and Westinghouse Research Plans Approved

The FCC has authorized RCA Communications Inc. and Westinghouse Radio Stations Inc. to go ahead with their large scale experimental programs.

Westinghouse was granted its application to build five developmental "Stratovision" stations to test their recently announced method of broadcasting FM and television from aircraft flying at 30,000 feet. Four of the stations will be installed in airplanes and the fifth station will be located on the ground and used as a relay link for the air-borne transmitters.

RCA Communications Inc. was awarded construction permits to build eight class 2 experimental stations for research in microwave communications.

FCC to Issue Radar Licenses

A new policy of issuing a limited number of class 2 experimental licenses for development and research on radar navigational aid stations, has been set up by FCC. Although no licenses for radar navigation stations have been issued, the FCC cautioned future applicants to file complete experimental programs with their license applications.

The Commission added that the allocation of frequencies above 25 mc included several bands for radar and navigation. However, these bands are subject to change or modification at the next Telecommunications Conference. With this in mind, the Commission further cautioned future applicants that investment and expenditures for experimental radar navigational stations was at the risk of the frequencies being changed.

Conventions and Meetings Ahead

Institute of Radio Engineers, New York Section, 330 West 42nd Street, N. Y. C. Symposium on the Proximity Fuze design, January 2, Engineering Societies Building, New York City.

American Institute of Electrical Engineers (H. H. Henline, 29 West 39th Street, New York City), Winter Technical Meeting, January 21 to 25, Engineering Societies Building, New York City.

Institute of Radio Engineers, 330 W. 42nd St., N. Y. C. Annual winter Technical Meeting, Jan. 23-26, 1946, Hotel Astor, New York City.

National Association of Broadcasters (1760 N Street, N.W., Washington 6, D. C.), Broadcast Engineering Conference, Ohio State University, Columbus, March 18-23.

MIT To Continue Electronic Studies

The Massachusetts Institute of Technology has established a Division of Electronics, combining the interests of its Physics and Electrical Engineering Departments in that field, Dr. Karl T. Compton, President of M.I.T., stated in an interview with the Washington bureau of ELECTRONIC INDUSTRIES. The new organization, will be largely based on the momentum gained in the war work of the M.I.T. Radiation Laboratory.

"It will work on basic research and the development of new methods and instruments," the M.I.T. President stated, "but not primarily of military or commercial applications although some results in such lines will certainly emerge.

"To this end, our staff in electronics and our educational program in this field are being considerably expanded. There is a great interest in electronics by returning veterans who plan to complete their education and who have become interested in electronics by their use of electronic gadgets in the war. Also, the public interest in the subject has greatly increased.

"We feel certain that there are great possibilities ahead in this field, both scientific and in the development of useful devices."

Senate Committee Uses Electronic Industries

ELECTRONIC INDUSTRIES was one of the technical publications which was used as a source for depicting the wartime technological developments in the recently-published study by the U. S. Senate Military Affairs Committee's Subcommittee on War Mobilization. Other publications included the *Bell Laboratories Record, Wireless World* (British), *Electronics, General Electric Review, Westinghouse Engineer,* and *Aeronautical Engineering Review.*

Baker to Syracuse

Dr. W. R. G. Baker, vice-president of General Electric Co., is moving away from Bridgeport, Conn. Effective the first of last month his headquarters have been located in Syracuse, at the Thompson Avenue GE plant.

When your products require DC to AC Conversion

...THERE IS AN E-L VIBRATOR INVERTER for each important application

★ ***Greater efficiency*** ★ ***Increased capacity*** ★ ***Longer service*** ★ ***Lower cost...*** In your manufacture of communications equipment, appliances, electric motors and all similar products, E·L is equipped to serve your *exact* requirements with *efficient* DC to AC conversion units.

SERVICE AND ECONOMY

For coin-operated equipment, public address systems, neon signs, and electric razor operation there is a standard E·L inverter with longer service and lower cost. These results come from the simplicity of the E·L Vibrator Inverter, with *only one* moving part, plus precision construction in every detail.

No routine maintenance is required, since there are no brushes, armatures or bearings to lubricate or care for.

The design of each E·L Vibrator Inverter is preceded by a study of product and application. Each E·L model fits an exact need and becomes a part of your pattern of quality manufacture.

FOR EACH DC-AC APPLICATION

In case of products with new or unusual requirements, E·L engineers are equipped and ready to design special power supplies. In every way E·L is set up to satisfy modern manufacturers and distributors of electrical and electronic products in *each important* DC-AC *application.*

MODELS ILLUSTRATED
(Typical of 26 E. L Models available to meet your requirements)

MOD. NO.	INPUT VOLTS DC	OUTPUT VOLTS AC	OUTPUT WATTS	LOAD P.F. (%)	DIMENSIONS (in.)	WT. (lbs.)	PRINCIPAL APPLICATIONS
302	6	115	75	80-100	9 3/8x6 3/4	15½	Radio Receivers, Appliances
507	12	115	150	80-100	10 3/4x7 1/8x8 1/4	25	Radio Receivers, Transmitters, Appliances
146	32	115	350	80-100	16x10x8 3/8	48	Receivers, Transmitters, Coin Phonographs
268	115	115	750	80-100	20 1/8x11 3/4x7½	66	Motors, Communications, Equipment

Electronic LABORATORIES, INC.
INDIANAPOLIS

DC-AC INVERTERS

VIBRATORS AND VIBRATOR POWER EQUIPMENT FOR LIGHTING, COMMUNICATIONS, ELECTRIC AND ELECTRONIC APPLICATIONS

WASHINGTON

Latest Electronic News Developments Summarized by Electronic Industries' Washington Bureau

OUTLOOK FOR NEW YEAR—Reconversion of the radio manufacturing industry, now that the tangles of the OPA price policies have been somewhat unraveled, promises to move ahead speedily in the new year. There is scheduled to be increased production activity in January which will be stepped up in March and through the spring. By June the new designs of models—FM and Television—will be in volume production. Volume production will continue so that the 1946 Fall and Christmas output will give the public their long-desired wants of the latest types of radio receivers.

OPA RED TAPE—The radio manufacturing industry has been charged by leftwing labor spokesmen with being on a "sit-down strike" and with causing unemployment. Those accusations are definitely not borne out by the facts. The real and major hurdle has been the delays and bureaucratic red tape of the OPA not only in the case of the end-equipment industry and the parts manufacturers, but all down the line affecting the materials supplying such as aluminum containers, steel, and electric wire.

PROCRASTINATION BRINGS DELAYS—Not only has the reconversion of the end-equipment and parts industry been delayed for two months by the procrastination of OPA but, when the price increase regulations were promulgated, they were so complicated and legalistically tangled that manufacturers had to spend weeks in their analysis and in "translating" them into simplified language for distributors and retailers. Now through the granting of "individual hardship" price increase applications for manufacturers the price situation is still chaotic because of the OPA's administration of the pricing regulations by a staff which has no knowledge of the business. The 1941 price base policy has become virtually a "dead letter". In fact, left-winger laborites could more accurately accuse the OPA of a "slowdown".

TELEVISION PROGRESS—Television in the lower channel pattern is being given the "green light" by the Federal Communications Commission through the promulgation of final TV assignments and regulations, mainly based on the plan of the Television Broadcasters Association for directional antenna installations producing 59 additional metropolitan channels. Even though it is wedded to the eventual "upstairs" position of Television, the FCC did not wish to block progress in this new radio broadcasting art which promises so much to the public. When the "upstairs" color-high-definition TV comes into effect, the FCC has slated a transitional system so both lower and high channel television broadcasting can be operated, but the FCC opposed the guarantee of a specified number of years for lower channel TV. In FM the FCC has been granting the hundreds of FM conditional construction permit grants and is shooting toward completion of all FM grants by the end of the year.

PLANS FOR RADAR—Radar equipment of merchant marine ships, passenger and cargo airplanes and railroads received impetus in the recent collaboration between the Army and Coast Guard with industry on the commercial application of war developments in this field. Under the leadership of Commodore E. M. Webster, Chief Communications Officer of the Coast Guard, manufacturing companies held a conference on the potentialities of the Navy-Coast Guard radar types for merchant marine shipping and it was the consensus that practical and simple-to-operate apparatus, as inexpensive as possible, had to be produced for civilian uses.

SIMPLER RADAR SETS—In the case of aviation radar, the Army Signal Corps "early warning" radar sets which could detect a flight of bombers over Boston from Philadelphia may provide a pattern for airport radar equipment. It has been emphasized in these Army-Navy-Coast Guard conferences with the radio manufacturing industry that commercial radar cannot contain the complicated and expensive setup of military devices and must definitely be simplified in operation and maintenance.

SCIENCE FOUNDATION LEGISLATION—The huge record of the views of the leaders of the American scientific world, which has been given to the Senate Committee on the proposed National Science Foundation, has presented Congress with a story of the past and future scientific achievements, in which electronics has been as much an achievement as atomic power, that has never before been given to the national legislature. There have been conflicting viewpoints, but the scientific leaders, like Bush, Conant, Compton, Kettering, Jewett, have been in rather general agreement with the objectives of the legislation to stimulate the nation's research activities and education. The Senators sponsoring the legislation feel that a measure can be drafted and reported to the Senate for action by the new year. Because of the conflicting viewpoints, there may be separate legislative treatment on patenting of inventions developed through the aid of the government, and there are certain to be safeguards in any National Science Foundation to have leading scientists in roles to guide the policies of the undertaking.

National Press Building
Washington, D.C.

ROLAND C. DAVIES
Washington Editor

NEW PATENTS ISSUED

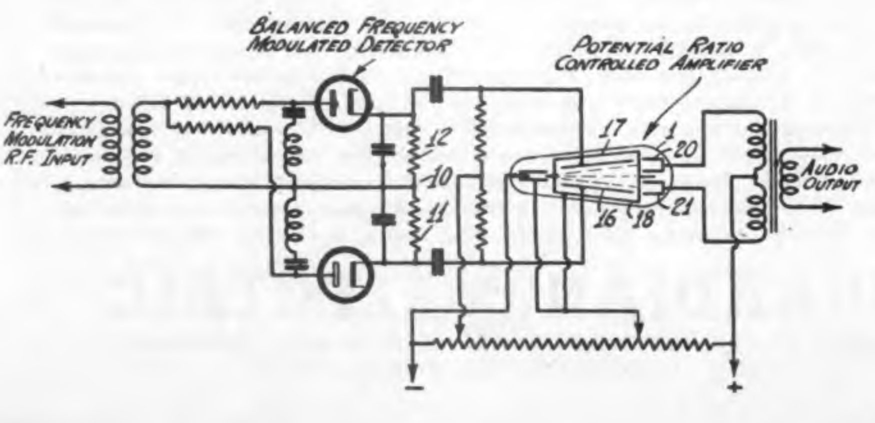
Ratio-Controlled Amplifier

The output of amplifier tube 1 is a function of the ratio of the potentials applied to deflection electrodes 16 and 17 and is substantially independent of the magnitudes of these potentials. It is proposed to use a combination of this tube with a balanced discriminator to avoid the necessity of a limiter in the frequency or phase modulation detector circuit.

For frequency deviations from the carrier frequency, the cathode ends of resistors 11 and 12 will be at a potential of like polarity with respect to the center point 10 but of different magnitude. For variations of carrier amplitude, however, the potentials at the cathode ends will change by an equal percentage. Amplifier tube 1 not responsive to variations in magnitude of the potentials applied to plates 16 and 17, as long as the ratio between these potentials is constant, will eliminate substantially any effects introduced by amplitude variations. Frequency modulation, which changes the ratio of the voltages across resistors 11 and 12, causes the magnitudes of the currents impinging upon collector electrodes 20 and 21 to change.

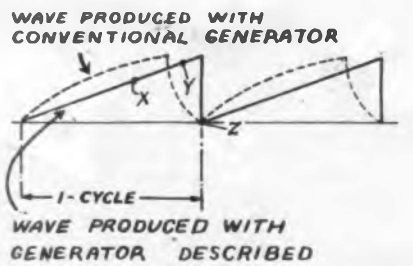
The potential-ratio controlled amplifier tube 1 contains a pair of divergent rod-shaped electrodes 16 and 17 controlling the beam deflection in combination with the electrode 18, at a positive potential with respect to electrodes 16 and 17, which are at equal potential in the absence of an applied signal. Under this condition, there will be a region of zero transverse electric field midway between the two electrodes 16 and 17 which will be followed by the electron stream; if the stream is deflected it will enter an electric field which tends to return it to the region of zero transverse electric field. No deflection will result from an equal percentage change in the potentials of the electrodes, the region of zero electric field strength remaining centered. However, a deflection of this region will cause the electrons to follow another path. The position of this region is a function of the ratio of the applied potentials. With this tube it is possible to make the path taken by the electron stream substantially dependent upon the frequency of the current input to a balanced discriminator, but nearly indepedent of the amplitude of the signal input.

C. W. Hansell, RCA, (F) December 10, 1942, (I) August 28, 1945, No. 2,383,855.

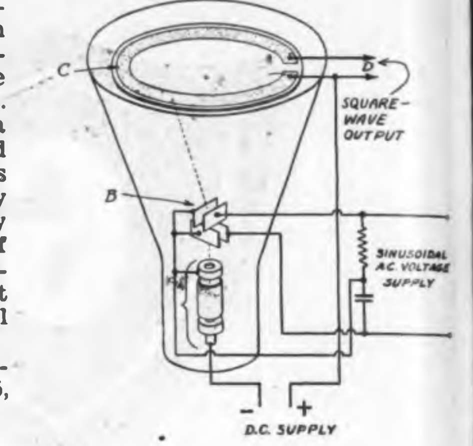


Saw-Tooth Wave Generator

The saw-tooth wave generator tube is particularly adapted for use as deflection voltage generator in television apparatus. Its advantages are that less tubes are required than in conventional circuits, and that the forward sweep takes up practically all the time, the time taken for the fly-back being negligible in comparison.



The target C in the cathode-ray tube is a resistance in the shape of a slotted annulus. This resistance element may have a varying resistivity or, as is preferred for television, should have a constant resistivity throughout. Sinusoidal voltages, 90 deg. out of phase, are applied to the beam deflecting plates B, causing the electron beam to rotate and impinge on the annular target C, traversing it at a uniform rate equal to the deflection frequency. This beam acts as a moving commutator, producing a saw-tooth output voltage across the output terminals D. The output voltage depends on the resistance of element C and on the beam current; the wave shape may be controlled by providing a non-uniform resistivity of target C or by altering the shape of the target.



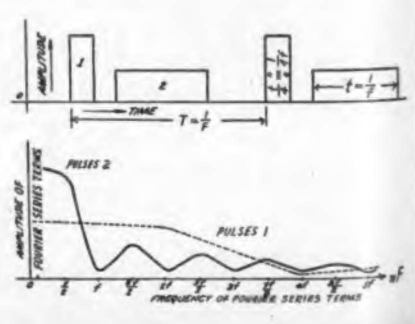
The target C may consist of a slotted mica disk covered with a coating of carbon sprayed onto the disk. Other targets are described. Output terminals and dc supply voltage terminals may be interchanged.

T. W. Cunniff, Tung-Sol Lamp Works, Inc., (F) March 11, 1941, (I) May 1, 1945, No. 2,374,666.

Discriminating Between Signals of Different Amplitude

The invention provides a method which permits to separate pulse modulated waves where the frequency and the energy at the receiver may be identical, but the amplitude and/or duration are different. This expedient makes it possible to increase the number of communications transmitted simultaneously within a given bandwidth. It also provides a means to discrim-

(*Continued on page* 170)



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★ TELEVISION TODAY* ★

New Developments in the Video Field

Intrastore Television Demonstrated by RCA

With interest increasing in possible non-radiating uses of television equipment, RCA's demonstration in Gimbel Bros. department store in Philadelphia revealed at least some of the engineering aspects of such installations.

For the purpose of demonstration RCA had installed a transmitter with viewing screens or "telesites" in about 20 locations throughout the store. Half the viewing screens were 16 x 21 in. projection type, and the other half were 8 x 10 in. direct view type screens. All images were transmitted with 525-in. interlaced scanning and standard RMA waveform.

Radio-frequency carriers were not used, and the program was not radiated. Signals were confined to the intrastore coaxial system. A bandwidth of 5½ mc was used in the video channel and the audio channel was 12,000 cycles wide.

Television receivers used were standard RCA equipment, complete with rf channels. As applied in the intrastore hookup, the rf channel is jumped and the coaxial cable connected directly into the video channel.

Televised programs could also be received from a dipole antenna on the roof, and presented at the telesites, if desired. This antenna is a single dipole constructed of ⅜-in. tubing, and provided with a reflector rod spaced to give an input impedance of 300 ohms. A 300-ohm line with polyethylene strip insulation and loss of one db per hundred feet leads from the roof to the control room on the fifth floor.

Three monitoring positions were provided in the control room. The monitors are standard RCA demonstrators, mounted on rollers for portability if need arises. Two cameras of the iconoscope type were used in the adjoining studio. Two monitors exhibited the two camera images, and a third monitor showed the image being put on the coaxial system to the telesites. Pulses originating at the synch generator served to sweep all studio and control room equipment.

Two Video Applications

Two more applications for commercial television stations to be located at Pittsburgh, Pa., and Cincinnati, Ohio, have been filed with FCC. The Allegheny Broadcasting Corp., Pittsburgh, applied for a station on channel 6 while the Institutum Divi Thomae Foundation of Cincinnati applied for a station on channel 4.

New TBA Members

Two more motion picture organizations have revealed their interest in television by becoming members of the Television Broadcasters Association Inc. The two new additions are the Research Council of the Academy of Motion Picture Arts and Sciences, Hollywood, and the Eastman Kodak Co., Rochester.

Lab Expands Facilities

Machlett Laboratories, Inc., Springdale and Norwalk, Conn., manufacturer of X-ray tubes and high voltage rectifiers, is doubling the size of its Springdale plant. The expansion program is designed to give added facilities for research, development, and production of vacuum tubes for radio, X-ray and industrial use.

Radio-Tele Center

Plans for a Radio-Television Center to be erected at a cost of $2,000,000 have been completed by station WCAU in Philadelphia, Pa. The project will occupy over 81,000 sq. ft. and will be peaked by a 612-ft. antenna that will radiate both the video and FM signal. On the roof of the structure will be a specially constructed helicopter landing platform suggesting quick transport of video equipment for outside studio broadcasting.

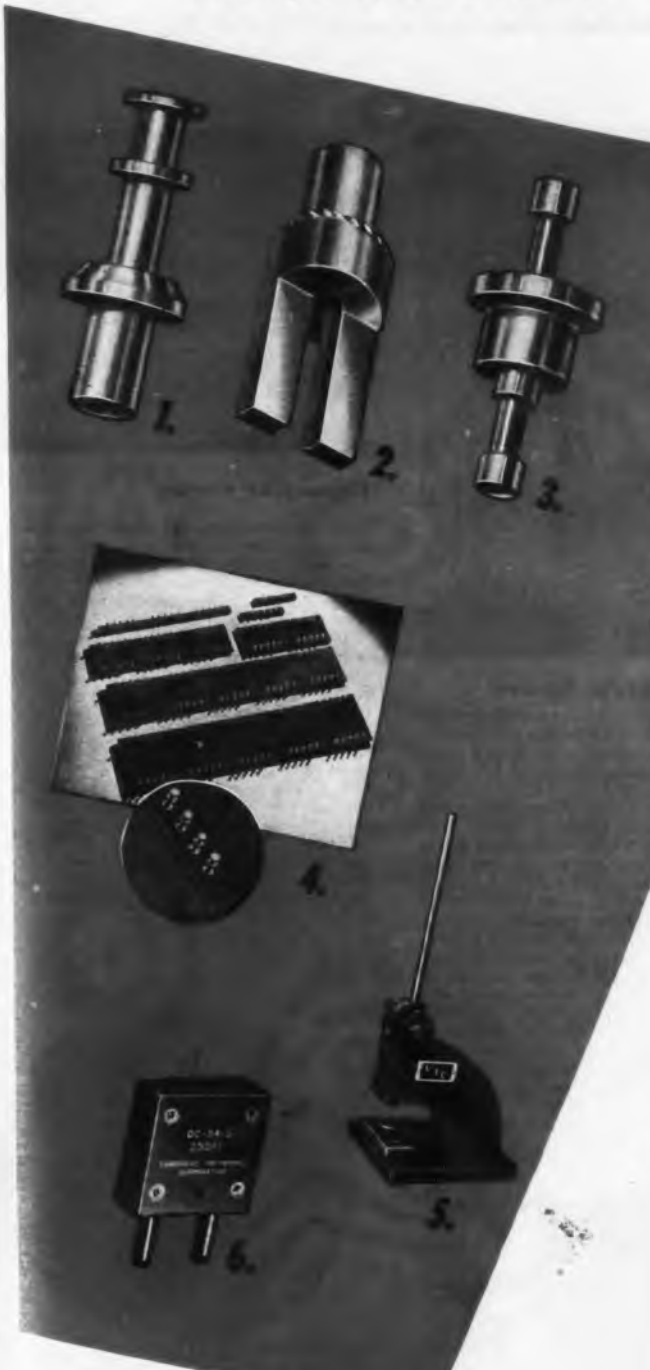
The main floor of the new building will have a 500 seat auditorium for both sound and television broadcasting. The main theater will have two hydraulically controlled stages.

In the remainder of the building there will be seven broadcasting studios and an additional television studio equipped with a partitioned stage. The sound studios will have polycylindrical acoustic control. The vanes can be controlled to give better acoustics according to the various sized groups of people broadcasting. Administrative offices, rehearsal rooms, writing rooms, makeup rooms, and property space, will make up the remainder of the structure. Completion of the new building is expected by December of 1947.

NEW TELEVISION CENTER FOR 1946 PLANNED BY WCAU

The new video installation will be erected at a cost of $2,000,000 and will have seven television and FM broadcasting studios and a 500-seat auditorium. A helicopter landing platform will be located on the roof of the new building to facilitate away from the studio telecasting

COMPONENTS THAT *Click*



1. C.T.C. TURRET TERMINAL LUGS. Heavily silver plated brass lugs. A short cut to speedy assembly. Firmly anchored to terminal boards by simple swaging operation. Lugs heat quickly, assuring neat, positive wiring. Two soldering spaces. Stocked to fit 1/32", 1/16", 3/32", 1/8", 3/16" and 1/4" terminal board thicknesses. Also available with single soldering space.

2. C.T.C. SPLIT TERMINAL LUGS are being enthusiastically received by manufacturers of transformers and other potted units that require soldering after potting. A .050" hole through the lugs makes them ideal for this type of application. Perfect for terminal boards, too, because wiring can be done from top or bottom of the board without drilling. Made of brass, heavily silver plated, to fit 3/32" terminal boards.

3. C.T.C. DOUBLE END TERMINAL LUGS. Twin terminal posts in a single swaging operation. Perfect electrical contact because both posts are part of the same lug. Neat, positive wiring from either top or bottom. These heavily silver plated brass lugs are stocked to fit 3/32" terminal boards.

4. C.T.C. ALL-SET TERMINAL BOARDS are proving a time-saver in the laboratory and on the assembly line. Just select proper width board and go to work.

All-Set Terminal Boards are made in 3/32", 1/8" and 3/16" linen bakelite in 4 widths — 1/2"; 2" (lug row spacing 1 1/2"); 2 1/2" (lug row spacing 2") and 3" (lug row spacing 2 1/2"). Fit all standard resistors and condensers. Boards may be broken in fifths by bending on scribed line or used full length. Available in sets of any of the 4 widths or in any single width in lots of 6 or multiples of 6.

5. C.T.C. HAND PRESSURE SWAGER for quick, firm, uniform swaging of terminal lugs to terminal boards. Adjustable to fit all thicknesses of boards. Lugs are put in board *right side up* and may be swaged as far as 1 7/8" from edge. Adjustable pressure assures uniform swage. Unit pictured swages all C.T.C. standard Turret Lugs. Can be furnished with additional anvils and punches to fit C.T.C. Double End and Split Lugs.

6. C.T.C. MATHEMATICALLY DIMENSIONED CRYSTALS. A new C.T.C. development, mathematical dimensioning achieves greater accuracy. It assures consistent performance—guarantees frequency stability, high activity and long life in every C.T.C. Crystal.

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WHAT'S NEW

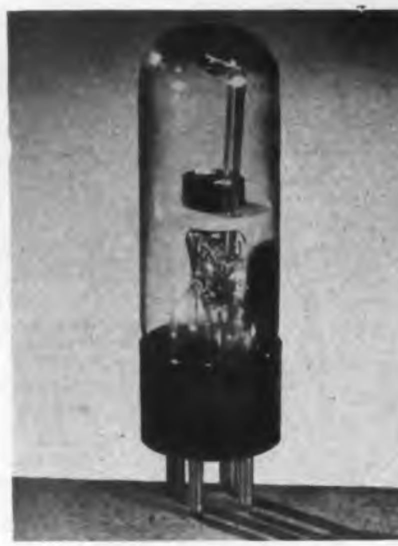
Devices, products and materials the manufacturers offer

Vibration Mount

Light-duty vibration mounts are being manufactured by Kent Mfg. Co., Kent, Ohio, designed to eliminate disturbing vibration and noise from small motors, business machines, small power tools, etc., or to isolate delicate instruments from external vibration. These mounts will handle loads as low as one pound and combine the high vibration damping properties of rubber loaded-in-shear, with the safety, durability and ease of installation of a simple compression mount. No overloading of the shear elements is possible, which makes specification of the proper mount simple. Five sizes of these light-duty units will handle a range of loads from 1 lb. to 200 lbs. Heavy-duty mounts are available that handle loads up to almost any weight.—Electronic Industries

Power Feeder

This pre-selectric power feeder automatically provides automatic chip clearance at pre-selected depths during drilling or tapping. A timer is provided to control the length of drilling time between chip clearances, duplicating hand drilling operations. Also shown to the right of the timer is a pressure adjusting knob which sets the amount of pressure on the drill, thus controlling the rate at which the drill is fed into the work. The unit operates on 110 v. single phase or 220/440 three phase current. In operation, the unit provides timed, reversible, adjustable torque with automatic start of the cycle and automatic stop, and retracts the drill for full chip clearance at a pre-selected point. When used with any standard tapping head, the unit becomes a precision automatic tapper. Maker is James H. Knapp Co., 4921 Loma Vista Ave., Los Angeles 11, Calif.—Electronic Industries



Stroboscopic Light Source

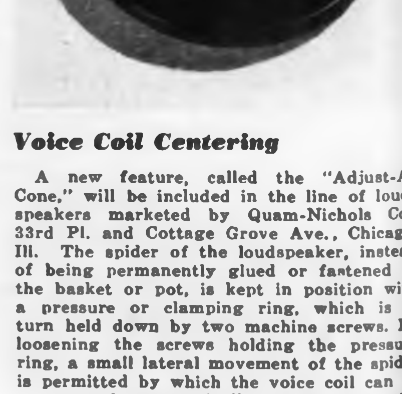
Cold cathode electron tubes, with two internal trigger grids for operation in simple capacitor discharge circuits, are being manufactured by Sylvania Electric Products, Inc., Salem, Mass., for use in inspection, stress study and timing of reciprocating and rotating motion, and electron switch and relay applications. These strobotron tubes provide pulse frequencies up to 240 pps. Standard units measure 4 9/32 in. overall including T-9 bulb and a 4-pin base, 1 3/16 in. in diameter. 50 ma average current with 350 v dc on the anode permit instantaneous surges of 5 amperes. Grids are operated at 70 v dc and 15 ma maximum. There is a drop of 75 v during glow discharge and a 20 v drop during arc discharge. Starting is initiated by discharge between any two elements but usually between grids or either grid and cathode. Starting voltages range between 80 and 145 dc, depending on the elements used and their polarity—Electronic Industries

Photo Timer

An electronic timer for photo or interval timing has been developed by the Caltron Co., 11744 West Pico Blvd., Los Angeles 34, Calif., that provides accurate interval control from 1/25 sec. to 80 sec. The timer employs two vacuum tubes. A push button provides positive control and prevents "double takes". No resetting is required between operational cycles. Once set for a given interval, it will repeat that exact time cycle each time the push button is operated. The time cycle, once initiated, is independent of the push button.—Electronic Industries

Capacitor Series

Oil-impregnated, oil-filled capacitors, designed for fluorescent lamp service, are being manufactured by the Tobe Deutschmann Corp., Canton, Mass. Contained in hermetically sealed metal cases, these capacitors are impregnated and filled with mineral oil, the characteristics of which render the units applicable where varied temperatures may be encountered. Operating temperatures range from minus 67° to plus 185°F. Oil-tight terminals are insulated with phenolic bushings and provided with tinned copper soldering lugs. Available sizes include capacitances from 2.0 to 5.25 mfd. and working voltages from 165 ac to 440 ac. The standard capacitance tolerance of these units is minus zero plus 20 per cent. Adjustable clamp brackets, separable mounting straps, and permanently attached mounting brackets can be furnished to meet installation requirements.—Electronic Industries



Voice Coil Centering

A new feature, called the "Adjust-A-Cone," will be included in the line of loudspeakers marketed by Quam-Nichols Co., 33rd Pl. and Cottage Grove Ave., Chicago, Ill. The spider of the loudspeaker, instead of being permanently glued or fastened to the basket or pot, is kept in position with a pressure or clamping ring, which is in turn held down by two machine screws. By loosening the screws holding the pressure ring, a small lateral movement of the spider is permitted by which the voice coil can be re-centered concentrically around the polepiece and within the gap. The screws holding the clamping ring in this unit are so positioned that it is often unnecessary to remove the loudspeaker from the chassis to re-center the voice coil.—Electronic Industries

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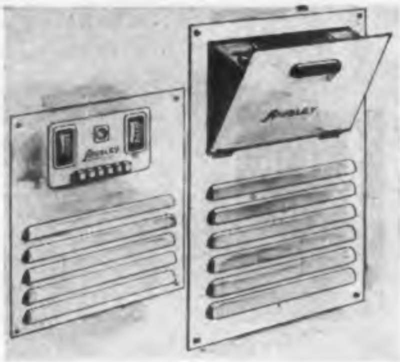


Built-In Radio

A new type of radio designed for built-in installations, is being manufactured by the Ansley Radio Corp. of Long Island City, N. Y. The receiver is built on a heavy steel panel and require 4½ in. of depth. Two models are available: a 7-tube set on a 14 x 14 in. panel furnished in either ac or ac-dc, and a 17-tube model giving both FM and regular broadcast reception, and requiring a 14 x 26 in. panel.—Electronic Industries

Cable Connectors

Electrical connectors for small size aluminum wires and cables designed to provide permanent, low resistance connections, are being manufactured by Burndy Engineering Co., 107 Bruckner Blvd., New York 54, N. Y. In the manufacture of these connectors, zinc is plated on oxide-free aluminum. This prohibits reformation of the oxide film once it has been removed, and provides the connector with a low-resistance contact surface. Laboratory tests on these new connections show a relative conductivity of approximate double that of an ordinary aluminum connection.—Electronic Industries

Iron Cores

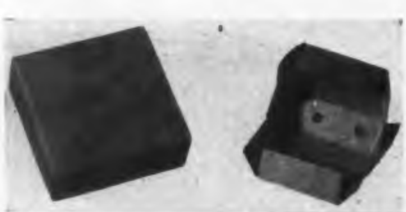
Screw type molded iron cores for rf transformers eliminate the need of a brass core screw for adjustments. Higher Q in the coil unit is obtained because there is no metal in the field and the cores themselves are not grounded. Made by Stackpole Carbon Co., St. Marys, Pa.—Electronic Industries

350 mc Pentode

A miniature pentode, the 6AK5, engineered by the Bell Telephone Laboratories for high frequency military communication equipment, has many characteristics which will be useful in new FM and television units. With high transconductance, high input resistance and low capacitances it has a signal-to-noise ratio better than twice that offered by any other tube previously available for use as an if amplifier at frequencies of the order of 50 mc. The 6AK5 will also operate satisfactorily up to 350 mc. Tube characteristics of this new pentode, which is only 1⅝ in. high when seated, are: Cathode, indirectly heated; filament voltage, 6.3; filament current, 0.175; normal plate voltage, 120; normal screen voltage, 120; normal grid voltage, 2; normal plate current, 7.5 ma; normal screen current, 2.5 ma; normal transconductance, 5,000 micromhos.—Electronic Industries

Junction Box

Jefferson Electric Co., Bellwood, Ill., has developed a junction box to fit its cold cathode ballasts, which can be easily attached with the bolts used for mounting the standard ballast. The box is made in two pieces, and is shown, separately and attached, in the accompanying illustration. One piece is designed to slide over guides on one end of the ballast case while the other forms the cover which is secured by one screw. Suitable knockouts are provided in sides, ends and bottom. Thus the standard ballasts requiring no junction box, as in the case of fixture installation, also serve where boxes are required.—Electronic Industries



Can Liners

The Howard J. Moore Co., 108 Park Row, New York 7, N. Y., is manufacturing can liners for use in capacitor making. Units fabricated with scores, punches and slits to the specifications of the manufacturer are available. Liners use various insulating papers, including drawtex, hitex, beaming kraft, kraftage and fish papers.—Electronic Industries

Low Voltage Rectifiers

The Green Electric Co., 130 Cedar St., New York, N. Y., has developed a stabilized rectifier with low voltage high current output. The unit is rated at 200 amperes, voltage range zero to 8 v. Any voltage selected in range is maintained to within 50 millivolts over load variation from zero to 200 amperes, with line voltage variation of plus or minus 10 per cent.—Electronic Industries

Quick Disconnects

A new double connector block, providing quick connect-disconnect features, is made by Aircraft-Marine Products, Inc., 1591 D North Fourth St., Harrisburg, Pa. The block is a permanent installation in the wall structure, a plastic cover snapping over each end of the block. The lugged wire ends are then inserted in the unit. Removal of the cover releases the connections.—Electronic Industries

Resistor

New 1 w Akra-ohm resistor units are now available, with values up to 1 megohm. Axial leads are provided for convenient mounting on standard terminal strips. Tolerances of plus or minus 0.1 per cent can be had. Made by Shallcross Mfg. Co., Jackson & Pusey Ave., Collingdale, Pa.— Electronic Industries

Solderless Switch Terminals

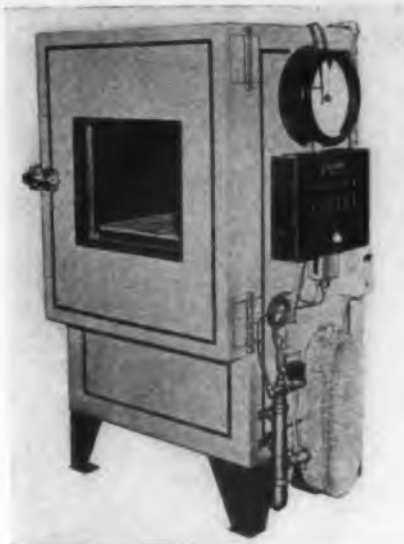
Heavy-duty lever and turn switches made by Donald P. Mossman, Inc., 612 N. Michigan Ave., Chicago 11, Ill., can now be had with screw type terminals. This eliminates the need of soldered connections and has specific application where wire ends are lugged.—Electronic Industries

Voltage Control

The new Increvolt unit allows adjustment of line voltage control from 0 to 130 volts in accurate steps of 0.1 v. Equipped with Klixon thermostat burn out protection against short circuits and overloads, it will carry a maximum of 15 amperes. It is made by Sorensen & Co., Stamford, Conn.—Electronic Industries

Stabilized Rectifiers

A new series of "TRX" stabilized rectifier units has been developed by the W. Green Electric Co., Inc., 130 Cedar Street, N.Y.C., to deal with the problem presented in telegraph and similar services of a rapidly fluctuating load demand. The dynamic voltage regulation characteristic is such that the load current may be varied between zero and maximum at any demand frequency, with negligible variation in terminal voltage. Unit also compensates for normal variations in ac supply voltage. Other features include a non-resonant filter, circuit breaker switch protection on ac side, and voltmeter, ammeter and supervising lamps. Connections may be made to 115 or 230 v, 50/60 cycle ac supply. Models for 1, 2, 4 and 7 amp capacity are available. Optional output ranges are 110-120, 150-160 v.—Electronic Industries



Test Chamber

A new insulated, variable temperature and humidity chamber is being made by Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J. Accurate control of temperature, humidity and air circulation, within close limits, can be maintained for laboratory and production testing operations.—Electronic Industries

Automatic Stand-by

A new unit, called an automatic announcer produced by Radio Mfg. Engineers Inc., Peoria 6, Ill., has both visual and audible alarm features in its automatic stand-by circuit. Operated as a radio switch by an incoming carrier it will eliminate the need of constant operator listening.—Electronic Industries

Marine Radiophone

A new radiotelephone, designed for small pleasure and commercial boat ship-to-ship, ship-to-shore and ship-to-Coast Guard service operates from 6 or 12 v batteries. Construction details of this 12 w transmitter-receiver were engineered for long service at sea. Two knobs control the selection of the frequency desired and the receiver gain. It is made by Radiatron Products, Inc., Los Angeles, Cal.—Electronic Industries

Video Amplifier

A new amplifier, with a frequency response flat within 1.5 db between 15 cycles and 4 megacycles and 3 db flat between 10 cycles and 4.5 megacycles, is being made by United Cinephone Corp., Torrington, Conn. Phase shift has been reduced to provide satisfactory reproduction of pulses of 1 microsecond and square waves at repetitive rates as low as 100 a second.—Electronic Industries

DC Motor

This new constant speed dc motor is especially adaptable to synchronous operation. It maintains a constant set speed regardless of wide variations in voltage, is self-starting, and builds up full speed almost instantly. Current consumption is .01 to 1 w, and shaft speeds may be geared from 1 revolution every 24 hrs. up to 600 rpm. Units are available for use at 1½, 3, 6, 12, 24, 32 or 110 v. Constant speed is maintained even in the case of storage battery operation where the voltage is higher when the battery is being charged. Maker is the Amglo Corp., 4234 Lincoln Ave., Chicago, Ill.—Electronic Industries

Switch Cover

A new type of waterproof switch cover completely seals bat-handle toggle switches against water and moisture. No special tools are needed for installation of this Neoprene boot.—Electronic Industries

Transmitting Tetrode

Eitel-McCullough, Inc., San Bruno, Calif., is manufacturing a new transmitting tetrode tube—the Eimac 4-250A. Maximum plate dissipation rating is 250 w. At 3000 plate volts, a single tetrode is capable of a power output of 650 w, with a driving power of less than 3 w. Due to the low grid-plate capacitance (0.11 uufd.) neutralization has been found unnecessary at frequencies below 40 mc.—Electronic Industries

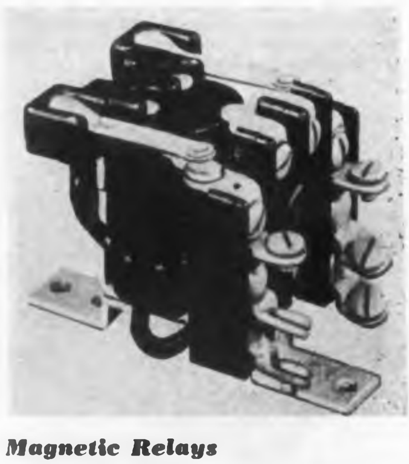
Vibration Test Table

A reaction type vibration test table for use in the correction of design and manufacturing errors, is being manufactured by L.A.B. Corp., Summit, N. J. The large table top is supported by four vertical rods acting as flexing columns to permit free

table vibration in the two horizontal directions. Four sets of rotating eccentric weights induce rectilinear and pure harmonic vibrations. These weights, mounted on vertical shafts, are driven by a variable speed drive through a synchronizing gear box and flexible shafts. The amplitude (⅛ in. maximum excursion at 100 lbs. table load) and the direction of vibration (horizontal crosswise or lengthwise) are adjustable when machine is not running. Increase in load over 100 lbs. automatically reduces the amplitude. Standard frequency range is 10 to 60 cycles per sec., which is adjustable while running, either by hand wheel or ¼ h.p. motor-driven automatic frequency change control, with 1 min. complete cycle. Amplitude does not vary with frequency. An acceleration of 10 Gs is produced between 50 and 60 cycles per sec. at ⅛ in. double amplitude. The equipment, which has a maximum capacity of 400 lbs., weighs 1500 lbs. and is operated by a 5 h.p. motor. Overall dimensions are 52 x 58 x 32 in. high. Table top is 24 x 40¾ in. Installations can be made on upper floors of buildings without concrete bases.—Electronic Industries

Pressure Transmitter

Model PV pressure transmitters for the remote recording of gas or liquid pressures are being manufactured by Statham Laboratories, 8222 Beverly Blvd., Los Angeles 36, Calif. These transmitters may be operated directly with ordinary microammeters, recording galvanometers, or recording potentiometers. Their natural frequency of approximately 1,000 cps makes them useful for recording rapidly fluctuating pressures as well as static pressures. These pressure transmitters are linear. Accuracy is 2%. The operating temperature range is —65° F to +250° F. The sensitivity increases with increasing temperature within this range in an approximately linear manner, and the change in sensitivity from room temperature to either extreme is less than 4%.—Electronic Industries

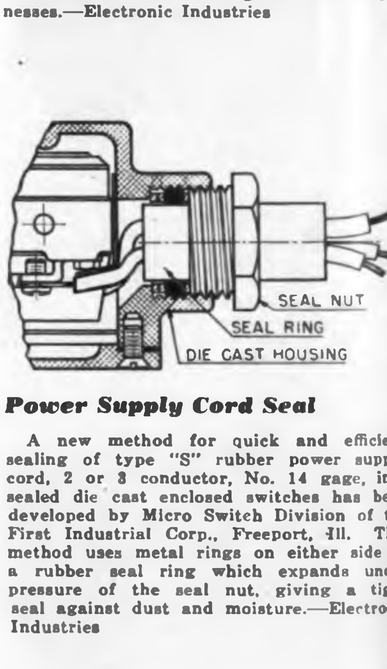


Magnetic Relays

R-B-M Mfg. Co. (Division of Essex Wire Corp.), Logansport, Ind., is manufacturing a new line of single and two-pole ac and dc magnetic relays with ratings of 10 amperes at 24 v dc and 110 v ac, 5 amperes at 220 v ac, and 1 h.p. single phase 110 and 220 v ac. Armatures are self-aligning. All wiring terminals (either screw or solder) are easily accessible from the front. Single and two-pole ac and dc relays have identical bases for complete interchangeability in mounting. Relays may be mounted either from front or rear.—Electronic Industries

Dial Locks

Radio Craftsmen, 1341-3 South Michigan Ave., Chicago 5, Ill., now has available for immediate delivery dial locks, applicable for use on mobile and other equipment to accurately maintain tuning adjustments. These locks have been used on Signal Corps SCR-299 tuning units. They are made of 21 gauge spring brass, nickel plated, and accommodate a wide range of dial thicknesses.—Electronic Industries



Power Supply Cord Seal

A new method for quick and efficient sealing of type "S" rubber power supply cord, 2 or 3 conductor, No. 14 gage, into sealed die cast enclosed switches has been developed by Micro Switch Division of the First Industrial Corp., Freeport, Ill. This method uses metal rings on either side of a rubber seal ring which expands under pressure of the seal nut, giving a tight seal against dust and moisture.—Electronic Industries

Vacuum Thermocouple

A new vacuum thermocouple, Type F, which generates 5 mv for an input of 1.2 ma, is being manufactured by the Field Electrical Instrument Co., 109 East 184th St., New York 53. The unit will stand a 100 per cent overload and generates an output of 25 mv at normal heater current. Another type, M, is available in ranges of 100 ma and over. Permissable overload is 50 per cent. Where the mv output of ordinary vacuum thermocouples would be inadequate, these type M couples may be used with small, rugged instruments to give full scale deflection.—Electronic Industries

Speaker Field Coil Form

The Precision Paper Tube Co., 2023 West Charleston St., Chicago 47, Ill., is manufacturing a new die-formed bobbin coil form for speaker field coils. The new coil form comes in a one-piece assembly, ready to go on the mandrel of a coil winding machine. The entire coil base is shaped by die in one piece from spirally wound, heat-treated dielectric materials. The ends of the tube are swaged and locked to the die cut vulcanized fibre flanges.—Electronic Industries

Voltage Regulators

Three unit, vibrating type, heavy-duty voltage regulators for low voltage dc generator application are now being manufactured by R-B-M Mfg. Co., division of Essex Wire Corp., Logansport, Ind. The three units—reverse current relay, voltage control, and current limiter—are designed to work in any position and withstand vibration in mobile apparatus. The assembly is dust-tight and waterproof and weighs 3.25 lb. Units are available in ratings of 30 amperes at 6 to 32 volts, and 45 amperes at 6 to 12 volts dc. Maximum field current rating is 3 amperes at 6 volts; and 0.5 amperes at 32 amperes dc.—Electronic Industries

UHF Calibrator

The James Millen Mfg. Co., 150 Exchange St., Malden, Mass., has developed a new calibrator covering the frequency range from 200 to 700 mc. With a maximum calibration error of not over 0.25%. The equipment uses an accurate cavity-type tuning unit, two-stage video amplifier and a peak-reading voltmeter. The range may be extended to 1500 megacycles by using harmonics.—Electronic Industries

Acorn Socket

National Co., 61 Sherman St., Malden 48, Mass., is making a new tube socket and shield for use with acorn tubes such as 955 and 6F4. This XLA socket can be had with five or seven contacts. Special ceramic capacitors of 50 to 100 mmf. may be inserted in the base under any contact to provide bypassing between the contact and the mounting surface.—Electronic Industries

UHF Triode

A new transmitting-receiving triode for use at full rating operation up to 250 mc features Nonex glass and a tantalum plate. Taylor Tubes, Inc., 2312 Wabansia Ave., Chicago, Ill., primarily designed this tube for mobile application and its internal construction was engineered for such service. It has an instant heating, thoriated filament. Approximate driving power 2 w. Carrier output at 115 megacycles about 40 w.—Electronic Industries

Pie Wound Resistor

Three new Riteohm precision resistor types have been added by Ohmite Mfg. Co., 4835 Flournoy St., Chicago 44, Ill. Enameled alloy resistance wire is non-inductively pie-wound on non-hydroscopic ceramic bobbins. Resistance values range from 0.1 ohm to 1.5 megohms—Electronic Industries

Potentiometer

Non-linear potentiometers with wire wound resistor elements are made by Fairchild Camera and Instrmuent Corp., 88-06 Van Wyck Boulevard, Jamaica 1, New York City, for precision applications. These units will reproduce various desired curves of resistance vs. rotation; sine, cosine, tangent, hyberole, square-root, logarithm and other special empirical relationships.—Electronic Industries

Hand Tachometer

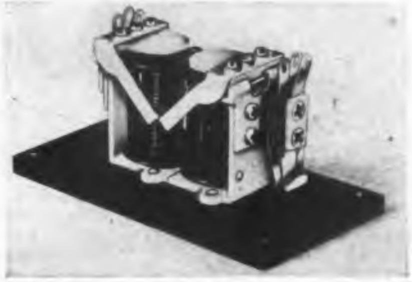
Merton Instrument Co., 432 Lincoln St., Denver 9, Colo., is manufacturing a new electric hand tachomter, operating from either batteries or 115 v ac line. The head is light weight and small enough to be used in restricted space. No magneto or generator is used in this unit: the rotating shaft in the head operating a set of contacts through a cam motion. Fixed installation models are also available with specially calibrated scales.—Electronic Industries

Vacuum Gage

The new Alphatron, made by National Research Corp., Boston 15, Mass., for measuring pressures of gases other than air, has a continuous linear response to 10 mm. pressure. Advanced amplifier design and the steady emission characteristic of the Alpha radioactive source insure great stability and minimum needle flicker. Pressures can be read to 1 per cent of full scale reading on each of the three scales, 0 to .1 mm., 0 to 1 mm., and 0 to 10 mm.—Electronic Industries

DC-AC Converter

A new frequency-controlled dc-to-ac rotary converter which permits controlled 60 cycles output has been added by the Carter Motor Co., 1608 Milwaukee Ave., Chicago, Ill. Unit is designed with the frequency control in the base, and includes a vibration reed-type meter to visually indicate the frequency of the output. In the 110-120 v dc to 117 v ac models, the output can be controlled within plus or minus 10 v at 60 cycles, over a plus or minus 10 v dc fluctuation. Models available have input voltages ranging from 6 through 64 v for battery conversion, and also 110-120 v dc for line conversion. Wattage ranges are from 40 w through 250 w capacity, continuous duty.—Electronic Industries



Latching Relay

A small latching relay, which can be supplied in either single or double pile-ups and with all standard pile-up formations and combinations, is being made by Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill. These latching Aerotrols are made for operation with maximum voltages of 125 v dc or 120 v ac.—Electronic Industries

Vibration Tester

Frederic D. Schottland, 82-62 Grenfell Ave., Kew Gardens, N. Y., has developed a meter designed to read the value of the maximum intensity of shock, even though that maximum exists for an extremely short duration. Since the magnitude of shock is readily expressed in terms of deceleration, the gravitational unit, or "G," is used as the unit of measure. The meter consists of two parts, the "G Meter" itself, which is subjected to the shock, and the electronically operated indicating mechanism. The two are interconnected by a multi-wire cable and the entire device works directly from an ordinary ac power line. Readings are obtained by means of a series of lights which represent graduating degrees of shock. Thus, for a given impact, all the lights calibrated for intensities up to that magnitude will glow. The highest of these represents the maximum instantaneous shock experienced by the "G Meter." Since it may be used in cases of vibration even at relatively high frequencies, it can determine the shock transmitted to the various components of any moving mechanism. The shock administered to a radio, and any parts of planes or cars, and the shock insulation of particular packages, my be readily determined.—Electronic Industries

Bobbin Type Resistors

Three compact units rated at 1, 2 and 3 w have been added to the Koolohm line of wire-wound bobbin type resistors. Developed by Sprague Electric Co., North Adams, Mass., they are wound with ceramic-insulated resistance wire on high-temperature plastic forms and are protected against tropical humidity conditions. Maximum resistance is 500,000 ohms—Electronic Industries

Hand Microphone

A new hand-held carbon mircrophone, made by The Aviometer Corp., 370 W. 35th St., New York, gives a 8 mw output with a 100 dynes per square centimeter input. An accoustic low frequency cutoff and a response to 5000 cycles provides satisfactory voice transmission even under extreme noise conditions. The Retrax flexible rubber cord extends 40 in. with less than a 2 pound pull.—Electronic Industries

Delay Switch

A new delay action switch which has both an instantaneous and a delayed action 'off,' of from zero to three minutes, is being made by T. J. Mudon Co., 1240 Merchandise Mart, Chicago 54, Ill. It is rated at 10 amperes 125 v and will fit any standard wall box.—Electronic Industries

Selenium Rectifiers

With current capacities from 25 ma to several hundred amperes, Radio Receptor Co., 251 W. 19 St., New York City, is making a new line of hermetically-sealed selenium rectifiers. By using aluminum in place of iron or similar metals, the total weight of the unit has been reduced and heat dissipation has been improved—Electronic Industries

Triple-gun CR Tube

For the many industrial applications requiring three separate response indications, the Electronic Tube Corp., 1200 Mermaid Ave., Philadelphia 18, Pa., is making a triple-gun cathode ray tube in a single envelope. It is 8 in. long and with special screen coating gives strong brillance on a 3 in. screen. Deflection and focus are electrostatic and intermodulation between the guns is kept at a minimum by a new type shield plate. This short tube is also made in a two-gun type and is a companion line of regular standard length tubes with a 5 in. screen.—Electronic Industries

Marking Machine

A new bench model marking machine will imprint steel, brass, aluminum and other metals as well as plastics and fibres. Using interchangeable type or logotype dies, almost all types of cylindrical work requiring markings around the periphery or near one edge of the can be handled. Depth of imprint is easily controlled. It is made by Acromark Co., 309 Morrell St., Elizabeth 4, N. J.—Electronic Industries

High Speed Relay

The new Stevens-Arnold Co., 22 Elkins St., South Boston, Millisec relay is an hermetically sealed sensitive relay capable of operating up to 1000 operations a second. Sensitivities of ½ mw with a closing time of less than 1 millisecond are possible. Ratings up to 5 amperes can be had. Outside dimensions of the 115 v ac 1 ampere model are 3 in. high and 1½ in. base diameter.—Electronic Industries

Signal Tracer

Audible and visual indication of signal strength is provided in a new unit made by Special Products Co., Silver Spring, Md. A new design of amplifier is used in this simplified signal tracer.—Electronic Industries

V-T Voltmeters

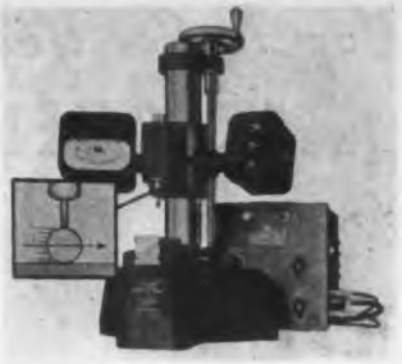
A bridge circuit type vacuum tube voltmeter for the measurement of voltage and resistance has been developed by Electronic Mfg. Co., 140 So. 2nd St., Harrisburg, Pa. Unit measures to 600 v dc with a constant input resistance of 11 megohms. With an external resistance built into a probe any range can be raised a multiple of 4 to 2400 v. A resistor contained in the dc probe permits readings in signal carrying circuits. A reversal switch makes it possible to obtain positive or negative indications. On ac the input capacity is less than 9-mmf giving a frequency response of less than 50 cycles to better than 100 megacycles. Input resistance on ac is 8 megohms on all ranges. A shunt type ohmmeter circuit is used, making only one adjustment necessary for all ranges. The meter is protected by saturation in the electronic circuit. It cannot be damaged by accidental overload. Accuracy is not affected by average line voltage variations. Meter ranges: dc volts 0-3; 0-30; 0-150; 0-300; 0-600. Ac volts 0-3; 0-30; 0-100 Meg.—Electronic Industries

Airport-Marine Radio

A compact radio telephone station combination for point-to-point and ground-to-plane use or as a tower control station has been developed by Aireon Mfg. Corp., Kansas City. With the exception of the antenna supports, the station is installed by plugging in. Suitable for operation by third class radio personnel, both the two-channel 50 watt transmitter and the fixed frequency receivers have push button convenience for either local or remote control. While made for use in the 2.0 to 8.0 mc, 200 to 410 kc and 118 to 132 mc bands, other frequencies are available. Frequency control in both the transmitter and the receivers is maintained by crystals.—Electronic Industries

Potentiometer

A new precision, 10-turn helical potentiometer is being made by Thomas B. Gibbs & Co., Delavan, Wisc., which is linear within one-tenth of one percent over its entire range. The 40 in. of wire wound resistance element used, is moulded as an integral part of the unit housing to provide linear and total resistance stability. Micropots are available in several resistance values from 1,000 to 30,000 ohms.—Electronic Industries



Electronic Gage

Model 130 provides four degrees of magnification, permitting measurements from .000010 in. to .003 in. Pre-selection by dial to give the degree of magnification desired is unnecessary. Dial markings are well-spaced and clear to assure maximum legibility when gage is used "on indicator" for selective sorting. Instantaneous limit lights indicate (green) OK (within limits); (red) oversize; (amber) undersize. To prevent marring or deforming soft or thin-walled parts, the pressure of the diamond contact point can be adjusted to as little as 1½ oz. Depending upon the hardness of the surface, wall thickness, surface contours and speed of movement of workpiece under the gaging contact, this pressure can be increased up to 16 oz. to give best gaging condition. Maker is Federal Products Corp., 1144 Eddy St., Providence 1, R. I.—Electronic Industries

Colored Vitroseal Terminals

A novel method of producing color-coded sealments, which are fired directly into practically any type of cover has been developed by the Vitroseal Corp., 342 Crescent Avenue, Wyoming, Cincinnati 15, Ohio. The process eliminates necessity of paint-spotting operations, providing an indestructable coding. Manufacturers are not restricted to standard terminal types, but may specify designs of hermetically sealed components in which terminals are spaced to facilitate assembly and to give the product a distinctive appearance.—Electronic Industries

Aircraft Transformers

For special applications such as aircraft installations, American Transformer Co., 178 Emmet St., Newark 5, N. J., is now vacuum oil impregnating these units. Enclosing cases have also been redesigned. In addition to the vacuum oil impregnation both core and coil receive a vacuum varnish treatment.—Electronic Industries

PHOSPHORS

(Continued from page 105)

satisfactorily in the tube (be efficient, have the proper spectral distribution, etc.), but it must also be able to withstand the severe processing conditions of vacuum tube manufacture. The following description of the manufacture of cathode ray tubes will bring out most of the rigors that phosphors have to undergo during the manufacturing process.

Essentially there are three parts to the cathode ray tube: 1. the viewing screen, 2. the source of electrons, 3. the deflection and focusing systems. These three parts are manufactured separately and assembled.

1. The viewing screen—After the phosphor has been manufactured it must be brought to the proper particle size so that it can be applied to the vacuum envelope or bulb. This is done by milling or grinding. It may be suspended in water or a dilute solution of phosphoric acid, or in an organic binder such as nitrocellulose. It may be applied in a number of ways among which are spraying, dusting, flowing-on, settling from suspension, and electrostatic precipitation. After the phosphor has been deposited firmly on the inner surface of the bulb the second anode conductive coating is applied. The bulb is then dried thoroughly by heating at 400° C.

The electron gun (source of electrons, focusing and deflecting systems. The gun is built by assembling on a molded glass and wire assembly (stem), a cathode (source of electrons and a filament to heat it), an electron focusing and deflecting system. This electron gun structure is connected to the prepared bulb in an operation known as "sealing in," in which the glass of the bulb and that of the stem are made to completely connect with each other by melting down and fusing together, see Fig. 14.

The tube is then ready for the removal of the gases from the bulb and its components (the phosphor screen and second anode coating), and from the filament, cathode, and ceramic and metal parts of the gun structure. During this "exhaust" operation the bulb is outgassed by heating in an oven (see Fig. 15), at 400° C, the metal gun structure by high frequency induction heating, and the filament and cathode by the passage of cur-

rent through the filament. The final step is the sealing off of the completely evacuated tube from the vacuum system. The getter is flashed to remove the last traces of gas. The tube is then operated for a short period in an aging process in which the cathode is brought to a good emitting condition and the residual gas in the tube is cleaned up, thus stabilizing the finished product, see Fig. 16. (*To be concluded*)

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TRANSITRON OSCILLATOR

(*Continued from page* 112)

with the proper fixed capacitor in the circuit the range is extended to beyond 175 kc.

The problem of coupling was readily solved by the use of an amplifier and cathode follower stage, Fig. 7. The reflection from the load upon the oscillatory circuit is practically nonexistent. The output feeds into a 300 ohm line. The output waveform is almost sinusoidal in its appearance as observed on a 5 in. oscillograph.

As can be seen from Fig. 7 the tuning capacitor C_1 in the oscillator tank was returned to ground, following the setup in the laboratory model. In the final circuit, however, this capacitor was returned to B+ of the coil. The reason for this change was the fact that the chassis of the unit was not tied to the grounded side of the power line, but was floating

and returned through a 1 mfd to the power line.

In the earlier setup the chassis was used as the negative return for C_1 as shown in Fig. 8. Although the reactance of the bypass condenser C at the operating frequency was only a few ohms, it was effectively in series with the oscillating circuit. The tank circuit was also shunted by a 50 mmfd negative capacitor of the ceramic type. The combination of these capacitors produced a curve with almost no frequency deviation during the ambient temperature change test.

When a later model was being tested, C_1 was returned to B+ and with a change in ambient temperature, the frequency deviation showed a very rapid excursion rate. The retrace of the unit operating at 50 kc fell far from the initial traces as in Fig. 9. Mechanical support of the variable capacitor was suspected and single-ended mounting was resorted to. An improvement was noted and is shown in Fig. 9A which gives initial and retrace run. It can be seen that the deviation with ambient change is still here, but at a uniform rate. This run was made at 100 kc.

A change over to the condition as shown in Fig. 8 proved that compensation due to the bypass capacitor existed accidentally in such a proportion as to produce an almost perfect compensation i.e. ±4 cycles for a 50° C. change.

To compensate the actual deviation from frequency produced by means of small capacitors appeared rather difficult, since many factors enter into the picture. The decision was made, therefore, to place the tuning elements under temperature control. L and C (fixed and variable) were isolated from the chassis holding the oscillator tube, amplifier and cathode follower. The chassis was then subjected to ambient temperature variations and the results are noted in Fig. 10.

The LC parts were housed in a small, specially designed compartment under temperature control. The construction of this compartment was such that five of its sides were lined with heater elements, thermostatically controlled. The exterior was enclosed in a jacket of ½ in. felt. The temperature within the compartment was maintained at 60°±5° C. A complete run from —40° to +60° C. with the unit completely assembled resulted in a performance of ±0.005 cycles at 50kc, ±5 cycles at 100 kc and ±9 cycles

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at 150 kc. A small additional capacitor of proper characteristic permitted sufficient compensation as to result in an overall performance of ±5 cycles over the range from 40 kc to 175 kc. The tuning capacitors (fixed type) selected are units with a stability of plus or minus twenty parts in one million.

A run at 400 kc without special compensation, but temperature controlled tank circuit components is shown in Fig. 11.

The overall stability of about 40 parts/million, is a compromise selected to eliminate any possible irregularities caused by changing tubes. Greater LC ratios have shown a greater stability of frequency with respect to voltage and temperature.

PRINCIPLES OF LORAN

(Continued from page 107)

they can be treated separately by using a fast sweep to expand the pedestal time interval across the cathode ray screen for more accurate measurements.

The fast sweep circuit produces a sweep voltage in which amplitude varies almost linearly with the time occupied by the pedestals. In the fast sweep position only the tops of the pedestals appear on the oscilloscope screen.

Making a reading

A typical oscilloscope pattern of a Loran indicator is shown in Fig. 3. The long downward pulses are 500 microsecond markers. When the two signal pulses appear on the screen the object is to "stop" one on the A pedestal and the other on the B pedestal. The master station pulse is on the A trace or pedestal; the slave station pulse appears on the B trace. These signals can be stopped since the transmitter and receiver-indicator pulse rates are synchronized. When the signal is halted in the "B" pedestal, the time difference of the two signals can be read on the oscilloscope screen. First approximation readings are made from the left edge of the A pedestal to the left edge of the B pedestal. In Fig. 3, the time between left edge of A pedestal and B pedestal is 3000 μ sec.

Expansion of the sweep (Fig. 4) allows only the pedestal tops to be examined at full scale. Fig. 4 shows a total of five 500-microsecond markers and intermediate 50-microsecond markers. Examination of Fig. 4 shows that the time between slave and master signals is


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1150 microseconds to the last 50-microsecond marker.

A further expansion (Fig. 5) of the sweep reveals the 50-microsecond intervals. This shows a time difference of 22 minus 7 or 15 microseconds. The total time difference of signals is therefore 4165 microseconds. This operation must then be repeated on a second pair of signals to determine a position fix.

WIDE READING

(*Continued from page* 114)

The English system, called "Gee," operates at shorter wavelengths. Although longer distances can be covered by the Loran system, multiple reflections, however, from the ionosphere introduce errors.

Arbitrary time delays introduced between the emission of pulses from the two antennas may be employed to prevent use of the pulse signals by the enemy. A last moment change made known to friendly aircraft, would necessitate remeasurements by the enemy before his aircraft could use the system.

The Gee system was also of great value in enabling aircraft to home right back to base. The first Gee raid was made on the night of Mar. 8, 1942, when about 350 aircraft made a heavy attack on the Ruhr. The performance proved highly satisfactory. The article includes a short history of the development of Gee stations in England.

Zircon H.F. Insulation

(Electrical Engineer and Merchandiser, Melbourne, April 16, 1945).

Zircon porcelain has been found to be superior to steatite porcelain for the manufacture of electrical insulators used in ultra high frequency signaling equipment. The tensile strength is 37% greater than that of standard porcelain, compression strength is 15% greater and resistance to transverse blows 30% higher. Zircon is more impervious to moisture than steatite porcelain.

Radar Specialists Available

Radio and radar specialists serving the War Production Board, Region 2 consisting of New York State and Northern New Jersey, are now available to private industry for employment. Information regarding employment of these specialists can be obtained from WPB, Empire State Building, New York. N. Y.

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2. **Studio equipment and accessories**
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4. **Automatic positioning mechanisms**
5. **Amateur radio equipment**

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The Collins 21A 5 kw. AM Air Cooled Broadcast Transmitter

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1. 21A, 5000/1000 watts
***2.** 20T, 1000/500 watts
3. 300G, 250/100 watts

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AM and FM Studio Equipment and Accessories

1. 6P preamplifier

2. 6M program amplifier

3. 6X line amplifier and monitor

***4.** 12W studio console

5. 12Y portable remote amplifier, 1 channel, a.c.

6. 12Z portable remote amplifier, 4 channel, a.c./d.c.

7. 26W limiting amplifier

***8.** equalizers, mixing panels, jack strips, attenuators

Singleturn or multiturn Autotune heads are available in a torque range of 4-25 inch pounds.

The Collins Autotune

The Collins Autotune is an electrically controlled means of mechanically repositioning adjustable rotary elements. Any combination of such components can be returned to any one of a number of preselected positions. By means of the Collins Autotune system, radio transmitters and receivers can be completely retuned in a matter of seconds. The Autotune system is readily adaptable to a variety of industrial control requirements.

Frequency Modulation

Broadcast Transmitters

***1.** 735A-1, 50,000 watts

***2.** 734A-1, 10,000 watts

***3.** 733A-1, 3,000 watts

***4.** 732A-1, 1,000 watts

***5.** 731A-1, 250 watts

Communication Equipment

***1.** 25 watt to 250 watt mobile and fixed transmitters in a frequency range of 25-162 mc.

***2.** Associated control equipment

***3.** Receivers for specific applications

The Collins 231D AM Autotune Communication Transmitter

Leadership in Radio Communications

The Collins 51K-1 Communication Receiver

AM Communication Equipment

1. 231D, 10 channel, 3-5 kw., 2-18.1 mc., Autotune Transmitter, crystal or sealed M.O. control
2. 16F, 10 channel, 300-500 watts, 2-20 mc., Autotune Transmitter, crystal or sealed M.O. control
3. 32RA, 4 channel, 50-75 watts, 1.5-15 mc., band-switching transmitter
4. 51K-1, 10 channel, 2.4-18.3 mc., crystal controlled, Autotune aircraft receiver

*5. 51H-2, 20-30,000 kc., communication receiver

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The Collins Research Division, directed by eminent scientists who contributed to the development of many exacting radar applications, is conducting a continuing program in the field of advanced research. The benefits of this program may be expected to result in entirely new products of far-reaching effect in scientific applications. These benefits will also be reflected in the ever-advancing design of Collins radio equipment.

*Scheduled for first half of 1946.

Collins Radio Company, Cedar Rapids, Iowa; 11 West 42nd Street, New York 18, N. Y.
In Canada Collins equipment is sold by Collins-Fisher Limited, Montreal

IN RADIO COMMUNICATIONS, IT'S COLLINS

FM BAND TESTS

(Continued from page 79)

This was done by generating a local field with an oscillator situated some distance away, and measuring this field in terms of recorder signal generator microvolts.

The antenna was then replaced by the antenna of a field intensity meter, and the field intensity directly measured. Two independent measurements of this kind were made, one by W. K. Roberts of the FCC, and the other by Stuart Bailey and Philip Laeser of WTMJ. Averages of these two sets of measurements were used as multiplying factors.

As a final check, the signal on 45.5 mc was used for calibration by recording it on a field intensity meter and on the test recorder simultaneously, and then checking peaks on both tapes.

Since it was not possible to obtain the same radiated power on both frequencies, the 91-mc data was corrected for an assumed power equal to that at 45.5 mc (35 kw). Direct measurement of 91-mc radiated power was made by Major Armstrong and C. M. Jansky by observing the current at the center of a dipole two wavelengths from the radiator. A multiplying factor for each day's operation was thus derived.

Receiver performance

Conservative estimate of performance of typical commercial receivers for these frequencies yields a limiting sensitivity of not less than 10 μv as measured by a signal generator through a dummy antenna load. Less than 10 μv will fail to produce limiting, resulting in completely unsatisfactory reception.

At 45.5 mc, the effective length of a half-wave dipole is approximately two meters, and five μv/m is required to produce the needed 10 μv. At 91 mc, the effective length is only half as great, and the required field is 10 μv/m. From the foregoing curves it is seen that the required minimum field is met 100% of the time at 45.5 mc, while it is below the required minimum at least 35% of the time at 91 mc.

It is to be emphasized that these figures are for tuned antennas mounted well in the clear, with short transmission lines. The average casual antenna installation could throw the 91-mc signal below the minimum most of the time, while appreciable margin remains before the 45.5-mc signal is seriously degraded.

(Continued on page 146)

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(Continued from page 144)

Fading is also a factor to be considered, as it is a greater cause of interference at this distance than is a low average signal. The magnitude and repetition rate of fading on 91 mc is much greater than on 45.5 mc.

When one drop-out per hour is taken as a basis for evaluating the fading factor, it is found that only 27% of the total time on 91 mc is free from drop-outs; on 45.5 mc, the figure rises to 87%. On practically all days, the hours from 11:00 to 3:00 or 4:00 are completely unsatisfactory at 91 mc, due to rapid and extensive fading. This is not to say that fading is absent at 45.5 mc, but it occurs much less frequently.

It has been concluded by the investigators that the curves used by the FCC for predicting average field intensities at these frequencies and distance are not in accord with observation. On this basis, the 45.5-mc signal was approximately twice the predicted value, and the 91-mc signal was one-half the predicted value.

They assert, therefore, that if the reallocation of FM frequencies was for the purpose of eliminating interference, the intent will fail at this distance, since the amount of interference due to fading is many times greater than the sporadic E interference which it is attempted to eliminate.

Rural coverage will be greatly decreased on the higher frequency, according to the investigators, since the test showed that a usable signal was obtained 85-90% of the time on 45.5 mc, but only 30% of the time on 91 mc.

Engineering Service

An engineering service for manufacturers is offered by the Associated Electronics Corp., 132 Nassau Street, New York 7, N. Y. Facilities include designing new products, developing new processes and technics, trouble shooting, laying out production and assembly lines, supervising methods, procedures and practices to be used, investigating the causes of rejections and failure of materials and products and the initiation of corrective measures. A well-rounded staff of draftsmen, detailers and designers with experience in several fields, especially in the electronic field, is supplemented by an Industrial Advertising Department which prepares catalogs for manufacturers.

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Radio, electronic and radar equipment is necessarily delicate in construction and necessarily precise in its functioning. The enormous recent advances, first made on paper, when translated into practice have almost invariably run into one major difficulty . . . vibrational interference.

So, Lord, pioneer and leader in subduing the harmful forces of vibration, has been called upon for a wide range of applications in this field. Where possible, outside vibration forces have been isolated at their source; vibration of component parts has been controlled; and delicate parts and instruments have been protected from outside interference by isolation.

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Originators of Shear Type Bonded Rubber Mountings

TUBE LIFE

(*Continued from page* 96)

temperature for best economy, both for present tubes and in connection with the design of future tubes. Should they be operated to have many thousands of hours of life or should they conform to the normal practice of having a life expectancy of the order of 3,000 to 4,000 hours? The particular 892 on which this discussion is based is assumed to have a life of 3,300 hours.

In one method of analyzing the question of proper filament operating temperature followed by the writer, the normal operation of a single 892 is compared with operation of two and then four tubes with reduced filament voltage and temperature just sufficient in each case to provide the same total emission. Fig. 2 shows that the tube operating cost per hour is actually reduced by these means even though the initial tube costs are double and quadruple respectively. This is due, of course, to the fact that the life expectancy is increased by the lower operating temperature at a rate faster than the increase in total tube cost.

To conclude from this that operation by such means is desirable is not correct. The final conclusion should be based on a consideration of overall operating cost. The latter point is more clearly illustrated in Fig. 3.

Hourly costs

In this figure the same 1, 2 and 4 (892) tubes are considered. The last three columns give the cost per kw hour of useful output energy and are calculated on the following assumptions: the output power in each case is 10 kw; the overall plate circuit efficiency is 60%; and again the filament voltages are adjusted so that the same total emission is obtained whether 1, 2 or 4 tubes are used.

Notice now that decreased overall energy output costs are obtained only when the electric energy rate is very low. Here, too, this economy should only be considered when the possibility of failure due to other causes is negligible.

The above discussion is directed toward operating existing tubes in a manner to give increased life-expectancy. Let us now examine whether new tube designs should depart from present practice of approximately 3300 hours design life to, let us say, 10,000 hours.

(*Continued on page* 152)


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This review, depicting the various steps in the manufacture of a mica capacitor is a reminder of how important the SANGAMO MICA CAPACITOR production set-up is to you in the matter of quality control from the first operation – MICA SPLITTING—all the way through to the final operation—FINAL TESTING.

WRITE FOR *Catalog*

As a user of MICA CAPACITORS, you will want to have the story of SANGAMO EXCELLENCE for reference. Therefore, we have bound the entire series of advertisements featuring the departments shown here, into a booklet. Simply write and ask for your copy of the booklet "HOW EXCELLENCE is built into SANGAMO MICA CAPACITORS."

COMPANY SPRINGFIELD ILLINOIS

• • WATT HOUR METERS • • • TIME SWITCHES • •

(*Continued from page 148*)

The subject of "long-life" tubes should be considered in the light of over-all operating expense. The components of this expense in the order of their importance are, power costs, depreciation cost and tube replacement cost.

In the case of communications, the initial cost of the high power stage or stages is nearly impossible to determine so that depreciation charges may not be determined readily.

In the case of industrial equipment, units are more clearly defined and with regard to initial costs were found to average $375 per kw. Five units of approximately 20 kw each, varying in design to suit different applications were considered. The highest cost was approximately $570 per kw and the lowest $240 per kw.

In discussing the subject of equipment life, John P. Taylor says "the useful life—is long and most likely will be terminated by obsolescence rather than wear. Depreciation therefore, can be based only on some arbitrary figure such as that used for tax purposes. Depreciation was figured on the basis of 25,000 hours of operating life (approximately three years at twenty-four hours per day or nine years at eight hours per day)". Several other authorities, when consulted were in substantial agreement with this figure.

Determining costs

The average cost of a 20 kw unit being $7500 it follows that the average hourly depreciation is 30c per hour.

With regard to the cost of power (energy) the figure of 1c per kw hour frequently is used. Most power companies have a sliding scale of energy cost and also have additional charges such as these for maximum demand. Small and medium size consumers therefor will find that the average cost of electricity determined by dividing the billed amount by the total kw hours used generally is greater than 1c per kw hour. The average for communications and industrial high-frequency users is felt to be nearer 2c per kw hour.

Fig. 4 shows the components of the overall operating cost of an average 20 kw industrial unit. (Labor cost of operator is not included.) Maintenance is negligible compared to other charges. The hourly tube replacement costs for the long life

With a proven background of honorable service on far-flung battlefronts around the world, Amphenol components—greatly improved by wartime experience and augmented in number, style and type—are now available to normal markets. Simplifying both buying and selling, this wider selection of high quality, tested items can be procured from one manufacturer. To know these popular Amphenol products better—write today for the new Condensed Catalog No. 72.

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tube are based on the assumption that the initial cost is 50% greater than a normal tube. Note that with energy at 3c per kw hour, the normal tube costs less to operate than the "long life". Even with 1c energy the saving of the long life tube is so small that increased consideration should be given to the additional hazard of tube failure due to abnormal conditions.

Let us consider further the design of a "long-life" tube. As a first assumption let us suppose that such a tube could be produced with no increase of unit cost. There will be a decrease in emission efficiency, however, so that the power costs will go up. It can readily be shown therefore that no over-all economy is realized to increase the tube life under these conditions unless the average electric energy rate is under 3.2 cents per kw hour.

Redesign needed

The fact that to obtain the requisite emission and longer life requires additional filament power means that a substantial re-design is required with larger grid and probably larger anode also. Let us assume therefore that the tube cost must be increased by a factor of 50%. Under these conditions unless the electric energy cost is less than 2.3c per kw hour, the overall economy is better with a 3300 hour tube than with a 10,000 hour tube.

As a final step consider if the tube costs were doubled in order to obtain the longer life. Then no economy would be effected unless electric energy cost is less than 1.7c per kw hour. This, it will be noted, agrees with the conclusion arrived at of Fig. 3.

Increasing life

All of the foregoing is based on the use of normal emission in the single tube arrangements. Actually, few equipment designers will operate tubes at maximum ratings. The 892 for example, is generally operated to give an output of 10 kw or less. (The maximum rating is 14 kw.)

Under these conditions it is entirely proper to adjust the filament voltage to a point where 70% of rated emission is obtained. At this point the life expectancy of the present design of tube is increased to 5600 hours and the "long-life" tube is increased to 16,600 hours.

Under these moderately loaded and properly adjusted conditions a "long-life" tube is justified only if the energy rate is less than 1.9c per hour. (Assuming tube cost is no greater than the present.)

If the new tube is 50% higher in cost, then an energy rate of 1.4c per hour or less is necessary for justification of the long life tube.

Automatic Filament Adjustment

In some communication services and in many industrial services equipment is called on to deliver power for only some fraction of the time. If the transition from "power-on" to "power-off" is not too rapid it would appear desirable to reduce the filament voltage to let us say .8 of normal during the stand-by or "power-off" periods. The expected life increase due to this mode of operation is illustrated in Fig. 5.

Vacuum tubes come to the end of their useful life due to a variety of reasons, some abnormal. The normal life of a tungsten filament tube is determined by the time of evaporation and its operating temperature. The choice of the proper operating temperature and hence the choice of a proper design life should be governed by a consideration of the total power cost and by the possibility of failure due to abnormal causes.

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October 18, 1945

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Ethical engineering at Eastern is the history of many years in the service of sound amplification. The 21 Star Features are the result of intensive experience dating back to the early days of radio—the pioneer 20s! Today this engineering background accounts for the many innovations we have designed for the new 1946 Eastern Amplifiers—the 21 Star Features that produce Eastern's famous *Quality Performance.* No other amplifiers, regardless of price, incorporate so many novel and useful features. ...For complete information and price list—for the first edition of our 1946 Catalog—write today! . . . Eastern Amplifier Corporation, 794 East 140th Street, New York 54, N. Y. Dept. 12M

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Electrodes, Filaments and Contacts—Cupaloy, molybdenum and tungsten are three Westinghouse metals with high purity and exceptional physical properties. Cupaloy—a nearly pure copper, alloyed with silver and chromium—offers many advantages because of its high yield and tensile strengths, contrasted with the softness of copper. Tungsten is hard, dense, has a high melting point, and makes a perfect seal with glass. "Moly", a metal with a promising future, finds wide usage because it can be made gas-free quite easily.

Brazing and Soldering Alloys—Westinghouse Phos-Copper, 35-Alloy and solders play an important role in every phase of industrial joining, and the particular characteristics of each metal fit it especially for certain joining operations. Comparative data and discussion make quick selection possible.

EQUIPMENT FOR THE COMMUNICATIONS INDUSTRY

A New Catalog on Devices—
Westinghouse has just compiled a new catalog on general-purpose switches, relays and other devices. The devices listed in this catalog have been refined over many years to meet the exacting demands of engineers responsible for plant performance. The catalog contains data on the following classes of products: Indicating Lamps and Wiring Devices, Pushbuttons and Control Switches, General-Purpose Relays, Contactors, Pressure, Vacuum and Limit Switches, Timers, Protective Relays and Photoelectric Devices.

Instrumentalists Meet

Several hundred scientists, industrialists and educators were in attendance at a week-long conference sponsored jointly by the recently formed Instrument Society of America and the Carnegie Institute of Technology starting October 16th in Pittsburgh. The Instrument Society of America was formed by uniting the local groups of the Society of Measurements and Control meeting in various cities for the past several years.

One of the features of the conference was to analyze technical advantages in the science of industrial instrument design and utilization, and to discuss its probable post-war importance in the curriculum of technical schools. The conference considered particularly the problem of how to train technical personnel in the skills necessary for applying the latest instrumentation methods in industrial measurement, inspection and testing of any product.

During the first three days of the conference more than thirty papers were given by industrial engineers, educators and by members of military organizations who have been charged with the utilization of most modern instrumentation processes in building up production of intricate equipment.

China Plans Radio Relay

It is reported that the Central Government of China is planning to establish a network of broadcasting stations, linked by radio relay, to service the heavily populated areas of the country, according to Larry E. Gubb, chairman of the board of directors of Philco Corp. The idea behind the plan is gradually to educate the people to use a single language rather than the many dialects now in use.

Muter Purchases Rola

The Muter Co., 1255 South Michigan avenue, Chicago, headed by Leslie F. Muter, well-known radio figure and former president RMA, has purchased the entire capital stock of the Rola Co., Inc., Cleveland, Ohio, manufacturer of loudspeakers. Continuing to operate under the Rola name, the Cleveland organization will be listed as a division of the Muter company. An incorrect item in last-month's issue reported the name of the purchasing company erroneously.

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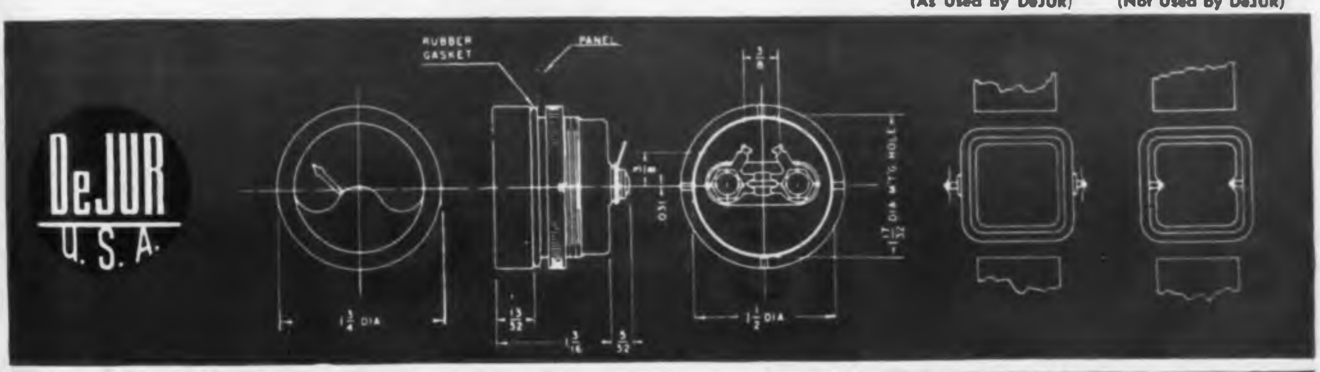

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NEW BOOKS

Treatise on the Mathematical Theory of Elasticity

By A. E. H. Love, M.A., D. Sc. F.R.S., Sedleian Professor of Natural Philosophy in the University of Oxford, Fourth Edition, published by Dover Publications, New York City, 662 pages, $3.95.

This is the first American printing of an English book that has been considered for years the standard treatise on elasticity. Containing a wide range of practical material on plates, beams, shells, bending, torsion, etc. as well as a thorough, rigorous discussion of theoretical aspects, the text has been and will be of great value. It is "the book" on elasticity.

Electronics Dictionary

By Nelson M. Cooke, Lieut. Comdr., USN, Executive Officer, Radio Materiel School, Naval Research Laboratory, Washington, D. C., and John Markus, Associate Editor Electronics, published by McGraw-Hill Book Company, New York, 1945, 433 pages, $5.00.

This glossary of over 6000 expressions of the subject of radio, television, industrial electronics, communications, facsimile, sound recording, etc. will be very convenient to engineers working in these fields. A short, readily understood definition or description of the term is frequently accompanied by a diagram or sketch to clarify the meaning. The dictionary contains much useful information regarding the rapidly expanding terminology which is trying to keep up with recent developments.

New Armour Licensees

Bendix Aviation Corp. is one of four new licensees to manufacture magnetic sound wire recorders under the Armour patents. Bendix plans to produce wire recorders with home receiver sets and also office dictating machines, portable recorders, and recorders for entertainment use. The other three licensees are Bang and Olufsen of Copenhagen, Denmark, Pyrox Proprietory Ltd. of Melbourne, Australia, and the Saint George Recording Equipment Co. of New York.

Aireon Buys Lewis

To further complement its postwar plans, Aireon Mfg. Corp., Kansas City, has acquired Lewis Electronics, Inc., Los Gatos, Cal. Lewis has long been a manufacturer of transmitting and industrial tubes.

ACCELERATOR

(*Continued from page* 93)

multiplied by the area of the orbit.

Since the magnetizing windings present a highly inductive load to the 200 KVA generator used as a current supply it was found necessary to resonate the circuit by means of a bank of capacitors thus bringing the power factor up to unity. The resonant voltage produced is 24,000 and necessitates careful insulation, there being 600 volts per turn and about 6,000 volts per layer.

The capacitor bank dissipates about 80 kilowatts, this representing a power factor of about ⅛ of 1%. The ion losses are around 100 kilowatts and both the magnet and the capacitor bank are cooled by forced air circulation.

The assembled glass vacuum tube is nearly elliptical in cross section and consists of 16 sectors of moulded pyrex glass having a minimum thickness of ¼ in. Their inner surface is made conducting by silvering. The carefully ground ends of the sectors are butted together and sealed with red glyptal paint. The inside silver surface is grounded and cross connected on the outside of the tube by means of resistors to decrease eddy currents.

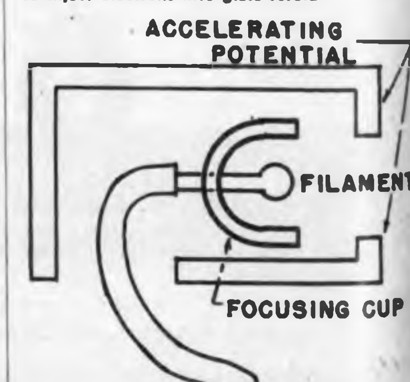
There is a rigid connection to a pump system including a liquid air trap and a mercury vapor pump. With this system it takes only an hour to evacuate the tube so it can be operated and at the end of two hours the pressure is usually down to .001 micron or less.

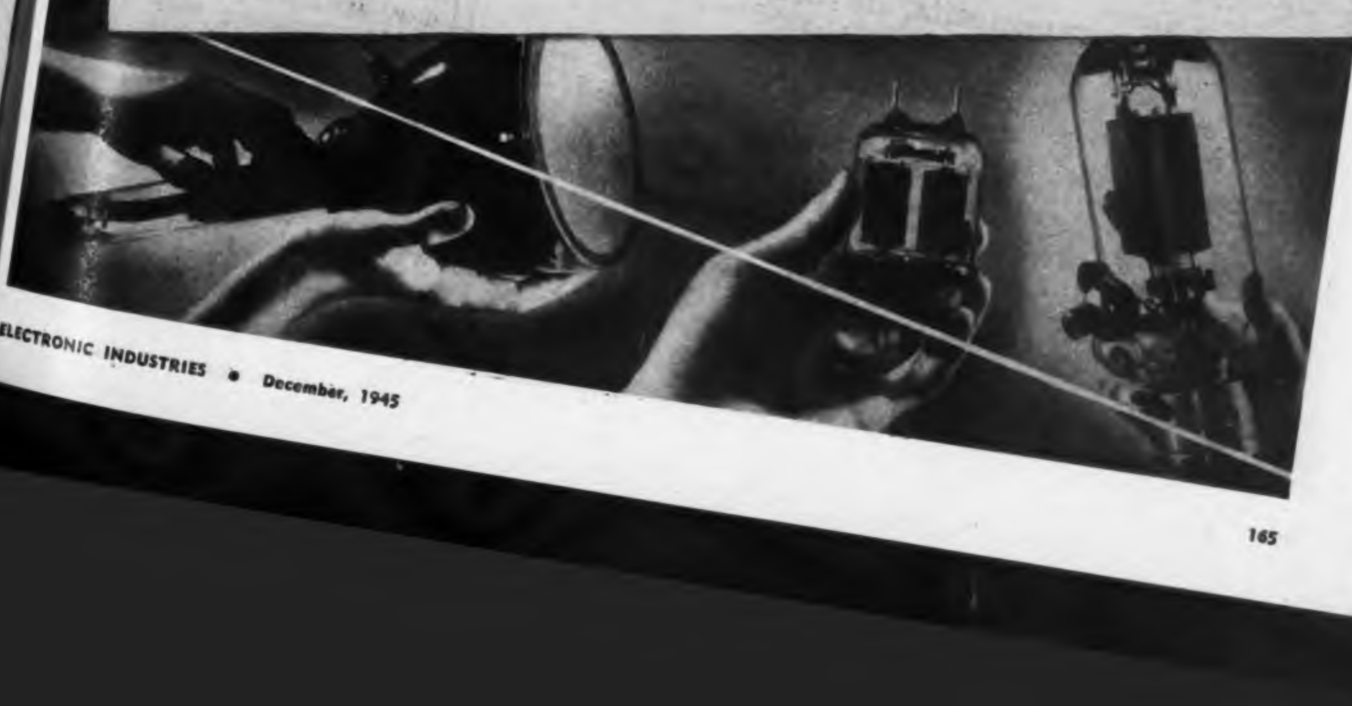
Since the whole magnetic structure vibrates when alternating current is turned on and emits a loud noise with an intensity of about 120 to 130 db. rubber supports are provided both for the entire structure and for the glass tube.

In the design of this machine, the electrical circuits required careful

(*Continued on page* 166)

General arrangement of the electron gun used to inject electrons into glass toroid





(*Continued from page 164*)

balancing because a change in the line frequency as little as 1/10 cycle caused detuning of the resonant circuit and resulted in the creation of a substantial leading or lagging current. It was found that the insertion of a series capacitor in the circuit to neutralize the generator synchronous reactance and the use of an 8 ohm resistor dissipating between 50 and 80 kilowatts eliminated troublesome low frequency oscillations.

To house the equipment a special building is required with 3-ft. concrete walls and a 1-in. motor operated steel door. The machine is run from an adjoining room and numerous interlocks are installed to prevent its operation before the room is cleared.

Electrons are injected into the tube tangentially by means of a heated filament and an accelerating voltage. Since electrons must be injected only when the magnetic flux is rising, a triggering circuit is incorporated. A small piece of permalloy surrounded by a winding is placed in the magnetic circuit between the poles in such a manner that most of the time it is saturated with flux. As the alternating voltage however crosses the zero line, a flux reversal takes place which momentarily causes a change in the flux in the permalloy strip. This triggers the grid of an SG 41 thyratron and permits the accelerating voltage to be impressed on the electron gun.

Orbit contraction coils

The orbit contraction coils have a diameter equal to that of the orbit of the electrons. They are bucked by compensating coils wound at a greater diameter so that the reluctance of the air gap within the compensating coils is half that within the expansion coil. The result is that a flux created by the capacitor discharge passes up through the center of the orbit and down again between the expansion and compensating coils. The arrangement is such that this pulse of flux is zero at the orbit diameter. The effect then is to change the radial gradient of flux, that is to say the flux distribution in the air gap between the pole faces is so altered that the orbit contracts slightly. The time of contraction can be varied so as to produce x-rays of less than 100 Mev energy.

(*Continued on page 168*)

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GENERAL ELECTRIC

(Continued from page 166)

In order to make cloud chamber studies the machine can be operated to give short bursts of x-rays at approximately one minute intervals. To do this the capacitor bank is split in the center, one-half being charged to a positive and the other half to a negative potential. The result is an oscillatory discharge with a time constant of .28 seconds.

RMA Reorganizes Sound Division

The Amplifier and Sound Equipment Division of the Radio Manufacturers Association has been reorganized. The new organization of the division include a five man executive committee that will coordinate engineering research of five new division sections. The new sections are:

1. Commercial Sound Equipment Section, for projects covering auditoriums, schools, hospitals, banks, etc., also railroad and aircraft equipment. The section will cooperate with the over-all RMA committee for "school equipment," dealing especially with the interests of sound equipment manufacturers.
2. Acoustic Section, to promote interests of manufacturers of microphones and accessories, horns, baffles, etc.
3. Intercommunication Section, to handle development and promotion of office and other public address apparatus.
4. Marine Equipment Section, to deal with special problems of sound equipment for ships.
5. Recording Equipment Section, to promote interests of manufacturers of discs, wire, tape and other similar apparatus.

Plastic Casting Method

Samuel Wein, specializing in plastic technology, at 2054 Harrison Avenue, Bronx 53, N. Y., has developed a plastic casting method whereby phenolic plastic castings in any color or shade or combination of colors can be made in plaster-of-Paris molds. By this method it is possible to get short runs if required in order to make changes or to get "customer reaction" for a particular cabinet design, and also long runs merely by using a gang or series of plaster molds. The process is not limited to size. The service rendered is one in which castings in plastics, including radio cabinets, are made for the trade.

PATENTS

(*Continued from page* 120)

inate against disturbances arriving at the same frequency. Either the amplitudes of the modulating pulses or their duration serves as separation characteristic. Fig. 1 illustrates two pulses which may be simultaneously transmitted over the same carrier; they have the same energy but different amplitude and duration.

If the two series of impulses, 1 and 2, are expanded in Fourier series, the coefficients of the terms for the two series will be as represented by the curves of Fig. 2. Satisfactory reception of the short pulses 1 may be obtained with a pass band of the order of four f, while the longer pulses 2 require only a pass band of the order of f. In a receiver of pass band four f, the peak of the short impulse 1 will be approximately twice as strong as the peak of the long impulse 2. If, however, the pass band of the receiver is made equal to f, the amplitudes of the long pulses 2 will be almost twice that of the short impulses 1. Discrimination between the two series of pulses may therefore be based on the choice of suitable band pass filters. The receiver will include suitable band pass filters, having ranges f and four f in the example mentioned. Each filter will be followed by a limiter passing on only the stronger component to the subsequent circuit elements.

Another method of separation is based on different pulse amplitudes. Assuming a receiver including a limiter which only passes the largest amplitude, another which passes pulses of the largest and the second largest amplitudes, and a further which passes all pulses, there being three series of pulses transmitted on the same carrier. The first receiver output will provide one message, the second message may be isolated by rendering the second receiver inoperative in response to pulses derived from the first receiver, while the third message is obtained from the third receiver which is made inoperative by pulses derived from the second receiver.

This system of communication is particularly applicable where a message is on purpose disturbed. It is possible to separate from the communication a disturbance unless the duration, frequency, intensity and phase of the disturbance relative to the impulses are similar. Variation of the duration of the pulses, in accordance with a code previously agreed upon by transmitting and receiving station, may eliminate disturbances.

E. H. Ullrich, International Standard Electric Corporation, (F) November 8, 1941, (I) August 7, 1945. No. 2,381,847.

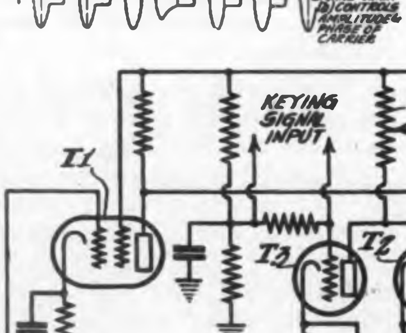
(*Continued on page* 172)

(Continued from page 170)

Amplitude Modulator for Facsimile

It is the object of the invention to modulate the amplitude of a wave produced by an RC coupled oscillator at the maximum keying rate that will produce a satisfactory signal at the receiver; further, the signal is to determine the zero phase starting position of the carrier wave and no transients are to be introduced by the keying mechanism.

The output of the oscillator tube T_1 is fed into the RC delay network through a cathode follower tube T_2 so that the oscillation amplitude depends upon the gain of the cathode follower. A modulator tube T_3 controls the gain of the cathode follower by way of a common plate resistor 21, the voltage across this resistor being determined by the current through the modulating tube which varies the gain of the cathode follower. A change of the voltage at the cathode of the cathode follower is prevented by balancing the decrease and increase of voltages across resistors 31 and 26 which are given values suitable for this purpose. No transients will be introduced by the signal at the input of the delay network; it merely controls the gain in the feedback loop and consequently the amplitude of the sine wave oscillations. These oscillations can be effectively started and stopped by the keying signal. Additional regenerative feedback connection 39, having the same time constant as the oscillator build up or decay, permits the oscillations to be started practically instantaneously by a keying signal.



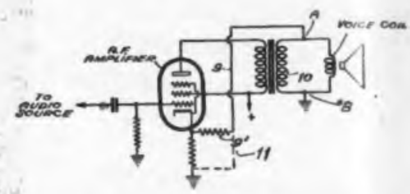
The second figure illustrates the difference between the conventional set-up and the apparatus according to the invention; the keying signals, supplied by a facsimile scanner, are of negative polarity. The signal of graph d would print a medium gray almost all through this series of keying signals with only the long dot of the series printing at full amplitude. In graph e, while most of the dots are slightly elongated, they are all printed at full amplitude and with definite spaces between them.

Another embodiment of the invention incorporating two diodes instead of the tube T_3 is also described and claimed.

M. Artzt, RCA, (F) February 22, 1943, (I) April 17, 1945, No. 2,373,737.

Power Amplifier

If the by-pass capacitor in an audio power amplifier is omitted to reduce its cost, the degeneration in the cathode resistor causes a reduction in gain not desirable in



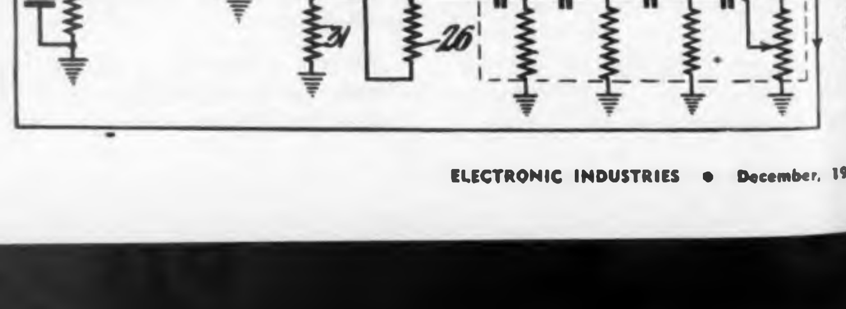
small receivers. The invention provides for a positive feedback connection 9 between voice coil and cathode resistor to compensate the loss through degeneration in the cathode resistor. The dotted line 11 indicates an alternative to resistor 9'.

In another embodiment, a tap of the secondary coil 10 is grounded and two connections taken from opposite ends of the voice coil are fed back to the power tube and a preceding amplifier tube, respectively.

W. R. Koch, RCA, (F) January 13, 1943, (I) August 28, 1945, No. 2,383,867.

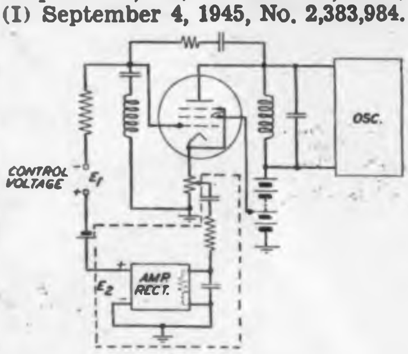
Selective Amplifier

The selective amplifier claimed is designed for zero phase-shift throughout the transmission band. It includes two feedback loops each



of which incorporates two parallel-T networks connected in tandem and isolated by electron tubes. One of the T-networks in each of the four parallel combinations has two series capacitors and a shunt resistor, the other has two series resistors and a shunt capacitor.

G. E. Oberweiser, Collins Radio Corporation, (F) October 30, 1943, (I) September 4, 1945, No. 2,383,984.



Reactance Tube Circuit

Since the curve of mutual conductance vs. grid voltage is S-shaped, the effective capacitance of a reactance tube is not a linear function of the control voltage. The insertion of the circuit elements within the dotted line are proposed to provide an additional voltage E_2 inserted in phase opposition to control voltage E_1. It is claimed that this additional voltage will make the effective capacitance of the reactance tube a linear function of the control voltage by an action comparable to negative feedback.

F. G. Marble, Bell Telephone Laboratories, (F) August 18, 1943, (I) August 14, 1945, No. 2,382,436.

Controlling Gyros

The vertical position of a gyro is corrected by a motor which is controlled by the system described. A pendulous pick-up rigidly connected to armature 17 which is rotatably mounted so as always to be vertical detects displacements between the vertical axis of the gyro and the true vertical about one horizontal axis. Another similar arrangement corrects for gyro deviations about the other horizontal axis. Currents of opposite phase are induced in pick-up coils 21 and 22; their amplitude depends on the relative position of the armature 17 with respect to core 11. Pendulous pick-ups are subject to oscillations while the gryro precesses, and it is intended to apply only the integrated or average pick-up output to the control motor. Consequently, the control action on the torque motor is of constant direction, regardless of oscillations, and the net torque applied in erecting the gyro is not diminished by oscillations of the pendulous pick-up.

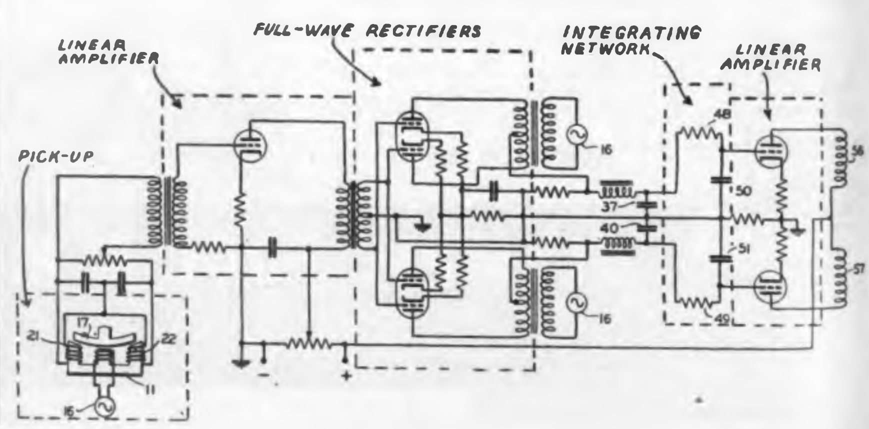
The signal derived from the pick-up is amplified and applied to two full-wave rectifiers, the plate voltages of which are provided by the same generator 16 that energizes the pick-up. Plate voltages and grid input are in such a phase that one full-wave rectifier responds to signals delivered when the armature 17 is deflected to the right, and the other full-wave amplifier responds to signals delivered when the armature 17 is deflected to the left. The outputs of the rectifiers are applied to capacitors 37 and 40 so that the voltages across these capacitors are indicative of the position of armature 17. Integrating circuits 48, 50 and 49, 51 have a long time constant and eliminate response to oscillations. Only the average deflection of armature 17 will control the currents in coils 56 and 57 which may be field coils of dc torque motors correcting the gyro position or they may control a relay.

R. Haskins, Sperry Gyroscope Co., (F) Feb. 14, 1944, (I) Aug. 21, 1945, No. 2,382,993.

Warning Device for Aircrafts

The warning device is responsive to an acoustic signal emitted by an approaching aircraft and transmits a radio wave the frequency of which is a function of the intensity of the acoustic wave at the point of reception. This point of reception may be, for instance, the top of a mountain where the warning apparatus is located to inform the pilot of the presence of the obstacle and of its distance from the aircraft.

The apparatus mounted on the



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obstacle comprises a microphone for the reception of the sound (for instance, motor or propeller noise) and its conversion into an electrical signal which is amplified, rectified, and used to control a relay as well as the grid bias of a reactance tube. The power supply of a crystal oscillator is operated by the relay so that oscillations are only provided above a definite intensity of the received sound signal. The frequency of another oscillator is controlled by the reactance tube, both waves combined and the heterodyned output transmitted. It will be seen that transmission occurs above a desired intensity level of the incoming acoustic wave, and that the frequency of the transmitted wave is indicative of the intensity of the received sound wave. Approaching planes will receive a note with increasing pitch; if the aircraft moves away from the obstacle, the pitch will go down.

E. E. Frazier, Bendix Aviation Corp., (F) June 1, 1943, (I) August 14, 1945, No. 2,382,557.

AVAILABLE PATENTS

The following U. S. patents are listed in the current Register of Patents Available for Licensing or Sale, published by the United States Patent Office as an addition to the Official Gazette. Printed copies of these patents can be obtained from the Commissioner of Patents, Washington, D. C., at the cost of 10c per copy.

Pat. 2,369,138. Coupling Means. Patented Feb. 13, 1945. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757.) Useful in the amplification of changes in direct or alternating currents or voltages. It is self stabilizing as it is not likely to be affected by changes in power supply, temperature or tube characteristics. Provides means for maintaining zero signal potential drop across an impedance where change in average potential level is permitted to occur, usually from higher to lower level. An improved device for transformation of signal voltages from higher to lower level. (Owner) George W. Cook, David Taylor Model Basin, Washington 7, D. C. Group 36—61—62—92. Reg. No. 410.

Pat. 2,380,592. Piezoelectric Crystal Holder. Patented July 31, 1945. Holder comprises two identical subassemblies each having a segment and an electrode carrying resilient spring portions. In assembling, crystal plate is placed against electrode of first assembly. Deformable gasket ring is then fitted into groove on first assembly and second assembly joined thereto, crystal plate being held between the electrodes. Electrodes and segments are provided with shoulders to hold plate in place. A plate or band is

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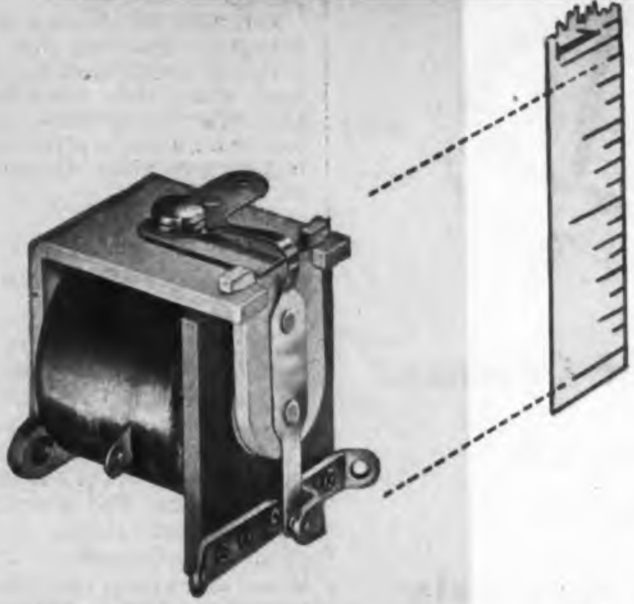
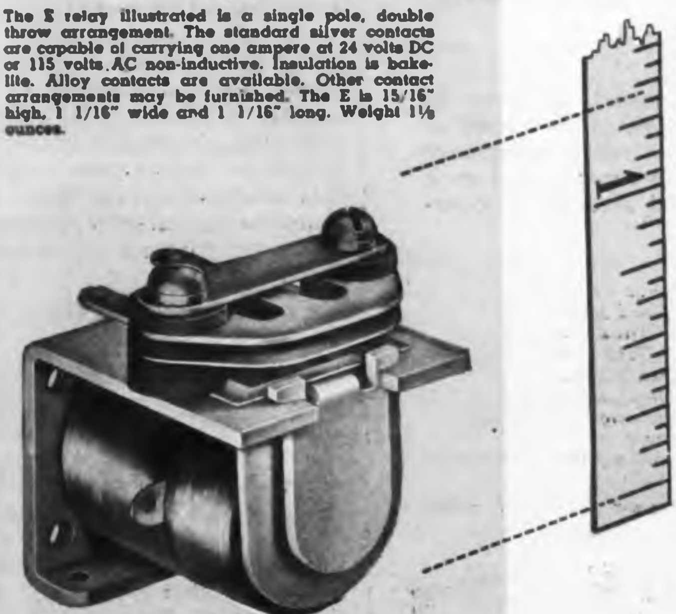


The E relay illustrated is a single pole, double throw arrangement. The standard silver contacts are capable of carrying one ampere at 24 volts DC or 115 volts AC non-inductive. Insulation is bakelite. Alloy contacts are available. Other contact arrangements may be furnished. The E is 15/16" high, 1 1/16" wide and 1 1/16" long. Weight 1⅛ ounces.



The F relay shown is a single pole, single throw normally open combination. The standard contacts carry three amperes at 24 volts DC or 115 volts AC non-inductive. Bakelite insulation is used. May be supplied on other contact combinations. Silver is standard contact material, alloy contacts can be substituted. The F is 1 11/32" high, 1 3/16" wide and 1 3/32" long. Weight is 1⅞ ounces.

DESIGNED for electronic controls in which space limitation is a critical factor, the E relay is small enough to fit into an area of approximately one cubic inch. Light too, it weighs about one ounce. The F relay, although available in two pole, double throw, is only slightly larger and weighs less than two ounces.

Used in your electronic assembly these relays will save you space and weight. Moreover you will be assured of positive and quiet operation, for into these relays go the same careful design and manufacturing precision found in Allied's larger relays.

Whatever your relay applications, check with Allied. In addition to sensitive, telephone, power, differential and other types of relays Allied manufactures solenoids and electro-magnetic devices. A number of strategically located plants are available to supply your immediate requirements. Allied's quality standard is in keeping with your post war products . . . write today for more information.

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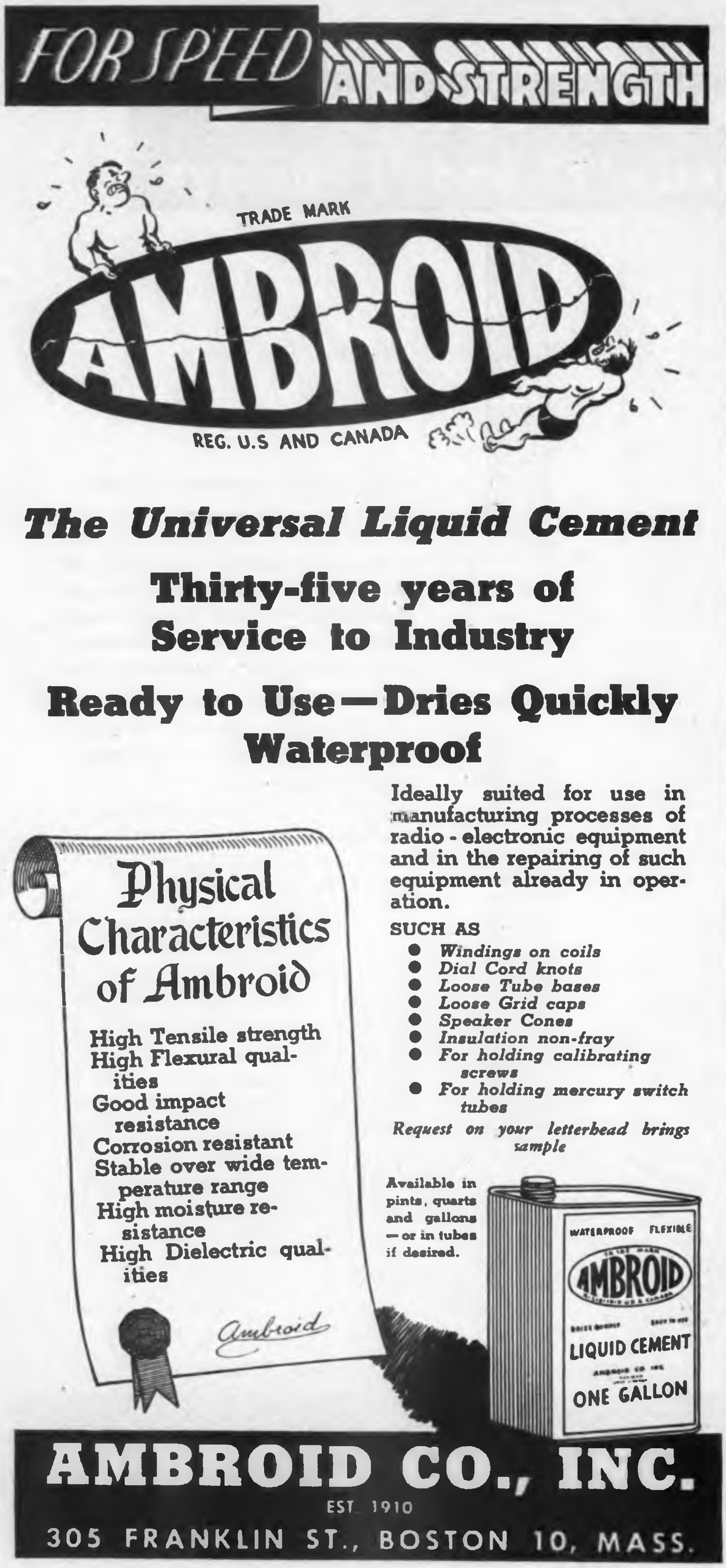
GENERAL OFFICES 2 East End Ave (at 79th St) New York 21, N. Y. Factories: New York City (2 East End Ave) Plantsville, Conn Chicago 4321 N. Knox Avenue, Chicago 41, Illinois. In California: Allied Control Co. of California, Inc. 1633 South Hope St., Los Angeles 15, Calif.



slipped over two assemblies, forced into position in grooves in each segment and maintains holder in assembled relationship. Moisture is effectively excluded from holder. Holder may be assembled by unskilled operator. Plate or band may carry indicia. (Owner) Herman L. Gordon, 100 Normandy Drive, Silver Spring, Md. Group 36—11—13. Reg. No. 413.

Pat. 2,362,769. Electronic Voltage Stabilizer. Patented Nov. 14, 1944. A voltage stabilizer of the electronic type, which both overcompensates and undercompensates, and hence can be adjusted to give almost perfect compensation. Group 36—19—92. Reg. No. 451.

Bibliography of Electron Microscopy

A bibliography of electron microscopy compiled by Claire Marton, Division of Electron Optics, Stanford University, Cal., and Samuel Sass, General Electric Laboratory, Pittsfield, Mass., is contained in the July 1945 issue of the Journal of Applied Physics. The material is arranged in eight groups; within each group the arrangement is chronological and within each year alphabetical by author and title.

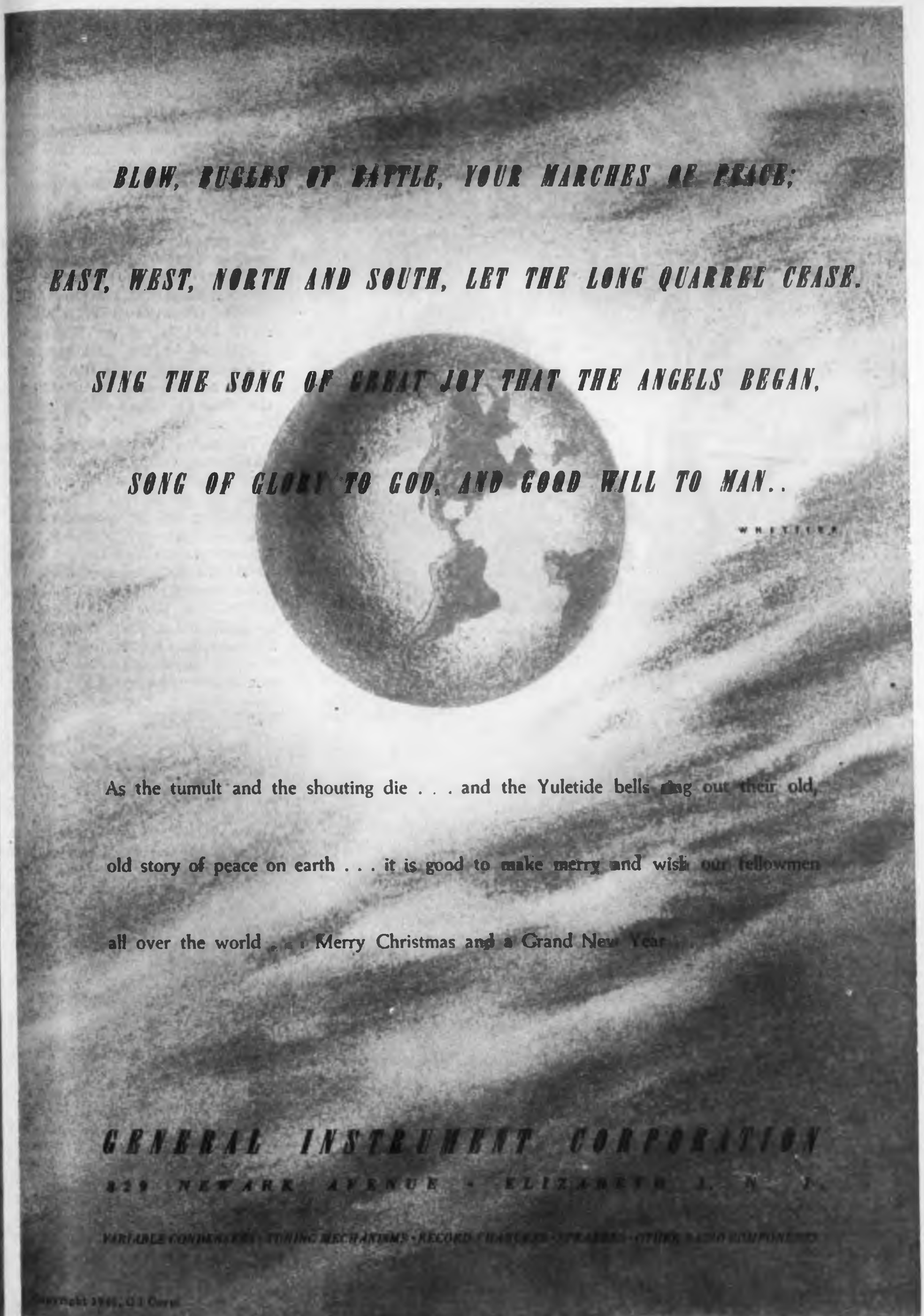
The article also includes a table listing the types of electron microscopes, their application, and the number of papers about each type published in Germany up to the end of 1943. A similar table comprising this information with regard to all countries exclusive of Germany is added for purposes of comparison.

Jefferson-Travis Buys Musicraft

The Jefferson-Travis Corporation, manufacturers of communications and recording equipment, has concluded negotiations for the acquisition of all outstanding stock of the Musicraft Corporation and affiliated companies in New York City and Los Angeles. Musicraft will be operated as a wholly-owned subsidiary of Jefferson-Travis.

J-B-T Adds Three

The Board of Directors of J-B-T Instruments, Inc., 441 Chapel St., New Haven, Conn., has elected three additional officers, effective November 15. R. L. Triplett, Bluffton, Ohio, president of the Triplett Electrical Instrument Co., has been chosen first vice-president; Phillips Stevens, 151 Westwood Road, New Haven, vice-president for sales and public relations; and Eric Ericson, 55 Marvel Road, assistant treasurer.


BLOW, BUGLES OF BATTLE, YOUR MARCHES OF PEACE;
EAST, WEST, NORTH AND SOUTH, LET THE LONG QUARREL CEASE.
SING THE SONG OF GREAT JOY THAT THE ANGELS BEGAN,
SONG OF GLORY TO GOD, AND GOOD WILL TO MAN..
As the tumult and the shouting die . . . and the Yuletide bells ring out their old,
old story of peace on earth . . . it is good to make merry and wish our fellowmen
all over the world . . . Merry Christmas and a Grand New Year
GENERAL INSTRUMENT CORPORATION

PULSE POSITION

(Continued from page 87)

This time depends on several factors: the value of the 67,000-ohm plate resistance (R266 and potentiometer P8) in the first tube V52A; the blocking capacitor C120; the grid resistor R284; the potential to which this grid resistor is connected; the voltage required to cut off the plate current of the second section (V52B); and the cathode potential across resistor R286 in the rest condition. The steady value of grid potential of V52A also affects the timing of the circuit. Variations of the first section of the tube are substantially eliminated as a source of variation of the time by virtue of the cathode feedback.

The mean length of the square wave generated by the multivibrator is adjusted to place the channel pulse in its normal unmodulated position by adjusting the time constant of the multivibrator. The time constant is determined by the adjustable load resistance of V52A (potentiometer P8 in the plate circuit of the tube V52A), and the coupling capacitor C120 (Fig. 5). Each channel modulator has a different time constant in order to locate the unmodulated channel pulse in its proper position in the frame.

Modulation method

Modulation is produced by variation of the potential to which 3.3-megohm grid resistor R284 of tube V52B is connected (Fig. 6 (B). This is done by connecting R284 to the output of voice amplifier tube V53A which is one section of a double triode tube. To avoid interchannel crosstalk, the channel pulse should not depart from its assigned time interval for any excessive value of input that may be applied.

Sharp limiting of the voice amplifier gain is obtained in voice amplifier tube V53A by use of a high load resistance (R276 plus R278) which provides plate voltage limiting. A 100,000-ohm resistor, R268, in series with the grid, further aids the clipping. The voice voltage needed for modulation is obtained from a voltage divider composed of resistors R276 and R278. These load resistors are different for each channel since less voltage is required to modulate channels farther removed from the starting pulse.

Two clipper stages are required

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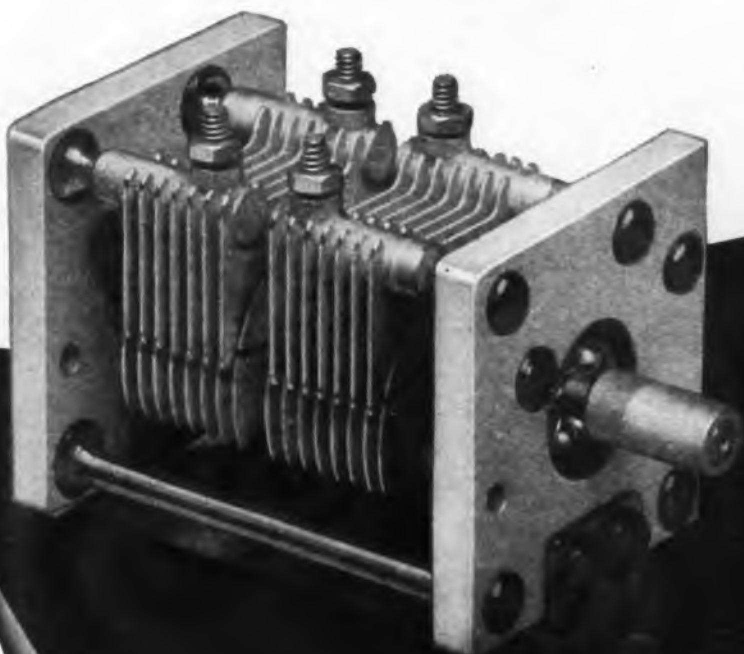

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to shape the channel pulses properly: V46A, the even channel clipper stage and V46B, the odd channel clipper stage. The separation of the odd and even channel pulses allows at least 17 microseconds clear space between pulses in the grid circuits of the clippers.

Clipper tubes V46A and V46B like the marker generator are operated at low plate voltage so that little gain remains for positive grid voltages. When the grid is driven negative, the plate current is cut off and the plate voltage rises. This drives the following grid positive and clips the peak to a fairly square shape. When the grid of the clipper is again driven positive, the plate voltage abruptly drops because the plate impedance again becomes small. The output pulses of the even and odd clipper stages are fed to even and odd video amplifier stages V36A and V36B, respectively.

Video amplifiers

Even and odd video amplifiers V36A and V36B increase the signal power and form the pulses to a substantially rectangular shape. The amplifier stage is divided so that even channels pass through one tube section (V36A), and odd channels through the second section (V36B). A section of another tube, V32A (Fig. 10), passes the marker. The plates of the three amplifier tubes (V36A, V36B, and V32A) are connected together, combining the marker pulse and the even and odd channel pulses.

The even and odd video amplifiers are biased past cut-off by the positive voltage developed across resistors R397 and R396 and applied to the tube cathode. Thus the residual ripples of the baseline that may have passed the clippers are eliminated since they are not of sufficient amplitude to drive the grid past cut-off. The channel pulses, however, are of sufficient amplitude to drive the grids to saturation, thereby clipping the peaks due to grid current flow. The combined marker and channel pulse output is applied through capacitor C104 to video amplifier No. 1.

Transmitter analysis

The radio transmitter converts the position-modulated positive impulses derived from the transmitting multiplex equipment into impulses of ultra-high-frequency power. The final waveform of the radiated ultra-high-frequency impulses may be pictured as a series of eight groups of 5,000-mc oscilla-

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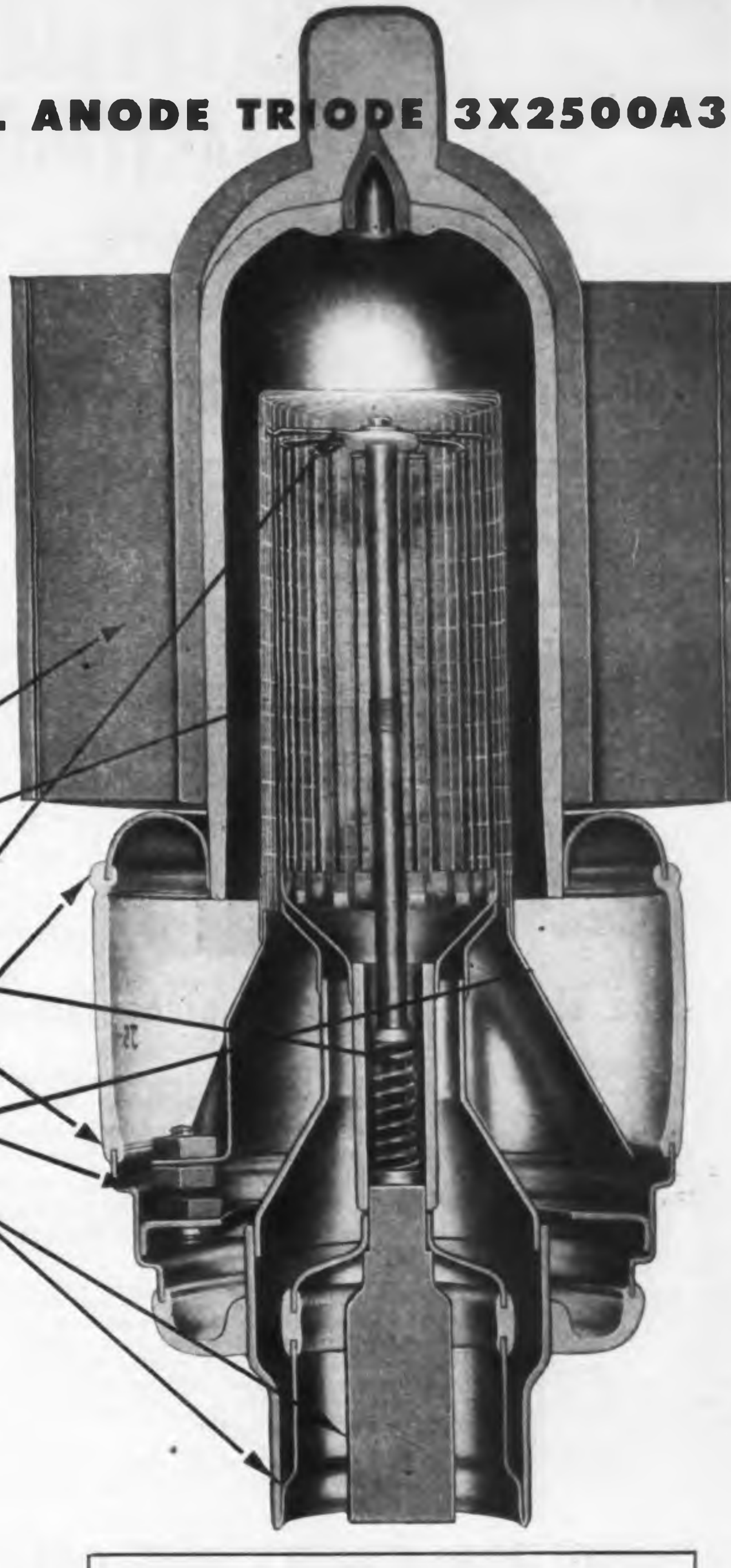
NEW EIMAC EXTERNAL ANODE TRIODE 3X2500A3



Rugged mechanical construction
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In the new 3X2500A3, Eimac engineers have developed a highly efficient external anode triode which, in Class C service, delivers up to 5 KW output at a plate voltage of only 3,500 volts. The mechanical design is radically simple, incorporating a "clean construction" which gives short, low inductance heavy current connections that become an integral part of the external circuits at the higher frequencies.

The external anode, conservatively rated at 2500 watts dissipation, has enclosed fins so as to facilitate the required forced air cooling.

Non-emitting vertical bar grid does not cause anode shadows ordinarily created by heavy supports in the grid structure.

Thoriated tungsten filament. Note unusually large filament area, and close spacing.

Filament alignment is maintained throughout life of the tube by special Eimac tensioning method.

New glass-to-metal seals do not have the RF resistance common to iron alloy seals, nor the mechanical weaknesses of the feather-edged types.

Grid ring terminal mounts a cone grid support which acts as a shield between plate and filament.

A coaxial filament stem structure forms the base of the tube. This makes possible proper connections to the filament lines.

Grid and filament terminal arrangements make it possible to install or remove the 3X2500A3 without the aid of tools.

The new mechanical and electrical features of the Eimac 3X2500A3 external anode triode make it valuable for use on the VHF as well as low frequencies. More complete data and information yours for the asking.

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TYPE 3X2500A3 — MEDIUM MU TRIODE

ELECTRICAL CHARACTERISTICS

Filament: Thoriated Tungsten	
Voltage	7.5 volts
Current	48 amperes
Amplification Factor (Average) 20	
Direct Interelectrode Capacitances (Average)	
Grid Plate	20 µµfd.
Grid Filament	48 µµfd.
Plate Filament	1.2 µµfd.
Transconductance (i_B = 830 ma., E_B = 3000 v.)	20,000 µmhos

1123

tions, each emitted from the antenna for a period of approximately 1 microsecond, plus a 4-microsecond marker impulse. For the production of a waveshape of this type, the transmitter includes an ultra-high-frequency oscillator, excited by momentary power impulses from a modulator stage.

The grid of the modulator tube receives its input from a two-stage video amplifier; like the foregoing amplifier stages, these stages are driven to saturation in order to shape the pulses properly and to maintain a short time of rise. The final oscillator is a 2K23 reflex Klystron. Microwave output power leaves the resonant cavity through a short section of coaxial conductor which is part of the tube base, and is radiated into the waveguide. A crystal rectifier is mounted on the waveguide for monitoring purposes.

The antenna is a piece of waveguide terminated by a plane reflecting plate at one end of a shallow box. Slots in the rear of the box allow energy to escape toward the parabolic reflector. Perforated instead of solid sheet metal is used in construction of the reflector, to reduce wind resistance.

Two watts of output power are found ample for 100-mile hops because of the highly directional transmittsion. Equipments are spaced at intervals of 40 to 50 miles apart in usual installations. The directivity is depicted quantitatively in Fig. 8.

Receiver

The receiving components function similarly to an ordinary communications receiver with the addition of a second intermediate frequency, referred to as the video frequency, which follows the if stages and precedes the audio or vf circuits. The video-frequency pulses are demodulated in the receiving section of the multiplex unit.

The receiving components are composed of four main units: the receiver converter mounted on the antenna tower, the if amplifier located in the radio frame, the video amplifier also located in the radio frame, and the receiving section of the multiplex unit in the multiplex frame. The block diagram of these components is given in Fig. 9.

The rf pulses radiated from the transmitting antenna of the distant radio set are picked up by a similar

Must we go back?

The evolution of electronics will always remain a bright page in the history books of science. And the record has been significantly brilliant during the past four years when improvements and developments were advanced at a faster rate than normal. With the ending of the war, there may be a few who do not feel the urgency to progress at a similar pace . . . who will be willing to relax the rigid wartime standards. Or there may be those who do not too accurately gauge the temper of the consumer, now in a mood to anticipate only the best from an industry which has accomplished such miracles in the past few years.

Along with many other far-sighted producers, we here at Marion fully intend to maintain our wartime quality pattern, and to cooperate in every known way to provide even better products for a peaceful world. We endorse the postwar standardization program of the Army and Navy Electronics Standards Agency, and will continue to manufacture all Marion electrical indicating instruments in conformity with JAN specifications. Our customers have a right to expect nothing else.

It is important to note that continued adherence to the Electronics Standards Agency program need not result in increased costs, either to the manufacturer or the consumer . . . while it will definitely result in improved product performance wherever such standardized components are used.

We, the manufacturers, engineers, consumers of electronics, are part of a vital, daring, visionary industry. It is with this realization that we are faced with the responsibility of deciding, at this time, whether we can relax, or whether we shouldn't give as much to a world at peace as we gave to a world at war.

Your comments will be welcomed.

MARION ELECTRICAL INSTRUMENT CO.
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EXPORT DIVISION 458 BROADWAY – NEW YORK 13, N.Y., U.S.A.
CABLE ADDRESS MORHANEX

parabolic reflector on the antenna tower of the receiving station and are conducted by a length of waveguide to the crystal detector. Here the received signals are beat against the output of beat oscillator V1 to form an if of 60 mc. The if output of the crystal detector is then amplified by three if amplifier stages (V2, V3, and V4) before being fed to the if amplifier unit in the radio frame. The gain of stages V3 and V4 is controlled either manually or automatically by a voltage obtained from the video amplifier. Similarly, the frequency of beat oscillator V1 may be manually or automatically controlled by a voltage obtained from circuits in the if and video amplifiers.

IF amplifier block

The if pulse output of the receiver converter is further amplified by five stages in the if amplifier before application to the second detector stage V6. The detector stage rectifies the if pulses, producing the marker pulse and eight channel pulses in a form similar to that applied to the radio transmitter at the distant station. These video pulses are then amplified by the first video amplifier V10 whose output is fed to the video amplifier unit also located in the radio frame.

Ninth amplifier stage V7 feeds discriminator circuit V8 and afc (automatic-frequency-control) amplifier V9, which develop a control voltage to control automatically the frequency of the beat oscillator so that the if frequency will always be at 60 mc. The output of V9 controls the search voltage output of searcher V12 in the video amplifier. This tube sweeps the beat oscillator frequency over the required range when no signal is received and locks in on the proper frequency when a signal is obtained.

Video amplifier block

In the video amplifier unit, the video pulses are first amplified by two broad band amplifier stages (V1 and V2) and are then shaped by video clipper stages V3 and V4. The clipper stages pass only a thin slice of the video pulse thereby producing a steep-sided pulse and reducing the noise. The pulses are then further amplified by video amplifier V5 whose output is applied through cathode follower V6 and the coaxial cable to the receiving section of the multiplex unit.

A portion of the video input voltage is rectified by avc rectifier V7 and amplified by avc amplifier V8

to produce a control voltage which automatically controls the volume of the if amplifier stages. The control voltage output of V8 is applied to if amplifiers V3 and V4 in the receiver converter and to stages 4 to 7 in the if amplifier unit.

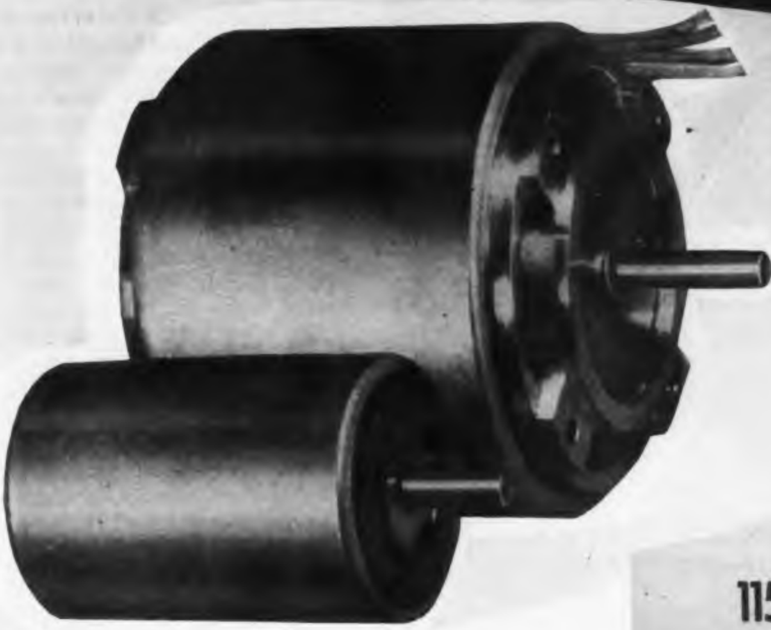
The video pulse output of the video amplifier unit contains the marker pulse and eight channel pulses. The function of the receiving multiplex is to transform the position-modulated channel pulses into voice frequencies. The pulses are first amplified by video amplifier V22A, then fed to marker selector V17A and to pulse amplifier No. 1 (V21A). The marker selector allows only the 4-microsecond marker pulse to pass, the narrower channel pulses being lost. The selected marker pulse is then applied to marker alarm amplifier V16B, and to marker amplifier No. 1 (V16A). The amplified output of V16B feeds marker alarm circuit V17B, which causes an alarm bell to ring and a lamp to light if the marker pulses are not present. The output of marker amplifier No. 1 feeds a second amplifier, V22B, whose output is used to trigger square wave generator V15.

Generator circuits

Square wave generator V15 is a multi-vibrator circuit whose output square wave is synchronized by the marker pulse. The square wave is used to divide the 125-microsecond interval between pulses approximately in half to separate the starting times of the gate circuits for channels No. 1 to 4 and channels No. 5 to 8.

Eight gate generator circuits are provides for separating the eight channel pulses. Each channel gate is so spaced in time as to lift out or gate the proper channel pulse from the common output of pulse amplifiers No. 1 and 2 (V21A and V21B). The gates for channels No. 1 and 5 are started directly from the output of square wave generator V15, gate No. 1 being delayed a few microseconds so as not to interfere with the marker pulse, and gate No. 5 being started at the point where the square wave reverses polarity.

The other six channel gates are not started directly from the square wave output, but are delayed by varying amounts to gate the proper channel pulse. These delays are obtained by generating sweep voltages in the sweep generator circuits and starting the channel gates



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CLASSIFICATION	H. P.	SPEED	DUTY	BEARINGS	MODEL No.
CAPACITOR INDUCTION MOTORS	3-5/16" Diam. Frame				
Capac. Start & Run	1/15	3000	Int.	Sealed Ball bearings	K70F K71F
" " "	1/30	3200	Cont.	" "	K70B K71B
" " "	1/60	3300	"	" "	K70 K71
" " "	1/15	3000	Int.	Sleeve	K73F
" " "	1/30	3200	Cont.	"	K73B
" " "	1/60	3300	"	"	K73
SHADED POLE MOTORS	3-5/16" Diam. Frame				
Shaded Pole	1/50	1420	Int.	Sealed Ball Bearings	KP70F KP71F
" "	1/100	1530	Cont.	" "	KP71 KP70
" "	1/50	1420	Int.	Sleeve	KP73F
" "	1/100	1530	Cont.	"	KP73
SYNCHRONOUS MOTORS	3-5/16" Diam. Frame				
Capac. Start & Run	1/100	1800	Cont.	Sealed Ball Bearings	JS70 JS71
" " "	1/100	3600	"	" "	KS70 KS71
" " "	1/100	3600	"	Sleeve	KS73
CAPACITOR INDUCTION MOTORS	1¾" Diam. Frame				
Capac. Start & Run	1/100	3000	Int.	Ball Bearing	K49F
" " "	1/250	3150	Cont.	" "	K49
" " "	1/100	3000	Int.	Sleeve Bearing	K43F
" " "	1/300	3150	Cont.	"	K43

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at a time when the sweep voltages cross a certain reference voltage as determined by the gate starter circuits.

The eight pulse converter circuits are identical and consist of a biased multivibrator circuit which is triggered by a channel pulse when the channel pulse and a gate pulse occur simultaneously. The multivibrator circuit then remains operative for the duration of the gate pulse. Thus a square wave is generated for each channel whose width during successive frames is varied at the voice frequency.

The length-modulated pulses are then applied through a 3-kc low-pass filter to a vf amplifier stage. The filter removes certain objectionable high-frequency tones, producing a vf output comparable to that of the originating station.

Receiving antenna

The receiving antenna is identical in design to the transmitting antenna. Electro-magnetic waves which arrive from a distant point as a beam of parallel rays strike the reflector. Concentrated on the focal point by the paraboloidal curvature, they pass through the window slots in the waveguide feed at the focal point and are reflected down the waveguide by the small plane reflector. Waves arriving from points not squarely in front of the reflector will not be concentrated on the focal point and therefore will not enter the waveguide. Obviously the reflectors must be accurately pointed at the distant station or no signals will be received.

Radio & Radar Div. Out As WPB Expires

The Radio & Radar Division of the War Production Board, which directed the industry's $7,500,000,000 war radio production, has gone out of existence with the expiration of WPB. Melvin E. Karns, former director of the Radio & Radar Division has returned to private industry.

Maguire Buys Radiart

Radiart Corp., Cleveland, a manufacturer of radio parts and accessories has been acquired by Maguire Industries, Inc. The corporation will be operated as a wholly owned subsidiary of Maguire Industries, Inc. The Radiart Corporation was organized in 1928 and is a maker of vibrators and automobile antennas and power packs.


Switches
Shown above are a few of the many types of micro-switches, toggle switches, knife switches, rotary switches, band switches, etc., now available through the Hallicrafters Co., Chicago, agent for the Reconstruction Finance Corporation under contract SIA-3-24.
Other radio and electronic components such as resistors and condensers are also available in large quantities. Send the coupon for further details.
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Especially interested in
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ROCHESTER REPORT

(Continued from page 81)

the speaker does not serve to close the valve, and design factors are such that frequency response is improved by its presence.

New piezoelectric crystals of dihydrogen ammonium phosphate which are formed without water or crystallization have advantages over Rochelle crystals in many applications such as operation at higher temperatures.

One of the outstanding developments in the acoustic field is the number and precision of objective acoustic measurement systems and instruments, obviating the need for placing complete reliance on subjective appraisals as in the past.

Industry Standardization Work in Television

by David B. Smith
Director of Research
Philco Corp.

It was reported that all of the recommendations made by the RTRB for the establishment of television service on the lower frequency range of operation have proved effective, and evidence now being collected shows that no major changes are necessary in any of these standards. In a few cases it has been found desirable to consider tightening some of the transmitter specifications. For instance, a closer control of the shape of the synchronizing signals may be needed. It may also be necessary to recommend a more detailed description of the picture aspect ratio and shape to prevent cutting off vital information, at the corners of the screen. Some work is being done on the more precise definition of the proposed inverse logarithmic relation between the light output of a receiving picture tube and its modulating voltage. This will insure correct reproduction of light and shade gradations.

Another problem being studied is the disturbance of the picture when different pickup cameras are switched in and the effect of this on automatic frequency controlled synchronizing circuits.

In the higher frequency bands authorized by the FCC, there are no official standards and the field is wide open for experimentation.

It is, of course, contemplated that both color and monochromatic pictures will be transmitted in this band. This raises two new stand-

ards problems: first, the choice of suitable color standards and second, the selection of standards for both color and monochrome pictures such that both types of transmissions will operate a single receiver. Consideration will also have to be given to three dimensional color television, although this might more logically fit in a higher part of the spectrum.

Plans are under way for tests by several organizations with a view to obtaining wide cooperation and agreement on these new standards.

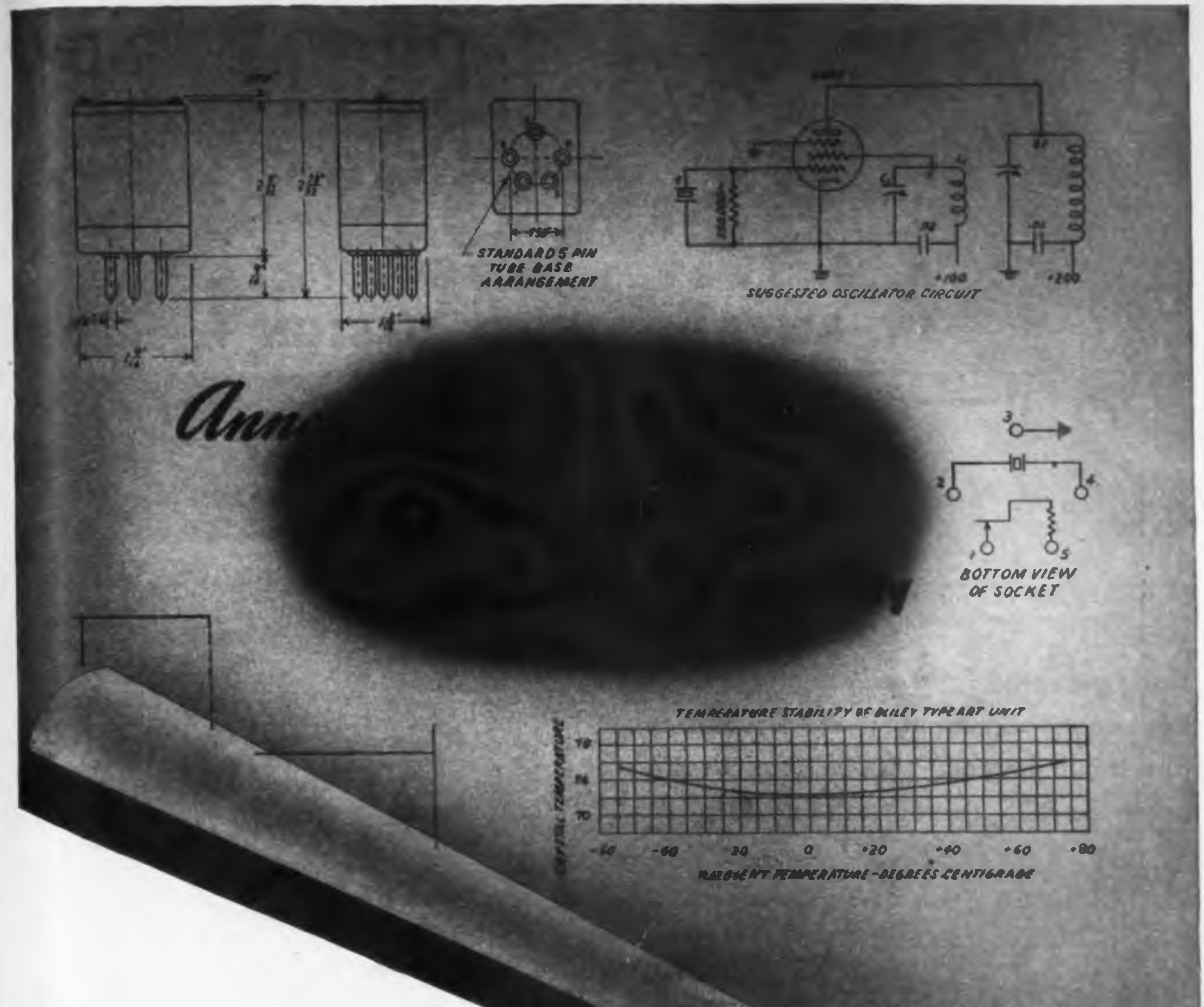
More Mobile Radio Communication Plans

Interest in mobile radio communications equipment for civilian use grows apace. Some time ago the New York Telephone company let it be known that it has plans for a mobile service in New York City. Now two more companies have similar plans. First of these is another Bell system company, the New England Telephone and Telegraph Co., which operates out of headquarters in Boston. FCC has just granted construction permits for one land station and fifty-five portable mobile stations. The land station would be located in Boston and would operate at 156.53 megacycles with 250 watts power for FM telephone communications. The mobile stations would operate on 157.43 megacycles at 15 watts power and would be used for both land vehicles and harbor craft in the vicinity of Boston. General Electric type experimental equipment would be used.

The other applicant for a similar service is Frank C. Mallinson, doing business as the National Electronics Laboratories with headquarters in Alexandria, Virginia. His application seeks the construction of a fixed land station at headquarters and some twenty-five portable mobile units to furnish radio-telephone service for doctors, nurses, ambulances, delivery trucks and public service vehicles. The service is planned to cover Maryland, Virginia and the District of Columbia.

Electronic Corp. Expands

Electronic Corporation of America has acquired an additional plant at 5302 Second Avenue, Brooklyn, to be used for the manufacture of ECA radio sets and other products. The company will continue to operate its two Manhattan factories.



This new Type ART acid-etched*, crystal unit is another Bliley "first", designed for VHF services, such as police and railway communications, where frequency stability must be maintained over temperatures ranging from -55°C. to +75°C. With a built in heater operating on 6.3 V. at 1 amp. crystal temperature is held within ±2°C. The unit will maintain an overall frequency tolerance of ±.005% or better including variations due to temperature change and tolerances required for crystal production. This rugged, compact crystal assembly is available for any frequency between 3500 kc. and 11,000kc.

A schematic diagram of the oscillator circuit and tolerance to be maintained should accompany requests for quotations. See above design for efficient frequency multiplication.

**Acid etching quartz crystals to frequency is a patented Bliley process.*

Bliley
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1. INTENDED APPLICATION__________ WHERE?__________
2. COMPLETE EQUIPMENT OR RECTIFIER STACKS DESIRED?__________
3. AVAILABLE SUPPLY VOLTAGE TO RECTIFIER STACK?____VOLTS RMS ± ____% ____PHASE ____CYCLES
4. D.C. OUTPUT AT RECTIFIER STACK: ______VOLTS ______AMPS. ______% RIPPLE
5. VOLTAGE REGULATION: ______% FROM______% LOAD TO______% LOAD
6. RECTIFIER CIRCUIT DESIRED__________
7. DUTY CYCLE: CONTINUOUS______ INTERMITTENT______ TIME ON______ TIME OFF______
8. TYPE OF LOAD: —— ATTACH SKETCH OF CIRCUIT ——→
   - A) RESISTIVE ______ CURRENT RANGE______ VOLTAGE RANGE______
   - B) INDUCTIVE __________
   - C) MOTOR ______ TYPE ______ (SERIES, SHUNT____)
   - D) CAPACITIVE ______ SIZE OF CAPACITOR______
   - E) BLOCKING D.C. (EXPLAIN ON BACK)______ DUTY CYCLE?______
   - F) BATTERY CHARGING:
     - NO. OF CELLS______ SERIES______ PARALLEL______
     - TYPE OF CELLS______ AMP. HRS.______ MAX VOLTAGE PER CELL______
     - CHARGING METHOD: CONSTANT CURRENT______ AT______AMPS.
     - TAPER: INITIAL CURRENT ______AMPS. FINAL CURRENT ______AMPS.
     - TRICKLE: AT ______VOLTS ______AMPS
     - FLOATING: AT ______VOLTS ______AMPS
9. APPROX. TEMP. OF AIR AT LOCATION OF RECTIFIER STACK____(°C) (°F) MAX____MIN____(°C) (°F)
10. SPACE AVAILABLE FOR RECTIFIER STACKS__________
11. METHOD OF COOLING: CONVECTION______ CHIMNEY______ FAN______
12. IS PROTECTIVE COATING OF RECTIFIER REQUIRED?______ AGAINST WHAT?______
13. TYPE OF MOUNTING: STUD______ BRACKET(S)______ OTHER SKETCH ATTACHED →
14. PRIME IMPORTANCE: LIFE?____ COMPACTNESS?____ COST?____ EFFICIENCY?____ WEIGHT?____
15. QUANTITY OF RECTIFIERS______ DELIVERY WANTED ______
16. ESTIMATED YEARLY REQUIREMENTS______ BY______

PERSONNEL

H. W. Zimmer

E. F. Carter

E. Finley Carter and **H. Ward Zimmer** have been elected vice presidents of Sylvania Electric Products Inc. Mr. Carter, who joined the company in 1932 as an engineer and who has been Director of Industrial Relations since 1941, becomes vice president in charge of industrial relations. Mr. Zimmer, with a record of over twenty-six years of service with Sylvania and its predecessor companies, has been general manager of operations of the radio division since 1943. He now becomes vice president in charge of the radio tube division.

Norman S. Kornetz, a veteran of 10 years' service in the television, radio and associated electronics fields, has been named as project engineer in charge of Westinghouse television receiver development in the Home Radio Division, Sunbury, Pa. He will have charge of all Westinghouse home television receiver development, and will devote his particular attention to receiving units to be used in flight tests of Stratovision.

N. S. Kornetz

N. P. Case

Nelson P. Case, well known in the radio industry and holder of approximately 30 patents on radio receiver circuits, has joined the Hallicrafters Co., Chicago, as chief engineer of its receiver division. For the last two years Case has been director of engineering design and development for the Hamilton Radio Corp., New York. Prior to that for thirteen years he was with the Hazeltine Electronics Corp., in various capacities. During later years with Hazeltine he was in charge of its New York license laboratory.

Richard E. Mathes, USNR, has joined Finch Telecommunications, Inc., Passaic, N. J., in the capacity of chief engineer and plant manager. He has recently been released from active duty in the Navy's Bureau of Ships, where he assisted Capt. Finch in the development and design of special electronic equipment for ships and aircraft of the Fleet.

Dr. Howard Doolittle, formerly of Radiation Laboratories, NDRC, has joined the engineering staff of Machlett Laboratories, Springdale and Norwalk, Conn. Dr. Doolittle in his new capacity will be in charge of all phases of high frequency research and development—a field in which he played a leading administrative and technical part as a member of the staff of Radiation Laboratories, where he was in charge of the group responsible for the development of pulse generators for radar purposes.

P. H. Merriman

Dr. H. Doolittle

Paul H. Merriman, for eight years head of the electrical group, tool engineering, of The Glenn L. Martin Co., Baltimore, has assumed new duties as head of the Electrical and Electronics Section of the laboratories of the Martin organization. He is chairman of the Eastern Section, Aircraft Welding Research Committee, a member of various NACA and NDRC War Committees, the Aircraft Armor Plate Committee, American Welding Society, AIEE, IRE, Institute of Aeronautical Science, and other organizations.

N. A. Moerman has joined the Potter Instrument Co., Flushing, N. Y., in the capacity of sales engineer. For the past six and one-half years he has been employed at Aberdeen Proving Grounds, Md.

Lt. Colonel Bern Dibner returns after nearly four years of military service to his civilian post at the helm of Burndy Engineering Co., New York, the company he founded in 1924 for the manufacture of electrical connectors.

Paul D. Zottu of 95 Country Club Road, Newton Centre, Mass., formerly chief engineer Thermex Division, the Girdler Corp., Louisville, Ky., has entered the field of consulting industrial electronic engineering. He will specialize in a consulting service in the field of high frequency induction and dielectric heating.

Martin D. Herbst has been appointed mechanical engineer in the development laboratory of TelAutograph Corp., New York. Before joining TelAutograph, he served as electro-acoustic design engineer for Control Instrument Co. and prior to that as physics instructor at Stuyvesant Technical High School.

E. A. (Ted) Leach has been appointed executive engineer of the Hammarlund Mfg. Co., 460 W. 34th St., New York 1, N. Y. He has advanced degrees in electrical engineering from Massachusetts Institute of Technology, and joined the General Electric Co. in 1928 as test engineer, holding many posts in radio there until he became sales manager of emergency communications, the last GE post held before he joined Hammarlund.

Com. R. T. Brengle

E. A. Leach

Commander Ralph T. Brengle, electronic officer with the United States 8th Fleet, has been released by the Navy Department and is returning to the active operation of the R. T. Brengle Sales Co., Chicago. During his three and a half years of actual services, Commander Brengle spent 18 months with the Electronics Division, Bureau of Ships. Procurement of all electronic materials for Navy, Marine Corps and Coast Guard caused him to let contracts totaling over a billion dollars.

Harold V. Nielsen has been appointed chief engineer of The United States Television Mfg. Corp., 106 Seventh Ave., New York 11, N. Y. He will be in charge of all radio, television, and special product design and production. He was formerly for 12$\frac{1}{2}$ years at Sparks-Withington Co., Jackson, Miss.

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When the ultra-short waves used in radar come echoing back, it's *Nickel* cathodes that "hatch" the tell-all stream of electrons for the cathode-ray screen.

And there is a definite reason why pure Nickel is the standard material for indirectly-heated cathodes of tubes for all radio, television and radar equipment.

No other commercial metal supplies the same combination of mechanical, electrical and electronic properties.

In addition, Nickel can be worked into the finest sizes and forms you need. The photo shows the infinite variety of cathodes that can be made from Nickel strip and seamless Nickel tubing.

The multiple advantages of Nickel and high-Nickel alloys make them particularly useful in many additional radar and other still-secret applications where strong, corrosion-resisting materials are needed with special electronic and electrical characteristics.

Write for your copy of *"Nickel in the Radio Industry."* The International Nickel Company, Inc., 67 Wall St., New York 5, N.Y.

Photo, courtesy of Superior Tube Company, Norristown, Pa.

Nickel

NICKEL INCO ALLOYS

MONEL* • "K" MONEL* • "KR" MONEL* • "R" MONEL* • "S" MONEL* • INCONEL* • NICKEL • "L" NICKEL • "Z" NICKEL* Sheet..Strip..Rod..Tubing..Wire..Castings..Welding Rods (Gas & Electric) *Reg. U. S. Pat. Off.

Westinghouse to Build Color Equipment

High-definition pickup units for processing both black-and-white and color pictures and their associated sound for simultaneous transmission on the same radio carrier wave will go into production shortly in the Baltimore plant of the Westinghouse Electric Corp. Basic development was done by the Columbia Broadcasting System.

The CBS units—designed as studio experimental equipments—are the first to handle both picture and sound transmission simultaneously on the same carrier. All sound transmission will be by frequency modulation.

In their original form the new units will pick up pictures from film or slides, and work is going ahead at CBS on a further development which will make possible live-talent pickups as well. Although designed especially for color work they can be used to produce superior black-and-white pictures as well.

Each unit will include a Dissector pickup tube, synchronous generating pulse forming equipment, color disc and drive and a series of sight and FM sound circuits for converting this information into electrical energy for modulation simultaneously on an ultra-high frequency radio carrier wave.

The new units will produce black-and-white pictures of 1029 lines-per-frame at 30 frames per second. Complete color pictures will be presented at a rate of 20 per second—two-thirds of the black-and-white rate. These pictures will be scanned at 525 lines per frame for each of the three primary colors—red, green and blue—and each complete picture will have 1575 such lines. This scanning will be through filters admitting only one color at a time and it will require one complete cycle of the three colors to provide one full-color picture.

CBS Color Television Tests on 485 mc

Using a 30-watt transmitter on 485 mc, located on the 71st floor of the Chrysler Building, New York City, CBS has transmitted color-television signals using a directive antenna, the pattern of which will cover one-fifth of New York City, said Dr. Peter Goldmark, CBS television engineer, in an informal report to the FCC. The horizontal pattern was such that signals were down 3 db at 30°. (*Cont. on page* 206)

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The receiver used was located in the CBS building about a mile away from the transmitter. Color pictures were satisfactorily received on equipment which used no rf amplifier and had a sensitivity such that the noise level and the weakest signal detectable were both 50 microv. Two hundred microv. gave a usable picture. This receiver was connected by means of several hundred feet of coaxial cable to the pick-up on the roof which comprised an antenna placed in a parabolic reflector measuring 17 x 18 in. This parabola was rotated by a selsyn motor controlled from the receiver about twenty stories below.

Satisfactory signals were received when the receiver was pointing directly at the transmitter. Also, upon rotating the receiving antenna through about 180°, seven or eight distinct signals, each free from distortion, were received. (Engineers commented that if the directive receiving antenna had not been used these various reflected signals would have caused serious multiple images. One of these signals was that reflected from the RCA building about a mile from the transmitter and half a mile from the receiver.) Calculations showed that the equivalent power reflected was about 1/100 of a watt, which bears out CBS's statement that relatively low powers are needed for HF television as compared to the present LF band. The figure CBS suggests is ten to one in favor of HF.

Low powers on HF

The CBS low-power transmitter which will shortly be increased to 50 watts, CBS believes to be satisfactory to cover New York City and furnish signals at a distance of 20 miles. However, within a few months CBS plans to have a high-power transmitter, efficiency 75%, output 700 watts peak. First use of this will be to carry out propagation tests jointly with FCC engineers. This power will be fed into an antenna which will give a horizontal gain of about 20 and a vertical gain of 18. CBS recommends for HF television one-kw stations using antennas with a power gain of 20. They are sure that 20 kw will be sufficient for any location.

In answer to Commissioner Jett's questions regarding dates, CBS engineers explained that they have a contract with Federal Tel. and Radio Corp. for a transmitter. This will be ready not later than February 1, 1946. In the meantime, the

CBS engineering staff developed the equipment described here. Federal promises a commercial 1.5 kw transmitter to be ready about June 1946. The motion-picture scanning equipment was developed by CBS engineers. Westinghouse, using CBS designs, is producing this scanning equipment.

Go above 525 lines

Ten units have been ordered, delivery to be in six months after the order is placed. Equipment for live pick-up, using much higher scanning frequencies than 525 lines, has been designed. This is to be duplicated by Westinghouse and will be ready for delivery in one year. CBS in Chicago will get the present equipment and new commercial equipment to be obtained will be installed later at New York.

Receivers are being produced by the General Electric Co. cooperatively with CBS. GE has a large group of engineers working on color television, but all design data comes from CBS, it was reported. HF receivers for pictures directly viewed will be ready January 31, 1946, and projected pictures will be available three weeks later.

Other engineers are known to be working on color produced electronically. Such a method is not better than the mechanical system used by CBS, said Dr. Goldmark, but CBS is also working along electronic lines. In spite of the reassuring tests on HF, CBS plans to continue its television broadcasting on LF, concluded Dr. Goldmark.

64 Conditional Grants Allowed by FCC

Conditional grants of 64 applications for new FM stations to be located in 21 states have been made by the FCC. The grants allow the applicants to proceed with preliminary plans for establishing the new stations, allowing them a 90-day period of grace before filing with FCC extensive engineering information. There are still more than 600 applications to be acted on under the Conditional Grant policy. Forty-eight FM stations are in operation at the present time and five under construction.

Not Cinaudagraph Corp.

It was Cinaudagraph Speakers, Inc., Chicago, that was acquired by Aieron Mfg. Corp. and not Cinaudagraph Corp., Stamford, Conn., as erroneously reported.

A FEW EXAMPLES OF

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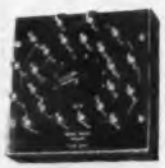

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DP10 & DP20 TEN & TWENTY POSITION SWITCHES.

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MM100 ELAPSED MILLI SECONDS METER.

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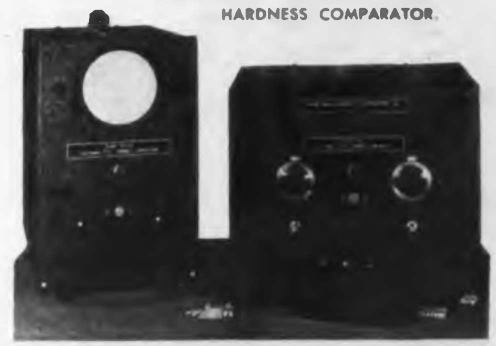
SM4 SYNCHRO CYCLIC TIMER.

FOR ASSORTING METAL PIECES
HC44 ELECTRONIC STEEL HARDNESS COMPARATOR.



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Dr. Frederick B. Llewellyn, new IRE President

Llewellyn Elected IRE President

Dr. Frederick B. Llewellyn, consulting engineer on the staff of Bell Telephone Laboratories, has been elected president of the Institute of Radio Engineers for 1946. He will succeed Dr. William L. Everitt, professor of Electrical Engineering department of the University of Illinois.

Dr. Llewellyn is an international authority on the design of vacuum tubes used for communication and electronic control purposes. His theoretical study of the subject resulted in his invention of the ultra-high-frequency oscillator tube which is fundamental to the development carried on during the war in radar and other communication devices. He is also known for his work on stabilized oscillating circuits used in radio and telephony.

Elected vice president of IRE for the coming year was E. M. Deloraine, president of the International Telecommunications Laboratories. Three Board of Director members were also elected: Dr. Walter R. G. Baker, vice president of General Electric Company; Dr. Donald B. Sinclair, assistant chief engineer of the General Radio Company; and Virgil M. Graham, plant manager of Sylvania Electric Products Inc.

Southern Representative

The W. J. Yount Co., Pleasant Grove Station, Dallas 10, Texas, has been organized to represent manufacturers of electronic products. Yount has been employed as civilian radio engineer for the Signal Corps, Headquarters Eighth Service Command, Dallas, for the past three and one-half years.

Raytheon Develops Navigation Raydar

A simplified navigational radar designed especially for the merchant marine has been developed by Raytheon Mfg. Co., Waltham, Mass. Called "Raytheon Raydar," this new microwave equipment features simplified operation and compact design. The equipment comprises three units — the antenna, the transmitter-receiver, and the indicator—the first two of which may be combined when the antenna is not mounted at the masthead. The equipment is designed to operate from shipboard 115-volt power source and has a low power consumption not exceeding 2 kva. Suitable transformers or converters will be provided for special requirements.

The expected maximum range is 15 to 20 miles for large surface objects such as type C-3 ships or 4 to 6 miles for small objects such as bell buoys. The minimum range—100 yards from the antenna—is desirably low. Four range scales will be provided—1½, 5, 15, and 50 miles. Range marks will permit ranges to be read with an accuracy of about 2 per cent. Bearing accuracy will be within 2 degrees. The antenna drive provides both clockwise and counter-clockwise rotation, thus permitting sector-scanning.

Commercial simplification

Such technical features as frequency, repetition rate, and pulse length have been chosen for maximum performance and minimum interference, on the basis of long experience with Navy radar under battle · conditions and extensive tests in the Raytheon laboratories.

Raytheon has had four years of experience in the manufacture of shipborne surface-search radar equipments for the Navy, and has produced more such equipment than all other manufacturers combined. Such experience has made it possible to design Raytheon Raydar to withstand extreme conditions of temperature and humidity, as well as any shock or vibration encountered on shipboard. Safety features are included to remove all high-voltage hazards to unskilled personnel.

Servicing will be provided by Raytheon's world-wide organization of factory-trained field engineers, who have long been working with the Navy in keeping ra-

When Wire Coils Must Be

OVEN-BAKED FASTER

FORMEX* Still Won't Crack

because the insulation on Formex magnet wire is highly resistant to heat shock

One way to speed coil production is to use higher temperatures and faster cycles in the baking process. Ordinary enameled wire can't stand such treatment, but Formex magnet wire *can!*

The superior toughness of the insulation on Formex enables it to withstand far more abuse in coil manufacture than other wires—in baking, bonding, winding, forming, and handling. This greater toughness affords you an opportunity to reduce rejects while maintaining top-speed production.

Because it needs no fibrous covering, and because it is available in rectangular and square shapes throughout a wide range of sizes, Formex makes possible more compact windings with resultant savings in weight and materials.

As the world's largest user of magnet wire, General Electric makes the same sort of comparisons of installed costs as you might make. These comparisons show that, even in those few cases where the price of Formex is slightly higher than the price of conventional magnet wire which it replaced, the higher first cost is definitely offset by lower costs of manufacturing the completed coil or installed winding.

Ask your G-E representative to show specifically how you can benefit by using Formex. *General Electric Company, Schenectady 5, N. Y.*

Round wire sizes: No. 8 Awg to .001 in.
Rectangular wire: Full range of sizes

*Trade-mark Reg. U.S. Pat. Off.

Buy all the BONDS you can—and keep all you buy

GENERAL ELECTRIC

dars operating at peak efficiency in all theatres of action and throughout the world.

Users will also have the benefit of Raytheon's policy of field modernization, whereby all equipments will be provided with the latest improvements in the art as fast as these are tested out and made practicable. It is expected that complete installations will be made to Merchant Marine operators for less than $10,000.

WU Microwave Relays to Displace Wire Lines

Western Union has now in operation a Washington - Philadelphia and Philadelphia-New York microwave radio relay system; sixty telegraph channels, two telephone channels, one facsimile channel, and one broadcast audio channel were recently demonstrated on a single 4000-megacycle radio beam.

First step in the microwave program is known as the "New York-Washington - Pittsburgh Triangle." Its establishment will in time lead to removal of 2500 miles of pole lines, with 54,000 miles of wires and 180 miles of aerial and underground cable.

The microwave system will provide beams in both directions, and provide 270 multiplex circuits per beam so that 1080 operators may transmit simultaneously.

Establishment of the "Triangle" involves installation of terminal equipment and the construction of 21 intermediate relays in towers on mountains or hills ranging from 14 to 54 miles apart and having elevations up to 2900 ft. The towers will be 60 to 120 ft. in height. Cabins 12 by 12 feet square are mounted atop the towers, in which reflectors are mounted for the purpose of directing the radio beams.

(*Continued on page* 216)

H. P. Corwith, assistant chief engineer for research of Western Union and one of the microwave radiators

Most of the equipment, however, is housed in a building at the base of the tower. Normally the relay towers will be unattended.

The minute antenna, operating in the range between 3000 and 15,000 mc., is contained in the assembly at the focus of the parabolic reflector. Antenna power is approximately 0.1 watt, which is more than ample for the fifty-mile hop.

The transmitter is frequency modulated. The 4000-mc carrier used in the demonstration was modulated by ultrasonic sound carriers which in turn were frequency modulated by the signals being transmitted. In some of the experimental systems amplitude modulation is used. Bandwidth in the F-M installation is 150 kc.

FCC-Radar Lab

The FCC has established a laboratory division to study the civilian uses of radar as they effect the allocation of frequencies. The new division will be part of the Commission's engineering department and will be headed by Charles A. Ellert, former chief of the Radio Intelligence Division (RID), who will be assisted by William K. Roberts, former chief of the FCC's Laurel, Md., field laboratory.

Beside conducting research on civilian radar, the new division will launch extensive experimental programs relating to wave propogation and allocation, developing new monitoring equipment, test new transmitters for type approval, and test diathermy and industrial heating equipment.

Australian IRE Vice President Here

Ray Allsop, of Sydney, N.S. Wales, a vice-president and Fellow of the Australian Institution of Radio Engineers, has been on tour of the United States and United Kingdom, investigating new developments in electronics, communications, FM, television, etc.

An ex Lt. Cdr. in the Royal Australian Navy, Mr. Allsop is a pioneer of radio development and sound pictures in Australia and was the engineer and builder of one of the first broadcasting stations there. He has been very closely associated with sound motion-picture equipment, being technical director and responsible for the development and production of Raycophone equipment.

Early Warning Radar History Made Public

The U. S. Army Signal Corps has just revealed the history and accomplishments of its "early warning" radar, which is so powerful that a squadron of bombers flying over Boston can be detected and tracked by a radar set operating in Philadelphia.

Early warning radar was developed originally in 1937 at the Signal Corps Radar Laboratory at Fort Monmouth, N. J., and the early models were in use when the Japanese attacked Pearl Harbor. The sets were also used in the summer of 1940 to guard the strategic Canal Zone.

Two main types of radar were used by the Signal Corps and the Army Air Forces and Marine Corps during World War II—all developed and procured by the Signal Corps. One was a mobile trailer-mounted set, SCR-270. Another is Radio Set SCR-271, a huge fixed-station building and a massive steel antenna tower ranging in height up to 400 feet. Several different models of this fixed-station set have been developed, varying in the type of building utilized, the height of the tower, or modifications of the antenna or the radar itself. Planes have been detected by this latter equipment as far away as 450 miles, but the maximum dependable range under normal conditions is from 150 to 200 miles.

Sky-surface search

The SCR-270 radar, designed to be moved rapidly on its trailer from one location to another to keep abreast of advancing forces, can be readied for operation at a new site by skilled technicians in eight hours. It can "search" both the sky and the surface of the earth in a 360-degree circle, and will detect ships at sea, as well as planes.

The extension of radar knowledge and technics during the next five years occurred at so fantastic a rate that new radars embodying great improvements over existing models were sometimes superseded even before they reached combat zones by still newer models of still greater range, accuracy, and efficiency. Despite these developments, however, the SCR-270 and 271 radars retained so many advantages that they were still in use on Okinawa and Iwo Jima when the war with Japan ended.

DEPENDABLE TEST AND MEASURING INSTRUMENTS THAT SHOULD BE INCLUDED IN YOUR NEW EQUIPMENT PLANS

After a distinguished record of service on the war front, these dependable, direct reading instruments are again available for civilian use, in the most exacting test and measuring operations for the design, development and production of Communication, Television and Radar equipment.

Q METER TYPE 160-A

Frequency Range: 50 kc. to 75 mc. may be extended with external oscillator down to 1 kc.
Range of Q Measurements, Coils: 50 to 625.
Accuracy: In general ± 5%
Range of Q Tuning Condenser: 30-450 mmf. (Vernier Condenser: ± 3 mmf.)

Q METER TYPE 170-A

Frequency Range: 30 mc. to 200 mc.
Range of Q Measurements, Coils: 100 - 1200
Accuracy: In general ± 10%
Range of Q Tuning Condenser: 10-60 mmf.

QX CHECKER TYPE 110-A

The factory counterpart of the Q Meter. Compares fundamental characteristics of inductance or capacitance and Q under production line conditions with a high degree of accuracy, yet quickly and simply. Insures uniform parts held within close tolerances. Frequency range 100 kc. to 25 mc.

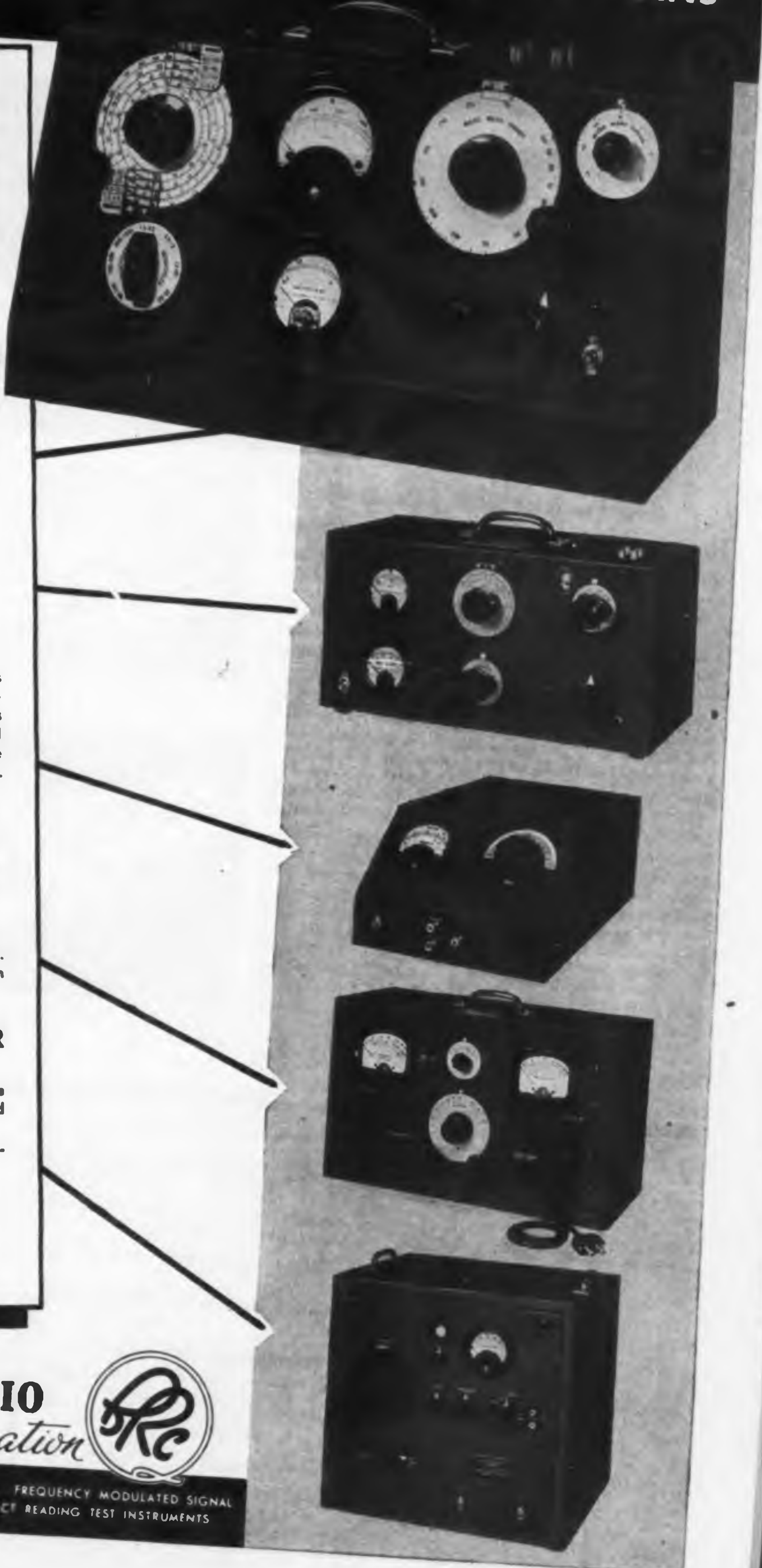
FM SIGNAL GENERATOR
TYPE 150 SERIES

Type 150 A—Frequency 41-50 mc. and 1-10 mc.
Type 151 A—Frequency 30-40 mc. and 1-9 mc.
Type 152 A—Frequency 20-28 mc. and 1-5 mc.
Type 154 A—Frequency 27-39 mc. and 1-7 mc.
Developed specifically for use in design of F.M. equipment. Frequency and Amplitude Modulation available separately or simultaneously.

BEAT FREQUENCY GENERATOR
TYPE 140-A

A single compact instrument which provides wide frequency and voltage coverage of generated signals.
Frequency Range: 20 cycles to 5 mc. in two frequency ranges.
Output Voltage Range: 1 millivolt to 32 volts.
Accuracy: ± 3%.
Output Power: One watt into external load.

For further information write for Catalog C



BOONTON RADIO *Corporation*
BOONTON, N. J.

DESIGNERS AND MANUFACTURERS OF THE "Q" METER . . QX-CHECKER . . FREQUENCY MODULATED SIGNAL GENERATOR . . BEAT FREQUENCY GENERATOR . . AND OTHER DIRECT READING TEST INSTRUMENTS

Survey Shows High Demand for FM Sets

During the next three years, FM set production may bring an additional $500,000,000 market to the radio set manufacturing business, according to a survey conducted by Frank Mansfield, director of sales research for Sylvania Electric Products Inc. The survey indicates that 17,000,000 radios are in public demand at the present time and of this total more than 10,000,000 may be AM-FM combination receivers or straight FM sets.

The survey was made by interviewing a representative cross-section of both FM and AM set owners to determine what the public expects as far as frequency modulation is concerned. Over 50% of those interviewed indicated willingness to pay from $125 to $150 more for an FM set over AM set prices.

FM set owners revealed that they liked FM best because it gives greater realism, less static and noise, and less interference from other stations. The survey also revealed that only a small percentage of FM set owners utilized the full fidelity capacity of FM either because they did not know how to tune their set or did not like the high tones. The survey shows that 2% of existing FM sets were home-made and over half were AM-FM combinations.

NAB To Resume Engineering Conferences

The National Association of Broadcasters will resume its Broadcast Engineering Conference with the 1946 meeting to be held at the Ohio State University in Columbus during the week of March 18-23. This is a continuation of the annual conferences held during the years 1938-42 inclusive. The conference will again be held annually, and the place of meeting will alternate between the campus of the Ohio State University and that of the University of Illinois.

Conferences are under the joint sponsorship of the Ohio State University and the University of Illinois with the National Association of Broadcasters and the Institute of Radio Engineers cooperating. Dr. W. L. Everitt, now head of the Department of Electrical Engineering at the University of Illinois, Urbana, Illinois, will continue to act as director with Professor E. M. Boone of the Ohio State University as associate director.


your local
Westinghouse
electronic tube distributor can
supply any electronic tube you need
A Westinghouse tube distributor or representative will survey the tube requirements of your electronic equipment. He will also make tube surveys of the other plants in your area.
This gives him an accurate picture on which he can base his tube stock.
HERE'S WHAT YOU GET! A copy of the survey of your equipment. A report on the tubes used in your plant. Prompt delivery on these tubes from your local Westinghouse tube warehouse.
FOR A SURVEY OF YOUR PLANT . . . call your local Westinghouse distributor or district office or write Westinghouse Electric Corporation, Electronic Tube Sales Department, Bloomfield, New Jersey.
TUNE IN: John Charles Thomas—Sunday, 2:30 P. M., EST—NBC.
Ted Malone, Monday through Friday, 11:45 A. M., EST — ABC.
One call does it all
WHEN YOU USE
THE WESTINGHOUSE
SURVEY AND SUPPLY PLAN
Westinghouse
Electronic Tubes at Work

Television Is Ready

Greatly improved by wartime developments, television is ready to go, Dr. C. B. Jolliffe, vice president in charge of RCA Laboratories, told the Radio Executives Club at the Hotel Roosevelt. All the elements necessary to the immediate expansion of an eminently satisfactory television service to the public have been developed, he said, and there is no technical reason for further delay in welding them into a system that "will give the American public a wonderful new service for which it has been waiting a long, long time".

Taking up in turn the camera, transmitter, network facilities and receiver, each unit a fundamental part of a television system based on the present frequency assignments of 44 to 108 mc, he highlighted the respective advances that have been made since 1940 and described their collective effect in producing high quality pictures for the home.

"Before Pearl Harbor", he said, "we had available transmitters capable of operating at 5 kw of power on frequencies between 40 and 108 mc. Now we can build them to operate at 50 kw up to 108 mc and at 5 kw all the way up to 300 mc. Furthermore, for the 5 kw transmitters, we can design new antennas with sufficient gain to make the power equivalent to from 20 to 50 kw."

Acme Sells Clyde Plant

The Acme Electric & Mfg. Co., N. Y., has sold its Clyde, New York, plant to the General Electric Co., Schenectady. This factory, which was erected in 1941 and employing between 400 and 500 people will be used by General Electric for the manufacture of fluorescent ballasts, which was the original product of the plant. James A. Comstock, vice president of Acme, together with the managerial and engineering personnel, will be moved to Cuba, N. Y., where a new Acme factory containing 40,000 sq. ft. of floor space is being erected and will continue the regular products of the company, which are electronic transformer, cold cathode and hot cathode fluorescent ballasts. This plant will be in operation during the month of December.

Acme has established a branch factory at Allegheny, N. Y., formerly a branch of Electrical Reactance Corp.

RECEIVER MANUFACTURERS:

RCA TEST EQUIPMEN

to help speed your television-receiver productio

IF your television-receiver program has been held up because of inadequate test and measuring equipment, here's the answer. RCA will begin to deliver the instruments shown here in 60 to 90 days. They are not experimental or first post-war models, but service-tested equipment—developed before the war and perfected as a result of RCA's extensive television-research and manufacturing work during the war for the armed forces.

With items 1 through 4, a complete video signal can be produced, making it possible to measure and adjust accurately the focus, contrast, resolution, and scanning linearity of your television receivers.

Items 5 through 8 are other instruments we believe you will also find useful in easing your laboratory and testing problems.

An early indication from you of your test and measuring requirements will assure prompt delivery of this hard-to-get equipment.

1 MONOSCOPE CAMERA

Produces a fixed television signal for aligning and testing equipment such as television receivers, transmitters, and monitors. The signal is produced by scanning a stationary pattern mounted permanently inside the monoscope tube. It is designed for rack mounting for use with the distribution amplifier and the synchronizing generator (items 2 and 4). The filament supply is self-contained, but a separate regulated plate supply is required. The 580-C unit (item 3) is ideal for this purpose.

2 DISTRIBUTION AMPLIFIER (TYPE TA-1A)

For use with the synchronizing generator and monoscope camera. Applications include: transmission over coaxial lines of pictures and synchronizing signals to various locations, feeding signals from program line to monitors, for isolating distributed pulses, as a mixer to combine synchronizing with picture signals to form the complete video signal. Designed for standard rack mounting, the unit requires a regulated plate supply.

3 REGULATED POWER SUPPLY (TYPE 580-C)

For supplying the plate power required by the monoscope camera and distribution amplifier. Regulation is better than .25 per cent over the range between 50 and 400 milliampères; output voltage is adjustable between 250 and 300 volts; output ripple is lower than .012 per cent of the d-c output voltage. This unit may also be used for general-purpose work around the laboratory. Designed for standard rack mounting.

4 SYNCHRONIZING GENERATOR (TYPE TG-1A)

Ideal for design and production testing of televisi receivers, and for application work in experimen laboratories engaged in television work. Provid "synchronizing" pulses of suitable wave shape an frequency for the production, in conjunction wi camera equipment, of 525-line interlaced televisi signals. It keys together the scanning beams of camera Iconoscope and the receiver Kinescope form a perfectly synchronized picture. Confor with proposed FCC Standards of Good Enginee Practice.

RMA Admits 22 Members

Twenty-two more companies have been admitted membership to the Radio Manufacturers Association bringing the association's membership to 273 companies. Following are the new members: American Transformer Co., Newark, N. J.; De Mornay-Budd, Inc., New York, N.Y.; Eastern Electronics Corp., New Haven, Conn.; Franklin Photographic Industries, Chicago, Ill.; Hartford Industries, Inc., Jackson Heights, N. Y. C., N. Y.; Hazeltine Electronics Corp., New York; Industrial Electronic Corp., Brooklyn, N. Y.; Lewis Electronics, Los Gatos, Calif.; Modern Electronic Co., Inc., New York; National Design Service, New York; National Moldite Co., Hillside, N. J.; Noma Electric Corp., New York; Peerless Electrical Products Co., Los Angeles, Calif.; Radio Receptor Co., Inc., New York; Rayenergy Radio & Television Corp., New York; Regal Electronics Corp., New York; Stamford Electric Products, Inc., Stamford, Conn.; Symphonic Radio & Electronic Corp., Cambridge, Mass.; United States Trunk Co., Inc., Fall River, Mass.; Waters Conley Co., Rochester, Minn.; Wilmak Corp., Benton Harbor, Mich.; The Workshop Associates, Newton Highlands, Mass.

Reconversion Slow-Up Revealed by RMA

Reconversion of the radio manufacturing industry has been set back nearly two months causing a reduction in this year's set production estimates from over 3,500,000 to 500,000. The set-back, according to the Radio Manufacturers Association, is due to a serious material shortage, existing military orders, and slowness of OPA in fixing price regulations covering the sale of new sets.

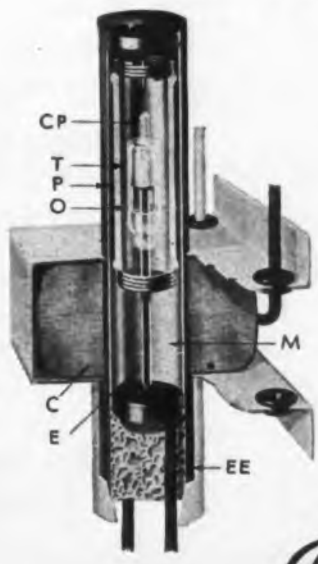
Material shortages are curtailing production of both components and end units. Component slow down is blamed on lack of steel, wire, and aluminum while the set bottleneck is due to shortage of variable condensers, speakers, and some wage and labor disputes. The OPA pricing problem had previously been the major block to reconversion. The remaining bottleneck to reconversion is a backlog of military orders for more than 300,000 sets and a large quantity of components. These orders carry the highest War Production Board priorities.

BUY VICTORY BONDS

Model 1200 for D. C. operation—Quick action available with contact ratings up to 10 amps. Either quick or time delay action, normally open or closed.

Model 1040 for A. C. operation — Quick action available with contact ratings up to 50 amps. Either quick or time delay action, normally open or closed.

Circuit Control with ADLAKE MERCURY RELAYS



HOW THEY WORK

ENERGIZED—Coil C pulls plunger P down into mercury M. Mercury thus displaced enters thimble T through orifice O. Inert gas in thimble gradually escapes through ceramic plug CP, thus producing time delay.

ENERGIZED—Mercury now fills thimble T, is completely leveled off and mercury-to-mercury contact established between electrodes E and EE. Degree of porosity of ceramic plug CP determines length of time delay.

Contacts and break-offs are as quick as a wink because Adlake Plunger-type Relays (models for A.C. or D.C.) use fast-moving, liquid metal mercury... positive in action; silent and chatterless; will not burn, pit, or stick.

Under the most exacting conditions . . . heat or cold, dirt, dust, or moisture they're ready and prompt to perform. Mechanisms, encased in armored glass or metal cylinders and then hermetically sealed, are impervious to the elements and oxidation.

No cleaning, no inspection, no servicing . . . relax and let an Adlake Mercury Relay work your timing, load, or control circuits—automatically and trouble-free.

Our bulletin tells the complete story, write for it today.

Adlake
TRADE MARK

THE ADAMS & WESTLAKE COMPANY

ESTABLISHED IN 1857 — ELKHART, INDIANA — NEW YORK · CHICAGO

MANUFACTURERS OF ADLAKE HERMETICALLY SEALED MERCURY RELAYS FOR TIMING, LOAD AND CONTROL CIRCUITS

NEW BULLETINS

Buyers Guide

The Representatives of Radio Parts Manufacturers, Inc., through its industry relations committee, of which Robert E. Breuer is chairman, has just issued a 130-page radio and electronic industry buyers' guide. This book contains an alphabetical listing of all component manufacturers, their addresses, the products they make and a geographical list of their representatives or their regional sales offices. Among the features is a "Where to Buy It" section in which every important radio component is listed alphabetically with sources of supply.

The directory is being distributed gratis through the National Secretary, David Sonkin, 347 Fifth Avenue, New York 16, N. Y., or any member of "The Representatives".

Multiple Connectors

A new bulletin on multiple contact connectors is being distributed by Cannon Electric Development Co., 3209 Humboldt St., Los Angeles. It contains 64 pages of information on "K" and "RK" plugs, receptacles, dust caps, junction shells, stowage receptacles for aircraft, instruments, radio, motors, geophysical equipment, and general electrical applications.

Capacitor Production

An illustrated booklet entitled Capacitor Craftsmanship has been issued by the Aerovox Corp., New Bedford, Mass. Many photographs are included showing the process of manufacture of various kinds of capacitors and the means used for quality control. Pictures of the production lines and other interiors of the factory are included.

Rotary Solenoids

A new booklet on rotary solenoids has been issued by George H. Leland, Development Engineering, 133 Webster St., Dayton 2, Ohio. A few applications are suggested for this mechanism. The rotary solenoid was used in bomb releases during the war.

The New Bendix-Pacific

VHF MOBILE RADIO COMMUNICATION SYSTEMS

Bendix—famous for many recent new developments in radio for industry and home—now announces advanced VHF radio communication systems for mobile use.

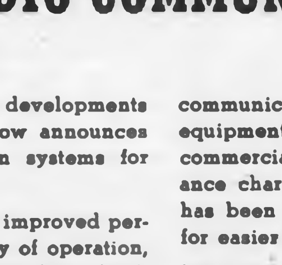
The new systems, which offer greatly improved performance characteristics and economy of operation, are available for use in three of the Very High Frequency bands — 30-44 megacycles, 72-76 megacycles and 152-162 megacycles.

All the equipment has been designed to use low input power. Any extended service can be provided with relay facilities.

For five years Pacific Division's radio research group has been working with military experts on advanced designs of VHF communication and control systems, and the new equipment embodies the latest developments for commercial application. In addition to new performance characteristics, the Bendix-Pacific equipment has been designed for compactness, long life and for easier service and maintenance.

Whatever application of radio voice communication you are planning, Pacific Division is interested in explaining the advantages of the new equipment to you. Pacific Division, Bendix Aviation Corporation, 11678 Sherman Way, North Hollywood, California.

Sales Engineering offices in New York and St. Louis.



One of the new VHF communication units combining transmitter and receiver in a single cabinet for either mobile or fixed station installation.

Pacific Division
Bendix Aviation Corporation
VHF COMMUNICATION SYSTEMS

Schering Bridge

Anyone interested in the measurement of dielectric constant and power factor of a dielectric in solid or liquid form, will be interested in the recently revised catalog E-54 (2), issued by the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, describing the modified Schering bridge. This new publication explains how the circuit is arranged so the operator is completely protected while making adjustments, how operation is speeded by using low impedance shield balance circuits to minimize time required to achieve guard circuit balance, how the controls, from which all adjustments are made, are located at a vertical dial-panel, and how the bridge, detector and operator are protected, in the event of a sample failure, by replaceable neon safety gaps. New photographs, photo-diagrams and explanatory material have been included to show more clearly the outstanding characteristics and advantages of this direct-reading instrument.

Fibre Containers

A descriptive pamphlet on containers has been issued by Weatherproof Solid Fibre Box Group (an association), 735 11th St., N.W., Washington 1, D. C. The booklet is profusely illustrated and contains much data on the testing of fibre containers and the results to be obtained from available boards. It should prove of value to manufacturers having a packaging problem.

Drawn Wire

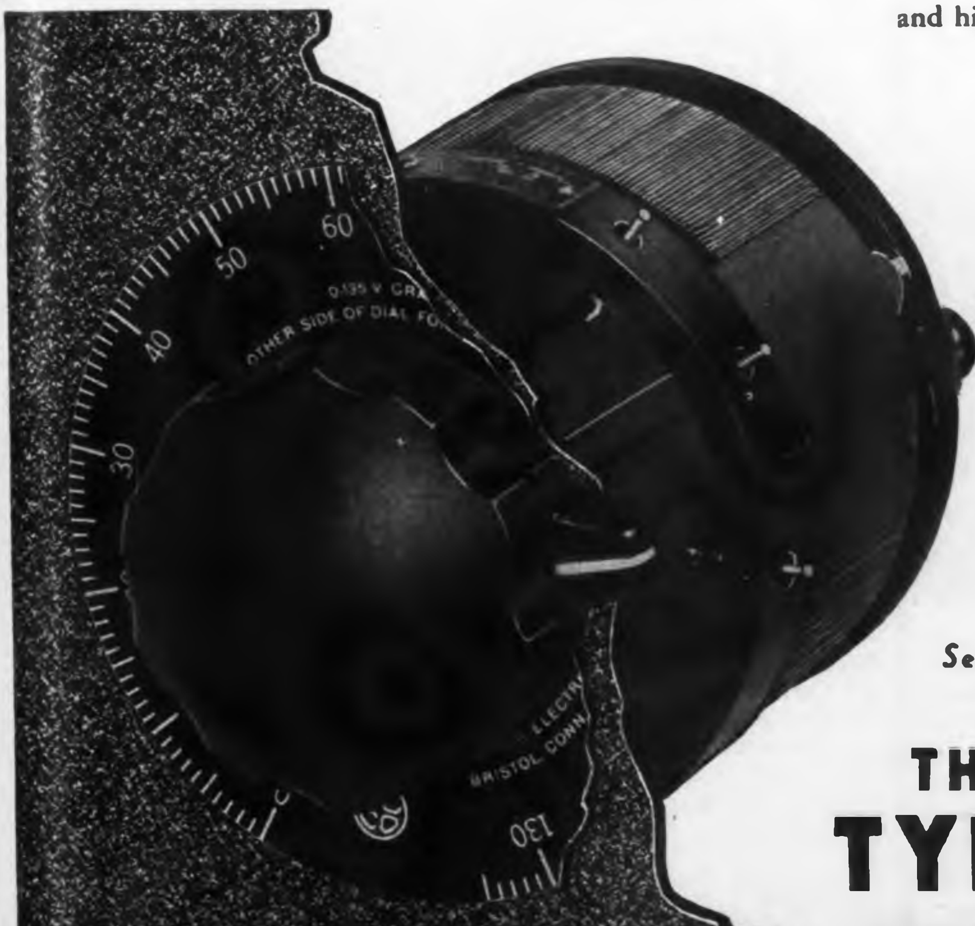
A folder describing precision steel and alloy wires has been issued by Spencer Wire Co., West Brookfield, Mass. Wires offered range from .001 in. to .050 in. diameter for resistance, spring, communication and miscellaneous industrial uses.

Wire Drawing

A new 8-page booklet titled "Fine Wire of Special Materials" has been published by North American Philips Co., Inc., 100 E. 42nd St., New York. The text brings the reader up to date on manufacturing methods and problems connected with wires 0.002 in. to 0.0007 in. diameter and smaller. The booklet contains ten photos which make the text easy to understand.

Here's the ACTUAL SIZE

In announcing another new and smaller POWERSTAT variable transformer, SUPERIOR ELECTRIC COMPANY offers in the Type 20 all the desirable characteristics of larger POWERSTATS together with design features only applicable to a unit of this size. Use of special core materials and an unusual mechanical arrangement permits mounting on 1¼ inch radius. The space required behind the panel is only 3 9/16 inches. Although small in physical dimensions, the rating of type 20 illustrates the advanced design and high quality workmanship.



Input: 115 volt, 50/60 cycles, 1 phase.

Output: 0 to 135 volts, 3 amperes, 405 va.

Weight: 3.9 lbs.

Questions regarding technical data, delivery or price will be gladly answered by any SECO engineer.

Send for Bulletin IE

THE NEW TYPE 20

POWERSTAT

SUPERIOR ELECTRIC COMPANY

471 LAUREL STREET, • • • BRISTOL, CONNECTICUT

Friction Sawing

The new technic for cutting materials known as "Friction Sawing" recently developed through the innovation of high speed sawing machines is described in detail in a new 24 page booklet being released by the Machine Tool Division of the DoALL Co., 1301 Washington Ave. South, Minneapolis 4, Minn.

The booklet explains why "Friction Sawing" is possible; its advantages and its limitations. Of particular interest is the "Job Selector" chart included in the booklet which contains a ready reference for selecting the proper sawing factors in cutting SAE steel, armor plate, stainless steel, illium, cast steel and cast iron.

Photographs and charts are used to illustrate the cutting rates to be expected from "Friction Sawing" including radii cutting factors, tube sawing and finish. Some 30 photographs show various applications for friction sawing in foundries, experimental laboratories, production, maintenance or salvage work.

Molded Plastics

A 48-page booklet on plastics has been issued by Eclipse Moulded Products Co., 5151 No. 32nd St., Milwaukee 9, Wisc. Not only is it profusely illustrated, but the textual material is highly informative. A feature is a large chart of various plastics permitting the reader to pick at a glance the plastic having the properties most useful to him. Each of the available plastics is thoroughly discussed and applications are given. The book also contains design tips for molded parts.

Powdered Metal Engineering

Hungerford Research Corp., Murray Hill, N. J., has issued a 16-page booklet explaining its services in the application of powder metals and plastics to mechanical and electrical equipment.

Phenolic Plastics

A brief, illustrated booklet about phenolic plastics has been issued by Durez Plastics & Chemicals, Inc., No. Tonawanda, N. Y. Perhaps its outstanding feature is the concise chart which points out the physical and chemical properties of a representative group of Durez phenolic molding materials. Included also are two pages devoted to uses of resins.

Medical X-Rays

A new 16-page booklet describing Philips Metalix Contact & Cavity Therapy Apparatus has been issued by North American Philips Co., Inc., 100 E. 42nd St., New York. Text covers the following points: (1) How direct X-radiation at high intensities in body cavities provides powerful weapon for attack of certain diseases. (2) Illustrated text on specific applications such as ear, mouth, breast, bladder (surgical), and extremity treatments. (3) Construction of X-ray tube and how it functions. (4) Features of the control unit. (5) Special accessories to handle various applications.

Precious Stock and Solders

Laminated and solid precious metal sheet, tubing and wire are described in a pamphlet issued by D. E. Makepeace Co., Attleboro, Mass. Numerous forlms such as squares, rounds, rectangles and special shapes with various degrees of precious metal content and various laminations are available and are illustrated. Another pamphlet has been issued on silver and gold solders. This includes tables showing the melting and flow points of the various grades available.

Insulating Waxes

A catalog of insulating waxes and compounds listing specifications and uses of a number of materials has been issued by Zophar Mills, Inc., 112-130—26th St., Brooklyn 32, N. Y. The company points out that its products must be tailored to the job and presents the catalog only for general information. Methods used for various tests such as softening and melting points, cold flow, penetration, flash point, specific gravity, color, viscosity and other tests are included.

Vibration Testing

Vibration testing machines are described in a new booklet issued by L.A.B. Corp., 31 Union Pl., Summit, N. J. Machines available have a capacity of 100 lbs. at 10 G acceleration and the frequency of vibration is variable from 10 to 60 cycles per sec. Other machines have a capacity of 400 to 500 lbs. A useful table is included showing the displacement of the vibrating surface in inches related to frequency and acceleration.

How Skilsaw Protects Equipment "In-the-Package"

Moisture "in-the-package" causes vast damage to precision equipment.

Skilsaw, Inc., prevents this damage by means of Jay Cee Silica Gel, the ideal drying agent. A few small bags of the Jay Cee Gel are included within tightly sealed packages of electric handsaws, drills, and other tools. The gel has amazing power to adsorb and hold moisture. Thus the air in the package is kept thoroughly dry and damage from rust or corrosion is avoided.

This practice is being followed by more and more manufacturers of metal products. The cost of the gel is a mere trifle in comparison with the possible damage from rust or corrosion.

Jay Cee Silica Gel has wide application in the Air Conditioning, Refrigeration, and Chemical industries. It is clear white; passes a rigid section test; meets exacting Government specifications; is strictly a quality product.

A few excellent Jay Cee Silica Gel sales territories are still open to jobbers. Write for details.

JOLIET CHEMICALS, LTD., INDUSTRY AVENUE, JOLIET, ILLINC

Jay Cee SILICA GEL

A superior dehydrant

Channels or Megacycles?

Preliminary results of a survey conducted by ELECTRONIC INDUSTRIES among FM station engineers to determine the best way for manufacturers to designate the dial location of various transmitters, show that majority sentiment exists for marking off dials by channel numbers rather than by megacycles. The scoreboard:

For Channels	*For Megacycles*	*For Both*	*Undecided*
13	1	4	1

A few replies favored push-button tuning identified by station call-letters, with frequency calibrations indicated on the manual tuning dial. The uncertain status of FCC channel designations is generally recognized, and opinion is colored by this factor.

The statement of Paul Dillon, chief engineer of WMIT, is typical:

"It is our opinion that the new sets should be calibrated in channel numbers only. . . .

"It is obvious that the average listener has no interest whatsoever in a station's frequency, power, or anything else of a technical nature. His primary consideration is whether he can get satisfactory reception. For this reason, we think that an FM listener would prefer a system of calibrations from zero to 100, rather than a complicated one which would be of no advantage other than to show the number of millions of times the station's output current ran up and down the antenna.

"There has been some mention during the past few weeks of changing the channel numbers to read from the high-frequency end of the band . . . to enable the channel numbers to run concurrently in the event additional frequencies are made available at the 'low' end of the band . . . it might be possible to number the present channels from say, 100 to 200, thereby making room for future expansion on either side."*

The opposition argument is forceful. Frank R. Smith, general manager of WWSW, says:

". . . station locations on the new FM band should be designated in megacycles. We believe most of the publicity and promotion associated with station activities will carry the megacycle assignment.

"Identification by channel number is a new theory. We believe it

*FCC on Nov. 16 adopted such a system, first channel (88.1 mc) being designated No. 201, highest channel (107.9 mc) No. 300—Editors

will be difficult to educate the public in accepting channel numbers on the FM band, when we still confine our other operations to kilocycles or megacycles. The introduction of channel locations, we believe, would confuse the issue."

Another logical trend of thought is voiced by K. J. Gardner, technical supervisor of WHAM:

". . . the public cannot associate numbers with radio stations. In this respect, I do not think either a channel number or a frequency number is particularly good for logging.

"In the case of push-botton sets, I think the best system is to apply the call letters to the push buttons. In the case of dial sets, I think the channel designation for FM and television would be best. . .

"Old, established call letters give an intimacy to the listeners which the numbers do not, since the numbers can be assigned to different stations."

Theodore C. Streibert, president of WOR, is among those who favor channel numbers, but views the FCC policy of change with well-founded alarm:

". . . the question involves the matter of investment by a station in trying to build up a recognition popularity for a channel number, if at some time in the future that channel number might be changed and the investment therefore wiped out.

"I suggest that you try to get some action on the part of the manufacturers to adopt channel numbering and as a necessary preliminary of such adoption that they seek appropriate action from the FCC to assure permanence of the channel numbers."

MACARTNEY WATCHED

That's Lloyd A. Hammarlund, president of Hammarlund Mfg. Co., New York, at the right, presenting to sales Vice-President H. B. Macartney a twenty-year gold watch, commemorating that many years with the Hammarlund organization

VISITRON

Television Tubes

by

Visitron **is not a new name in tubes.** ***Visitron*** **is Rauland's name for all electronic tubes made in the Rauland Tube Division. It is the mark of the advanced** ***Rauland*** **Television thinking and planning based upon a pioneering experience second to none.** ***Rauland Visitron*** **tubes for direct-viewing for the home and projection for the home and theatre are ready to take their places in the new era of Television entertainment now unfolding before us. To be sure of your tube, be sure it's "*Visitron*."**

RADIO · RADAR · SOUND **Rauland** **COMMUNICATIONS · TELEVISION**

Electroneering is our business

THE RAULAND CORPORATION • CHICAGO 41, ILLINOIS

Combining Sound and Video on One Carrier

Several different announcements have recently been made relating to proposed modification of the existing system of transmitting television sound. In the present system the sound channel with frequency modulation occupies a relatively narrow range near the upper end of the assigned station channel. This requires separate transmitters and separate antenna structures for each service. The sound channel normally has a power output substantially equal to that used in the video circuit.

In a method being tested by several organizations use is made of the synchronizing intervals between successive lines of the video pictures. Such a time interval is available because of the necessity of permitting the cathode ray to return to the initial edge of a line. The time utilized for this is of the order of 10%. At present this so-called "wasted time" is far from being lost however inasmuch as the highly complicated synchronyzing pulses are transmitted during these intervals. The signal also is, of necessity, restricted during these intervals to keep within a carrier level that insures that the spot itself is extinguished during the retrace time so that it does not add a smear to the line being scanned during the flyback interval. Since the matter of keeping receiving sets synchronized under all possible conditions of noise levels and signal levels is one of the most difficult problems of the television system a great deal of the time and effort was spent during the discussion of the Radio-Technical Planning Board and by the earlier National Television Systems Commission as to the best possible methods of providing a synchronizing pulse that is most effective. In view of these difficulties there has been hesitance among many of the television engineers to further complicate the synchronizing pulse system by the addition of other services superimposed upon it. However it is a trait among engineers to avoid letting anything go to waste and this possibility of superimposing sound channels on the radio channels during the flyback levels is rather intriguing and so, many experiments have been conducted in the laboratories of the major companies developing television during the past decade toward this end. (Cont., on page 242)

Several distinct principles have been suggested and tried but at least up to the time that the RTPB groups were deliberating none of them apparently offered enough promise to be considered seriously when the present system standards were laid out. Work continued thereafter, however, and several methods are now being set up for more complete tests. In order to avoid the difficulty of amplitude control of the pulses that appeared during these flyback intervals most of these systems utilized some form of pulse length control or else frequency or time modulation for this purpose. In the present system the line scanning frequency is 15,750 cycles, so that the basic horizontal synchronizing pulse frequency would have a similar rate. This would provide audio frequency signals up to a frequency of possibly half this value or a little under 8,000 cycle top.

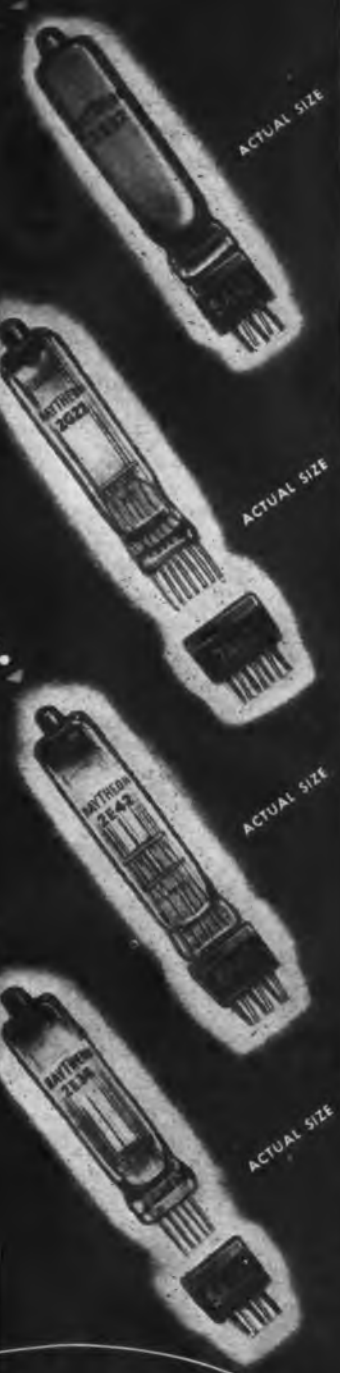
British Pye system

The British Government recently disclosed a system of this type developed by the British Television firm (Pye, Ltd.) which utilizes a system of sound transmission where the width of each blanking pulse is made to vary in accordance with the amplitude of the sound taking place at that interval. It is thus possible to maintain amplitude of the right polarity during the flyback interval so that the spot is extinguished. There is no evidence however as to what the method is whereby adequate synchronizing signals are maintained while the pulses start and stop at a time independent of conditions in the picture scanning. It is presumed that the pulse may start at a definite interval after the end of each scanned line and would have a length according to the sound amplitude characteristics.

Pulses and sub-carrier

In this country the CBS has inaugurated a somewhat different technic of combining the visual and the sound transmission on the same carrier frequency. This feature is being incorporated in the transmitter now being completed for CBS by the Federal Telephone and Radio Corp. In some of the research variations of the principles of the pulse time modulation systems recently disclosed have been considered in this service. Television receiver announcements by the

NEW RAYTHEON SUB-MINIATURE TUBES for Pocket Receivers



Since 1938 Raytheon has pioneered in the design, development and production of small, low drain, long life tubes. These have helped to make possible the modern extremely compact hearing aid.

New for Radio Receivers—Now Raytheon announces a physically similar kit of flat style, sub-miniature tubes for radio receiver applications. Included is a shielded RF-pentode amplifier, a triode-heptode converter, a diode-pentode detector-amplifier and an output pentode for earphone operation.

Much Smaller Radios Possible—These tubes make it possible to construct radios a fraction the size of prewar "personals," with sensitivity rivaling much larger sets.

The ratio of performance to battery drain is maintained very high, thus assuring the maximum possible operating life from the small size batteries now available.

The line consists of tubes approximately 1$\frac{5}{16}$" long x 0.3" x 0.4" in cross section. Each type is available with pins for use with small commercially available sockets as illustrated, or may be had with long flexible leads for wiring the tube directly into the circuit.

No progressive radio manufacturer will overlook the tremendous possibilities inherent in the small pocket receiver—built around the new Raytheon sub-miniature tubes. But call on Raytheon for *every* tube need—large or small—for the finest in engineering, production and performance.

ELECTRICAL CHARACTERISTICS

	2E31† 2E32♯ Shielded RF Pentode	2G21† 2G22♯ Triode-Heptode	2E41† 2E42♯ Diode-Pentode	2E35† 2E36♯ Output Pentode
Filament Voltage	1.25 V	1.25 V	1.25 V	1.25 V
Filament Current	50 ma	50 ma	30 ma	30 ma
Max. Grid-Plate Capacitance	0.018 μμf	0.065 μμf‡	0.10 μμf	0.2 μμf
Plate Voltage**	22.5 V	22.5 V	22.5 V	22.5 V
Screen Voltage	22.5 V	22.5 V	22.5 V	22.5 V
Control Grid Voltage*	0	0	0	0
Osc. Plate Voltage	—	22.5 V	—	—
Plate Current	0.35 ma	0.2 ma	0.4 ma	0.27 ma
Screen Current	0.3 ma	0.3 ma	0.15 ma	0.07 ma
Osc. Plate Current	—	1.0 ma	—	—
Transconductance	500 μmhos	60 μmhos (Gc)	400 μmhos	385 μmhos
Plate Resistance	0.35 meg	0.5 meg♯♯	0.25 meg	0.22 meg

*With 5 megohm grid resistance connected to F—.
**Higher voltage operation is possible as shown on engineering characteristics sheet available by request.

†Flexible lead Types.
♯Plug-in Types.
♯♯Approximate conversion Rp.
‡Signal grid to mixer plate Capacitance

RAYTHEON
MANUFACTURING COMPANY

Radio Receiving Tube Division

NEWTON, MASSACHUSETTS • LOS ANGELES
NEW YORK • CHICAGO • ATLANTA

EXCELLENCE IN ELECTRONICS

Westinghouse Electric Corp. also include utilization of some form of combination sound-vision modulation. Others which have been accorded attention involve the use of sub-carrier principles or those in which the video carrier is shifted a slight amount in accordance with sound channel requirements.

Better fidelity?

Many engineers believe that most of these systems have the disadvantage of complicating the most critical part of the television receiver, that is, the synchronizing system and this would add to the complexity of manufacturing and servicing. On the other hand in the news releases of information regarding the systems around which tests are being set up, the suggestions are made that the receiver design can be simplified thereby. The transmitters on which it is planned to try the system are designed for the higher frequency channels which ultimately go to more than 525 line scanning; it will be possible to increase the sound fidelity limits to more than 7500 cycles on these channels.

Baldwin to Produce Tuning Capacitors

Baldwin Instrument Co., Oceanside, L. I., N. Y., engaged for several years in the production of aircraft accessories, has expanded facilities and will produce gang capacitors for tuning AM receivers, and associated items. A. E. Maeder is president and Frederick S. Almy, formerly in charge of production of special equipment for Hammarlund Mfg. Co., Inc., has been appointed general manager in charge of production. Almy, formerly with Hammarlund, has just resigned his post with Minerva Corp. of America, radio and television manufacturers, where he was in charge of production planning.

EMA Reelects Wyckoff

L. Walter Wyckoff of Pilot Radio Corp. has been reelected president of the Electronics Manufacturers Association for the coming year. Also elected to official positions are: Vice presidents, Arthur Freed, Freed Radio Corp.; A. P. Hirsch, Micamold Radio Corp.; secretary, I. A. Mitchell, United Transformer Corp.; and treasurer, S. J. Novick, Electronics Corporation of America.

Quiet

Efficient—reliable—above all, *QUIET*—
that's the Ballentine Phonograph Drive.
Basic refinements in design, *precision dynamic balance*, the most advanced manufacturing technique and equipment make the Ballentine Phonograph Motor unequalled for low background noise or rumble.
Send for descriptive bulletin.

RUSSELL ELECTRIC COMPANY

366 WEST HURON ST., CHICAGO 10, ILL.

Manufacturers of

BALLENTINE PHONOGRAPH DRIVE

Location and Design of Television Stations

Many pitfalls, both technical and financial, await the unwary engineer or operator who plunges into a television project without giving it the critical appraisal which it merits. This was the central thought of Dr. A. N. Goldsmith's address before the Television Institute October 15 at New York's Commodore Hotel.

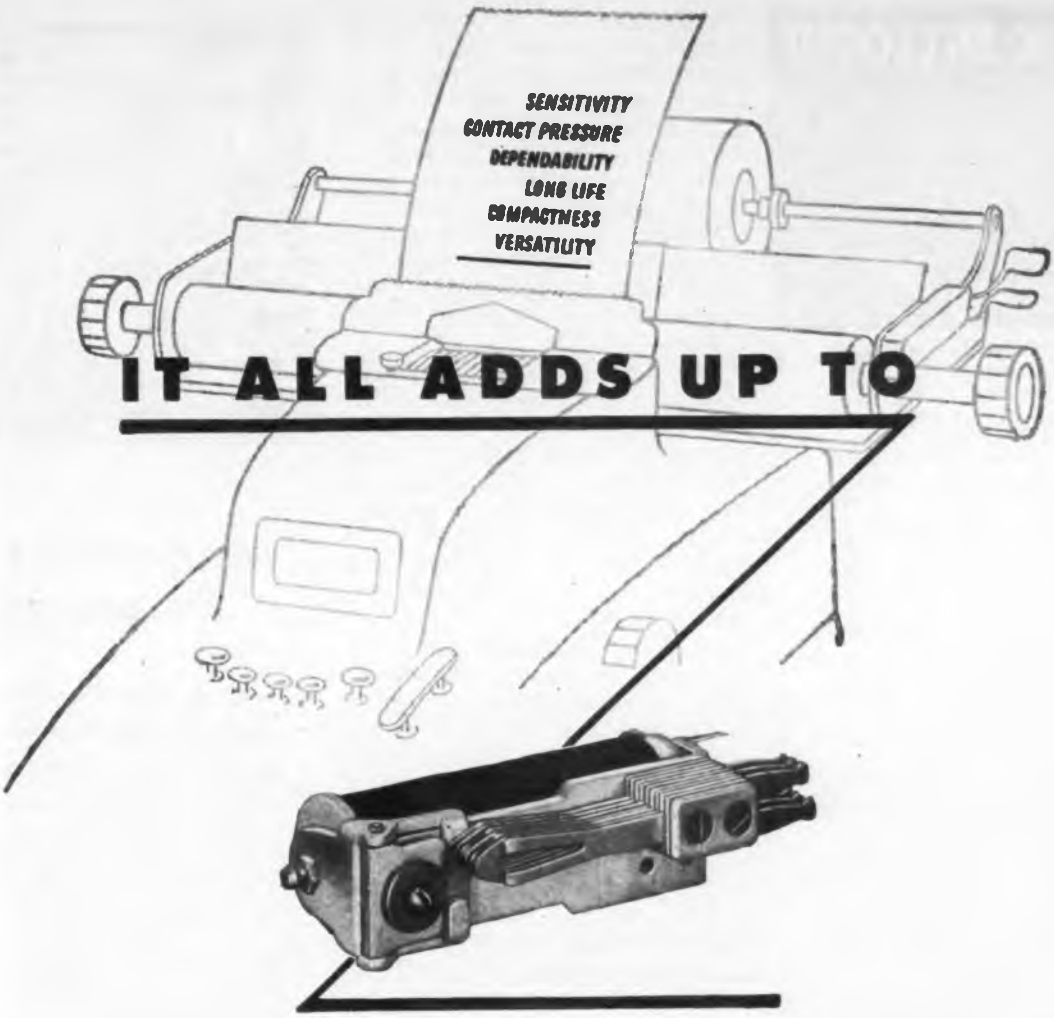
A capacity audience from programming and commercial fields attended the two day sessions.

When planning a television installation, Dr. Goldsmith advocates careful consideration of these points: Transmitter to be used, tower and antenna, coverage, blind spots, obstructions such as skyscrapers or bridges, interference level, municipal zoning regulations, FCC blanketing restrictions, radio beacon interference, airplane flight path obstruction, service area central point, location of studio, real estate values, accessibility, studio to station communication facilities, power line availability, and space problems peculiar to the television studio.

Since line of sight operation is involved at television frequencies, and since television waves do not penetrate through buildings to any considerable extent, Dr. Goldsmith points out that it is well to select the highest and most nearly central location possible. By looking around the terrain from the antenna site,

LONG AND SHORT

At the recent American-Canadian RMA second joint conference in New York, W. J. Addison, president of Addison Industries, Ltd., Toronto, felicitated C. J. Burnside (Westinghouse) behind him, and Ralph A. Randall, managing director of Radio Condenser Co., Toronto



IT ALL ADDS UP TO

AUTOMATIC ELECTRIC'S CLASS "B" RELAY

All six of the features you want—perfectly combined in one unit—that's what you get in this new relay. It meets all purposes, in widely varied applications, without compromising with the most exacting requirements. For in the Class "B" relay, Automatic Electric has combined the features you need—*all* of them, and each in greatest measure.

Independent twin contacts for dependable contact closure . . . efficient magnetic circuit for sensitivity and high contact pressure . . . unique armature bearing for long wear under severe conditions . . . compact design for important savings in space and weight. Now available for coil voltages to 300 volts DC and 230 volts AC, with capacities up to 28 springs; also with magnetic shielding cover, when specified.

The Class "B" relay, and many others, are shown in Catalog 4071. Write today for your copy.

Relays by **AUTOMATIC ELECTRIC**

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PARTS AND ASSEMBLIES FOR EVERY ELECTRICAL CONTROL NEED the engineer may view the possible service area. A good site from the engineering standpoint, may however be abandoned from financial considerations, or forbidden by CAA regulations. In the metropolitan area, interference levels are a matter of concern, and a relatively stronger signal must be laid down in regions of high interference. Ignition noise is a particularly troublesome form of television interference.

Film transmissions may occupy from 10 to 80% of the total service, and a film projection room must be provided. With respect to film, Dr. Goldsmith points out that 16 mm. just meets today's requirements, but will be inadequate if the industry goes to 700-800-900 line pictures. Thirty-five mm. film will then be a must.

Television standards today are not frozen. Dr. Goldsmith aggressively advocates freezing of present standards for ten years, in order that the infant industry may have opportunity to establish itself commercially. However, the fluid state of the art is one of the risks incurred by present-day operators.

Dr. Goldsmith introduced Howard L. Purdue of the General Electric Co., who furnished a survey of technical components required for small and large television installations:

Studio equipment

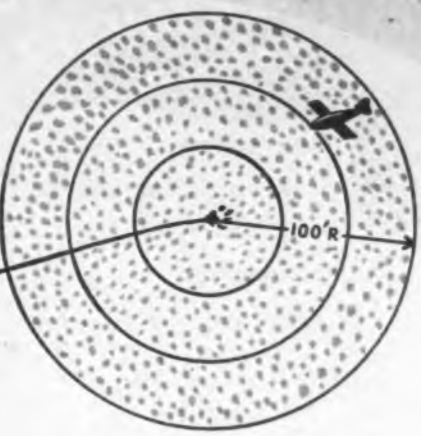
The basic equipment for a five-kilowatt television system includes the five-kilowatt television transmitter, a two-and-a-half kilowatt aural transmitter, a relay pickup receiver and converter unit, visual and aural receiving and transmitting antennas, visual and aural monitors, and film facilities. The cost of the electronic components is quoted at approximately $48,700.

Visual and aural identification equipment consists of a monoscope unit, synch pulse generator with amplifier and power supplies, audio frequency and microphone control panel plugs and cables, and monitoring equipment. The cost is approximately $10,500.

Motion picture channel equipment consists of a 16-mm. projector and accessories, pick-up camera mounting and tube, camera sweep generator, video amplifier, shading and camera control equipment, and distribution and mixing panel. The cost is approximately $11,400. Two 35-mm. motion picture channels, including projector and accessories,

A SECRET NO LONGER

Jefferson's part in Connection With



PATH OF SHELL

RADIO PROXIMITY FUZE

Now Can Be Told

The veil of secrecy that shrouded one of the most important factors in the war just past, can now be lifted. This development, the Radio-Actuated or Radio Proximity Fuze, has been placed second only to the Atomic Bomb in importance and scientific development.

In one of the darkest moments this Fuze halted the German drive in the Belgium counter attack, helped break Jap air power in the Pacific, and in England finally stopped the buzz bombs that Germany frantically released prior to the end of the European War.

Jefferson Electric's contribution in connection with this device can now be revealed. Also credit, which was withheld due to the utmost secrecy of the project, now can be given to the skilled and loyal workers, and the inventive genius of the engineers and production experts who worked so untiringly.

One of the vital requirements was a safe operating switch that would insure against detonating the shell as it left the gun but still operate at the precise moment desired. The time between leaving the gun and firing in most instances is measured in tenths of seconds. Improper timing in the fuze of a shell results in premature detonation, commonly referred to as muzzle bursts, and is hazardous to the gun crew.

To obtain reliable operation with many different types of projectiles a switch design was developed jointly by personnel of Jefferson Electric Company and Applied Physics Laboratories of Johns Hopkins University. The result was a switch 0.315" in diameter and 0.530" long—not only remarkable because of the small size but because it was actuated by centrifugal force of the spin of the projectile rather than by the usual tilt action.

No less than 12 classes of mercury switches (all smaller than a seamstress' thimble) were made to suit the various types of guns in which Radio Proximity Fuzes were eventually used. While developing these sensitive, small mercury switches was a major accomplishment—the mass production to high standards of uniform quality and accuracy was, if anything, a greater feat. This proved again Jefferson Electric's manufacturing skill, producing—as with its transformers, ballasts and fuses—to fixed high standards at mass output rates.

Jefferson is proud to relate the success in the development of this hitherto unthought-of device—of the constant improvements made, and of the staggering rate of production attained in so short a time.

JEFFERSON ELECTRIC

E · · ·

Because of the secrecy of the entire VT Fuze project, the Navy "E" Award for excellency was withheld lest it draw unnecessary attention to the plant. Now the Award with 3 stars has been made.

Jefferson Electric Company

BELLWOOD (SUBURB OF CHICAGO) ILLINOIS

In Canada: Canadian Jefferson Electric Co. Ltd., 384 Pape Ave., Toronto, Ont.

pickup camera, etc., will cost abo
$48,000.

Two studio camera channels
cluding camera, lens system, amp
fiers, dolly, sweep generator, mo
tor console, shading and came
control equipment including mic
phone, boom, transcription tur
tables, amplifiers, etc., come
$29,700.

Additional studio equipment in
curs $6,400, lighting equipment wi
selsyns $10,000, and $3,000 for supe
vision of installation. Thus a mi
mum cost of $97,500 may be antic
pated for equipping a 5-kw. statio
with the least possible electron
components. The corresponding fig
ure for a 50-kw. station is approx
mately $268,500.

French Get New "Broadcasting Director"

Christian Basque, an enterpr
ing reporter for the newspap
"Paris-Matin," got fed up with bu
reaucracy and at the same time g
a good idea for a story for his pap
reports John O'Reilly in the Ne
York Herald-Tribune. He went
the offices of the government-co
trolled French radio, set himself u
as the new Director of Broadca
and for two days passed on all ma
uscripts before they were broadcas

According to his story, Basque, o
a previous visit to the building
the Rue Bayard, had been unab
to find any one in charge. He sa
it was a sort of bureacratic vic

WINDOW FOR X-RAYS

One of the steps in the forming of the ... mann window in a Geiger-Muller tube ... expert in the Mount Vernon, N. Y. pl... the North American Philips Co.

circle, with everybody taking orders from everybody else.

So he went back to the building, selected Room 205 as his office, walked in and announced that he was the new Director of Broadcasts. They told him, "Fine." He selected a desk and put a sign on the door which read "Broadcast Control Offie." Then he circulated a notice saying, "Program directors, producers and script adapters will submit their scripts for approval and stamping in Room 205 before broadcasting."

People began to come in with manuscripts and ask, "Is this where the manuscripts are submitted?" Basque told them "Yes," and then, after reading the manuscript, he would stamp it with a stamp he had brought with him. Each individual would then carry away the stamped manuscript with the air of one who had done the right thing.

Basque tired of the work after a couple of days, even though he visited the studios occasionally and made suggestions. He decided to take down his sign and go away.

But before doing so he entered a studio which was on the air, waited for the end of the program, then stepped to the microphone and made an announcement. He told his listeners to be sure to read the results of an investigation of the French radio to be published next day in "'Paris-Matin,' the best-informed newspaper."

Then he went to his office and wrote the story which appeared on the front page.

DuMont Traces Radar History

At the present time considerable discussion seems to be developing between military and civilian personnel as to which group laid the technical foundations for radar. Friendly controversy has also arisen as to which technicians developed the new art to its remarkable refinements evidenced in the apparatus available at the close of the war.

At this period when such questions of early invention are being put, we have asked Dr. Allen B. DuMont to let us quote from a letter which he addressed to the Signal Corps May 20, 1943, and which outlines a number of the contributions made by himself and his staff in the development of radar apparatus and radar techniques.

Dr. DuMont advocated the use of the cathode-ray tube for instantaneous gun-spotting in a notebook

Where can you use this HIGH-PERMEABILITY, easier-to-assemble CORE?

The answer probably is: "In many transformer designs." Two-piece Hipersil* electromagnetic cores open up new horizons in electronic products . . . are available in an almost unlimited range of sizes. These easy-to-assemble cores—which increase flux-carrying capacity as much as 1/3—release designers from the limitations of ordinary silicon steel in many fields of application. Some of these are:

1. Commercial broadcast equipment transformers for AM, FM and television.
2. Induction heating equipment transformers.
3. Aircraft transformers for radio, radar and 400-cycle power.
4. Industrial electronic control device transformers.
5. Specialty transformers up to 50 kva.

Smaller size, lighter weight and wider range of linear response contribute to the superior performance of Hipersil cores. Five different thicknesses of laminations range from 29 gauge for 60 cycle applications down to 1 mil for high-frequency requirements. Laminations of this tissue thinness are grain orientated to give the exceedingly low losses and high permeability at high flux densities which are characteristic of other thicknesses of Hipersil.

Westinghouse application engineers can help you check the possible benefits obtainable with Hipersil. Consult your representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70465

*Registered trade mark

Hipersil Type "C" Cores come ready assembled, in two segments per loop. They eliminate tedious time-consuming "stacking" of separate laminations . . . permit quick, economical assembly with coils and stamped metal bases by means of steel straps. Cast mountings and assembly bolts can be dispensed with.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

HIPERSIL

entry dated January 8, 1933. Gun-spotting was effected by means of three microphones which energized string oscillographs; the string oscillographs recorded traces on photographic films, which required two minutes for development, following which the gun was spotted by triangulation. Dr. DuMont's communication states in this regard:

"On October 27, 1932, Mr. F. Ostensen from the U. S. Signal Corps at Fort Monmouth stopped up at our laboratory and I discussed with him the substitution of cathode-ray tubes for string oscillographs in connection with a gun-spotter they were working on. At this time I suggested to Mr. Ostensen another method of doing this, utilizing cathode-ray tubes, which is shown in 'Exhibit 1'."

These sketches from Dr. DuMont's notebook indicate that the essential features of radar screen presentation were conceived by him on the above date. The following comments accompany the notebook sketches:

". . . That is, to provide either a line time axis, circle or ellipse time axis, or some other shaped time axis. . . . This could then be photographed or else determined if one of our time-delay screens was used to retain the image long enough for the operator to make his determinations. In this case considerable time would be saved, making it useful for sub-aqueous spotting."

The time-delay screen, or, as now termed, the long-persistence screen, is what makes possible the PPI display. If this screen were not used, it would be necessary to photograph the pattern created by the radial beam, develop it, and then observe it. With the long-persistence screen, the pattern remains and can be observed while the antenna makes one rotation.

That Dr. DuMont early anticipated the employment of cathode-ray tubes in conjunction with radio-ranging devices, particularly the radio altimeter, is shown in the following excerpt from his communication:

"In the March, 1933, issue of 'Radio Engineering' an article appeared entitled 'Recent Developments in Cathode-Ray Tubes and Associated Apparatus' which was a resume of a paper presented by me before the Radio Club of Amer-

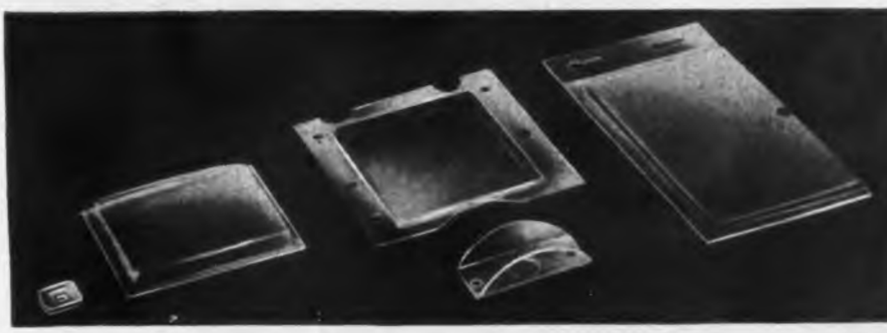
PLASTIC PARTS

. . . . PRODUCED TO YOUR SPECIFICATIONS

PRINTING
DIE CUTTING
CEMENTING

Wide experience by all known processes in the application of printing, engraving, silk screening, die cutting and cementing of all thermoplastics.

FORMING

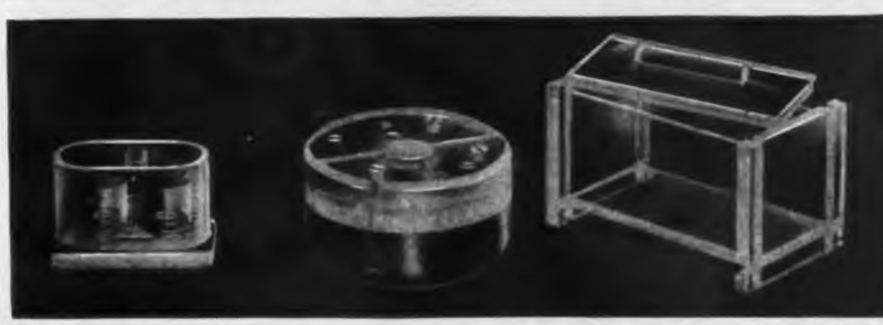


Specialists in deep drawing radio dial windows, embossing, swaging and bending in Acetate, Vinylite and Acrylics.

MACHINING

Precision threading, screw machine, milling, drilling, turning of Polystyrene, Acrylics, Phenolics, Nylon, Tenite, sheets, tubes and rods; through spindle capacity up to 2½" rod.

ASSEMBLY



Our engineers can assist you in problems of design and assembly of your plastic units.

PRINTLOID, *Inc.*

93 Mercer Street
New York 12, N. Y.

ica on January 18, 1933 . . . where mention is made of utilizing the cathode-ray tubes in depth measurements and also in connection with a radio altimeter. It is readily apparent from this article that the principle of sending out an impulse and measuring the time for the echo to return (so as to measure distance) by means of the use of a cathode-ray tube is fully discussed and to my knowledge is the first time that this scheme had been suggested."

The quotation from the article printed in *Radio Engineering*, March, 1933, is as follows:

"By rotating the beam in a circle at a known rate and sending out an impulse at a predetermined time, the echo can be made to appear as either a spot or a radial line along the circle. A suitable scale will indicate the depth. Using cathode-ray tubes for this purpose, it is economical to place repeaters at any desired point in the ship. Due to the fact that there is no inertia to the system, it is also possible to use these tubes to detect extremely small differences in time such as might be useful in a radio altimeter, etc."

First repeaters

Today, some of the larger ships have as many as twenty repeaters placed throughout the ship, so that various officers have the necessary information.

Realizing the importance of his conception, Dr. DuMont on April 2, 1933 recorded a disclosure on the direct-indicating locator which had been previously discussed, and had the disclosure witnessed. It reads in part as follows:

"This invention provides a simple and accurate method of locating the direction from which light, heat, infra-red, sound or radio waves come from.

"It consists of a rotating platform on which a suitable detector is placed. The detector may be a photocell (light waves), a thermopile (heat and infra-red), a microphone (sound), or a coil loop (radio waves). One or more of the above detectors may be used simultaneously if desired.

"Provision is made as will be shown for moving the beam of the cathode-ray tube in a circle at the same speed as the rotating platform, the position of the beam being in the same relative position toward which the detector is pointed. Furthermore, the detector

is connected to the cathode-ray tube in such manner that when it detects a wave or waves it causes a motion of the beam or a change in the intensity of the beam.

"The advantage of this system is that the cathode-ray tube indicates the source of the wave automatically and instantaneously without any adjustments or calculations."

Further details of the proposed system are developed in the disclosure, from which it is apparent that the basic principles of intensity modulation as applied to ranging technique were clearly conceived by Dr. DuMont at this time. After considerable delay, on March 15, 1939, a patent application was filed by Dr. DuMont. The seventh claim is of considerable interest:

Echo principles

"7. *Indicating apparatus of the character described, comprising a directional ultra-short wave radio transmitter embodying a movable directional horn, a directional, ultra-short wave radio receiver, disposed to intercept waves transmitted by said transmitter and reflected back and embodying a movable directional horn, an indicator device in the form of a cathode-ray tube, means for moving said horns, and deflecting the cathode-ray in unison, and means for controlling the cathode-ray by signals from said receiver.*"

Delay in filing the patent application was apparently due to business reasons. This was a very unfortunate circumstance, since it developed that a French patent No. 820,350 which had been filed on April 8, 1937, contained quite some of the subject material. This threatened infringement caused Dr. DuMont to abandon his patent application.

Many similar cases come to mind, such as the patent applications of Bell and Gray. Faraday and Henry worked almost simultaneously on the problem of self-induction. Armstrong and DeForest produced regenerative circuits at about the same time. DeForest reduced to practice a device (the three-electrode tube) which had been earlier conceived by von Baeyer.

Colloidal Graphite

Acheson Colloids Corp., Port Huron, Mich., has issued a 4-page folder on "dag" colloidal graphite as used in electronics. Advantages of this material for radio tubes, copper oxide rectifiers, light sensitive cells, electrostatic shields and other purposes is explained and discussed. In a companion pamphlet the various liquid dispersions in which graphite is available are mentioned, and their characteristics are given.

Transformers

The major products of the Jefferson Electric Co., Bellwood, Ill., are thoroughly described and attractively illustrated in the new 12-page catalog 451-GB. Transformers for 16 fields of application including power circuit, mercury lamp, neon, signal, and street lighting are presented with interesting data. In addition, descriptive information is given on ballasts, renewable and non-renewable fuses, fustats, plug fuses, and solenoids. Also included is a listing of Jefferson sales engineers and their locations.

Plastics

"Selecting the Right Thermosetting Molding Material" is the title of a 36-page booklet just issued by Bakelite Corp., 30 East 42nd St., New York 17, N. Y. The booklet includes the thermosetting plastics comparator, a special chart which shows in a readily understandable manner the complex relative values of the various phenolic and urea molding plastics. Such factors as shock resistance, thermal insulation, ease of molding, organic solvent resistance, loss factor, resistivity, cold flow, and hardness are given comparative ratings in the comparator, and then covered more completely under separate sections. These sections include all of the factors included in the table but in much fuller detail. Simplified explanations of the methods of testing molded plastic pieces are also given, in order to explain the means used to determine properties.

Solenoids

Phillips Control Corp., 612 N. Michigan Ave., Chicago 11, Ill., is issuing a folder on Phil-trol actuators. A number of types are illustrated and performance curves given. Range of sizes available give pulls up to about 12 lbs. at 1/16 in.

from closed positions. Useful motion extends to about 1 in. with reduced values of pull.

Power Tubes

Eitel-McCullough, Inc., San Bruno, Calif., has issued data sheets for the Eimac 4-125A and the 3X2500A3, two new recently developed transmitting tube types. Price lists for these two tubes as well as for types 4-250A and 4X500A, for which data sheets will be forthcoming soon are included. The Eimac 4-125A is a medium power transmitting tube in which low driving power requirements for high output make it an ideal tube for the amateur. For example, with less than 3 w drive, more than 350 w output may be had per tube in all the amateur bands up to and including the 2½ meter band. Two 4-125A tubes in pushpull, or in parallel, may be operated within ratings at a full kilowatt input for cw, and ample grid drive can be furnished by a single 6L6 or 807. The 3X2500A is a high powered triode of external anode construction, requiring forced air cooling. It is capable of giving an output power of 5 kw at the relatively low plate voltage of 3500 v. It is coaxially designed throughout. This, plus element mounts of very low inductance, makes operation up through the new FM frequencies highly feasible. In addition, installation and removal of the tube is simple without tools.

Thermocouples

Wheelco Instruments Co., Chicago 7, Ill., has issued a new edition of its Thermocouple Data Book and Catalog. Containing 32 pages and designated Bulletin S2-6, it gives information on selection of proper thermocouples and carries installation aids. It describes and lists prices and recommendations on thermocouples, thermocouple wire, lead wire, heads, connectors, plug and socket assemblies, insulators, and protecting tubes.

Construction Problems

An examination of transition problems of the construction industry points to manpower as the most threatening immediate but temporary barrier to a full-scale recovery. This is indicated in a new study entitled, "Construction Revival", just published by F. W. Dodge Corp., 119 W. 40th St., New York 18, N. Y., fact-finding agency for the industry. According to the study, the biggest transition problems for builders and

DOWN through the years with Radio—right from the very beginning—STERLING has built specialized apparatus for the Radio market and at times—complete Radio sets for world-wide distribution . . . Millions of STERLING products, battery eliminators, chargers, testers, have played a vital part in the development of Radio . . . Our wartime operations are now ended . . . Post-war products will reflect STERLING'S 39 years of successful electrical manufacturing experience.

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ELECTRICAL MANUFACTURERS FOR 39 YEARS

special trades contractors are manpower, materials supply, price and wage adjustments, and possibly transportation delays. Contained in the study is a statistical breakdown of 99.638 projects in design or preliminary stages, with an aggregate estimated cost of $15,746,202,000. The breakdown, by 12 major classifications, indicates whether the projects are planned for public or private account. The total owned work is $4,303,080,000 and publicly owned work is $11,443,122,000.

50 Watt Station

Aireon Mfg. Corp., Kansas City, Kan., is following up an earlier preview with an attractive, 4-page brochure presenting illustrations, special features and electrical and mechanical specifications for its 50 w ground radio station. The 50 w station, designed for small airports, airlines, and communication systems, is an RS-1 type, low power complete station, ready for installation.

Leather Packings

Two folders have been issued by Alexander Bros., 406 No. 3rd Street. Philadelphia 23, Pa., one of which presents a table of standards governing the correct proportions and dimensions of leather packings for practically every purpose. The other folder pictures an assortment of various Alexander leather packings, and describes the four most generally used shapes. A table of standard list prices also is given.

Fasteners

The American Institute of Bolt, Nut and Rivet Mfgrs., 1550 Hanna Bldg., Cleveland 15, Ohio, has issued a booklet on the manufacture and application of bolts for industrial uses. Details are given of the characteristics of various bolt steels. In addition, there are several interesting articles on the use of bolts in wood, in construction and in engine manufacture.

Transformer Design

An unusually informative illustrated book entitled Engineering a Transformer has been issued by Standard Transformer Corp., 1500 No. Halsted St., Chicago 22, Ill. The first half of the book is devoted to illustrations and general discussion of transformer problems as well as to showing methods of manufacture used by the company. The last half

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The quality of a product and its performance over the years can best be judged by the repeat orders received. Repeat orders mean one thing above everything else . . . customer *satisfaction!*

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500 WEST HURON ST., CHICAGO, ILL.

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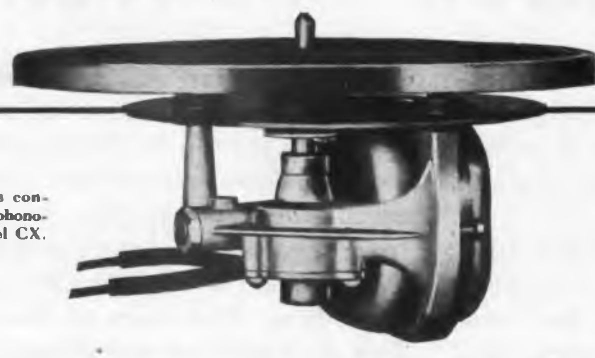
ELECTRIC MANUFACTURING DIVISION



is a technical discussion of the process of designing a transformer for high efficiency and low cost. Each detail is taken up separately and extensive tables are included comparing electrical sheets and giving winding data and losses. There are also curves on permeability, core losses, etc. This book is a valuable addition to any electronic engineer's library.

Metal Fabrication

An informative folder, describing facilities for manufacturing production parts and unit assemblies, is being issued by the Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 6, Mich. Of special interest are its graphic interior photographs of production departments, showing the machinery used in parts output. As described in the folder, the company is equipped to handle parts from rough stock to finished pieces. Engineering, machining, heat treating, grinding, sub-assembling, and inspection are all performed under one management. One of the nation's largest manufacturers of machine tools and cutting tools, Ex-Cell-O has more than 2000 pieces of equipment to carry out these operations.

Piezo-Electric Crystals

A new crystal catalog has been prepared by the Aireon Mfg. Corp., Kansas City, Kan., featuring a wide variety of standard and special types. Principal types described in the new catalog are: Octal type with cylindrical metal shield and standard eight pin base; three pin, two channel, aircraft type; standard two pin phenolic holders for various kinds of mobile and stationery installations (banana or pin plugs); variable air-gap mounting with screw top electrode. Special attention is merited by a new compact type designed for commercial transmitters or receivers where space is at a minimum and crystal will be incorporated in circuit like a resistor or condenser. This unit is supplied in a molded case, with wire leads, at frequencies of 2-10 mc. It is also furnished as an if filter unit, with soldering lugs, at 455 kc or any specified frequency.

Eyelets and Ferrules

A catalog of eyelets, ferrules and terminals is being distributed by Waterbury Companies, Inc., Waterbury, Conn. Complete specifications are given for a wide variety of styles of flat flange, rolled flange and spe-

MORE FACTS ABOUT THE "VT FUZE"

"the secret weapon second only to the Atomic Bomb"

...and its 17 Metal Electrōnents mass-produced by Scovill*

Scovill was one of the first subcontractors to get into mass production on the "VT Fuze" metal components illustrated below. Four of the many problems involved in producing these tricky metal parts in large volume to extremely close tolerances and other difficult specifications will interest you.

Part 1, the "potato masher" required extraordinary redrawing of stamped shells. Scovill installed and developed many special machines to meet the urgent production schedules.

Part 2, the detonator disc . . . held to tolerances of less than .001″.

Part 3, the antenna insert . . . an irregularly shaped drawn shell, made hollow instead of solid to save weight.

Part 4, the wind-driven vane which rotates the generator at 100,000 RPM . . . held to 1° concentricity.

Similarly, all the other parts had unusual specifications which called for the ingenuity of 15 different Scovill production departments in applying and improvising metal-working techniques . . . a well-known characteristic of Scovill engineers. For up-to-the-minute facts about how Scovill can save time and money on your small electronic components or complete assemblies, use the coupon below—today.

*Electrōnents = Electronic Components.

The epic story of the famous "VT" Radio Proximity Fuze has been told . . . how this shell-borne radio sending and receiving set explodes its shell by reflected waves from its target 70 feet away . . . how it stopped Jap suicide planes, knocked down German buzz-bombs, blasted Jap defenses at Iwo Jima and Okinawa.

Scovill
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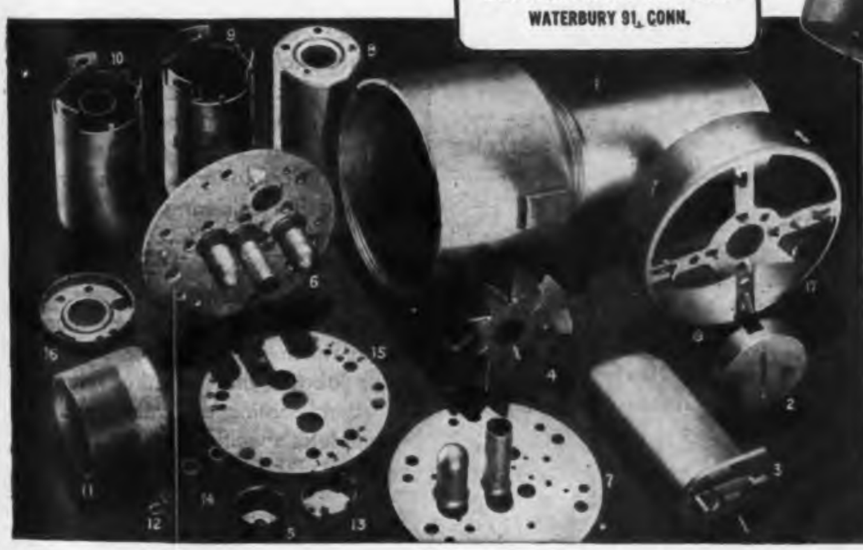

1. "Potato masher" encasing can
2. "T" cup disc
3. antenna insert
4. vane
5. spray shield
6., 7. chassis plate assemblies
8., 9., 10. condenser cans
11. "T" cup
12. contact
13. control cover
14. coupling
15. chassis cover
16. condenser cover
17. vane shield

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- ☐ Batteries
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- ☐ Dials
- ☐ Escutcheons
- ☐ Jacks
- ☐ Lugs
- ☐ Panels
- ☐ Sockets
- ☐ Stampings (misc.)
- ☐ Tubes

Other applications..

SCOVILL MANUFACTURING COMPANY
Electronic Division
23 Mill Street
Waterbury 91, Connecticut

Name ....

Company..

Address..

cial eyelets as well as cylindrical, split and cable ferrules. Many different terminal shapes are also shown. The company has also issued a catalog of radio knobs made from various plastics. Also included is a line of bushings and descriptive pages of many different plastics manufactured.

Friction Material

Various types of compressed metallic friction materials manufactured by the General Metals Powder Co., 130 Elinor Ave., Akron, Ohio, are illustrated in a 4-page folder recently issued. The basic ingredient of this material is an electrolytically deposited copper powder of great volume. This form of powder provides an interlocking structure.

Arc Welders

A line of medium and heavy arc welders is described and illustrated in a 4-page folder from the Mid-States Equipment Corp., Chicago, Ill. These operate from single phase 60 cycle 220 v lines and draw up to 48 amperes.

Dielectrics

A ready reference manual on electrical insulating materials together with catalog is being distributed by William Brand & Co., 276 Fourth Ave., New York 10, N. Y. The theory and behavior of dielectrics are discussed in the first 20 pages and tables are included showing the properties of various insulating materials and of plastics. The catalog in the rear of the loose-leaf binder contains information about flexible tubing, saturated sleeving, fibre glass and extruded plastic tubing, varnished cloths, mica products, wire markers and lacing cord.

Ionosphere Conference, Dec. 11

With Dr. Harlan T. Stetson, director of cosmic terrestrial research for MIT acting as host, an ionospheric conference will be held at Dr. Stetson's suburban laboratory, 31 Bird street, Needham, Mass., Dec. 11.

Dr. Stetson's organization, which was recently joined by Dr. Greenleaf W. Pickard, has been making tests of propagation and reception on the very short waves. The coming conference will take up these phenomena and also sunspots, cyclic effects, critical frequencies and field strengths.


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WATER COOLED TUBES
The progress of United Electronics has been characterized over the years, by the addition of new tubes in the higher power catagories. It is with reasonable pride therefore that we now announce UNITED external anode tubes in both water cooled and air radiator designs.
Type 893-A illustrated is rated for 20 KW anode dissipation and maximum power output of 50 KW.
Write for engineering information bulletins on UNITED external anode tubes.
Masterpiece of Skilled Hands
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Ruggedizing: A United feature which enables tubes to withstand terrific shocks.
UNITED ELECTRONICS COMPANY
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Transmitting Tubes EXCLUSIVELY Since 1934

FCC Will Delay Closing Present FM Band

As we go to press, a statement just received from FCC Commissioner E. K. Jett, regarding the matter of continuing FM operation on the old (44-50-mc) band until the new high band is provided with transmitters and receivers, reads as follows:

"The Commission has granted about 125 applications for new FM stations in addition to providing new assignments for existing licensees and permittees. Since there are about 500 more applications it is reasonable to assume that several hundred will be approved by the end of 1945.

"This should result in the construction of a large number of stations during 1946, which will enable the Commission to determine whether the existing frequencies should be continued or turned over to television.

"At any rate I can assure you that we do not intend to close the present band until service is generally available in the new band."

Night-time Interference On 88-106-mc FM

In the editorial on page 75 of this issue, a few copies were run off with the third paragraph incorrectly referring to daytime interference on the new high FM band. The last phrase of the third paragraph should correctly read "night-time interference at long distances from transmitters" as indeed it does appear in all except a few copies printed at the outset of the press-run.

RF for Soldering and Welding

Soldering at high speed is a natural application of radio heat, especially where a large number of identical pieces is to be processed. In the making of radio condensers at Camden, N. J., the soldering rate when done by hand was 100 units per hour. But a conveyor system now moves the cans through a special radio-heat coil at the rate of 2500 per hour.

British Television

The British Government has decided television transmissions shall be started as soon as possible from the London station at Alexandra Palace (an entertainment center in North London). Extension of the service to the provinces will follow as personnel and material become available. Research and development towards a higher standard of

SIZE DOESN'T MATTER

Transmission Line Support Arm

. . . to STUPAKOFF

Radio Tube Cathode-Heater Insulator

LARGE or small, simple or complicated, if the need is for the proper ceramic insulators the place to get them is Stupakoff. Two generations of experience, engineering knowledge, continuous laboratory research, and that intangible but most valuable asset—ingenuity, are concentrated on the solution of every insulation problem which comes to Stupakoff.

Precision in the final product is assured through absolute control over every procedure from selection of raw materials to final packing.

Quality comes first with Stupakoff, but is closely followed by efficiency which is extended to every known economy obtainable through the use of up-to-date equipment, specialized trained workers, and modern volume production methods.

Stupakoff takes pride in its ability to produce the finest, most intricate precision ceramics obtainable. The toughest ceramic problem you can pose is a challenge to Stupakoff engineers, and they never refuse a challenge.

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RMA RADIO MANUFACTURERS ASSOCIATION MEMBER

EXPORT DEPARTMENT — 13 EAST 40TH ST., NEW YORK, N. Y. — Cable Address ARLAB—All Codes definition than the present 405-line standard will be a matter of long-term policy.

The transmitting apparatus in London is undamaged but it has been used for war purposes and some reconversion is necessary. Many of the BBC's technicians are still with the Armed Services and application has been made for their release and a nucleus of staff is already assembling. Test transmission is expected by the end of the year and full public service early in the new year.

Cinema Television

At the 1939 Radio Exhibition in London no fewer than eight manufacturers showed projection type domestic television receivers and three systems were installed in a total of six London movie theaters; the mechanical scanning equipment of Scophony Limited and direct cathode ray tube projection systems by Cinema Television Limited and Electrical and Musical Industries Limited were used.

Before the war it was said that Odeon Theatres Limited, one of the largest cinema groups in England, was prepared to invest $5,000,000 in the development of a very high definition system of television for theater use. Today the J. Arthur Rank organization dominates the British cinema industry, controlling the Gaumont and Odeon Theatre chains, a leading group of film studios, Bush Radio Limited and Cinema Television Limited (the company that absorbed the pioneer Baird Television Limited). Speaking recently, Mr. Rank said that active research work would be carried on in the development of large screen television as a commercial proposition.

40-In. Lens Televises Army-Navy Contest

The longest focal-length lens ever used in a television broadcast was used by the National Broadcasting Company's television station WNBT when it televised the Army-Navy game from Philadelphia's Municipal Stadium, Saturday, Dec. 1.

A 40-in. lens was mounted on one of NBC's regular orthicon cameras to bring viewers closeup pictures of the gridiron contest. NBC obtained the use of the lens, for which a special bedplate and mounting were built, through the courtesy of the Bausch & Lomb Optical Co., Rochester, N. Y. The longest focal-length lens ever used heretofore by

IT'S YOURS AGAIN ... WITH NEW LAURELS!

• Originally designed as a radio serviceman's test unit, the Simpson 260, because of its sensitivity and wide range was found adaptable during the war to general service duties in the entire electronics and electrical fields. It was given thousands of essential war jobs in the production and servicing of communications equipment.

Over 300 government agencies and university laboratories of the United States and Canada procured every one of these test instruments Simpson could deliver on an expanded war production schedule. They were turned out by the thousands. Every branch of the armed services — Army, Navy, Marines, Coast Guard—carried them to the far ends of the earth.

Chosen on its merits, the 260 became uniquely *the* test instrument of the war.

AVAILABLE NOW TO YOU

Now the Model 260, always the preferred instrument of radio servicemen, is available again to a widened field of peacetime services. We ask you to remember its record as an example of the quality and advanced engineering that goes into all Simpson instruments, as evidence that other new Simpson developments during 1946 are well worth waiting for. They are being released as soon as Simpson standards for their manufacture are satisfied. They will continue the leadership that has given Simpson a world-wide reputation for "instruments that stay accurate" with ideas that stay ahead.

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SIMPSON 260, HIGH SENSITIVITY SET TESTER FOR TELEVISION AND RADIO SERVICING

Ranges to 5000 Volts—Both A.C. and D.C.
20,000 Ohms per Volt D.C.—1000 Ohms per Volt A.C.

At 20,000 ohms per volt, this instrument is far more sensitive than any other instrument even approaching its price and quality. The practically negligible current consumption assures remarkably accurate full scale voltage readings. Current readings as low as 1 microampere and up to 500 milliamperes are available.

Resistance readings are equally dependable. Tests up to 10 megohms and as low as ½ ohm can be made. With this super sensitive instrument you can measure automatic frequency control diode balancing circuits, grid currents of oscillator tubes and power tube, bias of power detectors, automatic volume control diode currents, rectified radio frequency current, high-mu triode plate voltage and a wide range of unusual conditions which cannot be checked by ordinary servicing instruments. Ranges of Model 260 are shown below.

Price, complete with test leads $33.25
Carrying case 4.75

Volts D.C. (At 20,000 ohms per volt)	Volts A.C. (At 1,000 ohms per volt)	Output
2.5	2.5	2.5 V.
10	10	10 V.
50	50	50 V.
250	250	250 V.
1000	1000	1000 V.
5000	5000	5000 V.

Milliamperes D.C.	Microamperes	Ohms	
10	100	0-1000	(12 ohms center)
100		0-100,000	(1200 ohms center)
500		0-10 Megohms	(120,000 ohms center)

(5 Decibel ranges: —10 to +52 DB)

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INSTRUMENTS THAT STAY ACCURATE

NBC television in coverage of sports events was a 19½-in. lens.

The new 40-in. lens has a 20-in. back focus and a lens speed of f 5.6. The bedplate and mounting made in NBC's model shop, are of Dural material, an aluminum alloy. The base measures 40 in. in overall length. The diameter of the front glass element of the lens is seven inches. The back of the lens is about 20 in. from the mosaic of the orthicon camera tube.

Allocation Below 25 mc Delayed Several Months

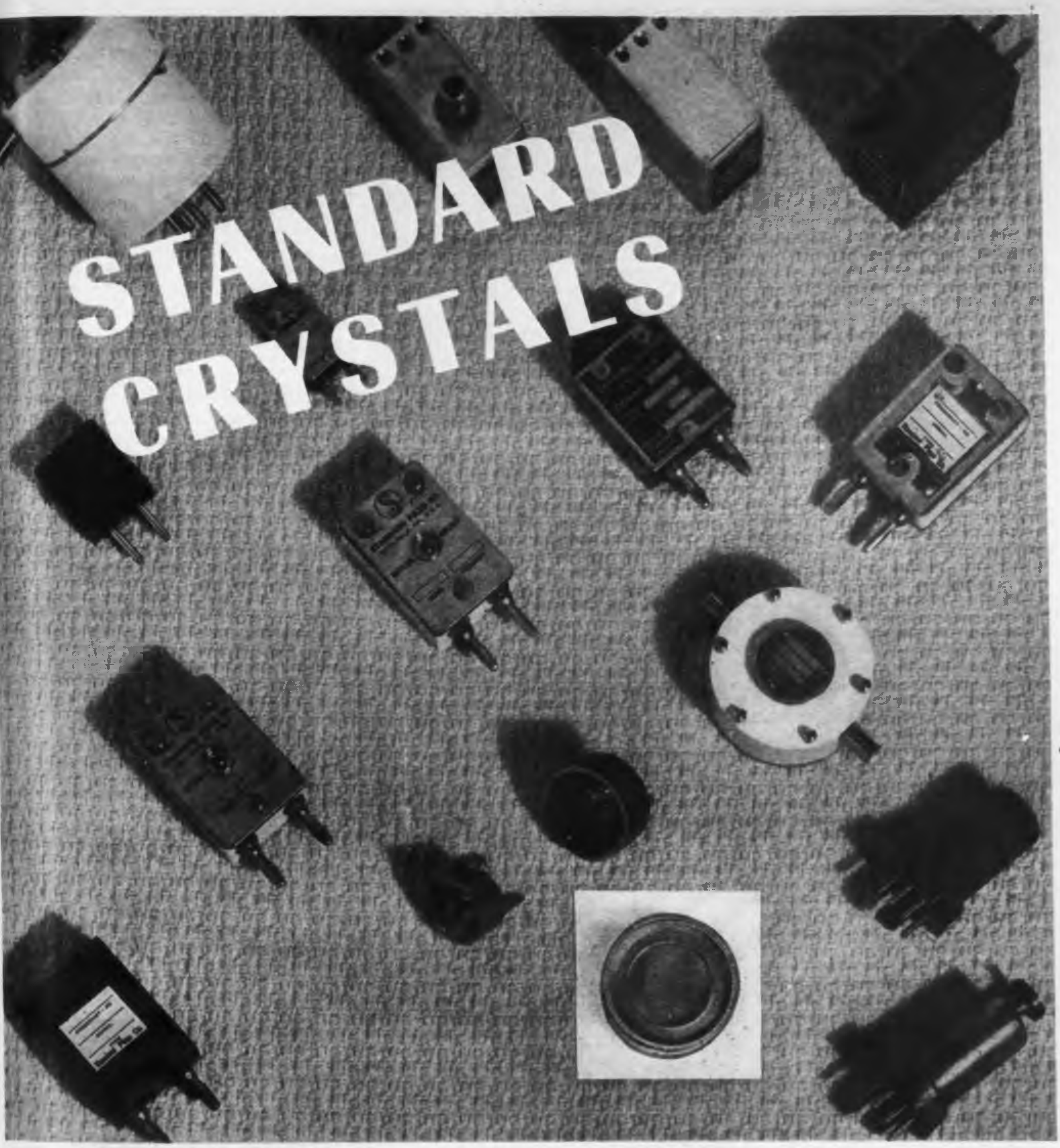
The final allocation of frequencies below 25 megacycles will not be formulated for some time in the future, possibly for several months. It will probably not be completed for three months at the earliest, FCC sources indicated this week. The reasons for the delay in the completion of the final allocation below 25,000 kilocycles are two-fold. The Commission engineering staff has been completely occupied with the problem of FM and television and experimental services so that it just hasn't had the staff to work on this allocation. In order to complete the allocation below 25 mc, the Commission also has to make further studies on railroad radio, industrial electronic heating, and the release of frequencies by the military services.

Atomic Instrument Company Formed

Paul E. McDuffee and G. Earl Whitham, are starting a company called Atomic Instruments Co., at 160 Charles St., Boston, Mass. They will produce electronic instruments for nuclear measurements such as counters, scalers and amplifiers, and are also set up to do consulting work Mr. McDuffee has recently been working on Mark 5, IFF, and Mr. Whitham is one of the scientists associated with the Atomic Bomb project.

Coax Links Philadelphia and New York

The Army-Navy football game in Philadelphia on December 1 was brought to New Yorkers by television over Bell System coaxial cable. The National Broadcasting Co. put the television reproduction of the game "on the air" in the New York metropolitan area, in addition to its regular network broadcast of the event from the Municipal Stadium in Philadelphia.


STANDARD
CRYSTALS

Telephone lines especially arranged for television transmission of the game linked the NBC camera installation at the Municipal Stadium in Philadelphia with the coaxial cable in that city. In New York the television images were carried over specially equipped telephone lines to the NBC transmitter on the Empire State building.

This experiment is said to be the forerunner of regularly scheduled intercity television which will begin early in January over a coaxial circuit between Washington and New York.

Plans for this experimental television use of the Washington-New York coaxial cable are being arranged by the Bell System together with representatives of the television broadcasters who expect to be early users of the facilities. These include Columbia Broadcasting Co., Allen B. DuMont Laboratories, and the National Broadcasting Co.

The Washington - New York coaxial cable will be available to CBS, DuMont and NBC two nights a week each during an extended experimental period. Others interested in television transmission, including motion picture producers and thea-

ter operators, also have been offered use of the intercity television system during the experimental period, when they have facilities available.

The Bell System's coaxial program calls for the construction each year for the next few years of upwards of 1,500 miles of coaxial cable suitable for carrying hundreds of long distance telephone conversations, or television. In 1946, for example, the cable network will be extended south of Washington to Charlotte, N. C. as well as between Atlanta and Dallas, while in 1947 the coaxial project will link Chicago and St. Louis and the southern route will be extended to Los Angeles.

Advocates Co-ordinating AM and FM Allocations

The assignment of FM broadcasting to the new band of 88-108 mc brings forth challenging possibilities in the way of improved broadcasting service for all listeners throughout the country. To do this we must be prepared to co-ordinate all broadcasting licenses and allocations both AM and FM, according to Dorman D. Israel, vice-president in charge of engineering and production at Emerson Radio and Phonograph Corp. Israel declared:

"There are approximately one thousand licensed AM broadcast stations in the standard broadcast band, but of these stations, only fifteen broadcast on cleared channels. The existing service is overcrowded. Nevertheless, reasonably good service exists in the standard broadcast band because of increased transmitter power and dependable low priced receivers working from simple self-contained antennas.

"But of the one thousand licensed stations only 56 operate on the present top power of 50 kw; one operates on 20 kw; 18 operate on 10 kw; and the remainder have power ratings ranging from 5 kw down to 100 watts. Some 20% of our population is served well and the remaining 80% in the rural and small city areas must depend on the lower-powered share-channel stations for their radio broadcast service. These stations cannot give good service day and night. Their low-power fails to override natural and man-made static noises. Furthermore, nighttime sky-wave reflection causes a drastic reduction in useful service area of shared channel stations because of similar sky-waves interfering from stations removed by many miles.

"Because there is no sky-wave reflection in the VHF band the useful service area is accurately predict-

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200 Ω
★ Clarotat is ready. This time it's with your peacetime resistance and control problems, as Clarostat's 100% war effort becomes history.
With vastly expanded production facilities for speedy deliveries; with a skilled personnel second to none; with rare experience in meeting the more critical design and production requirements of the war, Clarostat can and is offering you extraordinary collaboration.
Yes, "Let Clarostat Solve Your Resistance Problems", in peace as well as in the recent war.
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Cable Address: SIMONTRICE, NEW YORK
CLAROSTAT

able and the areas of interference can be held to a minor amount.

"Here then is the key to the solution of the problem of crowded channels in the standard broadcast band. From the public's point of view the ideal standard broadcast band condition would be 107 stations covering the kc width of the entire band from 540 to 1600 kc each on its individual cleared channel. We should have only cleared channel stations in the broadcast band and must, furthermore, demand that, to justify a clear channel, each station must operate, not on 'high power' but at 'super power'. This may be of the order of tens of thousands of kilowatts. The location of each super-power station would be based on the public need dictated by population distribution. Receivers could be made even more compact and so inexpensive to the public that each room in every home could be furnished with a set. The much heralded vest pocket radio would be carried by a hundred million of us. The broadcaster as well as the public would benefit immeasurably.

"All of our other broadcasters would take FM channels in the VHF band. Stations presently limited in power because of shared channel

considerations could upon reassignment to the VHF band increase their power and improve their plants so that they would serve a maximum of area and cover it successfully under any condition.

"Now is the crucial time to plan and assign frequencies for this practical and ideal program. The fact that there are no stations in operation over the new band leaves the way open to FCC as the custodian of these publicly administered broadcasting channels to set up a broadcasting system that will give the most listeners the best service at least cost. Radio educational and entertainment program service is the biggest dollar's worth the public ever bought. This plan will magnify this bargain many fold. The public, the basic owners of all broadcast channels, should take full advantage of the present opportunity which will never again be available."

Authorize Mobile Radio Systems

Demonstrating the effectiveness and speed of its new procedure in the approval of General Mobile Radio Service experimental applications, the FCC Administrative Board early in November granted the applications of Raytheon Mfg. Co., Bendix's Pacific Division, Cleveland Yellow Cab Co., Highway Radio Inc., Intercity Bus Radio Inc., and of Bell System companies for ten cities. All the applications were authorized in Class 2 experimental service.

The applications granted to the Bell System companies for construction permits to render radiocommunications service on an experimental basis to land vehicles and harbor craft within range, but with permission for handling traffic on a commercial basis denied were: Southwestern Bell at Houston; Illinois Bell for the Chicago area; Wisconsin Telephone Co. at Milwaukee; Cincinnati and Suburban Bell at Cincinnati; Chesapeake & Potomac at Washington; Chesapeake & Potomac of Baltimore City for that city; Southern Bell for Miami; Ohio Bell for Cleveland; Southern Bell for Memphis, and Pacific Telephone & Telegraph Co. for the San Francisco area.

The other applications granted included: Raytheon Mfg. Co. received approval of ten applications for Class II Experimental stations, to be located in New York, Boston, Chicago, and Los Angeles, with one portable-mobile unit to be used in conjunction with each land station. Experi-

"AEROTROLS"

The Small Relays with the Big Performance

• Engineered and manufactured for the necessities of military aircraft operation, Cook "Aerotrols" have opened new fields in electrical and electronic remote control applications in radio-radar, wire communications, mining, manufacturing, testing and innumerable other fields where greater dependability and accuracy must be provided.

• Here are some of the general specifications of the "Aerotrol" "400" Series relays. The size of the "Aerotrol" without springs (the frame, coil and armature) is $^{15}\!/_{16}$" wide, $1\,^{7}\!/_{16}$" long and 1" high. Spring assemblies add to overall height, up to 1" for 6 springs. Average weight for two spring pile-ups is $1\,^{3}\!/_{4}$ oz. The coil spool is one piece, moulded bakelite. Heel piece is arranged for two mounting screws with solder terminal for coil located at the armature end, at which end also, spring solder terminals are located. Coil winding capacity can be provided up to 10,000 ohms and for positive operation on current values as low as 2 milliamperes. Coil treatment normally includes impregnation with fungus lacquer and Insulex covering, and where required, the coil is treated for high humidity and other tropical conditions.

• "Aerotrols" are small, compact, yet rigidly constructed relays that have proven their dependability, not only in laboratory tests, but in actual operation under the most severe wartime conditions all over the world.

• "Aerotrols" are "application engineered" to provide specific performance suitable to circuit and control conditions. There are many selective features that can be incorporated into these relays. Bushings and insulators can be provided made of Cook patented "Cecotite" ceramics, to provide freedom from carbonization and wear, and to provide permanent stability of original adjustment and rapid frequency of operation. Mounting arrangements can be provided to meet installation conditions, including the plug-in types.

• "Aerotrols" of various types, such as time delay, latching, A.C. or D.C., both single and double pile-ups, can be supplied.

Illustrated above is an "Aerotrol" heavy current relay, with two Form "A" contacts operating on a double armature.

SEND FOR BOOKLET AR-145 FOR INFORMATION ON THE COMPLETE LINE OF "AEROTROL" RELAYS

Illustrated above is a latching type "Aerotrol" combining two type "401" Aerotrols. Any combination of the "400" series relays can be combined into a latching "Aerotrol".

COOK ELECTRIC Company

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ments with stations operating in both the proposed Highway Mobile and Urban Mobile Services will be undertaken in New York City. In the other locations experiments will be confined to proposed Urban Mobile Service. Three types of communications (Narrow channel selective-code paging and indicating signal systems; two-way voice transmission; and record transmission by facsimile and/or printer) are to be investigated with the object in mind of development to such an extent that they can be offered to the public eventually on a commercial basis.

Bendix Aviation Corp., Pacific Division was granted special temporary authority to construct 12 portable and portable mobile Class II experimental stations to be installed at various locations, to be determined by test, between Los Angeles and Fresno, Calif., or on trucks or buses operating in this region. The stations will be used for the development of a complete radio communication system for highway transportation companies.

Yellow Cab Co. of Cleveland, Inc., was granted construction permits for one land station and 10 portable mobile units for the purpose of developing a radiocommunication system in the proposed Urban Mobile Service. The land station is to be located in Cleveland, Ohio and the portable mobile units are to be installed in taxicabs operating in that city. The stations will be used for the dispatching of taxicabs by radio.

Highway Radio, Inc., granted application for authority to construct one land station and 100 portable mobile units for the purpose of developing a radiocommunication system in the proposed Highway Mobile Service. The land station will be in Chicago, and the portable mobile units will be installed on trucks operating in the vicinity of the Chicago area.

Intercity Bus Radio, Inc., authorized for construction permits for one land station and 100 portable mobile units for the purpose of developing a radiocommunication system in the proposed Highway Mobile Service. The land station will be located in Chicago, and the portable mobile units are to be installed on passenger-carrying buses operating in the vicinity of Chicago, Ill.

Proposed Rules for Railroad Radio

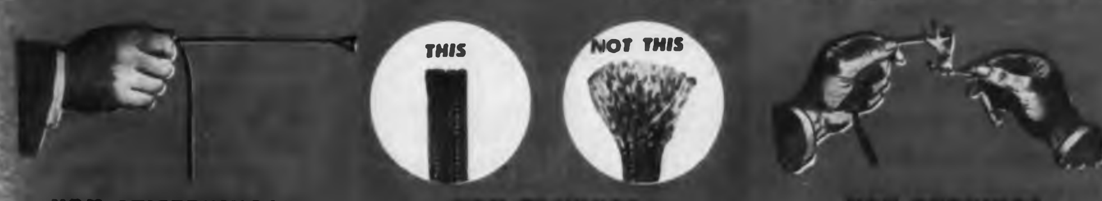
Simultaneously with the issuance of proposed rules and regulations, the FCC announced November 15 the

WHETHER he's Mr. Big of Industry or plain Mr. Homebody, the performance of your product's electrical insulation can make or break *his* good will, influence *your* future sales. Look at *all* the hazards of faulty or insufficient insulation. See why hundreds of manufacturers are protecting *their* products with BH Fiberglas Sleeving—the insulation that's way ahead in every important requirement, thanks to the *exclusive* BH process.

BH Fiberglas Sleeving is *permanently* flexible and non-fraying, the *original* sleeving to combine these qualities with heat resistance to 1200°F., with high tensile strength, and with resistance to moisture, oil, grease and most chemicals. It's easier to handle and install, and lasts longer in severest service. That's why BH Special Treated Fiberglas Sleeving, for instance, does a trouble-free job when the heat's on—why Mr. Room Heater Customer is sold *for good* when the heater's BH-equipped.

Whatever your product may be, if it depends on electrical insulation, you can count on one of the three BH Fiberglas Sleevings to meet your strictest needs. Send for free BH samples *today* —test them yourself—expect surprising results!

3 GREAT BH FIBERGLAS SLEEVINGS—EACH 3 WAYS BETTER!



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establishment of its Railroad Radio Service, effective December 31, 1945. A feature provision of the proposed rules was that eligibility for licenses in public service railroad radio will be confined to railroad common carriers. Experimental authorizations may be issued to communications common carriers for the purpose of providing railroad radio service as well as to manufacturers, but the regular licenses will be only issued to persons or organizations operating as railroad common carriers. This provision was contained in Section 16.21.

Another interesting portion of the proposed rules was Section 16.83 which provided for "coordinated service" so that an applicant for a license or an existing license can establish a coordinated railroad radio communication service for one or more railroads. The application for such authority must contain a complete description of the service to be rendered, the terms and conditions upon which such service is to be rendered or exchanged, including details of any arrangements for the sharing of capital investment or operating expenses and the basis of any charges to be made for the rendition of this service.

At the same time, the Commission also announced that it was considering the present low power rules governing railroad carrier current train communication systems.

Commercial Application of 20 Mev Betatron

The first industrial application of one of the newest electronic devices — the 20,000,000 v betatron which has been in use for two years in a Government arsenal—was disclosed today by the University of Illinois and Allis-Chalmers Mfg. Co., who cooperated in making the betatron available for industry. Generating X-rays more powerful than any ever before used in commercial radiography, the betatron enables engineers to take pictures through 15 in. of solid steel. Through use of the machine, minute hidden defects may be detected in huge castings and forgings.

Despite the high voltage of the X-rays, the betatron can be handled as easily as the low voltage equipment familiar to anyone who has had X-ray pictures taken on a visit to his doctor or dentist. However, it remained a laboratory tool until the war brought it into industry. Funds for the research carried on at the university and Allis-Chalmers were

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provided by a contract with the Office of Scientific Research and Development. Dr. G. D. Adams, physicist at the University of Illinois, said laboratory development of the betatron was carried on by Dr. D. W. Kerst, another physicist at the school. Kerst successfully handled a problem that had baffled scientists for many years—that of generating and guiding a sufficiently intense beam of electrons in a circular path while they were traveling in a vacuum at speeds approaching that of light.

The machines are operated by push-button and have automatic controls for timing photographic exposures so only the skill of ordinary X-ray technicians is needed to take successful radiographs. For example, heavy battleship parts which previously could be given only a surface inspection can be penetrated and the inside revealed as though it were completely open to an inspector's eye. So far, only a few of the many applications expected for the 20,000,000 v betatron have been explored. However, larger machines have been projected, at least for laboratory work, and indications are that they will play an important part in nuclear physics.

"Oh Engineer"—or the Serviceman's Lament

Editor, Electronic Industries: Has it occurred to you that your magazine could be of great service to the Radio Fraternity as a whole by leading a crusade for standardization of:

1. Accessories, 2. Model numbers, 3. Dials, 4 Accessibility.

1. Antennas

What service man wouldn't like to take the engineer of a multi-tube receiver out of a fine home and have him remove seven different kinds of ungainly loops, plates, and what have you from the cabinet. More often than not with the use of a crowbar, chisel, saw or acetylene torch. All this with a customer who probably questions the service man's ability to begin with and is now breathing down the back of his neck. Obviously it is impossible for a service engineering organization to build mockups for each and every type of radio encountered in the field to become adept at its disassembly. Antennas should wherever possible be integral with the radio chassis or at least have a standard plug and socket. Think of how wonderful it would be to be able to install a variable induction loop in the test booth with one plug, which would at least allow rough alignment. This also applies to speaker sockets, phonograph connections, ac outlets, etc.

2. Model Numbers

This is a subject that I really hate to go into. Frankly I almost froth at the mouth when I think of it. Some day some statistician may figure out the appalling amount of time lost hunting an elusive model number, which when found only give a search warrant to page through indexes that are reminiscent of a Signal Corps Catalogue (Army men please note). While on this subject for "Heaven Sakes" please let's label trimmers and their function. Thus osc. B.C., H.F.-osc, B.C.L.F., etc., on the chassis so we don't have to sit with a fifteen pound bible in our laps which slips and falls to the floor on the slightest provocation, while we hunt for 38A, 64T, 96X or what have you.

3. Dials

Here is real room for improvement in the matter of simplicity. I have watched trade periodicals for years expecting to find where some poor service man had become entangled in a complicated dial stringing job and strangled himself, but as yet have not seen such an article. Per-

haps it is contrary to the publishers policy to print such frightening material. One more thing while on the subject, (In our organization it is a policy to realign each and every radio that we service. We have found that less than ½ of 1% cannot be improved measurably by this service. This by the way includes radios less than one month old.) it is very disheartening to find that the dial scale was left behind in the customer's cabinet. The cost of printing a paper scale on the back of the dial frame certainly would not break any manufacturer.

Shades of Heaven is it really necessary to cover up two, three, or four tube sockets, if transformers, resistors, critical condensers, etc., with a semi-immovable push button assembly. I can't quite see the logic in having to spend two, three, or even more hours replacing a twenty-cent resistor. Picture yourself handing a customer a bill: 1—resistor—20 cents, labor replacing resistor $9.

It is the writer's honest opinion that a member of the firm's service department should be included in every engineering staff to pass on the serviceability of any or all models.—Thank you. J. W. Koen, Alhambra, Cal.

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PIONEERS OF ELECTRIC & ELECTRONIC PROGRESS

FCC Revises Tele Station Allocations

With 139 applications for television stations now pending FCC on November 21 issued a brief covering forthcoming Rules and Regulations and Standards of Good Engineering Practice for television below 300 mc—and in doing so gave Television Broadcasters Assn. basically exactly what it asked for.

It was at the hearing on October 11 and 12 that TBA proposed a considerable increase in the possible number of television stations and suggested that this increase might be obtained through the use of directional antennas.

In the report just issued, FCC makes possible the establishment of all the stations TBA asked for but without the use of directional antennas which it believes are not entirely practical in the present state of the art. As a result of the new ruling New York City is to have 7 stations and other big population centers are in most cases to have increases.

Against directional antennas

At the same time, the previous requirement of 6 hrs. operation per day was cut to a minimum of 28 hrs. a week or 2 hrs. a day. The report in its essential aspects follows:

"In the order of September 20, 1945, the Commission proposed that channels 1, 12 and 13 be set aside for Community stations and the remainder be used for Metropolitan or Rural stations. Under this proposal New York City would have only four television stations but this would make possible at least one television station in practically all of the larger cities in the country. Under the industry proposals which had theretofore been made to the Commission, New York City would have 7 stations but many important cities would not be able to have any television stations.

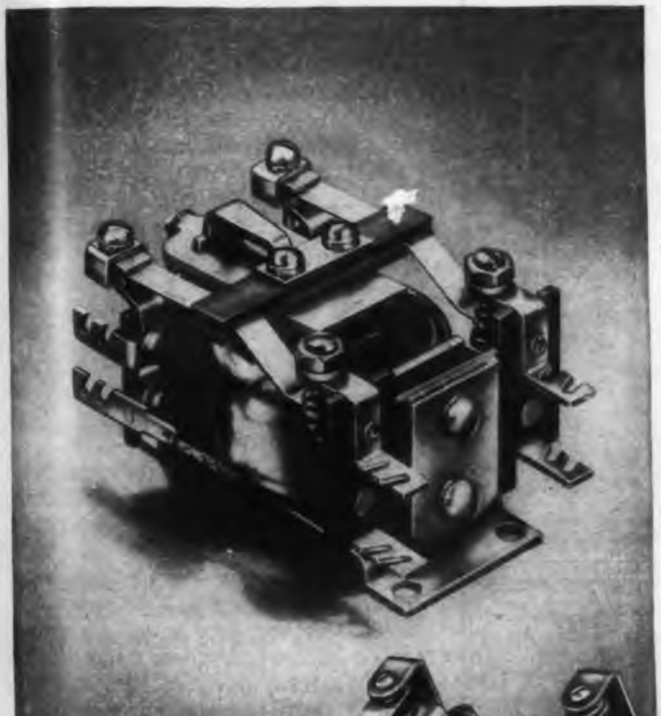
"At the hearing Television Broadcasters Association suggested a different assignment from that proposed in the Commission's order. Instead of using three channels for Community stations, it proposed that only one channel, No. 1, be used for Community stations and that the remaining channels should be used for Metropolitan or Rural stations. In addition, it pointed out that provision could be made for 7 stations in New York if directional antennas were employed in some of the smaller cities. Data were submitted in support of this plan.

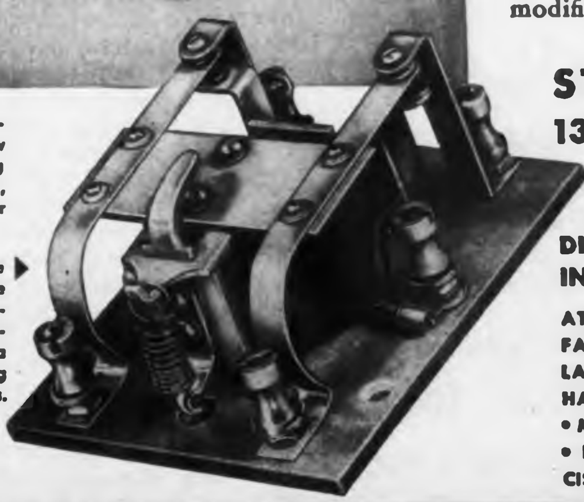
"The Commission has carefully studied the TBA proposal and the data submitted therewith. The Commission is of the opinion that it is desirable to have 7 television stations in New York City if this can be done without depriving other important communities of the opportunity of having any television station. An examination of the TBA proposal reveals that there are several disadvantages in attempting to accomplish this objective by the use of directional antennas. In the first place, the Commission desires to avoid as much as possible the resort to directional antennas for television. With the great increase in civil aviation as a result of the war, it is going to be increasingly difficult to find suitable antenna sites that do not constitute a hazard to air navigation.

"If directional antennas are used, there is much less flexibility in choosing antenna sites, thus increasing the possibility of conflict with air navigation requirements. Moreover, directional antennas will have to be located away from cities with the result that problems of shadows and multipath distortion in rendering service to cities will be much greater than where the

A STANDARD RELAY FOR DOZENS OF SPECIAL APPLICATIONS

. . . requiring a compact light weight unit that handles plenty of power and is highly resistant to shock and vibration





▲ TYPE 10XBX—Two-pole, double-throw contacts, featuring phenolic insulation, metal base, and solder terminals.

Modified 10 Frame construction Type 10XBX117 for R-F application. Features include bonded mica insulation and binding post type terminals. ▶

The design flexibility of Struthers-Dunn 10 Frame a-c and d-c relays coupled with their proven dependability under adverse operating conditions make them ideal for many applications usually requiring more costly special types. 10 Frame Relays are small and light and particularly built to withstand shock and continuous vibration.

Features include: — One- to four-pole, single- and double-throw contact arrangements; insulations suitable for power or radio-frequency circuits; high contact pressures and plenty of "follow-up" for long contact life.

Struthers-Dunn #10 Frame Relays are currently used in many Radar, Radio, and Communications circuits for shipboard, aircraft and general use, including a wide variety of industrial installations requiring extra quality and plus performance. Write for Data Sheet 10-000 describing the 10-Frame Relay Series and outlining a few of the many available modifications.

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antenna is located in the city itself—in most instances antennas can be located in the city itself where no directional antenna is required.

"In the second place, the directional antenna patterns proposed by TBA result in many instances in highly artificial service areas with a good part of the station's signal strength being directed out to sea. Moreover, the service area of the stations using directional antennas would be no larger than that of a Community station but such stations would be as expensive to construct and operate as Metropolitan stations.

"The Commission has devised a plan which meets the objectives of the TBA proposal but does not involve the use of directional antennas. Under this plan it will be possible to have 7 television stations in New York City and to have as many television stations in the other cities throughout the country as was proposed in the TBA plan.

Greater service area

"Generally speaking, what has been done is to provide for Community stations in the smaller communities where the TBA plan had proposed high-power stations with directional antennas. In addition, television stations have been located somewhat closer together in the eastern part of the United States than was done in the original Commission proposal with the result that in many instances stations may not be able to serve out to their 500 uv/m contour. However, on an overall basis the average service area of all stations in the eastern part of the United States will be greater under the Commission proposal than under the TBA proposal. In the remainder of the country, there is no difference between the TBA proposal and the Commission's allocation.

"Under the Commission's plan only television channel No. 1 will be designated as a Community channel. All of the other television channels will be available for either Metropolitan or Rural stations. However, in the smaller cities Community stations will be assigned to these channels.

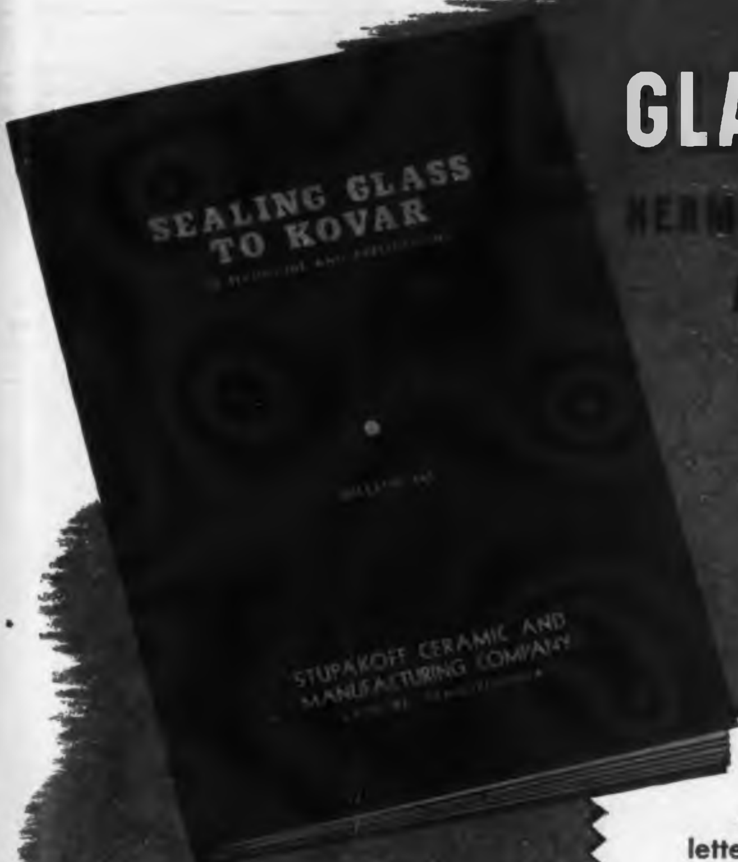
"Under the rules and regulations the official standard of protection of television stations will be the 5000 uv/m contour. The Commission will, however, make every effort wherever possible to permit stations to serve beyond their 5000

uv/m contour but no protection can be accorded beyond that contour."

Following are the new allocations which differ from those included in the list published in the November issue of ELECTRONIC INDUSTRIES:

Allocations changes

District	Total Stations Metro-politan	Total Stations Community
Akron	1	—
Altoona	1	—
Asheville	3	—
Augusta, Ga.	2	—
Austin	3	—
Binghamton	1	—
Birmingham	3	—
Boston	5	—
Buffalo / Niagara	4	—
Charleston, S. C.	3	—
Chattanooga	4	—
Chicago	7	—
Cincinnati	4	—
Cleveland	5	—
Columbus, Ga.	2	—
Columbus, Ohio	4	—
Dallas	3	—
Decatur	1	—
Detroit	5	—
Erie	1	—
Flint	1	—
Galveston	3	—
Hamilton / Middletown	1	—
Huntington, W. Va. / Ashland, Ky	1	—
Indianapolis	5	—
Johnstown, Pa.	1	—
Kalamazoo	1	—
Lancaster	—	1
Lansing	1	—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TO KOVAR
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District	Total Stations Metro-politan	Total Stations Commu-nity
Lincoln	2	—
Los Angeles	7	—
Lowell, Lawrence, Haverhill	1	—
Madison	1	—
Milwaukee	4	—
New Haven	—	1
New York, Northeastern New Jersey	7	—
Norfolk, Portsmouth, Newport News	4	—
Peoria	3	—
Philadelphia	4	—
Pittsburgh	4	—
Portland, Maine	2	—
Portland, Oregon	5	—
Providence, R. I.	1	—
Richmond	4	—
Roanoke	3	—
Rockford	1	—
Sacramento	3	—
Saginaw, Bay City	3	—
St. Joseph	1	—
St. Louis	5	—
San Jose	1	—
Sioux City	4	—
South Bend	—	1
Springfield, Mass., Holyoke	1	1
Stockton	1	—
Syracuse	3	—
Tacoma	3	—
Terre Haute	1	—
Toledo	1	—
Topeka	2	—
Trenton	—	1
Utica, Rome	2	—
Washington	4	—
Waterbury	1	—
Waterloo	3	—
Wheeling	1	—
Youngstown	1	—

WHAT'S NEW

Insulation Tester

Model 799 is a sensitive direct-reading insulation testing device for applications where high potentials are not required. It provides a single range for readings from 0.1 megohms to 10,000 megohms. The 10,000 mark is at 8% of the scale length, thus providing good readability. The circuit has a test potential of less than 50 v dc. An electrical guard circuit is provided for elimination of surface leakages when testing cables. The size of the unit is 5⅝ x 3¼ x 4⅞ in. All exposed metal parts are thoroughly insulated for the operator's protection. A "press-to-read" switch automatically disconnects battery circuit when not in use. Ferrules in panel permit attachment to lineman's belt or shoulder strap. Maker is the Weston Electrical Instrument Corp., 617 Frelinghuysen Ave., Newark 5, N. J.—Electronic Industries

Transceiver

A compact lightweight transmitter-receiver unit for use in privately owned aircraft has been developed by Harvey-Wells Electronics, Inc., Southbridge, Mass. It is less than 5 in. high x 6 in. wide x 8 in. deep and weighs 13 lb. Designed for plane to ground communication and direction finder operation, it will not be affected by any altitude, humidity or temperature normally encountered in personal flight service.—Electronic Industries

Wire

The new thermo-plastic insulation used on Turbotherm wire, has high voltage breakdown strength and increased resistance to soldering temperatures. It possesses the general characteristics of plastic insulation on its resistance to the effects of oil, inorganic solvents, acids, alkalies, sunlight and oxidation. Available in gages 24 to 30, it is made by William Brand & Co., 276 Fourth Ave., New York City 10.—Electronic Industries

Dial Lamp

A 6 w cold cathode tubular lamp for the illumination of radio dials, and test equipment panels, has been developed by Lynn Engineering Co., 912 Westfield Ave., Elizabeth 3, N. J. It operates from the B supply of power unit and has a life expectancy of over 3,000 hours. Cold cathode eliminates

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Literature describing the complete line of WESTON panel and test instruments is freely offered . . . Weston Electrical Instrument Corporation, 666 Frelinghuysen Avenue, Newark 5, New Jersey.

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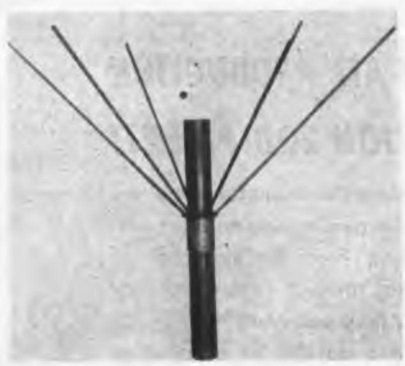
In Canada, Northern Electric Co., Ltd., Powerlite Devices, Ltd.

the radio interference usually associated with fluorescent lamps. This lamp also comes in black light for illumination of fluorescent plastics or pigments.—Electronic Industries

Remote Amplifier

A 4-channel high fidelity remote amplifier, being made by Collins Radio Co., Cedar Rapids, Ia., has both ac and dc self-contained power supplies. The dc battery supply is automatically switched into service if the ac voltage source fails without program interruption. Both individual channel and a master control are provided. Input impedance is 30 to 50 ohms and the output is 50 mw with less than 1 per cent distortion into a 600 ohm load. Frequency response is 30 to 12,000 cycles at an overall gain of approximately 95 db.—Electronic Industries



VHF Antenna

Bendix Radio, Baltimore 4, Md., have a new broad-band dipole antenna especially designed for use in the 108-132-mc band. Within this range, it will match into a 52 ohm coaxial transmission line and produce no more than a 1.5 to 1 standing wave ratio. Field pattern is non-directional horizontally.—Electronic Industries

Folded Antenna

The Andrew Co., 363 E. 75th St., Chicago 19, Ill., has developed a folded unipole antenna for use in transmitting and receiving at frequencies from 30 to 40 mc, and for powers up to 5,000 w. Unit weighs 15 lbs. Lightning hazard is minimized by grounded

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Up-to-the-minute switches add efficiency to the electrical product, that means greater sales appeal to the ultimate consumer. Stackpole line, slide, and rotary-action switches are highly adaptable to the individual needs of a wide variety of electrical equipment and cost but little. Eighteen standard units include 3-position types and 1-, 2-, 3-, and 4-pole switches with or without spring return, detent, covers and other optional features. Each can be adapted mechanically or electrically to meet a wide variety of specific requirements.

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Carbon Regulator Discs
Bearings—Pipe
Anodes and Electrodes
Packing, Piston and Seal Rings
Welding Carbons, etc.

WRITE FOR ELECTRONIC COMPONENTS CATALOG
. . . for complete details on Stackpole Switches, also Fixed and Variable Resistors, and molded iron cores.

STACKPOLE CARBON COMPANY, St. Marys, Pa.

STACKPOLE

vertical element. "Slide trombone" calibration permits exact adjustment for any frequency between 80 and 40 mc, using only a wrench. Proper termination of coaxial transmission line is provided by a non-reactive impedance with a resistive component varying between 62 and 75 ohms. Band width is never less than 400 kc wide for a standing wave ratio of 1.2 to 1, and by careful selection of transmission line impedance, may be made as wide as 1 mc. Unit may be used with any 70 ohm coaxial cable, solid dielectric or beaded, up to ⅞ in. diameter.—Electronic Industries

VHF Crystal

A new crystal unit for VHF service has been developed by Bliley Electric Co., Erie, Pa. Designed for frequency stability over a wide temperature range it has a built-in heater that operates on 6.8 v at 1 ampere. Over-all frequency tolerances of better than .005 per cent are maintained. This unit is available for any frequency between 3,500 kc and 11,000 kc.—Electronic Industries

Volt-Ohm-Milliammeter

Model 625-N has dc voltage ranges with dual sensitivity (10,000 and 20,000 ohms per volt) that provides double the number of full scale readings of the average tester. DC voltage ranges are 0-1.25-5-25-125-500-2500 at 20,000 ohms per volt; and 0-2.5-10-50-250-1000-5000 at 10,000 ohms per volt. DC ranges are 0-50 microamperes; 0-1-10-100-1000 milliamperes and 0-10 amperes at 250 mv. Resistance ranges are 0-400 ohms (60 at center scale); 0-50,000 ohms (300 at center scale); 0-10 megohms (60,000 ohms at center scale). Direct reading output level db ranges are —30 to +3, +15, +29, +43, +55, +69 db. A capacitor is in series with ac ranges for output readings.—Electronic Industries

New Plastic

Forticel, a new thermoplastic developed by the Celanese Plastics Corp., Newark, N. J., is of particular interest for injection and extrusion molding because of the possibility of reducing the molding cycle time. It has an unusual surface lustre and requires no mechanical polishing. Forticel shows good electrical properties.—Electronic Industries

Hermetically Sealed Relays

A maximum envelope diameter of 1¼ in., envelope length of 2¹⁄₁₆ in. and weight of 2 oz. makes the new hermetically sealed Type 45 relay made by Kurman Electric Co., 35-18 37th St., Long Island City, N. Y., one of the smallest. The envelope contains inert gas under pressure. The contacts normally carry 3 amps. on continuous duty and

ACTUAL SIZE

The cast iron pump was modern two or three generations ago. It was a big improvement over the old oaken bucket. But today we use a comparatively small faucet that supplies water at a twist of the wrist. It is another milestone on the road to greater efficiency in miniature.

This same tendency is evident in the development of the Electronic Tube. The Tung-Sol Miniature is the result of the trend to smaller component parts. It is used to great advantage in reducing th
of equipment. But more im
tures do a more ... the old st
espe... frequency circuits. They ha
and high mutual conductance. Short
give them low inductance. Smaller elements ... less, making Miniatures more rigid. This helps to eliminate distortion from vibration.

When planning new electronic devices or when improving old ones, discuss circuits and tube selection with Tung-Sol engineers. Their services are at your disposal. Such conferences are held in strictest confidence.

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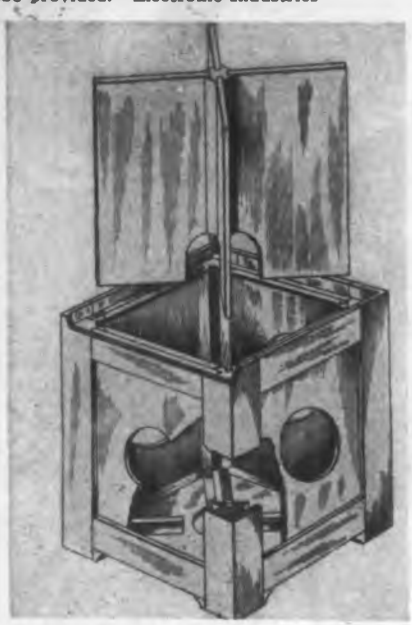
ELECTRONIC TUBES

TUNG-SOL LAMP WORKS ... NEWARK 4, NEW JERSEY

Also Manufacturers of Miniature Incandescent Lam... Sealed Beam Headlight Lamps and Current Intermittors voltages up to 800 RMS may be switched, depending upon gap adjustments. Single and double-pole contacts are available. Contact spring pressure is normally adjusted to obtain a sensitivity of 50 to 100 milliwatts but a sensitivity of 18 milliwatts can be provided.—Electronic Industries



Sound Resonator

A new combination directional—non directional sound distributor has been developed by the Robinson-Houchin Optical Co., 79 Thurman Ave., Columbus 6, Ohio. It contains no sound absorption or special frequency resonating units. Design permits either console type or ceiling suspension installation.—Electronic Industries

Oxide Rectifier

A new Coprox full-wave, copper oxide rectifier rated at 12 v ac and 50 ma dc or 6 v ac and 100 ma dc, is now being made by Bradley Laboratories, Inc., 82 Meadow St., New Haven 10, Conn. It is fully enclosed and completely sealed with a special plastic compound.—Electronic Industries

Renewable Switch

A new switch which is instantly renewable, like a fuse, has been developed by Robert Hetherington & Son, Inc., Sharon Hill, Pa. It is of non-snap type. This feature will be included in all switches from midget size to those handling 50 amperes at 110 v ac.—Electronic Industries

New Type Contact

Jacks and plugs are now being made by Alden Products Co., 117 N. Main St., Brockton 64, Mass., with a new type of contact to minimize soldering difficulties. Leads are mechanically held while soldering and complete insulation is retained around each lead.—Electronic Industries

Test Lamp

The Ne-O-Lite electric test-lite uses a small neon lamp for checking ac or dc circuits. Variable light intensity will indicate voltages from 60 to 550 ac. It is handy for locating blown fuses, testing polarity and ground faults.—Electronic Industries

Midget Vibrator

Operating from a 6 v supply, this midget vibrator, made by Radiart Corp., 3571 W. 62nd St., Cleveland 2, Ohio, will deliver an output voltage of 200 v dc maximum. Frequency is approximately 185 cps. Outside dimensions of the unit are about 2 in. high and 1 in. diameter.—Electronic Industries

Television Lead-in

A new two-wire polyethylene insulated cable has been developed by Anaconda Wire & Cable Co., 25 Broadway, New York City 4, for television lead-ins. It is non-

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5 A.C. 0-10-50-250-500-1000 at 1000 ohms per volt.
Current: 4 A.C. 0-.5-1-5-10 amp.
6 D.C. 0-50 microamperes — 0-1-10-50-250 milliamperes—0-10 amperes.
4 Resistance 0-4000-40,000 ohms—4-40 megohms.
6 Decibel -10 to +15, +29, +43, +49, +55
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shielded and flexible and has an attenuation of 0.75 db per 100 ft. and an impedance of 800 ohms at 50 megacycles.—Electronic Industries

Antenna Support

A 50 ft. telescopic plywood Ham-Mast made by the Plymold Corp., Lawrence, Mass., is designed for use in the UHF and VHF fields. Slight modifications will adapt it to FM and television reception. With a total weight of 70 lbs., including fittings, it is easily set up or moved. It will withstand winds of 100 miles per hour and does not require painting.—Electronic Industries

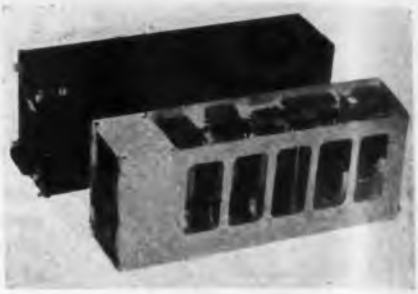
Wide Range Voltmeter

A vacuum tube voltmeter, developed by Reiner Electronics Co., 182 W. 25 St., New York City 1, will measure ac voltage values from 25 millivolts to 1,000 volts with a frequency range from 10 cps to 700 mc. Input capacity is 7 mmf. The unit has a single zero adjustment for all ac and dc ranges and is accurate within 2 per cent on full scale values. Resistance readings can be made from 1 ohm to 1,000 megohms. —Electronic Industries

Heat Dissipater

A new heat dissipating unit has been developed by The Eastern Engineering Co., New Haven, Ct., it will dissipate up to 1200 watts with a constant controlled temperature, irrespective of surrounding temperature, within a close heat control range of 2 degrees C. Dimensions of unit are 16 x 7½ x 7½ in. Various size units up to 5,000 w dissipation are obtainable.—Electronic Industries

Aircraft Receivers



A new crystal controlled, light weight aircraft communication receiver designed for commercial transport and executive planes has been developed by the Collins Radio Co., Cedar Rapids, Iowa. The Collins Autotune is used for selecting the channel of operation. The receiver offers 10 different, easily preselected frequencies for reception anywhere within the range of 2.4 to 18 mc. The maximum time required for the Autotune to change channels is 2 sec. The receiver fits into ½ ATR unit, weighs less than 20 lbs., and may be operated from a 24 v dc source. A 12 v model is also available.—Electronic Industries

Special Tubes

Sub-miniature electronic tubes for applications requiring extremely low grid current and very high leakage resistance have been developed by the Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio. They come in diode, triode and tetrode

types. Vacuum sealed resistors to work with these tubes are available in values from 1 to 1,000,000 megohms.—Electronic Industries

Power Measurement Lamps

Simple, direct measurement of power output, at frequencies up to 900 mc, is provided by power measurement lamps developed by Sylvania Electric Products, Inc., Emporium, Pa. Outputs of from 0.05 to 25 w can be made with accuracies within 5% or less. Twin filaments, one connected to the HF source and the second to a controllable ac or dc supply, are brought to equal brightness. Meters in the ac or dc supply will indicate power dissipation in HF circuit.—Electronic Industries

Miniature Jacks

Midget-sized jacks, designed for use where space is at a premium, are being made by Insuline Corp. of America. New engineering features are arched spring members for minimizing tension fatigue and interlocked component parts to prevent turning and shorts.—Electronic Industries

Wind Power

A new 32 v wind-driven generator, being made by Wincharger Corp., of Sioux City 6, Ia., has a variable pitch propeller, an automatic power control and a sturdy guyed-type tower. Under normal conditions it will supply 100 kwh of power a month. —Electronic Industries

Wire Recorder

The Magicwire portable recording-reproducing unit made by Utah Radio Products Co., 812 Orleans St., Chicago 10, Ill., will take about 66 minutes of both permanent or temporary recording. Automatic erasure is made when new recordings are made. Play back from the wire is instantaneous. The unit will operate from 115 v 60 cycle ac.—Electronic Industries

Speaker

Tru-Sonic Co-axial Speaker, made by Stephens Mfg. Co., 10416 National Boulevard, Los Angeles 34, is a two-way sound reproducing unit using a low frequency cone and a high frequency diaphram feeding into a multicellular horn. High frequency sound distribution is made in a 80-degree horizontal plane.—Electronic Industries

Glassed Selenium Stacks

For many high voltage, low current applications; Federal Telephone and Radio Corp., Newark, N. J., have designed a new selenium rectifier hermetically sealed in

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glass. No larger than a fountain pen and constructed like a cartridge fuse, the stacks can be mounted in 30 ampere fuse clips. These units are available for use with voltages up to 4,000.—Electronic Industries

DC Motors

The Kato Engineering Co., Mankato, Minn., is now making dc motors in one-quarter, one-third and one-half hp sizes. Rated for continuous operation the ball bearings are lubricated for the life of the unit. Radio interference suppression units are built-in. The one-half hp model uses 18 amperes at 110 v dc.—Electronic Industries

HF Amplifier

The Industrial Electronics Division, Sylvania Electric Products, Inc., Boston, Mass., is making high frequency amplifiers with center frequencies of 80 to 70 megacycles. Band widths range from 2 to 10 megacycles. 500 ohm input and 75 to 100 ohms output impedances are used. Overall gain at 60 megacycles is approximately 100 db.—Electronic Industries

Tape Transmitter

A new line of automatic radiotelegraph tape transmission equipment has been developed by McElroy Mfg. Corp., 82 Brookline Ave., Boston 15, Mass. The keying head on the transmitting unit has a speed up to 700 words per minute. Wheatstone tape is used.—Electronic Industries

Cored Solder

Rosin core solder for mass production work is a development of Glaser Lead Co., Inc., Brooklyn 27, New York City. Rigid control of manufacture gives a uniform solder that takes hold quickly, giving a strong permanent bond.—Electronic Industries

Metals Identification By Triboelectric Effect

In all plants using various analyses of steels or other metals which may look alike but have different properties and applications one of the problems has always been the proper identification of these materials in the stockroom or the machine shop when coding paints or other identifying marks are removed. In many cases it has been found cheaper to discard usable quantities of even expensive materials rather than risk misapplication.

A neat solution to this problem is provided by employing the triboelectric effect. This is the electric voltage produced at the junction point when two dissimilar materials are rubbed against each other. It is the same effect which is called static when a non-conductor such as hard rubber or bakelite is rubbed against cloth. With the metals, however, the triboelectric current is immediately conducted away from the junction point. By connecting the outer ends of the two metals being rubbed through a vacuum tube microvoltmeter a resulting potential can be read. When this is checked against previous calibrations of known materials identification of the material being rubbed becomes easy. The anvil against which rubbing takes place is, of course, a standard test bar.

Power rubber

This principle has been applied commercially, an electric hand tool which has a reciprocating motion being used to do the rubbing. The voltages developed range from a fraction of a microvolt to several millivolts. It is interesting to note that it is not necessary to have a dry rubbing surface and that in effect the presence of a lubricant is beneficial because it prevents scoring. It is only necessary to be sure that no foreign materials or metallic oxides are present at the rubbing point.

Engineers Schedule Radio Symposium

A joint meeting of the Institute of Radio Engineers New York Section and the Communications Group of the A.I.E.E. will consist of a symposium relating to the general theme of Radar systems and their importance to present day commercial services. This symposium will consist of two sessions held in the auditorium of the Engineers Society building, 33 West 39th Street, New York on Saturday, December 8. The morning session will start at 9:00 A.M. and the afternoon session at 1:30 P.M.

During this symposium engineers from six of the companies that have made pioneer contributions to the Radar problem will discuss some features associated with the projects. The following papers have been scheduled: "Fire Control Radar" by W. H. Doherty, Bell Telephone Laboratories (and Western Electric Co.); "Doppler Radar" by Edward Barlow of the Research Laboratories, Sperry Gyroscope Co., Garden City; "An Aircraft Navigation System" by L. F. Jones, P. J. Herbst, and Irving Wolff, the RCA Laboratories, Princeton, N. J.; "The SCR-584/784 Anti-Aircraft Radar Equipment" by M. R. Briggs, Westinghouse Electric Corp.; "Surface Search Radar" by Henry J. Geist, Raytheon Mfg. Co.; "Electronic Navigation" by L. H. Lynn, General Electric Co.

ANNUAL INDEX

To Electronic Industries for 1945

The Annual Index has been arranged by Subjects for easy reference to related topics. The first figure indicates the Month in which the article appeared; the second figure indicates the page.

I CIRCUITS and THEORY

AMPLIFICATION and AMPLIFIERS

AC Amplifier and Voltmeter ... 10-118
Balanced Amplifier ... 10-178
Cathode Biased Amplifiers....Hunter ... 11-92
Engineering Details of OWI 200 KW Units....Romander ... 10-100
Features of Cathode Follower Amplifiers....Reich ... 7-74
Grounded-Grid Circuits ... 1-112
Hearing Aid Technic....LeBel ... 1-104
Measuring Klystron Amplifier Features....Dodd ... 2-76
On Push-Pull Amplifiers ... 1-176
Phase Shift Effect in Amplifiers....Schaffstein ... 9-98
Push-Pull Circuit ... 4-170
Repeater Amplifier ... 4-98
Submerged Repeater ... 1-182
Space Charge Effects in Beam Tetrodes ... 9-158
Tone Control Circuit ... 8-115

CATHODE RAYS

Cold Cathode Oscillograph ... 5-90
Phosphors and Their Behavior in Television....Krushel ... 12-100
Projection C-R-O Tube....Feldt ... 9-118
RCA Reveals Projection Tele ... 4-95

ELECTRON PHYSICS

Atomic Fission Will Have Profound Effect....Stetson ... 9-77
Electron-Mirror Microscope ... 5-112
Electron Trajectories in Plane Diode ... 10-118
Generation of Atomic Power from Elements....Shea ... 10-90
100 Million Volt Electron Accelerator ... 12-90
The Cyclotron at Bonn ... 11-118
Velocity-Modulated Electron Beams ... 6-115

FILTERS

Designing Filters for Specific Jobs (I)....Halloran ... 4-76
Designing Filters for Specific Jobs (II)....Halloran ... 6-102
Insertion Loss of Dissipative Filters ... 5-112
Wave-Guide Filter ... 6-114

IMPULSE GENERATORS

Measuring Emission Characteristics with Pulse Technic ... 11-112
Operational Elements of a Radar System....Moulic ... 5-76
Principles of Loran in Position Location....Kenyon ... 12-106
Producing Rectangular RF Pulses ... 7-114
Square Wave Generator ... 12-114
Theory of the Multivibrator ... 6-174
Time-Base Converter and Frequency Divider ... 11-158

MODULATION AND MODULATORS

Cathode-Follower Modulator ... 5-216
Pulse Position Modulation Technic ... 12-81
Pulse-Time Modulation ... 2-112
PT Modulation for Multiple Transmission ... 11-90
Reviewing Some Basic Modulation Processes ... 5-98

OSCILLATION and OSCILLATORS

Coaxial Butterfly Oscillator....Gross ... 12-76
Intermittent Behavior in Oscillators ... 6-170
Magnetron Frequencies....Djakov, Raev ... 5-106
Measuring Klystron Amplifier Features....Dodd ... 2-76
Performance of RC-Coupled Push-Pull Oscillators ... 9-110
Thermal Stability in Receiver Oscillators (I)....Batcher ... 4-96
Thermal Stability in Receiver Oscillators (II)....Batcher ... 5-98
Transitron Oscillator for High Stability....Muller ... 12-110

RECTIFICATION, RECTIFIERS and INVERTERS

Germanium Crystals....Cornelius ... 12-80
Grounded-Grid Circuits ... 1-112

WAVE FORM ANALYSIS and RECORDING

Harmonic Synthesizer ... 1-182
Measuring Emission Characteristics with Pulse Technic ... 11-112
Vector Analysis ....Shea ... 11-94

WAVE PROPAGATION

Meteors and VHF Bursts....Stetson ... 8-112
Principles of Loran in Position Location....Kenyon ... 12-106
Tropospheric Study of FM Transmission ... 12-78

TRANSMISSION LINES, WAVE GUIDES and CAVITY RESONATORS

Analysis of Transmission Line Networks ... 6-115
Cavity Resonators....Daellenbach ... 4-104
Circle Diagram in Impedance Matching ... 4-112
Coax Cable Protection....Inskip ... 8-95
Computing Double-Stub Lengths for Lines....Paine ... 7-94
Frequency-Independent Impedance Matching ... 9-111
Selecting Coax Cable....Andrew ... 6-84
Transformation of Electromagnetic Waves ... 2-112
Vector Analysis....Shea ... 11-94
Wave-Guide Filter ... 6-114
Waves in Tubes Filled with Two Dielectrics ... 2-167

DETECTOR, DISCRIMINATOR

Measuring UHF Resistance ... 8-114
Mercury-Vapor Detector ... 8-106
Ratio Discriminator Is Insensitive to AM ... 11-82

II COMMUNICATION SYSTEMS and EQUIPMENT

AERONAUTICAL RADIO

Latest Type AAF Blind Landing Equipment....Montgomery ... 1-100
Remote Control Tuning ... 7-79

ANTENNAS

Airloop Antenna ... 10-114
Electromagnetic Field of Symmetrical Antennas ... 2-219
Experiments with Horizontal Antennas ... 4-176
FM Needs (1) More Power on 88-106 mc, (2) Extension of Operation on 44-50 mc ... 12-75
Ground Absorption for Dipole Antennas ... 2-112
Latest Type AAF Blind Landing Equipment....Montgomery ... 1-100
Operational Elements of a Radar System....Moulic ... 5-76
Polar Diagrams for Antennas ... 10-170
Polarized Radiation ... 12-113
Technic of Antenna Gain Measurements....Glinski ... 10-88
VHF Homing Device ... 8-104
WABC's New Two-Bay Antenna....Prestholdt ... 2-88

BROADCAST

OWI Mobile Recorder for Detached Service ... 2-106
"Talkies" ... 8-101

CARRIER CURRENT

Applying Power Line Carrier Principles....Beale ... 1-84
Pulse Position Modulation Technic ... 12-81
Radiotelephone Pipe Line ... 9-108

FACSIMILE

Facsimile Equipment Communication Units....Davies, Lesser ... 2-96

FREQUENCY MODULATION (FM)

Allocations Nearer ... 4-88
Army FM Mobile Unit ... 8-111
Developments in the FM Field ... 10-120
FM Frequency Allocations ... 10-288
FM Power Converter....Gunther ... 9-84
FM-Tele Allocations Delayed ... 6-82
FM-Tele Standards ... 9-94
FM Tests Statement by FCC ... 12-80
44-108-MC Allocations ... 8-84
Ground Wave Range Calculator for FM ... 11-109
High Frequency Police Equipment ... 6-81
Interference Effects in FM Without Limiting....Leydorf ... 5-100
Interference Problems....Bose ... 4-91
Measurement Technic....Evans ... 7-90
Proposed Allocations ... 2-80
Railroad Radio ... 5-81
Rock Island RR Radio ... 2-110
Simple FM Converters ... 5-82
Tropospheric Study of FM Transmission ... 12-78
Tube Characteristics ... 5-88
WABC's New Two-Bay Antenna....Prestholdt ... 2-88
Westinghouse Proposes Flying Tele-FM Stations ... 9-94

GENERAL

Diathermy Problems ... 8-107
New Type High Rate Dry Cell ... 8-85
Postwar Engineering ... 9-74
Remote Control System ... 5-216
Shielding HF Interference....Murray ... 8-108

INTERNATIONAL SHORT WAVE

Crosley-OWI 200 KW "Voice of America"....Rockwell ... 1-90
Short Wave BC Technic....Towlson ... 2-90
Sigcircus-P-568 ... 8-107

RADIO RANGING and DETECTION—RADAR

Army and Navy Radar ... 10-98
Future of Radar ... 12-77
Glossary of Common Radar Expressions ... 9-92
Gun Sound Ranging ... 5-89
Loran System ... 12-114
Navy's Floating Electronic Laboratory ... 9-76
Navy Proximity Fuze ... 11-104
Operational Elements of a Radar System....Moulic ... 5-76
Principles of Loran in Position Location....Kenyon ... 12-106
Radar Developed Electronic Navigator ... 9-218
Radar for Ships ... 9-107
Surface Search Radar ... 11-98

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RECEIVERS

Computing Noise in Receivers 1-112
Engineering Double Superhet Receivers....Reid 3-82
Sigcircus-P-563 8-107
Three-Band "Morale" Set 5-107

RECORDING, TRANSCRIBING and PLAYBACK

High Quality Sound Recording on Magnetic Wire....Holmes ..12-77
Improving Recordings....Pickering 10-82
Lear Demonstrates Home Wire Recorder 5-176
Multi-Channel Sound Recording on Film 4-92
OWI Mobile Recorder for Detached Service 2-106
Phonograph Dynamics....Bachman 7-86
Phono Head Balance....Chalfin 9-102
Pocket Model Wire Recorder Designed....5-254
Strain-Gage Phono Pickup 8-89

SOUND and PUBLIC ADDRESS SYSTEMS

Hearing Aid Technic....LeBel 1-104
High Level Sound 7-4
Shipboard Announcers....Cooke 8-96
Sound Waves in Rooms 6-114
War Influence on Acoustic Trends....Knowles 12-81

TELEVISION

Crash Fails to Stop NBC Tele Station....9-86
DC Picture Transfer....Kozanowski 4-106
DuMont's Projection Tele 6-97
Easing Multipath Problems 2-95
FM-Tele Allocations Delayed 6-82
FM-Tele Standards 9-94
44-108 MC Allocations 8-84
High Sensitivity Pickup 12-88
Industry Standardization Work in Television....Smith 12-102
Intrastore Television 12-122
Liquid Film Modulates Light in Television System....2-166
Mobile Tele Control 10-108
Phosphors and Their Behavior in Television....Krushel 12-100
RCA Reveals Projection Tele 4-95
TBA Proposes Big Tele Allocation Boost 11-186
Television Is Ready 1-122
Television Optics....Pestrecov 8-80
Television Reflections from Airplanes 10-86
Television Symposium 7-80
Television Today
- Industrial Television 1-120
- British Postwar Television 1-120
- 1945 Tests for RCA 5 kw-800 mc Tele....2-120
- British Plan Color Television Development....3-124
- RCA Readies 300-Mc Tele Transmitter for Tests....3-124
- Subscription Television 3-124
- TBA Engineering Group 4-122
- Theater Television 4-122
- International Standards 5-120
- Television in War 5-120
- French Tele Prepares for Postwar Operation....6-126
- Hotel Room Tele 7-126
- Television and FM Ask Alternative No. 1....7-126
- DuMont Tele Transmitter for Buenos Aires....8-126
- GE Big Screen Tele Receiver 8-126
- British Video Plans 9-126
- RCA-NBC Test New 288 MC Tele Transmitter....9-126
- CBS Color Plans 10-126
- Educational Video 10-126
- "Television City" 10-126
- Stratovision—Pro and Con 11-126
- Tele for Teaching 11-126

Television vs Foliage 9-88
VHF Network for Television Relay 6-86
Westinghouse Proposes Flying Tele-FM Stations....9-94

TRANSCEIVERS

Engineering British B48 Walkie Talkies 10-104
Marine Voice-Code Set 6-100

TRANSMITTERS

AAF's "Heroic" Transmitters 3-85
Crosley-OWI 200 KW "Voice of America"....Rockwell....1-90
Engineering British B48 Walkie Talkies 10-104
Factors Determining Industrial Tube Life 12-94
Marine Voice-Code Set 6-100
OWI-CBS 200 KW West Coast Transmitters....DeHart....4-82
Sigcircus—P-563 8-107

INDUSTRIAL COMMUNICATION

Latest Type AAF Blind Landing Equipment....Montgomery..1-100
Rock Island RR Radio 2-110

UHF COMMUNICATION and EQUIPMENT

Meeting Specs in UHF....Shea 5-84
Silicon Crystals for UHF Detection Circuits....Cornelius....11-74
VHF Network for Television Relay 6-86

RADIO RELAY SYSTEMS and EQUIPMENT

Multi Channel Army Communications Set....6-90
Navy Radio Equipment 4-108
Radio Relay Network Plans for the Future....6-94
Radio-Telephone Trucking Control 11-110

III COMPONENTS, MEASUREMENT and TEST APPARATUS

COILS

Effect of Spherical Screen Upon an Inductor 3-112
Effect of Vibrations on Permeability 7-116
Measurement of Effective Search Coil Area....11-160
Measurements of the Residual Parameters of a Q Meter....3-220
Nomograph for Coils 8-78
Nomograph for Q Meter 9-90
Permeability of Iron Wires 6-114
Reactance Meter 12-113
Remanence of Magneto Striction 2-112
Variation of Inductance with Core Position....6-115

CAPACITORS, DIELECTRIC MATERIALS

Electronic Uses of Silicone Insulation 3-246
Experiments on Electrets 1-180
Nomograph for Q Meter 9-90
Polythene as Dielectric 2-168
Reactance Meter 12-113

INSULATION MATERIALS

Electronic Uses of Silicone Insulation 3-246
Fabricating Plastics 2-86
Silicone Coatings 5-194

LUMINOUS and ELECTRON-EMISSION MATERIALS

Effect of Oxygen on Secondary Emission 4-112
Measuring Emission Characteristics with Pulse Technic....11-112
Phosphors and Their Behavior in Television....Krushel 12-100

MISCELLANEOUS

Tropical Treatment of Military Equipment....Horner, Koppa..7-106

OSCILLOGRAPHS

Cathode-Ray Oscillograph Sensitivity 8-114

RESISTORS, THERMISTORS

Measuring UHF Resistance 8-114
Nomograph for Coils 8-78
Silicone Coatings 5-194
Thermistor Technics....Johnson 8-74
Thermistors in Electronic Circuits....Batcher 1-76

TRANSFORMERS

DC Saturable Reactors for Control Purposes—Holubow....3-76

TUBES

DC Picture Transfer....Kozanowski 4-106
Factors Determining Industrial Tube Life....Dreyer 12-94
Glass for Electron Tubes 8-178
Klystron Equipment....Sherman 1-88
Limiting Stable Electron Current 5-218
Machine Tool Control....Stremel 11-102
Magnetron Frequencies....Djakov, Raev 5-106
Measuring Klystron Amplifier Features....Dodd 2-76
Mechanical Production of Grids 8-104
Mercury-Vapor Detector 3-106
Recent Developments in Converter Tubes....Dunn 12-81
Shortage in Receiver Tubes?....Stobbe 6-107
Space Charge Effects in Beam Tetrodes....9-158
Transit-Time Effects in Plane Diodes 3-219
Tube Characteristics 5-88
Velocity-Modulated Electron Beams 6-115
CR Tube Life Tests....Chioma 1-107

VACUUM TUBE VOLTMETER

Low Frequency Voltmeter 7-115

QUARTZ and OTHER PIEZO-CRYSTALS

Practical Problems of Crystal Dimensioning....Franklin....10-96
Quartz Cutting Jig 9-106

POWDERED IRON CORES

Magnetic Measurements on Iron Powder 2-170
Magnetic Powders....Shea 8-86
Powdered Iron Cores....Martowicz 6-108
Radio Frequency Cores of High Permeability....
Beller, Altmann....11-86

STRAIN GAGES

Strain Analyzing and Recording Instruments....Hathaway...10-74
Strain-Gage Phono Pickup 8-89

CABLES, TRANSMISSION LINES

Circle Diagram in Impedance Matching....4-112
Coax Cable Protection....Inskip 8-95

IV ELECTRONIC APPLICATIONS

CONTROL SYSTEMS and EQUIPMENT

General Problems

Electronic Control of Automatic Riveter....Dickinson 7-112
Machine Tool Control....Stremel 11-102
Radio Door Actuator....Rowe 9-96
Self-Forging Welder....Strange 7-109
Street Light Control....Haley 8-98
Synchro Controls for Meters and Servos....Goertz 9-78
Thermistor Technics....Johnson 8-74

PHOTOELECTRIC

"Bottle Detective" 8-102
Controlled Mercury Arc Lamp 11-113
Electronic Piston Ring Inspector 4-110
PE Tube Smoke Sensing....Sonbergh 3-98

SPEED CONTROL

Electronic Tachometer 3-80
Radio Control of Rocket Velocity 11-156

WELDING CONTROL

Self-Forging Welder....Strange 7-109

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VOLTAGE CONTROL

DC Saturable Reactors for Control Purposes....Holubow.......8-76
Voltage Stabilizers....Uttal 8-90

TEMPERATURE CONTROL

VT Furnace Control 6-111

GENERAL—INDUSTRY APPLICATIONS

Aircraft

Capacitance Gas Gage 9-108
Detonation Indicator for Airplane Engines 7-100
Electronic Recorder for Flight Testing....Dickinson.......4-100
Electronic Trainer 4-94

Chemical

Degassing of Metal Alloys 10-166
Electronic Tools in Chemical Research....Osborn, Beck.......2-82
Technics for Evaporation of Metals 11-162

General

Gaging by the Blind 9-104
Navy's Electronic Organization 11-98
Plated Coatings 5-260

HIGH FREQUENCY HEATING

Design of Electronic Heating Generators....Roberds.......5-108
Dielectric Heating for Gluing of Wood.......10-174
Electronic Blanching of Vegetables 11-110
Mercury Arc Heating Frequency Converter....Durand.......6-74
Study Electronic Heat 8-110
Vacuum Casting 9-172

MANUFACTURING PROCESSES

Miscellaneous

Electronic "Permanent" Frees Rayon Curls 4-110
Electrostatic Painting 8-103
High Vacuum Pumping 11-77
Modern Redevelopment Laboratory Technic.......6-98
Phosphors and Their Behavior in Television....Krushel 12-100
Tropical Treatment of Military Equipment....Horner, Koppa..7-106

MEASUREMENTS, TESTING and TEST PROCESSES

Acoustics

War Influence on Acoustic Trends....Knowles 12-81

General Measurements—Electrical Quantities

A Direct-Reading Audio-Frequency Meter 1-112
Hearing Aid Technic....LeBel 1-104
Industrial Testing with High Voltage 11-106
100-300 mc Equipment....Frankart, Rhoads 5-96
Measurements of the Residual Parameters of a Q Meter.......3-220
Recording Electrostatic Fields 5-215
Remote Recorder 9-108
SHF Power Measuring....Shea 6-79
Thermistors in Electronic Circuits....Batcher 1-76

Physical Quantities—Counter-Measurement of Time-Distance, etc.

A 1,000-g Centrifuge 2-168
A 100-kv Electron Microscope 7-115
Determining Young's Modulus of Elasticity (Using Ultrasonics) 8-112
Distinguishing Between Conducting and Isolating Films.......7-115
Electromagnetic Flow Meter 9-111
Electron Diffraction Pattern of Copper-Gold Alloy.......1-184
Electron-Mirror Microscope 5-112
Fluorescent Testing of Food 1-112
Gasket Pressure Meter....Pfefferle.......3-102
High Vacuum Gages 5-214
Input Circuit to Counter 4-176
Measuring Thickness 8-101
Microanalysis by Means of Electrons 5-212
Modern Measurement of Projectile Speed....Johnson.......7-82
Preset Interval Timer 7-97
Supersonic Measurement of Metal Thickness 5-214
Titrimeter 7-115
The Vibraton....Batcher 4-79
Wire Footage Counter 4-81

Photoelectric

Color Standardization 2-108
High Sensitivity Pickup 12-88
Measuring Projectile Speed 5-282
PE Controlled Lens Coating 2-108
PE Tube X-ray Timer ....Moreland 1-96
Tester for Plastic Windows 10-112

Seismic and Geophysical Prospecting

Instrument for Geophysical Prospecting 12-114

Spectrographic

AC Amplifier and Volt Meter 10-118
Color Standardization 2-108

X-Ray and Gamma Ray Measurement

Chemical Analysis by X-Ray Absorption 6-115
Secondary Electron Radiography 12-118
X-raying Rocket Fuel 2-108

Weather Observations

Enemy Radiosondes 2-202

Cosmic Rays, Ionosphere

Aurora and Geomagnetism....Gartlein 12-70

RECTIFIERS

Germanium Crystals....Cornelius 12-80
Selenium Rectifiers for Aircraft 8-77

X-RAY EQUIPMENT and APPLICATIONS

(Industrial Radiology, Medical Applications, General Scientific)

50th Anniversary of X-ray 5-254
100 Million Volt Electron Accelerator 12-90
PE Tube X-ray Timer....Moreland 1-96

V GENERAL ENGINEERING

ENGINEERS

Incentive Pay for Electronic Engineers....Stobbe 10-86
Paying the Engineer What He Is Worth.......11-84

PROFESSION REVIEW

"Variety" Plugs Engineers 5-258

SOCIETIES AND ORGANIZATIONS

IRE-Technical Meeting 1-96

STANDARDIZATION

CR Tube Life Tests ....Chioma 1-107

MAINTENANCE and REPAIR PROBLEMS and PRODUCTION

Factors Determining Industrial Tube Life....Dreyer 12-94
Production Brazing 8-102

MARKET PLANNING and SELLING

Surplus Disposal 8-88

GENERAL

1945 Statistics 1-81

ALLOCATIONS

Allocations Nearer 4-88
44-108 MC Allocations 8-84
FM-Tele Allocations Delayed 6-82
Proposed Allocations 2-80
TBA Proposed Big Tele Allocation Boost.......11-186

RADIO AND ELECTRONIC STATISTICS

Factors Determining Industrial Tube Life....Dreyer 12-94

ELECTRONIC APPLICATION INDEX

Electronic Uses in Industry....White 2-102

VI DEPARTMENTS and FEATURES

BOOK REVIEWS

An Introduction to Electronics....Hudson 4-198
Applied Mathematics for Radio and Communication Engineers....Smith 11-220
Effective Reproduction of Speech....Jensen Radio Mfg.......5-234
Electric Power Distribution for Industrial Plants....AIEE...5-234
Electrical Drafting Applied to Circuits and Wiring.... Van Giesen 9-212
Electrical Measurements of Mechanical Quantities....Pflier..11-220
Electronic Equipment and Accessories....Walker 11-224
Electronics for Radio Men and Electricians.... Coyne Electrical School 5-234
Electronics Laboratory Manual....Wright 9-210
Electronics Laboratory Manual....Wright 10-228
Electronics—Today and Tomorrow....Mills 1-207
Experimental Spectroscopy....Sawyer 1-207
High-Frequency Induction Heating....Curtis 7-124
International Control of Radiocommunications....Tomlinson..9-210
Introduction to Practical Radio....Tucker 6-214
Introduction to the Theory of Filters in Communication.... Engineering....Feldtkeller 9-212
Modern Operational Mathematics in Engineering....Churchill..2-218
New Radio Amateur's Handbook.... American Radio Relay League 6-214
Optical Instruments....Brown 11-222
Ordinary Differential Equations....Ince 3-142
Physical Foundations of Radiology.... Glasser, Quimby, Weatherwax 3-142
Plastic Molding and Plant Management....Dearle.......1-207
Plastics in Practice....Sasso, Brown 9-212
Principles of Radio....Henney 8-210
Prodigal Genius—Life of Nikola Tesla....O'Neill.......1-208
Pulsed Linear Networks....Frank 11-222
Radio Fundamental Principles and Practices.... Almstead, Davis, Stone 5-236
Tables for Converting Rectangular to Polar Co-ordinates Miller 5-234
Technic of Electrotherapy....Osborne 2-160
The Electrolytic Capacitor....Georgiev 9-210
Theory and Applications of Electron Tubes....Reich.......4-198
Treatise on the Theory of Bessel Functions....Watson.......9-210
UHF Radio Simplified....Kiver 9-210

SUPPLEMENTS

The New FCC Frequency Allocations—Chart—August

AUTHOR INDEX ON FOLLOWING PAGE

W. J. (JACK) YOUNT

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AUTHOR INDEX

ALTMANN, G. O.
Radio Frequency Cores of High-Permeability ... 11-86

ANDREW, DR. VICTOR J.
Selecting Coax Cable ... 6-84

BACHMAN, W. S.
Phonograph Dynamics ... 7-86

BATCHER, RALPH R.
Thermistors in Electronic Circuits ... 1-76
Thermal Stability in Receiver Oscillators ... 4-96
Thermal Stability in Receiver Oscillators ... 5-98

BEALE, F. S.
Applying Power Line Carrier Principles ... 1-84

BECK, LEWIS W.
Electronic Tools in Chemical Research ... 2-82

BELLER, DR. HANS
Radio Frequency Cores of High Permeability ... 11-86

BOSE, JOHN H.
Interference Problems ... 4-91

CHALFIN, NORMAN L.
Phono Head Balance ... 9-102

CHIOMA, LEONARD
CR Tube Life Tests ... 1-107

COOKE, L. B.
Shipboard Announcers ... 8-96

CORNELIUS, E. C.
Silicon Crystals for UHF Detection Circuits ... 11-74

CORNELIUS, EDWARD
Germanium Crystals ... 12-80

DAELLENBACH, W.
Cavity Resonators ... 4-104

DAVIES, ROLAND C.
Facsimile Equipment Communication Units ... 2-96

DEHART, ROBERT N.
OWI-CBS 200 KW West Coast Transmitter ... 4-82

DICKINSON, THOMAS A.
Electronic Recorder for Flight Testing ... 4-100
Electronic Control of Automatic Riveter ... 7-112

DJAKOV, E.
Magnetron Frequencies ... 5-106

DODD, COLEMAN
Measuring Klystron Amplifier Features ... 2-76

DREYER, JOHN F., JR.
Factors Determining Industrial Tube Life ... 12-94

Du BRIDGE, L. A.
Future of Radar ... 12-77

DUNN, R. F.
Recent Developments in Converter Tubes ... 12-81

DURAND, S. R.
Mercury Arc Heating Frequency Converter ... 6-74

EVANS, HOWARD D.
Measurement Technic ... 7-90

FELDT, RUDOLF
Projection C-R-O Tube ... 9-118

FRANKART, WM. F.
100-300 mc Equipment ... 5-96

FRANKLIN, C. W.
Practical Problems of Crystal Dimensioning ... 10-96

GARTLEIN, C. W.
Aurora and Geomagnetism ... 12-76

GLINSKI, G.
Technic of Antenna Gain Measurement ... 10-88

GOERTZ, RAYMOND
Synchro Controls for Meters and Servos ... 9-78

GROSS, E. E.
Coaxial Butterfly Oscillator ... 12-76

GUNTHER, FRANK A.
FM Power Converter ... 9-84

HALEY, JESSE L.
Street Light Control ... 8-98

HALLORAN, ARTHUR H.
Designing Filters for Specific Jobs (I) ... 4-76
Designing Filters for Specific Jobs (II) ... 6-102

HARRIS, W. A
Recent Developments in Converter Tubes ... 12-81

HATHAWAY, CLAUDE M.
Strain Analyzing and Recording Instruments ... 10-74

HOLMES, L. C.
High Quality Sound Recording on Magnetic Wire ... 12-77

HOLUBOW, HARRY
DC Saturable Reactors for Control Purposes ... 8-76

HORNER, W. F.
Tropical Treatment of Military Equipment ... 7-106

HORNI, PAUL P.
Locating Land Mines ... 1-82

HUNTER, PAUL H.
Cathode Biased Amplifiers ... 11-92

INSKIP, L. S.
Coax Cable Protection ... 8-95

JOHNSON, J. C.
Thermistor Technics ... 8-74

JOHNSON, T. H.
Modern Measurement of Projectile Speeds ... 7-82

KENYON, RICHARD W.
Principles of Loran in Position Location ... 12-106

KNOWLES, HUGH S.
War Influence on Acoustic Trends ... 12-81

KOPPA, F. RUSSELL
Tropical Treatment of Military Equipment ... 7-106

KOZANOWSKI, HENRY N.
DC Picture Transfer ... 4-106

KRUSHEL, IRVING
Phosphors and Their Behavior in Television ... 12-100

LEBEL, C. J.
Hearing Aid Technic ... 1-104

LESSER, PETER
Facsimile Equipment Communication Units ... 2-96

LEYDORF, G. F.
Interference Effects in FM Without Limiting ... 5-100

MARTOWICZ, C. T.
Powdered Iron Cores ... 6-108

MONTGOMERY, M. E.
Latest Type AAF Blind Landing Equipment ... 1-100

MORELAND, H. D.
PE Tube X-Ray Timer ... 1-96

MOULIC, WILLIAM E.
Operational Elements of a Radar System ... 5-76

MULLER, WERNER
Transitron Oscillator for High Stability ... 12-110

MURRAY, ALBERT F.
Shielding HF Interference ... 8-108

OSBORN, ROBERT H.
Electronic Tools in Chemical Research ... 2-82

PAINE, ROBERT C.
Computing Double-Stub Lengths for Lines ... 7-94

PESTRECOV, DR. K.
Television Optics ... 8-80

PFEFFERLE, GEORGE H.
Gasket Pressure Meter ... 3-102

PICKERING, NORMAN C.
Improving Recordings ... 10-82

PRESTHOLDT, OGDEN
WABC's New Two-Bay Antenna ... 2-88

RAEV, A.
Magnetron Frequencies ... 5-106

REICH, HERBERT J.
Features of Cathode Follower Amplifiers ... 7-74

REID, JOHN D., JR.
Engineering Double Superhet Receivers ... 3-82

RHOADS, JOHN A.
100-300 mc Equipment ... 5-96

ROBERDS, WESLEY M.
Design of Electronic Heating Generators ... 5-108

ROCKWELL, R. J.
Crosley-OWI 200 KW "Voice of America" ... 1-90

ROMANDER, HUGO
Engineering Details of OWI 200-KW Units ... 10-100

ROWE, R. G.
Radio Door Actuator ... 9-96

SCHAFFSTEIN, GOSWIN
Phase Shift Effect on Amplifiers ... 9-98

SHEA, H. GREGORY
Meeting Specs in UHF ... 5-84
SHF Power Measuring ... 6-79
Magnetic Powders ... 8-86
Generation of Atomic Power from Elements ... 10-90
Vector Analysis ... 11-94

SHERMAN, JESSE B.
Klystron Equipment ... 1-88

SMITH, DAVID B.
Industry Standardization Work in Television ... 12-192

SONBERGH, GILBERT
PE Tube Smoke Sensing ... 8-98

STETSON, DR. HARLAN T.
Meteors and VHF Bursts ... 8-112
Atomic Fission Will Have Profound Effect ... 9-77

STOBBE, J. ALBERT
Shortages in Receiver Tubes ... 6-107
Incentive Pay for Electronic Engineers ... 10-85

STRANGE, C. H.
Self-Forging Welder ... 7-109

STREMEL, RAY A.
Machine Tool Control ... 11-102

TOWLSON, H. G.
Short Wave BC Technic ... 2-90

UTTAL, J. A.
Voltage Stabilizers ... 8-90

WHITE, W. C.
Electronic Uses in Industry ... 2-102

ELECTRONIC INDUSTRIES ADVERTISERS—*December, 1945*

Page

Accurate Spring Mfg. Co. ... 31
Ace Mfg. Corp. ... 252
Acro Electric Co. ... 310
Acton Co., Inc., H. W. ... 286
Adams & Westlake Co. ... 227
Advance Electric & Relay Co. ... 248
Advance Research Corp. ... 240
Aerolite Electronic Hardware Corp. ... 292
Aerovox Corp. ... 26
Aircraft-Marine Products, Inc. ... 215
Aireon Mfg. Corp. ... 6
Alden Products Co. ... 228
Alliance Mfg. Co. ... 311
Allied Control Co., Inc. ... 177
Allied Radio Corp. ... 288
Allmetal Screw Products Co. ... 317
Altec Lansing Corp. ... 172
Aluminum Co. of America ... 137
Ambroid Co., Inc. ... 178
American Condenser Co. ... 296
American Electrical Heater Co. ... 317
American Lava Corp. ... 277
American Phenolic Corp. ... 153
American Television & Radio Co. ... 257
American Transformer Co. ... 149
Amperex Electronic Corp. ... 2
Amperite Co. ... 284
Andrew Co. ... 194
Arnold Engineering Co. ... 188
Associated Electronics ... 226
Associated Research, Inc. ... 238
Atlas Sound Corp. ... 222
Audak Co. ... 274
Audio Development Co. ... 180
Audio-Tone Oscillator Co. ... 316
Automatic Electric Sales Corp. ... 247

Ballantine Laboratories, Inc. ... 134
Barber Laboratories, Alfred W. ... 250
Barker & Williamson ... 202
Bell Telephone Laboratories ... 199
Bendix Aviation Corp., Pacific Division ... 229
Bentley, Harris Mfg. Co. ... 285
Benwood-Linze Co. ... 321
Bird & Co., Richard H. ... 304
Bliley Electric Co. ... 195
Boonton Radio Corp. ... 219
Bostonian Process Co. ... 310
Brach Mfg. Corp., L. S. ... 246
Bradley Laboratories, Inc. ... 60
Brainin Co., C. S. ... 302
Breeze Corporations, Inc. ... 171
Burke Electric Co. ... 276
Burlington Instrument Co. ... 206
Burstein-Applebee Co. ... 316
Byington & Co. ... 312

Cadie Chemical Products, Inc. ... 272
Callite Tungsten Corp. ... 55
Cambridge Thermionic Corp. ... 123
Capacitron Co. ... 168
Capitol Radio Engineering Institute ... 218
Cardwell Mfg. Corp., Allen D. ... 166
Carpenter Products, Inc. ... 291
Carron Mfg. Co. ... 298
Carter Motor Co. ... 270
Celanese Corp. of America ... 207
Centralab ... 38
Chatham Electronics ... 17
Chicago Telephone Supply Co. ... 163
Chicago Transformer Div. of Essex Wire Corp. ... 176
Cinaudagraph Speakers ... 156
Cincinnati Elec. Prod. Co. ... 36. 37
Clarostat Mfg. Co., Inc. ... 279
Cleveland Tungsten, Inc. ... 315
Collins Radio Co. ... 141, 142, 143
Colonial Kolonite Co. ... 292
Columbia Wire & Supply Co. ... 315
Communicating Systems, Inc. ... 234
Communication Measurements Lab. ... 4
Communication Parts ... 226
Conant Electrical Laboratories ... 170
Concord Radio Corp. ... 212
Continental-Diamond Fibre Co. ... 59
Cook Electric Co. ... 283
Cornell-Dubilier Electric Corp. ... 261
Corning Glass Works ... 233
Cornish Wire Co., Inc. ... 290
Creative Plastics Corp. ... 264
Crystal Research Laboratories, Inc. ... 156

Dalis, Inc., H. L. ... 228
Daven Co. ... Cover 3
Dazor Mfg. Co. ... 44
DeJur-Amsco Corp. ... 161
De Mornay Budd, Inc. ... 211
Deutchmann Corp., Tobe ... 3
Dial Light Co. of America Inc. ... 282
Distillation Products, Inc. ... 121
Dolph Co., John C. ... 70
Drake Mfg. Co. ... 278
Dumont Electric Co. ... 287
DuMont Laboratories, Inc., Allen B. ... 22. 68
DX Coil ... 230
Eastern Air Devices, Inc. ... 189
Eastern Amplifier Corp. ... 157
Eastern Engineering Co. ... 268
Eby, Inc., Hugh H. ... 222
Eicor, Inc. ... 186
Eisler Engineering Co., Chas. ... 311
Eitel-McCullough, Inc. ... 183
Electric Indicator Co. ... 190
Electric Specialty Co. ... 302
Electronic Apparatus, Inc. ... 310
Electronic Engineering Co. ... 284
Electronic Enterprise, Inc. ... 52
Electronic Laboratories, Inc. ... 117
Electronic Mechanics, Inc. ... 61
Electronic Measurements Co. ... 326
Electronic Radio Alarm, Inc. ... 288
Electronic Supply Co. ... 274
Electrical Reactance Corp. ... 264
Electro Motive Mfg. Co. ... 73
Electro-Tech Equipment Co. ... 288
Electro-Voice, Inc. ... 24
Erie Resistor Corp. ... 69
Erwood Co. ... 254
Ever Ready Label Corp. ... 319
Farnsworth Television & Radio Corp. ... 42
Federal Screw Co. ... 314
Federal Telephone & Radio Corp. ... 135, 169
Fenwal, Inc. ... 216
Ferris Instrument Co. ... 10
Formica Insulation Co. ... 47
Franklin Airloop Corp. ... 175
Freeland & Olschner Products, Inc. ... 278
Freed Transformer Co. ... 62
General Cement Mfg. Co. ... 311
General Electric Co. ... 5, 32, 167, 213, 241, 262
General Industries Co. ... 266
General Instrument Corp. ... 179
Glaser Lead Co., Inc. ... 198
Glendale Vacuum Products Co. ... 308
Graphite Metallizing Corp. ... 230
Green Electric Co., Inc., W. ... 152
Guardian Electric ... 119
Halldorson Co. ... 294
Hallicrafters Co. ... 54, 191
Hammarlund Mfg. Co., Inc. ... 181
Hardwick, Hindle, Inc. ... 282
Harrison Radio Corp. ... 296
Hartford Machine Screw Co. ... 315
Harvey Radio Co. ... 257
Harvey Radio Laboratories, Inc. ... 276
Haydon Mfg. Co., Inc. ... 260
H-B Instrument Co. ... 280
Helipot Corp. ... 35
Hexacon Electric Co. ... 236
Hopp Press, Inc. ... 298
Horni Signal Mfg. Corp. ... 196, 197
Houston Radio Supply Co., Inc. ... 304
Hovis Screwlock Co. ... 155
Hudson American Corp. ... 232
Hunter Pressed Steel Co. ... 27
Hytron Radio & Electronics Corp. ... 115
Illinois Condenser Co. ... ???
Indiana Steel Products Co. ... 72
Instrument Service Co. ... 300
Industrial Transformer Corp. ... 139
Instrument Electronics ... 310
Instrument Glass & Mirror Co. ... 276
Instrument Resistors Co. ... 25
Instruments Publishing Co. ... 280
International Nickel Co., Inc. ... 203
International Resistance Co. ... 63
Insl-x Co., Inc. ... 214
Intex Co. ... 313
Irvington Varnish & Insulator Co. ... 29
Jackson Electrical Instrument Co. ... 164
J-B-T Instruments, Inc. ... 132
Jefferson Electric Co. ... 249
Jennings Radio Mfg. Co. ... 58
J. F. D. Mfg. Co. ... 323
Joliet Chemicals, Ltd. ... 235
Johnson Co., E. F. ... 45
Jones Co., Howard B. ... 300
Kaar Engineering ... 28
Kahle Engineering Co. ... 308
Karp Metal Products Co., Inc. ... 39
Kelly Trading Co., Inc., Henry ... 258
Ken-Rad Div. of General Electric Co. ... 13
Keuffel & Esser Co. ... 53
Keystone Carbon Co., Inc. ... 51
Kinney Mfg. Co. ... 148
Kling Metal Spinning Co. ... 306
Kluge Electronics Co. ... 20
Knights Co., James ... 160
Lacquer & Chemical Corp. ... 252
Langevin Co., Inc. ... 133
Lapp Insulator Co., Inc. ... 50
Lavoie Laboratories ... 125
Lectrohm, Inc. ... 321
Leland Electric Co. ... 12
Lewis Electronics ... 187
Lord Mfg. Co. ... 147
Makepeace Co., D. E. ... 162
Mallory & Co., Inc., P. R. ... Cover 2, 14, 46
Manross & Sons, F. M. ... 144
Marion Electrical Instrument Co. ... 185
McGraw-Hill Book Co. ... 304
Measurements Corp. ... 258, 286
Merit Coil & Transformer Corp. ... 208
Micro-Ferrocart Products Div. Maguire Industries Inc. ... 223
Millen Mfg. Co., Inc., James ... 232
Mitchell-Rand Insulation Co., Inc. ... 217
Monitor Controller Co. ... 200
Mycalex Corporation of America ... 145
National Co., Inc. ... 66
National Lock Washer Co. ... 182
National Union Radio & Electron Tubes ... 165
National Vulcanized Fibre Co. ... 193
Newark Electric Co. ... 323
New York Transformer Co. ... 43
Norton Electrical Instrument Co. ... 244
Ohmite Mfg. Co. ... 8, 9
Olympic Tool & Mfg. Co. ... 173
O'Neil-Irwin Mfg. Co. ... 306

Palnut Co. ... 184
Par-Metal Products Corp. ... 254
Patton-MacGuyer Co. ... 312
Peck Springs Co. ... 309
Permoflux Corp. ... 146
Pioneer Gen-E-Motor Corp. ... 140
Premier Metal Etching Co. ... 300
Presto Recording Corp. ... 16
Process & Instruments ... 306
Protectoseal Co. ... 319
Printloid, Inc. ... 255

Quam-Nichols Co. ... 296

Racon Electric Co. ... 299
Radiart Corp. ... 41
Radio Corp. of America:
RCA Victor Division ... Cover 4, 224, 225, 256
Radionic Equipment Co. ... 280
Radio Receptor Co., Inc. ... 251
Radio-Television Institute, Inc. ... 316
Radio Wire Television, Inc. ... 248
Rauland Corp. ... 239
Rawson Electrical Instrument Co. ... 304
Raytheon Mfg. Co. ... 67, 243
Representatives ... 250
Revere Copper & Brass Inc. ... 7
Rice's Sons, Inc., Bernard ... 259
Rider Publisher, Inc., John F. ... 234
Rowe Radio Research Laboratory Co. ... 209
Russell Electric Co. ... 201, 245

Sangamo Electric Co. ... 150, 151
Savlion Labs. ... 220
Schauer Machine Co. ... 280
Schweitzer Paper Co. ... 23
Scientific Electric Div. of "S" Corrugated Quenched Gap Co. ... 205
Scovill Mfg. Co. ... 267
Segel Co., Henry P. ... 272
Selenium Corp. of America ... 174
Shur-Antenna-Mount, Inc. ... 314
Shure Brothers ... 48
Sigma Instruments, Inc. ... 136
Simpson Electrical Instrument Co. ... 273
Sipp-Eastwood Corp. ... 321
Slater Corp., N. G. ... 21
Small Motors, Inc. ... 242
Sola Electric Co. ... 57
Solar Mfg. Corp. ... 11
Sound Equipment Co. ... 298
Special Machine Tool Engineering Works ... 312
Speer Carbon Co. ... 289
Spencer Thermostat Co. ... 40
Spencer Wire Co. ... 71
Sprague Electric Co. ... 293
Stackpole Carbon Co. ... 305
Stamford Metal Specialty Co. ... 292
Standard Piezo Co. ... 275
Standard Transformer Corp. ... 154
Stedman Machine Works, Robert L. ... 240
Stephens Mfg. Co. ... 204
Sterling Mfg. Co. ... 263
Stevens Walden Co. ... 218
Struthers-Dunn, Inc. ... 297
Stupakoff Ceramic & Mfg. Co. ... 271, 301
Superior Electric Co. ... 231
Superior Tube Co. ... 295
Surprenant Electrical Insulation Co. ... 268
Sylvania Electric Products, Inc. ... 237
Synthane Corp. ... 33, 34

Taylor Fibre Co. ... 18
Tab ... 317
Taylor Tubes, Inc. ... 210
Talk-A-Phone Mfg. Co. ... 270
Technical Appliance Corp. ... 260
Televiso Products Co. ... 192
Thomas & Skinner Steel Products Co. ... 246
Thordarson Electric Mfg. Div., Maguire Industries, Inc. ... 265
Transmitter Equipment Mfg. Co., Inc. ... 19
Triplett Electrical Instrument Co. ... 309
Tubing Seal-Cap., Inc. ... 238
Tung-Sol Lamp Works, Inc. ... 307

United Cinephone Corp. ... 56
United Electronics Co. ... 269
United Screw & Bolt Corp. ... 15
United Transformer Corp. ... 74
University Laboratories ... 281
Victoreen Instrument Co. ... 204
Vitroseal Corp. ... 242
Vokar Corp. ... 236
Waltham Screw Co. ... 313
Ward Products Corp. ... 321
Waterbury Companies, Inc. ... 313, 319
Wedemeyer Electronic Supply Co. ... 266
Wellman Mfg. Co. ... 314
Western Electric ... 64, 65
Westinghouse Electric Corp. ... 158, 159, 221, 253
Weston Electrical Instrument Corp. ... 303
Whitaker Cable Corp. ... 49
Wiedemann Machine Co. ... 30
Willor Mfg. Corp. ... 138
Wind Turbine Co. ... 244
Winslow Co. ... 290
WiRecorder Corp. ... 323
Wrigley Co., Wm. ... 220
York Research Corp. ... 300
Yount Co., W. J. ... 323
Zenith Optical Laboratory ... 294


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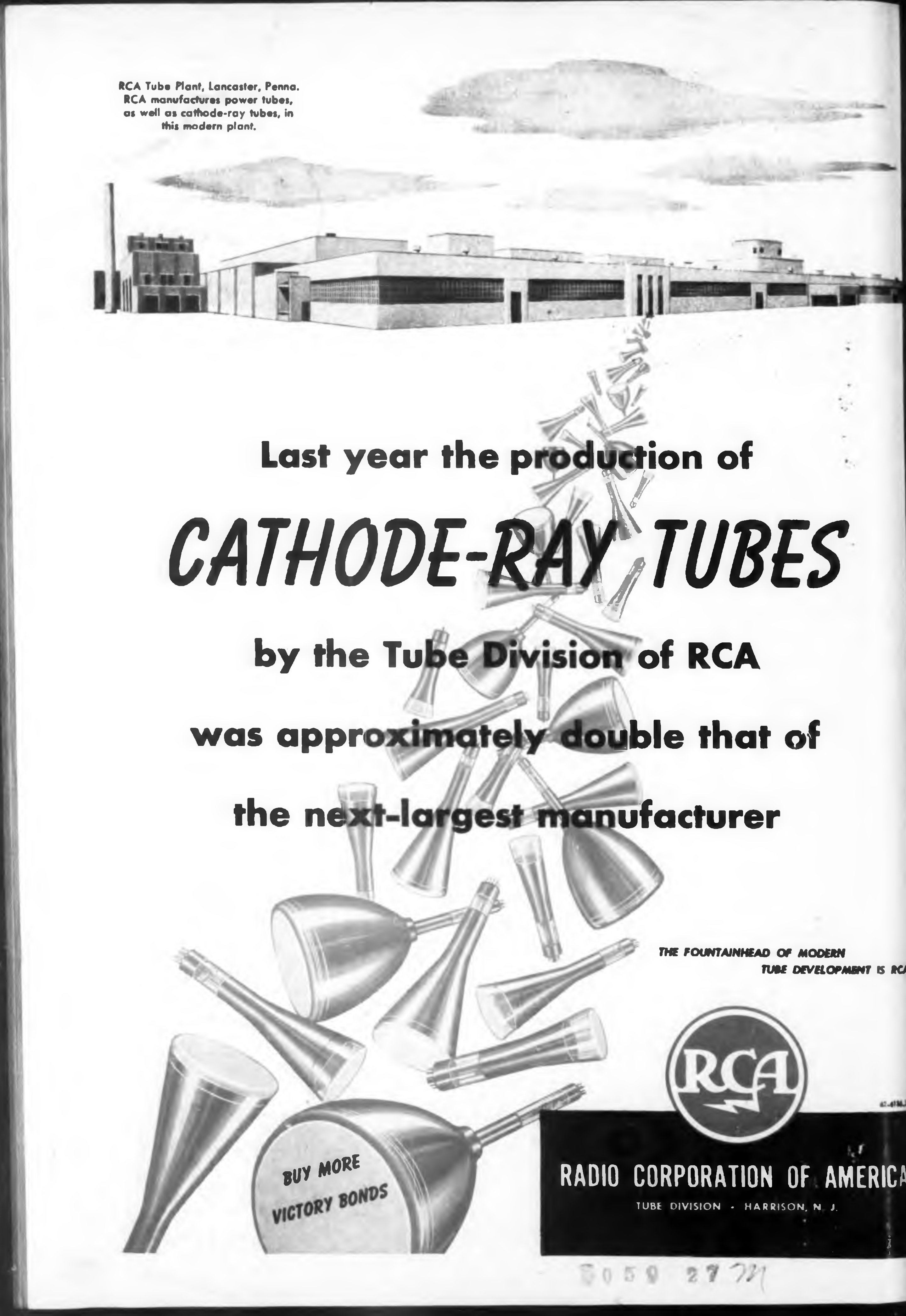
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