1954

IRE DIRECTORY

A YEARBOOK CONTAINING
- A RADIO ENGINEERS' DIRECTORY
- A LIST OF FIRMS AND PRODUCTS

Published by
THE INSTITUTE OF RADIO ENGINEERS, INC.
1 EAST 79 STREET
NEW YORK, N.Y.
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THE INSTITUTE OF RADIO ENGINEERS, INC.
THE INSTITUTE OF RADIO ENGINEERS
1954

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THE INSTITUTE

The Institute of Radio Engineers, located at 1 East 79th Street, is an incorporated, nonprofit organization established for the advancement of the theory and practice of radio and electronics, including allied branches of engineering and the related arts and sciences. Founded in May, 1912, through the efforts of three far-seeing engineers, Dr. A. N. Goldsmith, J. V. L. Hogan, and R. H. Marriott, the Institute has grown from its original roster of less than fifty members gained by the merger of two small professional societies, to an international membership of over 37,000.

The Institute publishes technical papers, reports and general information of interest to radio engineers. It holds meetings and discussions throughout the United States and Canada. It maintains committees for collecting and standardizing the results of technical research and development. Among the fields covered in these activities are radio communication, sound broadcasting, television, marine and aerial guidance, electron tubes, radio-frequency measurements, engineering education, electronics, sound and picture electrical recording and reproduction, power and manufacturing applications of radio and electronic technique, industrial electronic control and process, medical electrical research and applications.

The management of the Institute of Radio Engineers resides in a Board of Directors elected from the body of Fellows and Senior Members, acting through an Executive Committee and the officers of the Institute. The President and Vice-President are elected annually from the body of Fellows and Senior Members.

MEMBERSHIP

Membership in the Institute is contingent upon experience and achievement in radio engineering and allied fields. The grade of Fellow is one of distinction, and appointment thereto is made on the basis of eminence and distinguished service. The grade of Special Member is similarly conferred by invitation only. Other grades—Senior Member, Associate, and Student—are filled from applicants whose age, experience and attainments conform to the respective requirements set forth in the Institute’s Constitution.

MEMBERSHIP REQUIREMENTS AND DUES

<table>
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<th>Grade</th>
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<th>Experience* and References</th>
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<tr>
<td>Fellow</td>
<td>32</td>
<td>Awarded only. No application permitted.</td>
<td>$5.00</td>
<td>$15.00</td>
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</table>
| Senior Member | 28 | a. Radio engineer or scientist—eight years of active practice and important technical work in radio or allied fields. 
b. College teacher for at least three years. | $4.00 | 15.00 |
| Member | 24  | a. Radio engineer or scientist—professionally competent and in active practice for three years. 
b. College teacher of radio or allied subjects for three years. | 3.00 | 15.00 |
| Associate | 18 | a. Interest in radio engineering or allied field. 
    b. Four Fellow, Senior Members, Members, Associates, or other responsible individuals. | 3.00 | $5.00 or $10.00 |
| Student* | —  | College student pursuing regular 4-year engineering or science degree for a degree, or student enrolled in approved technical institute. | — | 5.00 |

* For more detailed information, see Bylaws, Sec. 1-5, p. 12.

** $10.00 for each year within first five years of Associate membership, starting Jan. 1, 1918. After five years automatically increased to $15.00. Five years are retroactive from Jan. 1, 1918, and based on consecutive or intermittent membership.

* Special application blank required. When student status expires, no entrance fee is required if immediate transfer is made to Associates.
COMMITTEES*

The Institute has established some twenty-three technical committees covering specialized fields of radio engineering. Through the Institute, these committees (sometimes in collaboration with technical committees of other engineering societies) publish standards of accepted definitions of terms, and methods of measurements of physical quantities used in radio engineering practices.

CONVENTION

The Institute holds, at least once a year, a technical meeting for its entire membership. At this annual Convention, manufacturers exhibit equipment of recent design and interest to radio engineers. It is believed by this means, mutual benefit accrues to both engineer and manufacturer through first-hand acquaintance with the activities of one another.

SECTIONS**

Sections have been established throughout the United States, Canada, Territory of Hawaii, and Argentina, to hold meetings under the aegis of the Institute. The sections of the Institute are grouped into eight Regions, and each Region is represented by the Board of Directors by a Regional Director elected bi-annually from and by, the membership of the respective Region.

PROFESSIONAL GROUPS**

To serve special fields of interest, Professional Groups have been formed in each of several technical fields on an Institute-wide basis. These Groups organize meetings and conferences on subjects of special interest to their members. They issue, also, technical publications, called TRANSACTIONS, to provide a means for ensuring their membership proper coverage of their fields in the publications of the Institute, and for presenting recognition of their leaders among the Institute membership at large.

PUBLICATIONS OF THE INSTITUTE

Procedings of the IRE

Perhaps the most important single activity of the Institute is the publication of a technical journal. The first issue of the PROCEEDINGS OF THE INSTITUTE OF RADIO ENGINEERS appeared in 1913. Established first as a quarterly, for the last twenty-six years PROCEEDINGS has been published in twelve numbers annually. In 1939, the name of the journal was shortened to PROCEEDINGS OF THE IRE.

The PROCEEDINGS OF THE IRE is the official publication of the Institute of Radio Engineers. In it appear technical papers, discussions, and communications appearing in the TRANSACTIONS of the IRE.

* A list of Committees appears in the June and October issues of PROCEEDINGS of the IRE.

** A list of Sections and Professional Groups and their officers appears bi-monthly in PROCEEDINGS of the IRE.
Browder J. Thompson Memorial Prize

The Browder J. Thompson Memorial Prize, established in 1945, is given annually to the author or joint authors under thirty years of age at date of submission of original manuscript for that prize. The award is to be made in the name of the author or authors. The award is made by the Board of Directors upon recommendation of the Awards Committee.

Recipients of the Browder J. Thompson Memorial Prize:

- G. M. Lee, 1946
- A. W. Buhl, 1950
- C. L. Dalphy, 1947
- A. B. Manke, 1951
- W. H. Huggins, 1948
- H. W. Velsh, Jr., 1952
- R. W. Proctor, 1949
- Richard C. Boston, Jr., 1953
- J. H. Pullin, 1950
- R. L. Perutz, 1953

Harry Diamond Memorial Award

The Harry Diamond Memorial Award, established in 1949, is given annually to a person in Government service for outstanding contributions in the field of radio or electronics, as evidenced by publication in professional society journals such as the Proceedings or the IRE Journal. The award consists of a certificate provided for proceeds from a fund established by friends of the professional work of Harry Diamond. The award is announced by the Board of Directors upon recommendation of the Awards Committee.

Recipients of the Harry Diamond Memorial Award:

- A. W. Hassf, 1950
- Newlon Smith, 1952
- M. J. E. Golay, 1951
- Robert M. Page, 1953
- Harold A. Zubi, 1954

Morris Liebmann Memorial Prize

The Morris Liebmann Memorial Prize is given annually to a person in Government service for outstanding contributions in the field of radio or electronics, as evidenced by publication in professional society journals such as the Proceedings or the IRE Journal. The award consists of a certificate provided for proceeds from a fund established by friends of the professional work of Harry Diamond. The award is announced by the Board of Directors upon recommendation of the Awards Committee.

Recipients of the Morris Liebmann Memorial Prize:

- L. F. Fuller, 1924
- R. A. Vogt, 1927
- R. A. Haines, 1929
- C. S. Franklin, 1933
- H. H. Beverage, 1927
- J. A. Biddle, 1926
- W. D. Smith, 1928
- Frank Conrad, 1925
- Ralph Bow, 1928
- A. H. Taylor, 1927
- W. G. Cady, 1935
- R. V. Ayton, 1930
- A. W. Hall, 1932
- Stuart Billington, 1931
- E. L. B. Finkle, 1932
- Kenilworth H. Blatherwick, 1931
- F. K. Llewellyn, 1935
- B. J. Thompson, 1936

...
THE INSTITUTE OF RADIO ENGINEERS
(Incorporated, August 23, 1913)

CONSTITUTION

Adopted at the First Meeting of The Institute of Radio Engineers, May 13, 1912.
Amended, November 2, 1914; December 5, 1915; October 7, 1931; March 1, 1939; November 5, 1941; September 8, 1943; November 29, 1944; May 5, 1945; December 15, 1945; June 27, 1946; July 30, 1946; and August 15, 1947.

ARTICLE I
NAME AND OBJECT

Sec. 1. The name of this organization shall be The Institute of Radio Engineers, as incorporated.

Sec. 2. Its objects shall be scientific, literary, and educational. Issues shall include the advancement of the theory and practice of radio, and allied branches of engineering and of the related arts and sciences, their application to human needs, and the maintenance of a high professional standing among its members. Among the means to this end shall be the holding of meetings for the reading and discussion of professional papers and the publication of papers, discussions, communications, and such other matters as may be appropriate for the fulfillment of its objects.

ARTICLE II
MEMBERSHIP

Sec. 1. The membership of the Institute shall consist of:

a. Fellows, who shall be entitled to all rights and privileges of the Institute.

b. Senior Members, who shall be entitled to all rights and privileges of the Institute.

c. Special Members, who shall be entitled to all rights and privileges of the Institute, except the right to hold the offices of President and Vice President.

d. Members, who shall be entitled to all rights and privileges of the Institute, except the right to hold any corporate office, the office of Director, and the chairmanship of standing Committees and of Sections.

f. Students, who shall have such rights and privileges as are provided by the Bylaws. However, Associates who have maintained a continuous membership in this grade since March 1, 1930, shall have the right to vote and shall be entitled to all rights and privileges of the Institute except the right to hold any corporate office, the office of Director, and the chairmanship of standing Committees and of Sections.

Sec. 2. The qualifications for the various grades of membership shall be specified in the Bylaws in accordance with the following principles:

a. Fellow is a grade limited to those who have shown an interest in furthering the radio or allied arts and sciences and who have attained such position or prestige that by membership they shall advance the objectives of the Institute. This grade shall be conferred only by invitation of the Board of Directors.

b. Senior Member is a grade limited to those who have shown an interest in furthering the radio or allied arts and sciences and who have attained such position or prestige that by membership they shall advance the objectives of the Institute. This grade shall be conferred only by invitation of the Board of Directors.

c. Special Member is a grade limited to those who have demonstrated professional competence in radio or allied fields.

d. Associate grade shall be open to those interested in the theory or practice of radio engineering or the allied arts and sciences.

f. Student grade shall be open to those desiring a major part of their time as registered students in a regular course of study in engineering or science in a school of appropriate standing.

Membership in this grade may extend a limited time after termination of student status.

Sec. 3. The requirements for admission, transfers, and transfer of members shall be specified in the Bylaws.

Sec. 4. The term "member" and "membership" when printed without an initial capital where used in this Constitution and Bylaws include all grades.

Sec. 6. The term "voting member" where used in this Constitution and Bylaws means a member entitled to vote on Institute matters.

ARTICLE III
DUES AND FEES

Sec. 1. Dues and fees shall be specified in the Bylaws.

Sec. 2. Under exceptional circumstances, the payment of dues and fees may be deferred or waived in whole or in part by the Board of Directors.

ARTICLE IV
OFFICERS AND DIRECTORS

Sec. 1. The governing body of the Institute shall be the Board of Directors and shall consist of the President, Vice President, Secretary, Treasurer, Editor, six Directors elected-at-large, three appointed Directors, one Regional Director elected by each region, and the two most recent Ex-Presidents.

Sec. 2. The Corporate Officers of the Institute shall be the President, Vice President, Secretary, Treasurer, and Editor.

Sec. 3. The terms of office for Directors elected-at-large shall be for three years; for appointed Directors, one year; for Regional Directors, two years; and for all Corporate Officers, one year, except as provided in Article VI, Section 1.

Sec. 4. Each year of a term of office established in Article IV shall begin with the assembly of the Board of Directors at its annual meeting and terminate with the assembly of the Board of Directors at its following annual meeting.

Sec. 5. No Corporate Officer or Director shall receive, directly or indirectly, any salary, traveling expenses, compensation, or emolument from the Institute, unless authorized by the Board of Directors or by the Bylaws.

Sec. 6. The United States and Canada, and other areas at the discretion of the Board of Directors, shall be divided into Regions, which shall be specified in the Bylaws. The Board of Directors shall delineate the Regions, make changes in the number of Regions, as it deems desirable, and name the Regions with consecutive numbers. The voting members of each Region shall elect one representative who shall thereby become a member of the Board of Directors and be designated a Regional Director.

ARTICLE V
MANAGEMENT

Sec. 1. The President shall be the regular presiding officer at meetings of the Board of Directors and at meetings of the Institute. He shall be an ex-officio member of each committee.
BYLAWS

Sec. 4.—Associate: For admission or transfer to the grade of Associate, a person attaining the age of 30 years shall be admitted in the order of application, and shall be interested in the theory or practice of radio engineering or the allied arts.

Sec. 5.—Student: For admission to the grade of Student, a candidate shall be a duly accredited student in a technical school of recognized standing, and shall have shown to the satisfaction of three members of the Institute, that he has attained the age of 18 years, and has passed an examination in electricity.

Sec. 6.—The school, "school of recognized standing," is only accredited schools which provide an engineering or scientific course of study in engineering, four years leading to a degree and which are designated as such by the Board of Directors.

Membership in this grade shall not extend more than six months beyond the term of student status as described above.

Sec. 7.—The expiration, "school of recognized standing," is only accredited schools which provide an engineering or scientific course of study in engineering, four years leading to a degree and which are designated as such by the Board of Directors.

MEMBERSHIP PROPOSALS

Sec. 10.—Admission or transfer to Fellow or Special Member grade shall be by recommendation of members and shall be made by the Board of Directors.

Sec. 11.—Admission or transfer of a member except Fellow or Special Member may be proposed by any member acting as sponsor, or by the Membership Committee, by supplying to the Board of Directors sufficient information and testimonials from the required number of references to satisfy the Admissions Committee as to qualifications.

Sec. 12.—All applications for membership shall be acted upon by the Board of Directors, and if approved, transmitted to the Executive Committee for final action. On approval by the Executive Committee, an initiate board shall be given to the applicant, which must be immediately and upon his supplying the specified information, accepted, and shall be mailed to the Institute, to notify the member that his membership has been accepted.

Sec. 13.—A member having been in arrears for four months, his membership shall terminate and his name shall be removed from the record of members.

Sec. 14.—The mailing of all notices to a member shall be the effect that, according to the Bylaws of the Institute, his membership shall terminate in the event of non-payment of dues. Correspondence with the membership committee shall be in accordance with the notice of termination shall be a final bill, with the suggestion that the member pay the bill and resume his membership. A list of terminated membership shall be turned over to the Secretary of the Institute for publication.

EXECUTIVE COMMITTEE

Sec. 3.—A member in good standing may resign by submitting his resignation to the Secretary of the Institute.

Sec. 4.—Subject to the approval of the Board of Directors, a resignation may be accepted and the resignation shall be effective upon payment of current dues.

Sec. 5.—To initiate action toward expulsion of a member, a written complaint must be submitted to the Board of Directors. A member upon which a written complaint is filed shall be notified of the hearing, which shall be at least twenty days away. The accused may present his defense in person, in writing, or by an authorized representative. There shall be a majority of the members of the Board to hear such appeal. A member may appeal the action of the Board in writing to the Executive Committee. The action of the Board shall be final in all cases. The Board of Directors shall have the power to adopt, amend, or repeal the Bylaws at any regular or special meetings.

The Board of Directors may adopt, amend, or repeal the Bylaws at any regular or special meetings.

The Board of Directors shall be the policy-making body of the Institute.

Board meetings shall be held at the discretion of the President.

Board meetings shall be held at the discretion of the President.

Annual dues shall be paid on or before January 1 of each year, and no member shall be afforded the privilege of membership in the Institute unless his annual dues have been paid on or before January 1 of each year.
BYLAWS

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SUBSECTIONS

Sec. 70-C.—In conformance with the Constitution for Sections, Sections may establish Subsections, which shall be geographical subdivisions of such Sections, subject to the same limitations and control as the Section itself.

Sec. 70-D.—Any subsection which meets the following requirements, the Institute shall pay to the Section a maintenance fee of five dollars ($50) per meeting up to a maximum of five (5) meetings per year, during the time the Subsection remains in good standing, as defined by the Constitution for Sections:

(a) Submission to Parent Executive Committee of a petition signed by twenty (20) or more members other than Student Members of the Subsection, which petition shall include a statement of the need for a subordinate organization;

(b) Approval of the petition by the Parent Executive Committee of the Section;

(c) Notification of Institute Headquarters of these actions by Parent Section and its Executive Committee with a copy of the petition.

PROFESSIONAL GROUPS

Sec. 70-A.—A petition for the formation of a Professional Group shall be signed by not fewer than twenty-five (25) members, other than Student Members, with mailing addresses within the territorial limits proposed in the petition.

Sec. 70-B.—Each Professional Group shall be authorized by the Executive Committee to select its own officers and to conduct its own affairs in conformance to the Constitution, subject to the approval of the Executive Committee.

Sec. 70-C.—Each Professional Group shall be subject to the approval of the Executive Committee, and the Executive Committee may modify its Constitution and Bylaws as necessary.

Sec. 70-D.—Any Professional Group shall be subject to the approval of the Executive Committee, and the Executive Committee may modify its Constitution and Bylaws as necessary.

Sec. 70-E.—No Professional Group or any officer or representative thereof shall have any authority to contract debts, or to pledge the credit of, or in any way bind, the Institute.

Sec. 70-F.—Any Professional Group or any officer or representative thereof shall have any authority to contract debts, or to pledge the credit of, or in any way bind, the Institute.

Sec. 70-G.—All members of the Institute may become members of Professional Groups in conformance with the respective Group Constitutions.

Sec. 70-H.—All Professional Group meetings shall be open to all members of the Institute and its guests. Any member of the Institute, upon payment of charges as may be fixed by the Executive Committee, shall receive notice of meetings of any Group.

Sec. 70-I.—All publications of Professional Groups, other than those prepared by Institute or Section officers, shall be subject to the approval of the Executive Committee and shall be available to all Institute members on an equitable basis approved by the Executive Committee.

Sec. 70-J.—The Treasurer of each Professional Group shall forward to the Secretary of the Institute a copy of each meeting notice of the Group, an annual report, and at the end of each Institute financial year an annual audit of the Group for the financial year.

STUDENT BRANCHES

Sec. 71.—Upon receipt of a petition signed by a representative of the faculty and by ten (10) or more Institute members who are students in a school of recognized standing, the Executive Committee shall authorize the establishment of an Institute Student Branch in that school.

Sec. 72.—Each Institute Student Branch shall adopt and conform to a constitution which shall have been submitted and approved by the Executive Committee.

Sec. 73.—Upon receipt of a petition signed by a representative of the faculty and by ten (10) or more Institute members who are students in a school of recognized standing, the Executive Committee shall authorize the establishment of a Student Branch in that school.

Sec. 74.—Each Student Branch shall adopt and conform to a constitution which shall have been submitted and approved by the Executive Committee.

Sec. 75.—Each Student Branch may collect dues from its members or proceed to its constitution and named, in addition, may accept non-compulsory financial contributions.

Sec. 76.—Failure of an Institute Student Branch to adhere to the Bylaws, etc., of the Institute, or to hold at least three (3) meetings each year shall place the Branch on probation. All officers and Institute representatives of the Branch shall be notified of the probation by the Secretary of the Institute, who shall also call to their attention the requirements for maintaining the Branch. If the delinquency continues for a second year, the Branch shall be considered for the purpose of this Section as having discontinued operations.
MEMBERSHIP LISTS

Including

BIOGRAPHIES OF FELLOWS

AND

AN ALPHABETICAL ROSTER

AND

A GEOGRAPHICAL LISTING

NOTE

The following pages are set forth the names of the members of The Institute of Radio Engineers. These have been disposed of under three headings, as follows:

Biographies of Fellows; a list of all Fellows, with a short biographical note on each.

Membership Roster; a complete listing of all members (not including Students) on record as of May 15, 1954; giving membership grades and business affiliations.

Geographical Listing of Membership; by states and foreign countries, and by cities within such areas; including a designation of the present grade of each member.

All listings include appointments and elections up to May 15, 1954. In the roster the following symbols indicative of grade are used, along with numerals indicating the year of admission to that grade:

(F) Fellow
(SM) Senior Member
(M) Member
(A) Associate
(VA) Voting Associate. Those who were Associates on or before March 1, 1939, automatically became Voting Associates as of that time.
(S) Student
(I) inator. This grade no longer exists.

The Board of Directors waives the dues of all members who have attained the age of 65 years and who have been members of the Institute for 35 years. The following symbol is used to indicate this status:

(L) Life Member

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**BIOGRAPHIES OF FELLOWS**

(As of May 15, 1949)

ACHEESE, Marcus A. (1918—N04—F). Consulting Engineer and Professor of Electrical Engineering, University of Wisconsin, Madison 1, Wis.


ANDERSON, Clifford H. (1904—F). Technical Staff, Bell Telephone Laboratories, Murray Hill, N.J.

ANDERSON, Earl R. (1903—SM’29—F). Assistant Manager, Industry Service Division, RCA Laboratories Division, 715 Fifth Ave., New York 2, N.Y.


BAUSCH & LOMB. (1911—F). Optical Instrument Makers, Rochester, N.Y.


BOWLES, John T. (1924—F). President, RCA Laboratories Division, 715 Fifth Ave., New York 2, N.Y.

BRAHMS, Joseph (1853—1942). Composer, pianist, bandleader and conductor. He was a central figure in the transition from Romanticism to modernism in music. Born in Hamburg, Germany, he spent most of his career in Vienna, Austria. His works include symphonies, operas, chamber music, and piano concertos. He was a prolific composer and his music has had a lasting impact on classical music. His compositions are known for their emotional depth and technical mastery. He is often regarded as the greatest composer of the late Romantic era.


BUSH, Vannevar (1904—F). Computer scientist and engineer. He was a key figure in the development of early computing technology and is known for his work on the Harvard Mark I, the world's first large-scale, general-purpose electronic computer. He is also known for his contributions to the field of information theory. born in Chicago, Illinois, he received his education at the University of Illinois and Harvard University. His work on the Harvard Mark I led to the development of the stored-program concept, which is a fundamental aspect of modern computing. He was a professor of electrical engineering at Massachusetts Institute of Technology and later became the first director of the Laboratory for Information and Decision Systems at MIT. He was awarded the National Medal of Science in 1956 and the Nobel Prize in Physics in 1966. He died in Cambridge, Massachusetts.


BIOGRAPHIES OF FELLOWS

Jensen, Axel G. (A'28-M'37-F'41), Director of Television Research, Bell Telephone Laboratories, Inc., Murray Hill Laboratory, Murray Hill, N.J.


Director of Bell Telephone Laboratories; Consultant, AT&T 


Joint committee, 1957-58; Television, 1953-54; Chairman, 1952-53; 

Television and Facsimile, 1957-58; Joint committee, 1953-54; ASA 

Secretary (Committee) on Television, 1952-53; Secretary (Committee) on Television, 1952-53; ASA Secretary (Committee) on Television 

1957, 1958; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54; 

Joint committee, 1957-58; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54; 

Joint committee, 1957-58; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54; 

Joint committee, 1957-58; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54; ASA Secretary (Committee) on Television, 1952-53; Joint committee, 1953-54;
GEOPHICAL LISTING OF MEMBERSHIP

The names of all members as of May 1, 1954, except those of student grade, are listed below according to Proceedings mailing address. Following the name of each city is an abbreviation and a number indicating to which Section is the member a member. The Sections are abbreviated as follows:

AANA—Annapolis
AN—Atlantic City
CH—Chicago
DC—Denver
D—Dallas
K—Kansas City
L—Los Angeles
M—Miami
N—New Orleans
NY—New York
Philadelphia
P—Portland
S—San Francisco
SAC—Sacramento
SS—Seint Paul
T—Tulsa
WASHINGTON, D.C.

UNITED STATES

ARKANSAS

Forsyth, J. S. (A)
Fort Smith, J. E.
Henderson, J. C.
Jones County, H. E.
Russellville, H. E.

ARIZONA

Council, E. D.
Flagstaff, J. J.
Phoenix, G. E.
Tucson, C. P.

CALIFORNIA

Bakersfield, H. R.
Berkeley, J. S.
Chico, J. E.
Fresno, J. E.
Fresno, J. L.
Fresno, R. F.
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<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
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<tbody>
<tr>
<td>Bacon</td>
<td>456 Main St.</td>
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<tr>
<td>Smith</td>
<td>789 Oak Ave.</td>
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<tr>
<td>Brown</td>
<td>321 Elm Rd.</td>
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**Continued...**
<table>
<thead>
<tr>
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<th>Cities</th>
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</tr>
<tr>
<td>Belgium</td>
<td>Brussels, Antwerp, Ghent, Liège, Ghent</td>
</tr>
<tr>
<td>Britain</td>
<td>London, Birmingham, Manchester, Liverpool</td>
</tr>
<tr>
<td>Canada</td>
<td>Toronto, Montreal, Vancouver, Ottawa</td>
</tr>
<tr>
<td>Africa</td>
<td>Cairo, Cape Town, Durban, Johannesburg</td>
</tr>
<tr>
<td>South America</td>
<td>São Paulo, Rio de Janeiro, Brasília</td>
</tr>
<tr>
<td>Asia</td>
<td>Tokyo, Shanghai, Beijing, New Delhi</td>
</tr>
<tr>
<td>North America</td>
<td>New York, Los Angeles, Chicago</td>
</tr>
<tr>
<td>Middle East</td>
<td>Istanbul, Tehran, Riyadh, Cairo</td>
</tr>
</tbody>
</table>

**Notes:**
- The table lists major cities in various countries.
- The list is not exhaustive and is intended to provide a general overview.
- The cities are listed in alphabetical order by country.
How to Use Our Business and Product Sections

The Business and Product Sections of this Directory are included for the service of members so that this book will be complete as an index of an industry—Electrical Engineers, the Businesses they have founded, and the Products they have created for radio, television, communications, and electronics.

The following 4 Sections of the IRE DIRECTORY are:

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<th>Section</th>
<th>Group Arrangement</th>
<th>Complete-Date-Spreads Section</th>
<th>Company List of Radio-Electronic Manufacturers</th>
<th>Product Index of Engineering Equipment and Parts</th>
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<td>Alphabetical List of Products &amp; Index To Products</td>
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<td>121-227</td>
<td>241-501</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-viii</td>
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</tbody>
</table>

SECTION 2

Part 2 is one of the most informative and valuable sections of this Directory. Here manufacturers are supplying engineers with the minimum amount of detailed information possible through the use of multiple page spreads of their products (see page 2). The purpose of this section is to give the engineer a complete and up-to-date catalog file right in his IRE Directory where he can always see it swiftly and quickly. We believe that the service of this section will be of the utmost help to you.

SECTION 3

2700 firms have supplied us voluntarily with information about the components, equipment, and services which they render to the radio-electronic industry. These manufacturers are listed alphabetically in this section beginning on page 121 and ending on page 501. The names of manufacturers such as distributors and representatives are listed under leading 10 special indexes. This index therefore gives the names of manufacturers of specific products available for purchase, with their addresses and code numbers indicating types of products which they offer.

The completeness of this index is not affected by voluntary contributions. Our most rigorous efforts may not have made it complete, but the excellent cooperation received from most of the industry is directly responsible for the up-to-date nature of our product data. We will welcome additions and suggestions for the 1955 edition.

SECTION 4

The Product sections start on page 241 and continue through 801. In both the alphabetical and the product index advertisers who have made it financially possible to provide a really comprehensive Directory to the manufacturers have been listed in bold face type with a cross index to the page on which their display advertisement appears giving complete information on their products and services. Non-advertisers have been listed in the product index giving firm name and state only. Full address the reader must turn to the alphabetical index for these companies.

To find the manufacturers of a given product, let us say "Audio Amplifiers," look this product up in the Pink Section, preceding page 1. You will see that it is classified Number 1. A full listing of audio amplifier manufacturers starts on page 241. Turn to this classification in Part 4.

As a service to engineers, both buyer and seller, we have included a list of 1198 firms and individuals who are distributors. Each name is further classified by number to indicate its place in the field—representative, distributor, exporter, etc. This class #104, starting on page 519.

There are several other helpful indexes. Advertisers are given on pages 583-584 (inside back cover), and an index in the 1954 Radio Engineering Show Exhibitors and Proceeding Advertisers who are in this Directory is on pages 181-182.

To get a comprehensive picture of what is offered manufacturers for engineers in our field, you will find in the alphabetical index of companies that all their products are listed by code number after the firm's name and address. These products are classified into ten separate Product Directories, serving basic sections of our Industry. We have tried vigorously to make this truly a useful "Radio Engineer's Directory."

Please submit all changes, corrections, additions and classifications to Industry Research Dir., Institute of Radio Engineers, 145 Broadway, New York 3, N.Y.

1954

Edition prepared by Advertising Department of The Institute of Radio Engineers, 145 Broadway, New York 3, N.Y.

William C. Copeland, Manager; Elliott Paton, Assistant; Carl Malek, Production; Frank G. Macklin, Research.
Guide to Directories and Product Classes

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90 Special purpose
90 Special purpose
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Guide to Complete-Data-Spreads

The full spirit of the IRE DIRECTORY is to give the reader-engineer "facts" in complete detail, and specific enough to be of useful service. Our advertisers have recognized this, and many have made their copy presentation full of useful specifications and illustrations.

Actually, a Directory Publisher cannot hope to describe products adequately in standardized listings. Only the Advertiser, using display space, and with his own intimate knowledge of his service or product, can do that job right.

The advertisers listed below have done their utmost to provide the reader with engineering data in full detail, through spreads and catalogs filed in this book for easy access and permanent reference. This can prove to be the most useful part of the 1954 IRE DIRECTORY to you.

Index to Complete-Data-Spreads

1954 IRE DIRECTORY Complete-Data-Spreads
Presents this proven group of electronic instruments

8 WIDE-RANGE AUDIO OSCILLATORS
0.001 cps to 520 kc

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency Range</th>
<th>Frequency Accuracy</th>
<th>Output</th>
<th>Regulation</th>
<th>Power Consumption</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>400-A</td>
<td>0.001 cps to 1 kc</td>
<td>±1%</td>
<td>50 ma/5v</td>
<td>±1%</td>
<td>100 watts</td>
<td>$395.00</td>
</tr>
<tr>
<td>410-A</td>
<td>0.001 cps to 100 kc</td>
<td>±0.1%</td>
<td>100 ma/5v</td>
<td>±0.1%</td>
<td>100 watts</td>
<td>$315.00</td>
</tr>
<tr>
<td>420-A</td>
<td>0.001 cps to 1000 kc</td>
<td>±0.1%</td>
<td>500 ma/5v</td>
<td>±0.1%</td>
<td>100 watts</td>
<td>$315.00</td>
</tr>
<tr>
<td>410-B</td>
<td>0.001 cps to 500 kc</td>
<td>±0.5%</td>
<td>100 ma/5v</td>
<td>±0.5%</td>
<td>50 watts</td>
<td>$215.00</td>
</tr>
</tbody>
</table>

MODEL 440-A Features
- Frequency range: 0.001 to 520 kc
- Output: 50 ma/5v
- Regulation: ±1% at any output level
- Amplifier circuit: Class A
- Frequency stability: ±0.1% over operating range
- Power consumption: 25 watts

MODEL 330 Features
- Unity gain
- Frequency range: 0.001 to 200 kc
- Output: 50 ma/5v
- Regulation: ±0.001 millivolts
- Amplifier circuit: Class A
- Frequency stability: ±0.1% over operating range
- Power consumption: 25 watts

6 VARIABLE ELECTRONIC FILTERS
0.01 cps to 200 kc

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Frequency Range</th>
<th>Frequency Accuracy</th>
<th>Output</th>
<th>Regulation</th>
<th>Power Consumption</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>370-A</td>
<td>Band Pass</td>
<td>20 cps to 200 kc</td>
<td>±10%</td>
<td>5 ma</td>
<td>50 watts</td>
<td>$275.00</td>
<td></td>
</tr>
<tr>
<td>370-A</td>
<td>Band Pass</td>
<td>20 cps to 200 kc</td>
<td>±10%</td>
<td>5 ma</td>
<td>50 watts</td>
<td>$275.00</td>
<td></td>
</tr>
<tr>
<td>330-A</td>
<td>Band Pass</td>
<td>10 cps to 500 kc</td>
<td>±5%</td>
<td>1 ma</td>
<td>10 watts</td>
<td>$190.00</td>
<td></td>
</tr>
<tr>
<td>340-A</td>
<td>Integrator</td>
<td>10 cps to 500 kc</td>
<td>±5%</td>
<td>1 ma</td>
<td>10 watts</td>
<td>$190.00</td>
<td></td>
</tr>
<tr>
<td>350-A</td>
<td>Resistor</td>
<td>10 cps to 500 kc</td>
<td>±5%</td>
<td>1 ma</td>
<td>10 watts</td>
<td>$190.00</td>
<td></td>
</tr>
<tr>
<td>360-A</td>
<td>Rejection</td>
<td>10 cps to 500 kc</td>
<td>±5%</td>
<td>1 ma</td>
<td>10 watts</td>
<td>$190.00</td>
<td></td>
</tr>
<tr>
<td>370-A</td>
<td>Rejection</td>
<td>20 cps to 200 kc</td>
<td>±5%</td>
<td>5 ma</td>
<td>50 watts</td>
<td>$190.00</td>
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NEW UHR SERIES POWER SUPPLIES
FEATURING ULTRA-HIGH REGULATION
OVER THE ENTIRE OPERATING RANGE
- Regulation 0.001%
- Ripple less than 100 microvolts
- Extremely low dc and ac impedance
- Transient response 0.001 milliseconds

NEW ULTRA-LOW DISTORTION POWER AMPLIFIER
DELIVERING 99.99999996% DISTORTION-FREE POWER

MODEL UF-101 SPECIFICATIONS
- POWER OUTPUT: 20 watts from 0.5 to 20 kc at 2dB
- OUTPUT IMPEDANCE: 2, 4, 8, 16 ohms
- DYNAMIC RANGE: 110 dB
- FREQUENCY RESPONSE: ±0.5% from 0.5 to 30 kc ±3 dB from 0.5 to 30 kc to 70 kc
- VOLTAGE GAIN: 14 dB or 100 dB
- PRICE: $350.00

NEW 5 NEW INSTRUMENTS

A NEW CATALOG GIVING COMPLETE DESCRIPTIONS OF THE ENTIRE LINE IS AVAILABLE UPON REQUEST. PLEASE WRITE
KROHN-HITE INSTRUMENT COMPANY
501 K, 100 MASS. AVE., CAMBRIDGE 38, MASS.
Stupakoff PRODUCTS for Electrical and Electronic Applications

CERAMIC PRODUCTS—Stupakoff is a leading supplier of powders, extended, machined, ground and assembled ceramic products for electrical and electronic applications, for all voltages, frequencies and temperatures. Specialized resistor ceramics, metallized ceramics, high thermal shock resisting ceramics and ceramic dielectrics are described below. Send for information, giving proposed application and approximate requirements.

RESISTOR CERAMICS—Stupakoff Temperatur-Sensitive Resistors are used for temperature indicating or controlling equipment such as Radiosonde, for infra-red light source and for heating elements. Supplied complete with terminals, in the form of rods, tubes, discs, bars, rings, etc.

CERAMIC DIELECTRICS—Stupakoff makes general purpose Ceramic Dielectrics for bypass, lead through blocking, standoffs and trimmer applications. Temperature compensating Ceramic Dielectrics have coefficients from P=100 to N=2500, and high K materials up to K=5000. Made in the form of tubes, discs and special shapes, plain or silvered.

PRINTED CIRCUITS—By combining resistors and capacitors of precision values, in circuits designed in accordance with the requirements of individual applications, Stupakoff printed circuits save space and weight, speed assembly, reduce costs, minimize assembly errors. Bonded connections are reduced by 25% to 80%, assemblies are lighter and more compact, production time is reduced and better products are made. Sturdy, compact, accurate.

METALLIZED CERAMICS

The reel sizes shown below consist of metal bands attached securely to ceramic rods and are typical of Stupakoff precision manufacturers. On a mass production basis, cost variability of components, for example, is held to less than 2%.

STUPALITH—When thermal shock conditions prevail, parts made of STUPALITH will withstand extremely severe service. Stupakoff makes parts ranging from a fraction of an ounce to several pounds in weight, in simple or intricate shapes, by pressing, extrusion, casting or ramming.

Two principal compositions are ordinarily employed: "zero" expansivity compositions, and porous compositions having near-zero expansivities. For parts requiring a high degree of dimensional accuracy, our production process includes machining or grinding to precision tolerances. Usually used at temperatures up to 500°F.

STUPAKOFF CERAMIC LATROBE, DIVISION OF THE & MANUFACTURING CO. PENSsylvANIA CARBORUNDUM COMPANY
COMMERCIAL AND MILITARY WRITE THEIR SPECIFICATIONS TO...

NEW! TWINPLEX COMMUNICATION UNITS

This twinplex communication system makes possible a 2-channel radio circuit where 1 channel is monaural or square wave and the other is monaural or square wave. The twinplex uses separate channels for telephone transmission and provides a single radio frequency carrier wave for each channel. The twinplex circuit is designed to provide the same performance as a single-channel radio circuit without the complexity of separate transmitters and receivers. The twinplex circuit is also designed to provide a higher degree of interference immunity than a single-channel radio circuit.

NEW VARIABLE MASTERY OSCILLATOR

- Long-time stability: 1 cycle per megacycle
- Variable in ANY frequency from 2 to 4 mc within 1 part per million

The New Radio Company Variable Master Oscillator provides a continuous variable source of radio frequency energy in the range of 2 to 4 megacycles. It has sufficient output power to drive the basic oscillator without the need for external amplification. The oscillator may be used as the basic oscillator for single channel radio, as a primary frequency source in the frequency modulation, and as a reference frequency source in the frequency modulation circuit. The oscillator is also designed to provide a higher degree of interference immunity than a single-channel radio circuit.

MEASUREMENTS OF TONE TELEGRAPH SYSTEMS

The Northern Radio Company Test Bay for Tone Telegraph Systems provides a complete terminal test for telegraph systems and telegraph equipment. The test bay is designed to provide a high degree of accuracy and precision in the measurement of telegraph systems and telegraph equipment. The test bay is also designed to provide a high degree of interference immunity than a single-channel radio circuit.

TONE CHANNELING SYSTEMS

Complete packaged systems of Multi-Channel Tone Equipment (both AM and FM) are available for line and radio link systems. For full details on the complete line, write now for catalog 90-56.
NORTHERN RADIO COMMUNICATIONS EQUIPMENT

NORTHERN RADIO COMPANY, INC.  Pave Systems in Quality  Communication Equipment
147 WEST 22ND STREET, NEW YORK 11, N.Y.

VARIABLE MASTER OsciLATOR

FREQUENCY SHIFT KEYER

incorporates the following outstanding features:

- Frequency shift dial shifts "Mark" and "Space" frequencies equally above and below the carrier, which remains fixed.
- Simplified frequency setting permits only the upper side band tuning indicator to be visible on the meter over essentially all tuning ranges.
- Direct reading frequency calibration of shift from 0 to 1000 cycles.
- Direct reading frequency calibration of shift and output tuning dial from 0.1 to 67 mc., 125 to 4.5 mc.
- Direct reading of calibration of output frequency variation at 2.5, 2.5, 100 cycles.
- Pulse shaping circuit to permit operation within assigned bandwidth with no harmonic channel radiation.
- Highly stable temperature controlled oven with temperature control of 0.01 C. of 0 C. with hysteresis.
- Component ratings according to JAN specs provide greater assurance of trouble-free operation.

DUAL DIVERSITY RECEIVER

Used for dual spaced diversity reception in high speed teleprinter, telegraph or telephone service, using any carrier modulation, such as FSK, CW, ICW, twin etc. Complete receiver is in a sturdy, lockable cabinet. Provided with a specially modified receiver monitor speaker. If moni-

FREQUENCY AND SHIFT MONITOR SYSTEM

This system consists of a Type 106 Frequency and Shift Monitor and a Type 127 Frequency Monitor. It is designed for a secondary standard to maintain the frequency and amount of shift of transmitter carrier outputs. It is particularly intended to measure the frequency shift and space of the signal either when shifting up or down or under normal keying conditions.

The Monitor's stability is better than 2 cycles per degree temperature of -100 C. using crystals having a temperature coefficient of only 3 parts per million/degree C. Range is 5.5 to 10 mc. with 10 crystal-controlled frequencies for control panel movement for each of 10 units which also provide for frequency shift range of 10-15,000 cpm. Less than 100 millivolts RF input needed for 1 volt audio output. The Frequency Meter is specially designed with selectable normal and fast-acting damping factors, permitting frequency measurement to 0.1 part per thousand by keying in accuracy of 2% of full scale for the ranges 0-500, 500-1500, 5000, 20,000 cpm.

Sylvania offers a full line!

As a result of greater facilites and improved manufacturing techniques, Sylvania is in a position to offer you the finest quality picture tubes products.

Much more to your physical spec requirements, Sylvania Aluminized Tubes also offer the finest performance! These tubes give whiter whites and blacker blacks...a 6 times better picture contrast.

For the full story concerning Sylvania's complete tube line, and how they can help your future sales, write a note on your letterhead to Dept. 4B-75, Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

Sylvania has a complete line of Picture Tubes and picture tube accessories. For full data on the complete line, write for catalog PD-54.
NEW SYLVANIA SOCKETS Save Assembly Time...Cut Costs ...Improve Performance!

Look over these new Sylvania 7-pin Miniature Printed-circuit Sockets. Contacts and center shield are shaped so that sockets can be stacked one upon another for automatic feeding and assembly. Small slots are used on the circuit board to receive the contacts. This results in stronger chassis construction.

Only one socket assembly need be stocked since terminals can be interconnected by printing the circuit on the chassis board rather than using a metallic connector on the socket itself.

Insulator is molded of general-purpose or low-loss phenolic. Contacts are brass or phosphor bronze, plated to suit your specification. Supplied with or without center shield. Now available in 7-pin construction with 9-pin miniature and other types to follow. Tube Shield Ground Strap can also be furnished.

Also find out about the New Sylvania Solderless-type Sockets for wire-wrapped connections. These are now being made in all 7 and 9-pin miniature sizes. Contacts are shaped to provide reliable connections with the use of present wire-wrapping tools.

Sylvania now offers you a wide variety of highest quality terminal strips...equipped with from 2 to 10 lugs...depending on style, suitable for many different applications. 3 different styles are available in spacing sizes of 1/4" and 1/2" spacings. 2 types are available with lugs in 2 to 10 positions. The 7 lug type is available with 2 to 7 lugs.

Insulators are made of NEMA grade P laminated phenolic—chocolate waxed, unwaxed or XXX P natural phenolic, waxed or unwaxed. Lugs are of brass, solder plated. Contacts are brass or cadmium-plated steel. Sylvania Terminal Strips can be supplied to your specifications.

Today, with enlarged, modern plastic molding equipment and metal stamping facilities, Sylvania offers you precision-built components of highest quality. For new illustrated sheets showing the complete line of Sylvania Terminal Strips and other radio and electronic components now available, write to: Sylvania Electric Products Inc., Dept. 4A-75, 1740 Broadway, New York 19, N. Y.
Sylvania Tungsten wire, rod, and components are quality controlled from ore to finished products and tested in the laboratory and in the field. Suppliers to all leading manufacturers in the radio and television industry, Sylvania offers you tungsten and chemical products that meet the highest standards of purity, precision, and uniformity.

Let Sylvania help you
Sylvania maintains large diversified metallurgical and chemical laboratories for the development and perfection of its many products. Today, these facilities are also available to help you. Sylvania engineers, Sylvania "know-how," and Sylvania equipment will aid you in product development or in the solution of tough manufacturing problems.

If it's a question concerning anything from a precision, custom-made tungsten wire to a specially-ground tungsten part, or from a high-purity phosphor to germanium dioxide for crystals ... get it up to Sylvania. A note on your letterhead will bring you the information you require. Address: Dept. 4T-55, Sylvania Electric Products Inc., 1740 Broadway, N. Y. 19, N. Y.

HIGH PURITY SYLVANIA
TUNGSTEN and CHEMICAL PRODUCTS NOW AVAILABLE INCLUDE:

- Tungsten
- Radio Heater and Grid Wire
- Support Wire and Rod
- Gold-Plated Wire
- Ground Seal Rod
- Formed or Ground Parts
- Cut and Beveled Pieces
- Hand Wound Coils
- Molybdenum
- Wire, Rod
- Metal Powder
- Special High Purity Chemicals and Compounds
- Potassium Silicate • Etching Inks
- Carbide Emission Coatings
- Mica Spray Coatings
- Baking Cements
- Metal Powders
- Silicon • Germanium
- Phosphors
- Cathode Ray Tube Phosphors

SYLVANIA
LIGHTING • RADIO • ELECTRONICS • TELEVISION

COMPLETE COVERAGE

- Amplifiers
- Attenuators
- Bolometer Mounts
- Carrier Oscillators
- Coaxial Instruments
- Detectors
- Directional Couplers
- Distortion Analyzers
- Electronic Counters
- Electronic Tachometers
- FM Monitors
- Frequency Counters
- Frequency Converters
- Frequency Meters
- Frequency Standards
- Function Generators
- Interpolation Oscillators
- Low Pass Filters
- Microwave Test Equipment
- Nuclear Scalers
- Oscillators
- Power Meters
- Power Supplies
- Pulse Generators
- Signal Generators
- Slotted Sections
- Square Wave Generators
- Standing Wave Indicators
- Time Interval Meters
- TV Monitors
- Vacuum Tube Voltmeters
- VHF Bridge
- Video Test Oscillators
- Waveform Analyzers
- Waveguide Equipment

SHORT FORM CATALOG

Hewlett-Packard offers over 250 measuring instruments for manufacturing, industrial and scientific research, equipment maintenance, communications and military use.

Each -hp- instrument gives you the economies of fast, accurate performance, broad usefulness, and dependable service. Each has the familiar -hp- characteristics of simple operation, minimum adjustment, independence of line voltage or tube changes, generous overload protection and highest quality design and construction.

This catalog gives brief details of major -hp- instruments. For complete information, see your -hp- representative, or write direct.
### -hp- Oscillators—Signal Generators .01 to 10,000,000 cps

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Uses</th>
<th>Frequency Range (output)</th>
<th>Output</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>-hp- 200A</td>
<td>Audio, ultrasonic</td>
<td>5 cps to 10000000 cps</td>
<td>5 volts</td>
<td>$125.00</td>
</tr>
<tr>
<td>-hp- 200B</td>
<td>Audio, ultrasonic</td>
<td>5 cps to 10000000 cps</td>
<td>10 mV</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200C</td>
<td>Interferometer and frequency</td>
<td>5 cps to 10000000 cps</td>
<td>10 mV</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200D</td>
<td>Telecommunication, meter, test</td>
<td>5 cps to 10000000 cps</td>
<td>10 mV</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200E</td>
<td>Quality control, radio, test</td>
<td>5 cps to 10000000 cps</td>
<td>10 mV</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200F</td>
<td>Audio, ultrasonic</td>
<td>5 cps to 10000000 cps</td>
<td>10 mV</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200G</td>
<td>High power ultrasonic</td>
<td>5 cps to 10000000 cps</td>
<td>5 watts</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200H</td>
<td>Quality control, radio, test</td>
<td>5 cps to 10000000 cps</td>
<td>5 watts</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200I</td>
<td>Quality control, radio, test</td>
<td>5 cps to 10000000 cps</td>
<td>5 watts</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 200J</td>
<td>Audio, ultrasonic</td>
<td>5 cps to 10000000 cps</td>
<td>5 watts</td>
<td>$135.00</td>
</tr>
</tbody>
</table>

### -hp- Distortion, Wave Form Analyzers—20 cps to 20 kc

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Uses</th>
<th>Frequency Range (output)</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>-hp- 300A</td>
<td>Wave form analyzer</td>
<td>20 cps to 10 kc</td>
<td>5 volts</td>
<td>$125.00</td>
</tr>
<tr>
<td>-hp- 300B</td>
<td>Wave form analyzer</td>
<td>20 cps to 10 kc</td>
<td>10 mV</td>
<td>$135.00</td>
</tr>
<tr>
<td>-hp- 300C</td>
<td>Tool form analyzer</td>
<td>20 cps to 10 kc</td>
<td>10 mV</td>
<td>$135.00</td>
</tr>
</tbody>
</table>

### -hp- Vacuum Tube Voltmeters—2 to 700,000,000 cps

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Uses</th>
<th>Frequency Range (output)</th>
<th>Voltage Range</th>
<th>Input Impedance</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>-hp- 400A</td>
<td>General purpose ac measurements</td>
<td>10 cps to 1 mV</td>
<td>50 mV to 1 mV</td>
<td>250,000 pF</td>
<td>$125.00</td>
</tr>
<tr>
<td>-hp- 400B</td>
<td>Wide range ac measurements</td>
<td>10 cps to 10 kc</td>
<td>50 mV to 1 mV</td>
<td>250,000 pF</td>
<td>$125.00</td>
</tr>
<tr>
<td>-hp- 400C</td>
<td>Portable, battery operated</td>
<td>10 cps to 10 kc</td>
<td>50 mV to 1 mV</td>
<td>250,000 pF</td>
<td>$125.00</td>
</tr>
<tr>
<td>-hp- 400D</td>
<td>Audio, analog voltages</td>
<td>10 cps to 10000000 cps</td>
<td>50 mV to 1 mV</td>
<td>250,000 pF</td>
<td>$125.00</td>
</tr>
</tbody>
</table>

### Other -hp- Frequency Measuring and Monitoring Equipment

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Uses</th>
<th>Frequency Range (output)</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>-hp- 1000A</td>
<td>Frequency counter</td>
<td>10 cps to 10000000 cps</td>
<td>10 mV</td>
<td>$125.00</td>
</tr>
<tr>
<td>-hp- 1000B</td>
<td>Frequency counter</td>
<td>10 cps to 10000000 cps</td>
<td>10 mV</td>
<td>$125.00</td>
</tr>
</tbody>
</table>

### -hp- 524B ELECTRONIC COUNTER

-hp- 524B ELECTRONIC COUNTER with plug-in units to fit your exact measuring need.

- Frequency 10 cps to 200 Mc, instantaneous reading 1 to 100 years.
- Frequency 10 cps to 10 Mc—all are measured instantly, automatically, directly by the electronic reads new -hp- 524B. You have the instrumentation you need; after add expensive plug-in units to double, triple, quadruple that simple electronic range. Design requires no calculations or technical training. Counter has high readability, sensitivity, accuracy, quality control. 

### -hp- 524A Video Amplifier

-hp- 524A Video Amplifier increases sensitivity of 10 cps to 1000 kc’s; increases video sensitivity to 10 mV, 10 cps to 10 Mc. $125.00.

### -hp- 524A Time Interval Unit

-hp- 524A Time Interval Unit measures interval with accuracy of one second in 1 second to 100,000 sec. $125.00.

---

**Data subject to change without notice. Prices F.O.B. factory.**
### -hp- Signal Generators—10 to 11,000 mc

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Frequency Range</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>-hp- 412A</td>
<td>10 to 500 mc</td>
<td>Output 0.5 to 5.0 + 0.5 dB above</td>
<td>$0.950.00</td>
</tr>
<tr>
<td>-hp- 414A</td>
<td>20 to 2100 mc</td>
<td>Same, 0.5 dB</td>
<td>$1.090.00</td>
</tr>
<tr>
<td>-hp- 416A</td>
<td>400 to 2,000 mc</td>
<td>Separate power meter</td>
<td>$1.090.00</td>
</tr>
<tr>
<td>-hp- 418A</td>
<td>800 to 3,000 mc</td>
<td>Same</td>
<td>$1.090.00</td>
</tr>
<tr>
<td>-hp- 420A</td>
<td>3,000 to 7,000 mc</td>
<td>Same</td>
<td>$1.090.00</td>
</tr>
<tr>
<td>-hp- 422A</td>
<td>5,000 to 10,000 mc</td>
<td>Same</td>
<td>$1.090.00</td>
</tr>
</tbody>
</table>

### -hp- Regulated Power Supplies

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Frequency Range</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>-hp- 711A</td>
<td>Power Supply</td>
<td>General purpose regulated plate and filament supply for lab and field use</td>
<td>$180.00 to 300 volts 72 million 150,000 127.00</td>
</tr>
<tr>
<td>-hp- 712B</td>
<td>Power Supply</td>
<td>Same as 711A</td>
<td>$180.00 to 300 volts 72 million 150,000 127.00</td>
</tr>
<tr>
<td>-hp- 713B</td>
<td>Power Supply</td>
<td>Similar to 711B/M, with separate power supply for field use</td>
<td>$180.00 to 300 volts 72 million 150,000 127.00</td>
</tr>
<tr>
<td>-hp- 715A</td>
<td>Power Supply</td>
<td>Regulated beam, emitterfollower circuit for high power klystrons</td>
<td>$300.00 to 600 volts 72 million 150,000 127.00</td>
</tr>
<tr>
<td>-hp- 715B</td>
<td>Power Supply</td>
<td>Regulated beam, emitterfollower circuit for Type 751 klystrons</td>
<td>$300.00 to 600 volts 72 million 150,000 127.00</td>
</tr>
</tbody>
</table>

### -hp- Waveguide Test Equipment—2.6 to 18 kmc

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter, Waveguide to Coax</td>
<td>$5.000.00</td>
<td></td>
</tr>
<tr>
<td>Cover to slip ring</td>
<td>$1.000.00</td>
<td></td>
</tr>
<tr>
<td>Alternators, fixed 20 mc</td>
<td>$2.000.00</td>
<td></td>
</tr>
<tr>
<td>Post, 20 mc</td>
<td>$1.000.00</td>
<td></td>
</tr>
<tr>
<td>Colimated, precision</td>
<td>$1.000.00</td>
<td></td>
</tr>
</tbody>
</table>

### Equipment below available for most waveguide frequencies

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>-hp- 809B Universal Probes</td>
<td>Cartridge</td>
<td>$180.00 to 300 volts 72 million 150,000 127.00</td>
</tr>
<tr>
<td>-hp- 810SL Slotted Sections</td>
<td>Cartridge</td>
<td>$180.00 to 300 volts 72 million 150,000 127.00</td>
</tr>
<tr>
<td>-hp- 4464 Unprobed</td>
<td>Crystal detector</td>
<td>$180.00 to 300 volts 72 million 150,000 127.00</td>
</tr>
<tr>
<td>-hp- 447A Thermistor Mount</td>
<td>Crystal detector</td>
<td>$180.00 to 300 volts 72 million 150,000 127.00</td>
</tr>
</tbody>
</table>

The -hp- line includes a complete range of waveguide test equipment and accessories. For complete information, consult your nearest -hp- office.
Microwave Power Measuring Equipment

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Use</th>
<th>Frequency Range</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ap-4108A</td>
<td>Microwave Power Meter</td>
<td>10 to 1,000 mc</td>
<td>Nonslip mount, 1000 mc measurement</td>
<td>$550.00</td>
</tr>
<tr>
<td>Ap-458A</td>
<td>Coaxial Thermistor Mount</td>
<td>for frequency range 10 mc to 10 kc</td>
<td>3000 to 10,000 mc</td>
<td>$50.00</td>
</tr>
<tr>
<td>Ap-417A</td>
<td>Coaxial Thermistor Mount</td>
<td>for frequency range 10 mc to 10 kc</td>
<td>10 to 100 mc</td>
<td>$50.00</td>
</tr>
<tr>
<td>Ap-418A</td>
<td>Coaxial Thermistor Mount</td>
<td>for frequency range 10 mc to 10 kc</td>
<td>100 to 1,000 mc</td>
<td>$50.00</td>
</tr>
<tr>
<td>Ap-419A</td>
<td>Coaxial Thermistor Mount</td>
<td>for frequency range 10 mc to 10 kc</td>
<td>1000 to 10,000 mc</td>
<td>$50.00</td>
</tr>
</tbody>
</table>

Microwave Impedance Measuring Equipment

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Use</th>
<th>Frequency Range</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ap-305A/B</td>
<td>Coaxial Slotted Section</td>
<td>500 to 10,000 mc</td>
<td>High stability, negligible slope, minimum leakage, exclusive parallel plate, 50 ohm system section and components,</td>
<td>$45.00</td>
</tr>
<tr>
<td>Ap-306A/B</td>
<td>Coaxial Slotted Section</td>
<td>500 to 10,000 mc</td>
<td>High stability, negligible slope, minimum leakage, exclusive parallel plate, 50 ohm system section and components,</td>
<td>$45.00</td>
</tr>
<tr>
<td>Ap-307A/B</td>
<td>Coaxial Slotted Section</td>
<td>500 to 10,000 mc</td>
<td>High stability, negligible slope, minimum leakage, exclusive parallel plate, 50 ohm system section and components,</td>
<td>$45.00</td>
</tr>
</tbody>
</table>

New Streamlined All-Metal -hp- Cabinets

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Use</th>
<th>Frequency Range</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ap-417A</td>
<td>VHF Detector</td>
<td>for use with 800 &amp; Bi-co, or general laboratory use</td>
<td>Super-regenerative receiver, 900 to 3000 mc, 3 bands plus sensitivity over entire band</td>
<td>$250.00</td>
</tr>
<tr>
<td>Ap-415A</td>
<td>STANDING WAVE INDICATOR</td>
<td>For all waveguide or coaxial slotted sections</td>
<td>Gives readings in VSWR or db, Simple frequency multiplication, 900 to 3000 mc, noise level, 30 mc sensitivity, 60 db sensitivity</td>
<td>$250.00</td>
</tr>
</tbody>
</table>

Amplifiers for General Use and Fast-Circuit Work

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Primary Use</th>
<th>Frequency Range</th>
<th>Characteristics</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ap-405A/B</td>
<td>Amplifiers</td>
<td>5 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
</tr>
<tr>
<td>Ap-410A</td>
<td>Amplifiers</td>
<td>100 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
</tr>
<tr>
<td>Ap-415A</td>
<td>Fast-Pulse Tube Amplifier</td>
<td>100 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
</tr>
<tr>
<td>Ap-420A</td>
<td>Fast-Pulse Tube Amplifier</td>
<td>100 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
</tr>
</tbody>
</table>

New Streamlined All-Metal -hp- Cabinets

<table>
<thead>
<tr>
<th>Instrument</th>
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<tbody>
<tr>
<td>Ap-405A/B</td>
<td>Amplifiers</td>
<td>5 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
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<tr>
<td>Ap-410A</td>
<td>Amplifiers</td>
<td>100 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
</tr>
<tr>
<td>Ap-415A</td>
<td>Fast-Pulse Tube Amplifier</td>
<td>100 to 1000 mc</td>
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<td>$10.00</td>
</tr>
<tr>
<td>Ap-420A</td>
<td>Fast-Pulse Tube Amplifier</td>
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<td>$10.00</td>
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</tbody>
</table>

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<td>$10.00</td>
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<tr>
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<td>Amplifiers</td>
<td>100 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
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<td>100 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
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<td>Fast-Pulse Tube Amplifier</td>
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<tr>
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<td>Fast-pulse, 50 db gain</td>
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<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
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<tr>
<td>Ap-420A</td>
<td>Fast-Pulse Tube Amplifier</td>
<td>100 to 1000 mc</td>
<td>Fast-pulse, 50 db gain</td>
<td>$10.00</td>
</tr>
</tbody>
</table>
In electronic test instruments, Hewlett-Packard gives you complete coverage several different ways.

In development—hp-design teams are continually at work designing and producing accurate, helpful new instruments that meet and anticipate the demands of electronics.

In instrumentation—the hp-line is the world's largest and most complete. You choose from over 250 instruments the poses that exactly the measuring coverage you require.

In frequency coverage—hp makes nearly every kind of useful electronic test instrument. And, for almost all useful frequencies too, for example, dp-signal generation, q and qc frequency coverage from 20 to 10,000 mc, dp-signal meters from 2 to 700,000,000 cps, oscillators from 0.01 to 50,000,000 cps.

In personal service—hp has selected the best independent organizations in America to give you personal help with measuring problems. Electronics specialists—men trained by Hewlett-Packard—to serve your place by helping select the exact dp-instrumentation you need—and following through to be sure the equipment is properly utilized to serve you best. These men are located in major business centers—as near as your telephone. Call them when you need personal help, —in your plant, today.

SPERRY GYROSCOPE COMPANY
SPERRY KLYSTRON TUBES and Microline Instruments

Stimulating from its sponsorship of the development of the klystron in 1938, Sperry has had vast experience in the manufacture of these tubes for low, medium, and high power applications. As a result of Sperry's pioneering in microwave measuring techniques, this company has a complete line of Microline instruments which include every type of device essential to precision measurement, in the entire microwave field.

For further information on the equipment listed below or on new development of klystrons and microwave test units, write at telephone our Special Electronics Department or our nearest District Office.

KLYSTRONs

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Frequency Range in Mc</th>
<th>Output Power</th>
<th>Beam Voltage</th>
<th>Reflection Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>5R13</td>
<td>Before</td>
<td>7000-12,000</td>
<td>5w</td>
<td>3500</td>
<td>0.05</td>
</tr>
<tr>
<td>5R13</td>
<td>After</td>
<td>7000-12,000</td>
<td>5w</td>
<td>3500</td>
<td>0.05</td>
</tr>
<tr>
<td>5R14</td>
<td>Before</td>
<td>7000-12,000</td>
<td>5w</td>
<td>3500</td>
<td>0.05</td>
</tr>
<tr>
<td>5R14</td>
<td>After</td>
<td>7000-12,000</td>
<td>5w</td>
<td>3500</td>
<td>0.05</td>
</tr>
<tr>
<td>5R43</td>
<td>Before</td>
<td>7000-12,000</td>
<td>5w</td>
<td>3500</td>
<td>0.05</td>
</tr>
<tr>
<td>5R43</td>
<td>After</td>
<td>7000-12,000</td>
<td>5w</td>
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BARRIERTON AND THERMISTOR MOUNTS

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IMPEDANCE METERS

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IMPEDANCE TRANSFORMERS

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HEWLETT-PACKARD COMPANY
3000 PAGE MILL ROAD • PALO ALTO, CALIFORNIA, U.S.A.
**FREQUENCY METERS**

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**DIRECTIOAL COUPLES**

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**ATTENUATORS**

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**TERMINATIONS**

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**HIGH POWER WAVETRONS TERMINATIONS**

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**TEES**

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**JENNINGS VACUUM COMPONENTS**

**Variable Capacitors**

**Fixed Capacitors**

**Relays & Switches**

**SPERRY GYROSCOPE COMPANY**

Division of The Sperry Corporation - Great Neck, New York

Cleveland - San Francisco - Seattle - Los Angeles - New Orleans - Brooklyn

in Canada: Sperry Gyroscope Company of Canada Limited, Montreal, Quebec
### VACUUM VARIABLE CAPACITORS

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<th>Model</th>
<th>Type</th>
<th>Nominal Dimensions</th>
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<td>20</td>
<td>BC-10</td>
<td>2.0 x 0.5 x 0.1</td>
</tr>
<tr>
<td>30</td>
<td>BC-15</td>
<td>3.0 x 0.5 x 0.1</td>
</tr>
<tr>
<td>50</td>
<td>BC-20</td>
<td>5.0 x 0.5 x 0.1</td>
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### VACUUM FIXED CAPACITORS

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### VACUUM SWITCHES & RELAYS

- Normally Open, Bolata Insulation, AC Soldered
- Normally Closed, Glass Insulated, AC or DC Insulated

### FIXED CAPACITORS

<table>
<thead>
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<th>Type</th>
<th>Nominal Dimensions</th>
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<td>10</td>
<td>BC-10</td>
<td>1.0 x 0.2 x 0.1</td>
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<tr>
<td>20</td>
<td>BC-15</td>
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### VACUUM'S SWITCHES & VOLTAGE DIVIDER

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<td>BC-10</td>
<td>1.0 x 0.2 x 0.1</td>
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<tr>
<td>20</td>
<td>BC-15</td>
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<tr>
<td>50</td>
<td>BC-25</td>
<td>5.0 x 0.2 x 0.1</td>
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### VACUUM'S SWITCHES & VOLTAGE DIVIDER

- Available with or without glass insulation
- Available with or without AC or DC insulation

- Normal Nop Open, Glass Insulated, AC or DC Insulated
- Normal Closed, Glass Insulated, AC or DC Insulated

### VACUUM'S SWITCHES & VOLTAGE DIVIDER

- Available with or without glass insulation
- Available with or without AC or DC insulation

- Normal Nop Open, Glass Insulated, AC or DC Insulated
- Normal Closed, Glass Insulated, AC or DC Insulated

### VACUUM'S SWITCHES & VOLTAGE DIVIDER

- Available with or without glass insulation
- Available with or without AC or DC insulation

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- Normal Closed, Glass Insulated, AC or DC Insulated

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- Available with or without glass insulation
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### VACUUM'S SWITCHES & VOLTAGE DIVIDER

- Available with or without glass insulation
- Available with or without AC or DC insulation

- Normal Nop Open, Glass Insulated, AC or DC Insulated
- Normal Closed, Glass Insulated, AC or DC Insulated

### VACUUM'S SWITCHES & VOLTAGE DIVIDER

- Available with or without glass insulation
- Available with or without AC or DC insulation

- Normal Nop Open, Glass Insulated, AC or DC Insulated
- Normal Closed, Glass Insulated, AC or DC Insulated

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- Normal Closed, Glass Insulated, AC or DC Insulated
JENNINGS VACUUM CAPACITORS ADDED DURING THE PAST YEAR TO PROVIDE WIDER CAPACITY RANGES AND HIGHER POWER RATINGS

LOW POWER CAPACITORS

The JCS fixed and the UCS variable series rated at 2 to 5 KV now include fixed capacities of 100, 250, 500, 750, 1000, 1500, and 2000 mmfd as well as variable capacity ranges of 4 - 250, 4 - 500, 5 - 750, 7 - 1000, and 20 - 2000 mmfd.

MEDIUM POWER CAPACITORS

More plates have been added to the UCS and UCSX series to provide wider capacity ranges with the same movement. At a voltage rating of 10 KV, we now have the UCSF 5 - 250 and 12 - 500 mmfd as well as the UCSXF 7 - 1000, 20 - 1500, 25 - 2000, and 50 - 2500 mmfd.

At the same voltage rating of 10 KV, we also have added two small variables—the ECS 5 - 30, and the GCS 5 - 100 mmfd.

Finally, in the medium power field we have developed a non-linear tuning capacitor designed specifically for amateur service—the VAC 4 - 40 mmfd rated at 42 amperes rms at 10 KV.

HIGH POWER CAPACITORS

More plates have also been added to the UCSXH to create a new unit similar to the UCSXF shown above. The new UCSXH is rated at 25 KV and has a capacity range of 20 - 500 mmfd.

The capacity ranges of the VMMC and the VMMHC have been increased in the same way to give us the VMMC 100 - 5000 mmfd rated at 5 to 10 KV (and 100 amperes) and the VMMHC 60 - 1000 mmfd rated at 35 to 45 KV. Two new fixed capacitors using the same plates will also soon be available. These are the MMC 5000 mmfd rated at 5 to 10 KV and the MMHC 10000 mmfd rated at 35 KV.

VACUUM SWITCHES AND RELAYS

Of the switches shown on the preceding pages, the R-8, RM-2, RM-4, and RC-2 switches and relays have been added during the past year.

JENNINGS RADIO MANUFACTURING CORPORATION - 270 McLaughlin Ave. P.O. Box 1278 - San Jose, California
Germanium Products

POINT CONTACT DIODES

The reverse of the R&R Diodes is vacuum filled with a diode wax material which is chemically and electrically inert. Receiver tube and diode are securely mounted against the effects of moisture and contamination from the surrounding air.

DIFFUSED POWER DIODES

Featuring very low forward resistance along with high breakdown voltage which results in high rectifier efficiency. For use in rectifier applications where extreme temperature requirements are involved.

COMPUTER DIODES

Recommended for applications requiring stability, long life and higher temperature operation. Thousands in the market special requirements.

TRANSISTORS

Types RB44, RB24, RB34, RN4, RN3, RN27 and RN34 intended for applications in low level audio circuits. Particularly applicable where small size and economy of operation are desired.

INDUSTRIAL TYPE RECTIFIERS

Those have proved reliable in thousands of use in industrial applications. These are used in the U.S. military and other important installations to meet specific requirements.

HALF-WAVE RADIO TYPE RECTIFIERS

These units are used in industrial power supplies, power amplifiers, magnetic amplifiers, electroplating, battery charging, etc.

CARTRIDGE ASSEMBLIES

... From tiny, single-cell units to those containing hundreds of cells. Wide range of battery types. Packed in cartons of 50, 100, 200, 500 or 1000.

RECENT DESIGN: Electroplating Transformer

RECTIFIERS FOR MAGNETIC AMPLIFIERS

Designs will be submitted to meet individual requirements.

Selenium Rectifiers

EMBEDDED RECTIFIERS

For adequate protection in military and other emergency use. Rectifiers mounted in the unit for maximum weight and stress. Also for important considerations such as in aircraft applications.

HIGH TEMPERATURE TYPES

These selenium rectifiers are capable of operating in high radiant temperature environments and are designed to meet single requirement.

HERMETICALLY SEALED UNITS

Built to special requirements in high value semiconductor products. Designed to meet individual needs.

Seletron and Germanium Division
RADIO RECEPTOR COMPANY, INC.

In Radio and Electronics Since 1922

SALES OFFICES: 225 WEST 55TH STREET, NEW YORK 19, N. Y., WATERS 4-3023. FACTORIES IN BROOKLYN, N. Y.

Seletron and Germanium Division
RADIO RECEPTOR COMPANY, INC.

In Radio and Electronics Since 1922

SALES OFFICES: 225 WEST 55TH STREET, NEW YORK 19, N. Y., WATERS 4-3023. FACTORIES IN BROOKLYN, N. Y.
Dependable Electronic Tubes for...

TRANSMITTING - REJECTING - INDUSTRIAL
SPECIAL PURPOSE - TELEVISION

Basic Technical Data Covering Complete Line of FEDERAL POWER TRIODES

<table>
<thead>
<tr>
<th>Type</th>
<th>Plate Volts</th>
<th>Plate Current</th>
<th>6-300 (500)</th>
<th>5-300 (500)</th>
<th>6-300 (600)</th>
<th>5-300 (600)</th>
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<tbody>
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<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
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<tr>
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<td>0.8</td>
<td>0.7</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**DELAY LINES AND PULSE TRANSFORMERS**

Delay Lines:

- New Federal Delay Lines are of the lumped constant type. They are compact, light-weight, efficient and meet military requirements. They are hermetically sealed against dust, dirt and moisture.

- Range of Delay: 0.3 to 45 microseconds
- Impedance Range: 100 to 10,000 ohms
- Minimum Rise Time: 0.5 microseconds

Pulse Transformers:

- Oil miniaturized construction, compact and efficient. Meet military specifications and are hermetically sealed.

- Duty Cycle: 100% maximum. Pulse Width: 1 to 7.0 microseconds minimum.

**FILTERS**

Various filters are available including high-pass, low-pass and band-pass for audio and certain types of electronic equipment. Hermetically sealed against dust, dirt and moisture. Use standard type high Q coils.

**TOROID**

- With high Q performance they are still shuntable and available in hermetically sealed cases, encapsulated, or vitreous and meet military requirements.

**POWER TRANSFORMERS**

Hermetically sealed, compact, rugged and high quality types to meet commercial and military specifications. Meet Class A, B or E temperature requirements. Also available in lightweight, high temperature, 400 cycle aircraft type.

**FEDERAL TRANSFORMERS ARE DESIGNED AND BUILT TO MEET CUSTOMER SPECIFICATIONS.**

**TELEPHONE TYPE RELAYS**

- Telephone type relays available with a wide variety of contact combinations and ratings. Single and double coil relays are available with coil resistances ranging from a few ohms to several thousand ohms.

**MINIATURE ANTI-CAPACITANCE SWITCHING KEY**

- Designed to be built into compact modern electronic equipment. Even under adverse conditions it will insure long life and the ultimate in reliable performance.

These Types Available:

- IN16A...
- IN16B...
- IN16C...
- IN16D...
- IN16E...
- IN16F...
- IN16G...
- IN16H...
- IN16I...
- IN16J...
- IN16K...
- IN16L...
- IN16M...
- IN16N...
- IN16O...
- IN16P...
- IN16Q...
- IN16R...
- IN16S...
- IN16T...
- IN16U...

**SINGLE-CRYSTAL-STABILIZED** GERMANIUM DIODES

- Featuring hermetically-sealed construction.

**HANDBOOK OF TUBE OPERATION**

72 pages booklet giving complete technical data on how to obtain longer service life from your vacuum tubes. Write Dept. 6850 for your copy.

**FEDERAL TELEPHONE AND RADIO COMPANY**

A Division of INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

100 KINGSFORD ROAD, CLINTON, N.J.


1956 ERE Directory
Federal

RADIO-TV SELENIUM RECTIFIERS

The revolutionary circuit elements that have led the way to important design advances in TELEVISION & RADIO RECEIVERS & ELECTRONIC EQUIPMENT. Whatever DC power is required there is a Federal Radio-TV Selenium Rectifier to do the job — and do it with an efficiency and reliability that is backed by the outstanding reputation of Federal—America's oldest and largest manufacturer of Selenium Rectifiers.

SELENIUM RECTIFIER EQUIPMENTS

QUALITY-BUILT MAGNETIC AMPLIFIERS
Powered by Quality Controlled

Federal

SELENIUM RECTIFIERS

Presently used in a wide range of successful applications for industry and the Armed Forces, such as:
- Voltage Control
- Temperature Control
- Current Control
- Photocell Control
- Speed Control
- Position Control
- Automatic Regulation

Federal Selenium Rectifiers, in partnership with the right magnetic components, provide magnetic amplifiers outstanding for:
- Stability
- Accuracy
- Long Life
- High Gain
- Fast Response

Low-cost Operation

Submit your magnetic or other requirements to Federal—write to Dept. F-4524.

FEDERAL’S RADIO-TV SELENIUM RECTIFIER HANDBOOK

12 pages of valuable design, characteristic and application information. Available for 50 cents (cash only).

POWER SUPPLIES: Designed to furnish a dependable and constant source of D-C power. Whether for industrial or laboratory use, these equipments are available in sizes to serve your requirements. For industrial requirements they are used to power magnetic amplifiers, basic readouts, control panels, current transformers, and also provide power for lighting magnets, relay, circuit-breakers and D-C motors.

SELENIUM RECTIFIERS

For Industrial Service. From AC to DC . . . Milliowatts to Kilowatts

Low-cost power conversion . . . efficient, dependable . . . from a-c to d-c

Introducing new, broad range adaptability in diverse fields, conditions and applications. They obtain direct current from any alternating current source. They are small, light, easy to install. They meet all needs of an unattended service.

FOR COMPLETE DATA Write for Federal’s Data Bulletins on Selenium Rectifiers. An informative guide to characteristics and applications of the industry’s most comprehensive line of high quality selenium rectifiers. Address Dept. F-4524.

The FEDERAL System of ENCAPSULATION

Federal’s method of encapsulating selenium rectifiers and allied components presents an entirely new approach to circuit and military equipment design — particularly where environmental or other unusual conditions necessitate special modifications. It is now possible to assemble transformers, capacitors, resistors and other components into complete sections or complete units of equipment. Each assembly facilitates the replacement of individual as well as entire groups of components without the necessity of time-consuming repairs. Assures excellent thermal shock characteristics and resistance to vibration and shock of the sealed unit over wide temperature ranges. Eliminates withstand low temperatures to —60°C, as well as high temperatures to plus 125°C. Send for Bulletin F-424 for complete details.

FEDERAL CONTACT PROTECTOR

The Federal’s Contact Protectors are a new way to longer life for relay contacts, eliminating circuit failure and interference caused by arcing.

1. Eliminates short circuit arcing
2. Extends Contact Life by more than 1500 times
3. Reduces circuit failures due to constant arcing (flickering, sparking, etc.)
4. Minimizes arcing interference
5. Provides an effective shield of complete circuit

Federal Telephone and Radio Company
A Division of INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

100 KINGSLAND ROAD, CLIFTON, N. J.


B 584 IRB Directory
FEDERAL VARIETY OF CABLE TYPES

Federal's cable department produces a variety of H-F cable types. Some of these cables are produced by Federal exclusively. All are made to the most exacting standards of quality and control. The materials used are the finest research has developed, assuring top electrical characteristics. Initial dielectric design and precision help to maintain stability over a wide temperature range.

SOLID DIELECTRIC COAXIAL CABLES

consist of a solid or stranded inner conductor, dielectric material, one or two copper braids, a synthetic resin protective jacket, and, in some cases, a protective armor or jacket. There are two types of solid dielectric cables:

- High-capacitance coaxial air-spaced cables
- Low-capacitance coaxial air-spaced cables

The term air-spaced refers to the fact that the dielectric material is not in contact with the conductor. One method of accomplishing this effect and still maintaining a high dielectric strength is through a construction involving an inner conductor in a tubular dielectric tube. This is made possible by means of a dielectric thread wound in a long spiral.

SPIRAL DELAY, HIGH IMPEDANCE LINES

There are four types available with delays of 1 microsecond per foot, 2 microsecond per foot, 3 microsecond per foot, and 4 microsecond per foot. Each microsecond per foot delay line is ideal for color TV use.

TELEVISION ANTENNA LEAD-IN WIRE

consists of two accurately spaced conductors over which is extended the dielectric material. These lead-in wires have no braiding, but may have an armor except in special cases. The advances in television have meant new over-the-air approaches to the design of TV lead-in to the point where it has taken many varied forms, the latest being the tubing shaped "piped-in" lead-in.

COMMUNITY TV COAXIAL CABLES

FEDERAL'S "BIG 5"...The answer to any Community TV's needs...Engineered for long life, low line loss and dependable all-weather signal transmission...over the longest link. Federal's K-14, K-11 and UGU-16 cables are the handiest and most dependable cable you can specify with utmost confidence...for Community TV Distributing Systems in any area...for any amplifier system used.

Wherever the annoying, proliferation-problems of signal leakage and reverse loss exist, the answer is Federal's new K-125 and K-126 coaxial cables. These new cables will revolutionize the entire TV cable industry. Federal's K-125 and K-126 are the primary lead-ins for fairest lowest loss, longest cable runs and fewer amplifiers required. Both K-125 and K-126 are highly recommended forCommunity TV installations.

All of the "BIG 5" are made to Federal's high standards of quality—and that means dependable, efficient transmission performance! You can depend on Federal's "BIG 5" for your Community TV installations.

Federal also manufactures many types of plastic-insulated wires and multicore cables for intercoms, telecommunications, and numerous special purposes.

COMPLETE COAXIAL CABLE ASSEMBLIES

are also available from Federal to meet your requirements. This service offers the same "Precision Production" that makes Federal the outstanding name in coaxial cables.

It's Federal for...EVERY H-F TRANSMISSION LINE REQUIREMENT

An Original Development by Federal

RG TYPE CABLES

WİTH THE NEW LOW-TEMPERATURE NON-COATING THERMOPLASTIC JACKET

Federal is supplying low temperature non-coriolis-jacketing cables on all cable types which now call for it and will also supply such compounds for specific cables to meet custom's requirements. The low temperature, non-contaminating jacket was an original Federal development.

The new RG types are outstanding for their longer service life under the most adverse conditions. Their non-contaminating feature means there is no degradation in dielectric strength due to molecular migration.

New HR* WIRES

14 to 24 AWG

High impact strength, resists thermal shock. Impermeability to the action of corrosive and highly resistant to most organic solvents. Water absorption is nil therefore the copper formations and surface finish are maximized. Low cold flow. Covers a wide temperature range (-25 C - 150 C) to cover any application for heat and cold applications. These wires are resistant to lower temperatures and higher temperatures for short periods.

TEFLOL INSULATED WIRED AND CABLES

Your inquiries are invited as these new Federal wires and cables. "Your Fantasy"

FOR COMPLETE DATA

Write Federal's Coating on H-F Cables. An informative guide to characteristics and applications of the industry's most comprehensive line of high quality H-F Cables. Address Dept. D-1014.
problems?

Keystone custom-engineer the most effective solution

When just an ordinary transformer or magnetic amplifier won't do, call on Keystone—a leading producer of custom-engineered equipment to meet unusually difficult specifications.

Standard or substandard transformers available to provide unique electronic accuracy, special quality, lower weight, or other critical factors.

No Keystone "Mole Mag" pre-designed magnetic amplifiers pick problems before they get started—save precious engineering time. By utilizing these pre-engineered "Mole Mags" in servos, computers, remote control devices, and other variable phase power units you'll save planning headaches and production dollars.

We'll be glad to demonstrate how "Mole Mags" can work effectively for you.

Write, wire or phone for additional details, technical information and quotes—now!

Keystone Products Company
Union City, N. J. Union 6-5400

NEW! PORTABLE DIRECT READING SPECTRUM ANALYZER

- 10 TO 22,000 MCS
- ONLY 3 R.F. HEADS
- SINGLE DIAL TUNING

Now, a new Polrad spectrum analyzer only 21 inches high that covers the entire frequency range 10 to 22,000 mcs with 3 interchangeable R-F tuning heads. The model TSA operates simply—one dial frequency control—with internal frequency stability. It provides highest accuracy, and reliability for observer and true evaluation of performance over the entire R-F spectrum—saving engineering manhours.

This instrument is designed for maximum utility and versatility in the laboratory and on the production line providing an easy-read 6 inch CRT display of the R-F spectrum.

The model TSA Spectrum Analyzer has these exclusive Polrad design and operating features:

- Single frequency control with direct reading dial. No klystron modes to set. Tuning dial accuracy 1%.
- Only three interchangeable R-F tuning units for the entire frequency range 10 to 22,000 mcs.
- Temperature compensation of Klystron Oscillator.
- Switch if provides 290 kc to 25 mc display independent of R-F frequency setting.
- Internal R-F attenuator.
- Frequency markers for measuring frequency differences from 100 kc to 25 mc.

Write today to your nearest Polrad representative, or directly to the factory for complete information.

Electronics Corporation
260 Metropolitan Avenue, Brooklyn 32, New York

1955 IBE Directory

1955 IBE Directory
Federal's cable department produces a variety of H-F cable types. Some of these cables are produced by Federal exclusively. All are made to the most exacting standards of quality and control. The materials used are the finest research has developed, assuring top electrical characteristics. Initial dimensional precision helps to maintain stability over a wide temperature range.

SOLID DIELECTRIC COAXIAL CABLES

(a solid or stranded inner conductor, dielectric material, one or two copper wire braids, a synthetic resin protective jacket and, in some cases, a protective armor)

LOW-CAPACITANCE COAXIAL AIR-SPACED CABLES

have a construction similar to that of the solid dielectric types, except that air is used in place of the dielectric. One method of accomplishing this effect and still maintaining a high dielectric strength is through a coax metal braid. Dual coaxial cables are similar in construction involving an inner conductor in a thin-walled dielectric tube. This is achieved by means of a dielectric thread wound in a long spiral.

SPIRAL DELAY, HIGH IMPEDANCE LINES

There are four types available with delay of 1 microsecond per foot, 1 microsecond per foot, 1 microsecond per foot delay line is ideal for color TV use.

TELEVISION ANTENNA LEAD-IN WIRE

consists of two accurately spaced conductors over which is extruded the dielectric material. These lead-in wires have no braid, jacket or armor except in special cases. The advantages second per foot. 1 microsecond per foot delay line is ideal for color TV use.

SPECIAL CABLE PROBLEMS

Federal Telephone and Radio Corp. maintains a stock of most of the required types. When requirements are so special that they cannot be met by Federal's cable types, Federal research and engineering facilities are readily available to develop any new cable constructions. Charges are based on quantity. Special Orders—like all Federal production—are executed under the high standards maintained by Federal "Quality Control." Every length of cable is carefully checked to see that it meets all tests indicated for the type ordered. Tensile, heat resistance, moisture resistance, dielectric strength, cold- and hot-water performance, all of the "50" type are made to Federal's high standards of quality and are the most dependable, all-weather transmission performance.

COMMUNITY TV COAXIAL CABLE

FEDERAL'S "BIG 5". The answer to any Community TV cable problem... Engineered for long life, low loss and DEPENDABLE all-weather signal transmission... over the longest link. Federal's K-14, BL-111 and RG-59/U are the H-F cables you can specify with confidence. Community TV Distributing Systems in any area... for any amplifier system used.

When the annoying, pre-existing problems of signal leakage and revenue loss exist, the answer is Federal's new K-125 and K-126 non-multiplying amplifiers for RG-11/U and RG-59/U used in conjunction with Federal's K-14-the primary leading licensee for lowest line loss, low cable cost and fewer amplifier requirements. Both K-125 and K-126 are double-shielded and double-insulated.

All of the "50" type are made to Federal's high standards of quality and that means dependable, all-weather transmission performance.
The revolutionary circuit elements that have led the way to important design advances in TELEVISION & RADIO RECEIVERS & ELECTRONIC EQUIPMENT wherever DC power is required there is a Federal Radio-TV Selenium Rectifier to do the job... and do it with an efficiency and reliability that is backed by the widest reputation of importance - America's oldest and largest manufacturer of Selenium Rectifiers.

### SELENIUM RECTIFIER EQUIPMENTS

#### QUALITY- BUILT MAGNETIC AMPLIFIERS

**Powered by Quality Controlled Federal**

**SELENIUM RECTIFIERS**

- Presently used in a wide range of successful applications for industry and the Armed Forces, etc.
  - Voltage Control
  - Temperature Control
  - Position Control
  - Speed Control
  - Current Control
  - Automatic Regulation

**Federal Selenium Rectifiers**

- In partnership with the highest magnetic components, provide Magnetic Amplifiers outstanding performance.
- Stability
- Accuracy
- Long Life
- High Gain
- Fast Response

### POWER SUPPLIES

- Designed to furnish a dependable and convenient source of DC power.
- Whether for industrial or laboratory use, these equipments are available in sizes to meet your requirements. For industrial requirements they are used to power magnetic amplifiers, checkers, buzzers, relays, meters, motors, etc.
- Additionally, they provide power supply for lighting, sensitivity, switchers, and general DC devices.

#### Federal's RADIO- TV SELENIUM RECTIFIER HANDBOOK

80 pages of valuable design data, specifications, and application. Available for 50 cents (coin only).

### FEDERAL'S SELENIUM RECTIFIER DIVISION

**THE SELENIUM RECTIFIER DIVISION**

**Offers Its Outstanding Engineering and Manufacturing Facilities to GOVERNMENT CONTRACTORS**

The Selenium Rectifier Division of Federal—the nation's headquarters for selenium rectifiers—is ready to serve you with start-to-finish production of power supplies, battery chargers, voltage regulators, engine starters, cathode protection, and other units—compact, rugged, quiet, dependable power equipment designed for any DC output.

Federal knows selenium rectifiers. Federal has unmatched power conversion experience... on experience backed by years of successfully meeting the rigid requirements of contracts for military equipment. And Federal has the capacity to deliver your orders—when you want them!

Mail us your specifications today!

### HIGH VOLTAGE Selenium Rectifiers

**FOR INDUSTRIAL SERVICE FROM AC TO DC... MILLIAMPS TO MILLIAMPS**

- Low-cost power conversion... efficient, dependable, ...from a-c to d-c.
- Introducing new, broad range adaptability in diverse fields, conditions, and applications. They obtain direct current from any alternating current source. They are small, light, easy to install. They meet all needs of an unattended service.

#### FEDERAL'S CONTACT PROTECTOR

Federal's Contact Protectors are a sure way to longer life for relay contacts, eliminating circuit failure and interference caused by arcing.

1. Separates contact arcing
2. Extends Contact Life by over 1000 times
3. Eliminates high voltage... by contact arcing
4. Aluminum wire... reduces arcing... reduces interference
5. Low resistance... allows full load current... to meet all AIEE specifications.

**FEDERAL TELEPHONE AND RADIO COMPANY**

A Division of INTERITIONAL TELEPHONE AND TELEGRAPH CORPORATION

100 KINGSFORD ROAD, CLINTON, N.J.

**1954 SBE Directory**

**1954 SBE Directory**
**FEDERAL VARIETY OF CABLE TYPES**

Federal's cable department produces a variety of H-F cable types. Some of these cables are produced by Federal exclusively. All are made to the most exacting standards of quality and control. The materials used are the finest research has developed, assuring top electrical characteristics. Uniform design and accurate tolerances are the specific methods used to maintain quality from one lot to another.

**SOLID DIELECTRIC COAXIAL CABLES**

consist of a solid polyethylene inner conductor, dielectric material, one or two copper wire braids, and a polyethylene protective jacket. In some cases, a protective armor is used.

**LOW-CAPACITANCE COAXIAL AIR-SPACED CABLES**

have a construction similar to that of the solid dielectric types, except that air is used in place of the dielectric. One method of accomplishing this effect and still maintaining a high dielectric strength is through an air gap between strands of metal braid. Dual coaxial cables are similar in design to the solid dielectric types, except that two accurately-spaced inner conductors are used, in some cases, a protective armor is used.

**SPECIAL CABLE PROBLEMS**

consist of accurately-spaced conductors which are insulated with dielectric material. These lead-in wires have no braids, and no armor except in special cases. The advances in television have meant ever newer approaches to the design of TV lead-in to the point where it has taken many varied forms, the latest being the fumbling shaped “piping” lead-in.

**COMMUNITY TV COAXIAL CABLE**

“FEDERAL’S BIG ‘S’”

The answer to any Community TV Lead-In problem ... engineered for long life, low line loss and DEPENDABLE all-weather signal transmission ... over the longest link. Federal’s K-14, K-11, and K-99 are the K-30 coaxial you can specify with confidence for the Community TV Distribution Systems in any area where... for any amplifier system used.

Whenever the amenity, playing problems of signal leakage and service loss exist, the answer is Federal’s new K-125 and K-126 non-reflecting alternatives for RG-11/U and RG-9/U used in conjunction with Federal’s K-14 or K-11 are the primary lead-in feeders for lowest line loss, long cable runs and fewer amplifiers required. Both K-135 and K-136 are double-shielded and doubled-protected.

All of the “Big ‘S’s” are made to Federal’s high standards of quality — and they mean dependable, Trouble-free transmission performance.

**COMMUNITY TV COAXIAL CABLE**

Principal characteristics of Federal’s “Big ‘S’” of Community TV

<table>
<thead>
<tr>
<th>Type</th>
<th>OD (in.)</th>
<th>Thickness (mil.)</th>
<th>DC &amp; 100GHz</th>
<th>Jacket</th>
<th>Weight per 1000 ft. (lbs.)</th>
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<tbody>
<tr>
<td>K-14</td>
<td>0.125</td>
<td>0.002</td>
<td>1.5</td>
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<td>2.8 lb</td>
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<td>0.135</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-136</td>
<td>0.135</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
</tbody>
</table>

**TELEVISION ANTENNA LEAD-IN WIRE**

There are four types available with delays of 1 microsecond per foot. 1 microsecond per foot delay line is ideal for TV use.

<table>
<thead>
<tr>
<th>Type</th>
<th>OD (in.)</th>
<th>Thickness (mil.)</th>
<th>DC &amp; 100GHz</th>
<th>Jacket</th>
<th>Weight per 1000 ft. (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-25</td>
<td>0.125</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-26</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-27</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-28</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-29</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-30</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-31</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
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<tr>
<td>K-32</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-33</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
<tr>
<td>K-34</td>
<td>0.122</td>
<td>0.002</td>
<td>1.5</td>
<td>0.15</td>
<td>2.8 lb</td>
</tr>
</tbody>
</table>

**TERMINAL INSULATED WIRE AND CABLES**

Your inquiries are invited on these new Federal wires and cables.

*Over Insulated*
NEW! PORTABLE DIRECT READING SPECTRUM ANALYZER

- 10 TO 22,000 MCS
- ONLY 3 R.F. HEADS
- SINGLE DIAL TUNING

Now, a new Polarad spectrum analyzer only 21 inches high that covers the entire frequency range 10 to 22,000 mcs with but 3 interchangeable R-F tuning heads. The model TSA operates simply—a single dial frequency control—yet maintains the utmost frequency stability. It provides highest accuracy and reliability for observation and true evaluation of performance over the entire R-F spectrum—saving engineering headaches.

This instrument is designed for maximum utility and versatility in the laboratory and on the production line providing an easy-to-read 5 inch CRT display of the R-F spectrum.

The model TSA Spectrum Analyzer has these exclusive Polarad design and operating features:

- Single frequency control with direct reading dial. No Klystron modes to set. Tuning dial accuracy 1%.
- Only three interchangeable R-F tuning units for the entire frequency range 10 to 22,000 mcs.
- Temperature compensation of Klystron Oscillator.
- Swept IF provides 250 kc to 25 mc display independent of R-F frequency setting.
- Internal R-F attenuator.
- Frequency marker for measuring frequency differences from 100 kc to 25 mc.

Write today to your nearest Polarad representative, or directly to the factory for complete information.

ELECTRONICS CORPORATION
200 PETROLYTE AVENUE, BROOKLYN 1, NEW YORK

1956 AIEE Directory

1954 AIEE Directory
Polarad
COLOR TV & B/W EQUIPMENT

TV PICTURE AND SIGNAL GENERATING EQUIPMENT

- Color Synchronizing Generator – Model PT-201
  - Provides both 1562.5 and 1050.0 color TV subcarrier frequency components and converts dither network to yield 31.5 Kc signal.
  - Provides driving, blanking, and synchronizing signals, as well as a vertical and horizontal dot for linearly checking.
  - Sustainability assured by driving all signals through a high lead-edge of crystal controlled oscillator.

- Color Bar Generator – Model PT-208
  - Provides color TV bar signals, NTSC standard for color TV equipment, networks, components, and systems.
  - Complete composite video signals in the form of seven fundamental color bars systemically and in the position of gamma bars.

- Bar & White Synchronizing Generator – Model PT-104
  - Same as color synchronizing generator, furnished without subcarrier frequency generator.

- Subcarrier Frequency Generator – Model PT-102
  - Modifies any existing standard (B/W) synchronizing generator in accordance with NTSC color TV standards by supplying NTSC color subcarrier frequency of 3.575 Kc ± 0.0005%, plus contains dither network to yield 31.5 Kc signal.

- Video Monitor – Model M-500
  - Color video monitor and portable units.

- Studio Picture Monitor – Model M-105
  - A portable instrument used to check the picture quality of video signals in color black/white or color television systems.

- Portable Wave Form Monitor – Model PB-1
  - Portable in-situ instrument for waveform analysis and amplitude measurement of TV and color TV signals in television circuits.

- Other Monitors Available
  - Model M-102: High-quality picture and wave form monitor.
  - Model M102/PS-10: Synchronizing signal, portable monitors.

- Power Supplies
  - Model No. Output Voltage Output Current
    - PT-101 400-450 V 250-300 mA
    - PT-102 350-300 V 150-200 mA
    - PT-110 350-300 V 150-200 mA
    - PT-110B 350-300 V 150-200 mA
    - PT-120 350-300 V 150-200 mA

During the past 20 years Collins Radio Company has pioneered many of the outstanding advancements in the radio-communication and electronics industry. Collins engineers had to develop unique and unusual systems and components to meet the superior standards of Collins equipment. These components, plus application recommendations, are now available in the electronics industry. Collins industrial components can help you. Send the coupon below for complete information.

MECHANICAL FILTERS

Concentrator, permanently tuned band pass filters for intercom frequency amplifier applications. Mechanical elements of the filter provide characteristics close to the ideal rectangular selectivity curve. It is a beautifully designed component requiring no adjustments. Selectivity curves for two of the 25 standard Mechanical Filters are reproduced at right.

COLLINS HYSTERESIS MOTORS

Collins Hysteresis Motors are long famous for their accuracy and stability. Collins Variable Frequency Oscillators are now available. They give transmitter, receiver, frequency standards, or test equipment accurate linear dial calibration and superb stability. Collins Oscillators are available in a number of frequency ranges.

COLLINS OSCILLATORS

Collins Oscillators are long famous for their accuracy and stability. Collins Variable Frequency Oscillators are now available. They give transmitter, receiver, frequency standards, or test equipment accurate linear dial calibration and superb stability. Collins Oscillators are available in a number of frequency ranges.

COLLINS AUTOTUNES AND AUTOPositioners

Collins Autotunes, the bases for both manually and directly controlling automatic tuning of high-quality communication equipment, are in use by many industrial applications. Collins Autopositioners are used in this type or more, pre-determined, fixed positions are needed. Available as individual units or in complex systems.

Collin's RADIO COMPANY

Cedar Rapids, Iowa
115 W. 53rd Street, NEW YORK 26
1950 Collins Drive, DALLAS 6
2700 W. Collins Avenue, BURBANK
COLLINS RADIO COMPANY OF CANADA, LTD.
26 Sparks St., OTTAWA, ONTARIO

Please send complete information on:
- Mechanical Filters
- Oscillators
- Hysteresis Motors

NAME

Company

CITY

STATE

43
AMERICAN TELEPHONE & TELEGRAPH COMPANY

RADIO-ELECTRONIC

AM by COLLINS

broadcasting

amateur

aviation

EQUIPMENT

COMMUNICATIONS RADIOS

51V-2 Glide Slope Receiver

Approach Horns

and Course

Indicator

F-110

Integrated Flight

System

310 Series

Communication Transmitter

54K-2 2-Channel

Communication Transmitter

320-240 Watt

Transmitter

310-240 Watt

Transmitter

BROADCAST TRANSMITTERS

AM

500

1000/500 watts

250

500/250 watts

125

250/125 watts

63

125/63 watts

SPEECH EQUIPMENT AND ACCESSORIES

Collins complete line for AM and FM broadcasting is listed in the Collins Speech Equipment Catalog. It provides a wide variety of high-quality speech

transmitters, receivers, talk-and-listen units, talk-and-listen apparatus, transducers, power supplies, control panels, and auxiliary equipment in

every model and price range, so that it is possible to build a new station or to

upgrade your old one. Collins Speech Equipment Catalog is a standard reference work. Your nearest Collins office will be glad to supply a copy to your station upon request.

AMATEUR EQUIPMENT

Collins Model 51V-2 incorporates the Collins Mechanical Filter in a new concept in receiver performance. Eiffel, or 500-cycle bandwidth selectable by a front-panel switch. AM signals can be tuned to accept the carrier and either one of the two side bands or both. Ideal for reception of single sideband signals.

51V-2 Antenna Receiver

618S 144-Channel HF Transmitter

510C 300-Channel VHF Communication Receiver

Squint radiation and harmonic interference kept to a minimum. 174 MHz Shortwave Transmitter, full 500-channel coverage in steps of 100 kHz, 30 watt power

output with phone emission. Meets ARPAN Spec. 5220. 510C 300-Channel VHF Transmitter, completely new design to meet ARPAN Spec. 5220 for 43

kHz bandwidth. Has the sensitivity, stability and spurious response rejection characteristics required for flag and airport traffic control.

512 Mark V Receiver is completely dependable, highly sensitive and free from spurious response. Operating with minimum "rejection" indication.

27C-2 VHF Airborne Communication System, for use with Collins VHF Transmitter. Dual, 255 kHz at 350 mc, single, 780 kHz at 150 mc.

57V Airborne Communication System, for use with Collins VHF Transmitter. Complete is a fixed glide slope system.

36V-2 Glide Slope Receiver, equipped with Collins VHF Antennas mounted on the fuselage, and provides great improvement in take-off and landing performance.

51V-2 Glide Slope Receiver is designed for reception of 90/150 c.p. modulated glide slope signals on any of the twenty channels in the VHF range. Typically approaches presents unique moving information in conjunction with simplified cockpit instruments.

Collins NC-401 Navigation System, provides the pilot continuous position information by automatically utilizing two VOR systems.

In requesting complete technical information on any Collins products please specify equipment type number.

For engineering excellence in Radio-Electronic equipment —

COLLINS RADIO COMPANY

11 W. 42nd St., NEW YORK 36

2013 Hi-Line Drive, DALLAS 2

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1000/500 watts

500/250 watts

250/125 watts

125/63 watts
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Get this booklet by return mail

and find out why Collins Microwave will serve you best.

You'll want all the facts in this informative booklet, but this is the story in a nutshell. Collins can do your communications and remote control jobs better because they're specialists in radio-electronic design and manufacture. Collins' extensive experience and success in the aviation, broadcast and amateur radio fields supply the required background and facilities to deliver microwave systems that represent the ultimate in dependability.

If your plan includes the use of Microwave, be sure you get assured performance and quality. Why not mail the coupon now.

COLLINS RADIO COMPANY  Cedar Rapids, Iowa
21 W. 42nd St., NEW YORK 16 2000 Hill Ave., DALLAS 2 2700 W. Olive Ave., BURBANK Collins Radio Company of Canada, Ltd., 74 Sparks St., OTTAWA, ONTARIO
With its comprehensive line of Precision Microwave Test Equipment, FXR has developed a new, fast-on-the-approach to the problems of microwave measurement. Every FXR product has been carefully evaluated in the light of latest advanced developments, the greatest accuracy and convenience in use, and the cost-conscious needs of the quality-conscious engineer who employs it... on the laboratory and on the production line. A large, fully equipped FXR plant... a well-rounded, growing staff of seasoned engineers... are capable of fulfilling your exact requirements with the fastest service in the industry, at costs well below the "it-and-wait" variety.

**PRECISION SLOTTED SECTIONS**

<table>
<thead>
<tr>
<th>TYPE NO.</th>
<th>FREQUENCY RANGE (GHz)</th>
<th>BARREL TYPE</th>
<th>CRYSTAL TYPE</th>
<th>USED WITH FXR SLOTTED SECTIONS</th>
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</thead>
<tbody>
<tr>
<td>6020A</td>
<td>1.00 to 1.443</td>
<td>531</td>
<td>5368</td>
<td>5368A, 6020A</td>
</tr>
<tr>
<td>6020A</td>
<td>1.00 to 1.443</td>
<td>531</td>
<td>5368</td>
<td>5368A, 6020A</td>
</tr>
<tr>
<td>6020A</td>
<td>1.00 to 1.443</td>
<td>531</td>
<td>5368</td>
<td>5368A, 6020A</td>
</tr>
</tbody>
</table>

*See Waveguide Test Equipment Chart for 1/2" to 2" series.

**SPECTRUM ANALYZERS**

**SPECIFICATIONS SUMMARY**
- Frequency Range: 87 MHz
- Resolution: 3 µHz
- Display: 9 digit
- Accuracy: ±0.05%
- Sweep Time: 0.1 to 100 sec
- Resolution: 3 µHz/0.1 sec
- Visible Pulses: 0.1 to 2 sec
- Choice of Cables: 50 ft G6000

**STANDING WAVE AMPLIFIER**

**SPECIFICATIONS SUMMARY**
- Variable bandpass amplifier 100 MHz to 100 GHz
- Adjustment: 0.5 to 100 MHz
- Gain: 20 dB
- 6 dB Bandwidth: 100 MHz

**TRANSMISSION LINE STANDS**

**TYPE NO.**

<table>
<thead>
<tr>
<th>WAVEGUIDE TEES AND BENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>50A</td>
</tr>
<tr>
<td>50B</td>
</tr>
<tr>
<td>*See Waveguide Test Equipment Chart.</td>
</tr>
</tbody>
</table>

**OTHER AVAILABLE (FXR) UNITS**

- Coaxial Detector: 530A
- Waveguide Transmitter: 5301A
- Waveguide Shorter: 5302A
DIRECT READING
Frequency Meters

DEIGNED for easier,
hem accurate readings...

Tried and true—the FXR Type 410A
Direct Reading Frequency Meters give you
bull's-eye accuracy, right to the exact reading
spot. No more jiggling of many dials, no more
complicated calculations. Human error
factor is eliminated. These dependable
FXR units provide the most convenient means
available for determining oscillator
frequency in the microwave region.

- 0.01% ACCURACY
- FULL WAVEGUIDE FREQUENCY RANGE
- DIRECT READING
- HIGH Q
- NOMINAL 20% ABSORPTION DIAL
- BACKLASH-FREE OPERATION

DELIVERY FROM STOCK • PRICE $125 EACH

Write today for new catalog of complete line of
FXR Precision Microwave Test Equipment

SLotted SECTIONS
PROBES
VSWR AMPLIFIER
SPECTRUM ANALYZERS

Electronics & X-Ray Division
F-R MACHINE WORKS, Inc.
20-12 BOROUGH PLACE, WOODSIDE 77, N.Y.

*Data and prices subject to change without notice.

Eclipse-Pioneer
Reference Catalog of Precision Components for
SERVO-MECHANISM and COMPUTING EQUIPMENT

ECLIPSE-PIONEER DIVISION
TETERBORO, NEW JERSEY
Unit Instruments and Coaxial Accessories for VHF-UHF Measurements

on Antennas, Lines, Coaxial Components, Lumped and Distributed Networks and Circuits

The compact and inexpensive instruments listed on these pages permit rapid and accurate measurements of impedances, VSWR, Reflection Coefficient, Voltage, Power and Attenuation. Their versatility, ruggedness and customer care make them extremely adaptable to laboratory or field use.

Illustrated above are typical examples of our line of standard and special electronic items currently being produced for leading manufacturers.

31 East Second Street, Mineola, N.Y.

ELECTRONIC AND MECHANICAL ENGINEERING CONSULTING SERVICE AVAILABLE

The Type 1102-B Admittance Meter is a versatile instrument for the rapid and accurate measurement of admittances, impedance or VSWR over a 2 to 1500 Mc range — direct reading between 41 and 1500 Mc. It can be used to match a load to a line, to compare directly the impedances of two circuits or components at the same time without measuring one at a time, or to test other, as well as for direct impedance measurements.

The Type 411 Connector is the basis for G.F.'s completely integrated system for measuring and adjusting the field of these connectors plug smoothly into each other, completely eliminating the need for male and female plug - electrical uniformity is excellent! All units are designed for use on 600 ohm systems.

The Field of Application for the Admittance and Impedance Meter is much expanded due to the unique accessories now available for measurements on antennas, lines, coaxial components, and lumped and distributed networks.

The Compact-Impendance Admittance Meter simplifies impedance measurements and eliminates line-length reflections between measuring points and unknowns — the Dumb and New Admittance to and from transmission lines make possible accurate measurements on balanced or unbalanced, distributed and distributed transmission systems — The Component Mount and Insert Unit provide a means for accurate high-frequency measurements of resistors, capacitors, inductors — a variety of Adapter permits connection to all commonly used systems.

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**Unit oscillators**

are compact and highly-efficient sources of power for minimum variability. They are ideally adapted for use in industrial laboratory or college experimentation class. One Type 120-A Power Supply and several oscillators are sufficient for maximum coverage at minimum cost.

| Type 120-A Flow Oscillator | 120-2 to 60 Hz | $100.00
| Type 120-A Flow Oscillator | 60-250 Hz | $150.00
| Type 120-A Flow Oscillator | 250-920 Hz | $200.00

**GENERAL RADIO Company**

275 Massachusetts Avenue, Cambridge, Mass., U.S.A.

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8056 13th St., Silver Spring, Md. WASHINGTON, D.C.
920 S. Michigan Avenue CHICAGO 9
1000 N. Second Street PHILADELPHIA 19

**CONTINENTAL-DIAMOND FIBRE CO.**

HELFPS YOU IMPROVE DESIGN
HELPs YOU SIMPLIFY PURCASHING
HELPs YOU SPEED PRODUCTION

**METHAL CLADS**

For Printed Circuit Metal Clad Stock

Metal Clad laminates are finding wide use in printed circuit applications. Printed circuit technique involves the printing of an electronic circuit upon a metal clad laminate surface using an acid resisting ink. In a subsequent acid etching operation, the unwanted metal foil surface which is not under the printed portion of the foil, is etched away leaving only the circuit pattern or, that part of the metal foil which is under the inked portion of the laminate. Write for technical bulletin.

**Dillecto METAL CLADS**

Printed circuits depend upon stable, uniform core material and Dillecto has years of proven insulation service. Dillecto is a laminated thermo-setting plastic made only by C-D-F from paper, cotton, glass or asbestos fiber, a mix. Usually, normal, the better electrical grades of phenolic resins laminates, such as grades XXXP-24 and XXXP-16, are used for metal clad sheet stock. Other grades such as XXXP-30, XXXP-35, or XXXP-35A may be supplied with copper clad sheet upon special order. Outstanding are copper clad Dillecto grades XXXP-24 and XXXP-16. These are the best bonding grades with high insulating properties. Any C-D-F Catalog gives complete data on these and other Dillecto grades including glass base metal clad laminates. Write for your copy today.

**Teflon® METAL CLADS**

Glass fiber cloth is coated with Teflon resin and laminated into C-D-F. GB-1127 sheet stock. This base withstands high heat (200°C, maximum operating temperature) with the dissipation factor and dielectric constant low over a wide frequency range. The adhesive film used to bond the metal to the Teflon laminate does not degrade the inherently good electrical properties of the core material. GB-1127 has practically zero water absorption, so a METAL CLAD with this core offers consistent high insulation resistance with excellent dimensional and electrical stability.

* Du Pont Trade Mark.

**MICABOND**

Only the finest mica splittings are used in Micabond types, plates, tubes and fabricated parts. They are plated for completely leakproof coverage, with mica splinters used. Available in a wide range of sizes with many different thicknesses including fiberglass, silk, cellulose, glass, and paper. Micabond tapes are band-laid. Flexible sheets are both hard and machine-laid, both retain their electrical insulating properties at elevated temperatures.

**C-OF**

HELPS YOU IMPROVE DESIGN HELPS YOU SIMPLIFY PURCHASING HELPS YOU SPEED PRODUCTION

**CONTINENTAL-DIAMOND FIBRE CO.**
For every application in electronic manufacturing, DILECTO vulcanized fibre is a versatile material. It is a non-magnetic, non-conductive, non-flammable, and non-toxic material that is ideal for use in electronic applications. It is available in a variety of thicknesses and colors, and can be easily machined and formed to fit specific needs.

OUTSTANDING PROPERTIES
- Heat Resistance: Due to the non-flammability and high heat resistance of DILECTO, it can withstand the high temperatures of electronic equipment.
- Moisture Resistance: DILECTO is unaffected by humidity and moisture, making it ideal for electronic applications.
- Chemical Inertness: DILECTO is resistant to most chemicals, making it a versatile material for various applications.
- DILECTO TECHNICAL DATA

**DILECTO Vulcanized Fibre**: A versatile material for electronic applications. It is non-magnetic, non-conductive, and non-toxic. It is available in a variety of thicknesses and colors, and can be easily machined and formed to fit specific needs.

**DILECTO TECHNICAL DATA**
- **Thermal Conductivity**: 0.035 W/m°C
- **Dielectric Constant**: 3.5
- **Dielectric Loss Factor**: 0.005
- **Flammability Rating**: Non-flammable
- **Maximum Operating Temperature**: 200°C

**DILECTO INSTALLATION**
- **Fasteners**: Use self-tapping screws and nuts.
- **Washing**: Use warm water and mild detergent.
- **Curing**: Cured at 120°C for 6 hours.

**DILECTO Fab**
- **Availability**: Available in a variety of thicknesses and colors.
- **Applications**: Ideal for use in electronic applications.

**DILECTO Vulcanized Fibre**
- **Applications**: Ideal for use in electronic applications.
- **Electrical Properties**: Non-magnetic, non-conductive, and non-toxic.
- **Physical Properties**: High heat resistance, moisture resistance, and chemical inertness.

**Technological Properties**: DILECTO vulcanized fibre is a non-magnetic, non-conductive, non-flammable, and non-toxic material. It is available in a variety of thicknesses and colors, and can be easily machined and formed to fit specific needs.

**RESIN-IMPREGNATED FIBRE**
- **Materials**: Only DIJECTO vulcanized fibre is supplied in sheets, tubes, rods, and fabricated parts. The material has been formulated to be used in a specific resin. It is certified and approved by the Underwriters Laboratories as Class A Insulation. Internal over-burnout is not a concern since this material is designed for use in a resin matrix and not for direct mechanical and chemical interaction.

**CONTINENTAL-DIAMOND FIBRE CO.**
- **Contact**: For more information, please contact CONTINENTAL-DIAMOND FIBRE CO., 1954 IBE Directory.
NEW INDICATING FUSE POSTS FOR 3AB & 3AG FUSES

Fulfilling a need for a fuse post which indicates by means of a light when a fuse is blown, Littelfuse has developed a line of Indicating Fuse Posts in ratings up to 15 amperes and 500 volts. In normal use the indication light, located in the extractor knob, is shuttled by the fuse and does not light. When the fuse blows, the open circuit voltage is thrown across the lamp which then lights, indicating that the fuse is blown.

DESIGN FEATURES

1. Smallest on the market: 21/2" overall, 1/2" above panel, 1/8" below panel, including the solder terminals.
2. The most positive indication: Light is completely above panel to provide 360° indication from any angle.
3. Rugged: Molded black high strength bakelite body; tough translucent nylon non-breakable knob at finger tip design. No sharp points or nails.
4. Can be manufactured to meet government requirements of waterproofing and fuses resistance.
5. Mounts at 5/16" maximum center to center, dimension. Knob, 15/32" O.D., body mounts in 1/4" diameter "D" non-turning hole; 1/4-18 thread on holes.
6. Field installable fuse with knob removal.
7. Contact pressure on fuse 5 to 8 lbs.
8. When the lamps are n blown with the fuse, the minimum rating ½ amperes, maximum 15 amperes as above.
9. For standard commercial application a half twist bayonet type of lamp between knob and body will be used. Where it is desirable and necessary, the unit will include and/or waterproofing from front panel, "D" rings will be added between the lamp and the body and between the body and the panel, and the locking design will be changed to a threaded screw type instead of the bayonet style.
10. Identification: In order to provide positive identification of each different voltage range, the knob and the body will be clearly marked. This avoids the necessity for non-interchangeability between ranges, and/or color coding.
11. Both solder terminals grade from the bottom of the unit for easier assembly in equipment.

The post will be available for all different voltage ranges as follows:
- 6-8 watts using an incandescent lamp.
- 10-32 watts using an incandescent lamp.
- 32-48 watts using an incandescent lamp.
- 90-120 watts using a neon lamp.
- 125-250 watts using a neon lamp.
- 250-500 watts using a neon lamp.

The variety of voltage ranges provides maximum light intensity and long life. Lamps provided by series resistors.

LITTELFUSE
Des Plaines, Ill.

investigate the advantages of Type JL RMC DISCAPS

More and more of the leading electronics, radio and TV manufacturers are specifying Type JL DISCAPS as the ideal cost-saving replacement for paper or general purpose wire capacitors. In addition to a lower initial cost, Type JL DISCAPS feature smaller size and greater mechanical strength which make them economical in production assembly.

This series is manufactured in a wide range of capacitances and offers exceptional stability over an extended temperature range. The maximum capacity change between -60° C and +125° C is only ±7.5%, of capacity at 25° C. Type JL DISCAPS have a standard working voltage of 1000 V.D.C. and are available in tolerances of ±10% or ±20%.

Our engineers are prepared to work with you on problems requiring standard or special types of ceramic capacitors, write today.

RADIO MATERIALS CORPORATION
GENERAL OFFICE: 3323 N. California Ave., Chicago 18, III.

FACTORIES AT CHICAGO, ILL. AND ATTICA, IND.
Stable Capacity DISCAPS TYPE JL
Extended Temperature Range
Close Tolerance

SPECIFICATIONS
POWER FACTOR: 1.5% Max. @ 1 K C (below)
POWER FACTOR: 2.5% Max. @ 1 K C, other humidity
WORKING VOLTAGE: 1000 V.D.C.
TEST VOLTAGE (RMS): 2000 V.D.C.
LEADS: No. 23 tinned copper (2025 dia.)

INSULATION: Dura phenolic—room-temperature
- After humidity: Guaranteed higher than 7500
- Capacity: ±10% to ±20% or ±25% ± C

...the MONEY SAVING Replacement
for Mica and Tubular Ceramic Condensers

HIGH VOLTAGE DISCAPS
for yoke and other applications

SPECIFICATIONS
POWER FACTOR: 1.5% Max. @ 1 K C (below)
POWER FACTOR: 2.5% Max. @ 1 K C, other humidity
WORKING VOLTAGE: 2000, 3000, 4000, 5000, 6000 V.D.C.
TEST VOLTAGE (RMS): 8000, 12000, 16000, 20000 V.D.C.
LEADS: No. 22 tinned copper (2025 dia.)
INSULATION: Dura phenolic—room-temperature
- After humidity: Guaranteed higher than 7500
- Capacity: ±5% to ±20% or ±25% ± C

Now available in any capacity between 5 MMF and 330 MMF

Heavy-Duty By-Pass DISCAPS TYPE B

Temperature Compensating DISCAPS TYPE C

RMC DISCAPS

DISCAP CERAMIC CAPACITORS

RADIO MATERIALS CORPORATION
GENERAL OFFICE: 3235 N. California Ave., Chicago 18, Ill.
FACTORIES AT CHICAGO, ILL. AND ATTICA, N.Y.

1954 IRE Directory
for critical voltage applications...

RMC HIGH VOLTAGE DISCAPS®

**HIGH VOLTAGE DISCAPS for yoke and other applications**

RMC DISCAPS assure the voltage safety factor required in deflection yoke or special electronic applications. These RMC high voltage DISCAPS are rated at 1000, 2000, 3000, 4000, 5000, and 6000 volts DC.

Now available in any capacitance between 5 MFF and 10000 MFF, their smaller size and lower initial cost offer definite production ease and overall savings.

If you want proof that DISCAPS are the outstanding ceramic capacitors write us about your specific requirements and we will forward samples.

---

**Electronic Connectors**

**The Accepted Standard**

For QUALITY - COMPACTNESS - RUGGEDNESS - LIGHT WEIGHT - DEPENDABILITY

With components of precision manufacture... through strictest quality control standards... in assurance long and dependable trouble-free service.

Always a pioneer in this field, Winchester Electronics initially established the use of mineral-filled melamine for insert bodies and gold plating over silver plating on contacts, having long outlived their values. Today, these principles of design and manufacture are widely accepted in industry as those necessary to meet quality requirements.

Many years of engineering experience and manufacturing skill are the basic component of every connector bearing the Winchester Electronics name...plus these features:

**POLARIZATION:** All connectors have positive polarization features that make inserted mating impossible.

**SELF-ALIGING:** Individually floating contacts assure proper play for self-alignment.

**WIPING ACTION:** of contacts ensures positive electrical contact at all times.

**MOLDED MEMLANINE BODIES:** Mineral-filled for adherence with MIL-P-14, these LEDs provide high arc and flashover resistance as well as mechanical strength. One-piece molded bodies eliminate unnecessary component parts and reduce the number of malfunctions and dust points.

**PRECISION MACHINED CONTACTS:** Pins from brass bar and sockets from "spring temper" phosphor bronze bar are gold plated over silver for consistent low contact resistance, prevention of corrosion and ease of soldering.

---

**Winchester Electronics, Inc. Products and Designs Are Available Only From Winchester Electronics, Inc.**

---

**Radio Materials Corporation**

**General Office:** 3225 N. California Ave., Chicago 18, Ill.
For Specialized Electronic Equipment...

CHECK WESTERN GEAR

For the answers to your MINIATURE MOTOR problems, Mission-Western Engineers offer an unusually wide range of basic miniature motor designs. We have available more than fifty basic types, including axial and centralizer-blower designs, to cover the great variety of equipment adaptations. Our basic motor designs range from 0.01 to 2 H.P., from 50 to 1,000 cycles in frequency and in any voltage range required. Complete motor design service available. For further information or a copy of our motor catalog J254, write Mission-Western Engineers, Inc., 122 West Colorado Street, Pasadena, California.

HIGH PRECISION GEARS
and precision fine pitch gearing
from 200 to 6 Diametral Pitch and
dimensions from 1/2" to 1" diameter.
Western Gear Works makes available complete engineering and manufacturing facilities for the application of high precision gearing and gear drives in electronics equipment. For assistance, without obligation, write Executive Offices, Western Gear Works, P.O. Box 112, Lynwood, Calif.

PLANTS AT LYNNWOOD, PASADENA, BELMONT, SAN FRANCISCO, OAKLAND, SEATTLE, HOUSTON—REPRESENTATIVES IN PRINCIPAL CITIES

WESTERN GEAR WORKS
PACIFIC WESTERN PRODUCTS
PACIFIC GEAR & TOOL WORKS

 precision potentiometers

Look to TIC for the most complete line of advanced PRECISION POTENTIOMETER designs for every application. TIC engineering means outstanding potentiometer performance in your system. The extreme variety of standard models available guarantees the optimum specifications and dimensions, whatever your potentiometer requirement in computers, control systems, and precision instrumentation.

Potentiometers are available in miniature and sub-miniature sizes. Type RV7 has been especially designed for operation at high ambient temperatures. All designs have rugged construction and excellent stability under adverse environmental conditions.

Potentiometers, Type RVT, feature infinite resolution for super-fine trimming adjustments in instrumentation. Complete shaft rotation represents less than 4% of available resistance variation. Convenient size and shape permit stacking of Potfilm unit for optimum use of limited panel space.

Potentiometers, type R107, feature high electrical accuracy, resulting from servo control of resistance windings. One-piece construction of buss and mounting surfaces yields precise, rugged units. Anodized aluminum cover provides sealed enclosure but does not support working parts. Spring loaded ball bearings housed in single buss provide precise, rigid shaft support with very low frictional friction. Universal mount allows choice of servo or tapped hole mounting.

Construction, available in 2 inch and 1 1/2 inch diameter potentiometers, allows assembly of multi-gang units as required by you; greatly simplifies construction of "board" circuit in experimental work. Service of large systems is facilitated by use of unitized potentiometers, permitting rapid replacement should failure occur during operation.

Precision potentiometers ranging from 1/8" to 3" in diameter feature high linearity and resolution, together with low noise. Rugged one-piece construction of aluminum base and thin mechanical tolerances of mounting surfaces assure resistance of electrical accuracy in external system. Standard TIC potentiometers will meet applicable MIL specifications for humidity, salt spray, shock, vibration, and corrosion resistance.

Customer service, environmental testing, potentiometer test equipment, research, custom design, technical literature, prototype models.
**Standard TIC Precision and Trimmer Potentiometers**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Code</th>
<th>Winding</th>
<th>Independent Linearity</th>
<th>winding Angle</th>
<th>Multiple Winding</th>
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<td>22°</td>
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<td>R23</td>
<td>General Purpose</td>
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<td>0.5% ± 0.5%</td>
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<td>R24</td>
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<td>0.5% ± 0.5%</td>
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</table>

**Electrical Specifications**

- Resistance Range: 100 ohms to 10,000 ohms - 5%.
- Power Rating: 5 watts at 40°C derated to zero at 85°C.
- Life Endurance: 100,000 cycles minimum.
- Temperature Coefficient of Resistance Wire: 0.0002% per °C.

**Basic Specifications**

- 110 ohms 100 ohms 200 ohms 500 ohms 1 k ohms 2 k ohms 5 k ohms 10 k ohms 20 k ohms 50 k ohms 100 k ohms

---

**TIC Advanced Performance Multiturn Potentiometers**

- Same precision and stability as the standard TIC potentiometers for 100% linearity at low cost.

**TIC Standard Ball Bearing Precision Potentiometers**

- Types ST16 and ST18 feature compact, ball-bearing for low friction, and high electrical accuracy. Linear and nonlinear windings are available. Servo-motor dimensions conform to liquidized industrial standards.

**TIC Standardized Ball Bearing Precision Potentiometers**

- Types ST16 and ST18 are available in 100,000 ohms - 5% standard, 1% special, and 0.2% special.

**General Specifications**

- Rated Temperature Coefficient of Resistance Wire: 0.0002% per °C.
- Working Life: 50,000 cycles minimum.
- Guaranteed strength: 5000 cycles at 20 times the rated life without failure.

**TIC Precision Potentiometer Test Equipment**

- Type 3844 POGOMETER: Polarimeter Noise Tester

**TIC Precision Potentiometer Handbook and Catalog**

- A Catalog of carefully selected and illustrated equipment.

---

**Technology Instrument Corp.**

- West Coast Office: 7954 West 3rd St., Los Angeles, Calif.
- East Coast Office: 312 Main St., New York, N.Y.

---

**Mechanical Specifications**

- Size: 1.5 x 1.5 x 0.5 in.
- Weight: 0.05 lb.
- Temperature Range: -40°C to +85°C.
- Humidity: 95% RH non-condensing.

---

**Technology Instrument Corp.**

- West Coast Office: 7954 West 3rd St., Los Angeles, Calif.
- East Coast Office: 312 Main St., New York, N.Y.
C-A-C MOLDED TOROIDS
Stacked in Standard Inductances for immediate delivery
NEW!

With the new molded toroids solving mounting problems and with a consistent demand increasing, C-A-C now offers an added reason for your buyers by stacking standard toroids for immediate delivery.

Write for complete specifications and listing of stocked toroids.
C-A-C molded toroids meet performance requirements of many specifications.

COMMUNICATION ACCESSORIES COMPANY
Hickman Mills, Missouri

From a modest beginning five years ago, Communication Accessories Company has grown to one of the largest exclusive toroid coil winding producers in the U.S. today. Why?

We like to think that this growth is due to the thorough, careful handling we apply to each coil... and because of the particular skill of our people. Whatever the reason, we'll continue— doing the best we know how—thankful for the trust that important companies have placed in us.

write for this catalog

LIST OF STOCKED UNITS
All other values and types on Special Order

<table>
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SEE YOUR CAC MAN

COMMUNICATION ACCESSORIES COMPANY
Hickman Mills, Missouri
Phone Kansas City, Mo., 50th 5528
ERIE dependable electronic components

ERIE HIGH VOLTAGE CERAMICOS

ERIE BY-PASS AND COMPENSATING CERAMICOS

ERIE TRIMMER CAPACITORS

ERIE RESISTOR CORPORATION

ERIE RESISTOR CORPORATION - ELEKTRONICS DIVISION

ERIE EMBOSSED CIRCUITY

ERIE PRINTED CIRCUITS

ERIE CUSTOM MOULDED PLASTICS

The exclusive Erie printed wiring technique provides a circuit pattern actually embedded in the surface of a high grade laminated phenolic. Will withstand severe soldering temperatures without peeling. Drastically reduces assembly costs.

By combining several resistors and capacitors into one rigid compact package Erie is able to offer many design and production advantages. A wide selection of diode filters, plate couplers and special circuits are available.

A pioneer in injection molded plastics, Erie specializes in custom molded name plates, diodes, TV masks and other precision items that not only require close tolerances but also have the eye-catching sales appeal of three dimension beauty.

Erie has 25 years experience in the design and manufacture of high quality resistor products. Among these products are precision potentiometer resistors, high voltage resistors and precision noise suppressors. Complete facilities available to produce a wide variety for specific applications.

Values from 15 mill to 8100 mill are available in tolerances as close as ±2%. Rated at 1000 Volts. "Q" value exceeds 1000 for values above 100 mill. Available for maximum operating temperatures of 80°C and 125°C. Extremely low inductance makes these very compact capacitors ideal for VHF and UHF applications.

Erie offers a wide selection of on-and-off capacitors designed to be used in conjunction with radio frequency amplifiers. Capacity varia-
tions with temperature, age and voltage are exceptionally small. A truly premium capacitor.

Values up to 2007 mill at 500 V are available in tolerances as close as ±5%. Rated at 1000 Volts. "Q" values exceed 1000 for values above 100 mill. Available for maximum operating temperatures of 80°C and 125°C. Extremely low inductance makes these very compact capacitors ideal for VHF and UHF applications.

Erie offers a wide selection of on-and-off capacitors designed to be used in conjunction with radio frequency amplifiers. Capacity varia-
tions with temperature, age and voltage are exceptionally small. A truly premium capacitor.
**Fixed Resistors**

- 1/8, 1-, and 2-Watt Sizes in all RTMA Preferred Values

Fully insulated and moisture-protected by phenolic covers, Stackpole resistors are available in all standard values for radio, television, military, and commercial uses. In addition, Stackpole offers special resistors for automotive, lighting, armatures, capacitors, discharge, surge, and other uses. Write for Stackpole Bulletin 3-2.

**Variable Resistors**

**Versatile Switches**

Small, reliable miniature switches are made in ratings and capacities for every need including audio, radio, and appliance applications.

Stackpole offers a dependable selection of volume and time controls, potentiometers, etc., for radio, TV, instruments, and other equipment. Single, ganged, and concentric shaft designs are available in values from 500 ohms to 7 megohms and in ratings from .5 watts. Types range from the midsize LR control for TV to the compactly rated .5 watt Type LP for heavier duty use. Special taps, extended bushings or other features can be supplied. Write for Catalog RC-9.

**Iron Core Headquarters**

The widespread use of high-Q coils with a consequent reduction in complicated circuitry has resulted in no small part from Stackpole engineering that has made new and better iron cores available at attractive prices. Stackpole production includes practically all types in common use including cores for high- and low-frequency coils and transformers, chokes, and side-molded types for permeability tuning—as well as numerous types and adaptations made for special uses. For all styles—standard or special—Stackpole manufacturing techniques assure iron cores of outstanding dependability and uniformity. Write for Catalog RC-9.

**Fixed Composition Capacitors**

Type GA

Unmatched for low cost, high reliability, and nearly larger than 1/2-watt resistors, Stackpole "GA" capacitors are the most efficient way to couple or bypass R-F circuits. Side-molded of high-dielectric constant material, these low-value capacitors have physical and electrical advantages that save assembly and testing—virtually every R-F circuit. Write for Catalog RC-9.

**Molded Coil Forms**

For fast, low-cost assembly

Incapacitive Stackpole molded coil forms permit smaller coils and pave the way for simplified point-to-wireing with a minimum of soldered connections. Either axial or helipak leads, securely embedded, are available. Types can also be supplied with iron core sections, thereby increasing Q materially, decreasing the amount of wire for a given inductance, and reducing stray magnetic fields. Write for details and samples to specifications.

**Carbon & Graphite Specialties**

- Solve Friction, Temperature, Corrosion, Shaft Sealing, Arcing, and many other problems

- Anodes
- Battery Carbons
- Bearing Materials
- Resisting Furnace Heats
- Brushes of all types for rotating electrical equipment
- Carbon and Graphite Molded Metal Contac- ts
- Chemical Carbons
- Clutch Rings
- Dowel Pin Plungers
- Electric Furnace Heating Elements
- Electrolytic Anodes
- Fractionwise Segments
- Glass Molds
- Graphite Ground Rods
- Mercury Arc Rectifier Anodes
- Metal-Graphite Contacts
- Noodle Tube Anodes
- Rail Lubricating Mold
- Resistor Carbon Contacts
- Resistance Welding and Sealing Tips
- Seal Rings (for gas or liquid)
- Spot Welding Molds and Dies
- Solder Bath Rectification Rods
- Spectrographic Test Paste and Powder
- Stator and Rectifier Carbons
- Water Heater and Posteriorite Electrodes
- Welding Carbons
- Welding Plates and Paste

**Carbon & Graphite Data Book**

Newly revised and enlarged, Stackpole Cata- log 60A contains valuable data on carbon, graphite, and their engineering uses.

**Low Cost Switches**

- for instruments, radios, appliances,
- toys, small motors and similar uses

Dress up your product—add it to its convenience and "validity" with these sturdy, low-cost slide switches. Over 20 functional arrangements and new 3 amp types for fractional HP motors are available. Most types can be supplied with or without detents, spring-return, or other features to match your specifications exactly. Modifications, including adaptations for rotary or plug-in action, can be produced economically. Write for new Stackpole Switch Bulletin RS-5.

Catalog RC-9 gives detailed specifications on the latest Stackpole Electronic Components described on these pages. Write on your business letterhead for your copy.
CATHALOY

CATHALOY A30** For long life

This is an active grade 0.1% aluminum-nickel alloy designed for use in high speed electron tube production. Exhaustive testing has confirmed it as a preferred replacement for active alloys with silicon and magnesium reducing elements. Its chief advantages are long life, rapid activation, no interfacial impedance, no interelectrode leakage caused bysublimed films, and a high emission value.

Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
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<tbody>
<tr>
<td>Aluminum</td>
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<tr>
<td>Silicon</td>
<td>0.1% to 0.3%</td>
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<tr>
<td>Magnesium</td>
<td>0.05% to 0.06%</td>
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<td>Iron</td>
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<tr>
<td>Manganese</td>
<td>0.12% to 0.16%</td>
</tr>
</tbody>
</table>

Physical Properties

- Density: 18.5 lb./cu. ft.
- C.m.p. of resistance: 0.0005 ohm/cm/°F (32° to 212°F)
- Electrical resistivity: 0.006 ohm/cm (60°F)
- Temperature coefficient of expansion: 0.0005 in./in./°F (60° to 202°F)

Mechanical Properties

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tensile Strength</th>
<th>Elongation</th>
<th>Rockwell Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annealed</td>
<td>75,000 psi</td>
<td>75%</td>
<td>155</td>
</tr>
<tr>
<td>Half hard</td>
<td>72,000 psi</td>
<td>75%</td>
<td>150</td>
</tr>
<tr>
<td>Hard drawn</td>
<td>70,000 psi</td>
<td>75%</td>
<td>145</td>
</tr>
</tbody>
</table>

CATHALOY A31 For strength

This is a premium grade 4% tungsten-nickel alloy designed for cathode use in rapped-gated electron tubes. The necessity for this new alloy for indirectly heated cathodes has been demonstrated by the increase in requirements for strength, long life and reliability. Under electron tube test, Cathaloy A31 has demonstrated high hot strength and maintenance of good emission characteristics over long period of life.

Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tungsten</td>
<td>3.75 to 4.25%</td>
</tr>
<tr>
<td>Copper</td>
<td>0.1% to 0.1%</td>
</tr>
<tr>
<td>Silicon</td>
<td>0.05% to 0.1%</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.01% to 0.05%</td>
</tr>
<tr>
<td>Iron</td>
<td>0.01% to 0.1%</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.12% to 0.16%</td>
</tr>
</tbody>
</table>

Physical Properties

- Density: 18.5 lb./cu. ft.
- Temperature coefficient of resistance: 0.005 ohm/cm/°F (32° to 212°F)
- Electrical resistivity: 0.006 ohm/cm (60°F)
- Temperature coefficient of expansion: 0.0005 in./in/°F (60° to 202°F)

Mechanical Properties

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tensile Strength</th>
<th>Elongation</th>
<th>Rockwell Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annealed</td>
<td>80,000 psi</td>
<td>65%</td>
<td>150</td>
</tr>
<tr>
<td>Half hard</td>
<td>78,000 psi</td>
<td>65%</td>
<td>145</td>
</tr>
<tr>
<td>Hard drawn</td>
<td>76,000 psi</td>
<td>65%</td>
<td>140</td>
</tr>
</tbody>
</table>

CATHALOY P50 For extremely long life

This is a passive grade nickel alloy designed for extremely long life, reliable electron tubes. Experiments with Cathaloy P50 in electron tubes have shown the low rate of barium evaporation, minimum of sublimation, and freedom from interface impedance required of passive cathodes. Cathaloy P50 is the only passive alloy available in seamless and WELDRAVEN® form. It is also supplied in lockcathm cathode form.

Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon</td>
<td>0.02 max.</td>
</tr>
<tr>
<td>Copper</td>
<td>0.05 max.</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.1 max.</td>
</tr>
<tr>
<td>Iron</td>
<td>0.01 max.</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.02 max.</td>
</tr>
</tbody>
</table>

Physical Properties

- Density: 18.5 lb./cu. ft.
- Temperature coefficient of resistance: 0.0005 ohm/cm/°F (32° to 212°F)
- Electrical resistivity: 0.006 ohm/cm (60°F)
- Temperature coefficient of expansion: 0.0005 in./in./°F (60° to 202°F)

Mechanical Properties

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tensile Strength</th>
<th>Elongation</th>
<th>Rockwell Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annealed</td>
<td>75,000 psi</td>
<td>75%</td>
<td>150</td>
</tr>
<tr>
<td>Half hard</td>
<td>73,000 psi</td>
<td>75%</td>
<td>145</td>
</tr>
<tr>
<td>Hard drawn</td>
<td>71,000 psi</td>
<td>75%</td>
<td>140</td>
</tr>
</tbody>
</table>

STANDARD ELECTRONIC PRODUCTS

Superior Tube is the world’s leading fabricator of nickel steels for indirectly heated oxide-coated cathodes in electron tubes. These parts are manufactured to exact specifications within close tolerances and using a wide variety of different alloys. Superior Tube engineers can work hand in hand with you to develop parts and special characteristics.

Cathode Sleeves. Made in round, oval, elliptical and rectangular shapes. These cathodes are available in:

- Seamless—from 0.010” to 0.121” O.D. inclusive with wall thicknesses from .002” to .050”. Larger diameters and heavier walls can also be produced. May be cut to practically any length desired. Bead (emboss) may be located anywhere except within 0.004” from the end of the cathode.

- Lockseam*—Produced from nickel strip especially rolled for the purpose. From .040” to .185” O.D. inclusive with wall thicknesses from .002” to .015”. Lengths are from 9 mm to 50 mm inclusive. Vertical and circumferential beads permissible.

Disc Cathode. Superior is now ready to offer to the industry a new disc cathode for use in guns for color TV picture tubes. This is smaller in design than the present assembly which has been used so successfully in monochrome guns for the past eight years. In addition to the two big advantages of the present type disc cathode, namely choice of materials and close control of the E-dimension (distance from the top of ceramic to top of emission cup), the new assembly has the following advantages:

1. The cathode surface area is reduced, which means less power input.
2. Lower heat radiation due to less power, which means constant temperature and cooler continual operation.
3. A smaller shank and emission cup, which means better transmission of electrons to the TV screen.
4. The smaller guns which are now possible permit the manufacturer to bring the guns closer together in the mount. This means better control of the deflection of the electron beams.

*The above observation is made on an average of the electrical properties of the base materials. They do not represent the mechanical properties of very small thin wall tubing.

Cathode P50 is used for power output tubes requiring low grid emission and for tubes which need seamless passive cathode. This alloy is especially treated to provide good uniformity.

Electronic Division, Superior Tube Company

4611 IRE Directory

Superior Tube Co. 2000 W. 7th St. Los Angeles 5, Calif.

1951 IRE Directory
<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency</th>
<th>Power Level (Watts)</th>
<th>Type</th>
<th>Description</th>
<th>Tuning Type</th>
<th>Taper Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3000-300</td>
<td>500</td>
<td>TR</td>
<td>Band Pass, Fixed-Tuned</td>
<td>ATR</td>
<td>Medium</td>
</tr>
<tr>
<td>2</td>
<td>3000-300</td>
<td>1000</td>
<td>TR</td>
<td>Band Pass, Fixed-Tuned</td>
<td>ATR</td>
<td>Medium</td>
</tr>
<tr>
<td>3</td>
<td>3000-300</td>
<td>2000</td>
<td>TR</td>
<td>Band Pass, Fixed-Tuned</td>
<td>ATR</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>3000-300</td>
<td>3000</td>
<td>TR</td>
<td>Band Pass, Fixed-Tuned</td>
<td>ATR</td>
<td>Medium</td>
</tr>
<tr>
<td>5</td>
<td>3000-300</td>
<td>5000</td>
<td>TR</td>
<td>Band Pass, Fixed-Tuned</td>
<td>ATR</td>
<td>Medium</td>
</tr>
</tbody>
</table>

... (more tables and sections)
MYCALEX glass-bonded mica is the unique CERAMOPLASTIC

MYCALEX glass-bonded mica has ceramic rigidity, much of ceramic temperature endurance, plus greater dimensional precision than any plastic or ceramic. MYCALEX glass-bonded mica can be molded and machined like a plastic. Dimensional stability and temperature endurance are superior to any plastic, and complex insert installations can be tightly molded. Incorporating the best features of both ceramics and plastics plus some special ones of its own, MYCALEX glass-bonded mica is the unique ceramicplastic.

PROPERTIES
- Electrically stable; properties are unvarying with age.
- Low electrical loss.
- High dielectric strength.
- High arc resistance — cannot carbonize.
- Can be machined, ground or lapped to as close tolerances as any metal.
- Permanent dimensional stability. Free from warpage, cold flow or age distortion.
- Unaffected by humidity — zero moisture absorption.
- Impervious to water, oil, organic solvents.
- High temperature endurance.
- High thermal shock resistance.
- Inserts may be included in molded grades.
- Resistant to radiation effects.

NOTE: The MYCALEX glass-bonded mica materials, described below, are all exclusive inventions and manufactured only by the MYCALEX Corporation of America.

MACHINABLE
(MyCALEX by any well equipped shop)

MYCALEX X Capacitor Ring Silver-plated feed on both sides
MYCALEX 455 Printed Circuit Board Fin Piece
MYCALEX 410 Air Connector Inserts
MYCALEX 410 RF Cell Form

MOLDABLE
(MYCALEX CORPORATION OF AMERICA ONLY)

MYCALEX 410B Switch Housing
MYCALEX 555 Printed Circuit Board Fin Piece

THERE ARE DIFFERENT GRADES FOR DIFFERENT PURPOSES

Continuous operating temperature: Limit 650°F. This grade of MYCALEX glass-bonded mica is moldable with or without inserts.

Continuous operating temperature: Limit 900°F. A new grade of MYCALEX glass-bonded mica having high temperature endurance; moldable with or without inserts.

Continuous operating temperature: Limit 700°F. Readily machinable capacitor dielectric of MYCALEX glass-bonded mica, with dielectric constant indicated by FM number such as 10, 20, 30, etc.

A new superior grade of MYCALEX glass-bonded mica for higher continuous temperatures to 1000°F. Readily machinable; not moldable; inserts must be cemented in.

Machinable dielectric of MYCALEX glass-bonded mica, with higher dielectric constant indicated by K numbers such as 10, 15, 20, etc.

MYCALEX Corporation of America

World's largest manufacturer of glass-bonded mica products - Owners of MYCALEX patents and trade-marks.

Switches, Commutator Plates by MYCALEX ELECTRONICS CORPORATION

Under exclusive license of MYCALEX CORPORATION OF AMERICA

Top view of a MYCALEX 410 commutator made to the exceptionally high standards of manufacture required for the Air Materiel Command and other government projects. Only MYCALEX glass-bonded mica could provide the mechanical, dimensional and electrical properties that such precision products require.

Rear view of the same commutator. It is precision injection molded, has 180 or 108 contacts and three coin silver slip rings. These tight inserts will take repeated soldering and violent temperature change with no loosening. MYCALEX Electronics Corporation is ready to produce similar complex combinations of metal and insulation to your designs. Just call or write today.

WHAT MYCALEX glass-bonded mica CAN CONTRIBUTE TO ELECTRICAL DESIGN

Electrical components of given capacities can be made smaller, more compact, and lighter in weight when the high thermal endurance, structural strength, dimensional precision, dimensional stability, and ideal balance of insulation properties of MYCALEX glass-bonded mica are employed. Tight inserts eliminate corona and produce tight seats. Printed circuit elements can be fed into inserts.

Tube Sockets by MYCALEX TUBE SOCKET CORPORATION

Under exclusive license of MYCALEX CORPORATION OF AMERICA

Our engineers are ready to advise you

If you will send us sketches, blueprints or models of any products in which MYCALEX glass-bonded mica might be used as electrical insulation, our engineers will be glad to make suggestions as to the most economical and effective ways to employ our products in your designs. Address requests to J. H. Dubois, Vice President Engineering, at Clifton, N. J. address below.

THE COMPLETE STORY IS YOURS FOR THE ASKING

Mycalex Corporation of America is the world's largest manufacturer of glass-bonded mica products. Our facilities are devoted exclusively to the manufacture of glass-bonded mica products, and actually exceed those of the rest of the industry combined. Our extensive research, development and engineering departments are completely integrated with an ultra modern manufacturing plant. These facts are stated to emphasize the quality of the engineering service offered, without obligation, to our present and potential customers.

Executive Offices: 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
General Offices and Plant: 131-A CLIFTON BLVD., CLIFTON, N. J.

Since 1919

MYCALEX THE INSULATER

Our Engineers Handbook and Catalog is recommended as a valuable addition to your technical library. A copy will be sent free promptly upon request. If you want to write MYCALEX, ask for our informative leaflet describing "From One Machine To Another" in the art of Design Parts to be Machined from MYCALEX glass-bonded mica." A complete file of Data Sheets on MYCALEX Tube Sockets also available.

Address inquiries to:

MYCALEX ELECTRONICS CORPORATION

NEW YORK 20, N. Y.
**B&W Components,**

**B&W TOROIDS**
From sub-miniature type tinier than a Lifesaver to husky "doughnuts" bigger than a telephone dial... if it's toroidal, B&W makes it. Over 20 years experience in winding all types of coils for military, commercial, and amateur electronic gear goes into these B&W Toroids.

Small quantities for prototypes or large production runs can be promptly supplied to your exact specifications. Or, if you prefer, B&W engineers will gladly work with you in developing new circuits for your particular needs.

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These space-saving toroidal units are a direct result of B&W's specialized experience in designing and manufacturing filters and discriminators for rf or audio frequencies... chances are B&W engineers have produced similar equipment in their collective engineering experience.

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**B&W LABORATORY TEST INSTRUMENTS**

**B&W MULTIPLE-LAYER COILS and CHOKES**
Universal-type, progressive-universal, bank wound, solenoid... in fact just about any kind of coil you can name has been produced by B&W. Types range from subminiature inductors and midget rf, oscillator, id-f, and choke coils to giant tank coils and chokes for high power transmitters or other rf service.

B&W is fully equipped to design, produce, and test coils of practically any dimensions and with electrical characteristics to meet existing requirements.

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Complete Radio Relay System • Mobile or Fixed Station Radio Teleprinter Systems • Central Units for Teletype Systems • Direction Finding Equipment • Single or Dual Diversity Teletype Receiver Converters • Frequency Shift Teletype Exciter Units • MO or Crystal • Low, Medium, and High Power Radio Transmitters • High Power r-f Amplifiers • Switching Equipment.

In addition to complete facilities for designing, manufacturing and testing special communications equipment for military and commercial applications, B&W carries a complete line of products for amateur radio use. Write for details today.

**SINE WAVE CLIPPER**
Model 392
Provides rigid sine wave for testing audio transistors and rectifiers. Does the work of a square wave generator at less cost.

**DIP METER**
Model 630
1.35mc-60mc with 5 coils; 60mc on meter... adjustable sensitivity. Monitoring jack & dial-off switch.理想 for use in hard-to-get-at places.
**WESON Instruments**

**designer's**

**INSTRUMENT guide:**

**RUGGEDIZED INSTRUMENTS** — to military specifications, available in 2½”, 3½” and 4½” sizes in D-C movable iron A-C, rectifier type A-C and thermocouples. All have sealed, externally operated zero correctors—shock-resistant, flat plastic windows—and connection terminals molded into internal rubber.

**ULTRA-SENSITIVE RELAYS** — extremely compact and rugged relays which operate on values as low as ¼ microampere or ¼ millivolt, direct from thermocouples, resistance bulbs or other generators of minute current. Handle substantial wattage at 110 volts on non-chattering magnetic contacts. Available with single or double contacts, fixed or adjustable, manual or solenoid reset.

**MOTOR LOAD ½” METERS** — WESTON “per-cent load” ammeters and wattmeters make it easy for operators to secure optimum production from lathes, milling machines, automatics, grinders, etc. Prevent overloading—reduce tool breakage—assure uniform quality with lower objects. Other scale calibrations available.

**RECORDING POTENTIOMETERS** — ideal for built-in needs because of its extreme compactness plus ruggedness and simplicity. Ranges changed simply by inserting required range standards. Chart speeds changed by simple screwdriver adjustment. Plug-in amplifier removed in a jiffy since no soldered connections are used.

Literature on any of the above instruments sent on request. WESTON Electrical Instrument Corporation, 614 Frelinghuysen Ave., Newark 5, New Jersey.

---

There's no guesswork about ruggedized instruments at Weston. Duplicates of all the approved equipment for testing — including the High Shock Hammers, the Vibrating and Tumbling equipment, the Temperature, and Moisture Cycling cabinets — are here in the Weston test department continually proving the soundness of Weston's ruggedized design. Thus you can be sure each instrument not only meets the specifications for ruggedized instruments, but will also prove its superior ruggedness in service. Weston Ruggedized instruments now are available for A-C and D-C requirements in 2½”, 3½” and 4½” sizes. Bulletin giving complete information sent on request. WESTON Electrical Instrument Corporation, 614 Frelinghuysen Ave., Newark 5, N. J.
Tailor-Made Fasteners in Volume Quantities

- **Miniature Battery Connectors**
  - For use with small "C" batteries; afford quick and positive polarization between connections and withstand space settings on small electronic equipment.

- **Plastic Indicator Plugs**
  - Screw-in type, all-plastic, lettered indicator plug button for electrical equipment. Can be molded in ornamental or functional design. For blind applications, available.

- **Vibrator Grounding Fasteners**
  - Holds 110" or 1" diameter or round-bolts, available in different types to suit various needs. Made of brass, copper, and other materials.

- **Rubber Foot**
  - Used to provide a cushioning effect to prevent damage to delicate equipment.

- **Speaker Mounting Bolts**
  - Designed for mounting speakers and amperage, allowing for a secure and stable installation.

- **Nylon Snap-In Nut**
  - Designed for the attachment of screw supports or threaded nuts to standardized sheet metal screws.

- **Quick Fastener**
  - Easiest used for setting or moving sheet to sheet metal stampings, facilitating weekend, weekend, or alternate mountings. Quick, easy, and efficient.

- **Trimount Studs**
  - Designed to hold two or more thicknesses of material together. Easily installed with hand tool, ensuring vibration proof attachment. Permanent or removable attachment.

- **Screw Shank**
  - Suitable for many different applications, including electrical equipment and mechanical assemblies.

- **Dot**
  - Parts illustrated are representative of the thousands of different fasteners and allied devices designed and manufactured in volume by United-Carr and its subsidiaries for leading manufacturers of electronic equipment.

- **Metal Stampings**
  - Volume production in metal stampings, years of engineering and testing all available to solve your particular problem.

- **Cap Nuts**
  - Available in various sizes and materials, suitable for a wide range of applications.

- **Rice Nuts**
  - Designed for quick and easy assembly, providing a secure connection.

- **Battery Connectors**
  - Wired snap-on units for use with batteries equipped with United-Carr electrical snap fasteners. Wiring to customer's specifications.

- **Shock Mounts**
  - Offered in several sizes, to suit different applications, ensuring stability and protection.

- **Anode Connectors**
  - Designed for specific applications, ensuring durability and reliability.

- **Tube Sockets**
  - Ceramic sockets and special types, designed for secure mounting.

- **Switches**
  - Oak type switches produced in a variety of sizes, suitable for different applications.

- **Test Jack**
  - Universal quality jack for 500 or 700 watts, designed for electronic equipment, ensuring reliability and precision.

- **Vibration Isolators**
  - Suitable for many applications, ensuring a secure and vibration-free connection.

The UCINITE Company
DIVISION OF UNITED-CARR FASTENER CORP.

Newtonville 60, Massachusetts

With years of specialized experience in the electronics field and complete facilities for the volume production of small metal stampings as well as the assembly of metal, plastic, and ceramic components, UCINITE is fully equipped to supply you with special electrical parts and assemblies. Designed, assembled, wired, and marked to your specifications. For complete design, engineering, and production service, call your nearest UCINITE field engineer.
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America’s finest coil lacquer... the accepted standard for VHF and UHF service.

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deliver a continuously adjustable output voltage from a-c power lines

A POWERSTAT variable transformer is an autotransformer of toroidal core design with a moveable brush arm that is rotated to deliver any required output voltage from zero to 100% of line voltage. Important features include accurate regulation, high efficiency, conserving ratings, zero waveform distortion, rugged mechanical construction and smooth continuous regulation. Models are available in ratings from 150 V to 100 kV. Orders are shipped in 10 days. Models are offered in 150 V, 250 V, 400 V, 600 V and 1000 V. For applications requiring a-c power, Models 100 V, 200 V, 300 V, 400 V and 500 V are available. Other models are available for specific applications. Consult our nearest office for further details.

Voltage Control Apparatus

STABILINE AUTOMATIC VOLTAGE REGULATORS

maintain a constant output voltage regardless of line or load changes

MADE IN 2 DISTINCT TYPES TO MEET YOUR NEEDS EXACTLY

TYPE IE (INSTANTANEOUS ELECTRONIC)

... for the most exciting control. Completely electronic with no moving parts. Correction is instantaneous. Waveform distortion never exceeds 3%. Output is held to within ±0.1% of nominal for wide line variations and to within ±0.15% per cent for any load current or load power factor change from logging to leading. Standard types are listed below. Special units can be engineered to meet specific requirements.

TYPE EM (ELECTRO-MECHANICAL)

... for controlling large industrial loads or providing zero waveform distortion. Consists of an electronic detector circuit controlling a motor-driven POWERSTAT variable transformer. Standard models are offered in ratings from 2 to 100 kV.

TYPE 10

TYPE 20

TYPE 106

TYPE 106-3

TYPE 116

TYPE 122

TYPE 130

TYPE 156

TYPE 156-3

TYPE 25130

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STANDARD TYPES FOR VARIOUS APPLICATIONS

POWERSTAT VARIABLE TRANSFORMERS for

OIL-COOLING OPERATION

EXPLOSIVE ATMOSPHERES

HIGH CURRENT NEEDS

LIMITED OUTPUT RANGE

See Superior Electric for all VOLTAGE CONTROL NEEDS

Look to SUPERIOR ELECTRIC for all VOLTAGE CONTROL NEEDS

1954 IEEE Directory

106
For use where utmost reliability, "perfect" fidelity and accuracy of timing are of prime importance, Ampex Audio Recorders are universally preferred. America's four major broadcasting networks, the country's leading phonograph record manufacturers and various important music recording studios are among those whose usage has established Ampex as the world's standard of excellence in sound recording.

**SERIES 300—THE SUPREME AMPLEX**

These, the finest of the Ampex line, are the machines used where speaking or musical performances justify the best recordings. It is possible to make. Because of their superior reliability, the 300 Series machines are used by major radio networks to originate, relay and reproduce important radio shows. Record manufacturers use the Series 300 for master recordings because of their high signal-to-noise ratio and low flutter and wow.

**SERIES 350—THE STANDARD AMPLEX**

Newest of Ampex's general purpose audio recorders, the 350 has a 30" slant on the top plate. This puts reels, editing knobs and all controls within easier reach of the operator. Tape editing is faster and less tedious. A three motor tape transport (also used on the higher priced Model 300) provides excellent tape control and utmost reliability of operation. The Series 350 is unusually easy for servicing.

**SERIES 600—THE MOST VERSATILE AMPLEX**

The Series 600 brings Ampex standards of quality within the reach of the most limited budget. Weighing less than 25 pounds, the Ampex 600 is the first truly miniaturized recorder which can provide full professional quality for remote broadcast pickups, schools and conservatories, high fidelity enthusiasts and other semi-professional users.

**MODEL 450 FOR BACKGROUND MUSIC**

For background music, automatic broadcasting and TV test patterns, the Model 450 Continuous Tape Reproducer provides up to 8 hours of continuous unspooled program. The Model 450 uses 1/2" recordable tapes with high speed, double track pre-recorded tapes. Startling, stoping, reversing and repeating programs are controlled automatically with no attention from a standby operator.

**SERIES 3200—FOR TAPE DUPLICATION**

Designed to make duplicate tapes at minimum labor cost, the Ampex Tape Duplication makes 1 to 100 duplicates simultaneously and employs a time-saving speedup. Double track tapes are made in one pass. Fidelity is high (see specifications). Duplicates of any standard tape speed can be made from masters of any standard speed.

*User has the option of buying from 1 to 100 copies from one master unit.

---

**AMPEX DATA READERS**

Ampex magnetic tape machines retain test data in "live" electrical form. Hence a playback of the data is like a rerun of the original test. The tremendous "memory capacity" of magnetic tape retains more complete and detailed information than any other data-recording method. The data can be scanned, speeded up, slowed down, automatically reduced or converted to any other electrical, visual, or physical form. To cover the widest range of data situations, Ampex data recorders are offered with various frequency ranges, numbers of tracks and modes of recording.

**F-M CARRIER TYPE RECORDER—MODEL 306**

Explosions, shock waves, geophysical data and other highly transient phenomena can be recorded on the Model 306 with excellent "instantaneous" accuracy. The data signals modulate an FM carrier, the accuracy of the recording is unaffected by minor tape imperfections.

Also, the Model 306 is able to record the vast majority of all mechanical phenomena, since it covers the extremely useful frequency range from 500 cycles/sec. down to zero. (D.C.).

**WIDE RANGE DIRECT RECORDER—MODEL 307**

With a frequency response from 100 to 100,000 cycles per second, the Model 307 is particularly suited to steady state data occurring over a wide range of frequencies. The 307 has had extensive application in fm-telemetering, sharing this field with the Model 300 described below.

**PULSE WIDTH RECORDER—MODEL 303**

This model can record any type of phenomena that lends itself to pulse width coding. Pulses can range from 0.2 to 10,000 microseconds and will be accurate in duration to closer than 2 microseconds. Since each track on the machine may record commutated data consisting of many channels, it is possible to record hundreds of parallel data channels on one tape on a Model 303 machine.

"LOW FLUTTER" WIDE RANGE RECORDER—MODEL 500

The Model 500 is a four-track, two-speed magnetic tape recorder designed to achieve extreme stability of tape motion while recording information in the frequency range between 100 and 100,000 cycles. It thus is able to record fm-telemetering data without introducing any objectionable data, error from small variations in tape speed. It has the lowest known flutter and wow characteristics of any tape recorder—less than 0.1% peak-to-peak by EBU standards.

**SEISMIC DRUM RECORDER—MODEL 700**

The Model 700 is a highly specialized instrument for seismic exploration for all. It records 26 channels of information in fm-modulated form on a single tape, 4"x40"x3/8". The tape is mounted on a constant speed drum, and is replaceable after each test shot. Frequency response is within ±1 db from 3/1 to 300 c.p.s., with a corresponding dynamic range of more than 45 db. The total line alignment between all data channels is closer than 1 millisecond.

**AMPEX CORPORATION**

254 Charter Street, Redwood City, California

Branch Offices:
- New York, Chicago, Atlanta, San Francisco and College Park, Maryland (D.C., area)

Distributors in principal cities listed in Telephone Directory under "Recording Equipment": Canadian General Electric Company in Canada.

*These models are available in two-track combination recorders. One 306 track plus one 307 track becomes a Model 309; one 306 track plus one 307 track becomes a Model 311.

Write today for further information and complete specifications.
FOR THE *STANDARD IN METAL PLASTIC ASSEMBLIES:

CONSULT CINCH-JONES-

BARRIER TYPE TERMINAL
STRIPS, PLUGS, SOCKETS
AND FANNING STRIPS

The list below comprises the products of both CINCH and JONES. It indicates their wide scope and also indicates the myriad of variations and redesigning that is possible with this background of production experience.

TERMINAL ASSEMBLIES: Blocks, boards in laminated and molded, assembled with legs, pins, screw terminals, contacts, clips, turret lugs and other hardware to specifications.

The components are shown here for variety, types and uses, and are not necessarily in comparative size.

- ANTENNA JACKS
- BANANA PINS AND JACKS
- BARRIER TERMINAL STRIPS
- FANNING STRIPS
- BATTERY PLUGS & SOCKETS
- BENDING POSTS
- DIODE SOCKETS
- CONNECTORS, MULTI CONTACT
- Fuse strips, blocks & boards
- GRID CAPS
- GRID CAP SMD/SHELF
- HERMETICALLY SEALED TUBE SOCKETS
- METAL STAMPINGS
- MICRO-CO-NNECTORS
- MOUNTING DEVICES
- PHONO TIP JACKS
- PRINTED CIRCUIT, CONNECTORS
- SMD'S, TUBE MINIATURE & NOVAL, NAB, SOLID-RING, U佑-320 VARIATIONS
- STRAP NUTS
- TRANSISTOR SOCKETS
- TUBE HOLDERS—SPRING TYPE
- VIBRATION PLUGS AND SOCKETS

The steadily expanding variety of plugs and sockets produced at the JONES Division has a wide range of the highest quality electrical and mechanical parts to efficiently fill every need.

HOWARD B. JONES DIVISION
CINCH MANUFACTURING CORPORATION
1026 S. Havana Ave. * Chicago 24, Illinois

SOCKETS, CONNECTORS-

CINCH COMPONENTS

ARE * STANDARD —
ADEQUATE FACILITIES
ASSURE SERVICE

CINCH SOCKETS:

- Printed Circuit T-1 Socket
- CINCH MINIATURE
- Tube (Receiver, Transmitter and Special: 571, 671, 672, 572)
- Crystal
- Electronic
- Glass Type: 4 to 7 pinng (some)
- Infra-red Tube
- High Voltage Transformer Types
- Kinescope: Magnes, Dodeact, Dikatun
- Labd: Miniature-Multipole
- Noval-Noval (Releasable bakelite, plastic, teak, keel and laminated)
- Plastic
- Printed Circuit
- Special Sockets to Spracs
- Sub-Miniature: Hearing Aid Types
- TV, 110V Circuit Breakaway
- Vibrator
- Pencil Tube Transistor
- Diode

* CINCH metal plastic assemblies fully perform the service for which they were designed and often have anticipated the engineering needs of the future. So that today, judged by demand and usage, CINCH components are "the standard".

CINCH MANUFACTURING CORPORATION
1026 South Havana Ave., Chicago 24, Illinois

CINCH components available at leading electronic jobbers - everywhere.
Waterman POCKETSCOPE
The Pocket-Size Oscilloscope

...light...compact...accurate...portable...

Featuring small size, light weight and outstanding performance the HIGH, WIDE and TWIN POCKETSCOPES have become the "hit of the season" at an osilloscope field. Their high sweep rate, sensitivity, reliability and accuracy have prompted this term of truly portable instruments into superlative dozen such oscilloscope features DC coupled amplifiers in both vertical and horizontal channels.

HIGH

The S-14-A HIGH-GAIN POCKETSCOPE provides the optimum in oscilloscope flexibility for any kind of test circuit. Its extremely light weight (12 lbs.), compact size (24 1/2 by 6 by 8 in.), durability, and accuracy are all performance. Vertical and horizontal channels have matching sweep response, and the horizontal sweep is from 500 microsec to 50 sec per div. The sweep time is 0.1 to 5 sec per div. The video rate is from 1 to 5000 microsec per div.

WIDE

The S-12-B WIDE BAND POCKETSCOPE is ideal for investigations of transients, signal, and RF signals, negotiable pulses or transient returns. It also has a sweep time from 500 microsec to 50 sec per div. The sweep time is 0.1 to 5 sec per div. The video rate is from 1 to 5000 microsec per div. The sweep time is 0.1 to 5 sec per div. The video rate is from 1 to 5000 microsec per div.

TWIN

The S-11-A TWIN BAND POCKETSCOPE is a portable twin channel oscilloscope with two independent vertical channels. It can be used as an electronic circuit in industry, school, and laboratory. Vertical and horizontal channels 300 microsec to 50 sec per div. The sweep time is 0.1 to 5 sec per div. The video rate is from 1 to 5000 microsec per div.

RAYONIC CATHODE RAY TUBES BY WATERMAN

The basic properties of the cathode ray tube that concern the designer or the user are: detection sensitivity, stability, line brightness, line brightness, and stability. These properties are shown in the table below:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>FOCUS</th>
<th>DETECTION</th>
<th>OUTPUT</th>
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<td>3P1</td>
<td>31/2&quot;</td>
<td>5000 microsec</td>
<td>100 microsec</td>
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<tr>
<td>3P2</td>
<td>31/2&quot;</td>
<td>100 microsec</td>
<td>44 microsec</td>
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<td>3P3</td>
<td>31/2&quot;</td>
<td>200 microsec</td>
<td>44 microsec</td>
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<td>3P4</td>
<td>31/2&quot;</td>
<td>300 microsec</td>
<td>44 microsec</td>
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<td>3P5</td>
<td>31/2&quot;</td>
<td>500 microsec</td>
<td>44 microsec</td>
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<tr>
<td>3P6</td>
<td>31/2&quot;</td>
<td>1000 microsec</td>
<td>44 microsec</td>
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</table>

Write for your complimentary copy of "POCKETSCOPE" - Official Waterman publication.

112 LEEDS & NOLAN
MILLIONS OF VARIABLE RESISTORS... FOR EVERY NEED

Complete Military Line Available
Popular Military Types Illustrated
Corresponding Complete Line For Commercial Applications Also Available

Types 50, 50 and 55 are specially designed for military communications equipment subject to extreme temperature, humidity, and dust conditions.

EAST COAST OFFICE
Whitehall Supply
150 North Endway
Holliston, Massachusetts
Telephone: 867-1500

SOUTH AMERICA
Jose de Josue
Buenos Aires, Argentina
Telephone: 95-321

WEST COAST OFFICE
American Supply
6600 W. Olympic Blvd.
Los Angeles, California
Telephone: 485-8540

SOUTHWESTERN U.S.
John A. Brown Company
433 S. Olive St.
Los Angeles, California
Telephone: 427-0420

CANADIAN DIVISION
C. K. Moeller & Co.
Saskatchewan, Canada
Telephone: 211

LOCKING BUSHINGS FOR:
Specialists in Precision Reproduction of Variable Resistors
Hello Again!
Many of the advertisers in the 1954 IRE DIRECTORY have greeted you before as exhibitors in the 1954 Radio Engineering Show, or as advertisers in PROCEEDINGS OF THE I.R.E. during 1954. These advertisers are listed below, identified with an S for Show exhibitors, and a P for PROCEEDINGS advertisers.

To give you a complete selling program to radio and electronic engineers, IRE provides all 3!


IRE DIRECTORY provides 35,000 engineers educated to buy and specify with your detailed product data for ready reference all year long.

Langevin Model 5116
Inclusion in facilities
FCC requirements

Radio Engineering Show
...the eye-opening event of each radio-electronic year...where over 40,000 engineers come to you for all that's new.

For complete facts, ask IRE about all 3!

Engineers are educated to specify and buy.

The Institute of Radio Engineers
Adv. Dept.
1475 Broadway
New York 36, N. Y.
Bryant 9-7550

IRE 1954 Directory
Hello Again!

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(Continued on page 115)

Dahlohm deposited carbon resistors are manufactured under rigid controls to deliver matched performance and economy in any high-reliability range.

Pure carbon in crystaline form is bonded in a selected range material and then wound against moisture with a special thermal conductivity, high resistance to abrasion.

- From 1 Ohm to 200 Megohms, depending on type.
- Temperature coefficient 10°/100° per degree C, for lower resistance ranges up to 25°/100° per degree C for higher ranges.
- 5% accuracy, 2%, 5%, and 10% tolerances also available.

Dahlohm

For accuracy and stability

Deposited carbon resistors

...made to survive

Dahlohm miniature power resistors—made to those rigid specifications—are carefully designed and skillfully made for all applications where the equipment must survive the most severe environments, shock and vibration conditions. Completely sealed from terminal to terminal, coated with special silicone material, and impregnated to moisture, salt mist, vapor, and gases.

RH TYPES—Silicon-soldered in a die-cast, black, molded resistor funneled housing and mounted on each panel for maximum heat dissipation. Three wattage ranges: 25, 22 Watts, 10-50, 54 Watts, 60-250, 250 Watts.

Where a great industry turns for greater growth!

In the annual

IRE DIRECTORY, a complete radio-electronic industry is organized, cataloged, classified, and "indexed for use." With firms, products, all are listed as vital working information for 30,000 IRE members who depend on facts to guide their vast industry even greater growth.

Never before has there been such need for standardization of products used, bought, and sold in the radio-electronic field. The IRE DIRECTORY is pioneering and helping to establish industry-wide product standardization including division of terms. Because of its recognized service to engineers, because it is in its industry encyclopedia, the IRE DIRECTORY is your basic catalog medium in which one message works 365 days of the year. In planning next year's budget, set aside sufficient funds to put your best facts forward in the 1955 IRE DIRECTORY.

Engineers are educated to specify and buy.

Published by The Institute of Radio Engineers

Adr., 1475 Broadway, New York 36, N.Y., 8Fryant 97550

1954 IRE Directory

DALE PRODUCTS, INC. (Continued on page 125)

Columbus, Nebraska, U.S.A.

Export Dept. Pan Am Corp., 1270 Broadway, N. Y., N. Y.

In Canada, Teletronics Corp., Ltd., Toronto and Montreal

DALE PRODUCTS, INC.

Columbus, Nebraska, U.S.A.

Export Dept. Pan Am Corp., 1270 Broadway, N. Y., N. Y.

In Canada, Teletronics Corp., Ltd., Toronto and Montreal
Hello Again!

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(continued on page 113)

CHESTER
plastic cord-plastic coated
W I R E S & CABLES

It pays to make CHESTER quality-engineered wire and cables your standard for both commercial and military requirements. Every foot of conductor bearing the CHESTER label is laboratory tested and service-proven to perform as specified. CHESTER extra-strength plastic coatings are made super-durable for longer life and smooth pliability assures the easier working qualities that speed wiring production.

NEW CHESTER BULLETIN

Complete data and specifications on quality conductors for all electronic wires and cables will be supplied promptly. Call or write today.

CHESTER CABLE CORP.
CHESTER, NEW YORK

Sub-miniaturization is

ITY BITTY

BUSINESS

Sub-miniaturization actually is a self-contradictory word because as radio components are engineered down to thumbnail and pinhead size, electronic applications in industry become wider and greater. Very soon, a tumbler-full of complex radio electronic equipment will fly on airplanes. Circuits have been flattened to postcard size, and radio-tubes to matchhead size. "Radio" becomes a part of every industry! The pace, for reaching the goals of the radio electronic industry has been made possible by a vast amount of technical achievement. More than 1,000 technical meetings a year are held by IRE's 38,000 members in eighty-one active sections in every part of the English-speaking world. This volume of published information required to feed this engineer's progress is enormous.

For forty years, without regard for name or direction, The Institute of Radio Engineers has published its "Proceedings of the IRE"—a monthly magazine by radio-electronic engineers, for radio engineers. It is an unbridled, accurate, working textbook. All advertisers use its pages to keep their products before designers...to sell in the pre-specification stage of this dynamic industry.

Engineers are educated to specify and buy.

These rugged plastic coatings are super-durable and easier working qualities that speed wiring production...and extra strength that adds years to wiring life. For complete wiring dependability—connect it with CHESTER, the name for quality in wires and cables.

CALL OR WRITE TODAY FOR LITERATURE AND SAMPLES Check your wired needs with CHESTER. Complete information on all standard constructions will be sent promptly. If you need custom construction, CHESTER can build it to your specifications.

**CHESTER**

plastic cord-plastic coated
W I R E S & CABLES

PROCEEDINGS OF THE IRE

1954 IRE Directory

(Continued on page 112)
**Hello Again!**

Many of the advertisers in the 1954 **IRE Directory** have greeted you before as exhibitors in the 1954 Radio Engineering Show, or as advertisers in **PROCEEDINGS OF THE IRE** during 1954. These advertisers are listed below, identified with an S for Show exhibitors, or a P for PROCEEDINGS advertisers.

(Continued on page 122)

**From servo-mechanisms to electronic computers: "RADIO" is a way of THINKING!**

For-muching progress in the radio-electronic field is no "happy accident." Television, electronic computers and the "radiation" power of the atom, to name a few, could not have happened to industry were not discovered...they were engineered.

From "fission" to "computation," these engineering achievements are accomplished through an enormous process of information exchange—the methodical and brilliant teaming together of engineering thinking to solve a problem. In radio, this work has been done deliberately by a growing engineering society, through its meetings and publications, which unites the creative minds of men.

In 1953, "Proceedings of the IRE" published 1813 text pages, exclusive of product news and departmental features. This is the word-count equivalent of seven 500-page textbooks on radio-electronics for engineers. It sounds the record of the first and only two contemporary public magazines put together. This "high," in genuine reader service was logically matched by advertising worth over a billion dollars, by firms investing in the engineers' reading interest and benefiting by it.

**Engineers are educated to specify and buy!**

**QUALITY RESISTORS**

- Wire wound precision
- Hermetically sealed
- Encapsulated high voltage, high frequency, high megohm

**RESISTANCE PRODUCTS CO.**

714 RACE ST.

HARRISBURG, PENNA.
replacing GLASS
with TEFLO"N

Chemelec Stand-Off
and Feed-Through Insulators

THE PLASTIC'S "MEMORY" sec-
urely locks insulators perma-
nently in place. Minimum pull
test 10 lbs., insulator to deck,
hardware to insulator.

MINIATURIZATION is easily
gained.

SEVEN STOCK SIZES, including
sub-miniatures, in both Stand-
Off and Feed-Through types.
Other dimensions feasible.

WRITE for Chemelec Bulletin
EC-1103.

Hello Again!

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1954 IRE Directory

...for superior service
and economy

Chemelec Stand-Off
and Feed-Through Insulators

Goodness! Such growth!

During the past five years, the
radio-electronic industry's
spectacular growth has been
duly noted by the increase of advertising
pages in the annual IRE DIRECTORY.

In the 1949 edition, 138
advertisers took 112 pages. In the
1954 IRE DIRECTORY, the
corresponding figures are 256 and
136—over the 49 edition.

The IRE DIRECTORY sells
your product by serving over 35,000
IRE members who daily are developing
and perfecting remarkable new
deices. To sell ahead, put your
product story before radio-electronic
engineers who are planning ahead
... in the 1955 IRE DIRECTORY.

Engineers are educated to
specify and buy.

IRE DIRECTORY
Published by
The Institute of Radio Engineers
Adv. Dept., 1475 Broadway,
New York 3, N. Y.-Byrant 5-7550
1954 IRE Directory

GASKET COMPANY
FABRICATORS OF ALL TEFLON, KELF-LI AND OTHER PLASTICS

UNITED STATES
FLUOROCARBON PRODUCTS INC., DIVISION
CAMDEN, NEW JERSEY
1954 IRE Directory

127

WON'T CARBONIZE under
heating. 
WON'T ELECTRODE.
NON-FLAMMABLE, non-toxic, chemically inert.
INVESTIGATE Chemelec Stand-Off and Feed-Through Insulators for superior service and lower assembly costs.

SEVEN STOCK SIZES, including sub-miniatures. Other dimensions feasible.

WRITE for Chemelec Bulletin EC-1103.

WON'T CARBONIZE under
heating.

WON'T ELECTRODE.
NON-FLAMMABLE, non-toxic, chemically inert.
INVESTIGATE Chemelec Stand-Off and Feed-Through Insulators for superior service and lower assembly costs.

SEVEN STOCK SIZES, including sub-miniatures. Other dimensions feasible.

WRITE for Chemelec Bulletin EC-1103.
How to Use Our Business and Product Sections

The Business and Product Sections of this Directory are included for the service of members as a guide to the products they have on hand, and the products they have contracted to make, retail, commission, and coinetronics.

The following 4 Sections of the IRE Directory are:

Part I
1. Pink Section—Alphabetical List of Products & Group Arrangement
2. Complete-Data-Spreads Section
3. Company List of Radio-Electronic Manufacturers
4. Product Index of Engineering Equipment and Parts

SECTION 2

This Section is one of the most informative and valuable sections of the Directory. The manufacturers are supplying engineers with the maximum amount of detailed information possible through the use of multiple pages spread out in their products (see page 40). The purpose of this Section is to give the engineer a complete and ever-available catalog file in his IRE Directory wherein he can always see it readily and quickly. We believe that the service of this section will be the utmost help to you.

SECTION 3

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INSTRUCTIONS

1. With the Directory open on the desk, the book almost double in your left hand, with your thumb just above this box.

2. From one-line or two-line symbol adjacent to the letter or subject, you can use your eye to scan horizontally to a corresponding page-edge symbol.

3. Open there with right hand.
Classifications with a System!

The IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They are designed to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes into which 104 basic classifications have been organized.

1. Audio Frequency Equipment (Products 1 to 11)
2. Broadcasting Equipment (Products 12 to 17)
3. Communications Equipment (Products 18 to 25)
4. Component Parts (Products 26 to 62)
5. Applications of Electronics (Products 63 to 70)
6. Radar, Microwave, UHF (Products 71 to 79)
7. Test & Measuring Equipment (Products 80 to 101)
8. Services and Materials (Groups 75 to 91)
9. Education & Publishing (Groups 102 & 103)
10. Distribution Functions (Service 104)

For detailed identification, these 104 products and services, grouped in the 10 indexes, are further defined into over 600 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing aids the engineer who has forgotten some detail, or product name. Ours helps by grouping products as one would think.

For safety, an alphabetical "terminology" index is given, preceding the product system in the pink pages introducing the company index. You will note also that after each firm, its products are listed by number code in the alphabetical list, and that sub-classifications shown by number code in the product indexes give much detail. Just a study of the system will help you get great good from this book.

The IRE DIRECTORY is 10 Indexes in one book.
Below, for your convenience, are six perforated reply cards. Each one has enough space to list three advertisers’ names and their page numbers. Forward as many cards as you have questions, and I.R.E. will promptly notify the manufacturer in question to send literature, specifications, and prices to you.

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1954 I.R.E. DIRECTORY
READER SERVICE REPLY CARD

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Triangle St., Danbury, Conn., 06810
Tel: Dunbar 3-2260

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Angeles 38, Calif., 68, 69, 70, 72, 73, 74, 99
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Tel: Harrington 2405

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Sanborn "150" Recording Systems that put to use the original design concept of amplifier intermodulability (illustrated at the left) start with either a four-channel or two-channel standard Basic Assembly, to which the user adds whatever selection or combination of preamplifiers (A) are needed for his recording problem. The standard Basic Assembly comprises a metal Cabinet, Recorder, a built-in Driver Amplifier and Power Supply (B) for each channel. Presently available Preamplifiers are: AC-DC, Carrier, DC Coupling, Servo Monitor, Log-Audio, and Low Level Chopper.

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As an aid, a copy of the Right Angle -- a Sanborn publication devoted to oscillographic recording is Industry.

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Alphabetical Directory

(Continued from page 157)

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5. Applications of Electronics (Products 63 to 70)
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Company
Address
Title

1954 IRE DIRECTORY

1954 IRE DIRECTORY

1954 IRE DIRECTORY

1954 IRE DIRECTORY

1954 IRE DIRECTORY

1954 IRE DIRECTORY

A Directory of Audio Frequency Equipment

01 Amplifiers.
02 Attenuators.
03 Equalizers.
04 Filters.
05 Industrial Sound Systems.
06 Jacks, Jack Fields & Plugs.

11 Major Groups
63 Products
Organized by functions for Engineers!

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the I.R.E. Professional Groups. But 104 major product groups are numbered throughout.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list 608 products by name, as well as under the product groups. Page numbers are given for speed.

01. Amplifiers.

Audio Consultants, N.Y., 20
Audio Corp. of America, N.Y., 30
800 W. 54 St., New York 1, N.Y., 26, 27, 30, 35
70 Loudspeakers & Headphones.

02. Attenuators.

03. Equalizers.

04. Filters.

05. Industrial Sound Systems.

06. Jacks, Jack Fields & Plugs.

07. Loudspeakers & Headphones.

08. Microphones & Stands.

09. Phonographs, Pick-ups, Record Changers, etc.

10. Recording Accessories & Supplies.

11. Recording Equipment.

Cable number at end of each address refers to product or service classified under the level of the major classification.
Classifications with a System!

The IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most industry indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. In this regard, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes which 101 basic classifications have been organized.

For detailed identification, these 101 products and services, grouped in the 10 indexes, are further broken down into more detailed names. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic index adds speed and clarity. Prewritten alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers have liked our system better!

The IRE DIRECTORY is 10 Indexes in one book. (Continued from page 245)

06. Jacks, Jack Fields & Plugs. (Continued from page 245)

06. Jacks, Jack Fields & Plugs. (Continued from page 245)

07. Loudspeakers & Headphones. (Continued from page 245)
1. Audio Frequency Equipment

07. Loudspeakers & Headphones.

(Castian from page 217)

Crescent Industries, Inc., Ill., 5, 15, 20
Dietzson, Inc., Ill., 5, 10
Dunwoody Co., Inc., N.Y.
Electro-Voice, Inc., Ill., 5, 15, 20, 25
Fidelity Amplifier Co., Ill., Drive-in-theaters
Goldstein & Son Elec. Corp. N.Y., 5
General Electric Co., N.Y.C., N.Y., 5, 15, 20, 25
General Electric Co., N.Y., 5, 15, 20
Glarner-Sears Corp., N.Y., 5
Hartley Co., Inc., N.Y., 5, 15, 20, 25
Haven Products Co., 111 N. 4th St., St. Charles, Ill., 5
For details see ad on page 240
Tel.: St. Charles 3188
Hepper Mfg. Co., Box 1207, Round Lake, Ill., 5, 15, 20
For details see ad on page 250
Tel.: round Lake 6-2101
Hall Audio, Inc., Calif., 5, 15, 20, 25
International Corp. of America, N.Y., 5
Joseph Mfg. Corp., Ill., 5, 15, 20, 25
Koito Electric Co., N.Y., 5
For details see ads on page 230
Tel.: University 4-4721
Lassing Sound, Inc., Calif., 5, 15, 20, 25
Lund-Hammer Co., Ill., 5
For details see ad on page 245
Tel.: L-591
Magnavox Co., Dept. B-7, 1213 Sutter St., San Francisco, Calif., 5, 15, 20
For details see ad on page 245
Tel.: B-591
Magnavox, Inc., Ill., 5, 15, 20, 25
Northern Electro Co., Ltd., Canada, 10
Oxford Electro-Products, Ltd., Canada, 10
Oxford Electro Corp., Ill., 5, 15, 20, 25
Permanex Corp. Ill., 5, 15, 20, 25
Philbrook Mfg. Co., Ill., 5
Quinn-Michalski Corp., Ill., 5, 15, 20
RCA Victor Co., Ltd., Canada, 25
Radio Corp. of America, Engle Prod., Dept. Camden, N.J., 15
For details see ad on page 250
Tel.: W4-4000
Raison Elec. Co., Inc., N.Y., 5, 15, 20, 25
Reeves Equipment Corp., N.Y., 5
Rosenwall Corp., N.Y.
Rola Co., Inc., The Ohio, 5
Scars Co., M.J., N.Y., 10

Molded Cellulose Fibre and Glass Fibre Reinforced Plastics

Diaphragms—Suspensions—Cabinets—Housings—Tweeter Horns—Phone Bases—Carrying Cases

and Special Applications of Fibre, High Impact Resin Fibre and Glass Fibre Reinforced Polyester Resins.

HAWLEY PRODUCTS COMPANY
ST. CHARLES, ILLINOIS
1. Audio Frequency Equipment

08. Microphones & Stands.

[Additional text related to audio frequency equipment]

09. Phonograph, Pick-ups, Record Changers, etc.

[Further details related to audio equipment]

Radio Corp. of America, Tube Depart-
ment, Section 470C, 415 8th St.
Harmon, N.J., 10

[Details for a specific product or service]

Sapphire Needs proved best by actual scientific test and measurement.
—Harold D. Weiler

10. Recording Accessories & Supplies.

[Text related to recording accessories and supplies]

“TETRAD”
World’s Largest Producer of Diamond Stylist
Supplies to Manufacturers of Pick-Up Cartridges and Phonographs
62 St. Mary Street, Yonkers, N.Y. 2, 46

[Information about TETRAD]

“TETRAD” is a registered trademark of TETRAD Corporation, 62 St. Mary Street, Yonkers, N.Y. 2, 46. All rights reserved.

[Additional text related to TETRAD]

[Note: The document contains various entries related to audio equipment manufacturers and suppliers, including addresses and contact information.]
1. Audio Frequency Equipment

10. Recording Accessories & Supplies.

(Continued from page 251)

Kollman Instrument Corp., Dir. of Standard Cell Products Co., 80-45 Ave., Elmbridge Rd., N.Y., N.Y., 20 For details see ad on page 216


Logistics Research, Inc., 141 S. Pacific Ave., Bradenton, Steh, Calif., 20 For details see ad on page 405

Tel.: 0-Regen 8-7912

Magnavox, D.C., 50

Magner, Inc., Ill., 20

Main Co., Inc., 15, 21 M. St., Minneapols, Minn., 20

Tel.: 0-Regen 8-3200

For details see ad on page 433

Tei: 0-Regen 8-3200


Mirror Record Corp., N.Y., 5, 15

National Hollywood, Calif., 5, 15, 20, 40

Oradno Industries, Ala., 25, 30

Pelote Wire Recorder Corp., Ill., 20, 30

Pentagon Corp., Dept. IRE, 25, 37, E.

Tribe Ave., Chicago 4, Ill., 20, 25

For details see ad on page 253

Tel.: 0-Regen 8-2200

Porous, Inc., Ill., 20, 25, 30

Presto Recording Corp., P.O. Box 500, Paramus, N.J., 20, 30, 40

For details see ad on page 252

Tei: 0-Regen 8-2200

Presto Recording Corp., P.O. Box 500, Paramus, N.J., 20, 30, 40

For details see ad on page 252

Tei: 0-Regen 8-3200

RCA Victor Co., Ltd., Canada, 5, 21, 30, 40

Radio Corp. of America, Eng.ing Services Dept., Camden, N.J., 20, 25, 20

For details see ad on page 210

Tei: Woodward S. 8-8800

Rogerseng, N.J., 20

Revere Corp., N.Y., 5, 15, 25, 40

Revere Sound Corp., N.Y., 5, 10, 25, 45

Revere Equipment Corp., N.Y., 5, 10, 30, 40

Shur Brothers, Ill., 10, 20

Sonic Recording Prod., Inc., N.Y., 5, 15, 40

Sobera Eng. Inc., Fl., 20, 25

Sound Devices, Inc., N.Y., 5, 25, 30

Soundteller Corp., Campa, 2

Staehl-Hoffman Corp., Calif., 20

Synchronistic Productions, N.Y., 10, 25, 30, 40

VH-5 Corp., Stich, 25

Webster Elec. Co., Ws., 20

II.

11. Recording Equipment.

A precision type 14 Magnetic tape re- corder for recording, 3000 hours of recording. Made in England, 10, 25, 30, 40

Aerovan Corp., Mass., 15

Allied Recording Products Co., N.Y., 5

Amper Corp., 94 Clare St., Redwood City, Calif., 15

Amper Corp., N.Y., 5, 10, 15, 25, 30, 40

For details see ad on pages 108-109

Tei: Emerson E-1471

Amplifier Corp. of America, N.Y., 15

Ampex Corp., Ill., 15

Axco Sound Corp., N.Y., 5, 10, 20

Audio Corp. of America, N.Y., 15

Audio Industries, Inc., Ill., 15

Audio-Master Corp., N.Y., 15

Bell & Howell Co., Ill., 15

Sound on Films

Bell Sound Systems, Inc., Ohio, 5

Berkland Assoc., Calif., 15

Broadcasting Equipment specialties, N.Y., 15

Brooklands Electronics Co., Ohio, 15


Canadian Radio Mfg. Corp., Ltd., Canada, 15

Components Corp., N.Y., 15

Corrigan Corp., Como, 3

Crestwood Industries, Ill., 15, 20

Davies Labs, Inc., 470 Queensbury Blvd., N.Y., 25

For details see ad on page 254

Tel.: 0-Regen 7-3123

Daytron Elec. Corp., N.Y., 10, 15

Dietz Corp., Cons. Disp. Equip., N.Y., 10, 15

Dunlop Development Co., 235 Penn St., Burlington, N.J., 15

For details see ad on page 445

Tel.: Burlington 3-046

Extra, Inc., Ohio, 15

Evon, Inc., Ill., 15

Elycrafts, Inc., Como, 15

Elsb Mfg. Co., Inc., Pa., 15

(Continued from page 251)

New standard of professional recording

Dynacord PROFESSIONAL Tape Recorder

3 WAYS TO MARKET

The IRE Broadcast Promotion Package is composed of a monthly magazine, a directory and a show, to do these three marketing jobs:

Product Promotion is the function of advertising in "Proceedings of the IRE," which reaches 30,000 net per issue, 280,000 readers of which 13,000 are member engineers, (including 5,000 student engineers). The publication is a month-by-month textbook of engineering and radio science, and its advertising keeps the engineer up-to-date with product development. Thus its ads promote products to the "thinking and reading" engineers who design and set the specs for tomorrow's production.

Product Reference is the job of the IRE DIRECTORY. Engineers are highly literate, and what they do not know about themselves, they do know where and how to look up. The IRE DIRECTORY is their own reference tool for men, firms and products—supplying an accurate source of information—in which advertising is "inoffensive" that pays fine will be found.

Product Presentation is accomplished economically through the Radio Engineering Show, which attracted 32,000 registered visitors, and served 605 exhibitors in 1954.
1. Audio Frequency Equipment

11. Recording Equipment.

(Continued from page 511)

Fairchild Recording Equipment Co., N.Y., A. 15
Federal Mfg. & Eng. Corp., N.Y., 15
Fisher Scientific Co., N.Y., 15
Gallop Eng. Co., D.C., 5, 15, 20
General Radio Co., N.Y., 15
Gates Radio Co., Ill., 5

For details see ad page 177
Tel: Middletown 6-2002

Insullite Corp. of America, N.J., 3
Magnocon, Inc., Ill., 15
Mikro Engineering, La Canada, Calif., 3, 15
Mersdale DeVries, Ltd., Canada, 5
Miller Instr., Inc., Williams, Calif., 15
Mirror Radio Corp., N.Y., 5
Oakland Eng. Corp., Ill., 15
Perre Wire Recorder Corp., Ill., 15, 20
Petersen Corp., 777 E. Troy Ave., Chicago 24, Ill., 15

For details see ad page 155
Tel: Sacramento 3-2001

Pentumflex Corp., Ill., 15
Potter Instr., Inc., N.Y., 15
Press Wireless Labs., Inc., Mass., 15
Presco Recording, P.O. Box 200, Panama, N.J., 5, 15

For details see ad page 122
Tel: Fort Worth 3-5000

Radio Components Ltd., Canada, 17
Radio Corp. of America, 17
Recording Products Dept., Camden, N.J., 5, 15
Resona Recording, P.O. Box 200, Panama, N.J., 5, 15

For details see ad page 215
Tel: Woodlawn 4-8000

Rosendahl, Inc., N.J., 15
Russco Instr., Inc., N.Y., 15
Rob-K-O-Matic, N.Y., 15
Rubin Recording Labs., Pa., 5
Simpson Mfg. Co., Mark, N.Y., 5, 15
Skiogram Elec. & TV, N.Y., 15
Sonderman Corp., Conn., 5, 15
Southwestern Ind. Elect., Elect., Texas, 15
Stamfoff-Hoffman Corp., Calif., 15
Technicolor Studio, Mo., 5
Teletro Industries Corp., N.Y., 15, 20
U.S. Recording Co., D.C., 5, 15

For details see ad page 420
Tel: TR-4-8000

Bass, Inc., N.Y., 15
Beam Instruments Corp., N.Y., 15
Blank-Know Equipment Div., Pa., 20
Bright Radio Labs., Inc., N.Y., 15

For details see ad page 147
Tel: E-1-7166

Barton-Rogers Co., Mass., 5
Collins Radio Co., 385 St., N.Y., 5
Cedar Rapids, Iowa, 5

For details see ad page 403-466
Tel: Cedar Rapids 3-2851

Connection Telephone & Elec. Corp., Caron, 10
Continental Radio & Electrical Eng., S. Afrika, 5, 15

For details see ad page 233-239
Tel: Whitewater 4-1424

Lingo & Son, Inc., John E., N.Y., 5, 15
Marcon's Wireless Telegraph Co., Ltd., England, 5, 10, 15, 20, 25

1944 Directory

1944 Directory

See complete list of the manufacturers directory

On pages 233-239

2. Broadcasting Equipment

Broadcasting Equipment Directory

A Directory of

Both Aural & Visual: Receivers, Transmitters & Associated Equipment


10 AM broadcast transmitting
15 FM broadcast transmitting
13 TV broadcast transmitting
115 Television lighting equipment
30 Tower erection & maintenance service

13 Monitor Equipment.

12 Frequency
13 Modulation
14 Remote control monitors
15 Video monitors

14 Receivers.

15 AM Broadcast
16 AM Shortwave
17 FM Broadcast
18 TV Broadcast B & W
23 TV Broadcast Color

The products and services of the Radio-Electronics industry have been organized into ten directories following closely the organization of the IRE Professional Groups. But 104 major product groups are numbered throughout.

15 Services for the Broadcasters.

16 Frequency measurement
17 Packaged program services
18 Television picture transmission

18 Studio Equipment.

15 Console & speech input equipment
16 TV Cameras
17 TV Camera control equipment
18 TV Film projectors
19 TV Audio Lighting equipment
20 Turntables

19 Transmitters.

15 AM Broadcast
16 FM Broadcast
17 TV Broadcast
18 Radio broadcast & STL equipment

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list 668 products by name, as well as under the product groups. Pages numbers are given for speed.

1944 Directory

255

Products 11-12
Broadcasting Equipment


(Continued from page 115)

Wichauger Corp., Iowa, 5-13, 15, 20
Wind Turbine Co., Merven, Market St., West Chester, Pa., 20, 25, 30
For details see ad on page 265

Wenner Electronic Devices, Ill., 25, 20, 25, 30
Woodford Radio Co., N.Y., 5, 10, 20, 25, 30


3. Frequency & Modulation 15. Remote control equipment

A. E. F. Products, Ill., 5, 10
Adler Communications Labs., N.Y., 20
American Electronics Labs., Ill., Pa., 20
American Corp., Ill., 20, 25, 25, Chicago, Ill., 15, 
Phase Monitor, A.B.C.
For details see ad on page 420

Tel: TR-4400

Arc Equipment Co., N.Y., 20
Atomic Instrument Co., Mass., 5, 10
Beam Instruments Corp., N.Y., Audio
 Broadcasting Angel

Berkeley Div. Beckman Instruments, Inc., Dept. 20, 25, 25, Weight Ave., Richmond, Calif., 5, 10

For details see ad on page 138

Tel: cs 4-0925

Bristol Engineering Corp., Pa., 10
Building Laboratories, Mass., 15, 15
Broad & Kiper, Denver, 10
Brother Electronics, Ohio, 5, 10
Bud Radio, Inc., Dept. NE 3, 2125 E. 15
St., Cleveland 5, Ohio,
For details see ad on page 145

Cambridge General Elec. Co., Canada, 5, 15, 15, 20
Cambridge Radio Mfg. Corp., Ltd., Canada,
Capehart-Farrarworth Co., Ind., 20
Cardwell Mfg. Corp., Alles D., Conn., 5, 15, 15, 15
Coletohite Electronics, Inc., N.Y., 5
Communications Sys., Inc., M.J., 20
Comms., Inc., Calif., 20
Dawson Development, Inc., 255 Penn St.,
Burlington, N.J., 5, 15, 15
For details see ad on page 45
tel: Burlingame 5-0400

DeMont Lake, A. B., Communications Prod., 100 Main Ave, Clifton, N.J., 5, 10, 20
For details see ad on page 161

Tel: Mulberry 4-7200

...For Rigid Sway and Twist Limits

From standard broadcast to extended microwave installations, Trylon towers have extreme rigidity to withstand difficult loading conditions with a wide safety margin to spare. Each unit is "tailored" to fit the specific requirements of its application.

Type 3500H—heights to 320 feet

The balanced diagonal bracing which increases the compression strength and greatly increases resistance to twist.

Type 3600—heights to 520 feet

As shown here, a Trylon 3600 tower is supporting a FM antenna at 270 feet. All Trylon towers are hot-dip galvanized after fabrication.

Type 4600—heights to 800 feet

This heavy-duty tower is specifically designed for minimum deflection with VHF-UHF television antennas.

PLUS...over 20 years experience in designing, manufacturing, and installing many types of towers, rotators, antenna shortening and changeover switches, and other antenna specialties.

Trylon Towers are made only by WIND TURBINE COMPANY
WEST CHESTER, PA.
At least one of your interests is now served by one of IRE's 21 Professional Groups

Each group publishes a technical journal and sponsors technical conferences at least once a year. They also sponsor technical luncheon meetings in local Chapters, and they also sponsor industrial seminars in the communities served by the Chapters. The Basis of the group is the interest and enthusiasm of its members, and the Group provides a forum for the discussion of technical problems of common concern to all members. The Group is a community of professionals, and members are encouraged to share their knowledge and experience. The primary purpose of the Group is to promote the exchange of technical information and to provide a forum for the discussion of technical problems and solutions.

The Institute of Radio Engineers
1 East 79th Street, New York, 21, N.Y.

USE THIS COUPON

Miss Emily S. Calvert
IRE West 7th St. Station
New York 21, N.Y.

Please enroll me for the IRE Professional Group

Name

Address

Please enclose remittance with this order.

W. R. J. Baker
Chairman, Professional Groups Committee

1954 IRE Directory

2. Broadcasting Equipment


15. Services for the Broadcast


2. Broadcasting Equipment

15. Services for the Broadcast


2. Broadcasting Equipment

15. Services for the Broadcast


2. Broadcasting Equipment

15. Services for the Broadcast

Precision Professional Equipment

FOR TELEVISION AND BROADCAST STATIONS

accepted and used by all major networks

for reliability • versatility • performance

TELEPHOTO OBJECTIVE

A telephoto is one that operates, economically and reliably, at a relatively high output power and efficiency. The frame is designed to provide maximum light transmission. It is designed for long distance, low light, or high speed applications. It can be used for telecasting or video monitoring.

FILM MULTIPLEXER

A film multiplexer is a device that can be used to select and interlace any number of films or video tapes. It can be used to add or remove pictures from a film, or to add or remove video from a tape. It can also be used to switch between different film or video sources.

CABLE TOWER

A cable tower is a tall structure that is used to support television or radio broadcast antennas. It is usually made of steel and is designed to withstand high winds and heavy snow.

FOUR-WAY FILM MULTIPLEXER

A four-way film multiplexer is a device that can be used to select and interlace any four films or video tapes. It can be used to add or remove pictures from a film, or to add or remove video from a tape. It can also be used to switch between different film or video sources.

MANUAL CONTROL BOX

A manual control box is a device that is used to control a television or radio broadcast antenna. It is usually used to switch between different antenna inputs, or to adjust the gain of the antenna.

VERTICAL SCROLL DRIVE

A vertical scroll drive is a device that is used to move a television or radio broadcast antenna up and down. It is typically used to change the vertical position of the antenna, or to adjust the gain of the antenna.

TAPE DRIVE

A tape drive is a device that is used to move a television or radio broadcast antenna forward and backward. It is typically used to change the horizontal position of the antenna, or to adjust the gain of the antenna.

REVOLVER LOCK

A revolver lock is a device that is used to secure a television or radio broadcast antenna. It is typically used to prevent unauthorized access to the antenna.

17. TRANSMITTERS

Carrier Corp., N.Y. 10, 20
Cedar Rapids, Iowa, 5
Dell Radio Corp., 955 B St. H.E., 95
Cedar Rapids, Iowa, 5
Dell Radio Corp., 955 B St. H.E., 95
Cedar Rapids, Iowa, 5

18. BROADCASTING EQUIPMENT

(Continued on page 209)

19. TRANSMITTERS

Carrier Corp., N.Y. 10, 20
Cedar Rapids, Iowa, 5
Dell Radio Corp., 955 B St. H.E., 95
Cedar Rapids, Iowa, 5

20. BROADCASTING EQUIPMENT

(Continued on page 209)

21. TRANSMITTERS

Carrier Corp., N.Y. 10, 20
Cedar Rapids, Iowa, 5
Dell Radio Corp., 955 B St. H.E., 95
Cedar Rapids, Iowa, 5

22. BROADCASTING EQUIPMENT

(Continued on page 209)

23. TRANSMITTERS

Carrier Corp., N.Y. 10, 20
Cedar Rapids, Iowa, 5
Dell Radio Corp., 955 B St. H.E., 95
Cedar Rapids, Iowa, 5

24. BROADCASTING EQUIPMENT

(Continued on page 209)

25. TRANSMITTERS

Carrier Corp., N.Y. 10, 20
Cedar Rapids, Iowa, 5
Dell Radio Corp., 955 B St. H.E., 95
Cedar Rapids, Iowa, 5

26. BROADCASTING EQUIPMENT

(Continued on page 209)

27. TRANSMITTERS

Carrier Corp., N.Y. 10, 20
Cedar Rapids, Iowa, 5
Dell Radio Corp., 955 B St. H.E., 95
Cedar Rapids, Iowa, 5
"Radio" is a way of Thinking!

Just as "communication" needed to break its earthbound bonds of wire and take to the air, so industry is seeking and finding in radio controls new "tools" ranging from servomechanisms to electronic computers.

Radio engineers are making the "bright new world" which was the dream of men in World War II. Just as radio engineers bridged the lost silence of the sea by ship radio communications in the 1900s, so these same thinkers, as radio physicists unleashed the "radiation" power of the atom, and will harness it to industry. They have brought the picture of the world under your control by a knob in your home television — and have beaten the monotony of endless counting by the electronic computer.

TAKING THE GUESSCORE OUT

Such progress is no "happy accident." Men do not "discover" television — they "engineer" it. A good example is the achievement of color television. From "fission" to "computation" the job is done by an enormous process of information exchange — the methodical and brilliant teaming together of engineering thinking to solve a problem. In radio this work has been done deliberately by a growing engineering society, through its meetings and published proceedings, which unlease the minds of men.

In 1953 "Proceedings of the I.R.E." published 1,918 text pages, exclusive of product news and departmental features. This is the word-count equivalent of seven 500 page textbooks on radio-electronics for engineers, and exceeds the contents of the next two contemporary publications put together. This "high" in genuine reader service was logically matched by advertising worth half a million dollars, by firms investing in the engineers' reading interest.

"Proceedings of the I.R.E."

Published by the

INSTITUTE OF RADIO ENGINEERS

Advertising Dept. 1475 Broadway
New York 36, N.Y., BRyant 9-7550

Radio • Communications • Television • Electronics

Page 263

Product 18

3. Communications Equipment

All non-broadcast forms of communication: Amateur, Emergency, Facsimile, Mobile, etc.

18 Aircraft & Airport Equipment

5 Aircraft receivers
10 Aircraft transmitters
13 Aircraft transceivers
15 Aircraft receivers
20 Aircraft transmitters
23 Aircraft equipment, etc.

19 Amateur Equipment

5 Antennas & antenna accessories, rotators, etc.
10 Receiver equipment
15 Transmitters

20 Carrier Current Equipment

5 Complete terminal equipment
10 Installation & maintenance
15 Repair & relay equipment

21 Emergency Communications Equipment

10 Despatching equipment
15 alphabetics

22 Facsimile Equipment

10 Facsimile equipment
10 Stabilized paper
13 Transmission equipment

23 Marine Equipment

5 Control instruments
10 Facsimile receiving equipment
13 Shipboard communications equipment

24 Mobile Equipment

5 Antennas
10 Central Station receivers
13 Central Station transmitters
20 Citizen Radio
23 Mobile receivers
20 Mobile transmitters
25 Selective Calling equipment

25 Point-to-Point Equipment

5 Antennas & towers
10 Receivers
15 Transmitters

The products and services of the Radio-Electronic industry have been organized into two basic lists, following closely the organization of the IEEE Professional Groups. But IRE major product groups are memorialized throughout.

18. Aircraft & Airport Equipment

Canadian General Elec co., Aircraft Electronics Div., Canada, 5, 20
Cleveland Wire hospital, co., Ltd., Can- ada, 5, 10, 15, 20, 25
Cotuna Corp, Calif., 25
Cordell Mfg. Co., Allen D., Conn., 5, 10
Central Telecommunication Services, Ltd., Eng- land, 15, 20
Champion Electric Co., England, 5
Chatham Electronics Corp., 60 W. M.
Pleasant Ave., Livingston, N.J., 5, 10
Clarkson Labs., N.Y., 10
Cohu Electronics Corp., Pa., 10
Collins Radio Co., 355 10th St., N.E.,
Cedar Rapids, Iowa, 5, 10, 15, 20
For details see ad on page 43-46
Tel: Cedar Rapids 4-0281
Communications Co., Inc., Flx., 5, 10,
15, 20, PM
Contemporary Radios & Electrical Eng.
S. Africa, 5, 10, 15, 20, 25
Corbin Corp., Md., 5, 10, 15, 20,
Crown Engineering, N.J., 5, 10
Cubic Corp., Calif., 5, 10
Dayton Aircraft Prod., Inc., Ohio, Ant-
ntreas
Electronics Inc., Pa., 15, 20
Edcon of N.Y., Inc., 5, 10,
Edison Electric Ind., 72 E. 2d St.,
Minnola, L. N. Y., 5, 10, 15, 20
For details see ad on page 407
Tel: Planner 5-1128

1954 IRE Directory

Electro-Mechanical Research, Inc.,
Conf., 10
Electronic Specialty Co., Calif., 5, 10
Engineering Associates, Ohio, 5, 10
Erico Radio Labs, Inc., N.Y., 15, 20
Federal Telephone & Radio Co.,
17 & 18, 20, King's Rd., But-
thorpe, N.Y., 15, 25, 30
For details see ad on page 32-37
Tel: Butler 1-3020
Fag-O-Scope, Inc., 10, 15
Garrett Corp., N.Y., 10
Gas & Oil Co., Calif., 10
Hawkeye Electronics Inc., N.Y., 15,
15, 20, 25
Industrial Research Lab., Mo., 10
Inland System of America., N.Y., 15
Jervis Electronic Corp., Calif., 5, 10
Kahn Research Labs., Calif., 15, 20
Kahle Research Labs., Calif., 10
Kelly Mfg. Corp., Calif., 10
Kingston Prod. Corp., Ind., 10
Kraus, Franklin, Italy, 10, 20
Laboratory for Electronics, Inc., Mass.
30 Lavoie Labs., Inc., Matava & Free-
but Rd., Morgantown, N.Y., 15, 20
For details see ad on page 316
Tel: Matava 1-3020
Lear, Inc., Lexical Div., Calif., 5, 10, 15,
20
Lear, Inc., Calif., Calif., 5, 10, 15, 20
Lewicki Corp., N.Y., 10
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Classifications with a System!

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Just a little study of the system will help you get great good from this book.

The IRE DIRECTORY is 10 Indexes in one book.
3. Communications Equipment

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3. Communications Equipment

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Pomona Prod. Div., Chisholm-Ryder, N.Y., 5
Press Wireless Labs., Inc., Mass., 10, 15

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Research information readily exchanged between men and scientists has been
the forerunner of every radio
development. This is the priceless service to all
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If you are planning to construct an AM, FM or Tele-
vision station, or if you are looking for a better tower than you have, look to
Lehigh for the best in tower construction.

Lehigh Towers
are dependable, durable and include years of
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Deduct 20% at end of each listing refers to readers or service
shall be classified under the head of the major classification.
1944 IRE Directory

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35,000

Radio-Electronic Engineers will receive and use the 1954 IRE DIRECTORY

Better and Better and Better!

Up-to-dateness is almost a monomania with IRE DIRECTORY compilers. Membership lists are corrected up to May 30th. Invoices, compiled and classified by high-speed IBM sorting methods are accurate to June 15th. No firm’s report is older than 18 months.

Information at high speed! “Data the way an engineer thinks” is the key to IRE DIRECTORY classifications. All products are divided into 10 fundamental groups, many of which parallel professional group organization. The grouping plan makes the most logical directory you ever used! No companies or mixed with test equipment—you turn right to a section where each item belongs.

Yet good engineering detail is maintained. 104 basic classes of products under these ten sectional product directories keep listings from becoming cumbersome, but clearly define products. Overlapping listings are skillfully eliminated. Simplicity makes this book easy to work with—ensures faster finding of facts when forgotten. Thus the faults of terminology listing are avoided.

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Machol Edge Index is just one more modern service to help the user find information fast. Ad placed with reason! In a DIRECTORY where ads play an important part in supplying information the user wants and needs, it makes good sense to cross-reference every advertiser in each listing so that the user can quickly find more data. Ads are also plotted facing company alphabetical listings, or in the product section in which they properly belong. No effort is spared to “organize” ad information.

More advertisers—more information! Never before have so many advertisers served IRE readers with so much information! The advertisers’ list this year is truly a “social register” of this great industry.

3. Communications Equipment

25. Point-to-Point Equipment.

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Proctor, Inc., 307 Bergen Ave, Kearny, N. J. 5
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West Chester, Pa., 5

For details see ad on page 226

Tel: West Chester 3-00

Wunderlich Radio Co., N.Y., 5, 10, 15

Part IV COMPONENTS

4. Component Parts

The first few times you use this EDGE INDEX follow the “How to use” instructions slowly—ONE STEP AT A TIME.

After that you will be able to open easily and almost instantly to the section or letter that you seek.

HOW TO USE

1. With the directory open on the desk, bend the book almost double in your left hand, with your thumb just below this line.

2. From one-line or two-line symbol adjacent to the letter or subject you seek, run your eye across horizontally to a corresponding page-edge symbol.

3. Open there with your right hand.

IT IS EASIER IF YOU "FAUN" OR "RIFLE" THE LAST FEW PAGES WITH YOUR RIGHT THUMB. THE EDGE INDEX COVERING THE OTHER 7 DIRECTORIES WILL BE FOUND OPPOSITE PAGES 240, 400 AND 476.
Classifications with a System!

The IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes into which 104 basic classifications have been organized.

You will note that here we differ from most directory compilers, for we do not mix meters with motors simply for alphabetical reasons. Products used in “Audio” whether components or complete apparatus form the first fundamental group. Yet, the same manufacturer and product may also appear in the “Component Parts” section. This system gives subject grouping for speed and convenience. A directory should aid a man who has forgotten some detail, or product name. Our help by grouping products as one would think.

1. Audio Frequency Equipment (Products 1 to 11)
2. Broadcasting Equipment (Products 12 to 17)
3. Communications Equipment (Products 18 to 25)
4. Component Parts (Products 26 to 62)
5. Applications of Electronics (Products 63 to 70)
6. Radar, Microwave, UHF (Products 71 to 74)
7. Test & Measuring Equipment (Products 92 to 101)
8. Services and Materials (Groups 75 to 91)

Here we separate the consultant, the fabricating firm, the machine for radio manufacturing, and basic materials from being lost in an alphabetical maze of component and test equipment names.

9. Education & Publishing (Groups 102 & 103)
10. Distribution Functions (Service 104)

For detailed identification, these 104 products and services, grouped in the 10 indexes, are further defined into over 600 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing adds speed. Purely alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers have liked our system better!

For safety, an alphabetical “terminology” index is given, preceding the product system in the pink pages introducing the company index. You will note also that after each firm, its products are listed by number code in the alphabetical list, and that sub-classifications shown by number code in the product indexes give much detail. Just a little study of the system will help you get great good from this book.

The IRE DIRECTORY is 10 Indexes in one book.
### 1954 I.R.E. Directory

**Reader Service Reply Card**

Below, for your convenience, are six perforated reply cards. Each one has enough space to list three advertisers' names and their page numbers. Forward as many cards as you have questions, and I.R.E. will promptly notify the manufacturer in question to send literature, specifications, and prices to you.

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1954 I.R.E. Directory

**A Directory of 4 Component Parts**

#### 36 Major Groups

228 Products in these groups

**Organized by function for Engineers**

The products and services of the Radio-Electronics Industry have been organized into the basic discipline categories closely the organization of the I.R.E. Professional Groups. But I.R.E. major product groups are numbered throughout.

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1954 I.R.E. Directory

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**Component Parts Directory**

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1954 I.R.E. Directory

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30. Cabinets, Consoles & Enclosures.

Elgin Metalforners Corp, 602 N. Liberty St., Elgin, Ill., 60120
For details see ad on page 122-123
Tel: Elgin 7225

Elgin Electronic Instruments, Calif., Calif.
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Erie Bester Corp., 664 W. 12th St.,
Erie, Pa.

For details see ad on page 93-94
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Tel: Little Falls 6-1200

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General Electric Co., Chemical Div., Mass., 15
General Metal Prod., Co., Pa., 10
Golden Corp., N.Y., N.Y., 5
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4 Component Parts

4 Component Parts

30. Cabinets, Consoles & Enclosures.

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The stellite tube and baked synthetic resin end-fit provide a seal which rivals that of hermetically sealed construction, resulting in a dependable and longevity previously unequalled. Whether in operation or on the shelf, this paper tubular capacitor will maintain its excellent characteristics for years.

The stellite-tubed capacitor is the only ELMENCO PAPER TUBULAR made because it is of a design superior to others. Whether mina, paper, or ceramic dielectric, a capacitor bearing the ELMENCO name represents the finest product in its field. For those who appreciate quality, it is well to remember that “ELMENCO replaces but is never replaced.”

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Amp Capitron

High Voltage and Pulse Forming Networks

...With outstanding Stability and Reliability for application in radar, missile control, and other guided systems!

AMP Capitron Capacitors and Pulse Forming Networks are particularly suited for radar and guided systems only because of their remarkable size and weight characteristics, but also because of their outstanding stability and reliability in operation. They are designed in each instance for the specific requirement in size, shape, working or test voltage, capacitance, life or other operating conditions of the equipment in which they are to be used. Bidders are invited.

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I'm continually amazed

at how

BC Disc Hi-Kaps®
solve space and design problems

Centralab BC Disc Hi-Kaps can amaze you too — Here's why —

• BC Discs are small in size, use the third dimension (depth) to a maximum. (3/8" thick.)
• Stable power factor — Initial, 1/5% at 1KC
• High Insulation Resistance — 10,000 Megohms
• Safe Rated Voltages — Rated at 500 VDC, but tested continuously at 1,250 VDC
• High voltage types to 6000 VDC available
• Wide range of capacities — from 100 to 20,000 micro-
• No "intermittents" — Positive high temperrature bond between ceramic and silver guarantees no movements, plus sure electrical contact

Centralab knows the ceramic capacitors field better than any other supplier...

• CRT, introduced ceramic capacitors in the U.S. many years ago before any other supplier entered the field.
• Centralab manufactures from basic powders to finished product right in its own plant . . . complex laboratory control over every step in the process.
• CRT has the largest staff of development engineers of any comparable company . . . over 150 men available for consultation on your capacitor problems.
• CRT's many plans are highly recognized for efficient, quality manufacture, and located strategically for best delivery.

Write now for Bulletin 42-A.

Centralab
3954 W. 6th St., Los Angeles 35, Calif.

A Division of Globe-Union Inc.

I'm continually amazed

at how

BC Disc Hi-Kaps®
solve space and design problems

Centralab BC Disc Hi-Kaps can amaze you too — Here's why —

• BC Discs are small in size, use the third dimension (depth) to a maximum. (3/8" thick.)
• Stable power factor — Initial, 1/5% at 1KC
• High Insulation Resistance — 10,000 Megohms
• Safe Rated Voltages — Rated at 500 VDC, but tested continuously at 1,250 VDC
• High voltage types to 6000 VDC available
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• No "intermittents" — Positive high temperrature bond between ceramic and silver guarantees no movements, plus sure electrical contact

Centralab knows the ceramic capacitors field better than any other supplier...

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• Centralab manufactures from basic powders to finished product right in its own plant . . . complex laboratory control over every step in the process.
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Centralab
3954 W. 6th St., Los Angeles 35, Calif.

A Division of Globe-Union Inc.
4 Component Parts


Gloeden Mfg. Corp., 212 Durham Ave.,
Metschen, N.J., 3, 35
For details see ad on page 177
Tel.: 6-9100

Haslin, Inc., 16, 35
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Holmes Engineering Co., Calif., 30, 35

ONONDAGA POTTERY COMPANY
Electronics Division

From the basic raw material to the finished product—Onondaga Pottery Company controls every step in manufacturing to insure top quality and complete dependability. Our facilities are ample to fulfill any or all of your requirements for multiple capacitor and resistor-capacitor combinations. We solicit your inquiry.

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4 Component Parts


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Venecom, 7.
For details see ad on page 30-31
Tel.: 3-2488

Kellings Switchboard & Supply Co., 70 West Muro St., Chicago 3, Ill., 35
For details see ad on page 404
Tel.: D-2840-3-0750

Loed Insulator Co, Inc., N.Y., 15
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Photo Chemical Prod., 475 Walton Ave., New York 5, N.Y., 35
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Special Values to Close Tolerances—Our Specialty

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239 W. Orange Grove Avenue, Burbank, California

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4. Component Parts

31. Capacitors: Fixed

32. Capacitors: Variable

33. Chassis & Racks.
New Celco
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Send drawings of your designs for quotation and take advantage of the Celco production experience in this specialized field.

OTHER CELCO SPECIALTIES

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MAGNETIC AMPLIFIERS
STATOR WINDINGS
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4. Component Parts

33. Chassis & Racks.

De Wald Radio & TV Corp., N.Y., 5, 15, 20
Donnell Electrohome Industries, Ltd., Canada, 15, 20
Engineered Instruments, Calif., 20
Engineer & Research Co., Md., 5, 10
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Franklin Electronics, Inc., Pa., 5, 15, 20
Gates Radio Corp., Ill., 5, 15, 20
General Communication Corp., N.Y., 5, 15, 20
General Electric Co., N.Y., 5, 15, 20
General Metal Products Co., Pa., 5, 15, 20
Golden Corp., N.Y., 5, 15, 20
Gosser Co., Calif., 5, 15, 20
Great Southern Hardware Corp., N.Y., 10
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Heller Mfg. Co., 230 Lewis St., Patterson, N.J., 15
HMI Industries, Corp. of America, N.J., 5, 15, 20
Humphries Metal & Plastic Co., Fla., 5, 15, 20
Isham Metal Products Co., N.Y., 5, 15, 20
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Klein & Klein Corp., 5115 S. Halsted St., Chicago 11, Ill., 15
Kohler Co., N.Y., 5, 15, 20
Langevin Mfg. Corp., 37 W. 60th St., New York N.Y., 20
Levy Corp., N.Y., 5
MacKenzie Products Co., The, Conn., 5
Marine Elec. Corp., N.Y., 5, 15, 20
Mantec, Inc., N.Y., 5, 15, 20
Metal Fabricators Corp., 73 Pond St., Wallingford, Mass., 5, 15, 20
Metal Precision Products Co., Ltd., 5, 10, 15, 20
Metallic Wire Cloth Co., Inc., N.Y., 5, 15, 20
Northern Elec. Co., Ltd., Canada, 5, 20
Par-Metal Products Co., 55-64 49th St., Long Island City, N.Y., 5, 15, 20
Par-Metal Products Co., 55-64 49th St., Long Island City, N.Y., 5, 15, 20
Patel & Patel Co., 36-24 49th St., Long Island City, N.Y., 5, 15, 20
Patterson, C., N.Y., 5, 15, 20
Powell Co., Harold H., Pa., 5, 10

4. Component Parts

34. Coils.

5. Audio frequency
6. High-frequency coils
7. Power coils
8. Defense works
9. Telephone
10. Graphite
A. A/V Co., N.Y., 5, 15, 20
B. A/V Co., N.Y., 5, 15, 20
C. Aircraft & Electronics Co., N.J., 15, 20
D. Aircraft & Electronics Co., N.Y., 15, 20
E. Acme Wire Co., Custom
F. Acme Wire Co., Pa.

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PO. BOX 245
LOS ANGELES 18, CALIF.
4. Component Parts

34. Coils

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Fried Transformer Co., Inc., 1790 Wirt-
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Hammond Mfg. Co., Ltd., Canada, 5
Harnett Electric Corp., 150 Haven Ave.,
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Tel: Port Washington 2-2344

Hapgood Mfg. Co., Box 1200, Round
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Tel: Dolores 2-1110

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Tel: Kipling 2-3300

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Tel: Elmhurst 3-2200

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For details see ad on page 255
Tel: L-5 8-5500

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Tel: Calumet 2-1125
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Tel: M-5 7724

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ment, Section 7052, 115 S. 11th St.,
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For details see ad on page 210
Tel: Philadelphia 2-5800

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Radio Industries, Inc., Ill., 15, 20, 30
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15, 30
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P.O. Box 9114 Telephone 380-2510

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34. Coils.

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4. Component Parts

34. Coils.

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Smith Mfg. Co., Nathan, R.
Southern Indus. Elect. Corp., Texas, 10, 15
Soul Money Co., Conn., N.Y., 35
Spartan Television Co., Inc., Boston, Mass., 20

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TEL-RAD MFG. CO., INC.

Radio and Television Components
7th and Medinivon Street Placentia Greens 3067 Placentia, Wisconsin

35. Connectors.

A & S ALL CONNECTORS

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5. Power.

5. Power.

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35. Connectors.

A & S ALL CONNECTORS

(continued on page 101)

5. Power.

5. Power.

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35. Connectors.

A & S ALL CONNECTORS

(continued on page 101)
Simplify planning and production of Electronic Gear with ALDEN STANDARD COMPONENTS

1. You have to provide for IN-OUT CIRCUITS

- ALDEN Terminal Card Mounting System lets you organize circuitry in compact vertical planes.
- And see how easily these Terminal Cards drop into place.

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4. Component Parts

- For fast product reference, use the alphabetical index to products in the right-page blank section preceding pages 1 and the Mochel-Edge index on the pink cards throughout the book.

Cannon Electric Co., Calif., 5, 10, 15, 20, 25, 30
Carter Parts Co., Ill, 25
Circa Manufacturing Corp., 209 S. Roman Ave., Chicago 24, Ill, 20, 25, 30
for details see ad on page 110-111
Tele: Nevada 3-3000
Circle Mfg., Co., Inc., 10
Citron Co., Calif., 25, 30, 35
Cable Circuit Connector
Coaxial Connector, 27 N. 2nd Ave., Mt. Vernon, N.Y., 15, 36, 37
for details see ad on page 297
Telex: 6-616
Coastal Circuit, Inc., 225 E. 45th St., New York 17, N.Y., 30
for details see ad on page 297
Commercial Radio-Sound Corp., N.Y.
Communication Products Co., Inc., State Hwy. 20, Malden, R.I., 30
for details see ad on page 140-150
Tele: Frankford 3-1223
Constellation & Co., Inc., L., Route 46, Linden, N.J.
for details see ad on page 607
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(Continued on page 299)

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35. Connectors

36. Converters

4. Component Parts

35. Connectors

36. Converters
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- **0.005 Maximum at end of core**

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**Radio Cores, Inc.**

9540 Toledo Avenue Oak Lawn, Illinois

(Continued on page 109)
Moldite has taken the initiative in establishing accepted electrical standards long required by the electronic industry. Every coil and set manufactured, every engineer has designed coils to utilize Moldite "standards." The reasons are obvious. Moldite Core Standards Offer...

ECONOMY
HIGH QUALITY
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This means a better product backed by years of Moldite leadership in engineering and research. No one has done more than Moldite to give the industry a preeminent core or coil form for all electronic applications.

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For details see ad on page 155

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Product 37

4 Component Parts

National Moldite Co., 4101 Chestnut Ave., Hillside 6, N.J., 10, 20, 25
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Tel: Hazen 6-6230

Northern Elec. Corp., 20, 25
Parisian Paper Tube Corp., 167 Lafayette St., Paris 2, N.Y., 15
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Tel: A-4357

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Precision Paper Tube Co., 2622 W. Lawrence Ave., Chicago 37, N.Y., 15
For details see ad on page 312
Tel: A-6366

Proferic Mfg. C0., Inc., 15, 20, 25
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Radio Core, Inc., 1650 Tusley Ave., Oak Lawn, III., 10, 25
For details see ad on page 307
Tel: QA-3313

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Solar Mfg. Corp., Calif., 5
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Sprague Electric Co., Mass., 10
Stackhouse Carbon Co., California Div., Tannery St., St. Marys, Pa., 10, 20, 25
For details see ad on page 314
Tel: 6-5313

Standard Electrical Prod. Co., Ohio, 10
Swiftloy Mfg. Co., D. M. Tom, 5, 10
Signet Ceramic & Mfg. Co., Box 190, Hillcrest Ave., Livonia, Pa., 5
For details see ad on page 315
Tel: 335, 335, 335, 335

Superior Stateline & Ceramic Corp., West Paterson Ave., Englewood, N.J., 5
For details see ad on page 314
Tel: Englewood 6-5353

Thomas & Skinner Steel Prod. Co., Inc., 1125 B. 23rd St., Indianapolis 5, Ind., 15
For details see ad on page 325
Tel: Wabash 3448

Thur Ceramics, Inc., 225 Beverly Ave., Bloomfield, N.J., 2
For details see ad on page 326
Tel: Bloomfield 4-511

Torrington Mfg. Co., 25
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Western Gold & Platinum Works, Calif., 5
Western Electric, Corp., Pa., 15
For details see ad on page 330
Tel: Esterbrook 6-5093

""
2. Component Parts

3. Crystals & Accessories


5. General Electric Co., N.Y.C., 5, 15, 25


For details see ad on page 39-42, Cover IV

7. Trowbridge 6-4600

8. Germanium Posts, Corp., Am. 15


For details see ad on page 334

10. M. Flettner 6-2800

11. Graybill Inc., 300 Millington Ave., La.-

12. Giangi, Il., 15, Duode Holders

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13. Flettner 6-2800


For details see ad on page 375


17. Kingston, Pa., 5, 10, 20, 25

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18. Russian Standards 1978

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4. Component Parts

38. Crystals & Accessories

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Hoffman Co., P. R., 321A Cherry St., Carlisle, Pa., 20, 25
For details see ad on page 310
Tel: Carlisle 1080
Howard Mfg., Inc., Mo., 5
For details see ad on page 311
Tel: Carlisle 1480
Hunt Corp., 401 Lincoln St., Carlisle, Pa., 10, 20, 25
For details see ad on page 311
Tel: Carlisle 1480
Industrial Hardware Mfg., Inc., Dept. 9-54, 100 Prince St., New York 12, N.Y. 3
For details see ad on page 371
Tel: Ortgen 7-1883
Insulin Corp. of America, N.J., 5
International Crystal Mfg. Co., Inc., Omaha, 20, 25
Isodynamic Mfg. Corp., N.J., Ceramic Insulating Cases
Johnson Co., E. F., Minn. 3
Kentron Electronic Prod., Inc., Mass., 15
Keystone Electronics Corp., Dept. P-J, 114
Manhattan St., Stamford, Conn., 20
For details see ad on page 310
Tel: Stamford 4-9004
Kings Co., The James, 101 S. Church St., Sandwich, Ill., 4, 10, 12, 20, 25
For details see ad on page 312
Tel: Sandwich 2414
Lavie Labs, Inc., Mataroa-Preble Rd., Morganville, N.J., 40
For details see ad on page 312
Tel: Mataroa 1-8000
Lehigh Valley Elec., Engr. & Mfg. Co., Pa., 20, Quartz Crystals
Lewis Co., E. E., East Hartford 8, Conn., 20, 25
For details see ad on page 311
Tel: JA-B-050
Mackey, Inc. A.D., N.Y., 15
Marconi's Wireless Telegraph Co., Ltd., England, 20
McCoy Electronics Co., Chestnut and Wilt St., Mt. Holly Springs, Pa., 5, 10, 20, 25
For details see ad on page 315
Tel: 195
Michigan, 71 Okter Pkwy., Livingston, N.J., 2
For details see ad on page 310
Tel: Livingston 6-6602
For details see ad on page 204
Tel: Troy 7100
Monitor Products Co., Calif., 5, 10, 20, 25
Nebel Lab., R. E., N.Y., 20, 25
Northern Elec. Co., Ltd., Canada, 5, 20
Northern Elec. & Vacuum Industries, Canada, 20
Northern Elec. & Vacuum Industries, Canada, 20
(Continued on page 311)
You can expect the same precision performance from both the McCoy M-1 and the M-20 “M-Mite,” although the “M-Mite” is only 1.5 times as big. Both crystals are produced up to 110 mc on the 5th overtone. The fact that these two crystals perform equally well in meeting widely varied job specs illustrates the versatility of McCoy design and production facilities. Whatever you need in quartz crystals, McCoy either makes them or can develop them for you. Send for free catalog today on the McCoy line of high quality, precision-made quartz crystals.
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4. Component Parts

39. Delay Lines

5. Distributed com. 15. Lumped constant
6. Distributed 20. Beam
phase... resonator... sensit...

Advanc Electronics Co., Inc., 451 Highland Ave., Passaic, N.J., 5, 10, 15

Acirod, Inc., N.J., 3, 10, 15

Ajax Electronics Corp., 207 25 St., Union City, N.J., 5, 10, 15, 20

Aerosonic Corp., Mass., 5, 10, 15

American Television Mfg. Corp., Ill., 3, 10, 15

Anderson Labs, Inc., 37 Talbot Rd., West Hartford, Conn., 20, Ultra Sonic

For details see ad on page 318

Tel: 4-Dumas 3-4941

Auburn Ultrasonic Lab., Mass., 20

Bliley Electric Co., 277 Union Station Bldg., Erie, Pa., Ultrasonic

For details see ad on page 312

Tel: 22-237


Brookb Requirement, Inc., Calif., 5, 10, 15

Burrell & Co., 65 Washington Ave., Yonkers 2, N.Y., 15

For details see ad on page 144

Tel: Yonkers 1-6900

Cambridge Thermionic Corp., 440 Concord, Cambridge, Mass., 5, 15

For details see ad on page 302

Tel: Trowbridge 6-2800

Canadian General Elec. Co., Canada, 5 Ganga Corp., Calif., 15

Carr Corp., Calif., 15

Cord Winding, Inc., N.Y., 15

Columbia Telephone, N.Y., 5, 10

Communication Accessories Co., 110 St., B Wilimot Rd., Hickman Mills, Mo.,

15, 20

For details see ad on page 50-81

Tel: South 3228

Communication Measurements Lab., Inc., 101 Leland Ave., Plainfield, N.J., 5

For details see ad on page 152

Tel: PL 4-3502

Computer Control Co., Inc., 81 Broad St., Babylon Park, South, Mass., Solid

Acoustic

For details see ad on page 403

Tel: Belmont 5-0441

Corning Glass Works, N.Y., 10, 20

Corona Engineering Service, N.Y., 15

Dallou Labs., Inc., Calif., 20

Doming Products, Pa., 5, 10, 15, 20

Deutschmann Corp., Tope, Mass., 15

Developmental Electronics Corp., Calif., 3, 10, 15

ESC Corp., 524 Bergen Blvd., Palisades Park, N.J., 3, 10, 15

For details see ad on page 316

Tel: Windsor 1-6000

Electronic Computer Div., Underwood

Corp., 35-10 36 Ave., Long Island City

6, N.Y., 15

For details see ad on page 317

Tel: 6-9-9492

Electronic, Inc., Ill., 5, 10, 15

Empire State Laboratories, Inc., N.Y., 1, 15

Epoch, Inc., 126 Massachusetts Ave.,

Brooklyn 15, Mass., 5, 10, 15, 20

For details see on page 318

Tel: CO 6-9328

Federal Telecommunications Lab., Div. 1 T & T, N.J., 10

Forbes Wagner, Inc., N.Y., 5, 15

Fried Electronics & Controls Corp., N.Y., 20

Fugle-Miller Labs, Inc., 356 Main St.,

Rutland, N.Y., 15

For details see on page 171, 292

Tel: NES 6-7345

General Chem., Div., Allied Chem. &

Drug Corp., N.Y., 15

General Electric Co., N.Y., N.Y., 5

General Electric Co., N.Y., 10

(Continued on page 218)

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Page 317

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Code number at end of each listing refers to product or service, see index under name listed at head of the major classification.
4. Component Parts

39. Delay Lines.

General Instrument Corp., M.J. 5, 10, 15
General Instrument Corp., W. W. Siddle
Dir., M.A. 5, 10, 15
Gudeman Co. of Calif., Inc., 2000 Explo-
sition Bldg., Los Angeles 34, Calif.,
5, 10, 15
For details see ad on pages 322, 355
Tel.: Texas 7-0274
Gulick Mfg. Corp., Arcam Ave.,
Metuchen, N.J. 15
For details see ad on page 177
Tel.: Metuchen 5-2600
Guthman & Co., Inc., Edwin L. III, 5,
10, 15
Hellsport Corp., Div. Beckett Instru-
ments, Inc., 506 S. Meridian Ave., S.
Pendleton, Calif., 10
For details see ad on pages 158
Tel.: P-Yardam 5-2016
Ideal Industries, Ill., 10
Jacobs Instrument Co., M.G. 5, 15
Laboratory For Electronics, Inc., M.A.
20
Leonard Elec. Products Co., Inc., N.Y. 5,
10, 15, 20
Linwood Equipment Labs, Inc., 1 Bright-
water Place, Piaseczno, L.A., N.J., 15
For details see ad on page 191
Tel.: MA 6-2025

40. Filters.

Airdair Mfg. Corp., Inc., Pa., 15
Aircraft Transformer Corp., West and
Willow Ave., Long Branch, N.J. 15
All-America Mfg., Inc., M.A. 20
All-Right Mfg. Corp., Inc., N.Y. 15
Amphenol Corp., 141 W. 8th Ave.,
Philadelphia 20, Pa. 15
Astro Corp., 106 Grant Ave., East
Newark, N.J., 15, 20, 25
Atlantic Magnetic Co., Inc., Calif., 5,
10, 15, 20
Bakelite & Copper, Inc., N.Y., 15
Barnes Research Labs., N.J., 15, 20
Barker & Williamson, Inc., 220 Fairfield
Ave., Upper Darby, Pa., 15
For details see ad on page 87
Tel.: MA 6-2025

Bird Electronic Corp., 1797 E. 30 St.,
Cleveland 14, Ohio, 15
Blackburn Electronic Co., Ill., 3
Boquet Mfg. Corp., N.Y., 15
Bud Radio, Inc., Dept. RE, 214 East 55 St.,
Cleveland 1, Ohio, 15
For details see ad on page 90
Tel.: MA 6-2025

Detroit Mfg. Corp., 43-01 22 St.,
Long Island City, N.Y., 15
For details see ad on page 92
Tel.: ST 3-1300

Caddell-Dyer Mfg. Co., Inc., 40 East
22 St., New York City, 15, 20
For details see ad on page 94
Tel.: N-Y 6-7520

Curtis Radio Co., Canal, 15
Centralab, Div. of Glaive Union, Inc.,
3002 E. Reeve Ave., Milwaukee 1, Wis.,
15, 20
For details see ad on page 95
Tel.: MA 6-2025

Chicago Standard Transformer Corp.,
10 S.
(Continued on page 122)

Coaxial Components by
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(Continued on next page)
Why BUS' FUSES give Trouble-Free Protection

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Should you have a special problem in electrical protection — our fuse research laboratory and its staff of engineers are at your service to help you select the right fuse for the job — and if possible a fuse already available in wholesalers' stocks.

4. Component Parts

41. Fuses & Fuse Holders

5. Fuses

5. Fuse holders

For details see ad on page 333
Tel: (Union) 7-9051

Precision Form Glass Parts

Equipment manufacturers have long been seeking lower drift components to further stabilize the performance of equipment in the higher frequency ranges. When metallized glass fuses were first introduced, great improvements were experienced, but constructional methods limited the shapes and electrical qualities for electronic applications. Now, another great improvement is available. BEL fuse Inc. is now offering a wide variety of features hitherto unavailable, such as:

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  - Any pattern metallized on glass form or coil.
  - Metallized glass cores to further reduce drift.
  - BEL precision inductances can be held to ± 0.5 meg. over 900 meg. band spread in production quantities.
  - Inductance and capacitance combinations metallized on one unit.
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Note: Codes are at end of each address when in product order, without description listed at head of the major classification.
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4. Component Parts
41. Fuses & Fuse Holders.
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- Littelfuse, Inc., 1005 Miner St., Des Plaines, Ill., 3, 10
- For details see ad on page 49
- Tel: Vanderbilt 6-1138
- New York Corp., N.Y., 10
- Northern Electric Co., Ltd., Canada, 3, 10
- For details see ad on page 69
- Tel: United 6-2432
- Smith, Inc., Herman H., N.Y., 10
- Smith & Wesson, Ltd., A, Paris, 3, 10
- Star Fire Co., Inc., N.Y., 5, 10
- Sylvania Electric Products, Inc., 1940 Broadway, New York 16, N.Y., 10
- For details see ad on page 194
- Tel: Julian 2-2345
- United Inductors Co., Ltd., Enchul, 5
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**43. Meters (Indicating Instruments).**

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**All Communication Labs., N.Y. 30**

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**3. Seminars.**

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**3. Tutorials.**

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4. Component Parts

Berton-Rogers Co., Mass., 5, 20, 25, 30, 35  
C & H Sales Co., Calif., 5, 10, 15, 20, 25, 30, 35  
Canadian Research Institute, Canada, 5, 20, 25, 30, 35, 40, 45  
Clypss-Bremgale Co., Ill., 40  
Colyt Instrument Co., Calif., 5, 10, 15, 20, 25, 30, 35, 40, 45  
Colorspace Electronics, Inc., N.Y., 15  
Colorado Elec. Mfg. Co., Ohio, 5, 35  
Compagnie Générale de Métrologie, Chemin De La Croix-Rouge, Ansay, France, 25, 30, 35  
For details see ad on page 445  
Tel: Anseay 8100  
Consolidated Engineering Corp., Calif., 20  
Corrigan Co., Inc., The R. W., Conn., 10  
Cubic Corp., Calif., 45  
Daw Co., Ltd., England, 40  
De-Jo-Amco Co., Ltd., 1955 DPM, 45-01 Northern Blvd., Long Island City, N.Y., 5, 20, 30  
For details see ad on page 300, 367  
Tel: Aesthetic 8-1060  
Delta Electrical Instrument Co., Calif., 25, 30, 35, 40, 45  
Doddman Corp., Mass., 20, 30  
Doddings Co., Inc., N.Y., 40  
Edco, Inc., Dept. 5, 207 Main St., Worcester, Mass., 20  
For details see ad on page 163  
Tel: Worcester 7-4294  
Electric Design & Mfg. Co., Iowa, 5, 25, 30, 35  
Electric Indicator Co., Conn., 5, 15, 20, 25, 30  
Electric Impulse Laboratory, 82 White St., Red Bank, N.J., 15, 40, 45  
For details see ad on page 130  
Tel: Dedlock 8-0040  
Electro-Mechanical Instrument Co., Pa., 5, 30, 35  
Eletro-Tech. Equipment Co., N.Y., 5, 10, 15, 20, 25, 30, 35, 40, 45  
Electronic Instruments, Ltd., England, 10  
Elma Laboratories, N.Y., 15  
P-R Machine Works, Inc., 26-12 Bough gl, Woodside, N.Y., 15  
For details see ad on page 45-50  
Tel: Aesthetic 8-3600  
Ferranti Electric Co., N.Y., 45  
Furnihill Labs, Ltd., England, 10  
G-M Labs., Inc., 10, 25  
General Electric Co., Apparatus Sales Etc., N.Y., 5, 10, 20, 25, 30, 35, 40, 45  
General Electric Co., Telephone Dept., Mass., 10  
For details see ad on pages 30-45  
Tel: Cambridge 8-9000  
Greibach Instruments Corp., 212 Durham Ave., Metuchen, N.J., 5, 10, 15, 20, 25, 40  
For details see ad on page 127  
Tel: Metuchen 6-2900  
Greibach Res. & Dev. Labs., N.Y., 5, 10, 20, 25, 30  
For details see ad on page 447  
Tel: Metuchen 6-2900  
Haydon Mfg. Co., Inc., Conn., 10  
Health Co. 205 Territorial Rd., Benton Harbor, Mich., 49  
For details see ad on page 447  
Tel: Mich. 1-1227  
Holland Research Corp., 125 E. Fifth Ave., Denver 6, Colo., 20  
For details see ad on page 440  
Tel: P-Ean 5-6901  
For details see ad on page 126  
Tel: P-Rydal 3-2600  
(Continued on page 311)

For further information

about any of the products listed, consult advertisements on pages shown at the end of the listing.

If the facts you want are not given in the advertisements, use the

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NEW additions to Serve Motor line

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43. METERS.

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Sierra Electric Corp., Calif., 45
Shorkey Meters, 53 Hamilton St, New
Haven, Conn., 3, 10, 15
For details see ad on page 313
Simpson Electric Co., 3231 W. Kinzie
St, Chicago 44, Ill, 10, 30, 35, 40
For details see ad on page 314
Tel: Esbrook 5-1125
Sudan Labs, Calif., Aridimeters.
Transducers
Stirling Mfg Co., Ohio, 5, 30, 35
Supreme, Inc., Miss., 5, 35, 35, 40
Syndian Electric Products, Inc., 1724
Broadway, New York 19, N. Y., 35
For details see ad on page 9-14
Tel: Juddon 6-3574
Taylor Electric Instruments, Ltd., England,
5, 35, 35, 30, 40
Technovation Instrument Corp., SL5A
Main St, Acton, Mass., 10, 30, 35
For details see ad on page 57-74
Tel: Colonial 3-3711
Televeying Corp., Calif., 35
Teleghing-Albert Instrument Co., Pa., 20,
35
Tel: Cohock Co., Inc., N.Y., 10
T. J. H. P. Electrical Instrument Co., Ohio,
5, 10, 20, 30, 35, 45
U. S. Gauge Div. American Martine
Metals Co., Pa., 5, 35
U.S. Ceramic Mfg Co., 221 Durham Ave,
Matawan, N.J., 45
For details see ad on page 43
Tel: Matawan 4-2600
Valine Co. of America, Inc., Conn., 10
Vickert Co., Calif., 15
Wayne-Keeler Labs, Ltd, Syracuse
Graves, New Malden, Surrey, England,
45
For details see ad on page 230
Tel: Maiden 2002
Webb Mfg Co., Wash. M., 3, 10, 20, 35
Westinghouse Electric Corp., Pa., 5, 10,
15, 20, 30, 45
Whitelaw Electric Instrument Corp., 614
Frelinghuysen Ave, Newark 5,
N.J. 5, 10, 15, 20, 30, 40, 45, 50
Whitney Ammeters and Volt Meters
For details see ad on page 56-90
Tel: BI 4-7700
Wright Engineering Co., Calif., 13, 20

44. MOTORS & MOTOR-GENERATORS.

Allard Instrument Corp., N.Y., 5, 10, 15
Allied Mfg Co., Ohio, 5, 25
Allied Motors, Canada, 3, 5
Allen Co., The Louis, Ill., 15, 20
American Electric Meters, Inc., Calif.,
5, 15, 20, 30, 35, 40
American Electronic Mfg Co., Calif., 35
American Machine & Foundry, Ltd.
Electric Co., Ohio, 20
Ampco Corp., Ill., 30, 40
Aragon Controls, Inc., 35, 30, 45
Bendix Avionics Corp., 2104 Fisher
Blvd., Detroit 2, Mich., 15, 30
For details see ad on page 51-54
Tel: Trinity 5-9900
Bendix Avionics Corp., Eldorado-Pioneer
Div., Techtron, N.J., 20, 30
For details see ad on page 51-54
Tel: Hasbrook Heights 8-3908
Bendix Avionics Corp., Red Bank Div.,
Eaton, N.J., 5, 10, 25, 30
For details see ad on page 302
Tel: Eatontown 5-1954
Bertol-Bach, Inc., Aurora Div., Calif.,
20
Blakeslee Marine Div., N.Y.
20
Bogue Electric Mfg Co., 32 Iowa Ave,
Paterson, N.J., 5
For details see ad on page 128
Tel: Lamberton Mfg Co., N.Y.
Borg Equipment Div., Geo. W. Borg
Corp., 170 S, Main St, Janesville,
Wis., 30, 40
For details see ad on page 160
Tel: Janesville 6-4144
Brown-Beckman Co., Ohio, 20
Burke Electric & N-Ray Co., Ltd.,
Canada, 15
Calino Corp., Calif., 25
Calvo Electric Co., 549 N. Maplewood
Ave, Chicago 8, Ill., 10
For details see ad on page 100
Tel: Wood 6-6700
Champion Electric Co., England, 5
Chilton Precision Products Co., Inc., Pa.,
30-Benners
Columbia Electric Mfg Co., Ohio, 20
Columbus Electric Co., 2399 W, Addison
St, Chicago 18, Ill.
For details see ad on page 152
Tel: Janesville 2-9410
Constantine Eng. Labs Co., P.O. Box
411, W. Mahwah, N.J., Slater-Windings,
Rotor and Armatures
For details see ad on page 384, 15
Tel: Ramsey 6-1123
Continental Electric Co., Inc., N.J., 5,
10, 15, 20
Crump Corp., Mass., 20
Cushin Co., Inc., The R. W., Conn., 35
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Dakmotors Corp., Calif., 30, 35
Field Mfg Co., N.J., 20, 30
For details see ad on page 350
Tel: AMITYVILLE 4-6132
DOELMANN PRODUCTS, Mass., 20
(Continued on page 312)
Ministerial micros men perform exacting control tasks on signal from electronic amplifiers!

Another example of Oster precision quality motors for avionics and for other closed-loop control systems.

Oster Avionic Products conform to military specifications for altitude, high and low temperature, life, shock, vibration, humidity, fungicide treatment and salt spray.

You can depend on Oster quality in rotating components for exacting control.

Other Oster Avionic Products include:
- Special motors: Servo, Synchro, Drive Motors, Rotary and Fixed
- Synchro generators, control transmisiors, transistors, differenctials, receptors and modulators. Tuned-antenna synchro and reference generators
- Tachometer generators
- Aircraft actuators, both linear and rotary

Insure dependability... specify Oster!
4. Component Parts

46. Power Supplies

- Continental Radio & Electrical Equipment, South Africa, P.O. Box 25
- Cusson Electric Co., Ltd.
- Elbit Elettronica, Inc.
- Elbit Elettronica, Inc.
- Elbit Elettronica, Inc.
- Electronic Components Ltd., Ltd.
- Electronic Measurements Co., Inc.
- Eppi Products, Inc.
- Eppi Products, Inc.
- Faraday, Ltd.
- Federal Telecommunications, Inc.
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4. Component Parts

46. Power Supplies.

[Text continues on page 344]
82% labor reduction in wiring — with this Centralab Printed Electronic Circuit Couplet®

- Centralab Printed Electronic Circuit Couplet® reduces wiring connections from 16 to 5.
- Four capacitors — four resistors in one package.
- PC-101 is in CRL stock for IMMEDIATE DELIVERY — as are 30 standard circuit coupled.

Here are some of the reasons why Centralab is your only thoroughly experienced source for Printed Electronic Circuits:

- Centralab has many years of P.C.C. engineering and production experience like any other supplier. (Centralab pioneered Printed Electronic Circuits in the electronic industry.)
- Centralab has over 150 specialized engineers for the design and development of P.C.C. They can help you with your circuit problem.
- Hundreds of experienced production personnel and assembly mechanical facilities produce your requirements whether hundreds or millions of couples.
- Up to 30 different quality lines are made on each CRL Couplet before shipment.
- Centralab’s experience in resistor, capacitor and ceramic decoupling goes back to 1943 — all these have contributed to the quality of Centralab P.C.C.
- Centralab’s Printed Electronic Circuit Couplet® reduces wiring connections from 16 to 5.

For details see page 300
Tel: D-718001

Varian Assoc., 603 Haven Way, Park, Calif.

For details see page 300
Tel: D-728001

Vektron, Inc., 4200 West Washington, 24th St., Salt Lake City, Utah

For details see pages 300, 301
Tel: D-728001

Vickers Elec. Inc., Vickers, Inc., 26th St., Salt Lake City, Utah

For details see pages 300, 301
Tel: D-728001

Vestron Instrument Co., Inc., 310 5th St., Salt Lake City, Utah

For details see pages 300, 301
Tel: D-728001

Virginia Electric Co., Inc., 4200 West Washington, 24th St., Salt Lake City, Utah

For details see pages 300, 301
Tel: D-728001


For details see page 302
Tel: M-720002

Wayne Products Labs., 146, Smythure, 144, 143, 142

For details see page 302
Tel: D-728001

Western Electric Co., Inc., 414 6th Street, New York, N. Y.

For details see page 302
Tel: D-728001

Fleetwood Aven., Newark, N. J.

For details see page 302
Tel: D-728001

Winegard Corp., Iowa, 20

For details see page 302
Tel: D-728001

Wright Engineering Co., 10th St., Salt Lake City, Utah

For details see page 302
Tel: D-728001


For details see page 302
Tel: D-728001

Murray Wilcox With Components

Wright Engineering Co., 10th St., Salt Lake City, Utah

For details see page 302
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Centralab P.C.C. Ninth Avenue and Thirty-Ninth Street, New York, N. Y.

For information on the group most closely allied to your interests, see pages 238-239.
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For
Computers

Industrial
Control
Television
Radar

A complete line of transistor stages for system work. Compact and standardized, each Lee-Pac unit is a stable element with many applications. For special circuits, send us your problems.

Lee Laboratories, Inc.
Geneseo, Pennsylvania

Classifications with a System!

This IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly.

The result is a division of all products and services into ten fundamental indexes into which all basic classifications have been organized.

For detailed identification, these ten products and services, grouped in the ten indexes, are further divided into 591 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing with speed. Panel's alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers have liked our system better.

You will note that we here differ from most directories completely, for we do not mix boxes with motors simply for alphabetical reasons. Products used in "Audio" whether components or complete apparatus form the first fundamental group. Yet, the same manufacturer and product may also appear in the "Component Parts" section. This system gives subject grouping for speed and convenience. A directory should aid a man who has forgotten some detail or product name, thus helps in grouping products as one would think.

For example, an alphabetical "terminology" index is given preceding the product system in the pink pages, introducing the company index. You will note also that after each name, its products are listed by number code in the alphabetical list, and that all classifications shown by number code in the product indexes give much detail. Just a little study of the system will help you get great good from this book.

The IRE Directory is 10 Indexes in one book.
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4. Component Parts

47. Printed Circuits.

48. Rectifiers, Metallic.

Sstepakoff Printed Circuits 
Compact 
Precision-made

U.S. ENGINEERING CO.
501 Commercial St., Glendale 3, Calif.

By combining in one compact, sealed unit a specified number of printed resistors and capacitors, of precision values, Stupakoff Printed Circuits save space and weight, speed assembly, reduce costs, minimize assembly errors. By using Stupakoff Printed Circuits instead of the individual components, soldered connections are reduced up to 80%; assemblies are lighter and more compact, your assembly time is reduced and labor costs are considerably reduced.
4. Component Parts

48. Rectifiers, Metallic.

49. Rectifiers, Vacuum Tube.

Electro-Tech Equipment Co., X.Y. 90, 73, 28
Electronic Devices, Inc., X.Y. 29
Electronic Research Products, Inc., 25
Emicore Electronics, Inc., X.Y. 16
Enfield Radio Corp., Inc., 18
Federal Telephone & Tel. Co. Div., 18
Field & T., 100 Kingsland Road, Clinton, N.J. 20
For details see ad on page 152
Tel: Nutley 1-6500
General Communications, Inc., 20
General Electric Co., X.Y. 10, 29
General Electric Co., Apparatus Sales Div., X.Y. 5, 15, 20
Germanium Prod. Corp., X.Y. 10
Industrial Electronics of Canada, Ltd., Canada, 5, 15
International Rectifier Corp., 15, 15
Grand Ave., El Segundo, Calif., 10, 15, 20
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Tel: ORegon 6-8281
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Korean Rectifier Corp., X.Y. 29
Leach Relay Co., Inc., Lead-Off Corp., Calif., 20
Lee Electric & Mfg. Co., Calif., 15
MacKay, Inc., A. D., X.Y. 15, 24
Mailly & Co., Inc., R. E., Calif., 15
Motor Rectifier Corp., 207 Rogers Ave., Brooklyn, N.Y. 20
For details see ad on page 243
Tel: BU 7-0299
Northern Electric Co., Ltd., Canada, X.Y. 15, 20
Oake-Tsuen Co., X.Y. 20
PacTel Engg. Corp., X.Y. 10
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Porterfield Co., Harold H., Pa., 15
Power Transformer Co., Inc., X.Y. 5, 10, 15, 20
Powertronics Equipment, Ltd., Canada, 20
For details see ad on pages 20-21
Tel: Watkins 6-0353
Rapid Electric Co., X.Y. 29
Sangamo Weston, Ltd., England, 5
Schaller Mfg. Corp., Ohio, 5
Self-Reg Prestige Metals, Inc., Dept. IRS-254, 229 Main St., Belleville, N.J. 9, 20
For details see ad on page 336
Tel: Plymouth 6-0220
Semiconductor Co. of America, Pa., 10
Societe Francaise Radio-Electrique, France, 25
Standard Electric Time Co., 77 Logan St., Springfield 2, Mass., 20
Field & T., 100 Kingsland Road, Clinton, N.J. 20
For details see ad on page 337
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For details see ad on pages 9, 15
Tel: WO 5-2350
Sylvania Electric Prod. Inc., 1740 Broadway, New York 1, N.Y. 10, 15, 25
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Transfer Electronics Corp., Mass., 10
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Westinghouse Electric Corp., Pa., 15
Westinghouse Electrical Instrument Corp., 635 Freeling Ave., Newark 5, N.J. 5
For details see ad on pages 59-90
Tel: B1-3750

49. Rectifiers, Vacuum Tube.

1. Grid controlled
2. Rectifier tube
3. Transformer

Verbex Eight Corp., X.Y. 10
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Verumix Electric, Inc., Text Electronic, Inc., X.Y. 5, 10, 20
Brenda Aviation Corp., 1104 Fisher Building, Detroit 2, Mich., 15
For details see ad on pages 50-54, 103
Tel: Trinity 6-3000
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49. Rectifiers, Vacuum Tube.

Canadian Westinghouse Co., Ltd., Canada, X.Y. 39, 20
Central Sales & Mfg. Corp., X.Y. 20
Chatham Electronics Corp., 610 W. Mt. Pleasant Ave., Livingston, N.J. 5, 10, 15, 20
For details see ad on pages 80-87
Tel: Livingston 6-1000
Chicago Corp., Mass., 5, 10, 15, 20
Cinch-McCrone, Inc., 750 San Marco Ave., San Bruno, Calif., 10, 20
For details see ad on pages 90-91
Tel: Juno 16-1282
Electro, Inc., 127 Sussex Ave., New-ark 2, N.J. 20
For details see ad on page 153
Tel: Humboldt 2-5977
Fleming Electronics, Inc., X.Y. 5, 10, 15, 20
Fleming Telephone & Radio Co., Div. of L.T. & T., 100 Kingsland Road, Clinton, N.J. 10
For details see ad on page 152
Tel: Nutley 2-6000
General Electric Co., N.Y. 5, X.Y. 5, 10, 15, 20
General Electric Co., Tube Div., X.Y. 5, 10, 15, 20
Holin, Inc., Ill., 20
Huntington Electric Corp., X.Y. 5, 15, 20
Industrial Tubes, Inc., Ill., 5, 10, 15
International Rectifier Corp., X.Y. 5, 10, 15, 20
Laramie & Kansas, Ltd., Calif., 20
Marshall Labs, Inc., 1060 Hope St., Springfield, Conn., 20
For details see ad on page 190
Tel: Stonmouth 2-5961
Marxian Corp., X.Y. 20
Marx's Telechron, Ltd., 10
Martin & Co., H.S., Ill., 10
Mettal, Ltd., Enfield, X.Y. 5, 10, 20
Muffin-Tube Lab., Ill., 5, 10, 20
National Electrometers, Inc., 601 North St., Geneva, Ill., 10
For details see ad on page 90
Tel: Geneva 2-720

ELECTRONICS, INCORPORATED

127 SUTTON AVENUE
Newark 3, N. J.

Send for your catalog and operation. 

Send for your Engineering Manual Catalogue.
4 Component Parts

49. Rectifiers, Vacuum Tube.

Standard Miniature

Miniaturizing Your Equipment? Specify Simplest, Most Compact AMPERITE THERMOSTATIC DELAY RELAYS

Most Economical, hermetically sealed

Provide delays ranging from 2 to 120 seconds.
- Actuated by a heater, they operate on A.C., D.C., or Pulser Current.
- Hermetically sealed, not affected by altitude, moisture, or other climatic changes.
- Circuit: SPST only — normally open or normally closed.

Amperite Thermostatic Delay Relays compensate for temperature changes from —65° to 150°. They ensure correct operation at any temperature within the range of the unit from —65° to 150°.

Types: Standard Sizes C-C and C-C-Mi, 5-50 minutes.

PROBLEM? Send for Bulletin No. TR-81

AGASTAT pneumatic time delay relays

Light, sensitive, dependable
- Unaffected by voltage variations
- Insensitive to vibrations
- Adjustable timing from 0.1 second to 10 or more minutes
- Available in manual and automatic types
- Simple control
- Easy to operate

Write for 4-page Technical Bulletin No. AB-51

AGASTAT time delay relays

California, USA

1927 8th Avenue, Elizabeth, New Jersey

Manufacturers in pneumatics.

4 Component Parts

50. Relays.

50A Relay

50B Relay

50C Relay

50D Relay

AGA Division

Elastic Stop Nut \ Corporation of America

1927 8th Avenue, Elizabeth, New Jersey

Manufacturers in pneumatics.

AGA Division

Elastic Stop Nut Corporation of America

1927 8th Avenue, Elizabeth, New Jersey

Manufacturers in pneumatics.
4. Component Parts

50. Relays.

Kellnugh Switchboard & Supply Co., 70 W. Monroe St., Chicago 2, Ill., 40, 30, 60
For details see ad on page 194
Tel: DECrete 2-7350

Kelley Mfg. Corp., N.Y., 45

Kings Electronic Co., N.Y., 3

Kumar Electric Co., Inc., N.Y., 20, 25, 30, 40, 55, 60, 65


each half century of experience in specialized design and production of precision components...

RELAYS

COMPUTER COMMUNICATIONS MINIATURE COAXIAL RADIO FREQUENCY HIGH VOLTAGE PROCESSING PULSE MINIATURE HERMETICALLY SEALED

SOLENOIDS

MINIATURE PUNCHERS FOR PUSH OR PULL 300 CUSTOM TYPES FROM 20 STANDARD PARTS

SWITCHES

ROTOR SELECTOR ROTARY PULL TOUCH

HERE'S AN INNOVATIVE SOLUTION TO YOUR RELAY PROBLEMS

Our engineers can help you solve your relay problems. Let advantage of Pollak's advanced design and engineering experience be utilized to help you design a relay system which is superior to your present relay system. If you wish a relay with a different specification, we will be glad to design one for you.

Our engineers will be glad to make a study of your problem and present to you one or more solutions. We will be glad to work with you on a confidential basis.

WE INVITE YOUR INQUIRY

JOSEPH POLLAK CORPORATION
500 Relays

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RELAYS for Your Circuits

Hermetically sealed relays like this one to government spec. MIL-R-57578 or designed to your special needs. One piece magnets—Nylon coil forms—Teflon sleeves—Long service life.

MILWAUKEE GAS SPECIALTY COMPANY
MILWAUKEE 1, Wis.

Inquire locally or write for literature on products or service which will help you solve your relay problems with the least amount of your time and energy.
4. Component Parts

50. Relays.

ACE PRECISION POTENTIOMETERS

Wire Wound Linear and Non-Linear

- Standard and Miniature—1" to 3" Specialties in Miniaturization
- Single or gang assembly
- Micro-torque—standard dial or ball bearings
- Double precision metal contacts to ensure repeatable frequency
- Higher dielectric and ambient temperature range by new techniques

Miniature or special wire wound resistance strips for all types of Electro-Mechanical Devices, Experimental and Production

Submit your specifications for recommendations

ACE ELECTRONIC ASSOCIATES

Western Branch

51. Resistors.

Standard Resistors
- Carbon, fixed
- Wire-wound
- Metal film
- Thick film
- Film
- Metal film on mica

Precision Resistors
- Carbon, fixed
- Wire-wound
- Metal film
- Thick film
- Film
- Metal film on mica

Non-Standard Resistors
- Custom
- Special
- To specifications

ALLIES' A.D.

precision deposited carbon resistors

Isolated Temperatures from -55°C to +150°C

One Per cent Standard

Allies Resistors precision deposited carbon resistors are replacing wire wound resistors in many power supply and noise reduction applications. The low temperature coefficient makes them much more reliable than wire wound resistors. The low leakage current makes them ideal for precision applications.

ALLIES' A.D. PRODUCTS CORPORATION

(Continued on page 310)

1951 IEE Directory

300 LEE Directory

Code number at end of each address refers to product or section of classification shown at head of the main classification.
Simplify circuit trimming with

Bourns

sub-miniature

TRIMPOTS

One of many appli-
cations when springs
are at a premium.

Noblette and Nobleloy METAL FILM RESISTORS

Our research and development efforts continually aimed at resistor improvement and specialized in the range of 1/2 watt to 5 watt, makes available to you resistors of economical manufacture and high stability performance.

Better frequency response, less inductance and excellent resistance stability under adverse operating conditions are major features found only in our metal film resistors—and with assured initial accuracy, you have good reasons why, this time try-Noblette and Nobleloy metal film resistors.

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Nobleloy 1/2, 1, 2, & 5 WATT

WM wire wound (low power) resistors, color coded—REMA standard are also available in 1/3, 1/2, and 1 watt. Write for technical data and catalog on all Continental products.

Represented in leading cities from coast to coast.

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Electra carbon-coat deposited carbon resistors

8 sizes to meet circuit requirements of high stability, accuracy & low cost

Electro carbon-coat resistors provide the precision, stability and accuracy to meet a variety of applications and requirements of advanced electronic circuits. Electro offers the benefits of low voltage coefficient, low capacitive and inductive characteristics in high frequency applications, in addition to small physical size and economy.

STABILITY — regardless of tolerance tolerance all Electro deposited carbon resistors are equally high in stability.

ACCURACY — ± 1% is a normal but resistance value tolerances of ±2%, ±3%, and ±10% are available.

ECONOMY — When the advantages of stability, accuracy and small physical size are considered, Electro resistors are your most economical buy.

No. PART NUMBER Voltage Range Nom. 
DC-1 125 250 15" 0.35" 1/2" 7/8"
DC-2 150 300 51/2" 0.375" 1/2" 7/8"
DC-5 150 300 2" 0.375" 1/2" 7/8"
DC-10 150 300 1/2" 0.375" 1/2" 7/8"
DC-5 150 300 1/2" 0.375" 1/2" 7/8"
DC-10 150 300 1/2" 0.375" 1/2" 7/8"
DC-2 150 300 1/2" 0.375" 1/2" 7/8"

Lead Length — Lengths of leads for all resistors shown in 1/2" increments.

Hematometrically Sealed Resistors Are Available in 6 Sizes From 1/2 Watt to 2 Watts.

Write for complete information—addresses.

Electro Manufacturing Co.
Resistor Division
Kernville, Kansas City, Mo.

For details see ad on page 361
4. Component Parts

51. Resistors.

Electrical, Inc., 74 Atterbury St., Boston
30, Mass., 21
For details see ad on page 348
Tel.: JA 4-5220

Electronic Corp., N.Y., N.Y., Precision
Electric-Elements, Inc., 4127 S.E.
Street, Portland 15, Oreg., 30, 30
For details see ad on page 363
Tel.: FL 5900

Electronic Labs., Inc., N.Y., N.Y., 30, 55
Etronick-Telepone Co., N.Y., 30, 45, 56
Electronic Devices, Inc., N.Y., 45, 55
Electronics of Colorado, Inc., Colo.
Electron-Practice, Inc., Ill., 23, Therm.
Erie Senator Corp., 144 West 12th St.
Erie, Pa., 15
For details see ad on page 82-83
Tel.: Erie 2-1481

Fairfield Camera & Instrument Corp.,
N.Y., 30

Federal Engineering Co., Calif., 20
Gannett Co., Mass., 35
General Electric Co., N.Y., 45
General Electric Co., N.V., N.Y., 45
General Electric Co., Apparatus Sales
N.Y., N.Y., 45
General Radio Co., 275 Massachusetts
Ave., Cambridge 39, Mass., 35, 55
For details see ad on page 15-62,
Cover IV
Tel.: Trumbull 6-4400

Giambrini & Co., Inc., M., N.J., 30, 55
Girard, Hopkins, Calif., 5
Glass Products Co., 1911 S. Chi
cago Ave., Chicago 37, Ill., 25
For details see ad on page 247
Tel.: Fairfax 6-1209

Glenn C., 321 Cunliff Ave., Met
tuchen, N.J., 15
For details see ad on page 294
Tel.: Metuchen 6-2500

Gulton Mfg. Corp., 321 Cunliff Ave.,
Metuchen, N.J., 15
For details see ad on page 177
Tel.: Metuchen 6-2500

Gyron Instruments, Inc., N.Y., 20
Hardwick, Inc., N.J., 30, 45, 56
Helipot Corp., Div. Beckman Instru
tments, Inc., 806 S. Meridian Ave., Sta
cas, Calif., 20, 50, 55
For details see ad on page 156
Tel.: Pyramid 1-2184

Herco Corp., 95, 25
Hower, Inc., Calif., 55

International Telechron Co., Pa., 30, 45,
50, 55, 30, 55, Submarine Precision
For details see ad on page 300

1955 Radio Engineering Show
March 21-24, 1955
Kingbridge Armory,
New York

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40-01 Northern Blvd., Long Island City 1, N. Y.
Manufacturers of Scientific Precision Equipment for Over 30 Years

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stand adverse conditions of vibration, heat and moisture. Each is engi
neered and manufactured to meet rigid government requirements. In
addition to its wide variety of stock instruments, DeJUR offers top-flight
laboratory, engineering and manufacturing facilities for production of
these precision units adapted to your specifications. Inquiries are invited.

Write for more detailed information on any of the products
shown on this page to Dept. 1069PM.

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Showed MODEL DF-II

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Frequency Requirements: less than 1% change at 145V.
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Convenient installation: means less in panel space.
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Micro-Circuits Co., New Buffalo, Michigan

4. Component Parts

51. Resistors.

Industrial Assembly Corp., N.Y. 5, 50, 50, 50, 50, 50
Instrument Resistor Co., L.Y. 45, 55
Wire-Wound Substitutes & Solid Rods, Inc., N.Y. 55
International Resistance C. A., P.N. 30, 50, 50, 50, 50, 50, 50
Inductive Mic. Corp., N.Y., 50, 50, 50, 50, 50, 50, 50
Jet Electronics Inc., N.Y., 50, 50, 50, 50
Ketronic Carbon Co., Calif., Calif., Calif.
Lederle, Inc., Calif., Calif., Calif., Calif., Calif.
LeIno Electronics, Inc., Calif., Calif., Calif., Calif.
Mallory & Co., Inc., Calif., Calif., Calif., Calif.
Marlowe Corp., N.Y. 50
Metro Corp. Inc., 50, 50, 50, 50
Meracon Radio Corp., N.Y. 45
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4. Component Parts
51. Resistors.
(Continued from page 165)

For details see ad on page 204
Tel: 516-644-4301
Parsons, W. H., 151 Passadena Ave., S. Passadena, Calif., 15, 35, 55.
For details see ad on page 242
Tel: Cleveland 5-3147
Precision Electric Components, Ltd., Canada, 20.
Porias Electric Components, Ltd., Canada, 20.
Porias Electric Components, Ltd., Canada, 20.
Radio Components Ltd., Canada, 10, 20.
For details see ad on page 167
Tel: Virginia 6-4425
For details see ad on page 124-125
Tel: Harrisburg 2-4242
Rectifiers, Inc., N.Y., 30, 55.
Reed & Robinett, Co., N.Y., 30, 55.
Rectifiers, Inc., N.Y., 30, 55.
Reed & Robinett, Co., N.Y., 30, 55.
Rectifiers, Inc., N.Y., 30, 55.
Reed & Robinett, Co., N.Y., 30, 55.
Rectifiers, Inc., N.Y., 30, 55.
Reed & Robinett, Co., N.Y., 30, 55.
Rectifiers, Inc., N.Y., 30, 55.
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Reed & Robinett, Co., N.Y., 30, 55.
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Reed & Robinett, Co., N.Y., 30, 55.
Rectifiers, Inc., N.Y., 30, 55.
Reed & Robinett, Co., N.Y., 30, 55.
Rectifiers, Inc., N.Y., 30, 55.
Reed & Robinett, Co., N.Y., 30, 55.
51. Resistors.

Ward Leonard Electric Co., 90 South St., Mount Vernon, N.Y. 20, 30, 41, 10

For details see ad on page 208

Tel.: (201) 668-4100


Wayne-Kaye Laba, Ltd., Smythmore Grove, New Malden, Surrey, England, 20, 23

For details see ad on page 210

Tel.: Walden 2630

Welch Mfg. Co., W. M., III, 30

Welsh Canada Ltd., Canada, 15, 20, 25, 30, 45, 55

Weston Electrical Instrument Corp., 644 Frelinghuysen Ave., Newark 5, N.J., 45, 55

For details see ad on page 54-59

Tel.: HU 3-5700

White Industrial Inc., Inc., X.Y., 5, 60

Witt Co., Pa., 26, 30, 45, 46

Youkens Industries Inc., Inc., X.Y., 45, 55

Zenith Optical Lab., N.Y., 40

52. Semi-Condutors.

S. Germanium diodes 15. Transistors, point contact film

Sensors Electronics Corp., X.Y., 10

Berkshire Labs, Mass.

That's resistors, relays and chokes...we're talking about—but it's a man looking for these devices earns his A when he ships at Ward Leonard. You get more performance per dollar...a wider selection of stock items...and quicker service on made-to-order controls from Ward Leonard than from anyone else.

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For Further Information

about any of the products listed, consult advertisements on pages shown at the end of the listing.

If the facts you want are not given in the advertisements, use the Post Card Inserts to write for literature without cost.

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REPRESENTATIVES

For fast product location, please use the pink indexes
4. Component Parts

53. Sockets.

5. Capacitors, plug-in, 12 V, 10 V, 15 V, 12 V, 10 V, 15 V, 12 V, 10 V, 15 V, 12 V, 10 V, 15 V.
6. Resonating tube, 15 V, 10 V, 15 V, 12 V, 10 V, 15 V, 12 V, 10 V, 15 V.

4. Component Parts

53. Sockets.

Livingston Electric Corp., N.J., 10, Hermetically Sealed

Mechado Mfg. Corp., 2031 W. Churchill St., Chicago 47, Ill., 15

For details see ad on page 530

Tel.: Brunswick 6-6266

Milmin Mfg. Co., Inc., James, 150 Exchange St., Middletown, 10, 15

For details see ad on page 546

Tel.: Milford 4-6410

Myhre Corp. of America, 111-A Clinton Blvd., Clinton, N.J., 10

For details see ad on page 54-55

Tel.: Prospect 6-6505

National Co., Inc., Mass., 15, 10

Nepaneco Electric Co., N.Y., 10, 15

Philmore Mfg. Co., Inc., N.Y., 10

Plexus Mfg. & Eng., N.C., 10

Production Tool & Fixture Co., 37 W. Main St., Oyster Bay, L.I., N.Y., 15, 15

For details see ad on page 566

Tel.: Oyster Bay 6-6600

Rayna, Inc., Ill., 15, 15

Reider Co., Ltd., Calif., 15, 15, 15

Radala Mfg. Co., Inc., Pa., 30

Societe Francaise d'Electricite, France, 15

Syracuse Electric Prod., Inc., 1745 Broadway, New York 19, N.Y., 15, 15

For details see ad on page 571

Tel.: Jackson 6-2424


For details see ad on page 510

Tel.: LA 7-4840

United-Carr Fastener Corp., 31 Ames St., Cambridge 42, Mass., 15

For details see ad on page 510

Tel.: Rindell 6-9000

United States Gasket Co., 611 N. 10th St., Camden 1, N.J., 5, 15, 15

For details see ad on page 512

Tel.: Wooster 2-6700

Vector Electronic Co., Calif., 10

54. Switches.

A. Reed

B. Snap

C. Key

D. Spst

E. Spst

F. Spst

G. Triple & push

H. Push

I. Pull

J. Push & pull

K. Push & pull

L. Push & pull

M. Push & pull

N. Push & pull

O. Push & pull

P. Push & pull

Q. Push & pull

R. Push & pull

S. Push & pull

T. Push & pull

U. Push & pull

V. Push & pull

W. Push & pull

X. Push & pull

Y. Push & pull

Z. Push & pull

For details see ad on page 571

Tel.: Illinois 6-6266

Arch-Hart & Hegeman Electric Co., Conn., 30, 40, 40, 40, 40, 60, 70

Automatic Electric Co., Ill., 15, 25, 30, 40, 50, 50, 70

Automatic Electric Mfg. Co., Minn., Time

Automatic Switch Co., Ill., 35, 55, 60

(Continued on page 237)

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4. Component Parts

54. Switches.

C and H Sales Co., Calif., 79
Culver Prod. Co., Calif., 55
Corning Cable, Inc., Conn., 45, 50, 60
Curtis Transformer Co., Ill., 20, 30, 45, 50, 70
Curtiss-Wright Corp., Conn., 65
Curtiss-Wright Corp., Conn., 65

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Chances are you’ll never design an “electronic husband,”... But the uses for Centralab Rotary Selector Switches are as Breed as your imagination

- Available in standard (1/2” diameter) or miniature size (1/4” diameter)
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4. Component Parts

54. Switches.

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Jennings Radio Mfg. Corp., 790 McClellan Ave., San Jose, Calif., 10, 35, 75, 85
For details see ad on page 25-37
Tel: Cypress 2-8723

Kollmorgen Switch Co., 151 Garfield Ave., Garden City, N.Y., 30, 50
For details see ad on page 40
Tel: 555-3050

Kings Electronic Co., N.Y., 45
Kruger Corp., N.Y., 30, 50
Kultz Elektriz Co., Inc., 63 S. Fulton Ave., Millburn, N.J., 30, 50, 70
For details see ad on page 111
Tel: M-Overton 4-9524

Leader Electronics, Inc., Ohle, 45
Leland, Inc., G. H., Ohle, 40, 45, 55
Libra Corp., Inc., Calif., 45
Lineman Switch Corp., Conn., 15
Littelfuse, Inc., 1100 Hickey St., Des Plaines, Ill., 35
For details see ad on page 68
Tel: Wabash 4-1168

Livingston Electric Corp., N.J., 15

4. Precious Metals in Industry

Your design problem simplified with the use of one of our standard contacts

PECKER soledoids
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General Devices, Inc.
Box 253, Princeton, New Jersey

For details and Literature address Dept. T.

For details and Literature address Dept. T.

See also listings for
Thermistors on
page 378

Page 377
Product 54
4. Component Parts

55. Telegraph Keys.
- E. Brandt
- M. Semi-automatic

Alden Products Co., 113 N. Main St., Bloomfield, Ill., 5
For details see ad on page 296
Tel: Bloomfield 160

American Telephone & Telegraph Co., N.Y., 5
Bohn, Inc., 60-62 N. 10th St., Oklahoma City, N.Y., 5
Boswell & Co., 112 E. 11th St., N.Y., 5, 10

Cortelya, N.Y., 10
Corning Eng. Co., N.Y., 5

Edison M. Inc., 138 E. 2nd St., N.Y., 5
Erie, N.Y., 10, 12
For details see ad on page 298
Tel: Providence 2-5159

Electro-Medical Lab, Inc., Vt., 15
Johnson Co., E. F. M., 15-20, 5, 15

Marconi's Wireless Telegraph Co., Ltd., England,

Northern Electric Co., Ltd., Canada.

Stromberg-Carlson Co., N.Y., 5

Taft Electric & TV Co., N.Y., 5

Technical Materials Corp., N.Y., 10

Vibradex Co., Inc., N.Y., 15

56. Thermostats.
- L. Brandt
- M. Semi-automatic

American General Thermostat Corp., N.Y., 5
American Instrument Co., Inc., Md., 10
Baker & Co., Inc., 113 16th St., Newark, N.J., 10

Baiter, Inc., 10

Barber-Colman Co., Ill., 5, 10

Bristol Co., Inc., Mass., 10


Curtis Development & Mfg. Co., Wms., 10


Electro-Tech Equipment Co., N.Y., 10


Pearsall, Inc., Mass., 10

Plug-O-Screw Co., Ill., 10

G-V Controls, Inc., N.J., 15

General Electric Co., Appliance Sales Div., N.Y.

Hart Mfg. Co., Inc., 15

Mellcor Corp., Ill., 10

Monitor Products Co., Calif., Ill.

Stevens Mfg. Co., Inc., 212 Walnut St., Mansfield, Ohio, 10, 15

For details see ad on page 296
Tel: 365-55

Savile Controls Ltd., England, 5

Ulanski Co., George, 413 Market St., Newark, N.J., 10

For details see ad on page 296
Tel: Market 2-3005

United Control Corp., Wash., 10, 15

Valvex Controls, N.Y., 10, 15

4. Component Parts

57. Transformers.

See Page 407, Product 64

Electronic Control Equipment, Subhead 20, Production control, counting and sorting equipment

Ace Coll. & Electronics Co., N.Y., 45

Acme Electric Corp., 63 Water St., Cuba, N.Y., 10, 15, 20, 30, 40, 50, 60, 70

For details see ad on page 281
Tel: Cuba 4

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ACTUAL SIZE

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To Canada: Acme Electric Corp., Ltd.
381 Bovais Way, Toronto, Ontario.

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Page 381
Product 57
Standalone text is not available for this page.
There are 3 SPECIFIC WAYS in which “Proceedings of the I.R.E.” serves the advertiser differently and more effectively than other publications.

1. Pre-Specification Selling

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The Institute of Radio Engineers is an engineering society for individual engineers who must qualify on their own education, experience and engineering work. Thus, the magazine follows the reader as his private possession, wherever he goes. Whenever new engineering problems are developing, the work is done by individual engineers—and it is none that cannot be sold! Only the engineer knows enough to specify what he needs in a highly technical industry. Selling is a matter of matching the minds of men because a company cannot ask for purchase orders. Wherever radio engineering activity is the greatest, companies employ IRE members. An engineer moves into a new job in advance of production and with him goes “Proceedings of the I.R.E.” with all the advertising you can suggest to place where engineering activity is the greatest.

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ADVERTISING DEPARTMENT
1475 Broadway
New York 36, N.Y.

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Fisher Engineering, Inc.
P.O. Box 327
Huntington, Indiana

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Pulse Forming Networks
Modulator-Converters
Magnetic Amplifiers
Reactors Charging-Filter
Transformers: Modulation Blocking Oscillator Pulse—all types Power-Filament Plate

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SURPASSES MIL-T-77 TEST SPECIFICATIONS
PULSE WIDTHS: 25, 50, 75, 100, 200, 300, 500, 750, 1000 microseconds
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SPECIFICATIONS:

Write for complete data and MIL-T-77 series S-6

5020 Equestrian Boulevard
Los Angeles 13, California
1954 IRE Directory

4. Component Parts

Pulse Transformers

Ferranti Electric, Inc., N.Y., 3, 10, 15, 30, 40, 70
Fisherman Engineering, Inc., P.O. Box 327, Huntington, Ind., 5, 10, 15, 30, 40, 60
For details see ad on page 235
Forbes-Wagner, Inc., N.Y., 10, 20, 40
Forrest Electric Co., 1128 Circle Ave., Forrest Park, Ill., 3, 10, 20, 30, 50
For details see ad on page 232
Tel: MA 6-0556
Fisher Transformer Co., Ohio, 5, 10, 15, 30, 40
Frederick Transformer Co., Inc., 1730 Westfield St., Brooklyn 2, N.Y., 5, 10, 15, 20, 30, 40, 60
For details see ad on page 190
Tel: Everest 6-1300
Fuglen-Miller Labs., Inc., 385 Main St., Newton, N.J., 10
For details see ad on page 171, 292
Tel: ME 6-2165
Galbraith & Son Elec. Corp., C.C., N.Y., 11, 21, 30
General Elec. Co., Apparatus Sales Div., N.Y., 3, 10, 15, 30, 40, 70
General Elec. Co., Power Transformers, Ballast, Ind., 5, 10, 15, 20, 30, 40, 60
General Magnetics, Inc., N.J.
General Electric Co., 231 Massachusetts Ave., Cambridge 39, Mass., 5, 15, 65, 70
For details see ad on page 59-60, Cover IV
Tel: Tremont 6-4800
General Transformer Co., 18240 Harwood Ave., Homewood, Ill., 5, 15, 30, 50, 60
For details see ad on page 236
Tel: Homewood 1-34
General Wiring Co., Inc., N.Y., 10, 15, 30, 40
Glaser-Stevens Corp., N.J.
Gould Electric & Mfg. Co., Calif., 5, 10, 15, 20, 30, 40, 60, 70
Granger-Turner Co., 2354 N. Pulaski Rd., Chicago 30, Ill., 5, 15, 30, 40, 60, 70, Hearing Aid
For details see ad on Cover 11
Tel: Everglade 6-4400
Guiderman Co. of Calif., Inc., 2020 Exposition Blvd., Los Angeles 24, Calif., 10
For details see ad on pages 318, 385
Tel: Exposition 1-2021
Guiderman & Co., Inc., California, Calif., 5, 10, 15, 30, 40, 60
Guiderman, Inc., Chicago 30, Ill., 5, 10, 15, 30, 40, 60
Hedley Co., Inc., Robert M., Calif., 10, 15, 20, 30, 40, 60
Henderson Transformer Co., Ill., 5, 10, 15, 20, 30, 40, 60, 70
(Continued on page 197)
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KENYON TRANSFORMER CO., INC.
840 Barry Street, New York 59

4. Component Parts

57. Transformers.

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Hardy Electric Corp., 138 Haven Ave., Port Washington, L.I., N.Y., 6, 15, 25, 30, 35, 40, 50
Hartley Co., Inc., 11 A, N.E., S, 30
Hepner Mfg. Co., Box 1207, Round Lake, Ill., 20, 40, 55
For details see ad on page 324
Tel: Round Lake 6-7781

Highland Engineering Co., Main and Utica Sts., Westbury, L.I., N.Y., 5, 15, 25, 35, 50
For details see ad on page 387
Tel: WE 7-2033
Hi-fiber Mfg. Co., N.Y., 20, 30, 40, 50
Hi-line Transformer Co., Inc., N.Y., 5, 15, 25, 30, 40, 50
Hi-line Transformer Co., T. E., Ill., 45
For details see ad on page 388
Tel: Hi-line 6-7781

7-F Circuit Breaker Co., Pa., 45, 55
Industrial Television, Inc., N.Y., 60
JFD Mfg. Co., Inc., 225 2nd St., Brooklyn 1, N.Y., 20
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Tel: WRE 6-1800
Jodo Insul Co., Ltd., 40, 50
Jefferson Electric Co., Ill., 3, 15, 25, 30, 40, 50
Jenron Electronics Co., Pa., 40
K.V. Transformer Corp., Conn., 5, 15, 20, 35, 40, 50, 65
Key Electric Co., 4 Maple St., Pine Brook, N.J., 45, 60
For details see ad on page 385
Tel: Caldwell 6-4100
Kenyon Transformer Co., Inc., 140 Barry St., New York 25, N.Y., 3, 15, 25, 30, 40, 50
For details see ad on page 386
Tel: Kingstreet 2-4500
Kenyon Mfg. Co., N.Y., 50
Keystone Products Co., 281 23 St., Union City, N.J., 15, 30
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Tel: Union 6-0400
Lake Co., Wisc., 40
For details see ad on page 116-117
Tel: B-3000
Lansky & Associates, Inc., W. T., N.Y.
For details see ad on page 30
Tel: Rockman 1-3200
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Lehigh Valley Electronic Mfg. Co., Pa., 45
LeMaire Electric Cords, Inc., N.Y., 5, 15, 25, 30, 40
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LeVay Corp., N.Y., 5, 15, 45
Lindberg Mfg. Co., Ill., 30, Plate & Fittings
Lindell Mfg. Co., Charles S, Ill., 45, 65
Magnatronics, Inc., N.Y., 30, 40, 45, 70
Magnavox Co., The, 2154 Hester Rd., Fort Wayne 4, Ind., 3, 15, 20, 60, 70
For details see ad on page 248
Tel: 5-5401
Magnetics Magnifiers, Inc., N.Y., 15, 45, 50, 50
Magnetics Mfg. Corp., Calif., 40
Magnetic Windings, Div. Essex Wire, N.Y.
For details see ad on page 277, 387
Tel: C-1-0002
Magnetron Corp., N.Y., 5, 15, 30, 40, 50
Mark Electronics, Inc., N.Y., 20, 50
Menlo Prods., Inc., Miam, 3, 15, 25, 30, 40, 50, 60, 70
Merit Corp. & Transformer Corp., Ill., 3, 15, 25, 30, 45, 55, 65
Mitchel Mfg. Co., Wisc., 45
(Continued from page 393)
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4 Component Parts

57. Transformers.

For details see ad on page 359.
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Milwaukee, Wis. 53210

Milwaukee Electric Co. Inc.
5115 S. 28th St., Milwaukee, Wis. 53210

Milwaukee Electric Co. Inc. (Milwaukee, Wis. 53210)

Milwaukee Electric Co. Inc. (Milwaukee, Wis. 53210)
4. Component Parts

57. Transformers.

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Sange Corp., Inc, Win, 5, 15, 25, 30, 50
Sangiacomo Industries, N.Y., 5, 15, 25, 30, 35, 40, 50
Savage Transformers, Ltd., England, 5, 25, 35
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Servo Corp. of America, Div. 1, 15, 20
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Teletronics, Inc., Berlin, 5, 70
Tecumseh, Inc., 64, Merrick Rd., Amityville, L.I., N.Y., 70
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Societe Francaise Radio Electronique, France, 5, 50, 45
Sopelectric Co., 4522 W. 16 St., Chicago 50, Ills., 70
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Sylvania Electric Products Inc., Raton Rd., Ipswich, Mass., 5, 15, 25, 30, 40, 50
For details see ad on pages 9-14
Tel: Ipswich 5-360
Sylvania Electric Products Inc., 1740 Broadway, New York 15, N.Y., 15, 35
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Tele-Beam Industries, Calif., 60
Telechron Inc., 64 Merrick Rd., Amityville, L.I., N.Y., 70
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Timemaster Co., Ills., 5, 10, 15, 25, 30, 40, 45, 50, 60, 65, 70
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VOLTAGE REGULATING TRANSFORMERS

SOLADA Constant Voltage Transformers provide the following advantages: Automatic transformer regulation within +2% regardless of primary variations of 25%. No moving or expendable parts... no mechanical adjustments or maintenance... self-protecting against short circuit... available in a complete range of capacities and special types.

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SOLADA Constant Voltage Transformers

SOLADA ELECTRIC CO.
4611 W. 16th Street, Chicago 50, Illinois
4. Component Parts

57. Transformers.

58. Tuners.

59. Vacuum Tubes, Receiving.

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4. Component Parts

58. Tuners.

59. Vacuum Tubes, Receiving.

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58. Tuners.

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FIXED REGULATION
300V to 10,000V
- stabilized voltages
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NATIONAL INDUSTRIAL TUBES IGNITORS—THYRATRONS—RECTIFIERS
Write for your National Industrial Tube Catalogue
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GENEVA, ILL.

(Continued on page 197)

60. Vacuum Tubes, Special Purpose.

69. Vacuum Tubes, Receivers.

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Amperite Co., 501 Broadway, New York 12, N. Y., 19
For details see ad on page 254
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For details see ad on page 255 (continued)
Tel: 432-1450
Anton Electronics, Inc., 1212 E. 21st St., New York 8, N. Y., 19
For details see ad on page 255
Tel: 232-1450
Armstrong Electronic, Inc., 220 E. 42nd St., New York 17, N. Y., 19
For details see ad on page 255
Tel: 232-1450
Arthur Corporation, 512 W. 42nd St., New York 18, N. Y., 19
For details see ad on page 255
Tel: 232-1450
Arthur Corporation, 512 W. 42nd St., New York 18, N. Y., 19
For details see ad on page 255
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NATIONAL ELECTRONICS, INC.
GENEVA, ILL.

(Continued on page 197)

60. Vacuum Tubes, Special Purpose.

69. Vacuum Tubes, Receivers.
4. Component Parts

61. Vacuum Tubes, Transmitting.

Federal Telephone & Radio Co., Div. of I & T & T, 100 Kingland Road, Cliff-

Man., N.J., 10, 20, 25, 30, 45

For details see ad on pages 22-27

Tel: Nyack 2-3000

Mallard, Ltd., England, 20, 25, 30, 45

For details see ad on page 210

Huggins Labs, Inc., 311 Hamilton Avenue, Melrose Park 2, Calif., 40

For details see ad on page 207

Tel: San Jose 7-0700

International Electronics Corp., N.Y., 10, 20

Isotonic Mfg. Corp., N.Y., Low Loss Ceramic Insulators

Lewis and Kaufman, Ltd., Calif., 10

Los Angeles, Calif., 25, 30

Machlett Labs., Inc., 1003 Hope St., Springdale, Conn., 10, 45

For details see ad on page 306

Tel: Standard 4-5751

Marconi Instruments, Ltd., N.Y., 25

Marc- ultrasound Telegraph Co., Ltd., England, 10, 20, 25, 30, 45, 48

For details see ad on pages 15-16

Tel: JDI Institution 6-2624

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Two types of 3-Band Traveling-Wave Tubes for instrumentation and systems application as well as microwave laboratory use.

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Frequency: 3 kHz - 2 kHz

Power: 150 mW 1 watt

Gain: 40 dB 30 dB

Similar Huggins Tubes in other frequency ranges are presently in various stages of development, as well as other types which details cannot be published.

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It's Varian... for top performance in every Klystron application.

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- Microwave relay transmitters and receivers
- Telemetering systems
- UHF television transmitters
- Radar receivers—local oscillators
- Coherent and pulsed radar transmitters
- Guided missile applications
- Microwave test equipment
- Particle accelerators—power tubes

Varian has a production KLYSTRON... that meets the requirements of these typical applications:

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<th>APPLICATION</th>
<th>FREQUENCY RANGE</th>
<th>POWER RATING</th>
<th>TYPE TUBE</th>
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<td>25 - 140 W</td>
<td>V-270, V-280, V-105, V-115, V-155</td>
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<td>8,000 - 11,000 MHz</td>
<td>100 W - 3 kW</td>
<td>V-23, V-63, V-62, V-82, V-95</td>
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<td>30 - 50 W</td>
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<td>UHF Television Laboratory Testing</td>
<td>8,000 - 12,000 MHz</td>
<td>45 - 60 W</td>
<td>V-310, V-320, V-340, V-360</td>
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For complete specifications and technical data on these outstanding Varian klystrons, and for information about special purpose klystron engineering—write to the Varian Application Engineering Department today.

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Palo Alto 3, California

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4. Component Parts

61. Vacuum Tubes Transmitting.

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Taylor Tubes, Inc., Ill., 10, 45
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Varian Vacuum Products, Calif., 5, 10, 15
Varian Associates, 601 Hansen Way, Palo Alto 2, Calif., 29
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Westinghouse Electric Corp., N.Y., 5, 10
White Electron Devices, Inc., Roget, Route 17 & Erie Railroad, Ramsey, N.J., 45
For details see ad on page 399
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General Magnetics, Inc., N.J., 5
General Radio Co., 275 Massachusetts Ave., Cambridge, 38, Mass., 10
For details see ad on pages 55-62, Cover 11

Gorham Transformer Corp., 2734 B, N. Portland St., Chicago 16, Il., 10
For details see ad on Cover 11

Gyroscope, Inc., N.Y., 5
Herschell-Brown, Inc., N.Y., 5
Hoffman Brothers, Inc., N.Y., 5
Industrial Electric, Ltd., Can., Canada, 5
Ketet Labs, Inc., N.Y., 5
K repairs, N.Y., 5
Landis Electric Corp., N.Y., 10
Levin & Co., Inc., 282, Cal., 5, 10
Magnetic Amplifiers, Inc., N.Y., 5
Magnetics, Inc., N.Y., 5
For details see ad on pages 373, 374

Tel: CH 1-8592

Marconi's Wireless Telegraph Co., Ltd., England
Marshall Electric, Ltd., Cal., 5
Metro Products, Inc., Munich, 10
Micro-Circuits, Inc., New York 3, N.Y.
For details see ad on pages 356, 357
Tel: 329591

Norton's Wireless Telegraph Co., Ltd., England
Norgren Controls, Inc., N.Y., 10
Omega Mfg., N.Y., 5, 10
Perkins Transmitters, Ltd., England, 10
Peco Power Co., Ill., 10
Peach Electronics, Inc., 13 Garden St., New Rochelle, N.Y.
For details see ad on page 34
Tel: NE 2-3575

Polarine Co., Inc., 202 Fifth Ave., Cal., 5
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For details see ad on page 146
Tel: Ulster 2-8630

Polytronics Co., Ltd., Cambridge
Power Transformer, Inc., N.Y., 5, 10
Precise Measurements Co., 415 Kings Highway, Brooklyn, 11, N.Y.
For details see ad on page 345
Tel: ES 5-8435

Quasar Transformer, Inc., N.Y.
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Scrib-Tech, Inc., Ohio, 5
Sole Electric Co., 622 W. 16th St., Chicago 50, Ill.
For details see ad on page 391
Tel: 31-2414

Sorensen Co., Inc., Conn.
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Tel: JU 6-2454
Thermador Corp., Amer. N.J., 15
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Transformer Techniques, Inc., Ill., 5, 10
United Transformer Co., 150 Varick St., New York 14, N.Y., 5, 10
For details see ad on page 182
Tel: AL 3-5000
Vayo Mfg. Co., Inc., Tex., 5
Wolvetron Co., Mich., 5, 10
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101 Television Test Equip. 475

Part V INSTRUMENTS & CONTROLS

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6. Radar, Microwave, UHF Equip.
7. Test & Measuring Equip.

The first few times you use this EDGE INDEX follow the "How to use" instructions below—ONE STEP AT A TIME.

After that you will be able to open easily and almost instantly to the section or letter that you seek.

How TO USE

1. With the directory open on the desk, bend the book almost double in
your left hand, with your thumb just below this line.

2. From one-line or two-line symbol adjacent to the letter or subject you
seek, run your eye across horizontally to a corresponding page-edge symbol.

3. Open there with your right hand.

IT IS EASIER IF YOU "FAN" OR "RIFLE" THE LAST FEW PAGES WITH YOUR RIGHT THUMB. THE EDGE INDEXES COVERING THE OTHER DI-
RECTORIES WILL BE FOUND OPPOSITE PAGES 240, 270, & 476.
Classifications with a System!

The IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes into which 101 basic classifications have been organized.

You will note that we here differ from most directory compilers, for we do not mix meters with motors simply for alphabetical reasons. Products used in "Audio" whether components or complete apparatus form the first fundamental group. Yet, the same manufacturer and product may also appear in the "Component Parts" section. This system gives subject grouping for speed and convenience. A directory should aid a man who has forgotten some detail, or product name. Ours helps by grouping products as one would think.

1. Audio Frequency Equipment (Products 1 to 11)
2. Broadcasting Equipment (Products 12 to 17)
3. Communications Equipment (Products 18 to 25)
4. Component Parts (Products 26 to 62)
5. Applications of Electronics (Products 63 to 70)
6. Radar, Microwave, UHF (Products 71 to 74)
7. Test & Measuring Equipment (Products 92 to 101)
8. Services and Materials (Groups 75 to 91)
9. Education & Publishing (Groups 102 & 103)
10. Distribution Functions (Service 104)

For detailed identification, these 101 products and services, grouped in the 10 indexes, are further defined into over 600 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing adds speed. Purely alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers have liked our system better!

For safety, an alphabetical "terminology" index is given, preceding the product system in the pink pages introducing the company index. You will note also that after each firm, its products are listed by number code in the alphabetical list, and that sub-classifications shown by number code in the product indexes give much detail. Just a little study of the system will help you get great good from this book.

The IRE DIRECTORY is 10 Indexes in one book.

1954 I.R.E. DIRECTORY
READER SERVICE REPLY CARD

Place a 2¢ stamp on one or more of the perforated cards below, and they will be promptly forwarded to the manufacturers listed on the back. If you prefer to send your specific requirements, a letter would be more advantageous, however be sure to enclose the reply card.

PLEASE PRINT IN INK OR TYPEWRITER

To: IRE DIRECTORY
1475 Broadway
New York 36, N.Y.

To: IRE DIRECTORY
1475 Broadway
New York 36, N.Y.

To: IRE DIRECTORY
1475 Broadway
New York 36, N.Y.

To: IRE DIRECTORY
1475 Broadway
New York 36, N.Y.
1954 I.R.E. DIRECTORY READER SERVICE REPLY CARD

Below, for your convenience, are six perforated reply cards. Each one has enough space to list three advertisers' names and their page numbers. Forward as many cards as you have questions, and I.R.E. will promptly notify the manufacturer in question to send literature, specifications, and prices to you.

---

### Applications of Electronics

#### Industrial, Medical, and Military

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
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<th>Title</th>
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63. Computers & Counters
- 10 Analog-to-digital converters
- 10 Computers, digital
- 10 Counters, counters
- 15 Computers, digital
- 15 Computers, digital
- 15 Computers, digital

64. Electronic Control Equipment
- 15 Regulators & protective devices
- 15 Electronic controls
- 15 Electronic controls
- 15 Electronic controls
- 15 Electronic controls
- 15 Electronic controls

65. Geophysical Apparatus
- 15 Geophysical equipment
- 15 Microphones
- 15 Geophysical equipment
- 15 Geophysical equipment
- 15 Geophysical equipment

66. Induction Heating Equipment
- 15 Induction heating equipment
- 15 Induction heating equipment
- 15 Induction heating equipment
- 15 Induction heating equipment
- 15 Induction heating equipment

67. Medical Equipment
- 15 Medical equipment
- 15 Medical equipment
- 15 Medical equipment
- 15 Medical equipment
- 15 Medical equipment

68. Nuclear Equipment
- 15 Nuclear equipment
- 15 Nuclear equipment
- 15 Nuclear equipment
- 15 Nuclear equipment
- 15 Nuclear equipment

69. Service Mechanisms
- 15 Service mechanisms
- 15 Service mechanisms
- 15 Service mechanisms
- 15 Service mechanisms
- 15 Service mechanisms

70. Telemetering Equipment
- 15 Telemetering equipment
- 15 Telemetering equipment
- 15 Telemetering equipment
- 15 Telemetering equipment
- 15 Telemetering equipment

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**ELECTRONIC COUNTERS with PLUG-IN UNITS**

**INSTRUMENT**

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<th>RANGE</th>
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<th>PRICE</th>
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**PHASE MEASURING INSTRUMENTS - 6 CPS TO 500 MC**

**CONTINUOUSLY VARIABLE DELAY LINES with**

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<tr>
<th>TYPE</th>
<th>NAME</th>
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**STEP VARIABLE DELAY LINES with**

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</tbody>
</table>

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**ADVANCE ELECTRONICS CO., INC.**

451 Highland Ave., Hackensack, N.J.

---

63. Computers & Counters
- 10 Analog-to-digital converters
- 10 Computers, digital
- 10 Counters, counters
- 10 Computers, digital
- 10 Computers, digital
- 10 Computers, digital

---

For details see ad on page 401.

---

ADVANCE ELECTRONICS CO., Inc., 451 Highland Ave., Hackensack, N.J.

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For details see ad on page 401.

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For details see ad on page 401.

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For details see ad on page 401.
5. Applications of Electronics

### 5.3 Computers & Counters

<table>
<thead>
<tr>
<th>Computer &amp; Company</th>
<th>Address</th>
<th>City, State</th>
<th>Phone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Control Co., Inc.</td>
<td>92 Broad St., Boston, MA 02116</td>
<td>Boston, MA</td>
<td>617-547-5600</td>
<td></td>
</tr>
<tr>
<td>Digital Dynamics, Inc.</td>
<td>10 E. 42nd St., New York, NY 10017</td>
<td>New York, NY</td>
<td>212-685-5555</td>
<td></td>
</tr>
<tr>
<td>Elmer's Corp.</td>
<td>5357 E. Beverly Blvd., Los Angeles, CA 90042</td>
<td>Los Angeles, CA</td>
<td>213-487-5555</td>
<td></td>
</tr>
<tr>
<td>Esterline-Angus Corp.</td>
<td>8123 S. Cicero Ave., Chicago, IL 60620</td>
<td>Chicago, IL</td>
<td>312-477-5555</td>
<td></td>
</tr>
<tr>
<td>Electronic Controls Co., Inc.</td>
<td>234 W. Jackson Blvd., Chicago, IL 60606</td>
<td>Chicago, IL</td>
<td>312-444-5555</td>
<td></td>
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<tr>
<td>Electronic Data Systems Corp.</td>
<td>7700 W. Jefferson Blvd., Los Angeles, CA 90045</td>
<td>Los Angeles, CA</td>
<td>213-487-5555</td>
<td></td>
</tr>
<tr>
<td>F. J. Eaton &amp; Co.</td>
<td>30 E. 42nd St., New York, NY 10017</td>
<td>New York, NY</td>
<td>212-685-5555</td>
<td></td>
</tr>
<tr>
<td>Federal Telephone &amp; Telegraph Co.</td>
<td>1767 Broadway, New York, NY 10019</td>
<td>New York, NY</td>
<td>212-486-5555</td>
<td></td>
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<tr>
<td>Fidelity Instruments Corp.</td>
<td>250 W. 57th St., New York, NY 10019</td>
<td>New York, NY</td>
<td>212-486-5555</td>
<td></td>
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<tr>
<td>Ferranti Electric, Inc.</td>
<td>5357 E. Beverly Blvd., Los Angeles, CA 90042</td>
<td>Los Angeles, CA</td>
<td>213-487-5555</td>
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<tr>
<td>Ferranti, Ltd., 250 W. 57th St., New York, NY 10019</td>
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<td>212-486-5555</td>
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<tr>
<td>Ferranti, Ltd., 250 W. 57th St., New York, NY 10019</td>
<td>New York, NY</td>
<td>212-486-5555</td>
<td></td>
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<tr>
<td>First Instrument Co., Div. of Sperry Rand Corp.</td>
<td>21217 Thomson Ave., Long Beach, CA 90806</td>
<td>Long Beach, CA</td>
<td>213-487-5555</td>
<td></td>
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<tr>
<td>Flexmetrics Corp.</td>
<td>30 E. 42nd St., New York, NY 10017</td>
<td>New York, NY</td>
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<td>Flexmetrics Corp.</td>
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<td>New York, NY</td>
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### 5.4 Magnetic Data Handling Systems

<table>
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<th>Company</th>
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<tr>
<td>Acoustical Imaging, Inc.</td>
<td>1234 5th Ave., New York, NY 10023</td>
<td>New York, NY</td>
<td>212-486-5555</td>
<td></td>
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<tr>
<td>Acoustic Research Corp.</td>
<td>1234 5th Ave., New York, NY 10023</td>
<td>New York, NY</td>
<td>212-486-5555</td>
<td></td>
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<tr>
<td>Acoustic Research Corp.</td>
<td>1234 5th Ave., New York, NY 10023</td>
<td>New York, NY</td>
<td>212-486-5555</td>
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### 5.5 Magnetic Data Handling Systems

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>City, State</th>
<th>Phone</th>
<th>Fax</th>
</tr>
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<tbody>
<tr>
<td>Magnetic Data Handling Systems, Inc.</td>
<td>1234 5th Ave., New York, NY 10023</td>
<td>New York, NY</td>
<td>212-486-5555</td>
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</tr>
<tr>
<td>Magnetic Data Handling Systems, Inc.</td>
<td>1234 5th Ave., New York, NY 10023</td>
<td>New York, NY</td>
<td>212-486-5555</td>
<td></td>
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### 5.6 Magnetic Data Handling Systems

<table>
<thead>
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<th>Company</th>
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<td>Magnetic Data Handling Systems, Inc.</td>
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<td>New York, NY</td>
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### 5.7 Magnetic Data Handling Systems

<table>
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<td>212-486-5555</td>
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<td>Magnetic Data Handling Systems, Inc.</td>
<td>1234 5th Ave., New York, NY 10023</td>
<td>New York, NY</td>
<td>212-486-5555</td>
<td></td>
</tr>
</tbody>
</table>
There are 3 SPECIFIC WAYS in which “Proceedings of the I.R.E.” serves the advertiser differently and more effectively than other publications.

1. Pre-Specification Selling
Because “Proceedings of the I.R.E.” publishes basic research and engineering applications that are strictly covered by those design standards, the ways “I.R.E.” presents these to the market.

2. Personal Contact to the Individual

3. Economy
It is a specific purpose of the Institute of Radio Engineers to attract attention to the technical requirements of industry and to make available to the public a means of conducting research and development in the field of radio and electronic engineering. The Institute now offers the technical requirements of industry in the form of a technical journal, the Proceedings of the I.R.E. The price of this journal includes all the cost of publication and mailing and is available on a subscription basis for all who desire to keep pace with the rapid developments in radio and electronic engineering.

Thus, the Institute of Radio Engineers is in an enviable position to attract attention to the technical requirements of industry and to make available to the public a means of conducting research and development in the field of radio and electronic engineering. The price of this journal includes all the cost of publication and mailing and is available on a subscription basis for all who desire to keep pace with the rapid developments in radio and electronic engineering.
New Analog Computer Packaging Concept Permits Maximum Component Selection

400 Series REAC Expansion Consoles Combine Adaptability with Economy

Bud Diode Generator, Diode Multiplier Recorder, Servo Voltage Adder to REAC Line

The Reeves Instrument Corporation success in the field of analog computing equipment is the result of a new development in low-power computing in the 400 Series line of REAC Expansion Consoles. Let us take a closer look at the unique features of the new consoles.

**MINIATURE FLOATED GYROS CONTROL, MEASURE MOTION**

The miniature floated gyro is a key component in the 400 Series REAC Expansion Consoles. It provides a high degree of stability and accuracy in measuring motion. The gyro's sensitivity to angular motion is maintained even in the presence of external disturbances, making it ideal for various applications.

**DIODE GENERATOR**

A diode generator is used to control the flow of electric current. In the 400 Series REAC Expansion Consoles, it plays a crucial role in the stability and accuracy of the system. The diode generator ensures that the current flows in the desired direction, preventing any unwanted disturbances.

**PRECISION INDUCTION RESISTORS USEFUL FOR MANY APPLICATIONS**

Precision induction resistors are critical components in analog computing equipment. They are used to control the flow of current, which is essential for the accurate operation of the system.

**SERVO VOLTMETER**

A servo voltmeter is a device that measures voltage. In the 400 Series REAC Expansion Consoles, it is used to monitor the output of the system, ensuring that it remains within the desired range.

**SIX CHANNEL Recorder**

A six-channel recorder is a device that records data from multiple sources. In the 400 Series REAC Expansion Consoles, it is used to record and analyze the data generated by the system, providing valuable insights for further analysis.

**NEW TYPES OF PHOTOELECTRIC SOURCES**

The introduction of new types of photovoltaic sources in the 400 Series REAC Expansion Consoles has significantly improved the system's efficiency and reliability. These sources provide a stable and consistent supply of power, ensuring the system's performance.

**STANDARD, MINIATURE BREADBOARD INSTRUMENTATION PACKAGE ECONOMICAL FOR BUILDING EXPERIMENTAL SERVOS, COMPUTERS**

Standard, miniature breadboards are used to construct the 400 Series REAC Expansion Consoles. They are economical and allow for easy experimentation, making it possible to build and test various configurations.

**5. Applications of Electronics**

**63. Computers & Counters.**

The Reeves Instrument Corporation offers a wide range of applications for its digital computer equipment. Here are some examples:

1. **Digital to analog converter**
2. **Pulse amplitude generator**
3. **Output display device**
4. **Data manipulator**
5. **Pulse generator**
6. **Precision timer**
7. **Number storage**
8. **Shift register**
9. **Pulse counter**
10. **Synchronizer**
11. **Rate meter**

For more details, please refer to the Reeves Instrument Corporation's catalog or contact us directly.
5. Applications of Electronics

5.1 Nuclear Equipment.

Bendix Aviation Corp., 510 West Third Street, Cincinnati 2, Ohio. 10
For details see ads on pages 51-54, 55-56.

5.2 Nuclear Instrument & Chemical Corp., 10-15
For details see ads on pages 51-54, 55-56.

5.3 Nuclear Research Corp., 5, 10
For details see ads on pages 51-54, 55-56.

5.4 Nuclear Research & Dev. Co., 5, 10, 15
For details see ads on pages 51-54, 55-56.

5.5 Nucleonics, Inc., 10-15
For details see ads on pages 51-54, 55-56.

5.6 Nuclear Data, Inc., 5
For details see ads on pages 51-54, 55-56.

5.7 Nuclear Data, Inc., 5
For details see ads on pages 51-54, 55-56.

5.8 Nuclear Science, Inc., 10-15
For details see ads on pages 51-54, 55-56.


Bendix Aviation Corp., 510 West Third Street, Cincinnati 2, Ohio. 10
For details see ads on pages 51-54, 55-56.

6.1 Nuclear Instrument & Chemical Corp., 10-15
For details see ads on pages 51-54, 55-56.

6.2 Nuclear Research Corp., 5, 10
For details see ads on pages 51-54, 55-56.

6.3 Nuclear Research & Dev. Co., 5, 10, 15
For details see ads on pages 51-54, 55-56.

6.4 Nucleonics, Inc., 10-15
For details see ads on pages 51-54, 55-56.

6.5 Nuclear Data, Inc., 5
For details see ads on pages 51-54, 55-56.

6.6 Nuclear Data, Inc., 5
For details see ads on pages 51-54, 55-56.

6.7 Nuclear Science, Inc., 10-15
For details see ads on pages 51-54, 55-56.

6.8 Nuclear Science, Inc., 10-15
For details see ads on pages 51-54, 55-56.

6.9 Servo-Mechanisms.

American Electronic Laboratories, Inc., 15
For details see ads on pages 51-54, 55-56.

American Electronic Manufacturing, Calif., 15
For details see ads on pages 51-54, 55-56.

American Machine & Foundry Co., N.Y., 10
For details see ads on pages 51-54, 55-56.

Arma Corp., Rochester Field, Garden City, L.I., N.Y., 13, 15
For details see ads on page 51-54, 55-56.

Arkansas Regulator Co., Ill., 5
For details see ads on pages 51-54, 55-56.

Atlantic Electronics Corp., 5, Manhasset Ave., Post Washington, L.I., N.Y., 15
For details see ads on pages 51-54, 55-56.

Bendix Aviation Corp., 5, Manhasset Ave., Post Washington, L.I., N.Y., 15
For details see ads on pages 51-54, 55-56.

Bendix Aviation, Pacific Div., 4025 S. Normandy Ave., Chicago 15, Ill.
For details see ads on pages 51-54, 55-56.

Bendix Aviation, Pacific Div., 4025 S. Normandy Ave., Chicago 15, Ill.
For details see ads on pages 51-54, 55-56.

Bendix Aviation, Pacific Div., 4025 S. Normandy Ave., Chicago 15, Ill.
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Bendix Aviation, Pacific Div., 4025 S. Normandy Ave., Chicago 15, Ill.
For details see ads on pages 51-54, 55-56.

Bendix Aviation, Pacific Div., 4025 S. Normandy Ave., Chicago 15, Ill.
Transoiloil servo systems feature integrated design—every component is made to match all the others ... coordinated to insure maximum efficiency and top performance. For systems of your own design, Transoiloil can supply precision components designed to meet your requirements ... their effectiveness limited only by the restrictions you impose. Complete data will be sent on request.

PACKAGED ELECTRONIC COMPONENTS for design and production

ECONOMY

ServoMechanisms, Inc., pioneers in the "packaged function" technique, offers the economy-minded designer and manufacturer of electronic and electromechanical control systems, outstanding savings in development and production costs through the use of plug-in electronic components. These standard plug-in components may be used immediately in the laboratory breadboard stage or in quantity production, thus relieving the user of design and production problems and reducing the electronic plug-in components to a purchased part status. This advanced design philosophy provides a new standard of reliability, interchangeability, and ease of maintenance. ServoMechanisms, Inc., facilities are available for the development and production of special "packaged electronic functions" and complete systems.

5. Applications of Electronics


- Magnetic Amplifiers, Inc., N.Y., S. 15
- Mark Electronic, Inc., N.J., S. 15
- Marshall Inc., Electronic Inc., Cali., S. 15
- Mason Corp., W. L., N.Y., S. 15, 16, 20
- McKee Lab., N.Y., S. 16
- Mecnell, J. B., Corp., S. 16
- Metcalf Corp., Ill., S. 16
- Mideast Industrial Lab., China, S. 15
- Servo Devices
- Milwaukie-Honeywell Regulator Co., Ill., S. 16
- Milwaukie-Honeywell Regulator, Inc., Div., Pa., S. 16
- Mektron-Western Engineers, Inc., Cali., S. 16, 17, 20
- Mosley Co., F. L., 400 N. Fair Oaks Ave., Pasadena, Cali., S. 15
- For details see ad on page 412
  Tel: 327-2400
- Motorhome, Inc., Cali., S. 16
- Motordrive & Co., Ltd., England, S. 17
- Norton Co., Inc., Div., S. 16
- Norton Labs., Corp., Conn., S. 17
- Norton Electro-Products, Inc., Ill., S. 17
- Ortho Filter Corp., 100 Allston Ave., Cambridge, Mass., S. 17
- For details see ad on page 412
  Tel: MULberry-6-0884
- Outer Mfg. Co., John, 1 Main St., Redon, Wis., S. 17
- For details see ad on page 417
  Tel: 416-6381
- Otis Elevator Co., N.Y., S. 17
- P.M. Instrument Co., Conn., S. 17
- P.F. Applied Res., Ltd., Canada, S. 17
- Parsons Co., Ralph M., Cali., S. 17
- Penn-Rent Eng. Corp., P.O. Box 240, Kutztown, Pa., S. 17
- For details see ad on page 203, 203, 203
  Tel: Kutztown 2075
- Pierce, Inc., N.Y., S. 17
- Phillips Petroleum & Devo Co., Inc., S. 17
- Tillyard St., Brooklyn, N.Y., S. 17
- For details see ad on page 166
  Tel: UL 4-7800
- Rolls Corp., Ill., S. 17
- Radiation, Inc., PO Drawer O, Melbourne, Fla., S. 17
- For details see ad on page 153
  Tel: Melbourne 600
- For details see ad on page 201
  Tel: WOODside 3-5000
- Reeves Instrument Corp., 205 E. 81 St., New York 21, N.Y., N.Y., S. 17
- For details see ad on page 406
  Tel: TR 6-6000
- Reflections Corp., Inc., Cali., S. 17
- Regulator Mfg. Co., N.J., S. 17
- Rembrandt, Inc., Mass., S. 17
- Roco-Eds. Inc., Cali., S. 17
- Research Dock, Inc., Pa., S. 17
- Research Instrument Co., N.Y., N. 17
- Rich-Rod Labs., Conn., S. 17

(Continued on page 417)
The IRE Directory is 10 Indexes in one book.

The IRE Directory is 10 Indexes in one book.
A Directory of Radar, Microwave, UHF Equipment

The Ultra-Highs have brought into being a set of equipment, mostly used for military purposes. In this particular directory we list both equipment and components which belong specially to this area of the spectrum.

4 Major Groups
19 Products
Organized by functions for Engineers

71. Antennas.

27. Feed systems
28. Reflectors
29. Transmitting

Aeronautical Communications, Inc., Ph., 10
Airtronics, Inc., 100 W. Elizabeth Ave., Lincoln, N. J., 3
For details see ad on page 419
Tel. Lincoln 3-0000
Alliance Manufacturing Co., Ohio, 20
Aeroplastic Labs, Inc., Pa., 10, 25
American Machine & Foundry Co., N. Y., 5, 10, 15, 20
American Spartan Corp., 1870 S. 34 Ave., Chicago 50, Ill., 5
For details see ad on page 120
Tel. Spartan 3-9900
American Screen Prod. Co., Clarks, 10, 25
Andrew Corp., 363 E. 15th St., Chicago 19, Ill., 5, 10, 25
For details see ad on page 420
Tel. TB 4-6600

Burroughs Corp., Inc., Dept. 1894, 227
Main St., Beloitville, N. J., 10
For details see ad on page 427
Tel. Plymouth 2-2220

For details see ad on pages 25-26, 32
Tel. Stanley 2-3811

Bendix Navigation Division, N. Y., 25
Bogart Mfg. Corp., N. Y., 5, 10, 15, 20, 25
Borg-Warner, Inc., Indus. V. S. UHF
Boeing Engineering Co., Calif., 5, 25
Bristol Mfg. Corp., N. Y., 5, 10, 15, 25
Budd-Stanley Corp., 4860 32 St., Long Island City, 1, N. Y., 5, 10, 25
For details see ad on page 420
Tel. STI 2700

Cass H Sales Co., Calif., 20
Curtiss-Wright Corp., N. Y., 20
Canaan Corp., Calif., 5, 10, 15, 20, 25
Capelhart-Farnsworth Co., Ind., 10, 25

For more information, please refer to the full version of this document.

72. Receivers.

31. Microwave relay
32. Position indicators
33. Radar

73. Transmitters.

35. Microwave
36. Microwave relay
37. Radio

74. Waveguides & Accessories.

38. Couplers
39. Flexible waveguides
40. Hybrid junctions
41. Microwave instruments
42. Rigid waveguides
43. Sampling lines, reflectors, etc.
44. Switches
45. Transmission lines

Always consult the pink pages of the Annual Directory for a complete cross-reference, or to find products by name. The pink pages list 680 products by name, as well as under the product groups. Page numbers are given for speed.

For an NTC 20 Militant Microwave system, a minimum must be purchased. For details, see page 120.
GABRIEL MICROWAVE ANTENNA

Field proved the world over, Gabriel Parabolics are produced for commercial, industrial, and military frequencies.

Request Catalog EMP-2 complete specifications in three and other frequencies.

7000 mc. — 7000 mc. Railroad Microwave System Operates in mid-west weather conditions ranging from -37° to 109° F. — and often mounted where difficult access makes reliability critical. Photo courtesy of Philco.

Important Features: COMPLETE COVERAGE — 100-105 mc. HIGH GAIN — 16.5 db. over line-of-sight range. LOW VSWR — 1.15 max. LOW SIDE LOOPS — better than 72 db down.


Specifications: HIGH GAIN — better than 30 db over line-of-sight range. LOW VSWR — 1.3 max. over 1010-1019 mc band. COMPLETE COVERAGE — flat top, zero -7 db. LOW SIDE LOOPS — better than 75 db down.

6. Radar, Microwave, UHF

71. Antennas.

(Continued from page 411)

GABRIEL HIGH GAIN UHF-TV Broadcast Antenna

From station after station, in metropolitan and smaller communities, Gabriel TV antennas have been installed with a reliability and economy of operation at relatively low cost — with Gabriel's radically new transmitting antennas.

Request 24-page Report TV for complete performance characteristics.

Important Features: HIGH GAIN — 25 db and 16 power gain models available. IDEAL VERTICAL PATTERN — Gaussian shaped radiation pattern for optimum field strength. SHAPED HORIZONTAL PATTERN — Omni-directional or cardiod at site required. NULL FILL-IN — standard on all models. TROUBLE FREE — mechanical design with greater stiffness in de-icing, no insulator except seal — ELECTRICAL BEAM TILT if desired.

GABRIEL COMMUNICATIONS ANTENNAS

A complete line for wide-range dependable mobile communications for increased signal power with wider coverage at great savings over cost of high power stations and mobile transmitters. Request 24-page Catalog EMG.

HIGH GAIN BEACON ANTENNAS — Gabriel BW series covers 140-290, 144-174, 100-104 mc bands. Gain up to 63 db over 70 degree cone, with equal radio reception in all horizontal directions and low VSWR.

MOBILE ANTENNAS — Gabriel's complete line with bases, arms, and stands. Feeds many mobile communications networks.

Typical models are famous "daguerre" Model SPP-71 for all police frequencies; Model SPP-22 for smaller organizations; and whip antenna; Model SPP-34 roof-top model for 140-145 mc.

Information at high speed! "Data the way an engineer thinks" is the key to IRE DIRECTORY classifications. All products are divided into 10 fundamental groups, many of which parallel published group organization. The groupings plan makes this the fastest working directory you ever used. No components are mixed with test equipment — you turn right to a section where your item belongs.

Yet good engineering detail is maintained. 104 basic classes of products under these 10 sectional product directories keep listings from becoming cumbersome, but clearly define products. Developing pine lists of skillfully eliminated. Simplicity makes this book easy to work with — insures fastest finding of facts when forgotten. Thus the faults of terminology listings are avoided.

Completeness is insured! Most firms make many products in a single classification. Wasteful, eye-Confusing relisting of some firms over and over is quite sensibly solved by using a system of codes under the 104 basic headings which already provide 608 separate classifications. A more complete picture of what each firm’s full line is results, but you travel through lower listings. The "Coop Principle" of Directory indexing makes these lists wide, well marked highways to information — fast.

3000 Firms listed. The alphabetical directory gives a clear definition of these firms by showing only one or all of the ten fundamental groups in which these firms belong after every name.

Ads positioned with reason! In a DIRECTORY where ads play an important part in supplying information the user wants and needs, it makes good sense to cross-refer every advertiser in every listing so that the user can quickly find more detail. Ads are also placed listing company alphabetical listings, or in the product sections in which they properly belong. No effort is spared to "organize" ad information.

More advertisers — more information. Flowering behind the success of many advertisers served IRE readers with so much information. The advertisers list that this year is truly a "social register" of this great industry.
IRE DIRECTORY provides all THREE “Proceedings of the IRE” puts your product promotion monthly before the “thinking and doing” engineers in the fabulous, fast-moving radio-electronics industry. Circulation 38,945 (ABC).

Founded in 1933, “Proceedings of the IRE” is the authoritative weekly book of America’s fastest-expanding industry. In an electronics advances, years ahead of the times, are published every month, thus keeping engineers up to the moment on all that is now in engineering research and application. Its advisory is a constant product pipeline of the best this industry manufacturers. A vital service in all men who specify and buy it, is a proved vehicle for your consistent product promotion—with prejudice!

IRE DIRECTORY provides 35,000 IRE members educated to buy and specify with your detailed product data results, now for the first time all long year.

The IRE DIRECTORY is their working vocabulary — it organizes, edits, simplifies, and quickens their way through a complex industry. They look to its listing of men, firms and products as vital working information. Wherever an IRE member, you’ll find IRE DIRECTORIES close at hand for details not keeping your product story before 30,000 engineers in your work. The price of one page is less than one-half the three units postage required to mail 35,000 letters.

6. Radar, Microwave, UHF

72. Receivers.

(Abridged from page 422)

6. Radar, Microwave, UHF

73. Transmitters.

Automatic Electronics & Controls Corp., N. Y. S., 10, 15
Baldwin, Service, Eng., Calif., 10
Bendix Aviation Corp., 1600 Sherman Way, N. Hollywood, Calif., 31
For details see ad on page 457
Bendix Aviation Corp., Bendix Radio Div., 5104 4th Ave., Kansas City, Mo., 15
Bendix Aviation Corp., 11000 Sherman Way, N. Hollywood, Calif., 31
For details see ad on page 1027
Bendix Aviation Corp., 6005 Racine St., Kansas City, Mo., 15
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For details see ad on page 457
For details see ad on page 2003
For details see ad on page 457
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For details see ad on page 2400
For details see ad on page 457
For details see ad on page 2400
It does happen, you know... an inspired twist, a new application... a microwave component that seems impossible to produce.

But so many fine ideas lie dormant... never leave the design board for want of production know-how, like the microwave assembly below. Luckily, in this case, the illustration is only an artist’s conception. But suppose you dreamed it up and it had to be produced, with all its complications, exacting tolerances, specialized finishes.

That’s where the many years of unique production experience and the unusual facilities of Budd Stanley can help you in so many ways.

For we at Budd Stanley are manufacturing specialists in microwave components only. We constantly tackle the seemingly impossible design and engineer new production methods of our own to accomplish its manufacture... exactly as you specified it.

So, if you are designing or wish to specify a component that seems difficult to produce... write, phone or wire us. We’ll be glad to lend our knowledge to your problem.

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Tel. STIllwell 6-1706

specialists in microwave application

for SPECIFIC microwave information on “new” components or “standard” plumbing

If you use microwave components... you can benefit from Airtron’s broad range of engineering experience in designing and producing both advanced and so-called “standard” plumbing. For specific, helpful information... prepared by and for engineers... merely fill in the obligation free coupon below and send it to us.

6. Radar, Microwave, UHF

74. Waveguides & Accessories.

Airtron, Inc., 1409 W. Elizabeth Ave.,
Linden, N.J., 07036, 10, 15, 20, 25, 30, 35, 40.
For details see ad on page 419
Tel: Linden 3-2840

Murphy Research & Eng., Inc., Calif., 5, 15, 20, 25

American Phase Desktop, 1830 N. 54th Ave., Chicago 30, Ill., 40
For details see ad on page 410
Tel: Chicago 3-2700

Andrew Corp., 19 E. 72nd St., Chicago 30, Ill., 25, 30, 35, 40.
For details see ad on page 400
Tel: TR 6-4400

Bart Labs, Inc., Dept. IRS4, 127 Main St., Beverly Hills 2, N.J., 5, 25
For details see ad on page 402
Tel. Beverly 6-2500

For details see ad on page 50-52
Tel: Beverly 4250

Budstone, Inc., 45-01 22nd St., Long Island City 1, N.Y., 5, 15, 20, 25, 30, 35, 40.
For details see ad on page 424
Tel. STILLwell 6-1705

Creston-Rasmussen Co., Inc., 5, 25, 30

Cascades Research Corp., Calif., 20, 35, 40

Century Electronic, Div. Century Metalcraft, Calif., 5, 25, 30, 35

Communi-Line, Inc., State Hwy. 70, Marion, N.Y., 20, 35, 40.
For details see ad on page 341
Tel: Freehold 8-1850

Cooper Industrial, Inc., N.J., 5, 10, 25

Corning Glass Works, N.Y., 20, Micro Strip

Cubic Corp., Calif., 5, 15, 20, 25

Douglas Metallic Door Co., N.Y., 25

Dulles Fan Co., Calif., 5, 25, 35

Hayes Co., N.J., 35

Hickman, Inc., 1 John St., New

Lee Manufacturing, Calif., 5, 20, 25, 30, 35, 40

Continued on page 411
DOUGLAS
MICROWAVE SPECIALISTS

SOME SPECIAL FEATURES OF A FEW OF OUR CATALOG ITEMS

MODEL 121 ATTENUATION, FLAT

Features 230° lead rotation; may be easily calibrated

CRITICAL DETECTOR AUTOMATIC WAVEGUIDE - 12C400A45405000

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Features double probe tuner to lower VSWR

DIRECTORIAL COUPLER DIRECTIONAL COUPLER

MODEL 125

Features sliding probe on director for higher directivity

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Features adjustable set for better match

FEATURES CATALOG BOOKS FOR FLEX TUNING; once adjusted does not shift under vibration

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Our catalog, the most complete and comprehensive in our field, is available upon request.

MICROWAVE COMPONENTS

QUALITY DEVELOPMENT AND PRODUCTION OF...

MICROWAVE COMPONENTS INSTRUMENTS ASSEMBLIES AND SYSTEMS

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PRECISION COUPLERS

FOR LAB, INSTRUMENTATION AND COMMUNICATIONS APPLICATIONS

Model No. Frequency Range (mc)
500-17 50 - 150
300-17 150 - 300
250-17 300 - 600
200-17 600 - 1200
150-17 1200 - 2400
100-17 2400 - 5000
50-17 5000 - 10000

Specifications:
Coupling (5) 17 db or as specified
Directivity C 5 10 db minimum
Amp losses within 0.4 db
Amp matched to 1.45 cm 50 ohms
VSWR below 1.5:1
Price $120.00 Delivery from stock

DOUGLAS
MICROWAVE CO., INC.
11 BEECHWOOD AVENUE NEW ROCHELLE N.Y.
New Rochelle 6,000

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INCORPORATED
9 Alan Court Farmingdale, L.I.

GLASS GUIDE

R. F. COMPONENTS MADE OF LAMINATED GLASS CLOTH

Microwave Transmission Lines Fabricated In This Manner Offer The Following Superior Properties:

NON CORROSIVE
NON HEAT CONDUCTING
HIGH STRENGTH TO WEIGHT RATIO
CLOSE MECHANICAL TOLERANCES
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Straight sections, tees and mitered elbows are among the many components available as standard items. GLASS-GUIDE can also be made to your print.

"Don’t say waveguide, say Glass-Guide!

Write today for complete data.

LEE LABORATORIES, Inc.
Geneese, Pennsylvania

6. Radar, Microwave, UHF
74. Waveguides & Accessories.

(Continued from page 740)

Diamond Microwave Corp., Mass., 15, 15, 30
Douglas Microwave Co., Inc., 11 Beechwood Ave., New Rochelle, N.Y., 5, 15, 20, 25, 30, 35, 40
For details see ad on page 150
Tel: NE 8-6900

Dr. Metz Labs., Inc., A. B., Communications Prado, Div., 1300 Main Ave., Clifton, N.J., 40
For details see ad on page 141
Tel: Mulberry 4-3400

Electro Impulse Lab., Inc., 52 White St., Red Bank, N.J., 30
For details see ad on page 330
Tel: Red Bank 6-0606

Electro Precision Products, Inc., N.Y., 5, 15, 25, 30, 35, 40
Electron-Radar Products, Ill., 20, 25
Emerson & Cuming, Inc., Mass., 20
Engel Devices Products Corp., 18-15 Bell Blvd., Bayside 61, L.I., N. Y., 40
For details see ad on page 145
Tel: BA 6-4500

Engineering & Research Corp., 164, 5, 15, 30
P.R. Machine Works, Inc., 26-12 Borough Pl., Woodside 77, N.Y., 5, 15, 20, 25, 30, 35, 40
For details see ad on pages 150-150
Tel: Astoria 6-2800

Federal Telecommunication Labs., Div. T & T, N. Y., 15, 30, 40
General Chem., Div. Metals & Controls, Mass., Tubing
General Precision Lab., Inc., 62 Bedford Rd., Pleasantville, N.Y., 5, 10, 15, 20, 25, 30, 35
For details see ad on page 188
Tel: Pleasantville 2-0000

General RF Filtrings Co., Inc., Mass., 5, 15, 20
Grimal Mfg. Co., R.I., 5, 15, 30, 40
Grimal Mfg. Co., Inc., R.I., 5, 20, 35
Grubbs-Allen Co., Inc., Ill., 35
Haas Instruments Co., Inc., Va., Radios
For details see ad on pages 15-15
Tel: Davenport 5-460

Honeycomb Co. of America, Inc., Conn., 45, Windows
Hycon Mfg. Co., Calif., 15, 30
Impedance Inc., 9 Alan Court, Farmingdale, L.I., N.Y., 30, 35, 40
For details see ad on page 451
Tel: Farmingdale 2-2060

Imperial Radar & Wire Corp., N.Y., 50, 30, 40

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6. Radar, Microwave, UHF

74. Waveguides & Accessories.

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Industrial Prds. Co., Conn., 15, 25
Inland Circuits, Inc., N.J., Printed Circuit Components
JFD Mfg. Co., Inc., 1626 62 St., Brook-
lund, N.Y., 40
For details see ad on page 286
Tel: 946-3500
Jersey Specialty Co., Inc., N.J., 40
Kellogg Switchboard & Supply Co., 19
W. Monroe St., Chicago 3, Ill., Tele-
phone Terminating Equipment
For details see ad on page 406
Tel: 946-3500
Kendall Instrument Co., Inc., 932 9th
St., Kansas City, Mo., 15, 20, 25, 30
For details see ad on page 422
Tel: Kansas City 4-4812
Kings Electronic Co., N.Y., 5, 15, 20,
25, 30, 35, 40
Kipper, Inc., Co., F. D. Co., N.Y., 35
Kraftsman Optical Co., Mass., 40
Kohele & Mfg. Co., N.Y., 30
Lee Labs, Inc., P.O. Box 200, Granada,
Pa., 15, 20, 25, 40
For details see ad on pages 299, 439
Tel: Granada 2577
Lerner Inst. & Elect. Mfg. Corp., N.Y.,
1, 25, 28
Linos, Inc., N.Y., 5, 10, 20, 25, 30,
Flamek, Adapters, Tests,

tubes, Phase Shifters

Mackenzie Prds. Co., The, Conn., 5, 15,
20, 25, 30, 35, 40
Mappi-Cope, D. E., Div. Union Plate &
Wire, Dunlap & Pine Sts., Alle-
boro, Mass., 25
For details see ad on page 230
Tel: Alamosa 1-3000
Mellon & Co., Inc., P. B. Ind., 25
Purchasing House, Inc., Mass., 20
Metallurgical Spooling Co., Inc., 4th Ave.,
New York, N.Y., 10, 20, 25, 30,
40
For details see ad on page 300
Tel: New York 3-3212
Mercury Metalcraft, Inc., 213 W. Whis-
ter Blvd., Whittier, Calif., 5, 10, 25, 20,
30, 40
For details see ad on page 432
Tel: Raymond 2-408
Metal Fabricators Corp., 731 Pond St.,
Waltham, Mass., 25
For details see ad on page 387
Tel: WA 2-3480
Metals & Controls Corp., Mass., 35
Metalax, Inc., N.Y., 20
Meriden, 7000 Fews Pw., Livingston,
N.J., 15, 20, 20, 40
For details see ad on page 310
Tel: Livingston 6-7292
Microwave Consultants, N.Y., 5, 15, 30,
20, 40
Microwave Dev. Labs., Inc., Mass., 3, 15, 35
Addison St., Chicago 41, 11, 35, 20,
25, 30
For details see ad on page 432
Tel: Spring 2-4225
Narda Corp., 60 Main St., Morris, N.J.,
10, 20, 20, 25, 30, 40
For details see ad on page 461
Tel: Pioneer 6-4550
Northland Electric Co., Ltd., Canada, 5
15, 30, 35
Pepis Dodge Copper Corp., Prds. Co.,
40
Wall St., New York City, 5, 20,
30, 40
For details see ad on page 498
Tel: Wall Street 4-2225
Philco Corp., Pa., 5, 15, 20, 25, 30,
35, 40
Poindexter Electronics Corp., 100 Metro-
poll Ave., Brooklyn 15, N.Y., 20
For details see ad on page 37-42
Tel: Stag 2-3746
Radiotechnic Res. & Dev. Co., Inc., 307
Tillary St., Brooklyn 1, N.Y., 20
For details see ad on page 166
Tel: 815-2-7400
Premier Instrument Corp., 52 West
Houston St., New York 11, N.Y., 5, 15,
30, 20, 25, 35
For details see ad on page 433
Tel: Gramercy 3-3325
Radio Components, Ltd., Canada, 35
Radio Corp. of America, Carnes,
Marketing Dept., Camden, N.J., 40
For details see ad on page 109
Tel: Woolworth's 3-8000
Saulnier Assoc., Inc., N.Y., 40
Schulte Mfg. Co., Carl W., N.Y., 5, 10,
15, 20, 25, 30, 40
Sightmaster Corp., N.Y., 5, 10, 15, 20,
25, 35
Sivers Labs, Sweden, 10, 20, 20, 30
Societe Francaise Radio Electronique,
France, 5, 10, 15, 20, 30
Sperry Gyroscope Co., Div. Sperry Corp.,
Great Neck, L. I., N.Y., 20, 40
For details see ad on page 32-24
Tel: Filestone 7-2600
Sprague Rubber Prds., Co., 60 Derby
Pl., Shilton, Conn., Abortion Ma-
terial
For details see ad on page 520
Tel: Amaranth-Deerly 2-2881
Suffolk Prds., Inc., N.Y., 5, 20, 25
Summit Electronics, Inc., N.Y., 35, 40
Sprague Electric Products Co.,
1740
Brooklyn, New York 19, N.Y., 35
For details see ad on page 8-14
Tel: 8-6428
Technicare Labs., Inc., Conn., 5, 10, 20,
25, 30, 40
Telephone Co., N.Y., 15, 25
Templin Corp., 6th St., 40
Texas Instruments, Inc., 6000 Lummis
Ave., Dallas 9, Texas, 3, 15, 35
For details see ad on page 226
Tel: 1-1921
Thompson Prds., Inc., Dept. PI, Elec-
tronics Div., 2100 Clarkwood Rd.,
Chico, 2, Chico, 20, 30
For details see ad on page 235
Tel: RE 1-8500
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92. Audio Frequency Test Equipment.
93. General Laboratory Equipment & Supplies.
94. General Test Equipment.
95. Graphic Recorders.
96. Laboratory Standards of Frequency & Time.
97. Microwave & Radar Test Equipment.
98. Nuclear.
100. Radio Frequency Test Equipment.

101. Television Test Equipment.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index to find products by name. The pink pages list 608 products by name, as well as under the product group. Page numbers are given for speed.
7. Test and Measuring Equipment

82. Audio Frequency Test Equipment.

Daytron Instrument, Pa. 25, 35

Laser Scientific Co., Calif. 20, 25, 30

Dubow Development Co., 125 Penn St., Burlington, N.J. 5, 10, 15, 20, 25, 30

For details see ad on page 454

Tel: 914-8484

Instrument Electronics Corp., N.Y., 40

Instrument Labs., Ill., 30

For details see ad on page 471

Tel: 416-3388

Long Island Corp., N.Y., 15

Wright, Electrical Co., Ohio, 25

For details see ad on page 412

Tel: 680-6386

Electro Impulse, Inc., 62 White St., Red Bank, N.J., 10, 15

For details see ad on page 330

Tel: Red Bank 6-0938

Electronic Measurements Corp., Lewis Ave. & Maple St., Kaisertown, N.J. 5, 25, 30

For details see ad on page 360

Tel: Kaisertown 1-2530

Electronic Measurements Corp., N.Y., 25

Elco Electric, Inc., N.Y., 10, 15, 20, 25, 30, 35

For details see ad on page 459

Tel: R.A. 6-3200


For details see ad on page 710

Tel: 219-2200

FERRA, Inc., Phila., 35


Franklin Electronics, Inc., Pa. 25, 30, 35

For details see ad on page 417

Tel: Newton Vector 5-3700

Furhill Labs., Ltd., England, 20, 25, 30, 35

For details see ad on page 160

Tel: Evergreen 6-3636

General Electronics, Inc., N.Y., 5, 30

General Radio Co., 25, 30, 35

Ave., Cambridge, Mass., 5, 10, 15, 20, 25, 30, 35

For details see ad on page 59-68

Cever IV

Tel: Cambridge 6-4540


For details see ad on page 477

Tel: WA-6-1127


For details see ad on page 15-22

Tel: Davenport 1-4511

Hickok Electrical Instrument Co., 1051 Dupont Ave., Cleveland 8, Ohio, 40

For details see ad on page 436

Tel: Liberty 1-5000

Hytron Mfg. Co., Calif., 5, 10, 15, 20, 25, 30, 35

For details see ad on page 477

Tel: Liberty 1-5000

Industrial Test Equipment Co., 55 H. 11

St., New York 2, N.Y. 10, 20, 40

For details see ad on page 471

Tel: G.S. 4484

Instruments and electronics, L.I., 30

Instruments Corp. of America, N.Y., 5, 10, 15, 20, 25, 30, 40

Jackson Electrical Co., Ohio, 25


For details see ad on pages 2-3

Tel: Universal 5-4727

Linear Equipment Labs., Inc., Dept. R.D., 75 W. Shore Dr., Newtonville, L.N., 9

For details see ad on page 191

Tel: MA 6-3103

Mico Co., Inc., 21 N. 3rd St., Minneapolis, 1, Minn., Audionimeters

For details see ad on page 320

Tel: AT 8335

Mitsubishi Instruments, Ltd., N.Y., 3, 10, 20, 25, 30, 35, 40

Measurements Corp., Internat. Rd., Boston, 19, 15, 25, 35, 40

For details see ad on pages 460, 524

Tel: Boston 6-2351

Measurements Eng., Ltd., Canada, 25, 35

Millsboro Instr. Corp., N.Y., 40

McMaster & Co., 164, Philadelphia, 25

New London Instrument Co., P.O. Box 1008, New London, Conn., 0

For details see ad on page 44

Tel: E.T. 4-0946

Northern Radio Co., Inc., Dept. PD34, 147 W. 22nd St., New York 11, N.Y., 35

For details see ad on pages 6-8

Tel: Washington 6-3955

Northfield Co., Ltd., N.Y., 40

Panametrics, Inc., N.Y., 25, 35

Pilottone, Inc., Mo., 20, 25


(Continued on page 473)

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**FAST SOLUTION:** A General Purpose or Special Purpose Panametric Instrument Designed for Your Needs

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Analysis of Sound Vibrations, Waveform or Distortion

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Analysis of FM, AM and pulsed RF signals, interference, spatial modulations or monitoring communications channels

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**Solution**

**Panametric Sonic Analyzer**

LPF-adjustable, adjustable frequency components between 45 and 20,000 cps in one second. Readout Read-Out.

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Model 15-7

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Model SPA-1

Panametric Models 84-A.3, and 5A.8

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Available in a variety of sizes having different combinations of channels.

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**ALSO USE:**

Speckle Generators for acoustic frequency analysis covering sonic and ultrasonic frequencies. Models S-5, G-2 and G-3

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QUALITY PRECISION INSTRUMENTATION

FM SIGNAL GENERATOR
A precision FM signal source for testing FM equipment. 27-130 mc.

MODEL 100C

UHF-TV SWEEP FREQUENCY GENERATOR
A laboratory instrument also suitable for production and service testing of UHF television transmitters and receivers. 450-900 mc.

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MODEL 175

BROADBAND AMPLIFIER
Increases the sensitivity of audio and video amplifiers. 2700-3400 mc without objectionable distortion. 15 kc - 30 mc. 60 db gain.

MODEL 252

MODULATION MONITOR
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Suitable for testing the transient and frequency range of wide band amplifiers, and accurately measuring their amplitude. 100 pps to 1 mc.

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Measures transconductance under all operating conditions; reproduces any type of static or dynamic tube characteristic. Range: 0.1-1.0; 0.1-5.0; 0.1-10; 0.1-100 microamperes.

NEW MODEL 101

FREQUENCY STANDARD MODEL 701
A source of stabilized frequencies covering the range from 10 kc to 50 mc at intervals of 10 kc, 100 kc or 1 mc.

NEW LONDON INSTRUMENT COMPANY
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438 1954 IRE Directory

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A VERSATILE NEW INSTRUMENT THAT SIMPLIFIES THE MEASUREMENT OF BIAS AND DISTORTION

The Stelma Telegraph Distortion Analyzer Model TDA is a self-contained, portable unit designed to measure the bias and distortion of telegraph signals rapidly and accurately. The presence of distortion is read directly on an calibrated scale mounted in front of a cathode-ray tube. The various components of distortion making up the total distortion are clearly indicated.

No test signals required. Measurements are made on regular telegraph traffic.

An Ideal Instrument For Telegraph Terminal Centers and Field Stations

SIMPLE TO CONNECT
The Telegraph Distortion Analyzer is packed in order into a telegraph box or key terminal. It can be conveniently carried into the field and plugged into working circuits at various repeaters or terminal points in order to check the distortion characteristics of circuits and equipment.

QUICK TO ADJUST • EASY TO OPERATE
No special skill or technical knowledge is required to operate the TDA.

CONVENIENTLY PORTABLE
The Telegraph Distortion Analyzer weighs only 17 lb. and measures 15 9/16 x 8 x 12 inches.

STELMA PRODUCTS
Repeater and Repeater, Electronic Telephone Maintenance and Repairing

STEELMA CORPORATION
369 Ludlow St. Stoughton, Conn.

1954 IRE Directory

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7. Test and Measuring Equipment

92. Audio Frequency Test Equipment

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Poland Electronic Corp., 100 Metropolitan Ave., Brooklyn 11, N.Y., 30

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Tel: B-19-2004

Precision Corp., N.Y., 30, 35, 40

Precision Aiptron, 182-29 Hewlett St., Elmhurst, L.I., N.Y., 30

For details see ad on page 406

Tel: B-22-688

Rexon Corp., 25, 35

Radiation, Inc., P.O. Drawer Q, Moulton, Ill., 30

For details see ad on page 325

Tel: 64-300

Radio City Products Co., Inc., 25, 30, 35, 40

Radio Corp. of America, Eng. Div., Cambridge, N.Y., 10, 15, 20, 25, 30, 40

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Tel: Woodman 3-8000

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Rayen Electr. Co., Inc., N.Y., 25, 35, 40

Reflex, Inc., Paris, 15

Retford Electr. Co., Calif., 35

Scott, Inc., H. H., Mass., 15, 30,


Servo Corp. of America, N.Y., 20, 25


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Tel: F-1-2-900

Somov Electric Corp., N.Y., 25, 30, 35

Southwestern Indent. Elec. Co., Tex., 25, 40

Sprigley, Inc., W. S. A., Fort Lee, 30, 40

Spencer-Kentucky Labs, Inc., Mass., 35

Sternlehner, Inc., W. S. A., Fort Lee, 30, 35, 40

Stelma, Inc., 369 Ludlow St., Stamford, Conn., Telegraph Distortion Analyzer

For details see ad on page 409

Tel: Stanstaid 45-2275

Summit Elec. Inc., N.Y., 5, 10, 15, 20, 25, 30, 35, 40

Synchromatic Prod. Inc., Radio and Television Div., 254 Rano St., Buffalo 7, N.Y., 30

For details see ad on pages 6-14

Tel: Victoria 2400

T. L. G. Elec. Corp., N.Y., 35

Taffel Radio & TV Co., N.Y., 5, 25


Teletronics, Inc., Ore., 35

Teletronics, Inc., Ore., 35

Triumph Elec. Co., Ill., 30, 40

(Continued on page 442)
High Purity Baker ELECTRONIC CHEMICALS

New standards of precision have marked the rapid growth of the electronics industry. To help attain these standards, chemical purity is highly essential for plating, emission coatings, lightning agents, etc.

Some of the Baker Chemicals popular with the electronics industry are shown on this page. As your electronics development work requires these or other chemicals to precise standards, Baker is your logical source of dependable supply.

J. T. Baker Chemical Co., Executive Offices and Plant, Philadelphia, N. J.

93. General Laboratory Equipment & Supplies.

92. Audio Frequency Test Equipment.

CONRAD INC.
HOLLAND, MICHIGAN

CONRAD ENVIRONMENTAL TEST CHAMBERS

3. Asbestos Analyses

4. Microscopes

5. Other Laboratory Equipment

6. Laboratory Refrigerators

7. Test and Measuring Equipment

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Coleman Instruments, Ill., 10
Conrad, Ill., 5, 10
Erie Glass Works, Inc., 5, 10
Evans-Kooler Engineering Co., N. Y., 5, 10
Hoffman Corp., N. Y., 5, 10
Lindgren Engineering Co., Ill., 5, 10
Norton Glass Works, Ill., 5, 10
Rosenow Corp., Ill., 5, 10
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93. General Laboratory Equipment & Supplies.

92. Audio Frequency Test Equipment.

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91. General Laboratory Equipment & Supplies.

90. Laboratory Refrigerators.

89. Laboratory Refrigerators.

88. Asbestos Analyses.

87. Microscopes.

86. Laboratory Equipment.

85. Test and Measuring Equipment.

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Nuclear Instruments & Chemical Corp., III.

S. R. 10, Radiometric

Perkin-Elmer Co., Ill., 15, 20

Perkin-Elmer Co., Ill., 15, 20

Precise Instruments Co., 90 King St., Newark, N.J., 1, 20

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Tel.: New York 1-4306

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Scientific Specialties Corp., Mass., 10

Semen Barbo & Co., N.Y., Optical System

Shielding, Inc., 10 Rockefeller Place, N.Y., 20

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Tel.: Rockefeller 4-2002

Shaeffer Labs., N.Y., 10

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Swift Industries, Inc., Com. 13

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Tel.: Victoria 2560

Technic, Inc., N,Y., 1, 1, 2


For details see ad on page 442

Tel.: Unionville 2-7580

United Insurance Co., Ltd., England, $, Silver Subsidiary

Wiberg Mfg. Co., Inc., Ind. Test Chambers

Worth Mfg. Co., W., Ill., 10

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Zenith Optical Lab., N.Y., Optics

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For details see ad on page 444

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Bromwell Instruments, Calif., 15, 20

Burke Engineering Co., Calif., 15, 20

C.C.L. Laboratories, Inc., Comms., 10, 24

Calypso Co., Mass., 25

Cambironics Co., 1820 Hilyard Ave., Los Angeles 6d, Calif., 10, Computer Test

For details see on page 142

Tel.: Oregon 8-3741

Code number at end of each ad refers to product or service subcategory listed in the back of the issue, classifying the description.
High Resolution Laboratory Standard DC Voltmeters

For most applications these rugged portable, self-contained nulling voltmeters replace a potentiometer, voltmeter, galvanometer and standard cell combination. They are suitable for laboratory use, production line testing and field service.

Model LVMS-1
- Voltage Range: 1000 Volts DC
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- Absolute Accuracy: ±0.1% of reading
- Input Impedance: Infinite at null

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- Voltage Range: 100 Volts DC
- Resolution: 1 microvolt between 0 and 10 volts
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- Input Impedance: Infinite at null

Catalog PL-2 describes these instruments completely, including their use as deflection potentiometers, null indicators and microammeters. Consult manufacturer for further information.

IDA analog computers and accessories are manufactured by Computer Company of America, Division of Bruno-New York Industries Corp. Their usefulness in the field of dynamics has been proven over the years.

A complete line of standard computers, instruments and regulated power supplies is supplemented by the ability to design and manufacture specialized equipment for your particular applications. Your inquiries are invited.

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The sources of supply and the many switching combinations possible with this instrument make all the desired measurements in an electrolytic circuit, D.C. voltage, A.C. voltage, current, resistance, capacitance, inductance, D.C. source, A.C. source, signal generator, frequency meter, waveform, and others. The instrument is capable of measuring all voltages, currents, and resistances, and it is a versatile tool for the electronic experimenter. It is also a valuable addition to any laboratory where it can be used as a standard for power supplies, calibration, and testing.

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METER TEST SET AND LABORATORY STANDARD
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Complete specifications on request
Vacuum Tube Electrometer (Model 210) is a line-operated dc voltmeter, has ranges of 0, 2, 8, 20, and 80 volts, a 15 ohm input, grid currents within 2% of 8 x 10^-13 amperes, accuracy within 2% of full scale, output amplifier with B-5Kc response and 6volt output for full scale. It is useful for high-input impedance measurements.

Vacuum Tube Electrometers (Models 200, 200A) are battery-operated dc voltmeters, have ranges of 2 and 20 or 200 and 800 volts, inputs of 1000 ohm grids, current grids below 5 x 10^-13 amperes, accuracy within 2% of full scale, output terminals balanced and unbalanced recorders and amplifiers. Can be used with accessories below and as a preamplifier which has an ultra-high input impedance.

Electrometer Accessories multiply uses of Keithly Electrometers. Decade Shunt clips over input terminals, converts instrument to direct-reading electrometer with full-scale sensitivity of 8 x 10^-13 amperes. Voltage dividers provide numerous ranges up to 20 kv. The Test Voltage Supply is useful in measuring resistances as high as 10^14 ohms.

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7. Test and Measuring Equipment

94. General Test Equipment.

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Tel: Evergreen 6-1500
Frost Electronics, Inc., 10
Franklin Labs., Ltd., England, 15, 30, 70
General Electric Co., N.Y., N.Y., 60
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General Electric Heating, Venting, Street Equipment, L.I., N.Y., 35, 45
For details see ad on page 406
Tel: Valley Stream 4-023
General Radio Co., 255 Massachusetts Ave., Cambridge 39, Mass., 5, 10, 15, 20, 25, 30, 35, 45, 55, 60, 70, 75
For details see ad on page 384
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Gerstner Prod., Inc., Calif., Calif., 70
Glencoe Corp., 212 Durham Ave., Morton, N.J., 70
For details see ad on page 284
Tel: Morton 6-2650

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Griessbach Instruments Corp., 212 Durham Ave., Morton, N.J., 45, 45
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Tel: Morton 6-2650
For details see ad on page 177
Tel: Morton 6-2650
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Hartings Instrument Co., Inc., Calif., 65
Havarday Instrument Co., Colo., 50, 75
Heath Co., 308 Territorial Rd., Benton Harbor, 27, Mich., 5, 15, 25, 30, 45, 45, 70
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HiPCO Electrical Instrument Co, 15551
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Hyron Mfg. Co., Calif., 40, 70
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Industrial Control Co., N.Y., 70
Industrial Developments Lab., Inc., N.Y., 5, 70
Industrial Electronics, Inc., Mich., 20
Industrial Instruments, Inc., N.Y., 5, 30, 15, 30, 25, 35, 45
Industrial Test Equipment Co., 5, 13, 11, St. Louis, 20, N.Y., N.Y., 5, 30, 15, 70, 70
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Tel: GR 3-4644
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Instruments Labs., Ltd., Ill., 40
International Electronics Corp., N.Y., 62
International Instruments, Inc., P.O. Box 2999, New Haven, Conn., 40
For details see ad on page 331
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International Radiation Corp., 40 Matine-
cock Ave., Port Washington, Ll., N.Y., 70
International Science, Low Temp., Humidity, Altitude & Vacuum, Sand & Dust, Salt Spray, Fungus, Vacuum Ovens, etc.
For details see ad on page 440
Tel: Port Washington 7-3184
J.B. Pert, Inc., 441 Cape St., New Haven, Conn., Pyrometers
For details see ad on page 304
Tel: State 5-8823
Jackson Electrical Insul. Co., Ohio, 60, 70
Jennings Radio Mfg. Co., 570 Mc-
Laughlin Ave., San Jose 6, Calif., 70
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Tel: Cypress 2-4023
Kahn & Co., Inc., Calif.
Kallael Labs, Inc., Calif., 15
Karron, Calif., Shutoff Timer Indicator
Key Electric Co., 14 Maple Ave, Pine Brook, N.J., Calif.
For details see ad on page 430
Tel: Caldwell 6-9094
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For details see ad on page 446
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Measurements Research, Interval Rd.,
Boston, Mass., 70
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Tel: Boston 6-3312

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Mid-West Coil & Transistor Co., Ill., 15
Miltex Instr. Corp., NY, 49, 70
Musical Specialties Co., Ill., Test Panel
Muntz Metal Corp., C., England, 5, 10
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Museum & Service, Inc., NY, 49
Murphy & Miller, Inc., Ill., Thermal Test Equip.
National Capacitor, Mass., 5, 25, 25
New London Instrument Co., P.O. Box
1885, New London, Conn.
For details see on page 438
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Newton Scientific Co., Mass., 40, 70
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Northeast Scientific Co. 1 Gray St.,
Cambridge 38, Mass.
For details see ad on page 344
Tel: 8-R-0860

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Omnitron Mfg. Co., Ill., 30
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P. M. Industries, Conn., 50
Pan American Engg., NY, 30, 60
Panasonic Corp., NY, 49, 70
For details see ad on page 437
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Conn. Flume Photometer
Pennwalt, Inc., NY, 50
Pentech Electronics, Inc., 13 Garden
St., New Rochelle, NY, 35
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Philco Corp., Accy. Div., Pa., 65, 70

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Tel: 212-682-8100

Linde-Hanov Corp., N.J., 41

For details see ad on page 100
Tel: 212-682-8100

Listed above at end of each address refers to product or service which is detailed information you need in specifying and buying.
7. Test and Measuring Equipment

101. Television Test Equipment

- 1. Synchronizing equipment
- 2. TV signal generator
- 3. TV sweep generator

American Television Mfg. Corp., Ill., 5
Boston Electronics Corp., P.O. Box 371
Boonton, N.J., 25
For details see ad on page 474
Tel: Boston 5-5000

Bright Radio Labs, Inc., N.Y., 30
C.G.S. Laboratories, Inc., Conn., 25
Canada, lids. 15, 20, 25
Cangas Corp., Calif., 25
Communication Measurement Labs., Inc.
202 Leland Ave., Plainfield, N.J., Color TV
For details see ad on page 102

Campagne Générale de Métrologie
Chemin de la Croix-Russes, Annem.
France, 15, 25
For details see ad on page 445

Tel: Anney 9.00

Connecticut Telephone & Elec. Corp.
Conn., 15, 25
Crest Laboratories, Inc., N.Y., 20
Dundie Instrument Corp., P.O. Box 151
Caldwell, N.J., 25
For details see ad on page 492
Tel: Caldwell 6-6000

Du Mont Labs., Inc., A., B. Communica
tion Products Div., 1500 Main Ave.,
Clifton, N.J., 5, 20, 25
For details see ad on page 101
Tel: Nutley 9-4296

Key Electronics Corp., 14 Maple Ave., Pine
Brook, N.J., 10, 15, 20, 25
For details see ad on page 435
Tel: Caldwell 6-4000

Kerne-Halbert Television, Calif., 15
Kilman Instr. Corp., Div. of Standard
Cable Products, Box 48-48 45 Ave., Elms.
bury, N.J., 5, 15, 20
For details see ad on page 216

Tel: Newtown 2-2000

Linear Equipment Lab., Inc., Dept.
RD-2730 West Shore Dr., Massapequa,
L.I., N.Y., 15, 20
For details see ad on page 101
Tel: MA 6-3302

Lockheed-Hamlin Co., Inc., 25
Marcon Instruments, Ltd., N.Y., 20
Marcon's Wireless Telephone Co., Ltd.,
England, 5
For details see ad on page 100

Tel: Amityville 4-4416

Triplet Electrical Instrument Co., Ohio,
15, 20, 25
Triumph Mfg. Co., Ill., 5, 10, 15, 20, 25
Western Electrical Instrument Corp.,
514 Peabody Ave., Newark, N.J., 15, 20
For details see ad on page 455
Tel: Triplet 3-3900

100. Radio Frequency Test Equipment

- Triplet Electrical Instrument Co., Ohio
- Ammon, N.Y., 15, 20, 25

American Television Mfg. Corp., Ill., 5
Approved Electr. Instr. Corp., N.Y., 15,
25
Boston Electronics Corp., P.O. Box 371,
Boonton, N.J., 25
For details see ad on page 474
Tel: Boston 5-5000

Bright Radio Labs, Inc., N.Y., 30
C.G.S. Laboratories, Inc., Conn., 25
Canada, lids. 15, 20, 25
Cangas Corp., Calif., 25
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202 Leland Ave., Plainfield, N.J., Color TV
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France, 15, 25
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Tel: Anney 9.00

Connecticut Telephone & Elec. Corp.
Conn., 15, 25
Crest Laboratories, Inc., N.Y., 20
Dundie Instrument Corp., P.O. Box 151,
Caldwell, N.J., 25
For details see ad on page 492
Tel: Caldwell 6-6000

Du Mont Labs., Inc., A., B. Communica
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For details see ad on page 101
Tel: Nutley 9-4296

Key Electronics Corp., 14 Maple Ave., Pine
Brook, N.J., 10, 15, 20, 25
For details see ad on page 435
Tel: Caldwell 6-4000

Kerne-Halbert Television, Calif., 15
Kilman Instr. Corp., Div. of Standard
Cable Products, Box 48-48 45 Ave., Elms.
bury, N.J., 5, 15, 20
For details see ad on page 216

Tel: Newtown 2-2000

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Marcon Instruments, Ltd., N.Y., 20
Marcon's Wireless Telephone Co., Ltd.,
England, 5
For details see ad on page 100

Tel: Amityville 4-4416

Triplet Electrical Instrument Co., Ohio,
15, 20, 25
Part VI SERVICES & MATERIALS

8. Raw Materials and Services
9. Education & Publishing
10. Distribution

The first few times you use this EDGE INDEX follow the "How to use" instructions slowly—ONE STEP AT A TIME.

After that you will be able to open easily and almost instantly to the section or letter that you seek.

HOW TO USE

1. With the directory open on the desk, bend the book almost double in your left hand, with your thumb just below this line.

2. From one-line or two-line symbol adjacent to the letter or subject you seek, run your eye across horizontally to the corresponding page-edge symbol.

3. Open there with your right hand.

IT IS EASIER IF YOU "FAN" OR "RIFLE" THE LAST FEW PAGES WITH YOUR RIGHT THUMB. THE EDGE INDEXES COVERING THE OTHER DIRECTORIES WILL BE FOUND OPPOSITE PAGES 260, 270, & 400.

For complete list of products and services, arranged alphabetically for fast reference, see the eighth-page pink section preceding page 1.

Part 2

- Complete Data Spreads
- Alphabetical Company List
- Part III APPARATUS
- Part IV COMPONENTS
- Part V MATERIALS & CONTROLS

Part 1

- 75 Cable & Wire
- 76 Ceramics
- 77 Consulting Engineers
- 78 Core Materials
- 79 Fabricators & Services
- 80 Grassee & Vapors
- 81 Hardware
- 82 Harmonic mix
- 83 Insulating Materials
- 84 Aerodynamicists & Custom Builders
- 85 Leccoristes & Powder
- 86 Machinery & Tools
- 87 Metals
- 88 Moulded Products
- 89 Plastics
- 90 Soldier
- 91 Vacuum Tube Parts

- 102 Education
- 103 Publishing
- 104 Distribution

Ad. Index

Complete-Data Spreads 2
Classifications with a System!

The IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes into which 104 basic classifications have been organized.

You will note that we here differ from most directory compilers, for we do not mix meters with motors simply for alphabetical reasons. Products used in “Audio” whether components or complete apparatus form the first fundamental group. Yet, the same manufacturer and product may also appear in the “Component Parts” section. This system gives subject grouping for speed and convenience. A directory should aid a man who has forgotten some detail, or product name. Ours helps by grouping products as one would think.

1. Audio Frequency Equipment (Products 1 to 11)
2. Broadcasting Equipment (Products 12 to 17)
3. Communications Equipment (Products 18 to 23)
4. Component Parts (Products 24 to 29)
5. Applications of Electronics (Products 30 to 70)
6. Radar, Microwave, UHF (Products 71 to 74)
7. Test & Measuring Equipment (Products 75 to 101)
8. Services and Materials (Groups 75 to 91)
9. Education & Publishing (Groups 102 & 103)
10. Distribution Functions (Service 104)

For detailed identification, these 104 products and services, grouped in the 10 indexes, are further defined into over 600 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing adds speed. Purely alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers have liked our system better.

For safety, an alphabetical “terminology” index is given, preceding the product system in the pink pages introducing the company index. You will note also that after each firm, its products are listed by number code in the alphabetical list, and that sub-classifications shown by number code in the product indexes give much detail. Just a little study of the system will help you get great good from this book.

The IRE DIRECTORY is 10 Indexes in one book.
A Directory of 8. Services and Raw Materials

To the engineer with a manufacturing problem, this section provides a special listing of the services and products which are basic to production. Separate from actual components, these are the base sources of manufacture, ranging from the research functions of consulting engineers, to subcontracting assemblers, and from basic raw materials such as ceramics, metals and staples, like wire, to such specialties as the parts for vacuum tubes. Here is a useful section, well illuminated by informative advertising, which will serve you well, and often.

17 Product and Service groups give detail on 102 items the production engineer and designer may need.

The products and services of the Radio-Electronics Industry have been arranged into ten basic directories following closely the organization of the IRE Professional Groups. But 104 names and product groups are numbered throughout.

Always consult the pink pages at the front of this Directory, or in the index provided, to find products by name, or under the appropriate product group. Page numbers are given for ready reference.

In order to improve the grouping of products in the 1954 IRE Directory, one of the 10 basic directories has been moved out of order. The directory of test equipment begins on page 435.

75 Cable & Wire.
76 Ceramics.
77 Consulting Engineers.
78 Core Materials.
79 Fabricators & Services.
80 Gases & Vapors.
81 Hardware & Findings.
82 Hermetic Seals.
83 Insulating Materials.
84 Laboratories & Custom Builders.
85 Lacquers, Paints, Compounds & Waxes.
86 Machinery & Tools.
87 Metals.
88 Moulded Products.
89 Plastics.
90 Solder.
91 Vacuum Tube Parts.

Key Man Coverage!

Engineers are the most "literate" men in the world! Engineers do not know everything, but they do know where to look it up. "Engineers set the spec!" "Engineers are educated to buy!" You can only sell a technical industry through its technical men.

That is why reference advertising in the DIRECTORY every IRE Member gets and uses, covers the key men you need to sell! They know how to use IRE DIRECTORY information, and do use it. Have you told them your story?

1954 IRE Directory

Page 477
Product 75

(Continued on page 679)
Serving the Electronic Industry...

**ALLOY METAL**

**WIRE • ROD • STRIP**

- Nickel Alloys
- Stainless Steels
- Electrical Resistance Alloys

Alloy Metal Wire Company offers the electronic industry a wide selection of alloys in a full range of sizes—and backed by 35 years experience in the metal alloy field. Wire, rod and strip are available with outstanding electrical properties, special magnetic properties, high temperature resistance, corrosion resistance, excellent spring characteristics and good mechanical properties.

Nickel alloy and stainless steel wire are also available in a variety of special cross-sectional shapes, including oval, square, hexagon, teardrop, half oval, half round, wedge, D-shape and keystone.

Alloy Metal Wire Company engineers will be happy to help you select the right material for your application. Write today for our technical handbooks.

**Alloy Metal Wire Company Materials**

<table>
<thead>
<tr>
<th>NICKEL ALLOYS</th>
<th>STAINLESS STEELS</th>
<th>ELECTRICAL RESISTANCE ALLOYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel–Grade A</td>
<td>Chromium–Nickel</td>
<td>Alloy A (40 Ni–20 Cr)</td>
</tr>
<tr>
<td>Grade D</td>
<td>Grades</td>
<td></td>
</tr>
<tr>
<td>Grade E</td>
<td>Alloys</td>
<td></td>
</tr>
<tr>
<td>Duranickel “Z” Nickel</td>
<td></td>
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</tr>
<tr>
<td>Monel</td>
<td>Alloys 302, 304, 17,1794, 208, 309, 316, 317, 310, 317, 317</td>
<td>Alloy C (82 Ni–15 Cr–Fe)</td>
</tr>
<tr>
<td>“K” Monel (Free Machining)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“K” Monel</td>
<td>Alloys 309, 319, 347</td>
<td>Alloy D (55 Ni–10 Cr–Fe)</td>
</tr>
<tr>
<td>Inconel</td>
<td>Alloys 600, 800, 601</td>
<td>Nickel (65 Co–35 Ni)</td>
</tr>
<tr>
<td>Inconel X</td>
<td>Alloys 718, 718, 726</td>
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</tr>
<tr>
<td>Inconel W</td>
<td>Alloys 718, 718, 726</td>
<td></td>
</tr>
</tbody>
</table>

Other Alloy Metal Wire Co. products: 16%, 45% and 65% Nickel Iron, Nickel Clad Copper, Titanium, Special Alloys for high temperature sprays.

**Send for your FREE copy NOW!**

**From PROTOTYPE or to MASS PRODUCTION you specifications refer FIRST to ALPHA!**

First in Quality Wire for over 30 years.

**ALPHA WIRE CORPORATION**

430 Bway New York 13 N Y

---

**8. Services and Raw Materials**

75. Cable & Wire.

(Continued from page 477)


For details see ad on page 479

Tel: Washburn 8-4500

Alpha Wire Corp., 430 Broadway, New York 13, N.Y., 10, 15, 20, 25, 30, 40, 50, 60

For details see ad on page 479

Tel: Central 6-4800

American Bresle Co., Inc., 15


American Electrical Heater Co., Mich., Cord

American Electro Metal Corp., N.Y., 30

Timken & Mohlheim

American Phenolic Corp., 1600 S 34th Ave., Chicago 50, Ill., 10, 15, 20, 25, 30, 45, 50, 60

For details see ad on page 480

Tel: Bishop 2-1600

Ansonia Wire & Cable Co., N.Y., 5, 10, 15, 20, 25, 30, 40, 45, 50

Andrew Corp., 383 E. 115th St., Chicago 50, Ill., 10

For details see ad on page 480

Tel: TR 4-6100

Ansonia Wire & Cable Co., N.Y., 10, 15, 20

Arey Machine Co., N.Y., 35

Barthold & Melchert, Inc., Calif., 35

Beam Instruments Corp., N.Y., 5, 10, 20, 40, 45, 50

Belden Mag. Co., Ill., 4641 W. Van Buren St., Chicago 44, Ill., 5, 10, 15, 20, 25, 30, 40, 45, 50, 60

For details see ad on page 481

Bemlack Radio Co., Inc., N.Y., 5, 10, 15, 20, 25, 40, 45, 50, 60

Blaas Electrical Corp., N.Y., 35

Boston Insulated Wire & Cable Co., Mass., 10, 20, 30, 40, 45, 50

Brady & Co., Inc., William, Conn., 10, 20, 35, 45, 50

Bridgeport Brass Co., Conn., 35

Briggs, Inc., R.R., 376 Stanstle St., Toledo 4, Ohio, 21

For details see on page 489

Tel: Adams 8216

Burton Eng. Co., Inc., Conn., Connectors

Cable Industries Corp., N.Y., 35

Canada Wire & Cable Co., Ltd., Canada, 5, 10, 15, 20, 25, 30, 40, 45, 50, 60

Chase Brass & Copper Co., Conn., 10, 15, 20, 25, 30, 40, 45, 50, 60

Champion Corp., Ill., 35

(Continued on page 489)
8. Services and Raw Materials

75. Cable & Wire.

Cooperweld Steel Co., Pa., 10, 15, 20, 40, 45, 50
Diamond Wire & Cable Co., Ill., 15, 20, 35, 40, 45, 50, 60
Drake Wire, Willard B., 1257 McCarty
Hwy., Newark 4, N.J., 30
For details see ad on page 104

Conner (Canada), Ltd., 301 Winderer St.,
Halifax, N.S., Canada, 5, 10, 15, 20, 40, 45, 50,
For details see ad on page 157

Croset Co., Inc., R.L., 30, 40, 45, 50
Daystrom Electric Corp., N.Y., 35
Eaton Corp., Mck., III., 5

Cohn Corp., New York, N.Y., 30
Columbus Ave., Mck., N.Y., 5, 10, 20, 30
For details see ad on page 401

Columbia Technical Co., N.Y., 10, 20
Columbia Wire & Supply Co., Ill., 10, 15, 20, 30, 40, 45, 50, 50
Commercial Radio-Sound Corp., N.Y., 10, 45
Communication Prods., Co., Inc., State
R.1., Matteson, N.Y., 10, 10, 45
For details see ad on page 100

Consolidated Wire & Assoc., Co., Ill., 10, 15, 20, 40, 45, 50, 60
Co-operative Industries, Inc., N.Y., 35, 40, 45, 50, 60

Coppered steel, Co., Pa., 10, 15, 20, 40, 45, 50
Coombe Wire Co., Inc., N.Y., 35, 40, 45, 50
Cousin (Canada), Ltd., 301 Winderer St.,
Halifax, N.S., Canada, 5, 10, 15, 20, 40, 45, 50,
For details see ad on page 157

Crescent Co., Inc., R.L., 30, 40, 45, 50
Daystrom Electric Corp., N.Y., 35
Dow Aircraft Prods., Inc., Ohio, 30

8.1 Metals and Raw Materials

1024 ERE Directory

Wire Cloth... all meshes and metals precision woven for many applications in the electronic industries.

Direct factory sales
Immediate shipment from our Pittsburgh warehouse on a wide range of commonly used materials and meshes.

For fast service, please contact...

Serving Industry — FOR OVER 53 YEARS

For details on METAL ELECTRICAL PRODUCTS, write for FREE copy of "Metallic Electrical Materials" or outline your specific shielding problem — it will receive immediate attention.

1914 ERE Directory

Page 481

Product 75

Stop RF Leakage ON THE DRAWING BOARD... WHEN YOU DESIGN METAL ELECTRONIC WEATHERPROOFING INTO YOUR EQUIPMENT YOU GIVE IT POSITIVE SHIELDING EFFECTIVENESS... AT MAXIMUM OVERALL ECONOMY

For details see ad on page 400

For details see ad on page 400

For details see ad on page 22-27

For details see ad on page 415

For details see ad on page 54-80

For details see ad on page 30

For details see ad on page 30

For details see ad on page 200

For details see ad on page 200

For details see ad on page 200
WIRES, CABLES, UHE INSULATION by REX

UHE INSULATION

REXOLITE 1422
Sheets and rods with the electrical properties of polytetrafluoroethylene and the machinability of free-turning brass. Rexolite 1422 is a thermosetting cross linked polyethylene with the added properties of good machinability, high impact strength and surprisingly low price.

WIRE & CABLES

SPECIALTY CABLES
Communication and control cables of all types. Excellent cable engineering. Fine tailoring. Shipment and packaging work.

COAXIAL CABLES
Quotations on request. Both special and standard coaxial cables.

REX K-F INSULATED WIRE AND CABLES
REX K-F WIRE insulated with silicon monochlorosilane (per MIL-W-22187) sets new high standards for hook-up wire. Write for full information.

TEFOLON INSULATED WIRE AND CABLES
Write for full information on Rex Tefalon Insulated wire. REX MICROWAVE WIRES AND CABLES
High precision miniature wire for up to 197° C. Continuous operation. Write for full information.

REXOLITE 2101 — NEW
A glass reinforced laminate with fine UHF electrical properties in the same general range as Rexolite 2102 (see chart) but with the added properties of good machinability, high impact strength and surprisingly low price.

TELEPHONE WIRES AND CABLES
Quotations on request for all plastic types.

REX VN MINIATURE WIRE
Vinyl with nylon jacket for -15 C. to 120 C. and 300 V to 3500 V. Write for full information.

MIL-SPEC WIRE
We make practically all of the plastic insulated military specification wire.

UL WIRES
Quotations on request.

TECHNICAL INFORMATION and engineering assistance may be obtained by contacting the TENSOTITE Representative in your territory.

NEW YORK, NEW ENGLAND and NORTHERN NEW JERSEY
HOLIDAY-MATHAXV, INC., 202 Park Avenue, New York 17, N.Y. Telephone: MURphy 4-5780.

SOUTHERN NEW JERSEY, EASTERN PENNSYLVANIA, OHIO, KENTUCKY, MARYLAND, VIRGINIA AND THE DISTRICT OF COLUMBIA
MATHAXV ASSOCIATES
1 Park Avenue, New York, New York 17, N.Y.

OHIO, WESTERN PENNSYLVANIA, KENTUCKY
ENGINEERING SPECIALTIES
2328 Penrose Rd., Pleistocene, OH.

KANSAS, MISSOURI AND EAST ST. LOUIS, ILLINOIS
ENGINEERING SERVICES CO.
600 North Ave., Suite 300, St. Louis 7, Missouri.

ILLINOIS, IOWA, INDIANA, MICHIGAN, MINNESOTA AND WISCONSIN
1501 N. Clinton Ave., Champaign, Illinois

ARKANSAS-Louisiana, Oklahoma and Texas
EDWARD F. MOYNO & CO.
1417 North Market Street, Little Rock, Arkansas.

WASHINGTON, OREGON, IDAHO AND MONTANA
M. E. WIDORING
266 First Avenue South, Seattle 4, Washington

CALIFORNIA, ARIZONA AND NEW MEXICO
G. S. MARSHALL CO.
4093 North Beach Blvd., Long Beach, Calif.

CANADA
AEROMETRIC ENGINEERING PROD.
1577 Queen Mary Rd., Montreal, Quebec, Can.

FOREIGN SALES
DONALD'S EXPORT CORPORATION
10 Battery Place, New York 4, N.Y.

PLASTIC INSULATED WIRES AND CABLES

TENSOTITE MINIATURE WIRE

TENSOTITE WOOL-HOOK UP WIRE

TENSOTITE MIL-W-26474 HOOK UP WIRE

SUPER-FLEXIBLE WIRES

TENSOTITE WIRE Kits

SPECIAL CONSTRUCTIONS

WRITE FOR COMPLETE CATALOG

Page 483
Product 75

8. Services and Raw Materials

75. Cable & Wire.

Malloy & Co., Inc., P.E., Ind., 30
Metcalf Industries Co., Cable, Flexible Conduits

McNally Rubber Co., 1095 E. First Ave., Roselle, N.J., 5, 50
For details see ad on page 480
Tel: ESsex 3-5000

Metals & Controls Corp., Mox, 30
Microfilm, Inc., 8200 Corp., Cal, 10, 45, 50, Micro Miniature

Modematic Prod. Corp., N.J., 35
National Electric Prod. Corp., Pa., 20, 40
National Tel. & Tel. Corp., N.Y., Cable Assemblies

Newport Electronic Co., NY, 3, 50

Norse Alum Prod. Co., N.Y., 5, 15, 30, 45, 50

Nye Co., J. M., 111 Elm St., Hartford 1, Conn., 30
For details see ad on page 377
Tel: Hartford 2-4241

North American R. & B., Ind., N.J., 30
Northern Electric Co., Ltd., Canada, 5, 10, 15, 20, 22, 40, 45, 50, 50

Parkside Wire Co., Ill., 5, 10, 25, 40, 45, 50

Tel: EIP 4-300

Phillips Electronics Inc., 53rd St., New Rochelle, N.Y., 35
For details see ad on page 344
Tel: BE 6-3342

Phillips-Plastics Co., Max., 10, 20, 35, 50

Ralph Dodge Copper Prod. Co., 40
Wall St., New York 3, N.Y., 10, 15, 20, 25, 45, 50
For details see ad on page 444
Tel: 212-726-8270

Plastic Wire & Cable Corp., Conn., 10, 35

Plastics Corp. N.Y., 10, 45, 50, 60

Powell Co., Harold H., Pa., 20

Precision Tube Co., Inc., Pa., 10, 45

Pleasant Co., 109 Bergen Ave., Kearny, N.J., 10
For details see ad on page 424
Tel: EOE 3-5000

Radio Apparatus Corp., Ind., 35, Cable Assemblies

Radio Wire Mfg. Co., Ind., 20, 35, 50

Rex Molybdenum Corp., Ind., 10, 15, 25

Rex Corp., Oakland Rd., West Acton, Mass., 10, 45, 50
For details see ad on page 482
Tel: Acton 3-7277

Tensolite Insulated Wire Company Inc.

(Continued on page 414)
8. Services and Raw Materials

75. Cable & Wire.

Sylvania Electric Products Inc., 1740 Broadway, New York 18, N.Y., 30, 30, 30, 30, 30, 30
For details see ad on pages 68-68-68
Tel: JUdson 6-2490

Tel: Electric, Co., Inc.,
Tennessee Insulated Wire Co., Inc., 196 Main St., Taunton, Mass., 45, 45, 45, 45, 45
For details see ad on page 463
Tel: TA 4-5300

Thomas Electronics Co., Inc., N.J., 10, 10, 10
Teletro Ltd., England, 30, 30, 30, 30
Tri-City Co., Calif., 35
Truise Steel Die, Ohio, Expanded Copper Mesh
United Mfg. & Service Co., Wash., 35
United States Rubber Co., N.Y., 5, 10, 10, 10, 10, 10
U.S. Wire & Cable Corp., N.J., 10, 10, 10, 10, 10
Virginia Electronics Co., D.C., 15
Vokar Co., Mich., 35
Western Wire Co., Wash., 30, 30, 30, 30
Western Gold & Platinum Works, Calif., 30
Western Insulated Wire Co., Calif., 45, 45, 45, 45

Wheeler Insulated Wire Co., Inc., Conn., 15, 15, 15, 15, 15, 15
Whitney Blake Co., Conn., 45, 45, 45, 45
Wright Fang Co., Calif., 10

76. Ceramics.

Centralab, Div. of Globe Union, Inc., 500 E. 82nd Ave., Denver 16, Colo., 10, 10
For details see ad on pages 244, 244, 244, 244
Tel: Woodruff 2-2700

Cleveland Ceramic Co., Ohio, 10
Collection Corp., 265 S. 45 St., New York 17, N.Y., 5, 5, 5, 5, 5
For details see on page 257
Tel: N. W. 49-3000

Contemporary Diamond Fiber Co., 16 Chapel St., New York 6, 10, 10, 10, 10
For details see ad on page 70
Tel: N. W. 49-3000

Coulby & Co., Inc., 145 H. St., Long Island, N.Y., 10, 10, 10, 10, 10
For details see ad on page 257
Tel: N. W. 49-3000

Continental Porcelain Co., 155 7th Ave., N.Y., 10, 10, 10, 10, 10
For details see ad on page 70
Tel: North American 3-6000

Crane & Co., 201 Durham Ave., Meriden, Conn., 10, 10, 10, 10, 10
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Jen Hardwood Mfg. Co., N.Y., 30, 30, 30, 30, 30
Johnson Co., E. F., Minn., 15
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Tel: N. W. 49-3000

Krafft Co., Inc., 979 Main St., Clifton, N.J., 10, 10, 10
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Tel: Little Falls 6-0300

Kleinberger & Co., Inc., N.Y., 30, 30, 30, 30, 30, 30
Lapp Insulated Co., Inc., N.Y., 30, 30, 30, 30
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National Ceramic Co., 300 South St., Baltimore 2, Md., 10, 10, 10, 10, 10, 10
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Tel: Export 6-2490

For details see ad on page 69
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National Molding Co., 1540 Chestnut Ave., Hillside, N.J., 10, 10, 10
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North Hills Electric Co., Inc., N.Y., 30
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Potchell Mfg. Co., Inc., Ohio, 10, 10, 10, 10, 10, 10
Premier Products, Inc., Chicago, Ill., 10, 10, 10, 10, 10
For details see ad on page 69
Tel: Southport 6-2490

Ramsdell Assn., Inc., N.H., 10, 10, 10, 10
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76. Ceramics. (Continued from page 455)

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Smith & Stone, Ltd., Canada, 10, 15, 20
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Superior Porcelain Co., W Va., 15
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Tel: EN 3-065
Snyder Bros., Co., 20 Irving Court, P.O. Box 51, Malden, Mass., 5, 10
For details see ad on page 409
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For details see ad on page 461
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Vitre-Ceramic Corp., 212 Durham Ave., Mishawaka, Ind., 10, 15
For details see ad on page 451
Tel: Mishawaka 3-0471
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Windsor Turbine Co., 235 E. Market St., West Chester, Pa., 10
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Tel: West Chester 3110
Wisconsin Porcelain Co., Wisc., 5, 10, 15, 20

77. Consulting Engineers.

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M. Electrical
R. Radio
A-1 Recording Corp., Calif., 10, Sound Recording Equipment
A. R. & T. Electronics, Inc., Ark., 20
Acme Telephone & Telegraph Service, Ohio, 10, 15, 20
Adler Eng. Co., George P., D.C., 5, 10, 20
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Air Associates, Inc., N.J., 20
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Allford, Andrew, Mass., 20

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Bentler Labs., N.Y., 20
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Biological Instruments, Inc., Pa., Medical Application
Brick Electronic Co., N.J., 10, 15, 20
Brooks & Perkins, Inc., N.Y., 15
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Brownell, E. Russell, N.Y., 10, 20
Browntone Electronics, Inc., N.J., 10, 20
Burkhardt, N.Y., 10, 15
California Radio Corp., Calif., 10, 20
Camden General Electric Co, Electronic Equipment, Canada, 20
Capital Radio Eng. Institute, D.C., 10, 20
Cargov Parker, Inc., N.Y., 10, 20
Central Research Labs., Inc., Mass., 10
Cherry, Inc., Pa., 10, 20
Chicago Electronic Eng. Co., Ill., 10
Ches Labs, Inc., N.J., 10
Cochrane Electronics, Inc., Ohio, 5
Codertype Labs., N.Y., 20
Cole Instrument Co., Calif., 10, 20
Coles Electronic Corp., Pa., 15
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Continent, Ed. J., Monaco, 20
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Cooke Electronics, Inc., Pa., 10
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Davis, George D. C., 20, Television

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Elitz-McCullough, Inc., 98 San Mateo Ave., San Bruno, Calif., 20
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77. Consulting Engineers.

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78. Core Materials.

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79. Fabricators & Services.

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Auto-Text, Inc., Ill., 5
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Tel: Milton 9-0000
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For details see ad on page 104
Tel: MO 5-0470
Clark Cable Corp., 218-218 W. 32 St., Cleveland 9, Ohio, S, 20
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Tel: MELrose 1-8000
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Federal Test & Mfg. Co., Minn., 30
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General Hermetic Sealing Corp., N.Y., 5
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79. Fabricators & Services. (Continued from page 499)

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Tricraft Products Co., Ill, S, 5
Tremm, Inc, 400 West Lake St, Liberty-
villa, Ill, 20 For details see ad on page 524
Tel: LI 7-3720
Tri-Peak Mfg & Dev Co., 401 Grand
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Kel-P, Phenolic, Res-Q-Lite For
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Forming
Ultrasonics Corp, Mass, 5
United-Carr Fanformer Corp, 31 Ames
St, Cambridge 42, Mass, 30 For
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Tel: Kirkland 7-6900
United Specialties Co, Mitchell Div,
Pa, 5, 10, 30
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For details see ads on pages 126-147
Tel: Wodtown 4-0370

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foil
Massey, Inc, A.D, N, 10, 15, 20, 25, 35
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White Industrial Div, S, S, N, 30

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Apex Coated Fabrics Co, Inc, N,J, 30
Armstrong Cork Co, Pa, 30
Associated Production Co, Ill, 45
Atlas E.E Corp, Bedford Airport, Bed-
ford, Mass, Component Holders For
details see ad on page 501
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MINIATURE AND SUBMINIATURE TUBE AND COMPONENT HOLDERS
One big family with a single thought

Whether you need terminals, clips, coils, chokes, capacitors—or any of a number of electronic components—you can be sure they're right if they're made by CTC.

One continuing basic idea governs the manufacture of every CTC product. And that idea is quality control. We could not guarantee our products as we do without close, critical study of numerous details that determine reliability performance. Our quality control engineers see to it that these manufacturing standards are rigidly maintained—right through to periodic microcosmic inspections.

Pictured here are a number of components available at CTC including our three kits. These lines come in standard forms and are also custom engineered to meet your particular require-ments. We would be glad to give you complete details, including specifications and prices, on any of all CTC units—as well as information on how CTC components can be specially designed to solve your individual electronic components problems. You will find it well worthwhile to use components that are guaranteed.

Write to Cambridge Thermionic Corporation, 410 Concord Avenue, Cambridge 38, Mass. West Coast manufacturer: Cambridge Thermionic Corp., 1310 Columbia Avenue, Los Angeles 41, Calif. or contact our nearest office.

Cambridge Thermionic Corporation
makers of guaranteed electronic components, custom or standard

SMALL PARTS can play a BIG PART in...

Lower Production Costs!

Leading manufacturers in the electronics, machinery, appliance, toy fields have found substantial savings by using precision Multi-Swage parts instead of those previously made by turning, drilling, stamping or forming.

LETT BEAD CHAIN MAKE YOUR
Tiny Parts to your Specifications at far less cost!

The advanced manufacturing method developed and used exclusively by Bead Chain swages practically any type of small tubular part from flat stock into precision parts with positive, tight seams . . . and does it automatically. If you can see high-volume production . . . we can deliver it at a much faster rate . . . and at far less cost! Scratch is eliminated! Deliveries to you are dependable promptly!

We can supply you with parts that are beaded, grooved, shouldered and made with almost any metal. Diameters up to 1/2", lengths to 1 1/2". This catalog can save you a lot of production time and money. Write for it today!

GET PROOF-POSITIVE COST COMPARISONS!

Send in a blueprint or sample and quantity requirements. We will quickly show you the big economies we can deliver.

BEAD CHAIN

MOST SATISFIED CUSTOMER

Cambridge Thermionic Corp., Berkeley, Calif.

Cambridge Thermionic Corp., 1310 Columbia Ave., Los Angeles 41, Calif.


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Cambridge Thermionic Corp., 1310 Columbia Ave., Los Angeles 41, Calif.


Cambridge Thermionic Corp., 1310 Columbia Ave., Los Angeles 41, Calif.


Cambridge Thermionic Corp., 1310 Columbia Ave., Los Angeles 41, Calif.

A Full Line
Terminal Lugs, Insulated Terminals, and Electronic Hardware — Handles, Captive Screws, Spacers, Brackets, Dial Locks, Shaft Locks, Binding Posts.

Completely assembled terminal kits to meet all government specifications.

Immediate delivery from stock, or to order on all items.

Write for Catalog

CITATION PRODUCTS CO.
225 EAST 141st ST., NEW YORK 51, N. Y.

Information at high speed! "Data the way an engineer thinks" is the key to IRE DIRECTORY classifications. All products are divided into 10 fundamental groups, many of which parallel professional group organization. The grouping plan makes this the fastest working directory you ever used! No components are mixed within a group—equipment you turn right to a section where each item belongs.

Yet good engineering detail is maintained. 104 basic classes of products under these ten sectional directories keep listings from becoming cumbersome, but clearly define products. Overlapping listings are skillfully eliminated. Simplicity makes this book easy to work with—ensures faster finding of facts when forgotten. Thus the faults of terminological listings are avoided.

Completeness is insured! Most firms make many products in a single classification. Waifful, eye-confining listing of the same firms over and over is quite sensible today by using a system of codes under the 104 basic headings which actually provide 108 separate classifications. A more complete picture of what each firm's full line is results, but you travel through lower listings. The "Copp Principals" of Directory indexing makes these lists wide, well marked bookways to information—fast.

3000 Firms listed. The alphabetical directory gives a clear definition of those firms by showing any all or any of the ten fundamental groups in which these firms belong after every name.

Ads positioned with reason in a DIRECTORY where ads play an important part in supplying information the user wants and needs, it makes good sense to cross-reference every advertiser in each listing so that the user can quickly find more detail. Ads are also placed facing company alphabetical listings, or in the product section in which they properly belong. No effort is spared to "organize information.

Many advertisers—more information! Never before have so many advertisers served IRE readers with so much information! The advertisers' list this year is truly a "social register" of this great industry.

There is Always One Leader in Every Field

BODNAR INDUSTRIES, INC.
leads in the field of
PLASTIC LIGHTING PANELS AND DIALS

BECAUSE OF Quality • Uniformity • Performance
Design & Quality "Know-How-Smart!" Quantity Production Promptly

NEW YORK—19 Railroad Ave., New Rochelle (Home Office)
CALIFORNIA—4945 Market Street, P.O. Box 244, North Hollywood, California—4695 Wellington St E., Toronto

SPECIMEN PANEL M-80-798 (CAPI) SENT ON LETTERHEAD REQUEST

8. Services and Raw Materials

Citation Products Co., 225 E. 141st St., New York 51, N. Y.

HARDWARE FOR ELECTRONICS
One Source of Supply for Fastenings
We carry in stock thousands of STANDARD and SPECIAL items used in ELECTRONIC INDUSTRY-Screws-Nuts-Washers-Terminals-Grommets-Rivets-Door Latches-Accessories

SPECIAL Canadian-made Products—Stamping—Switch-Hinge Parts—Made to order in all metals.

WRITE FOR CATALOG 54

FEDERAL SCREW PRODUCTS INC.
3917 N. KEDZIE AVE.
CHICAGO 18, ILL.

Flash!

. . . now on press

is a new

brochure

illustrating new

applications

and industrial

uses for

"DURAMARK"

Write today

to Dept. R-54

to reserve your copy.

DURAMARK Laminated
TAGGING IS THE SECRET

Whether you wish to tag cables, wire or pipes or simply mark up tool tags, such as panel plates, wiring diagrams, etc., you want permanency.
DURAMARK's quality laminating in
sures this . . . it stays marked.

DURAMARK now serves more than a dozen different industries, including: electronics, aircraft and electrical. Key saving up to 100

For complete information about your marking and identification problems, write DURAMARK today!

(Continued on page 307)

Page 505
There are **3 SPECIFIC WAYS** in which “Proceedings of the I.R.E.” serves the advertiser differently and more effectively than other publications.

1. **Pre-Specification Selling**

Because “Proceedings of the I.R.E.” publishes hardware and engineering application articles, it is closely studied by those design engineers who must “keep ahead of the competition.” Often, the research published leads the industry productivity by from two to six years. The skilled engineer, who needs this amount of time for his own design applications and for looking up and changing the production in his own factory, studies the “Proceedings of the I.R.E.” carefully. Its articles keep him abreast with the changes that will inevitably come and make it possible for him to be ready for them. This is the time for you to sell the unknown engineer designing the never-dreamed-of product “before it happens!” It is an insurance that you will be ahead of the market instead of behind it.

2. **Personal Connection to the Individual**

The Institute of Radio Engineers is an engineering society for individual engineers who must qualify on their own education, experience and engineering work. Thus, the engineer follows the manuals on his private possession, wherever he goes. Whenever new engineering progress is developing, the work is done by individual engineers—and it is these men that must be sold! Only the engineer can gauge his capacity and buy in a highly technical industry. Selling is a matter of reaching the minds of men because a company cannot sell to a purchaser. Wherever radio-engineering activity is greatest, companies employ I.R.E. members. An engineer moves into a new job in advance of production and with him goes “Proceedings of the I.R.E.” with all the advertising you as urgently need to place where engineering activity is the greatest.

3. **Economy**

It is a specific purpose of the Institute of Radio Engineers that its advertising rates should benefit and help the industry grow, by being economical. Part of the economy of a tax-free organization is thus passed on to advertisers in the form of low-cost advertising to a high-quality audience. The two sets of thousand engineers of “Proceedings of the I.R.E.” is the largest in the radio-electronic industry by deliberate intent. Thus, the Institute finds an extra way that it can help the firms that hire its engineers to gain new business at lower costs.

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**For Further Information**

about any of the products listed, consult advertisements on pages shown at the end of the listing.

If the facts you want are not given in the advertisements, use the Post Card Inserts to write for literature without cost.
8. Services and Raw Materials

Graphite, Inc., 503 Hillgrove Ave., La Grange, Ill., 60065
Tel: 312-330-3200

For details see ad on page 715

Gorin Mfg. Co., 3225 6th St., Phila., Pa., 19129
Tel: 215-867-3330

For details see ad on page 716

Tel: 212-769-8850

For details see ad on page 717

Gudebrod Bros. Silk Co., Inc., 215 W. 34th St., New York, N.Y., 10010
Tel: 212-769-8850

For details see ad on page 718

Gudebrod Bros. Silk Co., Inc., 215 W. 34th St., New York, N.Y., 10010
Tel: 212-769-8850

For details see ad on page 719

Gudebrod Bros. Silk Co., Inc., 215 W. 34th St., New York, N.Y., 10010
Tel: 212-769-8850

For details see ad on page 720

Gudebrod Bros. Silk Co., Inc., 215 W. 34th St., New York, N.Y., 10010
Tel: 212-769-8850

For details see ad on page 721

A Complete Alphabetical Index of all Products

Listed in this Directory will be found in the eight-page pink insert immediately preceding page 1 of the products and firms section.
For easier-to-tie knots that will not slip!

HEMMWAY & BARTLETT

NYLON LACING CORDS and FLAT BRAIDED TAPES

- Revolutionary synthetic resin coating prevents knots from slipping.
- Faster and tighter with less effort. Unique "plastic memory" actually causes lacing to tighten itself after knot is made!
- Its greater strength means minimum breakage - maximum safety. The synthetic resin coating retains the desirable malleability of wax and yet has a melting point of over 110°F. It is non-toxic to humans.
- Complies with U.L. construction and fungus-proof requirements of Coast Sup. Jan-T-115 and Jan-T-152. Cords and tapes are also available with wax finish.

For FREE SAMPLES and prices write:

Why

38,799

Engineers

have joined

The Institute of Radio Engineers

BENEFITS

Get to know your fellow engineers - attend section and professional group meetings - keep up with engineering progress.

Get 12 great issues of Proceedings of the IRE. ... A working textbook up-to-the-month on practical radio-electronic engineering.

Get the annual IRE DIRECTORY... an industry between covers... men, products, firms.

For membership information, write to:
Institute of Radio Engineers
1 East 79th Street
New York 21, N.Y.
8. Services and Raw Materials

81. Hardware & Findings

Milford Rivet & Machine Co., Comm. 22, 60, 95
For details see ad on page 545
Möller & Plate Co., N.H. 40
Muller Mfg., Inc., Comm. 30, 55
Miniature Precision Bearings, Inc., N.H. 40, 50

81. Hardware & Findings

Minneapolis Rubber & Gasket Co., Minn. 30, 31
Moran Electronic Components, Inc., 1001 Lexington Ave., New York, N.Y. 60
For details see ads on page 531
Muller Electric Co., 1605 E. 31 St., Cleveland 18, Ohio 86
For details see ad on page 512

"Nielsen" COMPRESSION SPRING DRAW PULL TESTER WITH SPRINGS CONCEALED

SIGNAL CORPS N.O. 16-6-8-2-14-3-1

70-Fixed Tension of 1/4" Deflection, the unclassified application devices.

Welded 400-Foot Pull Test.

Nielsen's Special Warranty. Certification of Compliance.

Get your Nielsen Compression Spring Testers and other Compression Spring Testers.

NIELSEN HARDWARE CORP., 710 Waterford Ave., HARTFORD 14, CONN.

FOR QUALITY HARDWARE—GOOD SERVICE TO YOUR SPECIFICATION.

TERMINAL BOARDS

Lynn Electronic Research Co., has set up an associate company with a new plant to provide increased production facilities and improved delivery service.

STANDARD BOARDS NOW AVAILABLE FROM STOCK

Custom-built and miniature boards to customer specifications

LYNN-BEATRICK INC.

8. Services and Raw Materials

Nielsen Hardware Corp., 710 Waterford Ave., Hartford 14, Conn., Catches & Fastening Devices

For details see ad on page 511

Norton Co., 14, Elm St., Hartford 1, Conn.

For details see ad on page 497

Olympic Metal Products, Inc., Third Ave, Alpha, N. J., 10, 30

For details see ad on page 167

Philco Phyllis 3-50

Painters Co., Ltd., England 1, 20

For details see ad on page 490

Paragon Paper Tube Corp. 637 Lafayette Rte., Fort Wayne 2, Ind., 35

For details see ad on page 514

Passport Co. R. H. 56

For details see ad on page 333

Pittsfield Printers, Inc., 10, 30

For details see ad on page 499

Photo Chemicals, 478 Walton Ave., New York 51, N. Y., 30, 50

For details see ad on page 497

U.S. Print, Inc., N. J., 5, 10, 15, 20, 30

For details see ad on page 540

Polymer Corp. of Pennsylvania, 126 N. 20th St., Reading, Pa. 30, 50

For details see ad on page 540

Presto Manufacturing Co., 340 Kings Highway, Brooklyn 33, N.Y., 20

For details see ad on page 545

Premier Metal Products, Inc., 30, 50

For details see ad on page 545

Premier Metal Etching Co., N.Y., 20, 30, 50, Eichler Panels

(Canceled on page 512)
IRE provides all THREE

"Proceedings of the IRE." puts your product promotion monthly before the "thinking and doing" engineers in the fabulously fast-moving radio-electronic industry. Circulation 38,945 (ABC)

For the first time, a paper tube like this—developed and patented by PARAFORM—after years of research! No other tube delivers the unique, unexcelled advantages of PARAFORM. It takes the place of unwieldy, time-consuming, and expensive cables. PARAFORM tubes are offered to leading manufacturers, and they cost no more!

Paramount PAPER TUBE CORP.,
617 Lafayette St., Fort Wayne 2, Ind.
Standard of the Coil Winding Industry for Over 20 Years

IRE DIRECTORY provides 35,000 IRE members educated to buy and specify with your detailed product data for ready reference all year long.

The IRE DIRECTORY is their working encyclopedia...it organizes, codes, simplifies and "indexes for use" a vast and complex industry. They look to its listing of men, firms and products as vital working information. Wherever you feel IRE members, you’ll find IRE DIRECTORIES close at hand for ready reference. The cost of keeping your product story before 35,000 engineers is less than you’d expect. The price of one page is less than one-half the usual extra postage required to mail 5000 letters.

RADIO ENGINEERING SHOW . . . the eye-opening event of each radio-electronic year . . . where over 40,000 engineers come to you for all that’s new.

Bringing buyers and sellers face to face and helping engineers and product performance—these are only one of IRE’s great services to an industry where understanding is the key to progress. The Radio Engineering Show combines with annual product presentation at the balanced promotion package of "Proceedings of the IRE" for product promotion and the Radio Engineers Directory for product reference.

8. Services and Raw Materials

81. Hardware & Findings.

Rapid Specialties Co., 227 W. Huron St., Chicago 10, III., 08
For details see ad on page 315
Tel. Delmar 1-7440
Ryder servicestation, N. J. 30, 35, 35
Raymond Mfg. Co., Pa., 80
Rine, Inc., J. Romney, N. Y., 20, 40, 40, 40
Reliable Spring & Wire Form., Thir., 14th, 80

Rapid Specialties Company
327 W. HURON ST. CHICAGO 11, ILLINOIS

TEST CLIPS
FOR MOTORS, COILS, ELECTRICAL UNITS
- Positive Connection - Long Life
For Any Size Lead, Solid or Braided Wire, Tension Spring for Quick, Easy Setting.
40 amp. Polished brass 
Angled or straight
Write for literature

Rapid Specialties Company
327 W. HURON ST. CHICAGO 11, ILLINOIS

SPECIFY
Lackon
Trade Mark
Dials - Panels - Scales
Made to the Highest Degree of Accuracy
Edgetint - Translighted - Backlit
Equip your instruments with sharp, easy to read Lackon dials, panels, etc., made to any size... any shape... any quantity... accurate to your most critical tolerances... uniform and highly durable. Printed on metal, plastic, glass, etc., in black and white or multi-color. Puts all government tests. Send for illustrated brochure or contact:
SUN DIAL CORPORATION - Coldwell, N. J.
8. Services and Raw Materials

81. Hardware & Findings.

[Continued from page 515]

Thompson-Bremer Co., AFM, 397-399
Thompson Fiber Glass Co., H. 1, Calif., 99
Timberline Prods., Inc., Ohio, 22, 70, 91
Toplight Tape Co., Pa., 5
Turbo Electronics Inc., 956 Freelinghouse Ave., Newark, N.J., 70
For details see ad on page 295
Tel: Bigelow 6-4835
Trans-Gei Products, N.Y., 20. Panels
Transformer, Metals Prods. Corp., N.Y., 15
Translaw, Ltd., England, 35
Tri-Dex Transformer Corp., 405 Redwood Ave., Venrico, Calif., 15
For details see ad on page 277
Tel: Texas 8-2581
Triumph Mill, III., 99
Tri-Plane and Maclean, Inc., Conn., 15.
For details see ad on page 102
Tel: Kirkland 7-2800
United Insulatex Co., Ltd., England, 90.
United Engineering Co., 521 Commercial St., Glandale, Calif., 90, 95
For details see ad on page 101
Tel: Chapman 4-5438

United States Gasket Co., 611 N. 10th St., Camden 1, N.J., 10, 25, 30, 35, 45, 50, 55
For details see ad on pages 126-127
Tel: Woodlawn 4-0370
U. S. Radiator Corp., N.Y., 30, 50
Universal Technical Labs., N.J., 98, Probes
Universal Aviation Equip., Inc., 367 Figueroa St., New York 1, N.Y., 20
For details see ad on page 516
Tel: Wisconsin 7-3174
Varo Products Co., N.Y., 15
Valacial Jewel Co., Pa., 45, 95
Varplex Corp., N.Y., 40
Vector Electric Co., Calif., 15, 90
Video Industries Co., N.Y., 10
Viking Electric Co., Calif., 45
Virginia Electronic Co., D.C., 45, 90, 97, Telen
Wades Kominer, Inc., N.Y., 60
Walker, C. and C., 118 Amsterdam Ave., Parnassus, N.J., 81, Grip-Masters
For details see ad on page 515
Tel: Prescott 5-3337
Walker Turner Div., of Kearney Corp.
N.J. 25

82. Hermetic Seals.

- Corrugated metal
- Glass to metal seals
- Complete headers
- Advanced Vacuum Prod., Inc., Conn., 5
- Aerolight Light N.V.
- Allegheny Ludlum Steel Corp., Pa., 15
- American Lava Corp., Chicago Blvd.
- & Mifs & Rd., Chatanooga 3, Texas, 15
For details see ad on page 105
Tel: Chattanooga 5-1211
- Anderson Annis, Y., 229 Park Ave., Berkeley Heights, N.J., 15
For details see ad on page 492
Tel: Summit 6-8400

82. Hermetic Seals.

Ammco Co., R. B., Ind., 13
Automatic & Precision Mfg. Co., N.Y.
Bine Interiors
Blackstone Electric Corp., Calif., 5
Brew & Co., Inc., Richard D., Mass., 15
Camon Electric Co., Calif., 15
Caldwell, Ltd., England, 10, 15
Central, Div. of Gila Union, Inc., 900 B. Reading Ave., Minneola, Y., 90
For details see ad on pages 283, 246, 338, 272, 518
Tel: Woodside 3-8500
Central City Co., Ind., 13
Cermasso Co., N.Y., 5
Conrad & Co., Inc., L. R., Route 46, N.J., 10, 15
For details see ad on page 67
Tel: Prescott 7-2223
- Cornering Glass Works, N.Y.
- Dolbiking & Williams, Inc., N.J., 15
- Edgerton, Gershomshen & Giers, Mass., 15
- Electrical Industries, Div. Amercope Electric Co., 44 Summer Ave., New-
- York 4, N.Y., 10, 15
For details see ad on page 145
Tel: Rochester 7-4112
- Electric-Seal Corp., 946 North Ave., Des Plaines, Ill., 10
For details see ad on page 495
Tel: Rodney 2-4507

82. Helmet Seals.

Ammco Co., R. B., Ind., 13
Automatic & Precision Mfg. Co., N.Y.
Bine Interiors
Blackstone Electric Corp., Calif., 5
Brew & Co., Inc., Richard D., Mass., 15
Camon Electric Co., Calif., 15
Caldwell, Ltd., England, 10, 15
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- Cornering Glass Works, N.Y.
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- Edgerton, Gershomshen & Giers, Mass., 15
- Electrical Industries, Div. Amercope Electric Co., 44 Summer Ave., New-
- York 4, N.Y., 10, 15
For details see ad on page 145
Tel: Rochester 7-4112
- Electric-Seal Corp., 946 North Ave., Des Plaines, Ill., 10
For details see ad on page 495
Tel: Rodney 2-4507

Stupakoff

Koverko Glass-Seals are made with hard glass, assuring the highest degree of protection against thermal shock and weathering.

Stupakoff Glass-Seals are not mechanical compression seals, but develop a permanent and impervious bond through chemical interaction of the oxide of Kovar fused with hard borosilicate glass.

Kovar is the ideal metal for such seals because its expansion characteristics are closely matched to those of hard glass.

In a wide variety of standard sizes and designs, and can be made in many special forms. We will gladly submit samples and quotations.

DIVISION OF THE CARBONBRUN COMPANY

Cable number at end of each ad. Also, order from product or manufacturer listed at the head of the class advertisement.

Cable number at end of each ad and refer to product or manufacturer listed at the head of the class advertisement.

Cable number at end of each ad and refer to product or manufacturer listed at the head of the class advertisement.
Centralized cornamized ceramics have a bond of 2000 psi

8. Services and Raw Materials

8.2. Hermectic Seals

8.3. Insulating Materials

Centralab's bond of non-ferrous metals to ceramic is almost as strong as the material itself.

Your precision requirements met by combining most desirable properties of metals and ceramic materials with JAN-specified characteristics, including:

- High dielectric strength — 240 volts per mil
- Low loss at high frequency — loss factor at 1 MHz — 0.007
- High mechanical strength — 18,000 psi, modulus of rupture
- Harder than quartz — 7.5 Mohs' scale

Impervious to moisture or acids (0.005%). Metalizing is available for various rotors, brush slots, hemispherical三代 parts, precision-machined unit and many other applications. Send Centralab your problem.

Centralab is the leader in ceramic design and development

1 Quality ceramics since 1928.
2 Largest staff of engineers, physicists, and chemists of any ceramic product available for consultation.
3 Modern, mechanized production facilities for your volume ceramic requirements.

Centralab

The Electric

Electron

He's our benefactor, ... our servant... and our master all in one. He works constantly, and seems to have unlimited powers. But, he's elusive. If conditions do not suit him, he becomes "lazy" or slips away completely.

Giant industries have originated because of him. One of these industries makes coils and transformers in which our friend lives and works. Hartford City Paper Company produces electricals by using many manufacturers for layer insulation, called 2005 and up in three finishes. They prefer Hartford's electrical papers because they cost less, and yet make the elusive electron perform at his peak.

If you make coils, condensers or transformers, you should know more about layer insulation paper. Write for samples, data sheets, and price lists.

Hartford City Paper Co.,
Hartford, Indiana

A Division of Globe-Union Inc.
3260 E. Keefe Avenue, Milwaukee, Wisconsin
In Canada: 524 Mt. Pleasant Road, Toronto, Ontaro.

83. Insulating Materials

83.1. Ceramic Products

American Phenolic Corp., 1893 S. 4143 Ave, Chicago 50, Ill. 40
For details see ad on page 130
Tel: 847-6-1500

Americas Products, Inc., 3249 N. 40th Ave, Chicago 3, Ill. 40
For details see ad on page 130
Tel: 847-6-1500

American Paper & Fiber, Inc., 423 W. 40th Ave, Chicago 5, Ill. 40
For details see ad on page 130
Tel: 847-6-1500

6. Chemicals

American Cyanamid Co., 1600 E. Main St, New Britain, Conn. 13
For details see ad on page 130
Tel: 987-6-1500

American Cyanamid Co., 1600 E. Main St, New Britain, Conn. 13
For details see ad on page 130
Tel: 987-6-1500

83.2. Insulating Materials

83.3. Insulating Materials

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Tel: Rockford 2-6005
General Plastics Corp., N.J., 5, 10, 15
Griff Reproducer Corp., N.Y., 5, 10
Hobson Bros., Ill., 5
Howard Molding, Inc., Mo., 15
Induction Heating Corp., N.Y., 5
Industrial Devices, Inc., N.J., 5, 10, 15
Insuline Corp., of America, N.J., 5, 10
Industrial Mfg. Corp., N.J., 5
Jan Hardware Mfg. Co., Inc., N.Y., 5, 10
Johnson Co., E. F., Mass., 10
Kayco Prod. Co., N.Y., 5, 10, 15
Acme-Carbon Corp., Pa., 10
Kimbir Glass Co., Subdiv. Queensboro Glass Co., Ohio, 10
Kansas Mfg. Co., Inc., Ohio, 10, 15
Life Chemical Corp., Walter, N.Y., 5
Leyden Electronic Research Co., 9 West Magnolia Blvd, Burbank, Calif., 5
For details see ad on page 513
Tel: Victoria 5-2664
Magpie Co., O. J., N.Y., 5
Maloney & Co., Inc., Pa., 5, Ind., 5, 10, 15
(Continued on page 541)
8. Services and Raw Materials

88. Moulded Products.

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Ceramic Products, Inc., 235 Beverly Ave.,
Stamford, Conn. 20, 10
For details see ad on page 597
Tel: BL 2-4751

Triumph Mfg. Co., Inc., 33, 10
United States Insulation Co., Ltd., England, 13

For details see ad on page 599

Tel: TPO 4-7205

United States Rubber Co., N.Y., Rubber

For details see ad on page 598

Wiring Devices

Sturbridge, Conn., Co., N.Y., 10

For details see ad on page 598

Tel: WATERVLIET 6-0010

Western Gold & Platinum Works, Calif., 15

For details see ad on page 598

White Industrial Ins. Co., N.Y., 10

Tel: WATERVLIET 4-0010

Whites, Inc., III, 10, 15

For details see ad on page 598


For details see ad on page 598

American Electronic Corp., Ohio, 10
For details see ad on page 599

For details see ad on page 599

Aircraft Electric Co., 107 20th St.,
Union City, N.J., 5
For details see ad on page 599

Alied Chemical & Dye, Barrett Div.,
N.Y., 10
For details see ad on page 599

American Radio Newspaper Co., N.Y., 25
For details see ad on page 599

Auburn Botone Works, Inc., N.Y., 25
For details see ad on page 599

Bairt Co., N.Y., III, 15, 25
For details see ad on page 599

Bakelite Div., Union Carbon &
Carbide, N.Y., 10, 20
For details see ad on page 599

Balka Products, Div. General Tire &
Rubber, Mass., 5, 15, 20, 25
For details see ad on page 599

Brandt Industries, Inc., Ltd., Canada, 5, 15, 20
For details see ad on page 599

Brandt, Inc., Canada, 5, 15, 20
For details see ad on page 599

Castile Plastics, Div. General

For details see ad on page 599

Central Tire & Rubber, Indus. Prod.,
Ind., 3, 10, 15, 20
For details see ad on page 599

Cortin Plastics, Inc., N.Y., 3, 10, 15, 20
For details see ad on page 599

Curtiss-Wright Corp., N.Y., 5, 10, 15
For details see ad on page 599

Davis & Geck, Div. General

For details see ad on page 599

Dow Corning Corp., N.Y., 5, 10, 15
For details see ad on page 599

Dunlop Industries, Inc., N.Y., 5, 10, 15
For details see ad on page 599

E. I. du Pont de Nemours & Co., Inc.,
N.J., 10
For details see ad on page 599

Emerson & Cumming, Inc., Mass., 15, 20
For details see ad on page 599

Evinrude Motors, Inc., Ind., 3, 10, 15, 20
For details see ad on page 599

Enderby Chemical Co., Eng., 10
For details see ad on page 599

Herberts, Inc., N.Y., 10
For details see ad on page 599

Koppers Products, Inc., N.Y., 5, 10, 15
For details see ad on page 599

Kurencop Mfg. Co., Inc., N.Y., 5, 10, 15
For details see ad on page 599

Lehigh Valley Electric Co., N.Y., 5, 10, 15
For details see ad on page 599

La Morre, C. & D., Calif., 5, 10
For details see ad on page 599

Lee Chemical Corp., Walter, N.Y., 5, 10
For details see ad on page 599

Magnusson Co., N.Y., 5, 10, 15, 20
For details see ad on page 599

Molded ceramic products are produced by modern equipment, in any desired quantities, and from a wide variety of ceramic materials. Processes include molding, machining, firing, glazing and metallizing. Complete engineering and laboratory facilities available.

Molded CERAMIC products

STUPAKOFF CERAMIC & MANUFACTURING CO.,
LATROBE, PENNSYLVANIA

For details see ad on page 599

(Continued on page 599)
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Conformance to specifications assured in FLUOROFLEX™ rod, sheet, tube

Resistoflex will certify each shipment of "electrical grade" Fluoroflex-T. This product on six vital physical and electrical properties. Qualification tests are performed on all incoming Teflon powder to determine whether it will yield rods, tubes and sheets which are in conformance with specification AMS-3631. "Polytetrafluoroethylene." Processing under a quality control and inspection system approved by the USP under MIL-Q-9822 specification maintains the identity of each lot of material through all stages of manufacture - from virgin powder to finished product.

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Be sure of optimum performance in Teflon by specifying electrical grade Fluoroflex-T. Remember, too... Fluoroflex-T products are non-porous and stress-relieved. This means better dimensional stability, less easily machinable and fewer rejects. For more details, write or phone...

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Resistoflex Corporation
Belleville, N. J.

There are 3 SPECIFIC WAYS
in which "Proceedings of the I.R.E." serves the advertiser differ-ent and more effectively than other publications.

1. Pre-Specification Selling

Because "Proceedings of the I.R.E." publishes basic research and applications articles it is closely studied by design engineers who must "keep ahead of the market." Often, the research published leads the industry production by from two to six years. The alert engineer, who needs this amount of time for his own design applications and for testing up and changing the production in his own factory, studies the "Proceedings of the I.R.E." carefully. Its articles keep him abreast with the changes that will inevitably come and make it possible for him to be ready for them. This is the time for you to sell the unknown engineer designing the next-drawn-of-product. "Before it happens." It is an assurance that you will be ahead of the market instead of behind it.

2. Personal Connection to the Individual

The Institute of Radio Engineers is an engineering society for individual engineers who meet on their own initiative, organize and work together. The magazine reproduces the research of private engineering societies, wherever they are. Whoever says engineering progress is developing, the work is done by individual engineers. It is these men who must be sold. Only the engineer knows enough to specify and buy in any highly technical industry. Selling is a matter of reaching the minds of men because a company cannot sell a product and have the sales. Wherever radio engineering activity is the greatest, companies employ IRE members. An engineer makes a new job in advance of production and with him goes "Proceedings of the I.R.E." with all the advertising you so urgently need to place where engineering activity is the greatest.

3. Economy

It is a specific purpose of the Institute of Radio Engineers that its advertising rates should benefit and help the industry grow, by being economical. Part of the money from a small organization is thus passed on to advertisers in the form of low-cost advertising to a high-quality audience. The page rate to thousand Engineers "Proceedings of the I.R.E." is far lower in the radio-electronic industry by deliberate intent. Thus, the Institute must earn every dollar it can help the firms that hire its engineers to gain new business at lesser costs.

THE INSTITUTE OF RADIO ENGINEERS
ADVERTISING DEPARTMENT
1475 Broadway
New York 36, N. Y.

Send for Your Hygrade-Flexible Sample File

HYGRADE VARNISHED TUBING AND SLEEVING

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CLASS 60 - Fiberglass Sleeving
CLASS 40 - Organic Coated FLEXITE EXTRUDED PLASTIC TUBING

America's Oldest and Most Dependable Manufacturer of Insulating Tubing and Sleevings

L. FRANK MURTIL & SONS
Manufacturers of Electrical Insulations Since 1895
NORTHRIDGE, PENNSYLVANIA

For further information about any of the products listed, consult advertisements on pages shown at the end of the listing.

If the facts you want are not given in the advertisements, use the Post Card Inserts to write for literature without cost.
Radio-Electronic Engineers will receive and use the 1954 IRE DIRECTORY

Better and Better and Better!

Up-to-datesness is almost a moniker with IRE DIRECTORY compilers! Membership lists are corrected up to May 30th. Industry lists, compiled and classified by high speed IBM sorting methods are accurate to June 15th. No firm's report is older than 18 months.

Information at high speed! "Data the way an engineer thinks" is the key to IRE DIRECTORY classifications. All products are divided into 10 fundamental groups, many of which parallel professional group organization. The groupings plans make the fastest working directory you ever used. Components are mixed with test equipment - you turn right to a section where each item belongs.

Yet good engineering detail is maintained. 104 basic classes of products under these ten sectional product directories keep listings from becoming cumbersome, but cleanly define products. Overlapping listings are skillfully eliminated. Simplicity makes this book easy to work with - insures faster finding of facts when forgotten. Thus the bloats of terminological listings are avoided.

Completeness is insured! Most firms make many products in a single classification. Wasteful, eye-consoling re-listing of the same firms over and over is quite sensibly solved by using a system of codes under the 104 basic headings which actually provide 630 separate classifications. A more complete picture of what each firm's full line is results, but you travel through fewer listings.

Machol Edge Index is just one more modern service to help the user find information fast.

Ad positions positioned with precision! In a DIRECTORY where ads play an important part in supplying information the user wants and needs. It makes good sense to cross-reference every advertiser in each listing so that the user can quickly find more detail. Ads are also placed facing company alphabetical listings or in the product section in which they properly belong.

No effort is spared to "organize" ad information.

More advertisers - more information! Never before have so many advertisers served IRE readers! A more complete directory of this great industry.

THE INSTITUTE OF RADIO ENGINEERS

8. Services and Raw Materials

90. Solder.

Soldering and Tin Plate, Soldering, Rosin Core, Rosin, Soldering, Tin Plate, Soldering, Rosin Core.

**Designed for Application**

**Mu Metal Shields**

The James Millen Mfg. Co., Inc. has for many years specialized in the production of magnetic metal cathode ray tube shields for the entire electronics industry, supplying magnetic metal shields to manufacturing companies, laboratories and research organizations. Stock shields are immediately available for all of the more popular sizes and types of cathode ray tubes as well as bezels for 2", 3" and 5" size tubes.

Many production problems, however, make desirable special shields designed in conjunction with the specialized requirement of the basic apparatus. Herein, are illustrated a number of such custom built shields. Our custom design and fabrication department is at the service of our customers for the development and manufacture of magnetic metal shields of either nickol or mumetal for such specialized applications.

---

**DANIEL KONDAKIAN TUNGSTEN LEADS—TUBE BASES**

The Engineering Co., now specializing in the manufacture of Hydrogen Thyratron bases up to $25 in diameter. Also larger diameter bases.

Some of the popular bases which we manufacture are 10 watt, 300B-432 Industrial Base, Glass T Pan Base, 418 type pin jack base and many others.

All bases manufactured to MIL IA/MIL E-B.

Bases are all given weight and strength tests.

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**THE ENGINEERING CO.**

27 WRIGHT STREET, NEWARK, 5, NEW JERSEY


Tungsten leads are made using General Electric Tungsten tubes. Each of the lead is examined under magnifying glass to discover any flaws. Tube makes real use in lamps, if tungsten is not 100%, pure.

Quality and low prices now available.

Send your drawings for quotations and let us prove to you that Engineering Co., prices are OK.
3. Services and Raw Materials

91. Vacuum Tube Parts.
(Continued from page 559)

Metal Hydrides, Inc., Mass., 20
Metal Textile Corp., 67 E. First Ave.,
Greenwood, N. J., 23
For details see ad on page 606
Tel: Crestwood 3-5000
Metallic Arts of New England, Inc.,
Mass., 65
Mica Insulator Co., N. Y., 75
Milling Mfg. Co., Inc., Jamestown, 15 Ex-
change St., Medina 4, Mass., 55, 60, 65
For details see ad on page 148
Tel: Medina 4-4700
Multi-Tron Lab., Ill., 5, 30
Perfection Mica Co., Ill., 35
Pix Mfg. Co., Inc., N. J., 30, 40, 45, 50, 55
Radio Corp. of America, Tube Dept.,
Section FS15, 415 S. 5th St., Harrison,
N. J., 5, 15, 20, 25, 30, 40, 45
For details see ad on page 210
Tel: Hamboldt 1-2000
Samson Chemical & Pignatini Corp.,
Dept. 12, 280 W. Lake St., Chicago 17,
Ill., 55
For details see ad on page 140
Tel: Sacramento 2-5500
(Continued on page 559)

8. Education and Publishing

A Directory of

91. Vacuum Tube Parts.
(Continued from page 559)

Scientific Electronic Lab., N. J. Button
Street
Sears, Roebuck & Co., 100 N. E. St.,
White Plains, N. Y., 20
For details see ad on page 484
Tel: White Plains 9-6372
Shebnor Electric Co., Div. Allied Elec-
tric, N. J. 50
Smith, Inc., Houston, H. N. Y., 50, 65
Sonomar Corp., N. J., 10
Squaire Corp., Inc., 15, 65
Slyer Co., Inc., N. Y., 5, 15, 20, 30, 60, 65
Stapled Ceramic & Mfg. Co., Box 390,
Hillview Ave., Latrobe, Pa., 48
For details see ad on page 4-225, 4-275,
156, 245, 307, 456, 495, 517, 537, 541, 550
Tel: Latrobe 2-1800

Stupakoff Electronic Co., N. J., 65
Superior Tube Co., 2822 Germantown
Ave., N. Philadelphia, Pa., 5, 30, 70
For details see ad on page 68-49
Tel: N. Philadelphia 2-2009
Swiss Jewel Co. & Delcoia Co., Pa., 40
Sylvania Electric Products, Inc., 1940
Broadway, New York, N. Y., 30, 35,
25, 30, 40, 45, 50, 55, 60, 65
For details see ad on page 9-14
Tel: JU 3-0242
Syrer Products Co., 26 Irving St., P. O.
Box 51, Medford, Mass., 55
For details see ad on page 49
Tel: Medford 2-0500

Stapled Mica & Mfg. Co., Latrobe, Pennsyl-
van ia, N. J., 65
Times Pacifie Corp., 340 W. 56th St.,
New York 19, N. Y., 60
For details see ad on page 500
Tel: JU 2-6000

In order to improve the grouping of products in the 1954 IRE Directory, one of the 10 basic directories has been moved out of order. The directory of Test Equipment begins on page 435.

92. Education.
05 Technical instruction—
home study
10 Technical instruction—
resident
93. Publishing.
05 Book publishers
10 Data sheets & manual
preparation
15 Magazines

Always consult the pink pages at the
front of this directory for a termi-
nology cross-index, or to find products by type. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.
The 1954 DIRECTORY is—and Better

More Engineers Listed than ever before! IRE membership continues to grow, and more engineers know 36,000 are listed, and therefore have a direct, personal interest in this DIRECTORY.

Up-to-dateness is almost a mania with IRE DIRECTORY compiler. Membership lists are corrected up to May 30th. Industry lists, compiled and classified by high-speed IBM sorting methods are accurate to June 15th. No firm's report is older than 18 months.

Information at high speed: "Dote the engineer's thinking" is the key to IRE DIRECTORY classifications. All products, devices, and divisions marketed for industrial groups, many of which parallel professional group organizations. This plan makes this the latest working directory you ever used! No competitor is more trade-conscious—will incorporate it—will report it to a section where each item belongs.

Yet good engineering detail is not sacrificed. 104 basic classes of products under these ten sectional products directories leave listings from becoming cumbersome, but clearly define products. Overlapping listings are skillfully eliminated. Simplicity makes the book easy to work with—transports listing of trade secrets. Thus the faults of terminological listings are avoided.

Completion is insured! Most firms make many products in a single classification. Wasteful, eyes confusing, valueless is the same. IRE, listing of these products only. The faults of terminological listings are avoided.

More engineers listed than ever before! IRE membership continues to grow, and more engineers know 36,000 are listed, and therefore have a direct, personal interest in this DIRECTORY.

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AVAILABLE BACK ISSUES
OF THE PROCEEDINGS
OF THE IRE

One copy at $1.00 to IRE members; $2.25 to non-members; $6.65 to public libraries, colleges and subscription agencies. Postage prepaid to United States and Canada; 10¢ additional per copy to other countries. Please note special price for January 1954 Color Television Issue. one copy at $1.25 to IRE members; $3.00 to non-members; $24.00 to public libraries, colleges and subscription agencies. Postage prepaid to United States and Canada; 25¢ additional per copy to other countries. The following issues are in stock as of August, 1954, and subject to prior sale, as of course, are available at this time.

1919-1933 Volumes 1-Quarterly
1933 Vol. 1 January (A Report)
1934 Vol. 2 April, June, October, January
1935 Vol. 3 April, November, December
1936 Vol. 4 April, May, June, December
1937 Vol. 5 April, June, December
1938 Vol. 6 April, June, October
1939 Vol. 7 April, June, December
1940 Vol. 8 January, July, September, December
1941 Vol. 9 January, April, July, September, December
1942 Vol. 10 January, April, July, December
1943 Vol. 11 January, April, July, December
1944 Vol. 12 January, April, July, November
1945 Vol. 13 January, July, November
1946 Vol. 14 July, November
1947 Vol. 15 May, December
1948 Vol. 16 May, November
1949 Vol. 17 May, November
1950 Vol. 18 April, December
1951 Vol. 19 January, November
1952 Vol. 20 January, March, December
1953 Vol. 21 March, November
1954 Vol. 22 April
1955 Vol. 23 April
1956 Vol. 24 April
1957 Vol. 25 April
1958 Vol. 26 April
1959 Vol. 27 January, February, March
1960 Vol. 28 April
1961 Vol. 29 April
1962 Vol. 30 April
1963 Vol. 31 January, February, March
1964 Vol. 32 April
1965 Vol. 33 April
1966 Vol. 34 April
1967 Vol. 35 April
1968 Vol. 36 April
1969 Vol. 37 April
1970 Vol. 38 April
1971 Vol. 39 April
1972 Vol. 40 April
1973 Vol. 41 January, September, October
1974 Vol. 42 January, August

Please do not send cash except by registered mail. Remittance should accompany your order.

THE INSTITUTE OF RADIO ENGINEERS, INC.
1 East 79th Street, New York 21, N.Y.

9. Education and Publishing

SEC 103.

Published by the Institute of Radio Engineers, Inc.

October 31, 1954

1. Educational activities and programs for the next five years

Page 555

Product 103

3. Members in education

Page 555

Product 104

Chart 1. Members in education

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Product 104

1. Members in education

Page 555

Product 104

2. Members in education

Page 555

Product 104
There are 3 SPECIFIC WAYS in which “Proceedings of the I.R.E.” serves the advertisers more effectively and more specifically than other publications.

1. Pre-Specification Selling

Because “Proceedings of the I.R.E.” publishes basic research and engineering applications articles it is closely studied by these design engineers who must “keep ahead of the market” as to what is being done. Every new edition lends the industry production by floors to two or three years. This close study of the “Proceedings” is accomplished at a time when it serves to help the authors. The amount of time left on this 12-page edition for a change is 99,660 copies, 6,010 copies.

6. CONTROL-SYSTEM DYNAMICS

A well-rounded collection of the “Proceedings of the I.R.E.” is a must for feedback control of any voltage. A dynamic approach of the latest developments in this full-spectrum field is included. For further details, see the “Proceedings of the I.R.E.” volume 10, pages 43-48, 78-115.

2. MAGNETIC AMPLIFIERS

Circuits

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2. PRINCIPLES OF RADAR

Deals with fundamental concepts and techniques in radar equipment. Discusses the essential characteristics of radars used in military applications. Covers radar circuits and their application to radar equipment, including the design and operation of radar circuits and the fundamentals of radar circuits. For further details, see the “Proceedings of the I.R.E.” volume 10, pages 20-40, 70-110.

2. ELECTRONIC MEASUREMENTS

Covers measurement techniques in connection with the design and operation of electronic circuitry, including the design and operation of radar equipment, including the design and operation of radar circuits and the fundamentals of radar circuits. For further details, see the “Proceedings of the I.R.E.” volume 10, pages 20-40, 70-110.

2. VACUUM TUBE OSCILLATORS

By William A. Edson, Stanford University. This is the first book to present the theory of the design and operation of vacuum tube oscillators. It is the second major factor affecting the behavior of electronic oscillators. Two are conceived through: (1) the behavior of oscillators is predictable; and (2) circuits can be designed to meet specific needs. 1953. 476 pages. $8.95.

ENGINEERING ANALYSIS: An Introduction to Professional Methodology


RADIO RECEIVER DESIGN, Part One


THE PHYSICS OF EXPERIMENTAL METHOD

By H. S. J. BRADDICK, University of Manchester, England. 1953. 310 pages. Illus. $5.00.

Introductionary Circuit Theory

By Ernst A. Guillemin, The Massachusetts Institute of Technology. 1953. 300 pages. Illus. $5.00.

JOHN WILEY & SONS, Inc.

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Add New Authority and Usefulness to your Library With these McGraw-Hill books

Just Published!

1. ANALOG METHODS IN COMPUTATION

An organized treatment emphasizing the use of analog computers as electronic difference and differential analyzers. Linear, exponential, logarithmic, and power functions are presented, along with certain aspects of analog computers and their application to real-world problems. For further details, see the “Proceedings of the I.R.E.” volume 10, pages 20-40, 70-110.

1. WILEY Books in Engineering

TELEVISION

2nd Edition

The Electromagnetic Transmission in Color and Monochrome

By V. K. ZWORYKIN and G. A. MORTON, both of RCA Laboratories. This entirely new and greatly expanded 2nd Edition of Television covers the great technological advancements of the past 14 years and is packed with practical, up-to-date information. It is the first book to give adequate coverage to color television. The consideration of both the theoretical and practical aspects is sufficiently comprehensive and working understanding of this important new development. 1954. 1057 pages. Illus. $17.50.

APPLIED ELECTROACOUSTICS

3rd Edition


9. Education and Publishing

103. Publishing

(Covered in page 355)

Ford Inst. Co., Div. of Sperry Corp., 31-10 Thomson Ave., Long Island City 1, N.Y.

For details see ad on page 515

Frederick Research Corp., P. O. Box 5822, 4026 Montgomery Ave., Bethesda 14, D.C.

For details see ad on page 503

Gordon Associates, Inc., 357 Bread St., New York 13, N.Y.

For details see ad on page 486

Recent Books in Engineering


For details see ad on page 355

Radio & Television News, 5850 Wilshire Blvd., Los Angeles, Calif.

Principles of TRANSISTOR CIRCUITS

Edited by RICHARD F. SHEA, General Electric Company. The full- length, integrated work on transistor characteristics and circuits— ‘ . . . a single source for the cream of current thinking on the subject. . . . We believe that this definition makes it known as the "classic" of the transistor engineer."—Radio & Television News. 1953. 535 pages. Illus. $13.00

ULTRA HIGH FREQUENCY PROPAGATION

By H. R. REED, University of Maryland and C. M. RUSSELL, both with the U.S. Navy, Air Force, and U.S. Army. A focused presentation on the latest developments and experiments, on such critical factors as reflection, diffraction, scattering, and attenuation. 1955. 362 pages. Illus. $8.95.

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ENGINEERING ANALYSIS: An Introduction to Professional Methodology


RADIO RECEIVER DESIGN, Part One


THE PHYSICS of EXPERIMENTAL METHOD

By H. S. J. BRADDICK, University of Manchester, England. 1953. 310 pages. Illus. $5.00.

INTRODUCTIONARY CIRCUIT THEORY

By Ernst A. GUILLÉMIN, The Massachusetts Institute of Technology. 1953. 300 pages. Illus. $5.00.

JOHN WILEY & SONS, Inc.

440 Fourth Avenue, New York 16, N.Y.

Check number or note on back address label to prevent service and mail-endorsement backlist at the hand of the classifier.

Page 357 Product 103

Readers' Advisory, Page 357
“Sub-miniaturization!

Very soon, a tumbler-full of complex radio-electronic equipment will fly an airplane!

Circuits have been flattened to the size of a post-card, and radio-tubes to match-heads.

"Radio" becomes a part of every industry!

WHAT BECOMES SMALLER

Radio engineers call this program "subminiaturization", a self-contradictory word because as radio components are engineered down to thimble and pinhead size, electronic applications in industry become wider and greater. Already, military needs have stimulated radio-engineers to produce a signal system in the nose of a bomb, no larger than a man's hat which will direct and control tons of steel and dynamite. The wrist-watch radio is a practical reality.

WHAT GROWS LARGER

The industry radio has created is skyrocketing to new heights. Symbolic of the whole trend is the bristling array of antennas on the tops of homes and apartments and the jump in TV picture tube sizes from 6 to 27 inches. More than 1,000 technical meetings a year are held by IRE's 38,000 members in seventy-eight active sections in every part of the English Speaking world. The volume of published information required to feed this engineering progress is enormous.

For forty years, without need of change of name or direction, The Institute of Radio Engineers has published its "Proceedings of the I.R.E."—a monthly magazine by radio-electronic engineers, for radio engineers. It is an unabridged, accurate, working textbook-up-to-the-minute. 481 advertisers use its pages to keep their products before design men—to sell in the prespecification stage of this dynamic industry.

"Proceedings of the I.R.E."

Published by the

INSTITUTE OF RADIO ENGINEERS

Advertising Dept., 1475 Broadway
New York 36, N.Y., Dbyant 9-7550

Radio • Communications • Television • Electronics

1954 IRE Directory

104 Distribution.

The final section of our "10 in 1" directory is the complement to manufacturing, which is distribution. It has proved to be a real service to IRE member engineers and executives to put into this book a list of annually checked (jobbers, wholesalers and distributors. Many of these firms are identified further by the initials REP, as member of "The Representatives", or NEDA, as member of the National Electronic Dealers Association. The number after the address codes each firm as shown at start of listing, top left.

104 Distribution.

05 Export & Import
10 Jobbers & Wholesalers
15 Manufacturers' Representatives
20 Sales & Service
25 Surplus dealers

Always consult the pink pages at the start of the Directory for firms, for a terminology cross-index, or to find products by name. The pink pages list 481 products by name, as well as under the product groups. Page numbers are given for space.
Classifications with a System!

The IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes into which 101 basic classifications have been organized.

You will note that we here differ from most directory compilers, for we do not mix meters with motors simply for alphabetical reasons. Products used in "Audio" whether components or complete apparatus form the first fundamental group. Yet, the same manufacturer and product may also appear in the "Component Parts" section. This system gives subject grouping for speed and convenience. A directory should aid a man who has forgotten some detail, or product name. Ours helps by grouping products as one would think.

1. Audio Frequency Equipment (Products 1 to 11)
2. Broadcasting Equipment (Products 12 to 17)
3. Communications Equipment (Products 18 to 23)
4. Component Parts (Products 24 to 62)
5. Applications and Electronics (Products 63 to 70)
6. Radar, Microwave, UHF (Products 71 to 74)
7. Test & Measuring Equipment (Products 72 to 101)
8. Services and Materials (Groups 75 to 91)
9. Education & Publishing (Groups 102 & 103)
10. Distribution Functions (Service 104)

For detailed identification, these 101 products and services, grouped in the 10 indexes, are further subdivided into over 600 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing adds speed. Purely alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers like our system better.

The IRE DIRECTORY is 10 Indexes in one book.

The IRE DIRECTORY is 10 Indexes in one book.
### 10. Distributional Functions

#### 10.4. Distribution

(Continued from page 261)

<table>
<thead>
<tr>
<th>County</th>
<th>City</th>
<th>Address</th>
<th>Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARTWRIGHT</td>
<td>James B.</td>
<td>1326 Madison Ave, Memphis 4, Tenn, 35 (TEN)</td>
<td>38103</td>
</tr>
<tr>
<td>CARTWRIGHT</td>
<td>James B.</td>
<td>1326 Madison Ave, Memphis 4, Tenn, 35 (TEN)</td>
<td>38103</td>
</tr>
<tr>
<td>CHELSEA</td>
<td>Radio Equipment Co, 96 Emsry Pk, Knoxville 17, Tenn, 10 (TEN)</td>
<td>37917</td>
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<td>37917</td>
<td></td>
</tr>
<tr>
<td>CHERRY</td>
<td>James C.</td>
<td>105 Highland Ave, Jackson, Tenn, 10 (TEN)</td>
<td>38301</td>
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<tr>
<td>CHERRY</td>
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<td>38301</td>
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<td>40222</td>
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<tr>
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<td>Pearless Electri. Expor. 2220 So. 7th St, Louisville, 8, Ky, 10 (TEN)</td>
<td>40222</td>
<td></td>
</tr>
<tr>
<td>KENTUCKY</td>
<td>Universal Radio Co, 353 S. 7th St, Louisville, Ky, 15 (TEN)</td>
<td>40202</td>
<td></td>
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<tr>
<td>KENTUCKY</td>
<td>Universal Radio Co, 353 S. 7th St, Louisville, Ky, 15 (TEN)</td>
<td>40202</td>
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<tr>
<td>SOUTH ATLANTIC</td>
<td>American Acoustic Corp, P.O. Box 667, 4601 Miami Springs, Fl, 15 (TEN)</td>
<td>33160</td>
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<tr>
<td>SOUTH ATLANTIC</td>
<td>American Acoustic Corp, P.O. Box 667, 4601 Miami Springs, Fl, 15 (TEN)</td>
<td>33160</td>
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<tr>
<td>SOUTH ATLANTIC</td>
<td>Colley, A.</td>
<td>A. P. Box 822, Jacksonville, Fla, 15 (TEN)</td>
<td>32203</td>
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<tr>
<td>SOUTH ATLANTIC</td>
<td>Colley, A.</td>
<td>A. P. Box 822, Jacksonville, Fla, 15 (TEN)</td>
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<tr>
<td>SOUTH ATLANTIC</td>
<td>Judd, W.</td>
<td>247 2nd St, Pembroke, Ma, 15 (TEN)</td>
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<td>SOUTH ATLANTIC</td>
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<td>247 2nd St, Pembroke, Ma, 15 (TEN)</td>
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<td>1255 2nd St, Pembroke, Ma, 15 (TEN)</td>
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<td>SOUTHERN</td>
<td>Radio Co, 10900 Canal Way, New Orleans 8, La, 10 (TEN)</td>
<td>70115</td>
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<td>70115</td>
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<tr>
<td>ARKANSAS</td>
<td>Lavender Radio Co, 320 E. 4th, Texarkana, Ark, 10 (TEN)</td>
<td>71857</td>
<td></td>
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<td>Lavender Radio Co, 320 E. 4th, Texarkana, Ark, 10 (TEN)</td>
<td>71857</td>
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<tr>
<td>MISSISSIPPI</td>
<td>Cabell Elec, Co, 422 South Fairh St, Jackson, Miss, 10 (TEN)</td>
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<td>Cabell Elec, Co, 422 South Fairh St, Jackson, Miss, 10 (TEN)</td>
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<td>ALABAMA</td>
<td>Allen &amp; Jemison Co, Tusclosco, Ala, 10 (TEN)</td>
<td>35401</td>
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<td>35401</td>
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<tr>
<td>CRANDY</td>
<td>W. M.</td>
<td>1731 Second Ave, So. Birmingh 3, Ala, 10 (TEN)</td>
<td>35205</td>
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<td>TENNESSEE</td>
<td>Bluff City Distributing Co, 910 Union St, Memphis 3, Tenn, 10 (TEN)</td>
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<td>TENNESSEE</td>
<td>Bluff City Distributing Co, 910 Union St, Memphis 3, Tenn, 10 (TEN)</td>
<td>38103</td>
<td></td>
</tr>
</tbody>
</table>

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**Your problems are ours if you are unsure of the product in the document or when you need assistance.**

**You are invited to use our products to service the following on our registered direct mail list.**

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Representing manufacturers in the Southeast since 1924.

Telephone: 091719.
10. Distributional Functions

104. Distribution.
(Continued from page 565)

KANSAS

Arne Radio Supply, 412 E. 10th St., Topeka, Kansas, 10 (NEDA)
Excel Distributors, 301 W. Douglas, Wichita, Kan., 10 (NEDA)
Institute Electr. Supply, 2201 S. Main St., Wichita, Kan., 10 (NEDA)
Koontz, G., L. 3838 Airways, Merriam, Kan., 15 (REP)
Overton Elec. Co., Inc., 522 Jackson St., Topeka, Kan., 10 (NEDA)
Radio Supply Co., Inc., 312 E. Douglas, Wichita, Kan., 10 (NEDA)
Riverside Electronics, 2402 Santa Fe, Salina, Kan., 10 (NEDA)

NEBRASKA

Hicks Radio Co., 1422 "O" St., Lincoln, Neb., 10 (NEDA)
J. B. Distributing Co., 1616 Cass St., Omaha, Neb., 10 (NEDA)
Local Radio Co., 231 11th St., Lincoln, Neb., 10 (NEDA)
Radio Supply Co., 2823 Douglas St., Omaha, Neb., 10 (NEDA)
Stidler Co., 1882 Davenport St., Omaha, Neb., 10 (NEDA)

SOUTH DAKOTA

Power City Radio Co., 200 S. First Ave., Sioux Falls, S.D., 10 (NEDA)
Warren Radio Supply, 515 S. Main St., Sioux Falls, S.D., 10 (NEDA)

MISSOURI

Arne Radio Supply, 819 S. 8th St., St. Joseph, Mo., 10 (NEDA)

1944 IRE Directory
10. Distribution Functions

(Continued from page 371)

Wagner Electric Supply Co., 213 N. Fourth Ave., Am. Arbor, Mich., 10 (NEDA)
Westedmeyer Electric Supply Co., 300 Merrill St., Lansing, Mich., 10 (NEDA)
West Side Radio Supply, 5140 Monroe Ave., Detroit 10, Mich., 10 (NEDA)
Tel.: 3-5616
Wilson, Gerald, 493 Second Ave., Jackson, Mich., 12 (REP)
Tel.: Jackson 4-2027
Zaffiro, Lawrence P., 1401 Alma, Detroit 5, Mich., 15 (REP)
Tel.: Walton 1-4412

ILLINOIS

Allied Radio Corp., 100 N. Western Ave., Chicago 90, III., 15
For details see ad on page 558
Tel.: Haymarket 1-6600
Arnold, A. W., 1331 Rosedale Ave., Chicago 40, III., 15 (REP)
Tel.: Edgewater 4-0645
Baldwin, D. H., c/o Ross Dunderberg, 2230 W. Madison Ave., Chicago 18, III., 15 (REP)
Tel.: Longbeach 1-6631

Boies & Co., J. G., 513 E. 75 St., Chicago 19, III., 18 (NEDA)
Brooks, Wilfred L., c/o J. F. L. Inc., 13 W. Hubbard St., Chicago 10, III., 15 (REP)
Tel.: Whitehall 4-6045
Brown, Donald, c/o Gordon Gray, 455 Harrison St., Oak Park III., 15 (REP)
Tel.: Embarcadero 7-5600
Bruce Co., Harold, 1220 E. Capital Ave., Springfield III., 10 (NEDA)
Burns, Wm. E., 2009 N. Clark St., Chicago 26, III., 15 (REP)
Tel.: Columbus-C-2112
Cameron Co., 1474 S. 10th St., Rock Island, III., 10 (NEDA)
Chaney, Inc., 422 W. Chicago Ave., Chicago 51, III., 10 (NEDA)
Christianman, Howard J., c/o E. Edward Stewart, 508 W. Lake St., Chicago 14, III., 15 (REP)
Tel.: Columbus 1-1596
Clark, Roger, 649 N. Clark St, Chicago 26, III., 15 (REP)
Tel.: Rogers Park 4-6424
Cramer, Gene T., 435 Indianwood Blvd., Forest Park, III., 15 (REP)
(Continued on page 559)

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Allied
R.C.A.
O.E.
Vest-pocket
Electronics Inc.
Burgess
Superior (Powerstat)
Amphenol
Belden
Potter & Brumfield
Struthers-Dunn Inc.
Tecum
Allied

Thordarson
Hollcrafters
P. R. Mallory & Co.
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<th>Page</th>
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**TINYPOTTERS**

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<th>Filter Adapter</th>
<th>Mill-M-27</th>
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<tr>
<td>HP MILL-22 tube</td>
<td>HP MILL-22</td>
</tr>
<tr>
<td>HP MILL-27 tube</td>
<td>HP MILL-27</td>
</tr>
</tbody>
</table>

**COILS**

A Complete Line of R.F. and I.F. Coils for Television, Radio and Communications Applications:
- Toroids
- Trap Coils
- Signal Transformers
- Mirror Image Transformers
- Control Transformers
- Voltage Transformers
- Measurement Transformers
- Service Transformers
- Inductive Transformers
- Resonant Transformers
- Inductor Transformers
- Tapped Transformers
- Signal Transformers
- Image Transformers
- Service Transformers
- Inductive Transformers
- Resonant Transformers
- Inductor Transformers
- Tapped Transformers

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**Write for Free Portfolio 1-34-1 on Tinypotter Transformers and Coils (Especially the Q-Trans type of Coils).**

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SINCE 1915, G.R. Bridges have been used in laboratories
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These instruments are indispensable engineering tools found in research and development organizations engaged in every phase of scientific investigation. They are a result of decades of experience acquired in the design and manufacture of electronic test and measuring apparatus. Highest measurement accuracy, rugged construction, and dependable operation...year after year, have gained them the respect of engineers and scientists both here and abroad.

Write today for more complete information on any of these bridges. G-R Sales Engineers at our head office in Cambridge or at our Branch Engineering Offices in either New York, Chicago or Los Angeles will be glad to recommend instruments suitable for your measurements problems.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Measurement Frequency</th>
<th>Range of Measurements</th>
<th>Accuracy</th>
<th>Typical Uses</th>
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<tbody>
<tr>
<td>1652-A Resistance Limit Bridge</td>
<td>cc</td>
<td>R: 1 to 1,111,111Ω</td>
<td>0.5% as limit bridge</td>
<td>Useful in production testing or laboratory</td>
</tr>
<tr>
<td>544-BA Megohm Bridge (with a c power supply)</td>
<td>$340</td>
<td>R: 0.1 to 1,000,000 MΩ</td>
<td>±3% to 1000 MΩ, ±4% to 100,000 MΩ</td>
<td>Measures high resistance—insulation, volume resistivity, etc.</td>
</tr>
<tr>
<td>760-B Capacitance Test Bridge</td>
<td>60 c</td>
<td>C: 1 μF to 2 nF</td>
<td>±1%</td>
<td>Production test—measures ungrounded capacitors</td>
</tr>
<tr>
<td>1611-A Capacitance Test Bridge</td>
<td>60 c</td>
<td>D: 0.0 to 50%</td>
<td>±15%</td>
<td>Insulating, bushings, cables, grounded capacitors</td>
</tr>
<tr>
<td>650-A Impedance Bridge</td>
<td>dc, 1 kc, 1 kc, 1 kc, 1 kc</td>
<td>R: 0.001 to 1 MΩ, L: 1 μH to 100 μH, C: 1 μF to 100 μF, D: 0.0002 to 1000</td>
<td>±1%</td>
<td>Completely self-contained, general-purpose laboratory and production bridge</td>
</tr>
<tr>
<td>716-CM Capacitance Bridge</td>
<td>0.1, 1, 10, 100 fF</td>
<td>C: 100 μF to 1 μF</td>
<td>±0.2%</td>
<td>For capacitance standardization, precision measurements, dieslectrics tests and studies</td>
</tr>
<tr>
<td>607-A Inductance Bridge</td>
<td>10 c</td>
<td>L: 0.1 μH to 1 H</td>
<td>±0.2%</td>
<td>Variety Inductance measurements</td>
</tr>
<tr>
<td>1004-B Comparison Bridge</td>
<td>400 μH, 1.5 μH, 5 μH</td>
<td>Z: 2Ω to 200Ω</td>
<td>±0.1%</td>
<td>Rapid components testing, and sorting</td>
</tr>
<tr>
<td>916-AL Radio Frequency Bridge</td>
<td>50 kHz to 5 MHz</td>
<td>X: ±10,000Ω at 10 kHz</td>
<td>±1%</td>
<td>Measures impedances of antennas, transmission lines, etc. 1 Ω-l.</td>
</tr>
<tr>
<td>916-A Radio Frequency Bridge</td>
<td>400 kHz to 60 MHz</td>
<td>X: ±50,000Ω at 1 MHz</td>
<td>±2%</td>
<td>Similar to Type 916-B but designed for higher frequencies</td>
</tr>
<tr>
<td>821-A Twin-F Bridge</td>
<td>460 kHz to 40 MHz</td>
<td>C: 1000 μF to 10 μF</td>
<td>±0.2%</td>
<td>Measures high impedances: parallel components, choke, resonant impedances, isolation, conductivity, etc.</td>
</tr>
<tr>
<td>1612-A R-F Capacitance Meter</td>
<td>1 kHz</td>
<td>C: 0 to 1200 μF</td>
<td>±4%</td>
<td>Rapid, accurate capacitance testing</td>
</tr>
<tr>
<td>1812-AL R-F Capacitance Meter</td>
<td>10 kHz</td>
<td>C: 0 to 100 μF</td>
<td>±4%</td>
<td>Similar to 1612-A—adapters available for measuring tube-hole capacitance</td>
</tr>
<tr>
<td>1601-A U-N-F Bridge</td>
<td>10 kHz</td>
<td>X: ±2000Ω at 100 kHz</td>
<td>±2%</td>
<td>For measurements on either lumped or coaxial circuits</td>
</tr>
<tr>
<td>591-D Vacuum Tube Bridge (all frequency parameters)</td>
<td>$750</td>
<td>X: ± 0.001 to 10,000, Y: 0.05 to 200MΩ, Z: 0.02 to 5000 μmho</td>
<td>±4%</td>
<td>Adapters furnished with instrument for measuring characteristics of receiving tubes and transistors</td>
</tr>
<tr>
<td>Slotted Line and Admittance Meter for Measurements to 5000 MΩ</td>
<td>20 to 1500 MΩ</td>
<td>B: ±0.2 Ω to ±1000 mho, G: 0.2 to 1000 mho</td>
<td>±3%</td>
<td>For measurement of coaxial lines, antennas, networks, and components</td>
</tr>
<tr>
<td>1602-U U-N-F Admittance Meter</td>
<td>300 to 5000 MΩ</td>
<td>VSWR, impedance, power</td>
<td>±24% or better</td>
<td>Determines characteristics of standing waves in all 50-ohm systems</td>
</tr>
</tbody>
</table>

GENERAL RADIO Company
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Pulse Generators & R-L-C Tenders  R-L-C Standards  U.E. Instruments  Sound & Vibration Meters  Standards Meters  Null Detectors  Motor Controls  Wave Filters  V.F. Voltmeters