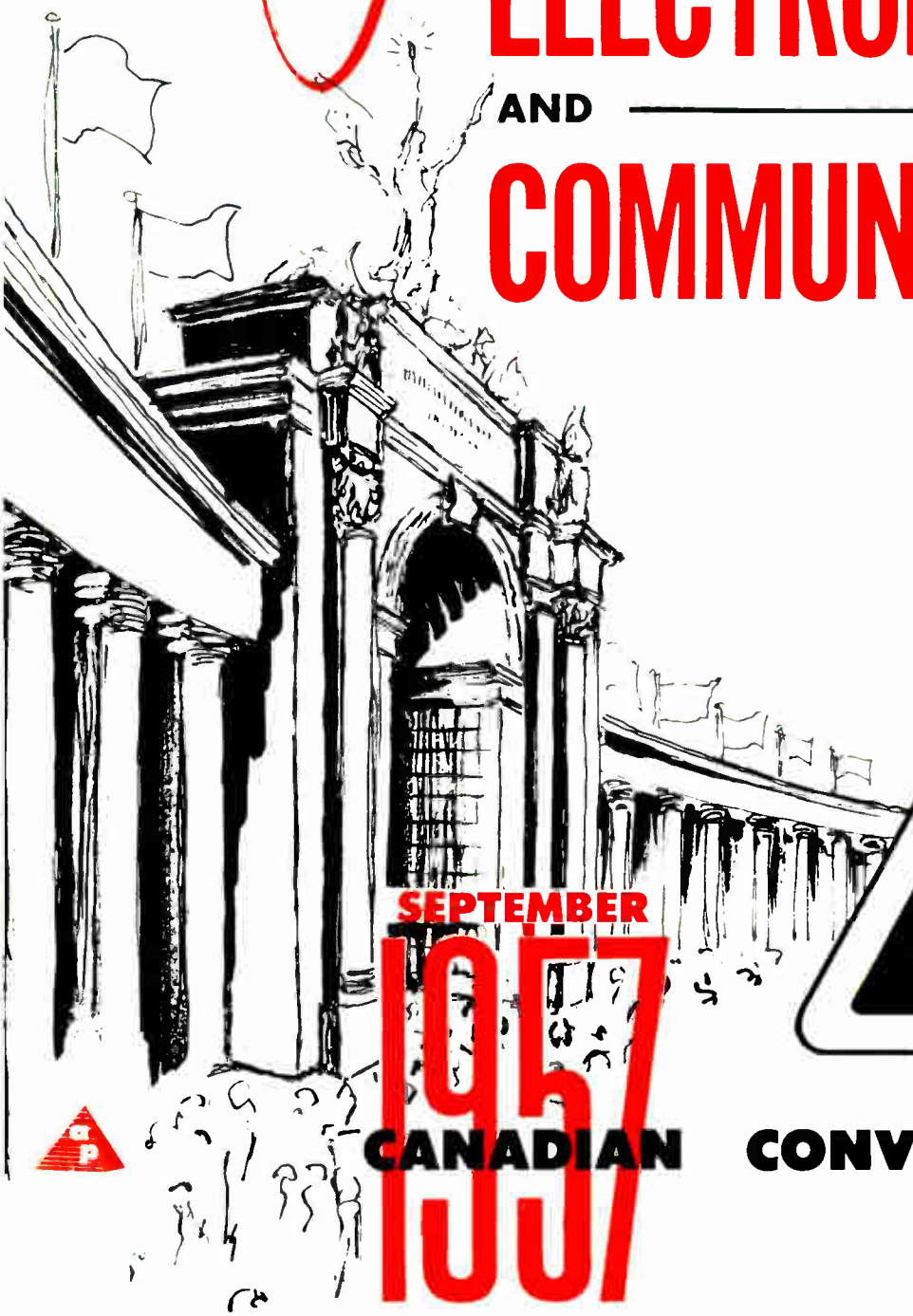
DESIGN MANUFACTURE ENGINEERING APPLICATION

ELECTRONICS AND COMMUNICATIONS



SEPTEMBER

1957

CANADIAN CONVENTION ISSUE

An AGE Publication, Toronto, Canada

Circulation Of This Issue Over 10,000 Copies

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- NEW — Struthers-Dunn hermetically sealed midget DC Telephone Type Relay.
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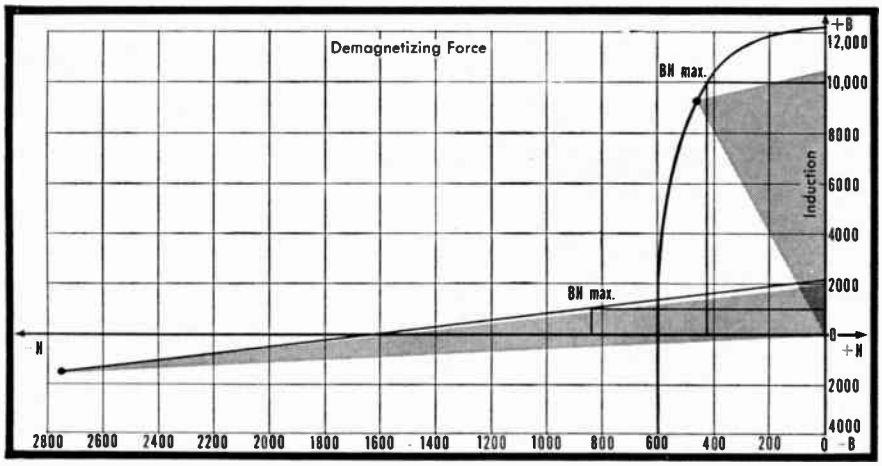

Composite of demagnetization curves showing that for Alnico V, upper, and Indox I, lower. Operation in the third quadrant is produced when a demagnetizing force, stronger than the magnet, forces flux in a direction opposite normal operation, providing negative magnetic induction. Indox magnetic flux returns to full value when this force is removed.

Why Ceramic Magnet Fields Are Now Practical for D.C. Motors

G. R. Hennig, Senior Design Engineer, The Indiana Steel Products Company, explains in this interview why Indox ceramic magnets are now practical for d.c. motors ranging from fractional to multiple horsepower.

Question: Why is the use of Alnico magnets limited to rather small motors, such as toy motors? Why are only some very special larger motors equipped with permanent magnet stators at the present time?

Answer: The price per unit of usable magnetic energy dictates the size limit. Alnico contains very expensive raw materials. For small magnets weighing a fraction of an ounce, this is not too significant. Labor cost, however, the other main factor in any calculation, is a sizeable item in small units. This is not true when larger Alnico magnets are required. With Indox he opposite is true. Its raw materials an cheaper than copper, and it appears that the larger the motor—within a certain limit—the more economically the material can be applied.

Question: How can Indox I, with only ⅕ the energy product (BH_{max}), of Alnico V, be recommended for motor usage where a high field energy is required?

Answer: Maximum energy product is a good criterion of quality for static conditions, such as in the magnet systems of moving-coil instruments or loudspeakers. In motors, generators, and many other applications where the magnet is subject to strong demagnetizing forces, maximum energy product is not an important consideration. One must consider the incremental permeability, even in the third quadrant of the hysteresis loop. The result is, that under the most extreme conditions, Indox I has a maximum usable energy of 17.4 in.-lb. per pound while Alnico V has only 13.7 in.-lb. per pound. Under conditions as found in motors, the usable energy of Indox I is about ½ instead of ⅕ of the usable energy of Alnico V.

Question: How does Indox V compare with Indox I and Alnico V, and where does this material find application?

Answer: Indox V is the strongest ceramic magnet material available today. Per unit of volume it provides more usable energy in motors than Alnico V does. Flat pieces with at least 2 sq. in. area are preferable for production. This means that Indox V is suitable for motors with about 1/25 hp and more, and not for the tiny toy motors.

Question: What are the size limitations for Indox I and Indox V motors?

Answer: Indox I is suitable for motors from the smallest possible size to about ⅕ hp. Indox V can be applied in much larger motors, possibly in the range up to 10 hp, or higher. The same applies for generators.

Question: Can any d.c. motor be converted to a permanent magnet-field motor?

Answer: Yes, most motors can be converted with very little design change. Others may require a considerable change in structure and layout of the armature.

Question: Is there a problem of meeting air gap tolerances with Indox I ring or segment stators, unless bore grinding is applied?

Answer: No. Even though there is an as-sintered tolerance of ± 1.5%, an Indox magnet may be compared with an air-core solenoid, and variations of the air gap length have little influence on the usable flux. Only the O.D. should be ground which is an inexpensive operation on centerless grinders.

Question: How will a permanent magnet motor compare with shunt or series wound motors?

Answer: In general, a permanent magnet motor will have characteristics falling between shunt and series wound motors. Although it will not duplicate the entire speed torque curve for either, it can duplicate characteristics over a specified range.

Question: What are the specific advantages of substituting permanent magnets for wound fields in motors?

Answer: The advantages are: Higher efficiency, cooler operation, less use of critical material such as copper and, possibly, simplification and cost reduction.

Question: Is there a possibility of using Indox in a.c. motors?

Answer: Yes. In addition to various synchronous timer motors, d.c. motors with Indox magnets can be used with the new, efficient power-rectifiers (silicon or others). The advantages over normal d.c. motors are higher starting torque and better speed regulation.

Question: How is the speed controlled in permanent magnet motors?

Answer: Normally, by varying the armature voltage, but also by using a magnetic shunt, by moving the armature axially out of the permanent magnet field, by rotating the brushes, or by an auxiliary field winding.

Question: Can a permanent magnet stator compete with an equal electromagnetic stator in size or total volume?

Answer: Yes, with the materials we have today it can. There is only one exception: Where wound fields are operated with high, short-time overloads.

A complete reprint of Mr. Hennig's paper, "Applying Ceramic Permanent Magnets to Motor Design" appears in the July-September *Applied Magnetics*. Write today for your copy . . . Dept. A.9.

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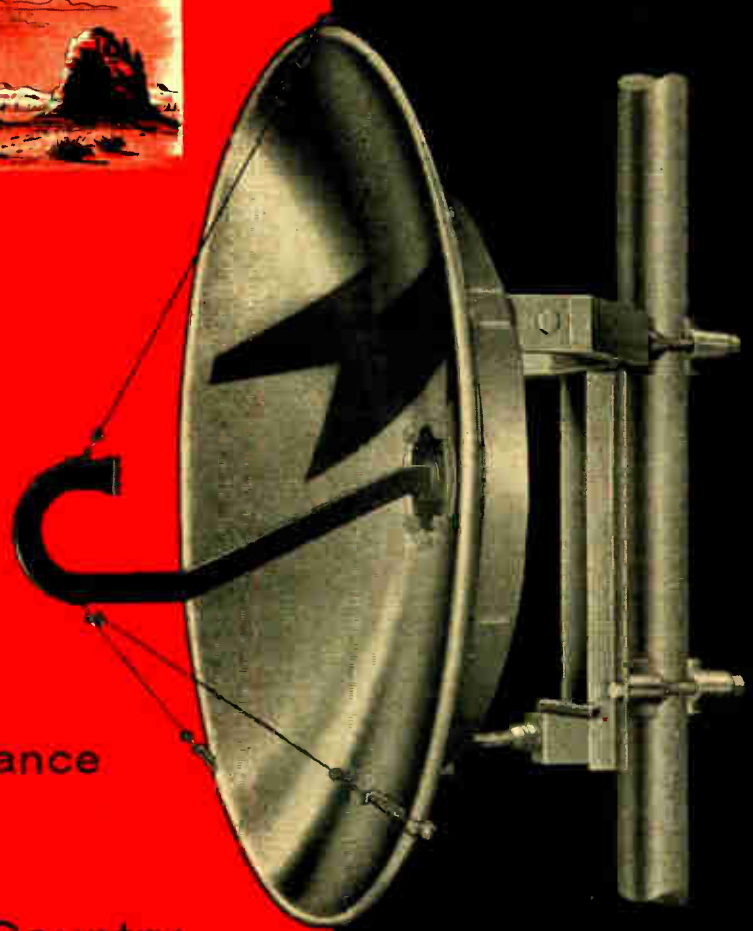

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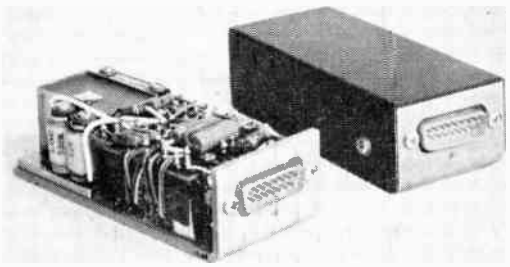

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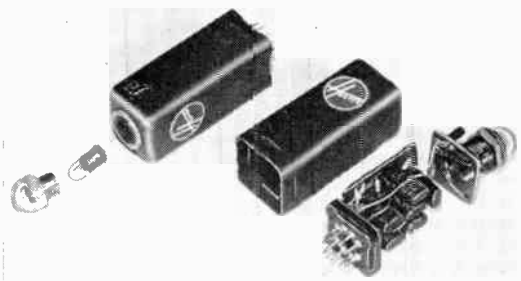

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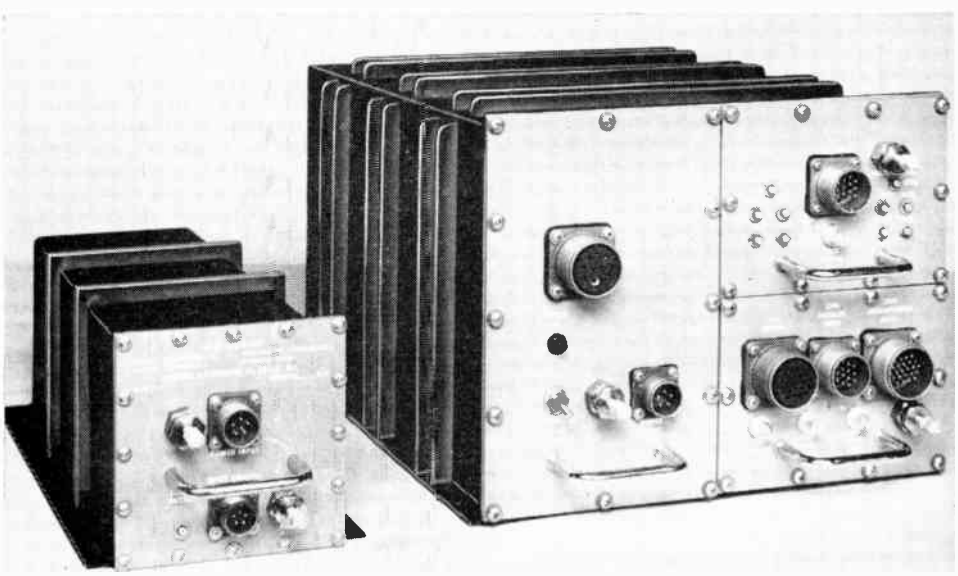

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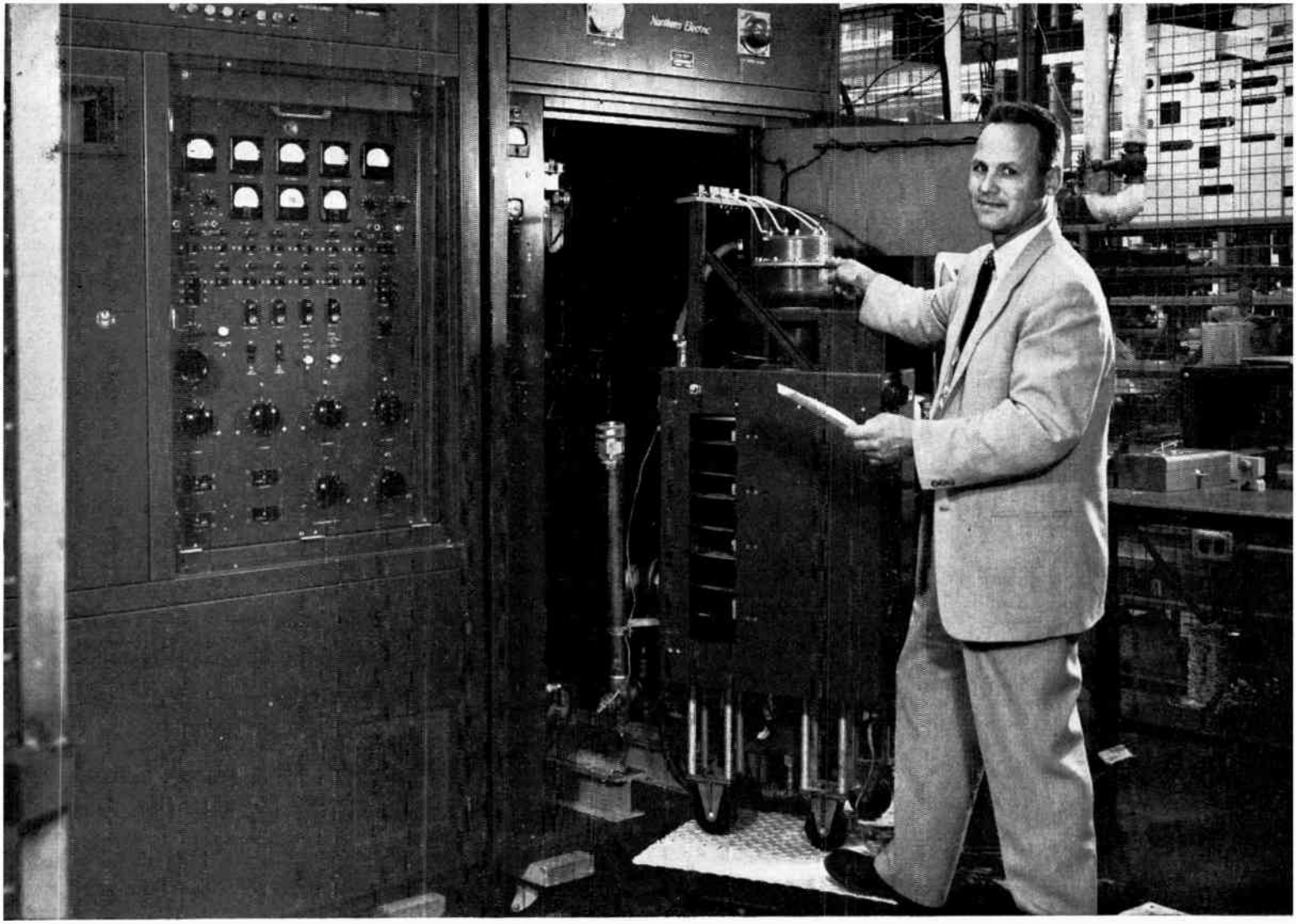

Final amplifier of Northern Electric Company, Type R20004A Telorizon transmitter showing Eimac high power klystron installed.

Northern Electric Uses Eimac Klystrons

In their new "TELORIZON" COMMERCIAL TROPOSCATTER EQUIPMENT

Northern Electric Company, Ltd., has announced new 2 kw and 10 kw "Telorizon" tropospheric scatter equipment for commercial application. This equipment was evolved from Northern Electric Company's military scatter transmitters developed and manufactured under licence from Radio Engineering Laboratories which are now "on-the-air" over 2,500 miles of rugged Canadian terrain. A typical span is in excess of 200 miles with 18 voice channels and more than 99% reliability. Shorter spans having capacities up to 132 voice channels are also in use.

When developing "Telorizon" equipment for commercial use, Northern Electric Company engineers again selected Eimac klystrons as final amplifier power tubes just as they did for their military equipment. So today, *all* Northern Electric Tropospheric communication transmitters use Eimac klystrons.

Eimac

Eimac First for high power amplifier klystrons

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ELECTRONICS AND COMMUNICATIONS

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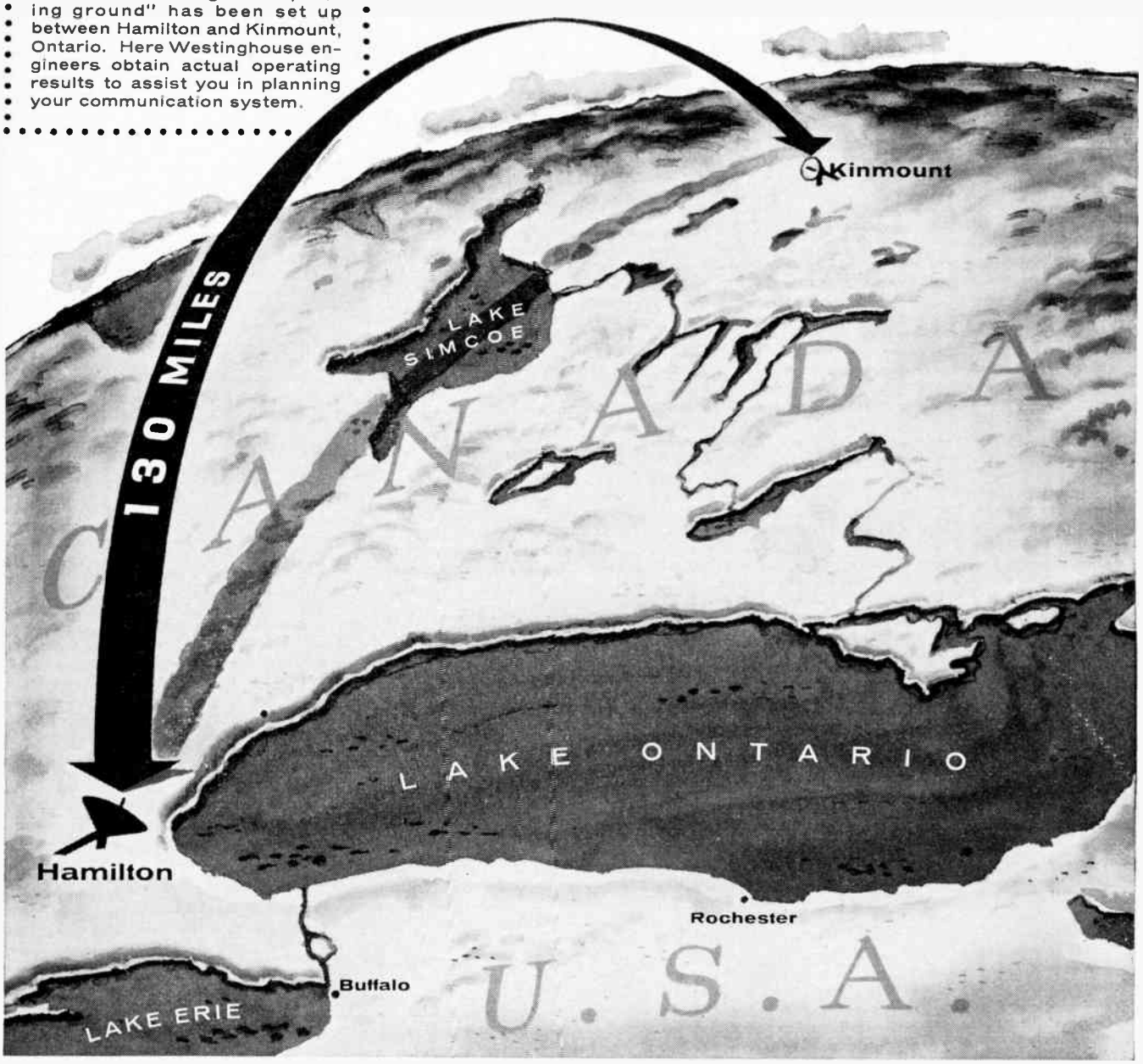

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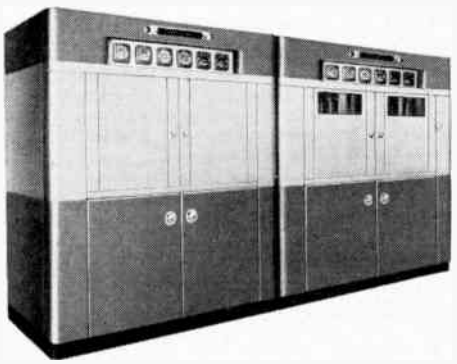

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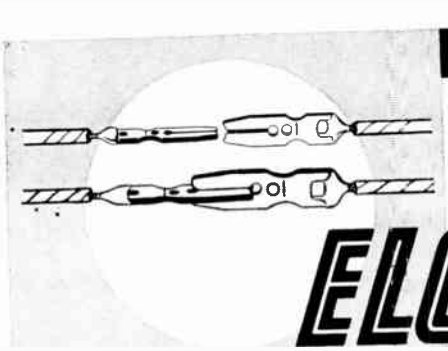

Special Report to Engineers

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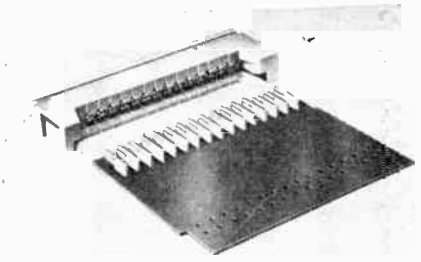
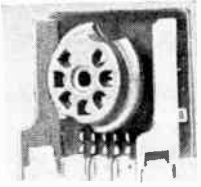
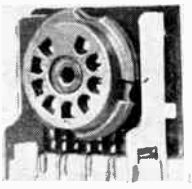
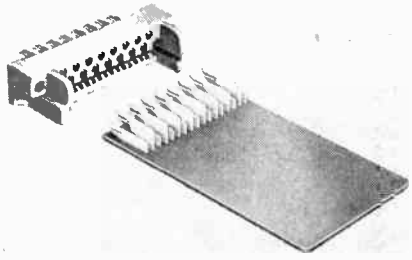


5000 Series Printed Circuit Connector: modular, may be built up to any desired size by stacking center sections.

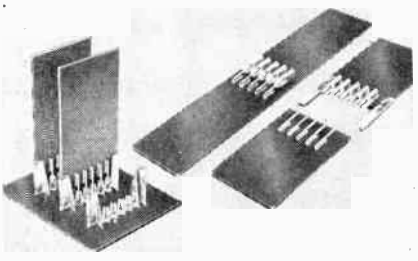


Printed Circuit Right-Angle Sockets: for use where vertical space is limited; available in 7 and 9-pins, with or without shield. Meets JAN Spec. requirements.

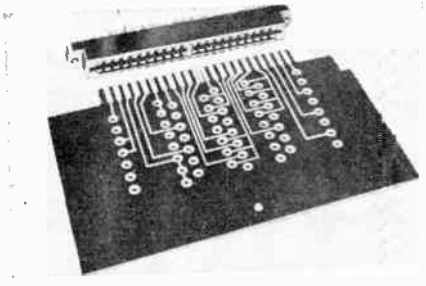




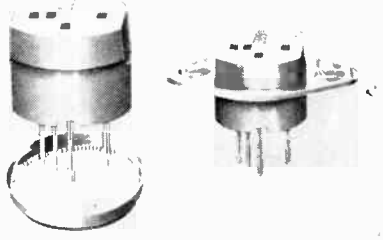
7000 Series Printed Circuit Connector: subminiature version of 5000 Series; available in 17 contact units; 5, 11, 23, 29, 35, 41, 47 contact units available soon.



Printed Circuit Board-to-Board Connector: makes possible small sub-assemblies for tandem, perpendicular or parallel connections.



6000 Series Printed Circuit Connector: for use with board acting as a plug.



Universal Transistor Socket: eliminates need for socket change when used with transistors of in-line or triangular contact configuration.

ELCO P-C CONNECTORS, SOCKETS, SHIELDS WIN MAJOR ACCEPTANCE

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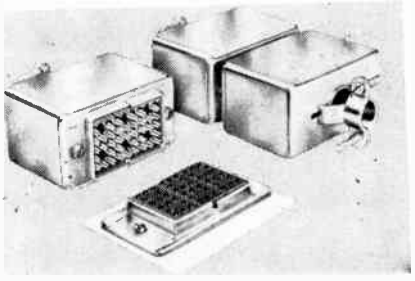
Heat Dissipating Corrugated Shield: allows tube to operate at lower temperature than it would in open air without shield.



8000 Series Varicon Connector: subminiature version of standard Varicon; available in 16, 40 and 48 contact units. Soon: 8, 24, 32, 64, 80 contact units.

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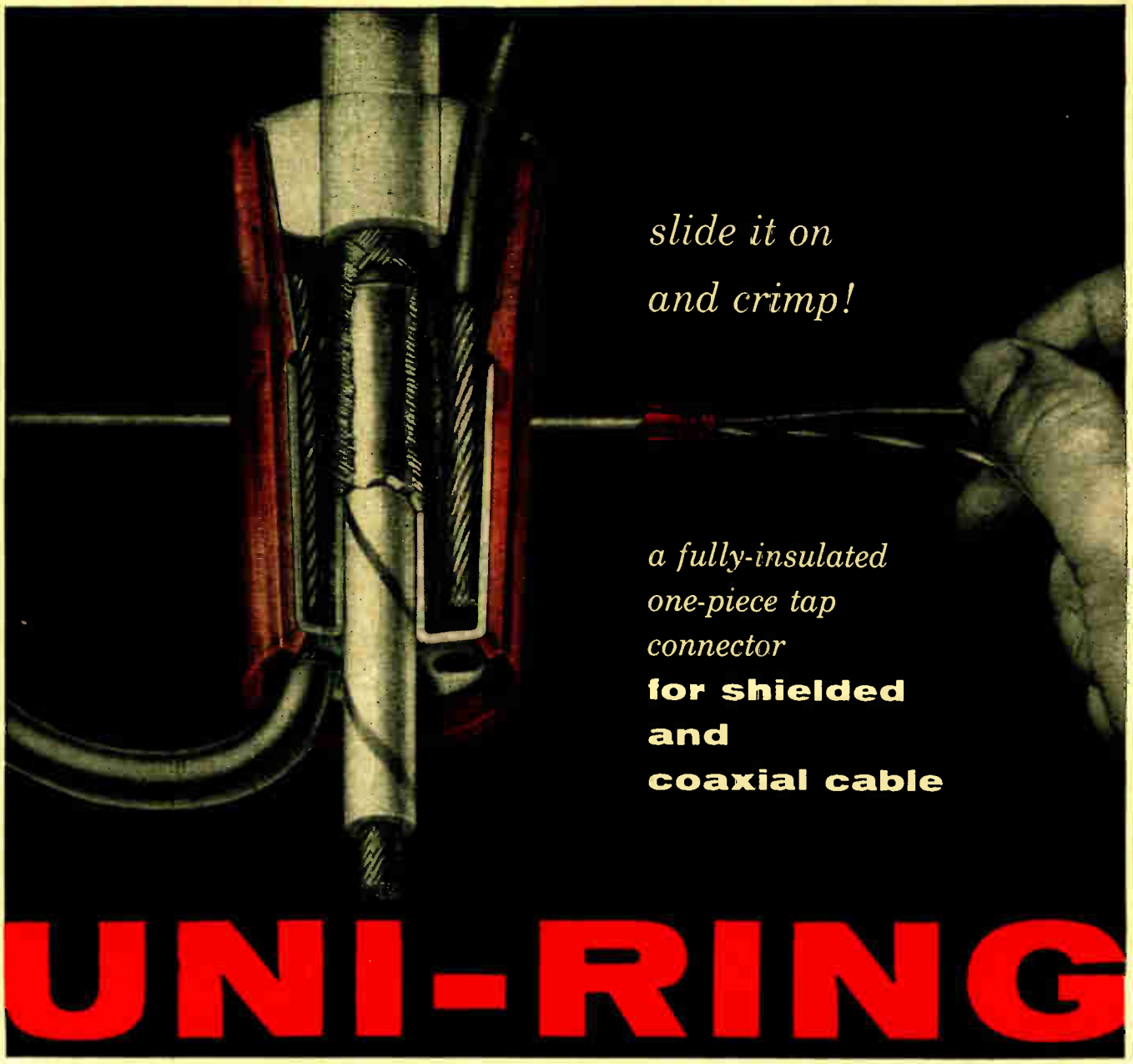

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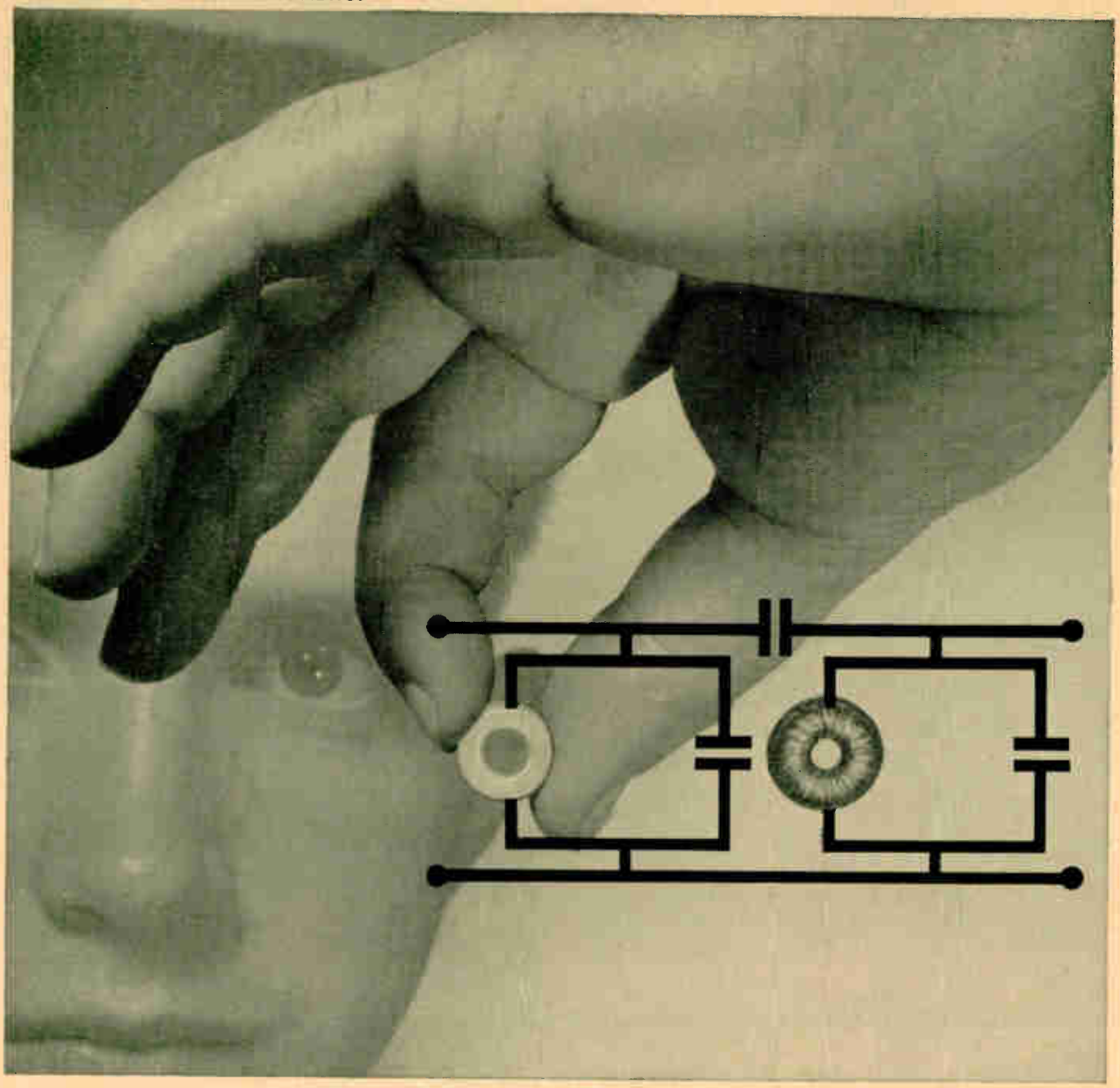
IRE SHOW

BOOTH NUMBER 436



Now you can use molybdenum permalloy powder cores in miniaturized circuits

When your engineering neighbor talks about "Cheerios" these days, he's apt to be discussing a new breakfast cereal-sized molybdenum permalloy powder core which has found a happy niche as a miniaturized filter component. Guided missiles, which are filling the troposphere these days, typically use these little fellows in their amplifier circuits. Small (down to .300-in. ID), they are tough and easy to use. They also provide a markedly high degree of stability with time, temperature and magnetization.

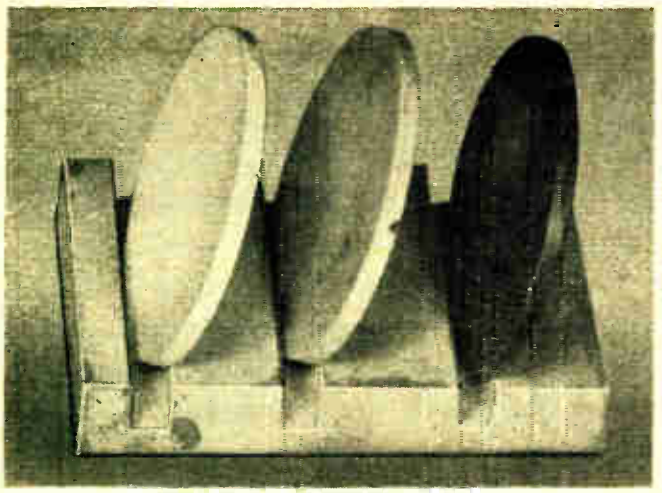
Made by Magnetics, Inc. (Performance-Guaranteed, of course) they provide the highest permeability and lowest core losses possible in use in filter, audio and carrier frequency circuits. We provide extras, too—you may specify our very exclusive feature—color-coding. Color-coding tells your assemblers how many turns to put on your cores without the lost time and extra expense of special testing.

Want more facts? There's a brand new bulletin (PC-103A), full of important information. It's yours by writing *Magnetics, Inc., Dept. EC-35, Butler, Pennsylvania.*

MAGNETICS inc.

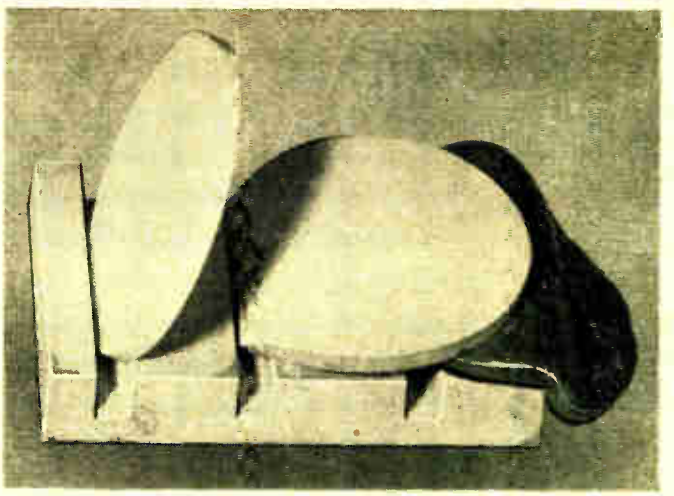
For further data on advertised products use page 101

For further data on advertised products use page 101.



START OF TEMPERATURE TEST

SUPRAMICA* 560 ceramoplastic insulation (Left) is to be compared with SUPRAMICA* 555 ceramoplastic (Center) and MYCALEX 410* glass-bonded mica — the best available materials with comparable properties.



75 MINUTES AT 550° *PLUS* 15 MINUTES AT 650°C

SUPRAMICA 560 ceramoplastic still shows NO NOTICEABLE EFFECT — SUPRAMICA 555 has completely cracked through — MYCALEX 410 has foamed and collapsed.

SUPRAMICA* 560 ceramoplastic

INSULATION FOR CONTINUOUS OPERATION AT 500°C

LIGHTWEIGHT MATERIAL CAN BE MOLDED WITH FRAGILE INSERTS

SUPRAMICA 560 ceramoplastic will free your designs from many of the functional limitations imposed by conventional insulating materials. Manufactured exclusively by Mycalex Corporation of America, SUPRAMICA 560 has the electrical and physical properties to meet exacting high-temperature insulation specifications — **in applications where no other material can be used!**

Proof of this high temperature performance is shown by these unretouched photographs of an actual "slump" test (Above). The characteristics listed at the right demonstrate the versatility of SUPRAMICA 560 ceramoplastic.

Lighter in weight than any comparable material — specific gravity similar to that of aluminum or mineral-filled polyesters — SUPRAMICA 560 is the perfect insulation for relay bases, connectors, tube sockets and many other parts in high-temperature components.

MYCALEX CORPORATION OF AMERICA precision molds this revolutionary new material for your product needs. Send for complete information.

SPECIFICATIONS: SUPRAMICA 560 ceramoplastic

DISSIPATION FACTOR, 1 MEG.	0.003
DIELECTRIC CONSTANT, 1 MEG.	6.8
DIELECTRIC STRENGTH, VOLTS-MIL	400
LOSS FACTOR, 1 MEG.	0.020
VOLUME RESTIVITY, OHM-CM	10^{14}
SPECIFIC GRAVITY	2.8 (Comparable to Aluminum or Mineral-Filled Polyester)
SAFE OPERATING TEMP	
CONTINUOUS	500°C
SHORT-TIME	600°C
WATER ABSORPTION	NIL
HARDNESS, ROCKWELL M	125
THERMAL EXPANSION	12.4×10^{-6} (Same as SAE 1010 Steel)
THERMAL CONDUCTIVITY, CAL-SQ. CM-SEC (°C/cm)	.0015
FLEXURAL STRENGTH, PSI	15,000
INSERTS	WILL ACCEPT ALL MOLDED-IN VARIETIES

MYCALEX
CORPORATION OF AMERICA

GENERAL OFFICES AND PLANT:
CLIFTON BOULEVARD
CLIFTON, NEW JERSEY

EXECUTIVE OFFICES:
30 ROCKEFELLER PLAZA
NEW YORK 20 NEW YORK

SALES OFFICES:
CHICAGO — DAYTON
LOS ANGELES — MIAMI
WASHINGTON

*SUPRAMICA, MYCALEX, and 410 are registered trade-marks of MYCALEX CORPORATION OF AMERICA.
555 is a trade-mark of the MYCALEX CORPORATION OF AMERICA.
SYNTHAMICA is a trade-mark of SYNTHETIC MICA CORPORATION, a subsidiary of MYCALEX CORPORATION OF AMERICA.

WORLD'S LARGEST MANUFACTURER OF GLASS-BONDED MICA AND CERAMOPLASTIC PRODUCTS

For further data on advertised products use page 101.

RETMA Report

By Basil Jackson, A.R.Ae.S., Tech. M.C.A.I.

Radio Fall Meeting For Canada

The 29th Annual Radio Fall Meeting, sponsored by the Engineering Department of the Electronic Industries Association (formerly RETMA of U.S.) and by the professional groups of the IRE and by RETMA of Canada, will be held at the King Edward Hotel, Toronto, Ont., on November 11, 12 and 13. This is the third time that the event has been held in Canada – the last time was on the occasion of the 25th Radio Fall Meeting, in October of 1953.

RETMA Microwave Committee Define Terms

One of the most active of the many engineering committees of RETMA, the Microwave, Radio Relay, and Multiplexing Committee recently compiled a proposed list of definition of microwave terminology for use in its work.

63 Million Television Receivers

Of the world's total of 63 million television sets, 2,658,000 are in Canada, a recent survey reveals. The United States has 44.5 million, and has 500 of the world's total of 900 television stations (Canada has 39 stations).

Outside Canada and the United States, Great Britain has 7,450,000 receivers and 21 stations; West Germany 1,100,000 sets and 39 stations; Russia 3,000,000 sets and 30 stations; Italy 575,000 and 90 stations; Japan has 650,000 and 16 stations; Cuba 300,000 sets and 18 stations; France 600,000 sets and 19 stations, and Mexico has 300,000 sets and 10 stations.

RETMA Industrial Relations Committee Produce Booklet

Information about the Canadian Electronics Industry for the high school student who is planning a career has been prepared and is published by the RETMA Industrial Relations Committee. Entitled "Your Future In Electronics", the booklet describes briefly the industry and lists in detail the various technical jobs in it, both in the civilian and military fields. Non-technical jobs are also described, together with a section on career opportunities for women, and on trade and technical schools conducting electronic courses in Canada.

The booklet is in the process of being distributed across Canada and free copies may be obtained from the RETMA Office, 200 St. Clair Avenue West, Toronto 7, Ontario.

FCC Relaxes Rules On Radiation

Recently the Federal Communications Commission of the United States relaxed its rules governing radiation from radio receivers that tune in the range 30-850 mc/s including television and FM receivers. This was the result of a petition by the Electronics Industries Association (formerly RETMA) of the United States.

Another decision by the FCC which might become accepted as final is the so-called Craven Plan. This would re-allocate television station channels in the United States. The plan would open up assignments to any station that could meet mileage separation requirements and conform to safeguards designed to protect UHF stations from further VHF competition. Geographical areas that are within 250 miles of the Canadian or Mexican borders however, remain as in the old table of allocations. Also unaffected are allocation of educational television stations.

Continued Overpage

RETMA Report

Electronics Division Re-organized

To cope with advances made in the fields of industrial and military electronics the RETMA Electronics Division recently reorganized its structure to provide better service to member companies. Reporting to the Division are the Tariff Committee, Membership Committee, Nominating Committee, Engineering Panel Representative, Government Relations Representative, Public Relations Representative, and the Commercial Representative. The substitution of "representatives" for the older "sections" will facilitate the reporting of the work done by the smaller groups to the division as a whole.

The Engineering Panel Representative has various engineering committees reporting to him. These include the Mobile Equipment Committee, Microwave, Radio Relay and Multiplexing Committee, Television Broadcast Committee, Radio Broadcast Committee, Sound Equipment Committee, and the newly formed Aeronautical Radio Committee, and the General HF Communications Engineering Committee.

In a similar manner, the Commercial Representative has reporting to him the Instrumentation and Data Handling Committee. The organization of the Electronics Division is sufficiently flexible to allow the addition of other committees or representatives as required.

29th Annual Meeting Location Announced

At a recent Board of Directors meeting it was decided to hold the 29th Annual Meeting of RETMA of Canada at "Bigwin Inn", Lake of Bays, Muskoka, Ontario on June 19 and 20, 1958.

Basic Patent On Radar Granted In U.S.

A fundamental patent for radar was granted recently by the United States Patent Office to Colonel William R. Blair, a retired Army Signal Corps scientist. Under the terms of the patent grant, the United States Government has a royalty-free license.

According to a news report, the pulse-echo method of direction finding and ranging was conceived prior to 1930 by Colonel Blair. The method was developed by the Signal Corps Laboratories, Fort Monmouth, N.J., during the 1930's. A complete workable radar set was demonstrated to the Secretary of War and to members of Congress in the early part of 1937 and the plans were given to manufacturing companies to build radar equipment for the Army. For security reasons a patent application was not filed by the Army Signal Corps until June 1945 and the application had been under consideration by the U.S. Patent Office until the recent issue of the patent.

Color TV Servicing Handbook Available

The National Advisory Council of Town Meetings has a limited number of color television circuit analysis handbooks left over from the 1957 series of Town Meetings of Service Technicians. The handbook includes an explanation of colorimetry and of the National Television System Committee standards. Copies of this useful handbook for television service technicians may be obtained at $1.00 each from the National Advisory Council of Town Meetings, Room 410, 200 St. Clair Avenue West, Toronto 7, Ont. Orders should be prepaid; no C.O.D. orders are acceptable.

Plan To Attend

IRE Canadian Convention & Exposition

This is the one time during the year when all the electronics industry in Canada meets. Where the latest electronic and communication equipment will be on display. Where the latest Canadian electronic engineering achievements will be discussed by competent authorities. It is your opportunity to meet customers and friends.

Yes, we are rolling out the red carpet again to help make the 2nd Annual IRE Canadian Convention and Exposition bigger, better and more interesting than ever.

Make A Date To Be There On...

OCTOBER 16-17-18, 1957

ELECTRONICS AND COMMUNICATIONS

The pioneer journal in the field

This is Your Registration Form

●

Tear Out, Fill In, Bring With You.

Wed. Oct. 16 — 9:30 a.m. to 10 p.m.
Thurs. Oct. 17 — 9:30 a.m. to 6 p.m.
Fri. Oct. 18 — 9:30 a.m. to 10 p.m.

1957 IRE CANADIAN CONVENTION AND EXPOSITION
OCTOBER 16, 17 and 18, 1957
AUTOMOTIVE BUILDING, EXHIBITION PARK, TORONTO

REGISTRATION PLEASE TYPE OR PRINT

PLEASE COMPLETE:

Registration Fee

IRE
☐ Member $1.00 $

Reg'd Professional Engineer $1.00 $

☐ Other $1.50 $

☐ Speaker (no fee)

Session Chairman (no fee)

(PLEASE CHECK ITEMS ON REVERSE SIDE)

1. NAME
   Surname First Name and/or Initials
2. COMPANY OR ORGANIZATION
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6. HOTEL OR LOCAL ADDRESS WHILE AT CONVENTION

PLEASE DO NOT MAIL BUT PRESENT UPON ARRIVAL

ELECTRONICS AND COMMUNICATIONS

The Pioneer Journal in the Canadian Field hopes that all members of the IRE and others among its readers attending the 2nd Canadian IRE Convention and Exposition will visit Booth 429 to meet the Editorial and Advertising staffs.

For five years now we have been talking to you through the columns of Electronics and Communications and, indeed, in this period of time have met many of you personally. We look forward to meeting our old acquaintances and making many more new friends at the forthcoming show.

Be sure to ask for a copy of the amusing booklet titled "What Are Engineers Really Like". This is the booklet that made such a hit with Engineers (their wives, too) in all parts of Canada and the United States. A second edition has been printed for distribution at the show.

PLEASE CHECK (✓) THE APPROPRIATE SQUARE OR SQUARES IN EACH COLUMN

YOUR OCCUPATION
- ☐ Management
- ☐ Consultant
- ☐ Engineering
- ☐ Production
- ☐ Operation
- ☐ Research
- ☐ Technical Writer
- ☐ Technician
- ☐ Sales
- ☐ Advertising
- ☐ Purchasing
- ☐ Teacher
- ☐ Student
- ☐ Other (Specify)

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YOUR BUSINESS
- ☐ Research
- ☐ Design
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- ☐ Communications
- ☐ Publishing
- ☐ Armed Forces
- ☐ Crown Company
- ☐ Govt. Department
- ☐ Manufacturing
  - ☐ Electronic
  - ☐ Nucleonic
  - ☐ Other
- ☐ Other (Specify)

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1957 IRE CANADIAN CONVENTION

Canada's Largest Scientific Assembly and Exposition!

men who make a "science of service"

They are the Canada Wire engineers who spend much of their time on location, at the heart of the problem where engineering begins.

R. L. Brereton,
Head;
Development Laboratory

Denny Vaughan and Joan Fairfax
Stars of "The Denny Vaughan Show"

"backstage" at a TV studio

Here is a different kind of "back stage", away from the glare and gaudiness of lights and scenery. This is the electronic heart of TV communications where tubes and amplifiers, circuits and resistors perform their intricate specialties for a critical audience of technicians.

There is an axiom in television that there are *no second chances*. Performers, cameramen, producers and engineers all must play their parts with split-second perfection.

This is as true for equipment as it is for performers. TV technicians therefore require maximum efficiency from their equipment. That is why Canada's radio and television industry can rely on CW-Telcon radio frequency cables for the latest in design and development and the utmost in efficient performance. Canada Wire produces a full range of high frequency balanced and coaxial cables to the most exacting specifications . . . to perform correctly the *first time* and *every time*.

Visit our Booth 529 at the I.R.E. SHOW

TRADE MARK REG'D.

Canada Wire and Cable Company Limited

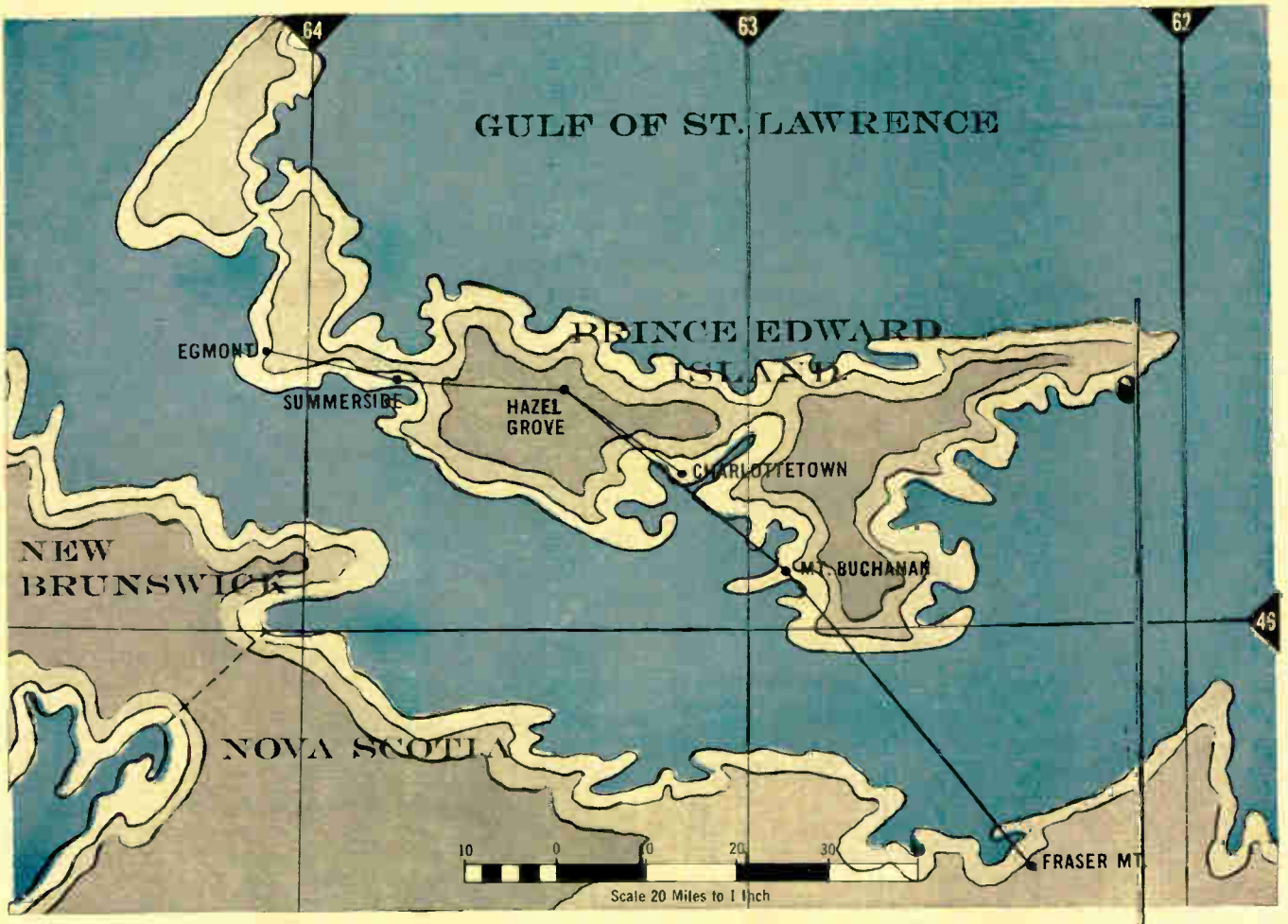
Factories:

TORONTO • MONTREAL • FORT GARRY • VANCOUVER

A Canadian Company Manufacturing and Selling Coast to Coast

57-91

For further data on advertised products use page 101.



Canadian Telephone Companies order Collins Microwave Systems

The Island Telephone Company installs Collins system on Prince Edward Island to replace wire lines, with over-water link to Nova Scotia main land . . . connecting with Collins system owned by Maritime Telegraph & Telephone Limited

On January 6th 1956. a severe storm and icing condition destroyed virtually all wire-line communications on Prince Edward Island. Replacement costs ran into hundreds of thousands of dollars, with service badly disrupted.

Determined that this should not occur again, Engineers at Maritime Telegraph & Telephone Company Ltd. and The Island Telephone Company Ltd.. began to lay plans for a modern microwave installation. Having had extensive previous experience with radio systems of many types, the Engineering personnel were in an excellent position to thoroughly analyze the available systems, and a contract was awarded to Collins Radio of Canada.

Two separate systems are involved, one originating at Fraser's Mountain, Nova Scotia, and terminating at Charlottetown, Prince Edward Island, via two repeaters, the other linking Egmont with Charlottetown via two repeaters.

Unique features include a dual space-diversity overwater path, the transmission of high fidelity multiplex channels for C.B.C. network use and assured circuit continuity through the use of battery-powering and instantaneous hot standby equipment.

These Engineers chose Collins for excellent reasons. Collins Sales Engineers will be pleased to discuss these reasons with you, and to demonstrate the benefits to be derived through the use of these or other Collins quality communications products.

Dual space-diversity overwater path

Collins CREATIVE LEADER IN COMMUNICATION COLLINS

COLLINS RADIO COMPANY OF CANADA, LTD., 11 BERMONDSEY ROAD, TORONTO 16, ONTARIO

For further data on advertised products use page 101.

For further data on advertised products use page 101.

Electronics
AND
Communications

Volume 5 | September 1957 | Number 9

A Temporary Set-Back For The DEW Line

One of the most spectacular moves that has been made in the game of international power politics that has been in progress between the Western nations and the U.S.S.R. during the years since the last war was the recent announcement by Russia that her scientists had developed and successfully tested an intercontinental ballistic missile.

While many may have hoped that this announcement would eventually be labelled by Western authorities as an exaggeration of fact, those who have expressed an opinion on the matter have spread little comfort but, on the contrary, have stated their belief that Russia most likely has successfully tested such a weapon.

Whether the timing of the Russian announcement was accidental or planned it could not have come at a more advantageous time insofar as knocking the wind out of the United States and Canadian announcement that — after long years of laborious work and the expenditure of 600 million dollars—the Distant Early Warning radar complex in the far north was ready to go into operation.

It is more than ironic that this vast array of radar stations should have been pronounced ready for operation practically on the eve of the Russian announcement, the significance of which makes the whole of the DEW line radar apparatus obsolescent. But the situation is surely not as black as it would appear to be.

While the radar equipment fitted in the far north installations may be inadequate to provide sufficient warning of the approach of an intercontinental missile it should be borne in mind that if any device is to be developed that will detect this weapon it will be born of an extension of knowledge of the science of radar. Bearing this in mind it is comforting to recollect that when such equipment is produced it will not again be necessary to face the prodigious task of erecting buildings in which to house it, this by reason of the logical presumption that when adequate radar counter-measures against the I.C.B.M. are available they will be fitted in existing installations.

Although there is little joy in the knowledge that our present radar equipment is not capable of coping with the I.C.B.M. there is, on the other hand, some consolation to be found in the fact that the most costly and difficult to build portion of our northern radar defenses, the installation facilities themselves, have not lost their usefulness. Measured by the unit of time alone that it would take to replace these installations, a commodity that cannot be bought in time of emergency, it may be said that, both from an economic and strategic standpoint, our northern radar defenses have suffered only a temporary setback.

It is, we believe, a little premature to label the DEW line as a North American Maginot Line. What is needed now to refute this rhetorical analogy is a radar counter-measure against the I.C.B.M. and in the light of past achievements we are among those who believe that such a counter-measure will be found.

Planning For Adequate Communications

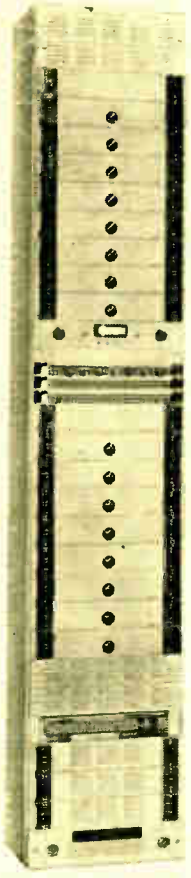
With the knowledge that the rapidly-mounting pace of international air traffic is placing a strain on existing communications services and air navigation aids, and that the jet aircraft which will be flying in the next few years will be even more demanding, technicians representing some forty countries and international organizations began a five-week meeting at the headquarters of the International Civil Aviation Organization in Montreal recently. The meeting is the sixth session of the ICAO Communications Division; it will concern itself both with immediate problems which already-developed communications and navigation techniques and equipment can handle, and with exchanges of views to help the development in the future of such things as long-range air navigation aids, the use of high-speed systems for transferring information from ground to air, and the practical impact of information theory on the development of aeronautical communications.

The Division will devote considerable attention to the problems of radio-telephone procedures. During the past few years the radio telephone has been displacing telegraphy for air/ground communication; recently in some sections of the world, this has been supplemented by a device known as SELCAL which rings a bell in the cockpit when the aircraft is called, simplifying the pilot's work by making it unnecessary to maintain a constant radio watch. Now that regional trials and studies have taken place, both of radiotelephony and of SELCAL, procedures must be decided upon for world-wide application.

The present plan by which aeronautical mobile radio frequencies in the very-high frequency band are allotted applies only until the end of this year. With increasing communications demands more channels are becoming necessary, and these may be obtained by decreasing the spacing between channels. The Division will prepare a detailed allotment table for use from 1958 onwards.

Other items on the Division's agenda include the development of international standards covering the technical requirements for primary and secondary surveillance radar used for air traffic control purposes, and for a new technique of improved communications known as single sideband; the development of procedures for the flight testing of the VHF Omni-directional Radio Range (VOR) short range navigation aid and for the ICAO standard instrument landing system; and the possibility of extending the dates during which the ICAO Standards guarantee that certain air navigation aids will not have to be replaced by newer systems.

Information concerning the work of the Division may be obtained from the Public Information Office, International Civil Aviation Organization, Montreal 3, Canada



Bayside equipped with 16 channels.

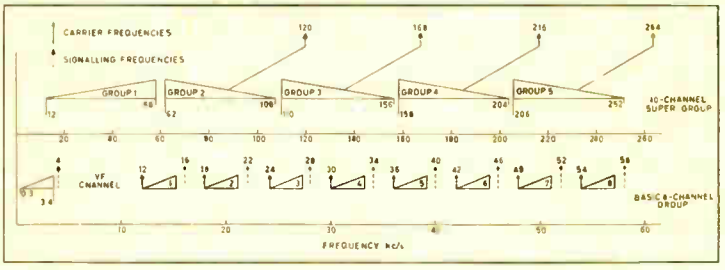
. . . for use on RADIO LINKS

TMC 40-CHANNEL CARRIER TELEPHONE SYSTEM R40A.

The TMC R40A system provides up to 40 high quality wideband telephone channels (300-3400 c/s) with inbuilt outband ringdown signalling and 2 or 4 wire strapping options. The use of 6 kc/s channel spacing and other design features results in a compact and low cost system.

A fully equipped terminal comprises three bayside mounting channels, 1-16, 17-32 and 33-40 respectively, each measuring 9 ft. x 20½ in. x 6½ in. A pair of baysides (32 channels) can be mounted back to back to occupy no more floor space than a double sided standard 20¼ in. apparatus bay.

Each bayside is self-contained with carrier supplies, power pack, alarm and metering facilities. Any number of channels can be installed initially and easily extended to meet traffic growth by plugging in channel panels or adding a bayside. The radio connections are 75 ohm (unbalanced). The transmit level is –37 dbm and receive level –8 dbm.



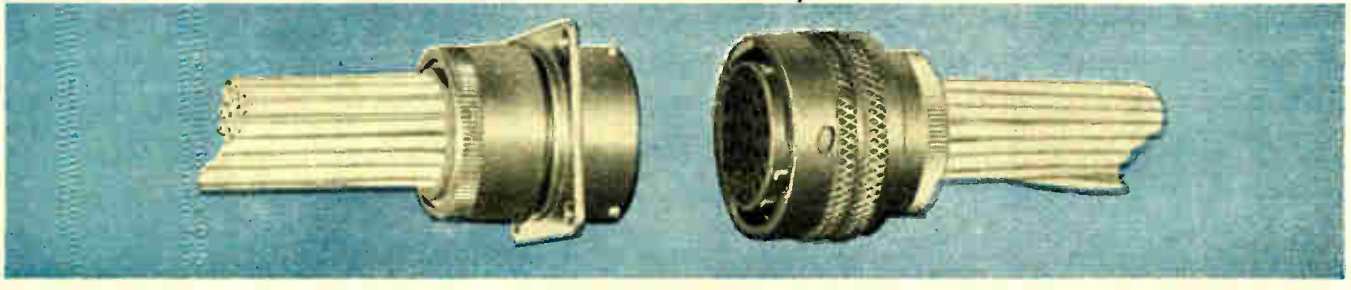
For full technical data apply Dept. EC.

TELEPHONE MANUFACTURING CO. LTD.

SAXONY BUILDING: 26 DUNCAN STREET, TORONTO. Telephone EM. 6-5314

TMC TRADE MARK

Bendix "PT" PYGMY ELECTRICAL CONNECTOR WITH 5-KEY POLARIZATION, 3-POINT LOCK



Positive locking feature eliminates safety wiring

The new Bendix* "PT" connector represents the greatest advance yet achieved in miniature connector design. It incorporates more exclusive features than any miniature connector on the market. Here are a few of the things that make the Bendix "PT" outstanding in the connector field today:

- Safety wiring completely eliminated
- Mechanically assisted coupling and uncoupling through cam action
- Visual and audible inspection of coupling—perfect for "blind" locations
- Three-point bayonet lock; perfect axial alignment of mating parts at all times
- Constant spring tension behind mated insert faces
- Five key polarization—positive protection against mismating or cross-plugging
- Resilient inserts, performance-proved in millions of Bendix connectors over the past ten years
- Heavy gold plating over silver on all contacts
- Closed entry, probe-proof socket contacts
- Both pin and socket contacts machined from high-grade copper alloy
- Machined bar stock or impact-extruded shell components cadmium-plated to QQP-416; olive drab iridite after treatment

"PT" connectors accommodate about three times as many circuits, size for size, as comparable "AN" connectors. Like so many Bendix products, they are a result of the traditional Bendix policy of anticipating the needs of the aviation industry, in this case the trend to higher voltages and smaller conductors. *TRADEMARK

Bendix **SCINTILLA DIVISION of** SIDNEY, NEW YORK

Bendix AVIATION CORPORATION

Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

FACTORY BRANCH OFFICES:

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Canadian Representative: Aviation Electric Limited, 200 Laurentien Blvd., St. Laurent, Montreal 9, Quebec

For further data on advertised products use page 101.

MODEL 372 SLIDING COAXIAL TERMINATIONS

This equipment, available only from Narda, provides the most convenient means for evaluating the residual VSWR of coaxial slotted lines. VSWR of the element is 1.05 or less; covers range from 2000 to 12,400 mc.

N Connector, male or female **$110** C Connector, male or female **$116**

MODEL 371 FIXED COAXIAL TERMINATION

This Narda coaxial termination is the first and only to cover the entire frequency range from S to X band. Same range and element VSWR as above.

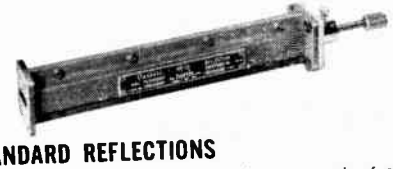
N Connector, male or female **$55** C Connector, male or female **$58**

3, 6, 10 and 20 DB

40 DB HIGH POWER

HIGH DIRECTIVITY COUPLERS

The 40 db High Power Coupler is another exclusive Narda product. Similar to standard types, except that the coupling irises are in the narrow wall, it may be used at the full rated power of the waveguide size. Nominal coupling value is 40 db; directivity 40 db. Directivity for 3, 6, 10 and 20 db couplers is also 40 db. Standard cover flanges on primary line; low VSWR termination and standard cover flange on secondary.



STANDARD REFLECTIONS

Narda offers five values of reflections for each of six different waveguide sizes . . . the most complete choice we know of! Provides calibrated reflections or VSWR's for use in standardizing reflectometers or calibrating slotted line impedance meters.

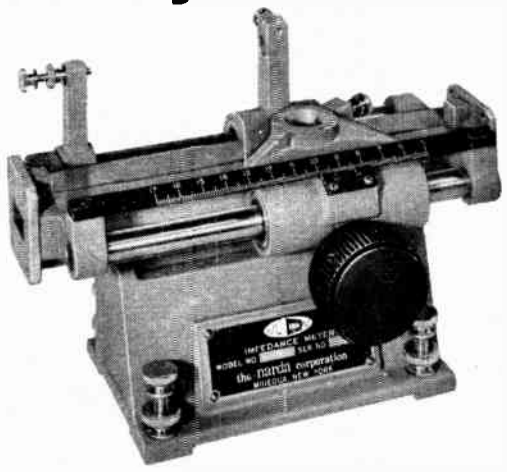
SPECIFICATIONS

Reflection Coefficient	0.00	0.05	0.10	0.15	0.20
Accuracy	0.002	0.0025	0.0035	0.0045	0.007
VSWR Equivalent	1.00	1.105	1.222	1.353	1.50

Models for 2.60 to 18.0 kmc, from $125 to $300

Microwave engineers—

Where can you use these exclusive features offered by narda?



Waveguide and Coaxial IMPEDANCE METERS

Exclusively in Narda Waveguide and Coaxial Impedance Meters, the carriage mounting and drive mechanism are integral with the precisely machined transmission line casting. This insures permanent accuracy and freedom from slope errors—no more tedious adjustment or possibility of misalignment.

Other features include angle-mounted scale and vernier for optimum visibility; readily removable supporting pedestal; and smooth carriage travel action. Waveguide models, accurate for VSWR's of 1.01, are available for complete coverage from 2600 to 18,000 mc; N or C Connector coaxial models, from 1500 to 12,400 mc.

WAVEGUIDE IMPEDANCE METERS

Frequency (kmc)	Narda Model	Residual VSWR	Price
2.6 — 3.95	224	1.01	$425
3.95— 5.85	223		350
5.3 — 8.2	222		325
7.05—10.0	221		270
8.2 —12.4	220		250
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1.5 to 12.4	Series N	231	$360
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DIRECTIONAL COUPLERS
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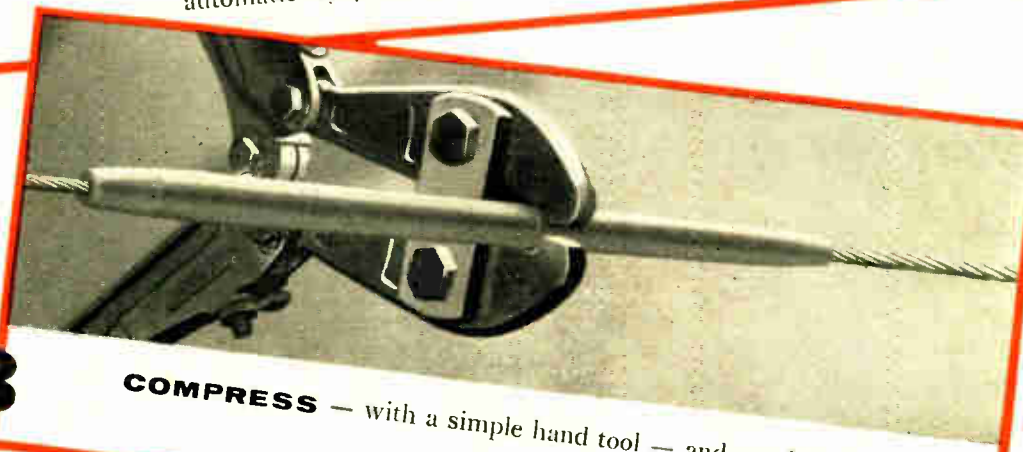
SIMPLE AS ABC

A **INSERT ACSR into UNIJOINT.** The notch at centre automatically positions conductor ends.



B **COMPRESS** — with a simple hand tool — and you have . . .

C **AN ECONOMICAL FULL TENSION JOINT** automatically sealed with special Unigrip Jointing Compound; no inner steel sleeve is required.

ALCAN UNIJOINT FOR ACSR

SIMPLIFIES LINE WORK INSTALLATION . . . REDUCES TIME, LABOUR AND MATERIAL COSTS . . . PROVIDES 100% JOINT EFFICIENCY

UNITERMS for dead-ending and jumpering are also available. For complete information on the advantages of these revolutionary new *one-piece* joints, ask your ALCAN Sales Office. A personal demonstration can be arranged at your convenience.

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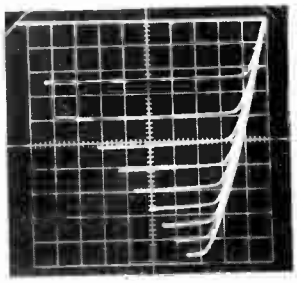
NEW TRANSISTOR-CURVE TRACER

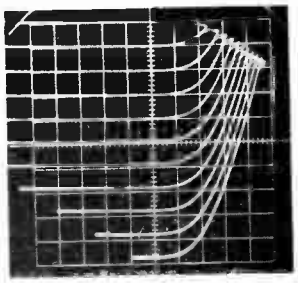
has 10-AMPERE COLLECTOR SUPPLY 2.4-AMPERE BASE SUPPLY

Displays 4 to 12 curves per family with input current from 1 MICROAMP/STEP to 200 MILLIAMPS/STEP



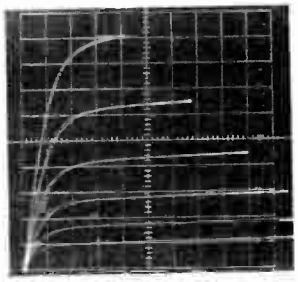
HIGH COLLECTOR CURRENT

PNP transistor, collector current vs collector voltage with constant-current base steps. Collector sweep is 0 to 5 v with a 0.25-ohm load, base current is 50 ma/step. Vertical deflection is 1000 ma/div, horizontal 0.5 v/div.



HIGH INPUT CURRENT

PNP transistor, collector current vs collector voltage with base grounded and constant-current emitter steps. Collector sweep is 0 to 1.5 v, emitter current 200 ma/step. Vertical deflection is 200 ma/div, horizontal 0.1 v/div. Zero voltage is at center scale.



LOW INPUT CURRENT

NPN transistor, collector current vs collector voltage with constant-current base steps. Collector sweep is 0 to 1.5 v, base current 1 microamp/step. Vertical deflection is 10 microamp/div, horizontal 0.1 v/div.

The Tektronix Type 575 traces characteristic curves for both PNP and NPN transistors on the face of a cathode-ray tube. Seven different types of curves can be plotted. Vertical deflection is calibrated in collector current, base voltage, base current and base source voltage. Horizontal deflection is calibrated in collector voltage, base voltage, base current and base source voltage. Collector current supply is capable of 10 amperes from 0 to 20 v, 1 ampere from 0 to 200 v. Constant current or constant voltage step supply to either base or emitter is calibrated in 17 values from 1 microamp/step to 200 milliamps/step, and in 5 values from 0.01 v/step to 0.2 v/step with 24 values of driving resistance from 1 ohm to 22 kilohms. Input steps are adjustable from 4 to 12 per family, with repetitive or single-family display.

TYPE 575 TRANSISTOR-CURVE TRACER . . . **$925**

f.o.b. Portland, Oregon

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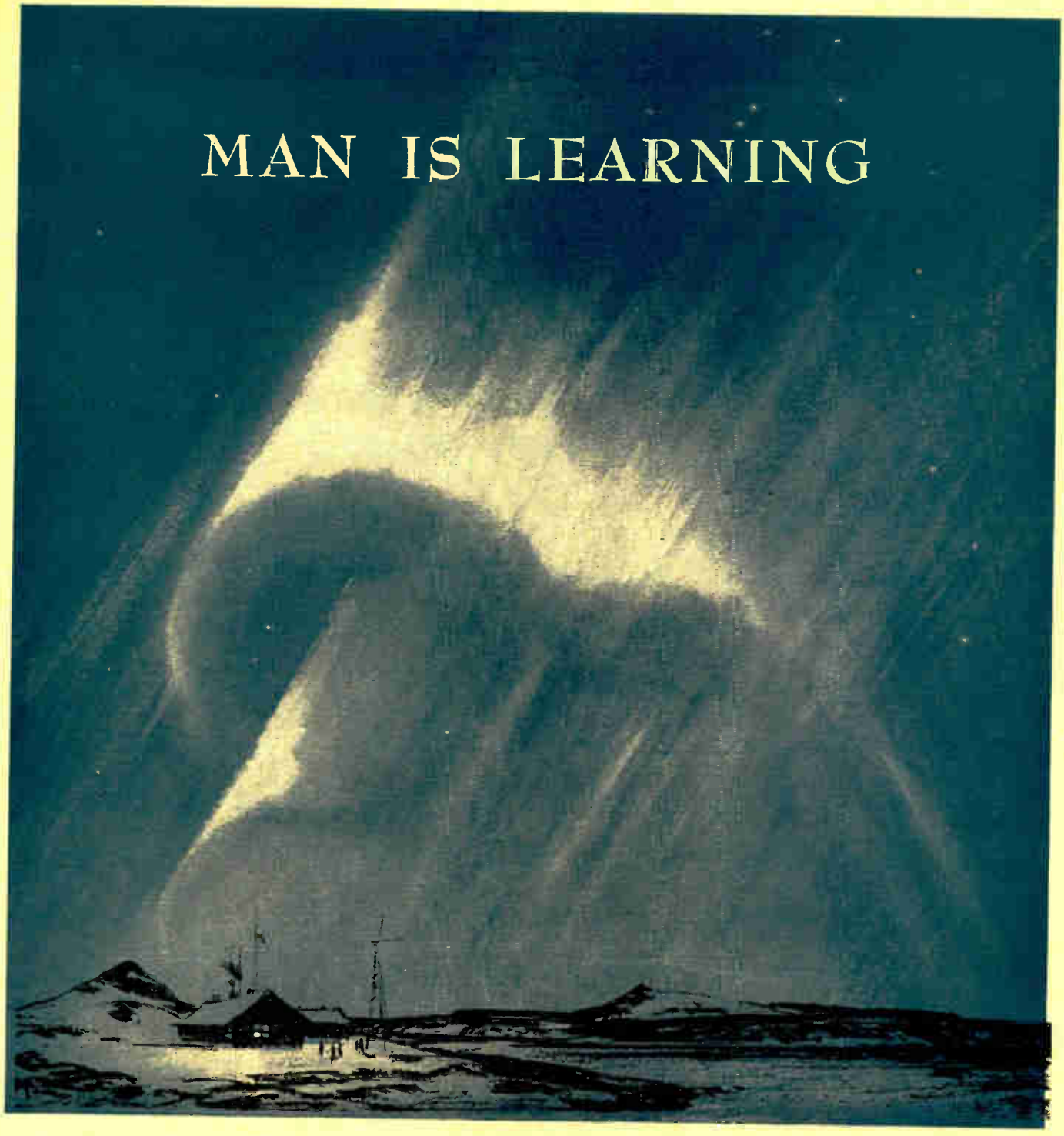
INTERNATIONAL GEOPHYSICAL YEAR BEGINS IN 1957



MAN'S unceasing quest for more knowledge of space and his world will continue with new vigour during the International Geophysical Year. Of the 43 countries uniting to make simultaneous observations, Canada's contribution will be significant for its studies of the ionosphere and of changes in the earth's magnetic field. Canadian Applied Research Limited is honoured to work with the Canadian scientists. Such new and unique instruments as the Auroral Recorder, the Stationary Magnetometer and a recording camera were engineered and produced for the project by Canada's leading instrumentation firm.

CANADIAN APPLIED RESEARCH LTD

(formerly PSC Applied Research Limited)

1500 O'CONNOR DRIVE, TORONTO

MEMBER : A. V. ROE CANADA LIMITED & THE HAWKER SIDDELEY GROUP

Expanded line of stock Sola transformers regulate filament loads up to 25 amperes

Sola Constant Voltage Filament Transformers are now available *from stock* in six different output ratings from 2.4 to 25 amperes. Now, even sizable banks of electron tubes may be supplied from one compact source of ±1% regulated filament voltage.

Because of the current-limiting characteristics of Sola transformer design, cold filament inrush current is restricted to a safe level at loadings within 75-100% of the transformer's full-load current rating.

The static-magnetic Sola filament transformer, furnished with separate capacitors, is designed for simple mounting as a component of manufacturers' products. The dependable tube performance and longer filament life these units offer is available at only a moderate increase in cost over conventional filament transformers.

For further information and specifications, contact your Sola representative, or write for Circular CVF-269.

SOLA *Constant Voltage* **TRANSFORMERS**

SOLA ELECTRIC CO.
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102 Laird Drive
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SEE SOLA REGULATING PRODUCTS AT BOOTH E-8, TORONTO IRE SHOW

For further data on advertised products use page 101.

Congratulations:

Canadian IRE Convention & Exposition

In 1956 the Institute of Radio Engineers planned and organized what may be described as an exceedingly memorable scientific convention and exposition.

It is our job to see that the operation which will be held in October, 1957, will mark an even greater Canadian achievement.

The radio engineers of Canada have made a great and valuable contribution to the development of many products and new methods of manufacture during the past quarter of a century. Within the last few years, in various major fields, achievements have become exceedingly spectacular.

From the days when the vacuum tube was electronics and electronics was the vacuum tube, the definition of the science of using tiny particles known as electrons has had to be expanded to include new semi-conductors and other recently developed and applied materials which enable electric current to be rectified, amplified and to be controlled with the minutest accuracy.

In Canada today, we are starting on the last lap of our trans-continental microwave system. For defense purposes we have constructed our far-flung radar screens. From its Arctic pioneering installations has come the commercial application of tropospheric forward scatter.

Electronic devices are filling a vital role in the control of the nuclear power plants which are in process of construction or already operating in Great Britain, Canada and the United States.

Rugged components are arriving in increasing numbers for use in intercontinental ballistic missiles. The use of electronic "inchworm" actuators on feed mechanisms in the metal working trades has been described as a chapter in industrial history.

There is the programmed control of machines, processes and operations; electrically operated printers are turning out an ever-increasing mileage of the products of data processing devices.

In time we shall have transatlantic television. We already have television to facilitate the monitoring of traffic at highway grade crossings, to record the serial numbers on moving railway freight cars, for watching developments inside nuclear reactors and in other equipment where hazard or the nature of construction do not permit of ready access.

These are a few of the many electronic applications which are found in industry today. It does not take much imagination to foresee that the next half-century will witness a miracle of transformation of all industry by those twin giant particles, the electron and the atom.

The I.R.E. is playing a conspicuous part in the progress which Canada and Canadian engineers are making in this challenging and spectacular field.

Colonel R. D. Harkness,
Northern Electric Company Limited.

It is a great pleasure to congratulate the Canadian Sections of the Institute of Radio Engineers on the occasion of the second Canadian Convention. The first convention in 1956 was a milestone in the technological and industrial development of Canada. The decision to hold a 1957 convention is ample evidence of the growing maturity of electronics in this country.

Communications, which is possibly the oldest branch of the art, is still an area in which great achievements are taking place. Electronic engineers can number among their recent accomplishments the completion of the Dew Line and the new Trans-Atlantic Cable. Nevertheless, it is significant that the 1957 convention program points up the increasing importance of electronics in many fields other than the one from which the I.R.E. originally grew. The emphasis on data processing, nucleonics, medical electronics, and indeed the great contribution that electronic engineers are making to the International Geophysical year, emphasizes the permeating influence of electronics throughout all of science and industry.

The exposition which runs concurrently with the convention technical program is tangible proof both of the great contribution which electronic engineers are making to the electronic industry and of the contribution which the electronics industry is making to Canada. The program for this year's convention makes it evident that, impressive as past contributions have been, they provide only a glimpse of the important developments which are to come and in which Canadian engineers will play an increasingly influential role.

R. M. Brophy,
President,
Philips Canadian Industrial
Development Company Limited.

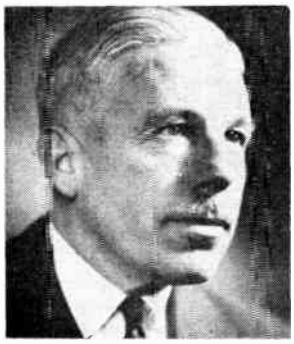
The study and application of electronics in all its phases has become an extremely valuable tool in the shaping of our daily lives. In the field of communications, in particular, the public is very cognizant of the important contribution of electronics. It is also apparent that communications, by all means known to us, are assuming an ever increasing importance in our affairs, be they local, national or international.

It is, therefore, very fitting that a forum for the discussion and exchange of ideas concerning electronics and communications should be provided in conjunction with an exposition for the display of the products of industry. The scientist, the engineer, the manufacturer and the layman will benefit from the opportunities offered at this meeting.

The Institute of Radio Engineers is to be congratulated on its initiative in arranging such a Convention. The original meeting in 1956 was a success, and with this encouragement the plans for 1957 will provide accommodation for additional exhibitors. With the co-operation of industry and various technical societies, it is to be expected that the second convention will be an outstanding success.

V. A. McKillop,
General Manager,
The Public Utilities Commission,
London, Ontario.

Canadian IRE Convention And Expositon



The I.R.E. Canadian convention, under the sponsorship of the Canadian Section of the Institute of Radio Engineers, has, in a very short time, become recognized as the "show window" of the electronics industry in Canada.

Attractive exhibits alone would not be the reason for the leading position that this "show" has won but, when attractive exhibits were combined with a program of excellent technical papers, then success was assured.

Today the use of electronic equipment, applying known principles and with presently available components, has developed into one of the four largest industries. While the electronics industry is well-established in years, it is one that has just started to grow. Horizons within the industry today are continually being rolled back and broadened. In fact, the future developments seem limitless.

This industry is one which demands a sound core of highly trained and skilled people, who are capable of dealing with not only today's knowledge of the electronic art but who will, and can, go forward to further developments.

The electronics industry today has the highest ratio of design and development engineers and technologists of any of the major industries. Such people backed up by an army of production and merchandising people, whose dexterity makes possible the "carrying through" of the designs of the technical group, are a well-rounded team who make the designs and developments of the drafting board and laboratory available in useful form for the better living and comfort of all mankind.

A catalog of electronic developments, uses, and products would be a monumental work. It can be truly said that we live in an electronic age, and as the future unfolds we will live more and more under the influence of electronic developments. May these uses and developments be directed toward the improvement and welfare of mankind!

John H. Fox, P.Eng.,
Vice President Sales,
Honeywell Controls Limited.

It is a pleasant privilege to extend the good wishes of all our members to the IRE Canadian Convention. All our Regional conferences are growing in importance and this is particularly conspicuous in Region 8 where it combines aspects both regional and national. The IRE can only consider it possesses an international character when it sponsors meetings on a national scale in a number of countries.

I believe this conference in Region 8 is already firmly fixed in the minds of many people outside the Region and outside our own membership as an appropriate meeting ground for ideas and new technology of particular interest to Canadians. The unique radio problems of the Region make such a conference peculiarly useful and one deserving our interest.

I am sure the IRE members of Region 8 will support the Convention with its accompanying exhibits and trust each year will see a goodly number of returning visitors.

Our thanks are due the Convention organizers, the authors of papers and the exhibitors. To them and all their visitors go the best wishes for success.

John T. Henderson,
President,
The Institute of Radio Engineers.

On behalf of Canada's Armed Services, I am grateful for this opportunity of appearing as one of the guest editors for your publication.

Communications and electronics have been an increasingly important factor in the development of the Canadian Forces. During the past four years, the annual Defense Budget has allocated an average of $45,000,000 to the purchase and development of communications - electronics equipment, or 10 to 13 per cent of the total estimates spent on military equipments of all types.

Canadian industries are demonstrating their capabilities most ably in meeting the demands placed upon them by the Services as the result of the ever increasing need for more and better communications - electronics equipment to fulfill the requirements of the armed forces in the nuclear age.

It is my feeling that we will be dependent to a large extent on our abilities and capabilities in this field to continue the development of the weapons necessary to maintain the peace. Therefore, the Canadian Forces are looking to Industry for development and refinements of equipment needed for such projects as: data processing systems; radars for surveillance and fire control; improved communications equipment to enable the Forces to cope with the problem of more extensive use with increased traffic but with a decreasing availability of frequencies; facsimile for transmission of maps and intelligence data; television for surveillance and briefing purposes; improved navigational aids; and the conduct of electronic warfare and electronic counter-measures.

The equipments to meet the above requirements must be durable, compact, lightweight, economical to operate, reliable, easily maintained, capable of mass production at the lowest possible cost.

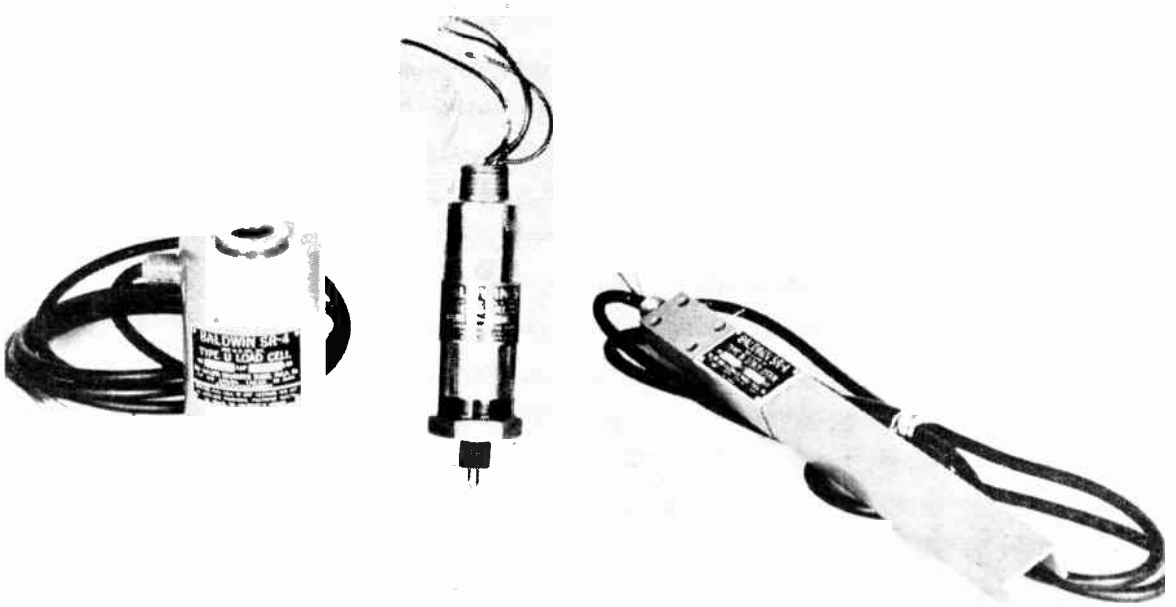
This is the challenge that we in the Services extend to you of the Communications-Electronics Industries.

General Charles Foulkes,
Chairman, Canadian Chiefs of Staff,
Department of National Defense.

Each succeeding year serves to emphasize the increasingly important part played by the Canadian Electronics Industry. New applications occur continually, and industry is meeting the challenge admirably.

This success is not achieved by merely following the lead of others. It is the result of meeting problems of development, design, and production with ingenuity and originality. Canadian scientists and engineers have demonstrated amply their creative ability, and their achievements are recognized throughout the scientific world. But however competent they may be, their accomplishments are facilitated by a generous interchange of ideas, and the I.R.E. Convention and Exposition is one of the more important mediums which make this possible. It serves also to publicize not only the industry but the men who comprise that industry. The first convention and exposition, held last year, was a pronounced success, and the 1957 convention promises to be even more significant. It provides a forum for scientists, engineers, and industry, and we at the National Research Council of Canada are happy to participate.

B. G. Ballard,
Director, Radio and Electrical Engineering,
National Research Council of Canada.



● *Fig. 1* Typical load cells used for weight measurement.

Load Cells Solve Industrial Weighing Problems

By David Vandeventer
Leeds and Northrup Co.

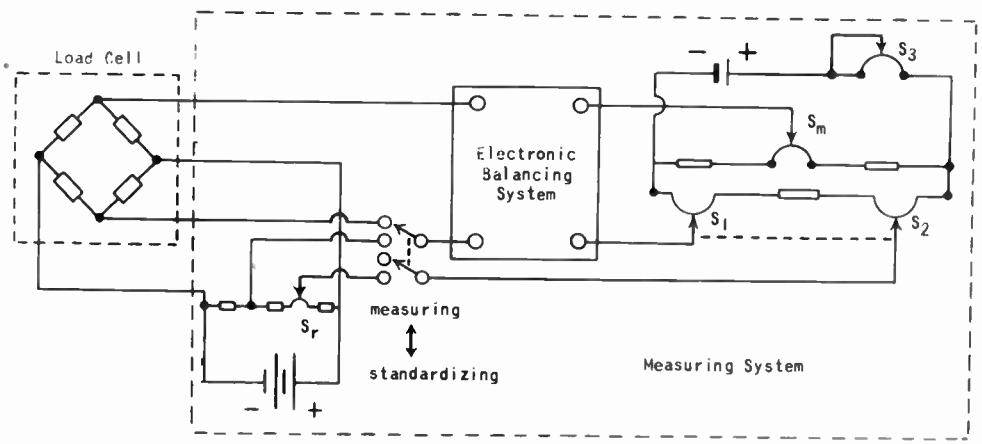
ELECTRIC-TYPE load cells, properly used with electronic instruments, have found many important new applications for weight measurement. They offer unique advantages for measurements which involve such difficult factors as:

(1) impact and vibration
(2) adverse ambient conditions
(3) high speed measurements
(4) awkward mechanical structures
(5) portable equipment.

Frequently, combinations of these factors in a given installation make weight measurement with load cells spectacularly successful.

In addition to the special advantages, load cell systems have several inherent features. They can easily provide remote indication or continuous recording of weight, with the addition of automatic control, if desired. Further, systems can be set to indicate a differential weight above or below any given value. For example, 100 lb. over a base load of 10,000 lb.

Sensitivity and accuracy are characteristics which vary with the specific load cell system. However, the potentials of this method are dramatically



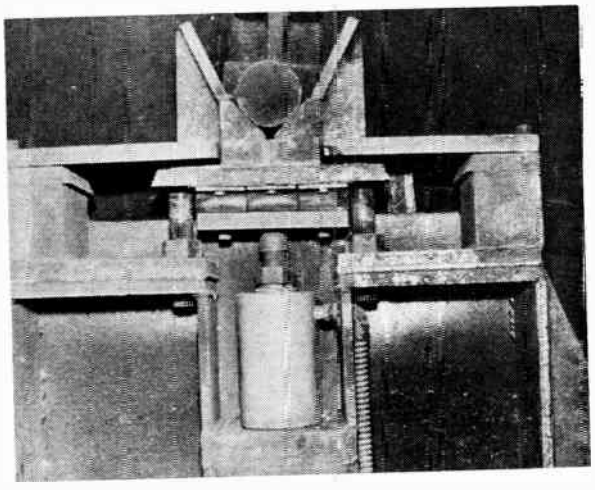
● *Fig. 2* Schematic circuit diagram, showing load-cell bridge connected to bridge voltage supply and potentiometer circuit of electronic instrument. Resistance changes in the load-cell result in bridge unbalance and load measurement.

S_r: Range Span Adjustment

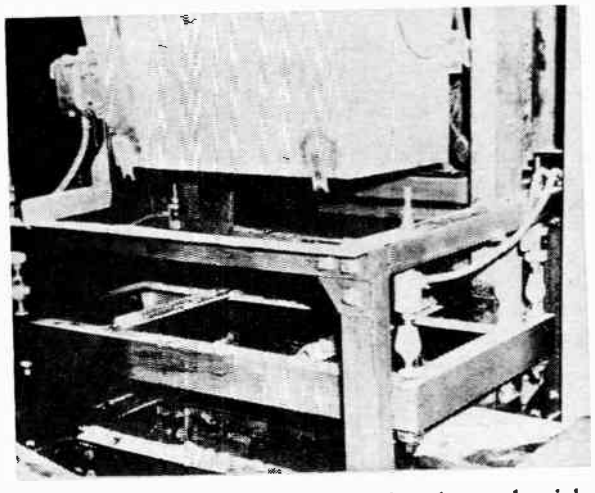
S_m: Measuring Slidewire

S_3: Battery Rheostat.

S_1, S_2: Provide (1) zero adjustment (2) Constant standardizing resistance.



● *Fig. 3.* Load cell supports foundry furnace charging bucket which is loaded by an overhead crane. Overload protection is provided by a soft-spring element between the cell and the bucket support.



● *Fig. 4.* Four load cells support foundry sand weighing cradle, overcoming problem of severe shock from skip bucket.

indicated by the case of a 500 lb. range cell which is capable of detecting 1 ounce washers — a sensitivity better than 1 part in 300,000.

Load Cell Defined

The load cell may be defined as a weight measuring unit with an output signal capable of transmission to a remote point. In its most commonly used forms (Fig. 1) the cell employs an electric signal which a suitable instrument translates into an indication or continuous record of weight.

Load cells have one basic characteristic which must be clearly understood: their output signal depends upon the elastic properties of a structural element which supports the weight being measured. This relation has been refined, compensated, and improved by a number of ingenious methods. However, measurement of weight by a load cell is fundamentally a deflection measurement.

The deflection factor is important because, in order to realize the maximum advantages of load cell measurement, some problems require that the gross load must be supported by the cell or a group of cells, while others may dictate that only a fraction of the load be applied to the cell. Hence, load cells must be used with various mechanical devices to balance tare load, provide over-load protection, improve accuracy, and otherwise insure dependable performance. The application engineer must thoroughly understand that the device is equivalent to a calibrated spring, or a "fish scale" — rugged and refined as it may be.

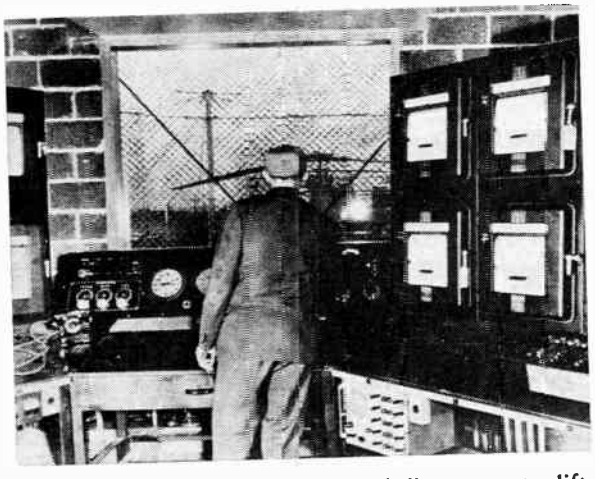
The load cell operates on the principle that the resistance of wire increases as the wire is stretched under a load. Thus, by a suitable arrangement of wires in a unit subjected to a load, the weight can be related to this resistance change. The resistances are arranged in a bridge network so that the output voltage signal is proportional only to resistance change produced by load. Temperature and other effects on the resistance values are cancelled. The output voltage is then measured on a precision potentiometer-type instrument. Fig. 2 shows a typical circuit diagram.

With a basic understanding of load cell principles, consider now the special advantages offered by load cells in solving difficult weight measuring problems.

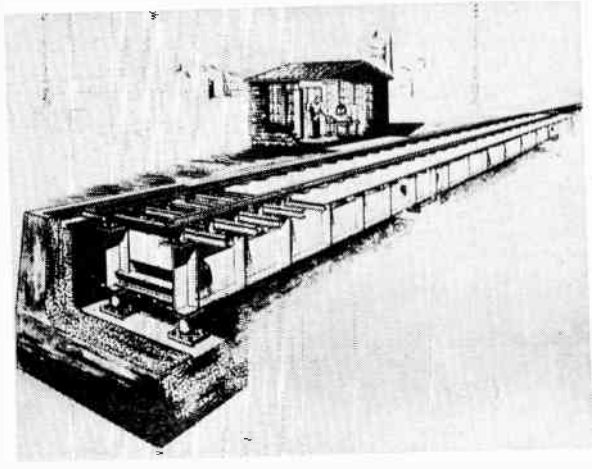
Vibration And Impact

The compact size and the rigid construction of the cell allows tight coupling between the load and the foundation structure. Therefore, under vibration, the force applied to the load cell varies, but no relative motion between parts occurs and damage to bearing points is eliminated. The signal generated by the cell follows the vibrating load, but simple electrical filters suppress this effect without difficulty. Weighing hoppers on lorry cars, and metering bins with vibrator-type discharge feeders are two examples of problems which have been successfully solved.

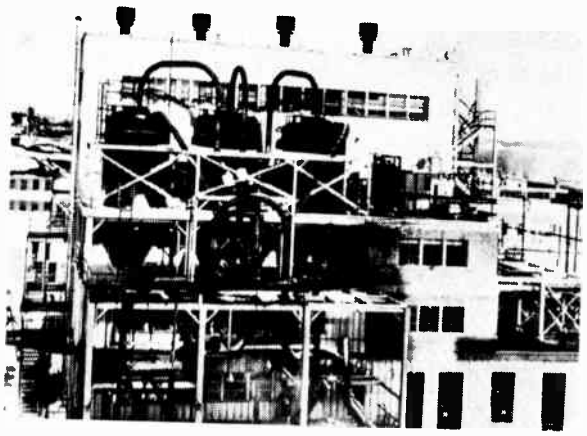
Impact loading is a somewhat more difficult problem, because as noted previously, load cells depend on the



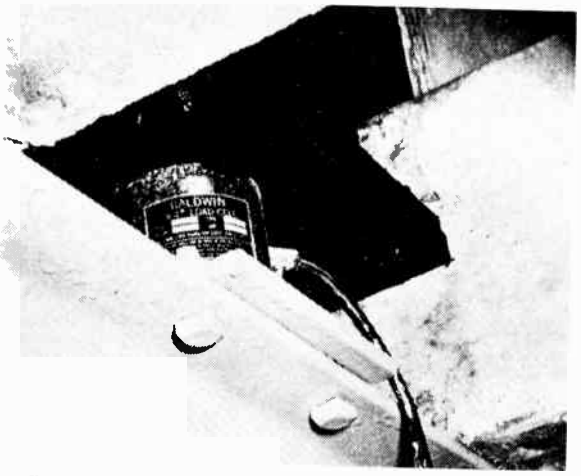
● *Fig. 5.* Load cells measure helicopter rotor-lift. L & N electronic recorders are at right and left.



● *Fig. 6.* Railroad track scale employs load cells to greatly simplify structure required.



● *Fig. 7* Twenty-five ton chemical storage tanks are individually weighed by form load cells.
(Courtesy DuPont Co. of Canada)



● *Fig. 8* Close-up view of cell mounting for tanks shown in Fig. 7.

elastic properties of some structural element. If the elastic limit is exceeded by an overload — accidental or otherwise — an irreversible zero-shift results. Oddly, this same elastic deflection is the basis of one of the simplest methods for protection of load cells. In several rocket test stands, a rigid overload stop bears the load after the cell has been strained to its rated capacity.

Usually, for industrial service, the precise positioning required by such a stop is impracticable. For such problems, the total deflection of the system may be increased by inserting a softer spring element between the load and the load cell, and an overload stop spaced at a more convenient distance. An ingenious installation of this type is shown in Fig. 3.

Adverse Ambient Conditions

The measurement of weight where corrosive materials and water are present, as in chemical and water treatment plants, presents a difficult problem, to which there is no perfect answer. The simpler the structure, however, the easier it is to protect and maintain the equipment. Hence the load cell comes into its own, because a tank or platform, resting on three or four rigid, sealed units offers just about the ultimate in simplicity.

The weighing units of such a system may be given a coat of corrosion-resistant paint for additional protection without impairing the accuracy of measurement. In some installations the cells are regularly hosed down with water to avoid accumulation of corrosive material or to maintain sanitary conditions.

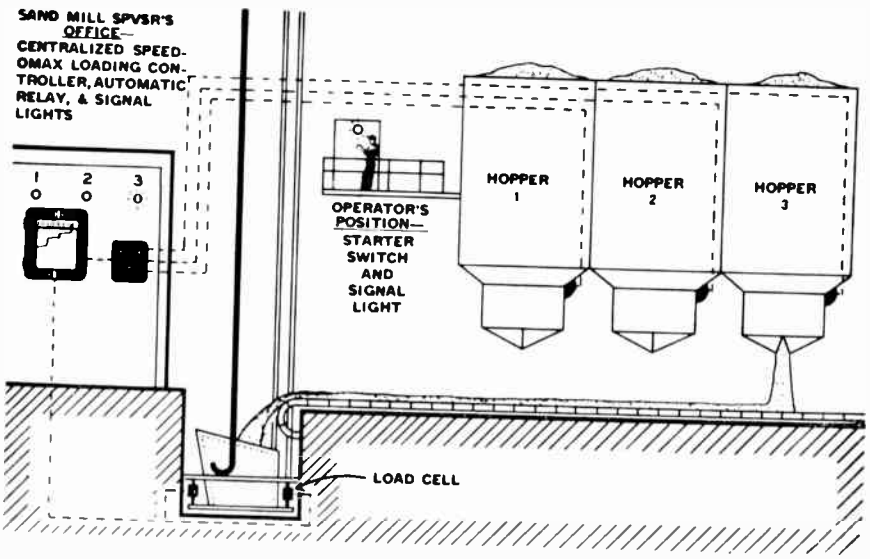
Load cells are quite satisfactory where fine abrasive dust is present. Sand particles in foundries and fly-ash near coal-fired boilers take a severe toll on any moving system. Several successful applications of load cells have been made in foundries, sand mills and similar dusty areas. (See Fig. 4). Notice that this particular installation includes a severe shock load hazard from the skip bucket. Seven similar units have been in continuous service for about seven years.

High Speed Measurement

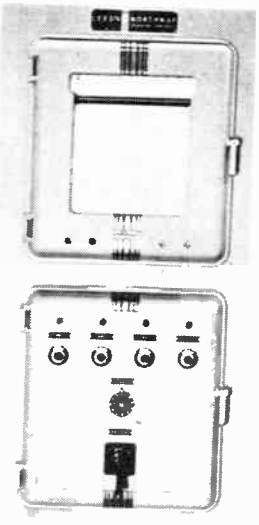
Higher and higher speed of measurement is a fundamental need in our advancing technology and in the rapid extension of automation. Load cells have helped to lessen the speed limits in measurement of weight. The reason may again be traced to the fact that load cells function by virtue of an elastic deflection. In most units, the total motion is small.

For example, in a typical Baldwin-Lima-Hamilton SR4 type cell, the deflection at full capacity is approximately 0.005 or 0.006 inches. Inherently, such a device has a high natural

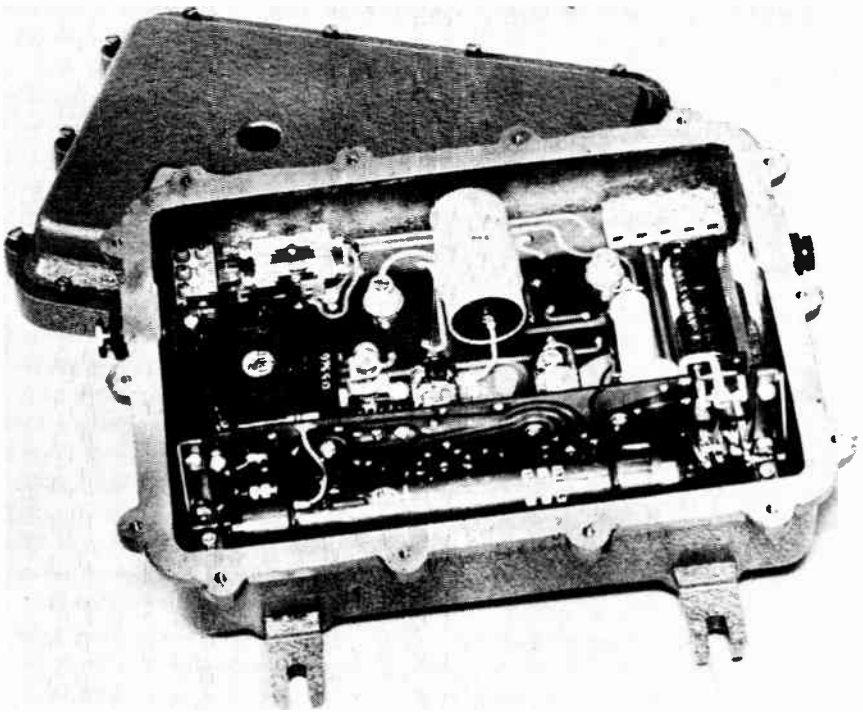
(Turn to page 116)



● *Fig. 9* Load cells provide automatic mixing control of three kinds of foundry sand.
(Courtesy General Steel Castings Corp.)



● *Fig. 10* This panel automatically controls four charges of molten iron to a multiple-flask centrifugal casting machine.



● The IDL Gamma Switch is completely protected from abrasion and other mechanical damage, and requires a minimum of maintenance. Illustration at the right with housing cover removed shows the Halogen quenched Geiger-Müller tube, relay and printed circuitry.

Process Control With The IDL Gamma Switch

The Gamma Switch is an important development in the application of nucleonics to the control of industrial processes. It is the first inexpensive and general purpose industrial device to be based on radiation detection.

Level control, density and liquid interface detection, and flow failure detection are examples of the type of control which can be achieved very simply and reliably using the switch. The following are among the advantages of the technique, compared with non-nucleonic methods:

(1) No probes, floats, electrodes, or other electrical or mechanical connections susceptible to damage are needed inside the hopper, tank, pipe, etc. The device is mounted completely externally.

(2) It is not necessary to put holes through the vessel to which the switch is attached. When appropriate it can be mounted independently to avoid the ill-effects of heat, vibration, etc., transferred from the vessel.

As the name indicates, it is a switch rather than a precision measuring instrument. It consists of a Halogen quenched Geiger-Müller tube in circuit with a simple relay, built on to a printed circuit chassis and contained in a fire-proof or weather-proof cast alloy case of approximate dimensions 11" x 10" x 4". It connects to a normal mains supply, and its relay contacts can be wired direct into conventional control circuits. The relay operates when a predetermined intensity of gamma radiation is detected by the Geiger-Müller tube.

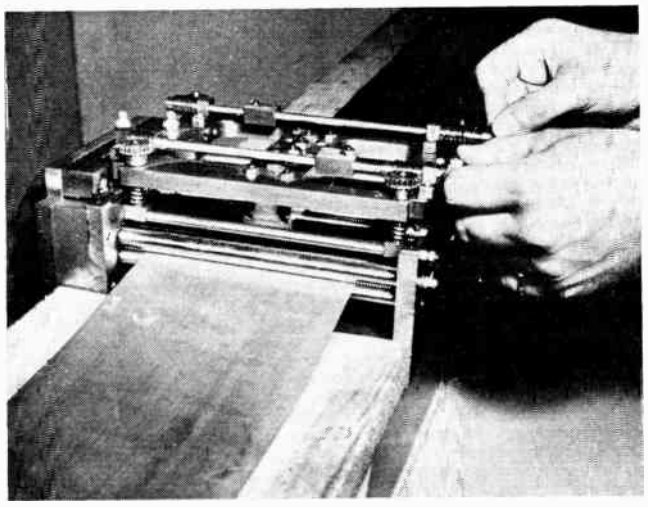
As the switch only operates when the radiation received increases or decreases beyond a predetermined level, it gives no indication of changes in radiation above or below this level. This is why it is inexpensive compared with other nucleonic instruments which give a continuous indication of the amount of radiation received and can therefore be used for precision measurement.

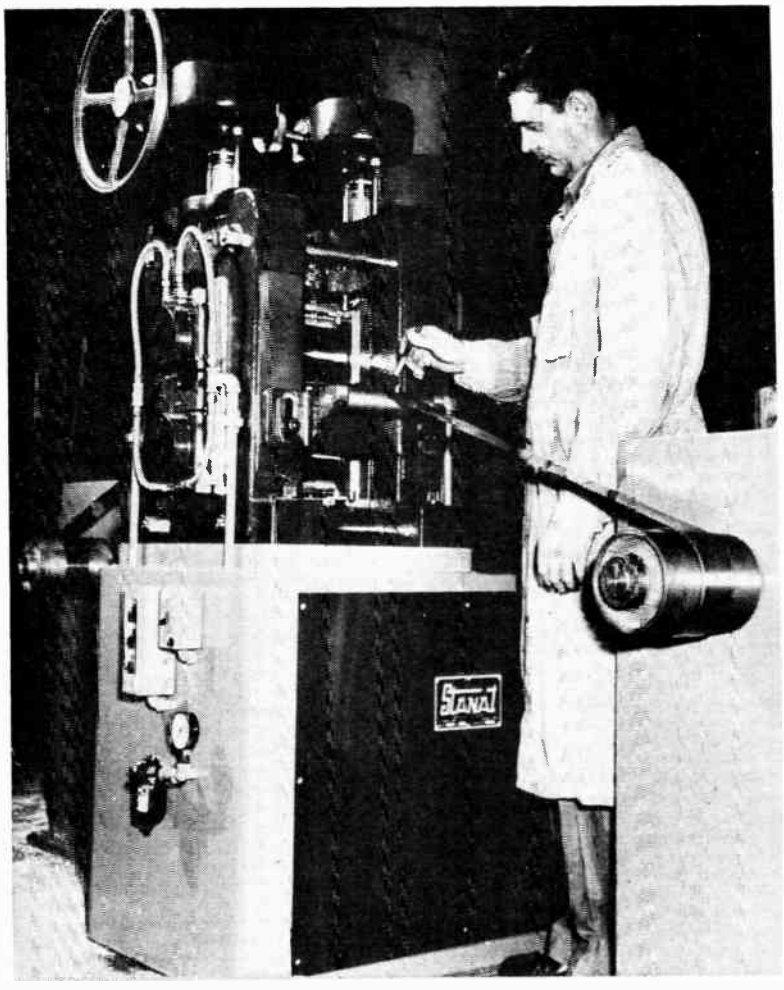
An example of a suitable application of the Gamma Switch is the control of high and low level of material in a hopper. A switch is mounted at the appropriate level outside the hopper, and a gamma ray source (suitably enclosed) is mounted on the opposite side. If the relay is set to trip when the radiation penetrating the hopper changes by the amount absorbed by the material in the hopper, a warning light or buzzer can be operated by the switch whenever the material passes the predetermined level. Alternatively, the switch can be connected to the device controlling the supply of material to the hopper, thus providing automatic control.

In a similar way the switch and detector can be mounted on each side of a conveyor to give warning of a failure in supply of material on the conveyor, or on a pipeline to signal any appreciable change of density in the fluid passing through. When employed at key points in such installation, the Gamma Switch greatly facilitates mechanization and automatic control. As the mechanism is completely protected from abrasion and other mechanical damage, very little maintenance is required.

Successful operation of the instrument is independent of the nature of the liquid or solid contained in the vessel or conveyor.

The switch can also be used for radiation protection in radio-chemistry laboratories, hospitals, etc., and in the vicinity of nuclear reactors. It can be set to trip at very low radiation intensities.





● *Above:* Stanat high-precision 15 roll, miniature leveler processing 0.005 in. silicon-steel strip.

● *Right:* Stanat 2-high/4-high Combination Rolling Mill reducing light gage Hipernik strip in the 4-high setup. Note application of front and back tension.

Core Manufacturers For The Electronic Industry Turn To Rotary Gang Slitting Lines For Increased Quality

New Equipment Aids Production Of Electronic Components

THE quality of today's high performance electronic equipment is so greatly affected by the properties of lamination stampings and tape wound cores that the manufacturers of these assemblies and related electrical and electronic equipment are indicating an ever increasing demand for processing machinery.

Obviously, the advantages a producer of electronic components can obtain by installing his own processing equipment are many, and with a reasonable consumption potential of magnetic material, such machinery can be amortized in a relatively short time. While a few companies have gone to the extent of installing induction or vacuum melting furnaces to obtain control of chemical analysis, the majority is satisfied with the analyses commercially available from mills. Thus, they can limit in-plant processing operations to breakdown rolling, finish rolling, slitting and leveling, as well as heat treatment.

To enable the entire range of rolling operations — from the hot breakdown of, say, 2" ingots to the finishing of ¼ mill tape — to be accomplished by only one machine, an interesting 2-high/4-high combination rolling mill was recently developed by Stanat Manufacturing Company, Inc.

Slitting is one of the most important processing operations affecting the ultimate performance of the magnetic assembly.

The large steel mills are generally not willing to slit to the narrow widths and close tolerances required in core manufacture, and 1 inch ± 0.008 inches is the minimum width of silicon-steel strip normally furnished. Hence, it is not surprising that practically all core producers have installed rotary gang slitting lines in recent years.

Used extensively for such applications is a precision gang slitter which features a unique unit-mounted core plate recoiler. The machine is capable of holding width tolerances as close as ± 0.001 inches, producing tightly wound uniform coils with burr-free edges, even on tough silicon-steel. By mounting a pull through roller leveler between the cutters and the recoiler of a silicon-steel slitting line, the strands can be cold worked slightly in passing through the leveling rolls. The cold work tends to reduce the core loss which had been raised in preceding coiling and slitting operations.

Figure 1

Figure 2

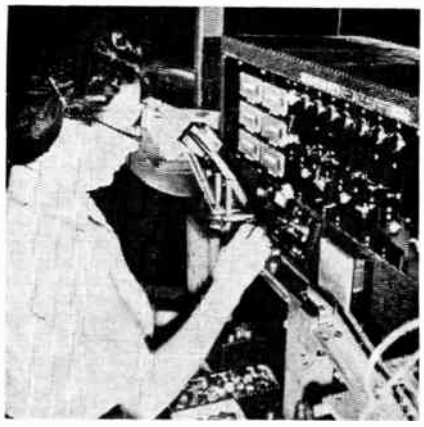


Figure 3

● *Fig. 1* Overall view of two miniature electronically-automated "production" lines recently installed to step up mechanical inspection and magnetic testing of speaker magnets in Edmore, Mich., plant of Carboloy Department of General Electric Co.

● *Fig. 2* Control switch works on time delay principle — when speaker magnet supply gets low in hopper, switch starts belt moving. This view shows magnets already automatically positioned feeding down tiny gravity conveyor to visual inspection.

● *Fig. 3* Magnets slide down second tiny gravity conveyor to special checking heads — which check length size, outside diameter, end squareness, and parallelism.

● *Fig. 4* Magnetic tester shown in this view. Note rotating hopper here and its relation to drop chute and inclined belt conveyor. Energy output of each magnet on this machine is tested at rate of 1600 per hour.

Figure 4

Testing Techniques For Speaker Magnets

IN APPROXIMATELY 16 feet of straight-line "automated space" all materials handling, mechanical inspection and magnetic testing functions for speaker magnets, previously done in a 50-square foot area, are centralized in two new electronically-controlled machines installed recently in the Edmore, Mich., permanent magnet plant of Carboloy Department of General Electric Company.

The two miniature "production" lines, automated by electronic tubes and a series of relays, already have tripled speaker magnet production in the plant by synchronizing production functions needed to transform the end-products well within range of industry standards.

With the aid of only two operators, they actuate belt conveyors, control drop chutes, hoppers, magazine feeders, aligning pushers, miniature gravity conveyors and other devices for both mechanical inspection and magnetic testing — segregating and counting every magnet processed.

The mechanical inspection unit, which processes 2100 speaker magnets per hour, a production pace three times faster than any technician can possibly work, provides facilities for visually inspecting for defects, then automatically checks the magnets for length, outside diameter, end-squareness and parallelism. The machine holds both length and outside diameter to plus or minus 0.001-inch and end-squareness under 0.002-inch.

Steady travel of the speaker magnets through the machine is controlled by a control switch inside the hopper, located at the left of the machine. So long as the hopper is full and the switch steadily actuated by the tumbling magnets in the hopper, no additional magnets are conveyed to the machine. Additional magnets are then conveyed to the hopper automatically when the switch is no longer actuated.

During the checking sequence only those magnets that measure up to all specifications pass entirely through the machine for eventual shipping.

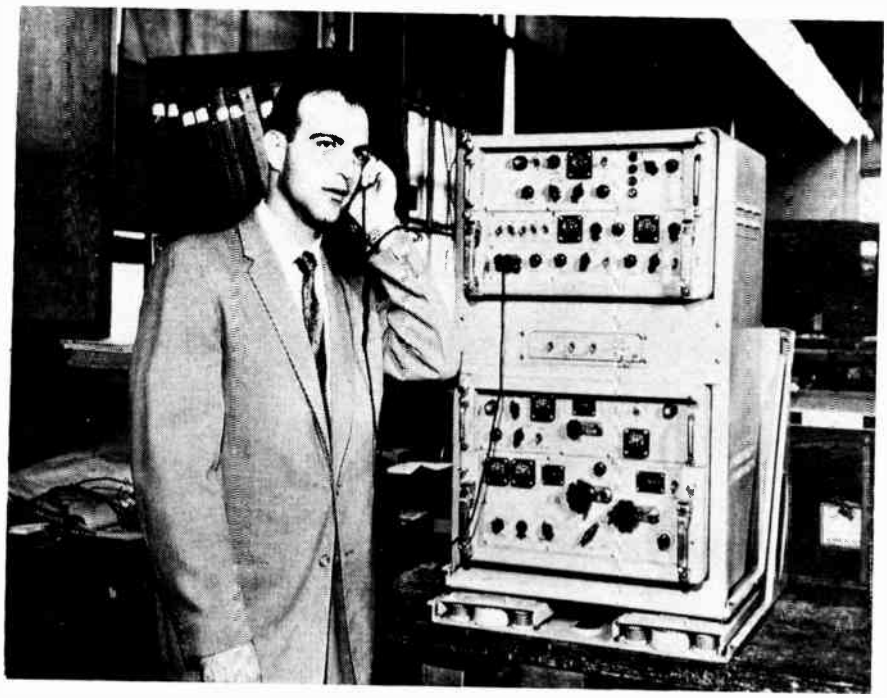
Any magnet failing to pass size specifications at any of the stations is automatically rejected at the point it fails to pass the test. For example, if the magnet is over or under size on length, it is automatically rejected at that point without going through the following checks for outside diameter and end-squareness.

Separate drop chutes built into the machine segregate magnets not coming up to standards at any of the checking stations. Solenoid control gates operated by circuits control the segregation operations.

The electronically-controlled magnetic testing unit, which is located in line with the mechanical inspection unit, operates in much the same manner as the latter. It processes about 1600 speaker magnets per hour, and its function is to test the magnetic output of individual magnets.

The machine can be calibrated for various size magnets to test them in seven energy levels simultaneously, ranging from 3.5 to over 6.5 million energy level.

In the magnetizing fixture of the machine, magnets are first magnetized then tested by comparing them with a standard magnet of known value. They are then partly demagnetized and electronically segregated. As in the mechanical tester, several drop chutes are used in segregating them into proper containers located at the bottom of the machine.



● Dr. David Kosowsky, Hycon Eastern, Inc., scientist who developed simplified crystal filters, is listening to clear signals from a radio receiver containing a high frequency crystal filter that eliminates interference between adjoining stations.

Crystal Filters

With Federal Authorities Constantly Forcing All Radio Systems To Operate In Continuously Narrower Frequency Bands Because Of Crowded Conditions At High Frequencies Narrow Band Pass Filters Are Becoming More And More Significant To The Designer Of Communications Equipment. The Following Article Deals With Some Of The Latest Considerations Concerning These Items.

RADIO receivers operate on the principle of selecting from a wide range of available energy some specific bit of energy containing desired information. Filtering is a scheme used by designers of radio communication systems to accomplish this feat. For years, filters have been used to cut out, or do away with, unwanted radio energy so that desired energy can be effectively used. Home radios and television receivers have several filters built into them. Military radios, in general, have even more filters.

A filter is an electronic network of components which will allow only certain signals to pass through it. Most filters are individually designed for the specific job they have to do. However, there are certain places in radio, radar, and television circuits where the same type of filter often turns out to be necessary. Therefore, manufacturers of radio and electronic devices have standardized certain filter types. Up to now, most of these standard filters have been made of coils and condensers.

Crystal filters do the same basic job as long-standing conventional filters, but crystal filters do the job much better, especially at high frequencies. In addition, crystal filters make possible the design of new types of equipment never before possible.

Single-sideband radio equipment makes particularly good use of crystal filters. In single-sideband transmission, effectively half of each radio signal is filtered out at the transmitter and then later reinserted at the receiver by electronic means. The very nature of a single-sideband system makes a good filter the heart of the system.

Crystal filters are desirable for high frequency single-sideband systems because a crystal filter has an inherently sharper rejection ability than other types of filters. Use of crystal filters in a radio receiver, especially at frequencies above conventional home radio bands, makes possible the design of a simpler radio set than is feasible with conventional filters made of coils and condensers.

For any communication or navigation system where it is necessary or desirable to transmit and receive a narrow band of information, the job can be done better using a crystal filter than any other type of commercially available filter. In many instances the use of a crystal filter represents the only way to do a given job using standard, commercially-available parts.

There are, in general, three types of filters commercially available. These are:

1. LC Filters
2. Mechanical Filters, and now
3. Crystal Filters

LC Filters are networks made up of coils and condensers; they represent

the most conventional approach to making filters which electronic designers have used in the past. Mechanical filters make use of vibrating metal structures to filter out undesirable signals which have been transformed to vibrations. The newest and best type of filter, the crystal filter, makes use of networks of tiny quartz crystals.

High frequency quartz crystal filters are smaller, more reliable, and simpler than their counterparts made of coils and condensers or mechanical structures. The crystal filters also do a better job of filtering.

Nature has arranged things such that it is easier to turn a sharp corner when there is less resistance to turning. In the case of filters, sharp corners are the desired end product. Abrupt changes in response to signals of different frequencies is what designers try to achieve in a filter. The less resistance an element has, the easier it is to bring about abrupt changes in response. Quartz, which is an extremely stable crystal substance, has the fortunate characteristic of possessing very little resistance to vibration at certain discrete frequencies. The frequency at which any particular piece of quartz crystal will vibrate without much resistance is dependent upon the dimensions of the crystal and mounting techniques. In general, a given piece of quartz crystal will vibrate at one specific frequency, but will not tend to vibrate at all at any other frequency. This fact is the key to filters made of quartz crystals.

Selectivity

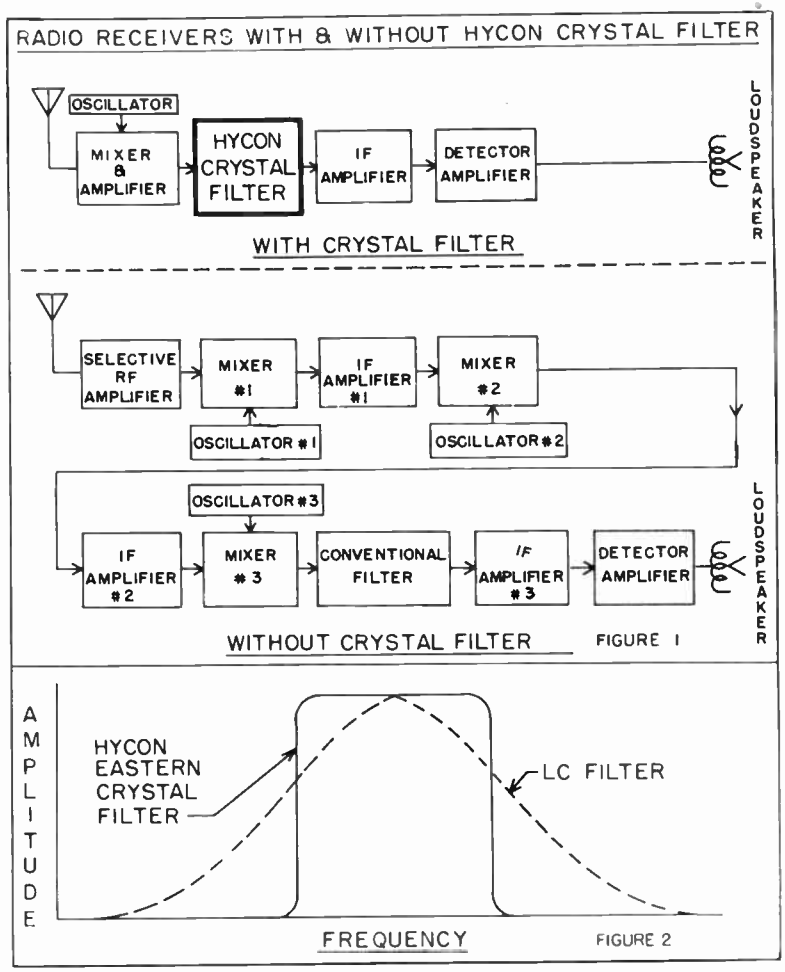
Crystal filters make use of several wafers of quartz; usually either two, four, or eight. The wafers, or individual crystals, are arranged in a lattice or bridge network configuration so that the entire network has certain desired characteristics. The characteristics desired and achieved in the filters are as follows. Consider an antenna normally connected to a radio receiver. This antenna is susceptible to a considerable portion of the radio energy passing by it. However, the radio receiver is only useful to a listener if some intelligible information emanates from it. If all the information contained in all the radio frequencies to which the antenna is sensitive were simultaneously presented to the listener, the result would be a garbled hodge-podge of noise, with essentially no intelligible information resulting. So the receiver is "tuned" to a narrow range of frequencies which contain only the information desired at one particular time.

Unfortunately, speech cannot be transmitted via radio on one single frequency. So it is general practice to tune a receiver to a specific frequency, the one read on the dial, and allow the receiver to pick up signals close to the dial frequency. Normally, the signals picked up, or detected, are equally spaced on both sides of the dial frequency. The resulting information which comes out of the loudspeaker is therefore a summation of information contained in a band of frequencies. The center of the band is the frequency to which the radio receiver is tuned. This frequency is normally referred to as the center frequency of a station. The band of frequencies over which intelligible information is transmitted is called just that, a frequency band. (In the case of home radio receivers, this band is a few thousand cycles in width.)

An essential part of a radio receiver, therefore, is a filter which will discriminate against all other frequencies exclusive of the frequency band of the station being received. Crystal filters are designed to make the receiver extremely receptive to the frequency band desired, and at the same time extremely non-receptive to unwanted frequencies, outside the band.

Communication systems more sophisticated than home radios vary the basic theme somewhat. Since the range of frequencies available in nature is necessarily limited, and since more and more people continually want to get on the air with information, many schemes have been advanced to make better use of a given finite band width of frequencies. One of the better schemes is single-sideband transmission in which half the frequencies are arbitrarily filtered out and thrown away. This leaves the omitted frequency band available for other people to use. In order to achieve such clever manipulation of frequencies, however, extremely good filters are required. The filters must be able to allow desired frequencies through a system virtually untouched, but at the same time must suppress immediately adjacent frequencies. Hence the sharp corner. The sharper the corner the filter can turn, the higher is its "selectivity", that is, the more nearly can the filter approach the ideal situation of allowing one frequency to pass through, but completely blocking the next adjacent frequency along the line. Crystal filters approximate this Utopian situation much more closely than other existing types of filters.

The ability for a filter to have high "selectivity" is primarily determined



● *Fig. 1.* Two diagrams show the simplification resulting when a Hycon crystal filter is included in a radio receiver operating at high frequency. The Hycon filter eliminates the need for two stages of frequency conversion and amplification. *Fig. 2.* The graph shows how sharply tuned a crystal filter is compared to a conventional filter made of coils and capacitors. The solid line indicates how a crystal filter restricts bandpass to a well-defined region of frequencies, while the dotted line shows how conventional filters gradually diminish attenuation.

by the "Q" of the elements used in the filter. Q or "quality factor" is an arbitrary symbol which permits the engineer to determine how much energy is dissipated or wasted by the filter element. The higher the Q, the less the wasted energy, and therefore, the better the filter. In addition, the same filter, produced at a higher frequency, will require a higher Q for the same performance or selectivity. Conventional coils used in L-C filters have Q's in the order of 200, while the elements employed in Mechanical filters have Q's of about 2000. On the other hand, ordinary quartz crystals have Q's which range from 20,000 to 200,000. In other words, the crystal filter can be made a great deal better than the L-C or Mechanical filter at low frequencies, and furthermore, can be produced at high frequencies where the other filters will not perform.

Simplified Design

Quartz crystals have been used for years to control the frequency of oscillation of oscillators. It has been only within the past two years, however, that any serious work has been undertaken to make commercially-available filters containing a network of quartz crystals which will allow a band of frequencies to pass. Lattice filter networks made up of quartz crystals were first proposed by a scientist named Warren Mason of Bell Telephone Laboratories about 20 years ago. However, the mathematical calculations necessary to design these networks and the difficulty of producing the necessary crystals at high frequencies caused manufacturers to shy away from crystal filters. It was Dr. David Kosowsky of M.I.T. and now at Hycon Eastern, Inc., Cambridge, Mass., who developed a highly-simplified mathematical technique for designing crystal filters, and devised new methods for producing and testing the required quartz crystals. Kosowsky went further on and designed shop production equipment which makes the manufacture of crystal filters almost routine. It was this latter step which enabled lowering of price to a figure which is competitive with LC and mechanical filters.

At frequencies above a few megacycles, crystal filters are virtually unchallenged by their sisters, LC filters and mechanical filters. The older type filters just won't do the job at high frequencies. At lower frequencies, where long-established techniques have brought LC and mechanical filter prices down to low figures, crystal filters excel only in performance. At lower frequencies, crystal filter prices and mechanical filter prices are roughly the same. A typical crystal filter currently sells for forty dollars when bought in small quantities, or twenty to twenty-five dollars when purchased in larger lots. As with transistors, which sold for about two hundred dollars when originally developed and now sell for less than two dollars, crystal filters will also come down in price when they are in high production.

Although the low frequency crystal filter will play a significant role in single sideband and telephone communication systems, the high-frequency crystal filter may well revolutionize the design of other communication and navigation systems. In addition to performance which cannot normally be obtained even at lower frequencies with conventional filters, the high-frequency crystal filter may be made extremely small in size. Models have already been produced which are about half the size of a small match-box. These miniature crystal filters in conjunction with miniature vacuum tube and transistor circuitry, are currently being employed in the design of several of the most compact communications equipment ever produced.

Biggest potential use in the next few years of crystal filters will probably be in mobile communications.

With the federal authorities constantly forcing all radio systems to operate in continuously narrower frequency bands because of crowded conditions at high frequencies, narrow band pass filters are becoming more and more significant. At the present state of communications art, LC and mechanical filters are being used to their ultimate capabilities. The advent of crystal filters now enables equipment manufacturers to surge ahead with radio and radar systems using narrower frequency bands than were possible before.

An extremely important significance of the arrival of crystal filters on the communications scene is the possibility now of eliminating multiple conversion high frequency receivers. Because it has been hard to filter signals at high frequencies, electronic manufacturers have utilized steps of frequency conversion to get the frequency down to a usable range. In other words, signals at high frequencies could not be easily filtered using LC or mechanical filters, so the signals have been converted to frequencies where filters will work. Often, multiple conversion receivers have three mixing stages where frequency conversion is accomplished. Each of the mixing stages requires an oscillator. In addition to the higher cost, each oscillator added to a receiver causes unwanted noise possibilities. In short, the manufacture and alignment of multiple conversion receivers is more complicated than for single conversion receivers. Crystal filters make possible the design and manufacture of single conversion receivers at high frequencies where this has not been feasible up to now.

Military and industrial users alike welcome the reliability characteristics of crystal filters. Unlike many LC filters, crystal filters need no alignment after manufacture. The quartz element is extremely stable with respect to temperature, shock, and vibration. In general, crystal filters will meet guided missile specifications for environmental conditions, whereas LC and mechanical filters have great difficulty performing under the missile conditions.

High selectivity at high frequencies, extreme stability, competitive price, and versatility are the outstanding characteristics of crystal filters. In the worst case, a typical crystal filter may change its parameters one part in one million over the period of a year.

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pH Control Instrumentation With Battery Power

BATTERY-POWERED instruments of exceptional versatility are expected to open new avenues to pH profit for persons who have never before considered pH control instrumentation because of cost or because of measurement complexities.

Anyone can make rapid, accurate pH determinations with the Pocket pH Meter. Measurements are accurate to 0.1 pH unit; the meter is scaled in divisions of 0.2 pH units, with a range of 2 to 12 pH.

Recently developed instruments are easy-to-carry, easy-to-operate, and ideally suited for on-the-spot pH checks in the out-of-doors . . . in the factory . . . in the laboratory. In the new instrument the single combination electrode (both reference and glass cells are in one unit) can be used on its 36-inch lead or left clipped to the instrument case. The electrode clip swings down, permitting the operator to hold the meter in one hand while simultaneously immersing the electrode tip in the buffer tube . . . in a small sample container . . . in a vat . . . or, directly into "soils" or other semi-solids. The combination electrode is designed for use at temperature from 0 to 50°C.

Bulky buffer bottles and containers are eliminated. The unique buffer tube contains a sponge which holds enough buffer for one day's use in field. A memory dial feature reduces the need for frequent restandardization.

Instrument power is supplied by six easily replaceable batteries which have a normal operating span of more than 400 operating hours.

News Report

A monthly roundup of news and personnel changes in the Canadian electronics industry

IRE Canadian Convention Panels Of Interest

At the forthcoming Institute of Radio Engineers' Canadian convention-exposition to be held in Exhibition Park, Toronto, October 16, 17 and 18, there will be gathered the greatest assembly of technical brains ever seen in Canada.

In the Wednesday session on Human Engineering, the 20th-century problem of equating humans with machines will be dealt with, when speakers will include A. H. Shepherd, Department of Psychology and J. M. Ham, both of the University of Toronto. Other speakers in the same session include M. Humphries and J. C. Ogilvie of Defense Research Medical Laboratory, Toronto, D. K. Ritchie, Ferranti Electric Ltd. and H. C. Ratz of Fischer and Porter.

Canada's part in the International Geophysical Year (IGY) occupies the Thursday morning session, with Frank T. Davies and P. A. Forsyth of the Defense Research Board, Peter M. Millman of the National Research Council, and D. A. MacRae, Department of Astronomy, University of Toronto, as speakers.

Speakers on the Thursday panel covering Engineering Education include J. D. Ryder, Dean of the College of Engineering, Michigan State University and Frank Noakes, Head of the Department of Electrical Engineering, University of British Columbia.

Among the 116 technical papers arranged for the three-day program will be one on Friday presented by Peter Humeniek of Canadian General Electric Co. Ltd. on the subject of Management as a distinct and professional kind of work founded on scientific principles and showing that the proper type of management can produce the climate that is conducive to the development of men.

In the Friday morning session on Audio and Acoustics a paper on new high impedance audio output circuits will be read by J. R. de Miranda of Eindhoven, Holland.

Included in the Friday afternoon session on Components, M. Gladden of the Newfoundland Light and Power Co. Ltd. will present a paper on the automatic electronic boiler control.

Clare Norris, general chairman of the IRE Canadian convention-exposition, assures exhibitors and visitors to the exposition that wide spacious aisles have been arranged for to give complete freedom from congestion.

Canadian Admiral Opens Winnipeg Sales Office

An Admiral factory sales branch has recently been established in Winnipeg to replace Allan Lyone Limited as the distributor in Manitoba and the Lakehead area for Canadian Admiral Corporation.

The company's new sales office, parts department, service center and warehouse occupy 7,500 sq. feet of floor space in a new building at 801 Berry St., St. James, Winnipeg 12.

The appointment of William O. Hoskinson as branch manager of the Winnipeg factory sales office and warehouse was announced by Stuart D. Brownlee, executive vice-president of the company.

Mr. Hoskinson joined Canadian Admiral in 1952 as office manager of the company's Montreal sales branch. Subsequently he became office manager of the Windsor and London, Ontario, sales branches. More recently, Mr. Hoskinson was assistant office manager at the company's head office in Port Credit, Ontario.

Electronic Enterprises Regd. Named Canadian Representative

Universal Transistor Products Corporation of Westbury, Long Island, N.Y., have announced the appointment of Electronic Enterprises Regd., 551 Oakwood Ave., Toronto, Ontario as their Canadian representative for UAC nucleonic instruments and transistorized power supplies.

Instron Engineering Appoints Eastern Canada Rep

Instron Engineering Corporation, Quincy, Mass., has announced the appointment of Elder Electronics, 3220 Robert Street, Burlington, Ontario, to represent them in Eastern Canada.

The new representative will be in a position to offer personnel fully trained in Instron tensile testing equipment, used in industry the world over to measure the characteristics of material with electronic accuracy.

Narda Corporation Changes Company Name

The Narda Corporation, Mineola, N.Y., has changed its name to The Narda Microwave Corporation. The announcement was made by Dr. John C. McGregor, Narda's president and board chairman, following a special meeting at which stockholders approved the change.

The new name was chosen to better reflect Narda's greatly increased activities in the microwave and UHF test equipment field, such as the recent acquisition of Kama Instrument Corporation, and a general expansion of the company's research and production facilities.

Narda's only business, when the company was formed, was a subcontract to supply components to a government contractor. The company's initial operation was so successful that it was decided to market several of the microwave products which resulted from that operation.

In five years, the Narda product line has grown to over 300 items. Sales representatives operating from 16 regional offices cover the principal industrial centers of the United States and Canada.

● Shown above is the Institute of Radio Engineers' Canadian convention-exposition committee responsible for organization of their second annual event to be held in the Automotive Building, Exhibition Park, Toronto, October 16th, 17th and 18th. *Back row:* Clive Eastwood, Grant Smedmor, E. O. Swan, L. C. Simmonds, Frank A. Ford, T. M. Lynd, W. F. Choat. *Front row:* R. C. Poulter, Fred Heath, Clare A. Norris (Chairman), F. H. R. Pounsett, A. H. Sievert. (Absent: Dr. George Sinclair and C. H. Hathaway).

News Report

MEL Sales Ltd. Appoints Sales Rep

The appointment of Mr. Garnet Rosamond as sales representative is announced by E E. Whittaker, general manager, MEL Sales Limited.

Mr. Rosamond will be responsible to A. C. Perkins, manager of the Central Ontario Office, P.O. Box 50, Don Mills, Ontario.

For further information, contact MEL Sales Limited, Arnprior, Ont.

Canadian Westinghouse Retires S. M. Smith

Stanley M. Smith, who has been actively associated with major power and industrial projects in Western Canada, retired on July 31st after 45 years with the Canadian Westinghouse Company Limited. He was western representative for the District Apparatus Division.

Mr. Smith joined the company in 1913, as salesman in the Halifax office. In 1919 he was made branch manager of the Fort William, Ontario office and was later transferred to Winnipeg and for some years was manager of the western region, District Apparatus Division.

Burndy Sends Out Mobile Electronic Display

The Hyliner, a modern transcontinental-type passenger bus, rebuilt as a mobile display unit for the Omaton Division of Burndy Canada, Ltd., Scarborough, will be in the provinces of Ontario and Quebec during the month of September.

The vehicle, an air-conditioned showcase of the company's full line of solderless electrical connectors, electronic components and latest installation tooling, is on a two year tour of Canada and the United States. The Hyliner has been described in press reports as the latest method of bringing modern industry "to the field". The vehicle's lounge contains two separate movie projector units, and refreshment facilities.

Western Electric Grants Canadian Firm World-Wide Manufacturing Rights

Grant A. Taylor, president of Taylor-Leslie Mining and Engineering Corporation Ltd., P.O. Box 312, Terminal A, Toronto, has announced that his company has been granted world-wide licenses from the Western Electric Company Incorporated, New York, for the manufacture of their transistors, photo transistors and diodes, and tantalum capacitors both wet and dry.

GRANT A. TAYLOR

According to Mr. Taylor this recently completed arrangement will result in making available for the first time in Canada a Canadian source of manufacture for these components.

In making the announcement Mr. Taylor pointed out that the Bell Telephone Laboratories spent in excess of 150 million dollars in the development of these components.

News Report

Canadian Applied Research Licensing Agreement

Transval Engineering Corp., Culver City, California, has entered into a licensing agreement with Canadian Applied Research Limited of Toronto, a member of the A. V. Roe Canada Limited group of companies.

This agreement, announced jointly by George K. Otis, Transval president, and J. Montague Bridgmen, managing director of Canadian Applied Research Limited, licenses the Canadian aircraft instrumentation firm to produce certain airborne transistorized power supplies developed by Transval. This agreement provides for future broadening of the working relationship to include other products which the Canadian firm will handle.

Transval produces a line of airborne radio equipment, transistorized power supplies, inverters, and missile components.

Electronic Craftsmen Ltd. Acquires Electric Coil Co.

Electronic Craftsmen Limited recently acquired the assets of Electro Coil Company, Waterloo, Ontario; a firm which was formed seven years ago to specialize in the manufacture of automotive ignition coils.

Electronic Craftsmen Limited, it is understood, will specialize in the manufacture of formed spring coils for television tuners, automotive coils, epoxy molded coils for electronic relay, solenoid and geophysical applications. Plans call for a diversification of the firm's products in the near future as a stepped up industry service program goes forward. At present, Electronic Craftsmen plans to accent the precision manufacture of molded electrical relay and solenoid coils.

Heading up Electronic Craftsmen as president is Hugh T. Watt. Vice-president of the new firm is John G. Varga, also serving as general manager.

Mr. Watt is well known in the electronic industry, having founded Watt Electronic Products Limited five years ago, which subsequently became a division of General Instrument - F. W. Sickles of Canada Ltd. Mr. Watt leaves General Instrument - F. W. Sickles as vice-president and sales manager to direct this new undertaking.

Mr. Varga, formerly purchasing agent of Canadian Transformer Ltd. and more recently founder and major partner of the Electro Coil Company, has had sixteen years' experience in the coil industry.

Electronic Craftsmen Limited is located at 30 Weber Street North, Waterloo, Ontario.

For further data on advertised products use page 101.

News Report

Radionics Ltd. Represent Westronics Inc.

S. H. Ungar of Radionics Limited, 8230 Mayrand St., Montreal 9, P.Q., announced recently the appointment of his company as exclusive representatives for Westronics Incorporated of Fort Worth, Texas.

Westronics manufactures single and dual pen recording potentiometers incorporating a variety of features which have proved valuable in process and control industrial applications. A miniature dual channel 5" recording potentiometer using completely transistorized amplifiers has recently been announced and is now available for delivery.

Stackpole Golden Anniversary Scholarships Awarded

Four $2,000 scholarships for 1957 have been awarded by the Stackpole Carbon Company, of St. Marys, Pa., in connection with its fiftieth anniversary scholarship plan established last year.

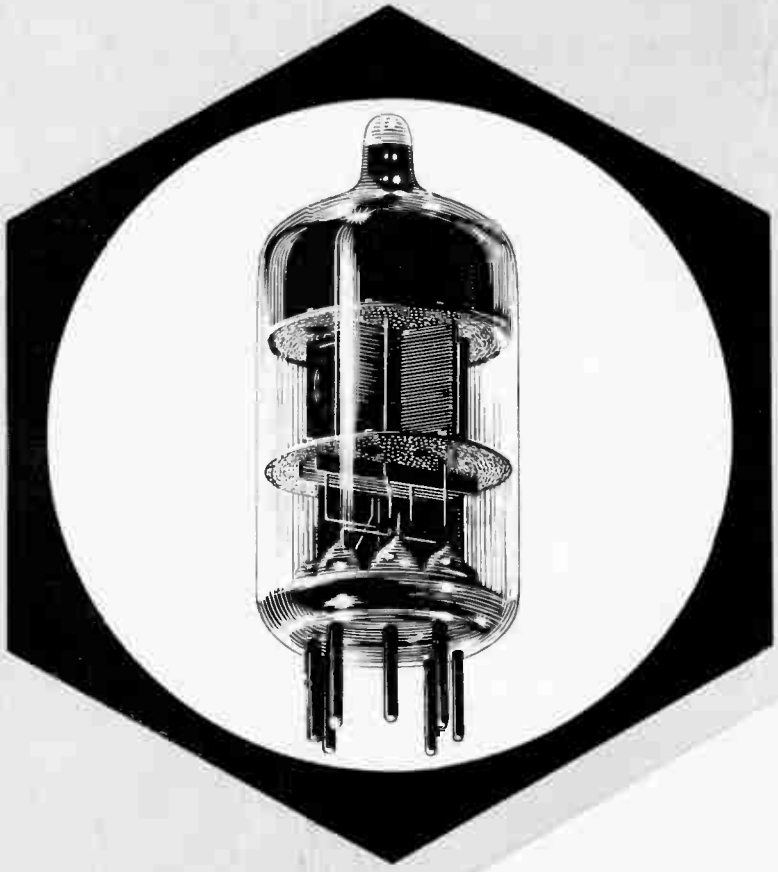
Two scholarships were awarded to sons of employees of the Stackpole organization. Two other scholarships, available to any boy or girl in localities where Stackpole operates plants, went to a girl and boy of Kane, Pa. and St. Marys, Pa., respectively.

Stackpole is represented in Canada by Canadian Stackpole Ltd. of 550 Evans Avenue, Etobicoke, Toronto 14.

AEROVOX APPOINTMENT

JAMES KEY

● W. Myron Owen, president of Aerovox Corporation, announces that at a recent directors' meeting James Key was elected to the board of directors of Aerovox Canada Limited, Hamilton, Ontario. Mr. Key has been general manager of the Canadian plant since 1952.



The M8100 RF Pentode is one of a line of Rogers Special Quality* tubes. Because of its long life and stable characteristics, this low noise, high transconductance pentode is an improved electrical and mechanical plug-in replacement for the popular 6AK5, 6AK5W and 5654.

Special measures in the design and production of Rogers M8100 ensures reliability, stability and uniformity. Its life is much longer than 10,000 hours when subjected to fair conditions of use.

**Although Rogers Special Quality tubes were developed for applications where dependability is of vital importance, they are finding more and more use in all types of professional equipment. In practice, their initial higher cost is more than compensated for by the greater reliability and lower maintenance cost of the apparatus in which they are used.*

ROGERS

electronic tubes & components

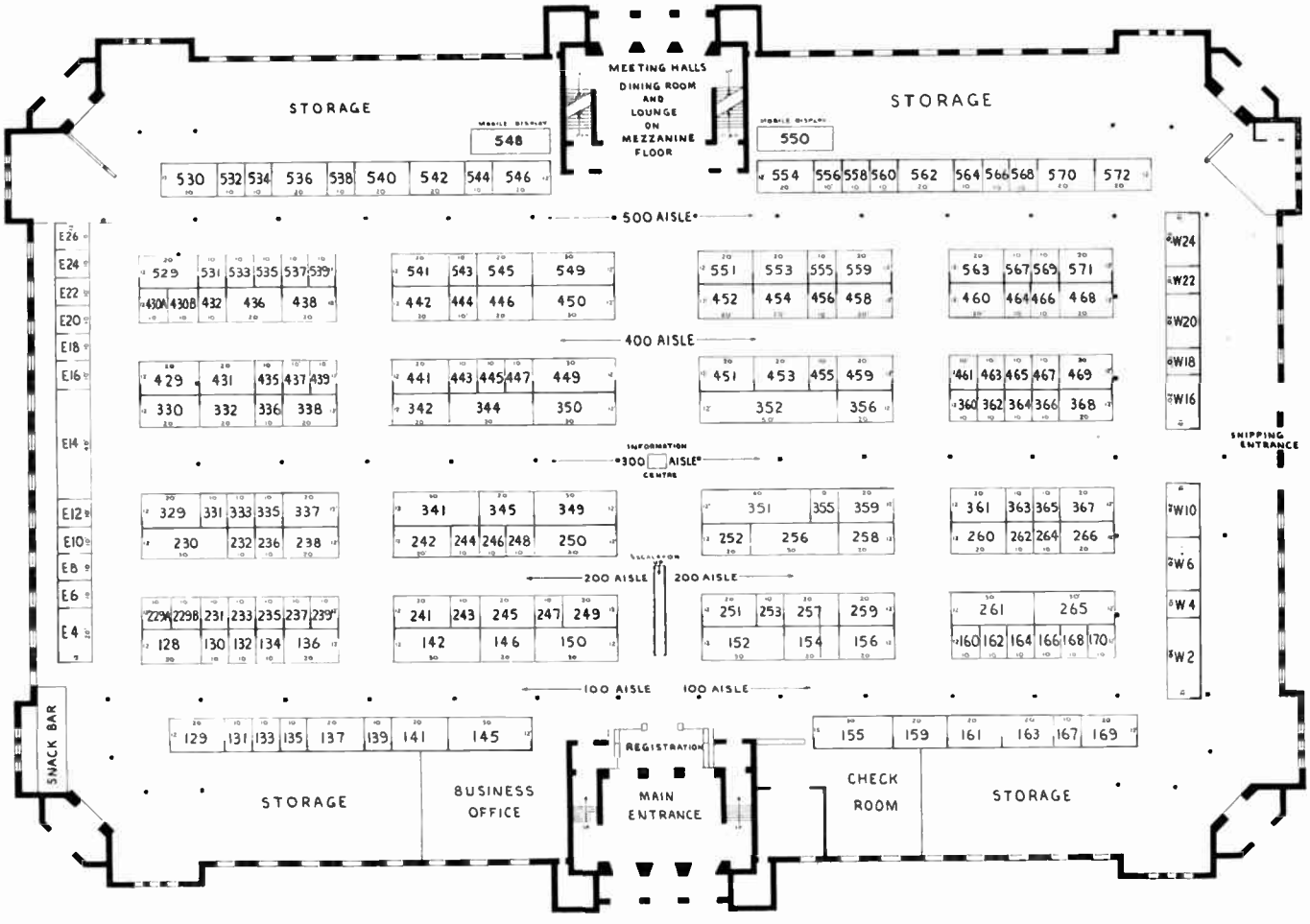
11-19 BRENTCLIFFE ROAD, TORONTO, ONTARIO / BRANCHES: MONTREAL, WINNIPEG, VANCOUVER

★Rogers Electronic Tubes are sold through Canada's Independent Electronic Parts Distributors

Your Guide To The

Canadian IRE Convention & Exposition

Automotive Building — Exhibition Park — October 16-17-18, 1957

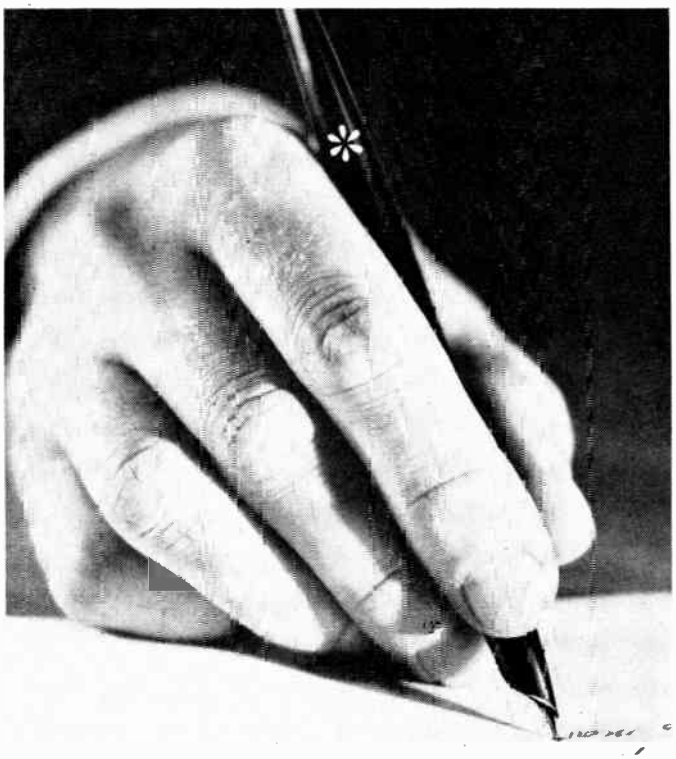


Floor Plan Showing Exhibitors' Booth Numbers

LIST OF EXHIBITORS

	Booth No.
Ace Electronics Associates, Inc., Somerville, Mass.	465
Adams Engineering Limited, Montreal, Que.	W-20
Aeromotive Engineering Products, Montreal, Que.	163
Aerovox Canada Limited, Hamilton, Ont.	546
Aircraft Appliances & Equipment Ltd., Toronto, Ont.	567
Aircraft-Marine Products of Can. Ltd., Toronto, Ont.	342
Alford Manufacturing Co., Inc., Boston, Mass.	461
Alpha Aracon Radio Co. Ltd., Toronto, Ont.	430
Alpha Wire Corporation, New York, N.Y.	430-B
Amalgamated Electric Corporation, Toronto, Ont.	232
American Electrical Heater Co., Detroit, Mich.	558
American Superior Electric Co., The, Bristol, Conn.	136
Ampex Corporation, Redwood City, Calif.	570/2
Andrew Antenna Corporation Ltd., Whitby, Ont.	253
Arco Electronics, New York, N.Y.	560
A. T. R. Armstrong Ltd., Toronto, Ont.	169
S. A. Armstrong Ltd., Toronto, Ont.	E-10
Assembly Products, Inc., Chesterland, Ohio	554

(Continued on Page 54)



LIST OF EXHIBITORS

(Continued from page 53)

Radio Trade Supply Ltd., Toronto, Ont.	236
Raytheon Canada Ltd., Waterloo, Ont.	367
Rogers Majestic Electronics Ltd., Toronto, Ont.	150
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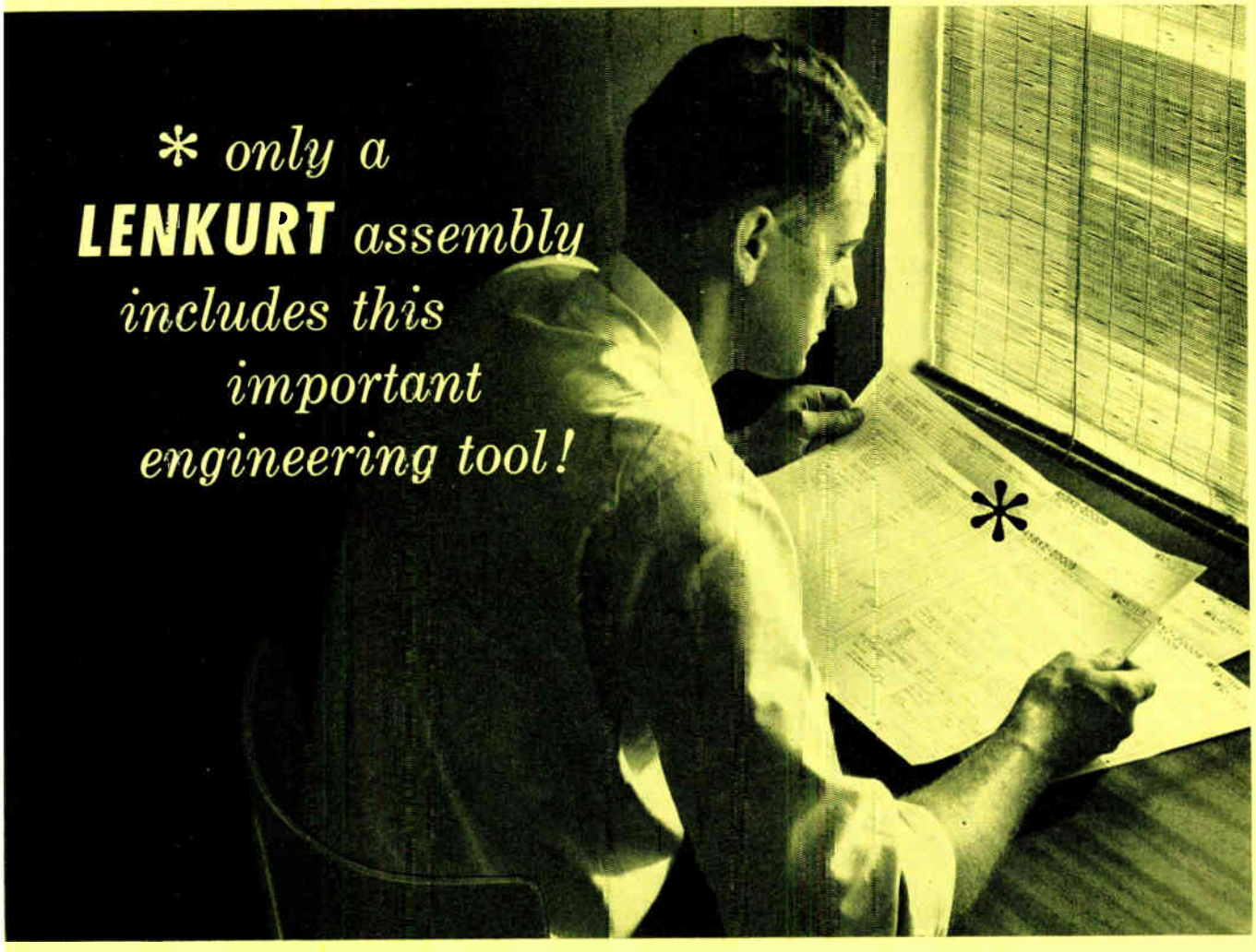
San Fernando Electric Mfg. Co., San Fernando, Calif.	456
Sealectro Corporation, Mamaroneck, N.Y.	229-B
Servomechanisms (Canada) Ltd., Toronto, Ont.	356
Shakeproof-Fastex, Div. of Canada Illinois Tools Ltd., Don Mills, Ont.	E-20
Sigma Instruments Inc., South Braintree, Mass.	361
Simmonds, A. C. & Sons Ltd., Toronto, Ont.	248/50
Sinclair Radio Laboratories Ltd., Toronto, Ont.	549
Sola Electric (Canada) Ltd., Toronto, Ont.	E-8
Sperry Gyroscope Co. of Canada Ltd., Montreal, Que.	442
Standard Telephones & Cables Mfg. Co. (Canada) Ltd., Montreal, Que.	449
Stark Electronic Sales Co., Ajax, Ont.	230
TMC (Canada) Limited, Ottawa, Ont.	345
Tecneek Associates, Montreal, Que.	235
Tektronix Incorporated, Syracuse, N.Y.	160
Telegraph Condensor Co. (Canada) Ltd., The Toronto, Ont.	336
Tilton Ltd., John R., Toronto, Ont.	131
University of Ottawa, Ottawa, Ont.	E-24
University of Toronto, Department of Electrical Engineering, Toronto, Ont.	568
Varian Associates of Canada Ltd., Georgetown, Ont.	368
Vactric (Control Equipment) Ltd., Montreal, Que.	E-26
Wickman Limited, A. C., Toronto, Ont.	W-10
Wind Turbine Co. of Canada Ltd., Toronto, Ont.	W-16



When you install Lenkurt multi-channel communications systems, you not only receive the ultimate in performance, and quality—you also receive a wiring list that provides you with full mechanical and electrical details—right at your fingertips.

This exclusive Lenkurt wiring list sets out all equipment used, the arrangement, and is the key to the technical information and drawings that are also supplied.

Use your Lenkurt wiring list! Check it against your order. Note carefully the options indicated. Make it your installation guide and keep it for future reference when adding to the system. Remember—Lenkurt supplies *complete* technical information with every shipment.

Address your enquiries about Lenkurt equipment and literature to AUTOMATIC ELECTRIC (CANADA) LIMITED, 185 Bartley Drive, Toronto 16, Ontario. Branches in Montreal, Ottawa, Brockville, Hamilton, Winnipeg, Regina, Edmonton, Vancouver.

5766

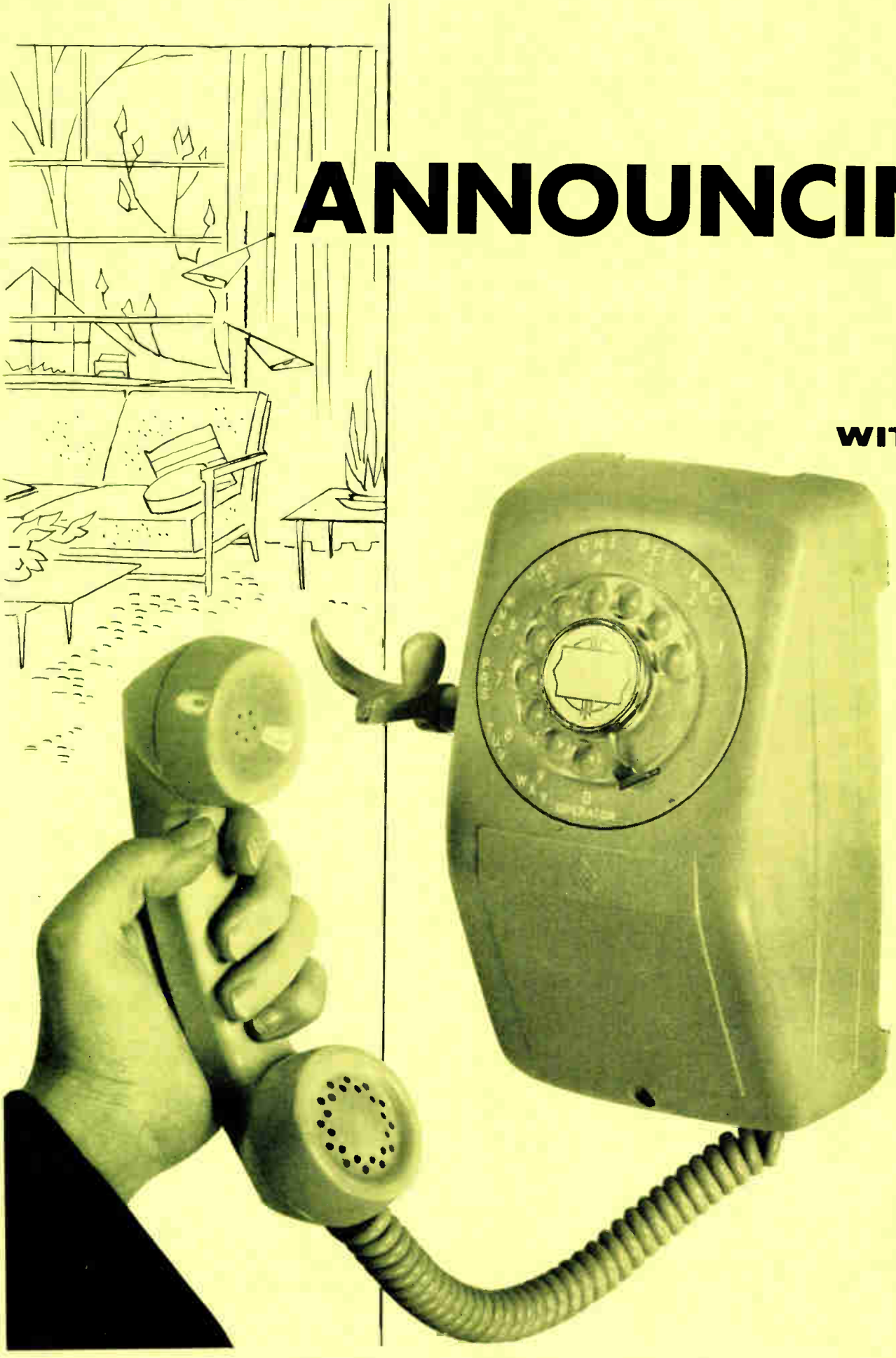
AUTOMATIC ELECTRIC

ORIGINATORS OF THE DIAL TELEPHONE

For further data on advertised products use page 97.

ANNOUNCING

WITH THE



For further data on advertised products use page 97.

...the Type 90 wall monophone

FEATURES YOU'VE ASKED FOR!

The Type 90 Wall Monophone provides superior reception and transmission. Such high performance was accomplished by using the same proven circuit for the Type 90 as was used in the Type 80 Desk Monophone. The result—higher gain and greater effective transmission.

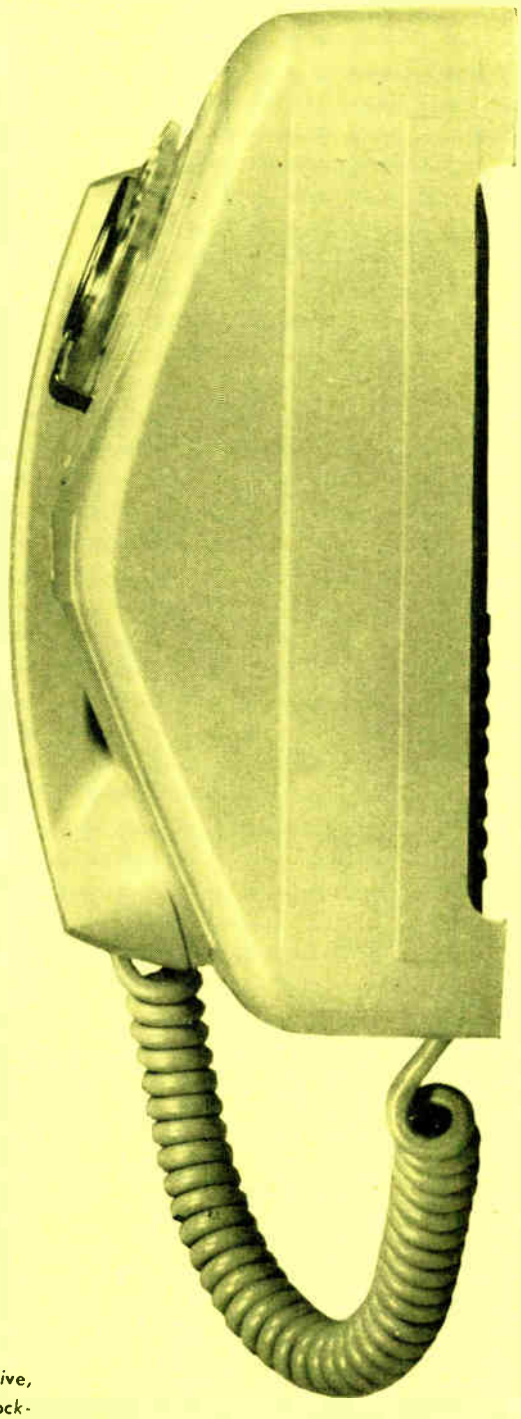
The Type 90 Wall Monophone is easy to install—it was designed with telephone companies in mind. The cover pops-off by loosening one screw, exposing all working parts that are attached to the single base. The unit is attached to any wall surface by four holes, three of which have stand-off lugs that give a tripod effect to compensate for any irregularities in wall surface. These same lugs hold the unit slightly away from the wall to avoid interference with the ringer's natural mellow tone. The line wires are easily connected, even under poor lighting conditions, by a twin screw terminal block conveniently mounted above the ringer.

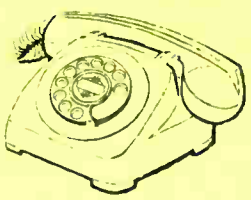
The hook switch mechanism not only withstands abuse but also provides freedom of mechanical trouble. An installer's hand lock is unnecessary because the side mounted hook makes it possible to remove the cover and work on the interior of the telephone without disturbing the handset.

Telephone operating people will like and appreciate the "functional" design of the Type 90. Installation is quick and easy. Case and handset hook are designed to provide trouble-free operation and easy maintenance when necessary. The heavy duty handset with its rugged hook can take a lot of slamming. The side mounting of the Type 90 handset reduces overall projection from the wall and protects it from being accidentally knocked off. This means fewer off-the-hook complaints and less breakage.

The Type 90 is available in conventional black, or in eight attractive single or two-tone modern colours . . . Sand Beige, Dawn Grey, Jade Green, Classic Ivory, Garnet Red, Turquoise, Colonial Blue and Sunlight Yellow.

The complete story is given in Circular 1870. Write for your copy today.





The very popular and successful Type 80 Desk Monophone

Automatic Electric (Canada) Limited, 185 Bartley Drive, Toronto 16, Ontario. Branches in Montreal, Ottawa, Brockville, Hamilton, Winnipeg, Regina, Edmonton, Vancouver.

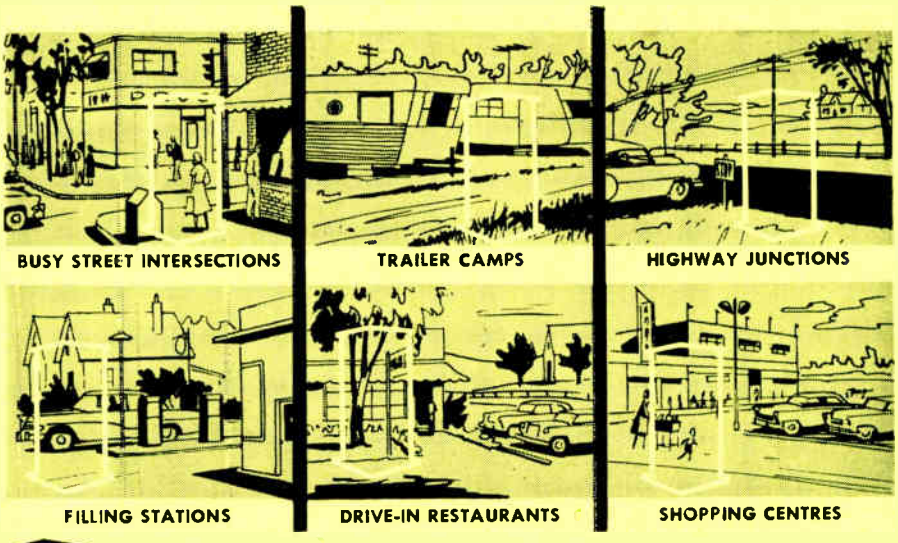
AUTOMATIC ELECTRIC

ORIGINATORS OF THE DIAL TELEPHONE

GENERAL SYSTEM

5-57

how to choose profitable sites for *Telephone Booths*



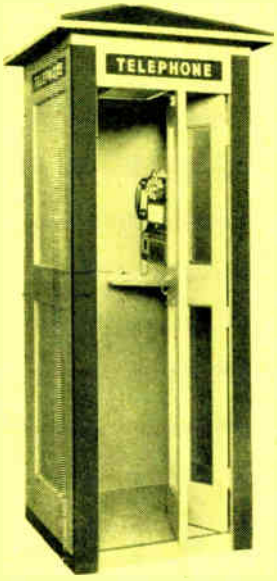
1 **LOOK FOR POTENTIALLY PROFITABLE LOCATIONS**
Choose sites similar to those which have proved profitable elsewhere. Here are six areas that can be big revenue producers. How many do you have of each?

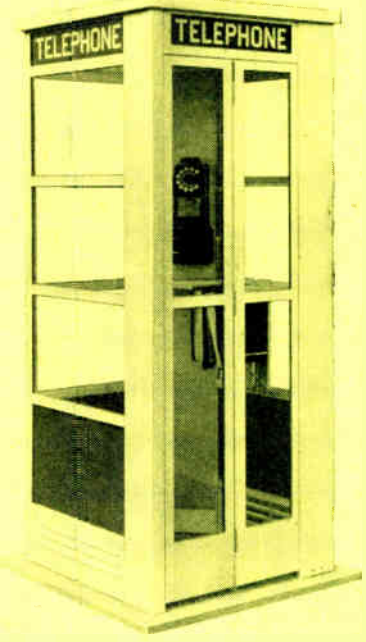
2 **EVALUATE YOUR LOCATIONS**
Draw up a survey sheet for each location as indicated here. Carefully compare the completed sheets to determine the revenue potential of each site.

- Address and description of location
- Are there already booths at or near this location
- Will any signs be required
- Will zoning regulations allow booths in this location
- Is the proposed location easy to see from street
- Will installation cause a traffic hazard
- During what hours are nearby businesses open
- Do terrain conditions make construction unusually expensive
- Can change be secured from nearby establishments

Is location dry	Is surrounding area free from trash
Is electric power available	Vehicle traffic count
Is parking area available	Pedestrian count
Will flood lights be needed	Time of day and length of time count was made

3 **THE CHOICE OF BOOTH**
After establishing the most profitable locations, you will need to consider the booths themselves. They should be neat in design, well ventilated, easily recognized and a pleasure to use. Here are two that fulfil these requirements and will also save you money.





DOUGLAS FIR BOOTH

A sturdy, but very low cost booth of selected Douglas Fir. It has proved to be hard wearing in all types of climate. The roof is furniture steel, welded at the seams and joints. Brackets are provided for anchoring and levelling. The interior light also illuminates the three telephone signs.

ALCOA ALUMINUM BOOTH

There is a tremendous "Sales Appeal" in this big, roomy, clean-looking, colourful booth. You save on maintenance because the Alumilite finished frame never needs painting and always looks spotless. You also save on transportation charges because of the lighter weight of aluminum. All necessary accessories are part of the standard booth. These include fluorescent lights, wire inlets, integral kick plates, door closing device, spring door stop, directory shelf and racks. 5561

For further information and advice on booths or sites, contact your nearest office of Automatic Electric Sales (Canada) Limited. Head Office: 185 Bartley Drive, Toronto 16, Ontario. Branches in: Montreal • Ottawa • Brockville • Hamilton • Winnipeg • Regina • Edmonton • Vancouver.

AUTOMATIC ELECTRIC
SALES (CANADA) LIMITED

For further data on advertised products use page 97.

News Report

MEL Sales Opens Montreal Office

E. E. Whittaker, general manager, MEL Sales Limited, announces the opening of an office in Montreal, under the management of Fred J. Ball. Mr. Ball is well known to the electronic industry in the province of Quebec and Eastern Ontario. He may be contacted by writing to MEL Sales Ltd., 12389 Cousineau Street, Cartierville, Quebec, or telephoning RIverside 8-9553.

Magtrol Incorporated Appoint Canadian Licensee

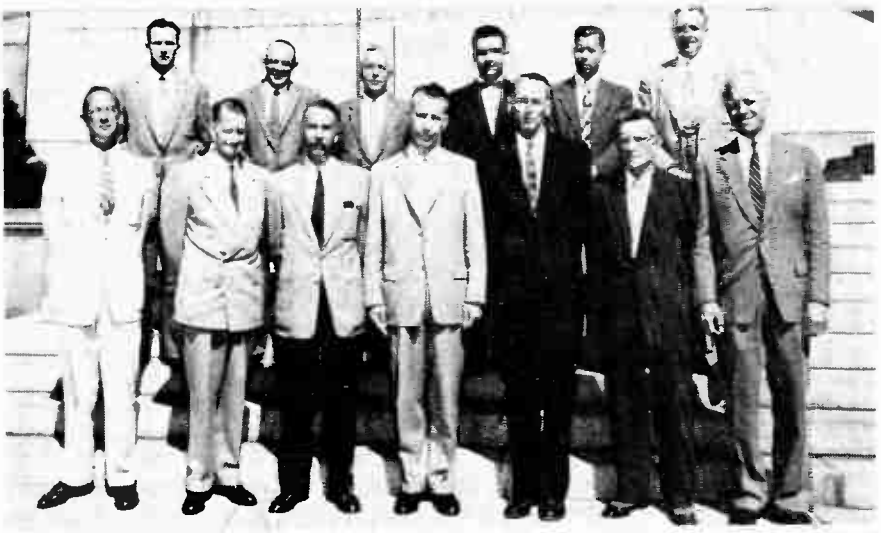
Found Bros. Aviation Ltd. of Malton, Ontario, have announced their appointment as Canadian Licensee for the manufacture and distribution of Magtrol Inc. products.

Found Bros. Aviation will manufacture the Magtrol line of electromagnetic clutches, brakes and dynamometers. The clutches and brakes are of two types, the conventional magnetic friction units in extremely small and compact configurations of clutch, clutch brake and brake. The other type of unit is a proportional device of the hysteresis type, employing no friction members to generate torque, and producing a force proportional to the current impressed. Found Bros. Aviation Ltd. is the only licensed manufacturer for hysteresis clutches, brakes and dynamometers outside of the United States.

APPOINTMENT

● The election of H. N. Muller as a vice-president of the Canadian Westinghouse Company, Hamilton, Ontario, was announced recently by George L. Wilcox, president. Mr. Muller, who directs the company's engineering facilities, has been associated with Westinghouse since 1935.

For further data on advertised products use page 101.



● Telecommunications officials from Canada and the United States meet in Ottawa to confer on frequency matters. Left to right are shown (front row): Phil Bogart, Civil Aviation and Communications Attache, U.S. Embassy; Victor Goings, U.S.; C. M. Brant, Department of Transport, Canada, Joint Chairman; A. L. McIntosh, U.S.; F. G. Nixon, Director of Telecommunications Branch, Canada; A. L. Lebel, U.S. Joint Chairman; J. A. McDevitt, U.S. Embassy. Left to right (back row): H. F. Jackson, U.S.; W. A. Caton, Canada; C. J. Acton, Canada; J. L. Stewart, U.S.; E. J. Holliman, U.S.; A. T. Dawson, Canada.

Instronics Canadian Rep For Detectolab

Canadian sales responsibility for Detectolab nuclear instrumentation has been assigned to Instronics, Ltd., Stittsville, Ontario. The announcement was made by John R. Harkness, vice-president and general manager of BJ Electronics.

The Santa Ana, California facility of Borg-Warner Corporation recently retained the Canadian sales representative for other product lines, including digital data systems, Vibrotron Transducers, R-F test instrumentation and allied accessories.

Radio Frequency Plans Concluded For U.S. And Canada

Telecommunications representatives of the United States and Canada met in Ottawa recently in another of a continuing series of formal meetings on frequency matters of mutual interest to discuss the assignment of radio frequencies to provide communications between shore establishments and ships transiting the International Section of the St. Lawrence Seaway. The requirement arises from plans for the establishment of communication facilities and the laying down of operational procedures now being developed by the responsible operating agencies. As a result of the discussions, mutually acceptable radio frequency plans were drawn up for the use of Medium Frequencies as well as for the employment of Very High Frequencies. These frequency matters are under active consideration by the Department of Transport in Canada and the Federal Communications Commission in the United States.

Diamond State Fibre Becomes Continental-Diamond

Allen G. Ballard, president, announces that the name of the Diamond State Fibre Co. of Canada Limited has been changed to Continental-Diamond Fibre of Canada Limited. This will achieve closer identity with the Continental-Diamond Fibre Corporation, Newark, Delaware (a subsidiary of the Budd Co.). This is the first step in a planned program of expansion and diversification.

Diamond State (now Continental-Diamond) was organized in 1919 and was the first to offer a service on vulcanized fibre and laminates in Canada. They have been manufacturing industrial laminates in Canada since 1949 jointly with the Arborite Company Limited.

Continental-Diamond Fibre Corporation is the oldest manufacturer of vulcanized fibre and laminates in the United States, and more recently has developed new products in the electrical insulation field, such as Teflon and insulating tapes.

The Budd Company claims to be the largest independent fabricator of sheet metal in the United States and is widely known throughout the automotive industry, but is probably best known in Canada as the builder of the modern CPR Dome Train, "The Canadian". Continental-Diamond is now manufacturing in Canada the Budd Brake Disc Lining Assembly to service Canadian railroads.

For further data on advertised products use page 101.

For further data on advertised products use page 101.

News Report

Quality Control Forum Scheduled For Montreal

More than 200 delegates are expected to attend the First All-Day Quality Control Forum sponsored by the Montreal Section of the American Society for Quality Control. The Forum will be held in Montreal at the Sheraton Mount Royal Hotel on Saturday, October 26th, 1957.

One of the outstanding features of the Forum will be an all-day training course in the fundamentals of statistical quality control. This session will be conducted by Mr. T. P. Monahan and Mr. P. C. Goddard of the Ford Motor Company of Canada.

Mr. Simon Collier, Director of Quality Control for the Johns-Manville Corporation, New York, will show his outstanding one hour sound color film "Statistical Quality Control".

There will be seven other sessions outlining applications of Quality Control in the fields of Electronics, Aircraft, Metals, Chemical and Administration.

The all-day event will be climaxed by a social hour which will be held in the Champlain Room of the Sheraton Mount Royal Hotel.

The complete program and advanced registration form may be obtained from R. Vance Ward, Canadian Industries Limited, P.O. Box 10, Montreal, P.Q.

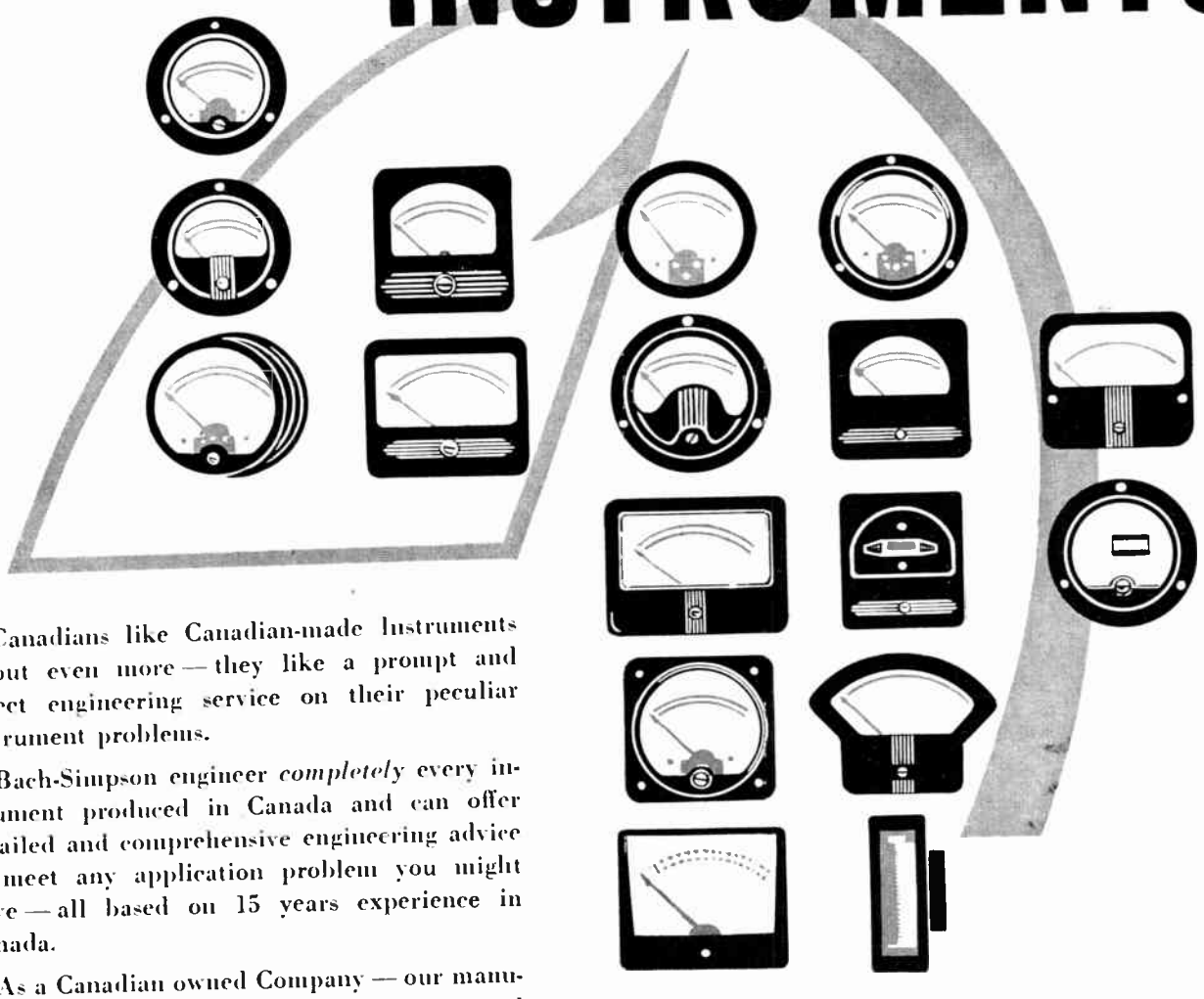
Professor Marcus Long To Address IRE Gathering

The challenging subject, "Are we Educating our Engineers for Yesterday's Jobs?" will be the theme of a panel discussion on engineering education at the 1957 Institute of Radio Engineers' Canadian convention-exposition in Toronto, October 16th, 17th and 18th. Panel members are J. D. Ryder, Dean of the College of Engineering, Michigan State University, Frank Noakes, Head of the Department of Electrical Engineering, University of British Columbia, K. F. Tupper, president, Ewbank and Partners (Canada) Ltd., Toronto and G. F. Tracy, Head of the Department of Electrical Engineering, University of Toronto. The discussion will take place Thursday afternoon, October 17th. The technical papers program begins Wednesday afternoon, October 16th, running through Friday afternoon the 18th.

Professor Marcus Long of the University of Toronto will be the speaker at the IRE Canadian convention banquet in the King Edward Hotel, Toronto on Thursday, October 17th, choosing as his title — "Engineers are People".

For further data on advertised products use page 101.

Simpson STANDARD PANEL INSTRUMENTS



Canadians like Canadian-made Instruments — but even more — they like a prompt and direct engineering service on their peculiar instrument problems.

Bach-Simpson engineer *completely* every instrument produced in Canada and can offer detailed and comprehensive engineering advice to meet any application problem you might have — all based on 15 years experience in Canada.

As a Canadian owned Company — our manufacture is complete from movement design, tool and mold manufacture, through case styling, dial printing to packaging — all in either commercial or military types.

Apart from the complete coverage of all electrical types and ranges — over 50 different case styles alone are available from Canadian production and tooling — and if you find your application calls for a new design — our engineering department is at your disposal.

VISIT US AT BOOTH 128
AT THE I.R.E. SHOW, TORONTO
OCTOBER 16 - 17 - 18

Bach-Simpson Limited also produce Laboratory Test Apparatus, Radio Service Equipment, Automotive Service Test Equipment, Electronic Control Apparatus for Industry and Instrument components and accessories.

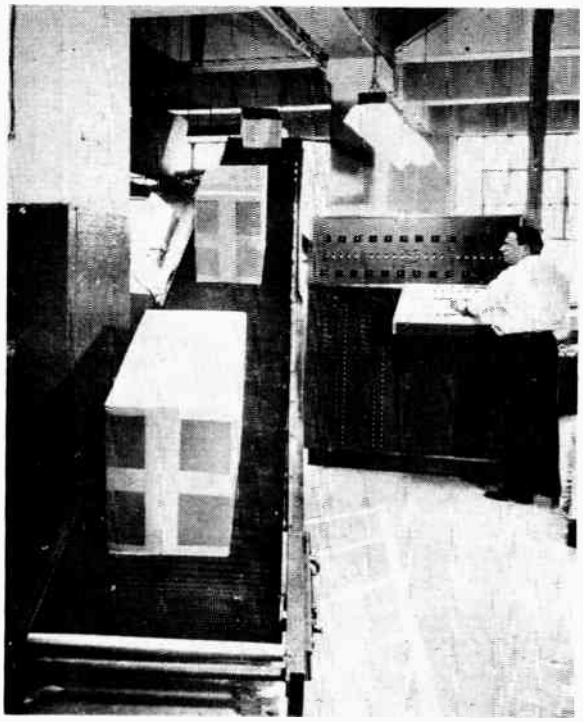
Bach-Simpson LIMITED

G6008

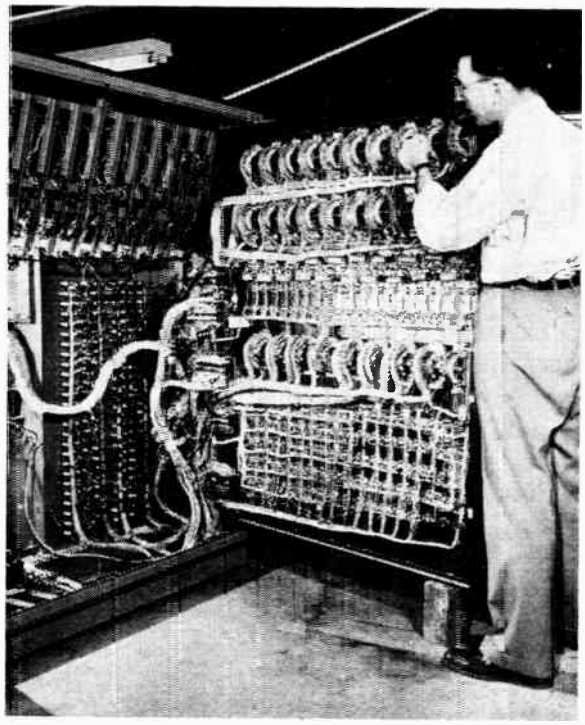
1255 BRYDGES ST., LONDON, CANADA

IN U.S.A.: SIMPSON ELECTRIC COMPANY, 5200 W. KINZIE ST., CHICAGO 44, ILL.

For further data on advertised products use page 101.



● A warehouse employee is shown operating DASAC, the control panel for an automated order filling system.



● View of inner workings of DASAC, showing interconnection of step-switch banks, relay levels, indicators and counters.

Automated Warehousing

In Operation For Only A Short Time Automated Handling Equipment Installed In The Manhattan Warehouse Of Judy Bond Inc. Has Substantially Paid For Itself.

DASOL Corporation, automation engineers, designed the automatic sorting system in use in the Manhattan warehouse of Judy Bond, Inc., world's largest manufacturer of ladies' blouses. Their objective was to speed up the order-picking operation, reduce space requirements and avoid excessive labor costs.

The system consists of conveyors which carry bulk cartons from the receiving section of the warehouse to a series of 23 distribution racks, at which the orders are picked. Two pickers are able to handle between them 3,600 dozen blouses daily, with each filling 300 separate orders.

From the picking section the orders are conveyed to packers and from the packers are automatically routed to a fully automated, self-adjusting case sealer. From the sealer the cartons are routed directly to out-going trucks.

The entire system is controlled by means of DASAC, a push-button console. In the operation DASAC performs three basic functions. First, there is the selection of the container destination and addition to the inventory. One bank of step-switches working with fast-acting relays performs this function. It is important to make the stepping of the relays and switches independent of the length of time it takes for the operator to push the select button. Special add-and-subtract counters are used to keep up-to-the-minute inventory. These are tied into both the previous select relay circuits and the tilt sections associated with the sorting racks.

The second phase consists of memorizing the selections in consecutive order. Two banks of step switches under the control of relays pick up the calls and record them for future use. Should there be an error in selections, an independent relay circuit allows the error to be erased and deducted from the inventory of that particular rack.

The third and last phase is the read section. A group of step-switches coordinates the information relayed by limit switches at the individual rack and the selections retained in the memory levels of the previous circuits. Motor control relay circuits are energized to stop the container at its proper discharge point and effectively send the container down its rack over a specially designed pull-off friction wheel drive. Erase levels then delete the section from the memory. The stepping levels of the read section wait for the signal that the container has passed the eye before carrying out the next selection. Separate levels in the step-switch circuitry guard against asynchronous troubles by giving a visual indication of the causes as well as preventing any further error.

In all, DASAC contains approximately 250 plug-in relays, step-switches, add-and-subtract counters and over four miles of wire. The unit is engineered for minimum maintenance by using standard plug-in units which can be switched around on-the-spot for trouble shooting and easy replacement. Wiring is color-coded for rapid circuit tracing and terminates in terminal blocks for rapid component replacements. All parts are readily accessible through rear doors or removable front panels.

The Judy Bond installation has been in operation only a short time and is already substantially paid for out of savings. The equipment has been "down" only nine hours for servicing during that time.

Book Review

Transductors And Magnetic Amplifiers by A. G. Milnes, D.Sc.

In the last decade, transductor and magnetic amplifier techniques have become of great prominence in the field of electrotechnology for regulating and control purposes.

In this Monograph, based in good part on the author's own investigations in this field, single-phase and three-phase transductor circuits are discussed for a variety of load and operating conditions. Design methods are explained and applications of magnetic amplifiers are described. Other circuits discussed include magnetic modulator devices, transductors with re-set voltage control and transistor controlled magnetic amplifiers.

The general approach is an analytical one, but the need for practical information has not been overlooked in the descriptive chapters. The book should be of interest to all designers and users of magnetic amplifiers in industry and to those teaching this subject in advanced electrical courses.

Transductors And Magnetic Amplifiers is published by The Macmillan Company of Canada Limited, 70 Bond Street, Toronto, Ontario, contains 286 pages, hard cover bound, price $10.75.

The Science Of Engineering Materials edited by J. E. Goldman, Manager, Physics Department, Scientific Laboratory, Ford Motor Company.

This volume comprises a series of lectures on the Impact of Solid-State Science on Engineering Materials, based on the Proceedings of the Carnegie Conference held at Carnegie Institute of Technology in June, 1954 and sponsored jointly by the American Society for Engineering Education, the National Science Foundation, the Carnegie Institute of Technology, and the University of Illinois.

The book is the work of a number of the outstanding scientists in a variety of physical and engineering fields. In defining the actual molecular makeup of materials, they explain and interpret, qualitatively, the properties of metals, alloys, semi-conductors, cements, polymers, and glasses.

The Science Of Engineering Materials is published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N.Y., contains 528 pages, hard cover bound, price $12.00.

Magnetic-Amplifier Circuits — Basic Principles, Characteristics, and Applications by William A. Geyger, Magnetics Division, U.S. Naval Ordnance Laboratory, White Oak, Silver Spring, Maryland.

Here is a practical treatment of the fundamental principles, characters, and applications of magnetic-amplifier circuits. It develops logically the various kinds of basic and more complex circuit arrangements, emphasizing experimentally observed phenomena and avoiding extended mathematical considerations and cumbersome proofs.

Written for the circuit designer in government, industrial, or academic research laboratories, its material has been classified according to circuit functions. Thus it enables the reader to compare various circuits for accomplishing a particular function and to select the one best suited to the solution of his special problem.

A special feature of the book is the list at the end of each chapter of both European and American patents and associated technical papers.

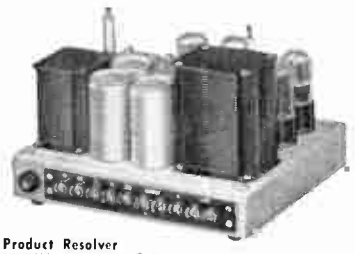
Magnetic-Amplifier Circuits is published by McGraw-Hill Company of Canada Ltd., 253 Spadina Road, Toronto 4, Ontario, contains 394 pages, hard cover bound, price $8.40.

A New Analog Multiplying Element

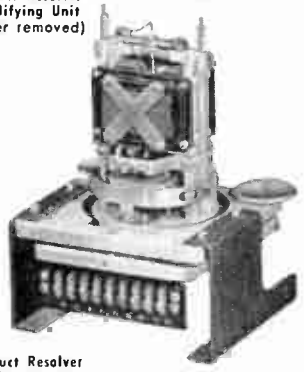
WESTON INDUCTRONIC® PRODUCT RESOLVER

— produces a direct current proportional to the product of two varying electrical signals

- four-quadrant operation
- precise . . . 0.1 per cent
- permanent calibration constant
- speed — 15 millisecond period
- especially suited to a-c/d-c measurements



Product Resolver Amplifying Unit (cover removed)



Product Resolver Converter (cover removed)

This Weston Product Resolver employs an electronically balanced electrodynamometer instrument mechanism to develop a product output signal from two input signals by torque multiplication. The Inductronic balancing system provides precise and rapid response, and an exceptional order of response to displacement. The mechanism is unique to this purpose and stems from Weston's long experience in the design and manufacture of precision dynamometer mechanisms. The complete story on the Model 1482 Inductronic Product Resolver can be obtained from your local representative or by writing Daystrom Limited, 840 Caledonia Road, Toronto 10, Ontario, or 5430 Ferrier Street, Montreal, Quebec, a subsidiary of Daystrom, Incorporated. Or call any office of Northern Electric Co. Ltd. 5705

WESTON
INSTRUMENTS
A DAYSTROM UNIT

Visit us at Booth 142 at the IRE Convention

For further data on advertised products use page 101.

News Report

Collins Radio Gets DDP $8.3 Million Contract

Collins Radio Company of Canada Ltd. announce that the Department of Defense Production has awarded them a production contract valued at $8.3 million for UHF Airborne Transceivers.

The RCAF have planned a conversion from VHF to UHF communication for some years. After exhaustive evaluation of available equipment they have selected the Collins designed AN/ARC-52. This radio has been adapted to meet RCAF requirements and will be known in Canada as the AN/ARC-552.

The AN/ARC-552 will be manufactured in Collins' Toronto plant. The AN/ARC-27 (predecessor of the AN/ARC-52) was produced for the RCN and RCAF at this facility.

Collins Executive Vice-President, Air Vice-Marshal J. L. Plant, expects that over 90 per cent of the components will be produced in Canada and that 50 per cent of the contract will be subcontracted.

The AN/ARC-552 is a UHF Transceiver employed in air-to-ground and air-to-air communications. Used in Canadian aircraft, it will replace earlier VHF equipment used for a similar purpose. The AN/ARC-552 provides a total of 1750 channels over the range of 225 to 400 mc. While all are available to the pilot, 19 are preset and available for instant use. In addition, an entirely separate guard channel is always available for emergency or search-rescue use.

The Canadian ARC-552 is directly interchangeable with the U.S. developed ARC-52, being an adaptation of the latter for Canadian requirements. Both equipments represent a major advancement over earlier equipment in service use. Though one-third the weight, and one-half the volume, the equipment has improved sensitivity and greater power output. Both factors increase the service range under severe propagation conditions.

The equipment makes use of the latest assembly techniques. Printed wiring reduces manufacturing cost; modular construction reduces maintenance; pressurization increases service life. These techniques, together with improved components now available from industry, have made possible an equipment of greatly improved reliability. This has become a must for the high performance aircraft of the jet age.

SEE YOU AT
THE IRE SHOW

APPOINTMENTS AT MEASUREMENT ENGINEERING

P. C. BOIRE

G. C. TEMES

MRS. V. TEMES

● Paul C. Boire, M. Eng., P.Eng., chief engineer of Measurement Engineering Limited of Arnprior, Ontario, announces two recent appointments to the engineering department. G. C. Temes, E.E., M.Sc., has been appointed to the Electronics Group and will be working on the design and development of Industrial Electronic Controls. Mrs. V. Temes, E.E., has been appointed to the Production Engineering Group. Mr. and Mrs. Temes are both graduates of the Technical University of Budapest.

For further data on advertised products use page 101.

Invitation from Britain

The Directors of British Physical Laboratories cordially invite you to meet them on their stand at the IRE Convention. They will be pleased to demonstrate their range of electronic test equipment and meters, which include ruggedized, hermetically sealed instruments.

They are also seeking to contact a Company to act as their representative in Canada.

STAND 363

IRE CONVENTION

TORONTO, 16-18 OCTOBER

British Physical Laboratories

RADLETT, HERTS, ENGLAND

CABLES: BEEPEELLE, RADLETT

Transistorized extended range volume indicator

TYPE R18568B

FEATURES

Large 4" rectangular meter for maximum readability.

Daven 30 step — potentiometer.

Parallel—T filter, may be switched "IN" to filter out undesirable 60 cycle "HUM" on communications lines.

Novel amplifier construction allows easy maintenance.

Use of low drain transistor circuitry provides long battery life.

Unit automatically turned off when lid is closed.

The Volume Indicator normally used to measure transmission levels in the fields of Telephone, Broadcasting, Recording etc. is very limited in its application. The Northern Electric Co. realizing the need for a small, accurate, highly sensitive and truly portable indicator has produced the R18568B Transistorized Extended Range Volume Indicator.

A conventional Volume Indicator is limited to a sensitivity such that it can be physically read down to approximately −20 VU. Whereas this may often be adequate, the engineer or technician must frequently make measurements which require accuracy from 0 VU to levels down to −20 VU and below. The R18568B Extended Range Volume Indicator incorporating an amplifier of flat frequency response and high gain together with a variable step potentiometer provides extreme accuracy of measurements over a range of −40 to +20 VU. Less accurate readings further extend the range from −60 to +23 VU.

The R18568B Transistorized Extended Range Volume Indicator is a battery operated instrument contained in a beautiful, furniture finished, low gloss walnut case which has a hinged, removable cover. All hinges, the handle and the fasteners are chromium plated which further enhances the overall appearance of this high quality and precision meter. The front panel of the R18568B Indicator is black anodized with all designations engraved and filled in white in order to provide a durable surface which will stand up under field and laboratory conditions.

SPECIFICATIONS

Range — zero deflection:	−40 to +20 dbm in 600 ohms.
— whole scale:	−60 to +23 dbm in 600 ohms.
Frequency Response:	+ 0 to − 1 db from 30 cycles to 15 kilocycles.
Input Impedance:	600 ohms, or high impedance bridging.
Current Drain:	1.25 ma.
Transistors:	2 Texas Instruments type 302.
Batteries:	2 Burgess U15 or 2 National Carbon 412D. 22½ V. dry cells in parallel.
Battery Life:	Approximately 200 hours at 2 hours per day.
Overall Dimensions (including cover):	6½" x 9¼" x 6".
Weight (including batteries):	6 pounds.
Finish:	Walnut.

Northern Electric

COMPANY LIMITED 1057-7

For further data on advertised products use page 101.

News Report

IRE Canadian Convention Offices Move

As of September 1st, 1957, the offices of the IRE Canadian Convention have moved to the Wawanesa Insurance Building at 1819 Yonge St., Toronto 7, Ontario. The telephone number remains unchanged — HUdson 8-7768.

Union Carbide To Build Head Office Building

Union Carbide Canada Limited has announced plans to build a $4,500,000 head office building on Eglinton Ave. East, Toronto. This 11 storey building with gross floor area of 180,000 square feet will bring together the management personnel of Union Carbide Canada Limited and its operating Divisions: Bakelite Company, Carbide Chemicals Company, Electro Metallurgical Company, Linde Air Products Company, and National Carbon Co.

According to J. S. Dewar, vice-president, Union Carbide Canada Limited, the building will be ready for occupancy in mid-1959.

Union Carbide Canada Limited is one of the leading manufacturing organizations in the country and employs over 4,100 people in 27 plants across Canada. Union Carbide's basic products are: ferro-alloys and metals, batteries, carbon, graphite, chemicals, industrial gases and plastics.

BRANCH MANAGER

H. A. ASHTON

● H. A. Ashton has been appointed Edmonton branch manager of Northern Electric Company, Limited. Prior to his new appointment Mr. Ashton was senior salesman in Victoria, B.C., contacting power utilities, industrial and contracting trades.

News Report

CFBR At Sudbury Equipped By C.G.E.

CFBR, 550 Kc, at Sudbury, Ontario, will join the family of Canadian broadcasting stations equipped by Canadian General Electric when it commences programming in October. When this takes place, a unique arrangement will exist whereby two commonly owned radio broadcasting stations will operate into a dual-tower array. The recently licensed daytime French language broadcasting station at Sudbury will share the array presently used by CHNO. Until such time as the new 1 Kw station, CFBR, operates with a night-time schedule, CHNO will broadcast in the hours after sunset at 30 per cent in the French language.

Canadian General Electric Company Limited will supply the 1 Kw AM Transmitter to CFBR including the specially designed phasing and tuning equipment.

Comptroller Appointed For Canadian Admiral Corporation

The appointment of Gerald J. Clarke as Comptroller of Canadian Admiral Corporation, Ltd. is announced by Stuart D. Brownlee, executive vice-president.

Mr. Clarke has held the position of Chief Accountant and Office Manager since the company began operations ten years ago.

During the past seven years Mr. Clarke has concentrated on the establishment and development of branches from coast to coast, holding the position of General Office Manager in charge of Administration.

Philips Industries Appoints Product Manager

The appointment of Gary W. Matheus, P.Eng., as product manager for high frequency induction heating equipment was recently announced by R. G. Archer, manager of the Scientific and Industrial Apparatus Dept., Philips Industries Limited.

G. W. MATHEUS

Mr. Matheus will also be in charge of Philips Application Laboratory, the facilities of which are available to industry for the study of the application of induction heating to brazing, hardening, annealing, forging and melting.

For further data on advertised products use page 101.

For further data on advertised products use page 101

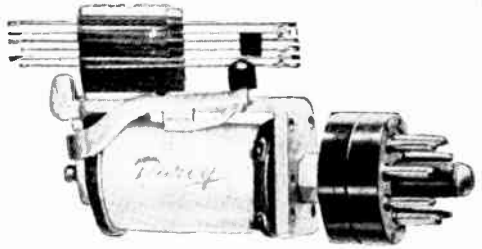
CLM DARCY RELAYS

Now you can get fast delivery with Canadian made relays. All standard types are available and all are electrically and mechanically interchangeable with other makes.

Illustrated are only a few telephone type relays. Other spring and coil combinations are available.

For full information call or write Jack West, Sales Manager, Rectronic Division, **Canadian Line Materials Limited, Toronto 13, Canada.**

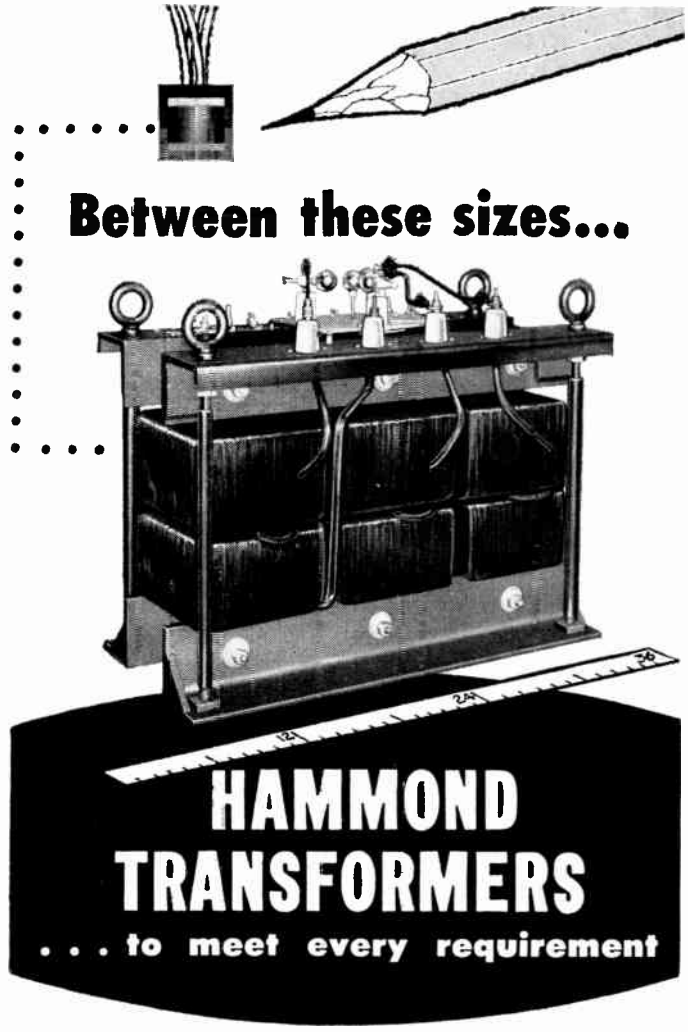
SALES OFFICES AND WAREHOUSES
ST. JOHN'S NFLD. • HALIFAX • SAINT JOHN • MONTREAL • OTTAWA
FORT WILLIAM • WINNIPEG • REGINA • CALGARY • VANCOUVER



TYPE CG
WITH PLUG-IN BASE

TYPE CC

CLM-DARCY RELAYS



Between these sizes...

HAMMOND TRANSFORMERS

. . . to meet every requirement

The miniature transformer, for transistor and vacuum tube circuitry, dealing with energy levels of one-thousandth of a watt; and the 1100 pound, 3 phase, plate transformer are extreme opposites in the Hammond Transformer line.

Between these sizes any specification and power level can be supplied. Engineering and manufacturing facilities are available to meet the most complex and rigid design requirements.

Many hundreds of stock units are available. If your requirement is not met by a stock type Hammond will build a transformer to your own specifications. Enquiries for large or small quantities of "specials" are invited.

RACKS • PANELS • CABINETS • CHASSIS

Fabricated metal parts are produced by Hammond for both industrial, and experimental work, in many stock sizes. Hammond also specializes in "original" metal equipment, built to your own design.

STANDARD ITEMS STOCKED BY LEADING JOBBERS FROM COAST TO COAST

For Catalogues, or further information on "specials" write:-

HAMMOND MANUFACTURING COMPANY LIMITED

H/57/4 **GUELPH, ONTARIO, CANADA**

For further data on advertised products use page 101.

News Report

Lake Engineering Appointed Canadian Reps.

Dialight Corp., Brooklyn, New York, has announced the appointment of Lake Engineering Co. Limited, 767 Warden Avenue, Scarborough, Ontario as their Canadian representative. This appointment also includes their associates Signal Indicator Corp., Leecraft Mfg. Co. Inc., all manufacturers of dial lamp assemblies and Dialtron Corp. which manufacturers thermal delay relays for airborne applications.

Canadian Applied Research Represented In Japan

Kusuda Shoten Limited of Osaka, Japan, that country's largest importer of office equipment, has chosen to represent Canadian Applied Research Limited of Toronto, Canada. Formerly known as PSC Applied Research Limited, the firm was acquired recently by A. V. Roe Canada Limited.

The Japanese company is especially interested in Applied Research's Automatic Tri-Film Processor, the unique device that develops and dries 16, 35 or 70 mm film at the rate of six feet a minute. It is now receiving worldwide interest. The Japanese see the machine as complementary to the micro-filming of business records.

The Japanese company means to introduce the Processor at the September Trade Fair in Tokyo. The firm will also market Applied Research's Mk. 7 Instrumentation Camera and its Mk. 8 Aerial Camera.

Photographic Survey Corp. Appoints R. A. Brocklebank

R. A. Brocklebank has been appointed chief engineer, surveys and mapping, of The Photographic Survey Corporation of Toronto. The announcement was made by W. H. Godfrey, vice-president and general manager of the company.

Mr. Brocklebank brings to his new assignment five years' experience supervising control surveys on large PSC projects in Peru, Venezuela and the West Indies as well as on mapping and engineering projects throughout Canada. He will be particularly concerned with technical liaison on PSC engineering jobs. A former employee of the Ontario Department of Highways, he is a civil engineering graduate of the University of Toronto and belongs to the Ontario Association of Professional Engineers, the Engineering Institute of Canada and the American Congress of Surveying and Mapping

For further data on advertised products use page 101.

News Report

General Radio Opens Canadian Office

General Radio Company of Cambridge, Massachusetts, U.S.A., manufacturers of electronic apparatus for science and industry since 1915, have opened a factory branch office for Canada at 99 Floral Parkway, Toronto 15, Ontario.

Arthur Kingsnorth is in charge of the new office and is assisted by Richard J. Provan. Both are well known to Canadian scientists and engineers through their long experience with GR equipment as associates with the firm's former representatives, Canadian Marconi Company.

The termination of the association with Canadian Marconi Company which has existed for over 25 years, is the result of General Radio Company's desire to extend its domestic direct-sales policy to Canada.

General Radio service and repair work in Canada will continue to be handled by Bayly Engineering, Limited, of Ajax, Ontario.

Electronic Service Supply Represents Du Mont In Canada

The appointment of Electronic Service Supply Co., Ltd., of Calgary, Alta. as exclusive Canadian distributor for Du Mont land mobile radio equipment has been announced by the International Division of Allen B. Du Mont Laboratories, Inc.

Coinciding with the appointment as Du Mont mobile radio distributor, Mr. Hugh McCarthy, general sales manager, announced that Electronic Service Supply will open an Eastern division office in Toronto, Ontario, to provide coast-to-coast coverage in Canada for the company's products.

Pye Canada Limited Appointment

Mr. W. Jones, managing director of Pye Canada Limited, announces the appointment of Mr. J. P. Gordon as general sales manager effective August 26th. Mr. Gordon brings to Pye almost a decade of successful sales background and will be responsible for the company's national sales in the communications, domestic, instrument and telephone divisions. Mr. Gordon's appointment is in line with the company's increased sales activity.

J. P. GORDON

For further data on advertised products use page 101.

News Report

Leeds & Northrup Forms Canadian Company

Leeds & Northrup, Canada, Ltd., formally opened its doors on Sept. 3rd, according to an announcement by J. William Robinson, president. The wholly-owned subsidiary of Leeds & Northrup Co., Philadelphia, U.S.A., is both manufacturing and distributing the electronic controls and measuring instruments formerly supplied by the parent company. It is located at 61 Industry St., Toronto 15.

Mr. Robinson was formerly Co-ordinator of Western Operations for the parent company, and in that capacity has become quite familiar with Canadian expansion especially in the western Provinces. The production manager of Leeds & Northrup, Canada, is J. Robert Gowen, also formerly with Leeds & Northrup in the west. The office manager is Richard C. Park, of Toronto. Other officers are I. Melville Stein, chairman of the board, D. H. Schultz, vice-chairman, S. Loidl Jr., treasurer, and L. A. Blake, secretary. Mr. Gowen is assistant secretary. Directors are Messrs. Stein, Schultz and Robinson.

"The purpose in forming this new company" said Mr. Robinson "is to render better service to Canada's ever-expanding economy."

Miniature Precision Bearings Elects Canadian To Board

The election of Arthur Starratt Torrey to the board of directors of Miniature Precision Bearings, Inc. of Keene, New Hampshire, has been announced by Horace D. Gilbert, president and chairman of the board of that organization.

A. S. TORREY

Mr. Torrey is president and general manager of W. C. Pitfield and Company Ltd., investment dealers in Montreal, Quebec. He is also a partner in Hugh MacKay & Co., members of the Montreal Stock Exchange, chairman of the board of the Phillips Electrical Company, Ltd., and a director of Anglo-Canadian Telephone Co., British Columbia Telephone Company and Combined Enterprises Ltd.

Miniature Precision Bearings, Inc., specialists in the field of miniaturization, manufacture more than 500 types and sizes of miniature ball bearings of extremely close tolerances for a wide range of applications in aviation instruments, guided missile components, medical and dental instruments and electronic components.

For further data on advertised products use page 101.

a Bendix Computer simplifies cross-country pipe line construction

problem:

Determine pressures required in a newly-constructed pipe line to deliver gas at a destination several hundred miles away.

solution:

Engineers brought this problem to Bendix in an effort to simplify the design of a major new pipe line. The line was broken down into mile-long "sections" and a "pressure profile" was run on each section, using a modification of the Panhandle Eastern Flow Equation. Answers were computed accurately, point by point. Solution time was less than 12 minutes. A complete report on this problem is available on request (use coupon).

The BENDIX G-15 is a compact digital computer of almost limitless versatility. An inexpensive accessory (cabinet to left of computer) adds digital differential analyzer capabilities to the G-15. Highly trained computer specialists are in many cases unnecessary, and rental and purchase prices are surprisingly low.

Bendix Computer

COMPUTING DEVICES OF CANADA LIMITED
P.O. BOX 508, OTTAWA, CANADA.

COMPUTING DEVICES OF CANADA LIMITED
P.O. BOX 508, OTTAWA, CANADA.

Please send me more details on Model G-15 General Purpose Digital Computers, and include a copy of the pipe line report.

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

5721

WESTERN DIVISION: COMMERCIAL BUILDING, EDMONTON, ALBERTA

New Products

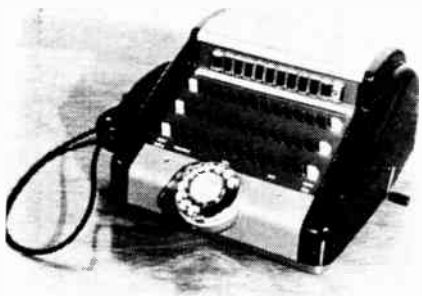
New Product specifications published in Electronics and Communications have been briefed for your convenience. If you require further information on any of the items published you may readily obtain such by using our Readers' Service, Page 101. Just mark the products you are interested in on the coupon on Page 101 and the information will be in your hands within a few days.

● *Cordless P.B.X. Switchboard*

Item 1669

A new, compact switchboard designed for the modern office has been manufactured by Etelco Ltd., of Beeston, England.

Available in a variety of attractive two-tone color schemes, cover ends are molded from strong plastic while the center sections are aluminum with a mottled enamel finish. Conversion from automatic dial to common battery is effected by removing the dial and fitting a new front plate.



All keys and indicators are of a new design. The miniature lever keys are positive in action and grooved to fit the finger.

Depending upon the model, the weight varies from 23 to 28 pounds. Able to fit unobtrusively on an office desk, this compact, new Cordless P.B.X. Switchboard is 13" wide by 8½" high by 13" long.

Several models are available and further details may be obtained by writing to **Pye Canada Limited, 82 Northline Road, Toronto 16, Ontario.**

● *Cable Terminal Sections*

Item 1670

Northern Electric Company Limited recently announced the introduction of Nos. 1A and 2A Cable Terminal Sections.

No. 1A Cable Terminal Section is an intermediate unit which can be used singly or assembled with similar units in a line-up. With the associated No. 2A Cable Terminal Sections, to close the ends, they form a housing of a wall type cable terminal for use within buildings. Nos. 1A and 2A cable terminal sections are made of sheet steel and finished in olive green enamel.

Protected and unprotected, terminating and cross-connecting facilities may be built up using these sections and the appropriate cable terminal blocks, binding post chambers and connecting blocks.

The intermediate section consists of two parts: a back with projections which provide the top and bottom and a removable snap-on cover. The top and bottom projections have an identical arrangement of knockouts for the entering cables and wires. There are four permanent wiring rings located in the corners of the sections and each section includes a No. 8A distributing ring. The No. 8A distributing ring may be mounted either at the top or bottom of the section, whichever arrangement is most convenient for wiring purposes.

The cable terminals assembled with these housings are exceptionally neat and compact.

For further information, write **Northern Electric Company Ltd., 1261 Shearer St., Montreal, P.Q.**

● *Saturable Reactor Catalog*

Item 1671

Control, a division of Magnetics, Inc., has issued a 32-page catalog describing the first standard lines of saturable reactors for industrial and other control.

These high gain units are manufactured in complete lines for both 240-volt and 120-volt operation, and this publication by the Butler, Pa., firm contains 88 curves, showing the transfer characteristics of these units under typical operating conditions.

Known as Catalog R-10, the literature describes typical applications of Control saturable reactors, and includes three pages showing typical circuits in which they are used.

A cut-away view shows the construction of Control standard reactors as a preliminary to a discussion of electrical characteristics. Electrical characteristics described in detail include rated load, volt-ampere amplification, time of response, and figure of merit.

A unique construction of the catalog cover provides a fold-out flap which enables the characteristic curves for a specific model to be checked against performance ratings and physical dimensions.

Copies may be obtained by writing for catalog R-10, **Control, Box 391, Butler, Pa., U.S.A.**

● *Polyfoam Coaxial Cables*

Item 1672

Amphenol Canada Ltd. announce a completely new line of Coaxial Cables featuring a new, versatile dielectric material — POLYFOAM.

Polyfoam is cellular polyethylene which utilizes an inert gas as an expanding agent to form completely enclosed cells within the polyethylene. As a result, the dielectric constant of polyfoam is lowered to 1.50 as compared to a dielectric constant of 2.25 for solid polyethylene. This lower dielectric constant is the key to the importance of this new material. With polyfoam as a dielectric, we are actually able to manipulate design parameters of cable to a very high degree.

A specially compounded black polyethylene jacket is used on this cable providing improved weathering properties. Being polyethylene, the jacket material is non-contaminating and thereby insuring against possible degradation of the dielectric material over a period of years.

This new polyfoam cable is also lighter in weight than equivalent polyethylene cable, yet does not sacrifice electrical characteristics.

This cable has actually been designed for certain specific applications such as community TV installations, for greater shielding effectiveness where radiation of the cable presents a problem for use in pulse and fast rise time circuits where low capacity is important and in all military and commercial applications where light weight and economy with no sacrifice of electrical characteristics is desired.

For further information write to — **Amphenol Canada Ltd., 300 Campbell Ave., Toronto 9, Ontario.**

● *Cement Sampler Kit*

Item 1673

Engineers and others engaged in production, research and development can now obtain a versatile sampler kit of various types of cements (14 in all), suitable for a wide range of applications. Packaged by General Cement Mfg. Co., Rockford, Illinois, the kit contains representative adhesives from the firm's regular line and has full instructions on their use.

The "G. C. Cement Sampler Kit" includes 14 two-ounce bottles, each with its brush-in-top cap and sealed for full protection until needed. Such items as bakelite, vinyl, neoprene, fabric, rubber, wood and other plastics may be fastened securely with these cements, which are sure to find unlimited uses around factory, shop or laboratory.

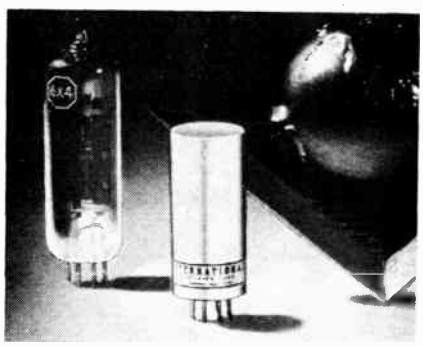
The "G. C. Cement Sampler Kit" (Catalog No. 345) is available through leading parts distributors. Additional information may be obtained by writing direct to **General Cement Mfg. Co. (Division of Textron Inc.), 400 South Wyman St., Rockford, Illinois,** or their Canadian representatives, **Charles W. Pointon Ltd., 6 Alcina Avenue, Toronto 10, Ontario.**

● *Silicon Replacements For Vacuum Tube Rectifiers*

Item 1674

Tube base mounted silicon replacements for vacuum tube rectifiers, which provide savings on filament power supply, cooler operation, long life and resistance to vibration and shock, are now in production at International Rectifier Corp., El Segundo, California.

The S6X4, a direct replacement for the 6X4 full-wave high vacuum rectifier tube, features an output of 85 ma. d.c. maximum, an input voltage of 400 volts r.m.s., and a maximum peak current of 225 ma. Maximum PIV is 1250 volts; the voltage drop, 6 volts at 70 ma.



The physical dimensions approximate the same over-all dimensions as those of the standard 6X4 tube, and will plug directly into the same tube pockets.

Thorough testing over a wide range of temperature and environmental conditions indicates extreme reliability for the design characteristics, and maximum stability is realized under all mounting positions.

For information on this and other silicon units for direct replacement in existing circuitry, write to **International Rectifier Corporation, El Segundo, California, U.S.A.**

For further data on advertised products use page 101.

For further data on advertised products use page 101.

New Products

- *Large Scale Ceramic Power Switch*

Item 1675

A huge 30 section 3 pole 6 position ceramic power switch which achieves 540 contact combinations was designed and produced by CENTRALAB, a Division of Globe-Union Inc., of Milwaukee for a west coast aircraft manufacturer.

This switch is an extended version of the popular Centralab PA-230 Heavy Duty series which features square rotor shafts in Monel bearings for smooth, backlash-free performance, 3000 volts R.M.S. and will handle a kilowatt. Versions of this switch are applicable to transmitters, industrial controls, and laboratory equipment.

For further information contact **Centralab Canada Ltd., 804 Mt. Pleasant Rd., Toronto, Ontario.**

- *Self-Contained Closed-Circuit TV Camera*

Item 1676

A new "single unit" closed-circuit television camera with associated remote control accessories was announced recently by General Precision Laboratory Incorporated, Pleasantville, New York.

The moderately priced vidicon camera, designated as GPL Model PD-500, weighs 12 pounds and is completely self-contained within the camera housing. It complements the company's present Model PD-150 camera chain which has found wide acceptance in industrial and institutional applications, and its Ruggedized Model PD-152 camera for extreme environmental conditions.

Remote control kits are provided to allow for remote operation of lens iris, focus and turret. The remote camera control box has switches for each of these functions. Intercom provision is built-in for convenience in remote operation. In addition, remote camera pan and tilt and zoom lens adjustments may be added without modification to the basic camera.

The PD-500 "package" contains the camera, camera circuitry and camera controls within a housing 5" wide, by 7½" high, by 12" long, eliminating the need for a separate control unit or external power supply. Controls for electronic focus, beam and target, horizontal and vertical centering, horizontal frequency, and both horizontal and vertical drives are prominently displayed on the back of the housing. Both RF and video signals are distributed directly and simultaneously from separate connectors supplying a 525 line picture to video monitors or standard TV receivers. Horizontal resolution is 400 lines or better and only 5 foot candles of illumination are needed for acceptable pictures.

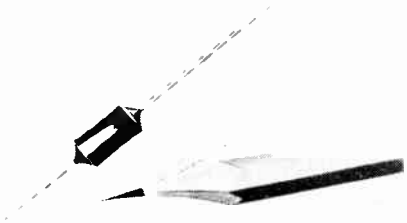
General Precision Laboratory, Incorporated, Pleasantville, N.Y., U.S.A.

New Products

• *Wire Wound Resistor*

Item 1677

The Daven Company, Livingston, N.J., announces a new wire wound resistor type developed for the Armed Services Microminiaturization Program. This unit is known as the Daven Type 1274.



This completely encapsulated unit measures $\frac{3}{16}$" in diameter by $\frac{3}{8}$" in length. It is rated at .25 watt. The maximum resistance on this unit is 250,000 ohms.

All requirements of MIL-R-93-A, except physical size, can be met by this resistor. Its size is such that it can be substituted in many circuits for deposited carbon resistors where greater accuracy, increased stability, or lower noise is necessary.

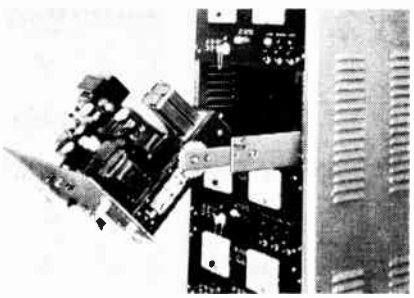
For further information on the Type 1274 wire wound resistor, contact **The Daven Company, 550 West Mt. Pleasant Ave., Route 10, Livingston, N.J.**

• *Cabinet Slide*

Item 1678

Quicker, easier servicing of electronic components will result from a 300 per cent increase in bearing surfaces on new Chassis-Trak cabinet slides. Mounted components can be pulled out on Chassis-Trak slides, locking in automatic "out" position. Chassis can then be tilted to permit access to wiring sections. The "Basic" model tilts freely without position locks, while the "Detent" locks in six positions — at 45°, 90° and 105° angles, tilted up or down.

Instant pushbutton removal of the entire chassis speeds emergency replacement of units, and a pushbutton lock release quickly returns chassis to the rack. With the increased bearing surface, sliding friction is greatly reduced while load-carrying characteristics are very favorably affected.



Chassis-Trak attaches to any standard 17" chassis and fits 19" panel racks without alteration to chassis or racks. The company also manufactures various other slide lengths to fit cabinets ranging in depth from 10" to 24".

Made of ultra-thin, $\frac{1}{16}$" cold rolled steel for maximum utilization of interior space, the Chassis-Trak is nevertheless extremely strong and durable. Unit will support up to 175 lbs. without strain. All parts are standardized and interchangeable, and installation is a simple 15-minute task for one man.

For further information contact **Canadian Agents, Electrodesign, 736 Notre Dame St. West, Montreal, P.Q.**

For further data on advertised products use page 101.

For further data on advertised products use page 101.

For further data on advertised products use page 101.

New Products

• *Spring Tension Clip*
Item 1679

Dominion Fasteners Limited have recently created and developed a special fastener to close the seams of the world's largest Radome, a large balloon-type unit used to house and protect radar antennae equipment on remote defense installations. The radome, made of neoprene coated fabric, is manufactured in sections and, when inflated, measures 61 feet in diameter.

The problem facing Dominion Fasteners' engineers was to design some device to securely join the sections of fabric together. Because these units are assembled on the site, this device had to be easily and quickly connected in sub zero temperatures while wearing heavy Arctic-type mitts.

The simple spring tension clip developed by Dominion Fasteners did the job, where many other attachment methods had failed.

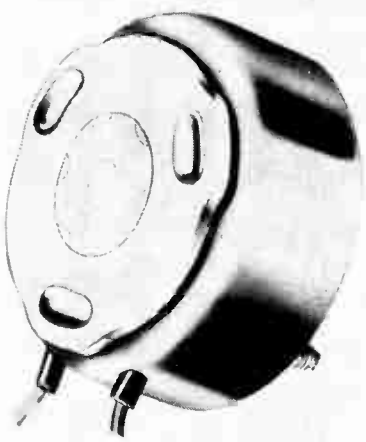
Dominion Fasteners Limited are the Canadian licensee and manufacturer of the famous Tinnerman Speed Nut brand spring tension fasteners.

For further information contact **Dominion Fasteners Ltd., 686 Parkdale Ave. North, Hamilton, Ont., Canada.**

• *500 F. Ledex Rotary Solenoid*
Item 1680

A new Ledex Rotary Solenoid that can withstand high ambient temperatures to 500°F. has been developed by G. H. Leland, Inc., Dayton, Ohio. A life expectancy of 300,000 snap-action operations at 500°F. is claimed by the manufacturer. In addition to high temperature application, advantages include ability to operate with higher wattage inputs to produce higher torques and usage in radio-active atmospheres without damage.

Eight basic sizes are available, ranging from 1 to 3⅜" in diameter. Starting torques for 45° stroke range from .2 pound-inches to 54.0 pound-inches.



Many remote control problems involving high temperatures, including various guided missile applications, can be solved with the 500°F. solenoid, the Leland company believes. Special magnet wire and coil insulation, lubrication, bearing and return spring materials were developed for the new product.

Operation is identical with the standard Ledex Rotary Solenoid. Magnetic action moves the armature along the solenoid axis. This action is converted into a rotary motion by means of ball bearings on inclined races.

For additional information, contact G. H. Leland, Inc., 123 Webster Street, Dayton 2, Ohio, U.S.A.

For further data on advertised products use page 101.

New Products

• *National Nylon For Electrical Applications*

Item 1681

A new grade of National Nylon, featuring superior electrical properties and low water absorption, has been added to the National Vulcanized Fibre Co. line of basic engineering materials. These basic materials include vulcanized fibre, laminated plastics and extruded nylon.

Known as National Nylon Grade 31, this new material is available in extruded rods and fabricated parts. Rods are available in diameters from ¼" through 2" and lengths from 3 to 6 feet. Grade 31 features a dielectric strength of 470 V/mm and water absorption of 0.4 per cent. It is used for cams, gears, bushings, nuts, and washers on electronic instruments, radios, television and other electrical equipment.

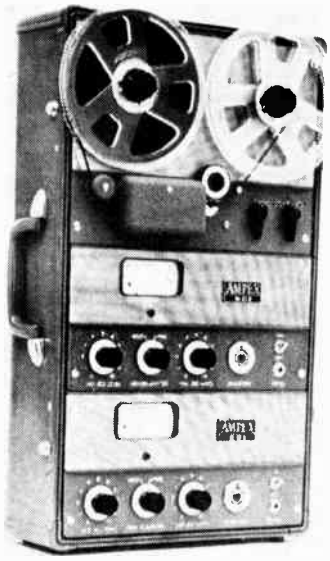
Since many of the uses for National's other basic engineering materials are in the electrical and electronic fields, the addition of Nylon Grade 31 now gives designers an even wider selection of materials for these applications from a single source. It also fills out the National Nylon line so that both grades of nylon covered by MIL-P-17091-B are available.

Additional information on National Nylon Grade 31 is available from **National Vulcanized Fibre Co., 1057 Beech St., Wilmington 99, Del., or National Fibre Co. of Canada Ltd., 107 Atlantic Ave., Toronto, Ontario, Canada.**

• *Portable Stereophonic Recorder*

Item 1682

The newest addition to the standard Ampex product line of magnetic tape recorders is the model 601-2 portable two-track stereophonic recorder. It uses precision in-line heads for recording and reproducing. Inter-channel crosstalk is below the inherent noise level. Separate microphone and line inputs and level controls on each channel permit stereophonic mixing. The unit records both stereo and single-channel tapes and plays back stereo, full or half track tapes. Convenient plug-in transformers are available for low impedance microphone operation.



Performance of the model 601-2 is indistinguishable from that of Ampex Models 300-2 and 350-2 at the 7½ i.p.s. tape speed.

For further information write **Ampex American Corporation, 70 Grenville Street, Toronto, Ontario, Canada.**

For further data on advertised products use page 101.

Featuring the latest developments in

- ★ TWO-WAY RADIO
- ★ TELEPHONY
- ★ INDUSTRIAL TV
- ★ COMMERCIAL TV
- ★ INSTRUMENTS
- ★ RADIO and HI-FI

PYE CANADA LIMITED

HEAD OFFICE AND PLANT: 82 Northline Rd., TORONTO 16
170 Dorchester St. E., MONTREAL
6692 Main St., VANCOUVER 3 Duke St., HALIFAX

For further data on advertised products use page 101.

New Products

• *Push-Button Actuator*

Item 1683

The manually operated A4-67 actuator is designed to accept any one of Electro-Snaps' three standard basic switches without altering the actuator bracket. This feature permits a wide range of circuit arrangements from SPST to TPDT-6 circuit. The actuator button is housed in an independent threaded bushing unit which screws into the bracket to act as an adjustment for panel thickness variations and also as a lock nut for panel mounting.

Actuator can be mounted to panels from $\frac{1}{64}$" to $\frac{1}{8}$" thickness. The knurled ring nut permits fast, hand installation. All metal parts are corrosion resistant treated. The large actuator button is available in standard colors of black, red and green. Other special colored buttons are available upon request.

A few of the applications where this switch is applicable are: Commercial electronic equipment, aircraft, appliances and vending machines.

For further information write to: **J. R. Longstaffe Co. Ltd., 300 Campbell Avenue, Toronto 9, Ontario, Canada.**

• *"Paging" By Pocket Radio*

Item 1684

This vest-pocket radio device was recently demonstrated in London by the British Communications Corporation. Its purpose is to maintain immediate and personal contact with key staff inside a building and does away with the need for messengers, for a loud hailer and the attention demanded by conventional indicator systems.

The device operates by the generation of a radio-frequency signal within a closed wire loop encircling the building, this loop being fed from a central transmitter.

The receiver has a built-in miniature crystal loudspeaker which gives ample volume. Messages can be heard without the need for putting the receiver to the ear and yet the volume is not excessive. There are no controls on the unit, which is housed in a molded plastic case with a ferrite aerial inside. When not carried in the pocket or propped in a vertical position the unit can only be laid flat. In the latter position a mercury switch automatically disconnects the tiny battery.

British Communications Corporation Ltd., Wembley, Middlesex, England.

For further data on advertised products use page 101.

Potentiometers — Trimmers — Relays

Ace *delivers reliability* in sub-miniaturization

Maximum performance — advanced designs, special materials, and unique winding and manufacturing techniques are combined to give you "heavyweight" performance in the "featherweight" class.

Sustained reliability — rigid quality controls and testing assure highest standards of performance-reliability over extended periods. Ace designs have been proved in use by leading manufacturers.

Prompt delivery — modern mass production techniques and extensive facilities guarantee delivery to meet your requirements. Prototype orders are expedited in a special order department.

ACEPOT* Sub-miniature precision wire-wound potentiometers . . .

actual size

This outstanding unit provides extremely high resolution and linearity yet is only ½" in size.

Size	½" x ½"
Weight	0.25 ounce
Resistance Ronge	10 Ω to 250K ± 2% std.
Linearity	±.3%
Temperature	—55° C. to 125° C. ••
Winding Angle	325° std. ≷ ovoilable
Resolution	Extremely high
Torque	.035 oz./in. @ 20° C. •••
Power	2 W for 60° C. rise
Mounting	Threoded bushing, servo, flush, flanged. Gonged up to 6 cups.

The above are standard. Modificatians are available.
Fully sealed against dust, maisture, humidity. Anti-fungus treated. Meets applicable JAN-MIL specs including shack and vibratian.

•• X-500 rated far higher temperature range —55° C. ta 150° C.
••• Jewel Bearing Acepat tarque af .001 aunce/inch

ACETRIM* Sub-miniature precision wire-wound trimmers . . .

actual size

A wide range of resistances is available in this low-cost, space and weight-saving trimmer.

Size	½" x ½"
Weight	0.25 ounce
Resistance Ronge	10 Ω to 150K ± 5% std.
Linearity	± 3%
Temperoture	—55° C. to 125° C. (to 150° C. on special order)
Winding Angle	325° std. ≷ ovoilable
Torque	.035 oz./in. @ 20° C.
Power	2 W for 60° C. rise
Mounting	Threaded bushing, printed circuit, flush, flonged, gonged

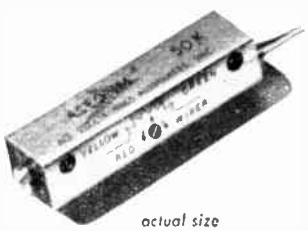
with tabs for printed circuits

The above are standard. Modificatians are avoilable.

Fully sealed against dust, moisture, humidity. Anti-fungus treated. Meets applicable JAN-MIL specs including shack and vibratian.

ACEOHM* Sub-miniature, high temperature, humidity-proof trimmers . . .

Specially designed for dependable operation in circuits subject to extreme environmental conditions.

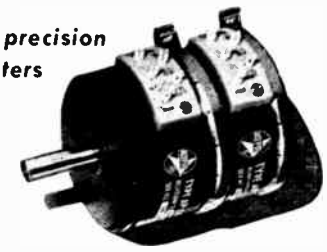


actual size

Size	1 5/16" x 5/16" x 3/8"
Weight	0.2 ounce
Resistance Range	10 Ω to 50K
Usoble Potentiometer Ronge	95-100%
Power Rating	1 W @ 50° C. (flush mount design) deroted to O W @ 150° C.
Temperoture	—55° C. to 150° C.
Resolution	High; to 0.15%
Dielectric Strength	1 minute @ 1M V. DC per JAN-R-19
Load Life	1M hours in accordance with JAN-R-19

35 turn adjustment far precisian settings. Excellent shack, vibration, acceleratian characteristics. (Meets or exceeds MIL-E-5272A.)

ACEPOT* Nonlinear precision wire-wound potentiometers

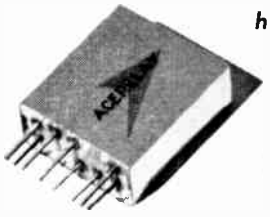


Ace designs, plus precision mechanical construction, give highest possible linearity and close conformity. Available in all AIA sizes to meet your unique nonlinear requirements.

	Sine-cosine	Double Sided Squore-low
Size	3"	3"
Resistance	20K ± 5% driving	25K ± 5% driving
Conformity	½% pk-pk	±0.25%
Function angle	360°	± 180°
Power	4 watts	3 watts
Mounting	Servo	Servo

Other nonlinear configurations to meet your specific requirements available in prototype and production quantities.

ACERELAY* Sub-miniature, hermetically sealed relays . . .



actual size

Bifurcated contact design assures *positive* reliability both in power and dry circuit work.

Size	3/4" x 7/8" x 3/8"
Weight	0.75 ounce
Contacts	bifurcated *
Contact roting	3 amp @ 28 V DC 1 amp @ 115V AC
Coil resistance	to 10,000 Ω
Vibration	5-2000 CPS @ 20G
Shock	50G
Life	500,000 operations minimum
Header types	plug in, wire leads, solder hook
Mounting	socket, top studs, side studs, bracket
Temperoture	to 125° C.

Entire relay hermetically sealed — coil assembly hermetically isolated from contact assembly.

* Double pole double throw, break before make, make before break.

Visit Booth #465, the Canadian IRE Convention

See the newest and latest in potentiometer, trimmer and relay developments. If you aren't attending the show, write for complete Engineering Fact File and Application Data Sheets. Engineering assistance on designs and applications is available immediately.

* trademarks applied for

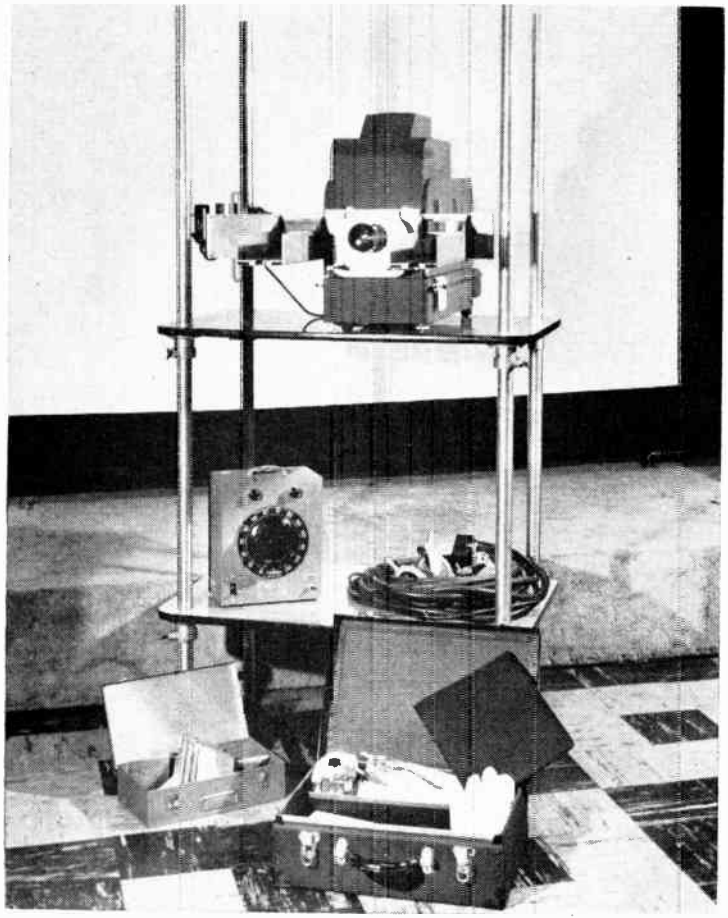
ACE ELECTRONICS ASSOCIATES, INC.

Dept. OA, 101 Dover Street, Somerville 44, Massachusetts
Telephone. SOmerset 6-5130 • MOnument 6-4800
Engineering Representatives in principal cities.

Represented by Samuel C. Hooker, Ltd. — 24-25 Grand Blvd., Montreal 28, Quebec; 4126 Bathurst St., Downsview, Ontario

Most advanced front & rear-screen projection ever

TELEPRO 6000



THE TELEPRO 6000 PACKAGE

● 1 Projector and changer ● 1 Remote control ● 1 50-foot control cable ● 1 Adjustable castored table ● 1 screen and frame, up to 9′ x 12′ ● 1 accessory kit including 48 blank sensitized slides, 6 pictorial slides, asbestos gloves, slide case, 2 bulbs.

1ST in

- Light Power
- Definition
- Slide capacity
- Speed — 62 slides per minute
- Complete remote control
- Optical efficiency
- Portability
- Designed to specifically accommodate 3¼" x 4" plastic-mounted polaroid transparencies
- Quiet operation
- Cool operation

THROWS A NEW LIGHT ON REAR-SCREEN PROJECTION

TELEPRO 6000 has won the praise of the entire television industry . . . it is without doubt the greatest engineering achievement in rear-screen projection.

Over *6000 lumens of light* give TelePro 6000 the kind of light engineers have tried for years to perfect — and this light is distributed evenly, for sharp and clear focus.

TelePro 6000 changes 60 slides a minute — the exclusive control permits operation at remote positions, so that the picture can be controlled from any vantage point.

Let us give you the facts today . . . you should *know* about TelePro 6000!

★

If you have an older projector at your station, we would consider it as part-payment on a new TelePro 6000. Write for details.

MAIL TODAY!

TO: CALDWELL A-V EQUIPMENT CO. LTD.
447 Jarvis Street • Toronto, Ontario.

Please rush me literature on your new TelePro 6000 Front and Rear-Screen projection kit.

Name .....
Firm .....
Street .....
City ..... Prov. .....

CALDWELL A-V EQUIPMENT CO. LTD.

447 JARVIS STREET • TORONTO, ONTARIO
TELEPHONE WAlnut 2-2103

For further data on advertised products use page 101.

New Products

• *Lightweight X-Band Magnetron*

Item 1685

A 40 watt, high reliability, X-band pulsed magnetron has been developed by Microwave Associates, Inc., Burlington, Mass., for operation in the frequency range from 8800 - 9600 m.c.s. The new magnetron is particularly suited for use in airborne radar beacon and navigational systems.

The tube is rated at 40 watts peak pulsed power output at a 25 per cent duty cycle for maximum pulse lengths of 5 microseconds. Substantially higher peak powers may be achieved with shorter pulse durations and reduced duty cycle requirements. Frequency and amplitude modulation of the magnetron output pulse has been measured at less than ± 30 kc/s modulation deviation in experimental models. Operating efficiency of the MA-215 is 20 to 30 per cent. A ceramic cathode bushing structure is used for increased reliability.

The new magnetron weighs approximately 20 ounces.

For further details write to Canadian representative, **E. G. Lomas, 277 Laurier Ave. West, Ottawa, Ontario.**

• *Automatic Program Operation*

Item 1686

Known technically as the M5429 Autostation, the new Gates Radio Company's Autostation equipment is a completely automatic programming system for radio broadcasting stations, incorporating facilities for both tape and 45 r.p.m. discs. It is composed of two basic pieces of equipment — the production unit and the playback unit. The production unit is not used for actual broadcasting, but for program make-up including control tones for automatic operation of a record changer, and two tape playback units.

When made up in sequence, the production tape is placed on the playback unit, which is used for actual broadcasting. The announcements on the tape trigger the 100 disc record player or optional tape playback units which operate unattended, providing up to 14 hours of automatic programming.

The Autostation is believed to be the first system of its kind to provide completely automatic program operation. As a result, it offers extraordinary savings in staff time.

Further information on the Gates M5429 Autostation can be obtained from **Canadian Marconi Company, 6035 Cote de Liesse Rd., Montreal 9, Que.,** who are Canadian distributors for Gates Radio Company.

For further data on advertised products use page 101.

New Products

• *Coaxial Directional Coupler*

Item 1687

Racal Engineering announce the availability of a new coaxial directional coupler type DCA. 57. The specifications are as follows:

Power Handling capacity: Adjustable, 500 watts c.w. maximum.
Impedance: 75 ohms
Connectors: As required
Overall Length: 17¼ inches
Coupling: 60 dB down
Measurable V.S.W.R. 1.15 to infinity.
Forward and reverse power output to a 50 micro-ampere meter or transistor amplifier.
Frequency Range: 2.5 to 3.5 KMC.
Low power trip circuit: adjustable 0-500 watts.

Full details on request from **Instronics Limited, P.O. Box 51, Stittsville, Ontario, Canada.**

• *Stalo Cavity*

Item 1688

A new, improved X-band Stalo Cavity, providing a high degree of short time frequency stability, has been introduced by Varian Associates, manufacturers of klystrons and related microwave equipment.

Called the VA-1280B, the cavity tunes an extremely wide range of 8200 to 10,000 Mc, depending on the klystron used. The cavity utilizes a unique method, developed by Varian, to suppress all undesired modes within this exceptionally wide range.

In combination with the VA-201B Klystron, the VA-1280B Stalo achieves a short term frequency stability of better than one part in a billion. The stabilization factor of the cavity is completely independent of the oscillator fluctuations or external disturbances. According to the announcement, this feature provides an important advantage over stabilization systems utilizing the feedback principle. The elimination of all electronic components except the klystron oscillator is also said to afford greater reliability and longer life.

Major applications of the new VA-1280B include stabilization of signal sources in high power klystron transmitters, airborne uses in conjunction with receiver local oscillators and laboratory and test applications.

Complete technical data and specifications may be obtained by writing to **Varian Associates of Canada, Ltd., Georgetown, Ontario, Canada.**

For further data on advertised products use page 101.

SEE

❶ MANY NEW WAYS TO USE LAMINATES, VULCANIZED FIBRE AND PRINTED CIRCUITS.

❷ A TRULY INTERESTING DISPLAY OF NON-DESTRUCTIVE TESTING EQUIPMENT.

AT THE I.R.E. CONVENTION BOOTH 259

Continental-Diamond Fibre of Canada Limited, have just acquired as a subsidiary, the Non-Destructive Testing Corporation (Canada) Limited. Both companies will be represented at the I.R.E. with product displays and literature. The variety of testing equipment represented by the Non-Destructive Testing Corporation is of particular interest to engineers:

Isotope Radiography	Dynamic Balancing
Isotope Thickness Gauges	Stroboscopes
Strain Gauges	Dye Penetrant Inspection
Photostress (stress analysis)	Physical Testing Machines (tensile, creep, etc.)
Ultrasonic Flaw Detection	Metallurgical Laboratory Equipment
Ultrasonic Thickness Testing	Hardness Testers
Sound and Vibration Measurement	Cyclograph Metal Testing

This listing merely headlines the many units that are available in each class. Qualified technical men will be present to discuss and describe application of this new specialized equipment in your business.

Continental-Diamond representatives will also be present to report on latest developments in industrial application of products manufactured by their company.

Be sure to visit Booth 259 at the I.R.E.
See two worthwhile displays at once!

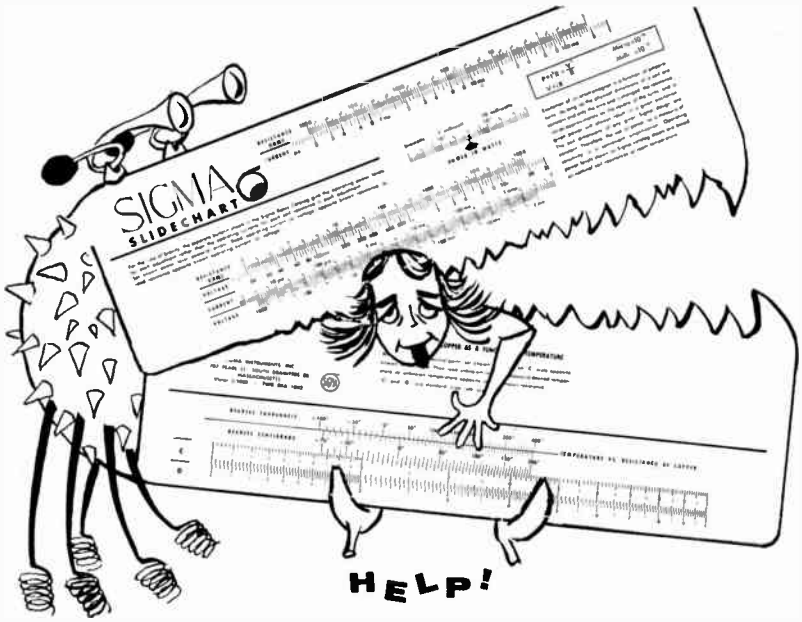
5709

formerly DIAMOND STATE FIBRE

CONTINENTAL-DIAMOND FIBRE
OF CANADA LIMITED
46 HOLLINGER ROAD, TORONTO 16, ONTARIO
1500 ST. CATHERINE STREET WEST, MONTREAL 25, QUEBEC

Phenolic • Melamine • Silicone • Epoxy • Combination and Copper-Clad Laminates • Vulcanized Fibre • Teflon • Micaband

For further data on advertised products use page 101.



According to Mrs. L. B. Q. (who is pictured in the above candid photograph of the advertising department's mail department and is in charge of Sigma premiums, box tops, blown tops and the like) Sigma's July offer of free Slidecharts has turned into a polymorphous hydra.

Now it becomes necessary, due to the laws of Kirchoff and diminishing returns, to terminate the *free* offer.

Hereafter we'll be glad to oblige, but at 25¢* (C. I. A.) per. (It's either this, fellows, or raising the price of Sigma relays.)

Don't think we do not appreciate the interest displayed — it's just . . . . . Still free is the EBG reprint which resumés SIGMA products and is big enough so you can read it.

*Cash, stamps or rare fiduciary objects.

SIGMA INSTRUMENTS, INC.
85 Pearl Street, So. Braintree 85, Mass.

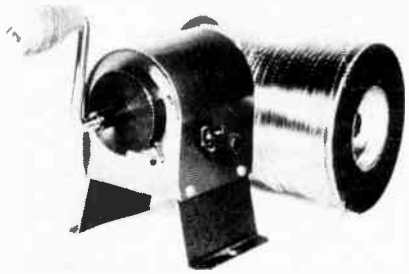
Canadian Representatives:
Samuel C. Hooker (Canada) Ltd., Montreal and Toronto • Ron Merritt, Vancouver, B.C.

New Products

• *Automatic Sleeving Cutter*

Item 1689

An automatic sleeving cutter called "Little Joe" is now available. According to the manufacturer this device will cut approximately 10,000 pieces per hour.



This machine can be hand or motor operated, and will cut all types of insulation tubing, including fiberglas and silicon coated nylon; also wire No. 20 and smaller. The adjustment screw on the side of the machine can be set to cut any length from a minimum of $\frac{1}{32}$" to a maximum of 2" long.

Available in Canada through **Atlas Radio Corporation Limited, 50 Wingold Avenue, Toronto 10, Ontario.**

• *Transistor Radio Direction Finder Kit*

Item 1690

The Heathkit Transistor Radio Direction Finder model DF-1 is a self-contained, self-powered, 6-transistor super heterodyne broadcast radio receiver incorporating a directional loop antenna, indicating meter, and integral speaker. It is designed to serve primarily as an aid to navigation when out of sight of familiar landmarks. It can be used not only aboard yachts, fishing craft, tugs, and other vessels which navigate either out of sight of land or at night, but also for the hunter, hiker, camper, fisherman, aviator, etc. It is powered by a 9-volt battery. (A spare battery is also included with the kit.) The frequency range covers the broadcast band from 540 to 1600 k.c. and will double as a portable radio. A directional high-Q ferrite antenna is incorporated which is rotated from the front panel to obtain a fix on a station and a 1 ma meter serves as the null and tuning indicator.

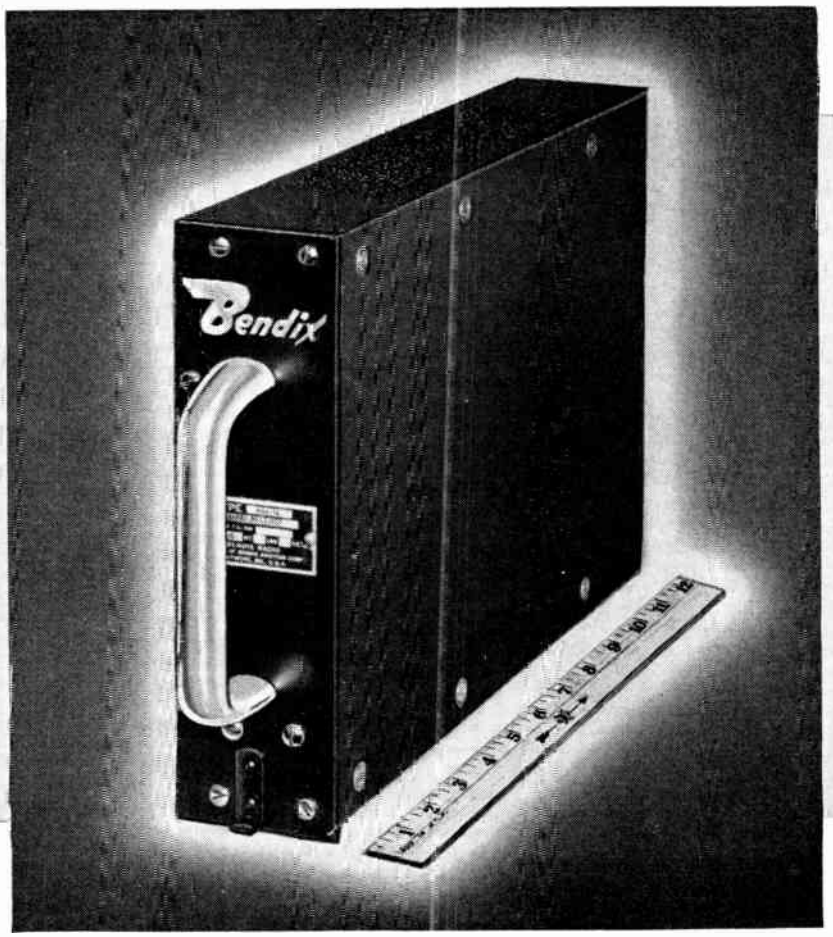
The control consists of: tuning, volume and power (on-off), sensitivity, heading indicator (compass rose) and bearing indicator (antenna index). Overall dimensions are 7½" W. x 5⅞" H. x 5⅜"D. Supplied with slip-in-place mounting brackets, which allow easy removal from ship bulkheads or other similar places. Shipping weight 5 lbs.

Heath Company (A Subsidiary of Daystrom, Inc.), Benton Harbor, Mich., U.S.A.

For further data on advertised products use page 101.

NEW Bendix MARKER RECEIVER

(¼ ATR)



Compact...Rugged...Weighs only 8½ pounds!

Now from Bendix*, makers of the world's standard in Marker-Receivers, comes a big advancement—the MKA-7A. Completely new from chassis to case, the Bendix MKA-7A Marker-Receiver is designed for dependable, trouble-free reception of signals from airways fan markers, station locator Z markers and ILS approach markers.

Smaller in size, lighter in weight, it is scheduled for use in Pan American Airways new fleet of DC-7C's.

Operating on a fixed frequency of 75 megacycles, the MKA-7A features improved circuitry that performs a two-fold function:

(1) Greatly reduces the chance of television or FM interference.

(2) Stabilizes gain under wide ranges of environmental conditions and line voltage fluctuations.

For further information, contact your Bendix Aviation Radio representative or write the factory direct. Address below.

*Reg. U. S. Pat. Off.

SPECIFICATIONS

Antenna transmission line input impedance	52 ohms. Voltage standing wave ratio less than 1.2 to 1.
AVC characteristics	Audio output is within a 6-db range at r-f input levels from 400 to 200,000 microvolts.
Selectivity	Attenuation — Total Bandwidth 6 db — more than 40 kc 60 db — less than 250 kc
Frequency stability	± 10 kc under all service conditions.
Undesired response rejection	Interference from adjacent channel television signals will not produce lamp threshold at input levels up to 3.5 volts.
Audio output impedance	500 ohms, nominal.
Power requirements	*AC Power Supply* 115 volts ac, 300-1000 cps, 35 VA with 27.5 volts dc for ON-OFF relay control. or *DC Power Supply* 27.5 volts dc, 36 watts.
Altitude performance	Operates at barometric pressures equivalent to 30,000 feet altitude.
Ambient temperature rating	−40°C to +70°C (−40°F to +158°F).

Specifications subject to change without notice.

RESEARCH · ENGINEERING · DEVELOPMENT · CONSULTING · MANUFACTURE

CDC COMPUTING DEVICES OF CANADA LIMITED

P.O. BOX 508 · OTTAWA · CANADA

WESTERN DIVISION — Commercial Building, Edmonton, Alberta

5716

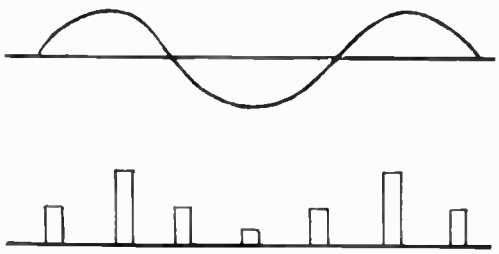
For further data on advertised products use page 101.

AIRMEC

ELECTRONIC INSTRUMENTS

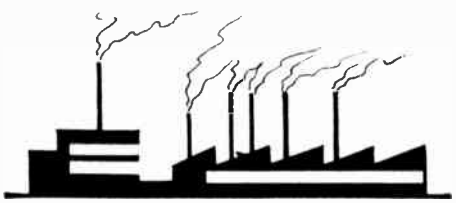
CATALOGUE NOW AVAILABLE

FOR RESEARCH AND DEVELOPMENT



- Time & Frequency Measuring Equipment
- Frequency Standards
- Ionisation Testers
- Wave Analysers
- Test Oscillators
- Oscilloscopes with Camera
- Signal Generators
- Electronic Counters
- Phase Measuring Equipment

FOR MANUFACTURING



- Electronic Batch Counters
- Electronic Tachometers
- Photocell Counting & Switching Equipment
- High Speed Counting Equipment
- Temperature Control Units
- Level Control Equipment

FOR SERVICING

- Radivet
- Oscilloscopes
- Signal Generators
- VT Voltmeters, Transistor Testers

RCE

SEND FOR YOUR COPY TODAY

RADIO COMMUNICATIONS

Equipment & Engineering Ltd.
850 Fifth Ave., Lachine
Montreal 32

For further data on advertised products use page 101.

New Products

• *Electronic Leak Detector*

Item 1691

A newly-improved electronic leak detector — so sensitive it can detect one part of helium in two million parts of air — has been announced by Canadian General Electric Company Limited.

Ten times more sensitive than its predecessor, the new M-2 leak detector finds and locates leaks in vacuum or pressure systems. It is used by electronic industries, nuclear developments, military units, and research laboratories for quality control and production checks.

The M-2 readily detects a leak rate of 1 x 10-10 standard cubic centimeters of air per second, a leak rate so small that it would take more than 5,000 years for one cubic centimeter of air at atmospheric pressure to leak into an evacuated vessel. The device has a response as low as two seconds and a high resolution which helps eliminate the possibility of response to elements other than the tracer gas (hydrogen or helium) introduced into a system for leak detection.

Electronic circuitry of the M-2 detector — less complicated than a home radio — and the use of plug-in components has simplified maintenance and operation. The mass spectrometer tube, for example, can be removed and replaced without shutting down the vacuum system.

No special training is needed to operate the M-2. The operator simply opens and closes one valve. The device to be leak-tested is evacuated and connected to the leak detector. A small jet of tracer gas (usually helium) is then sprayed over the surfaces of the equipment under test. If a leak is present, the sensitive instrument locates the leak which is indicated on the operator's control panel. An audible alarm is also available for indicating a detected leak.

For further information, write for descriptive bulletin GEC-336B to **Sales and Service, Canadian General Electric Co. Ltd., 940 Lansdowne Ave., Toronto 4, Ont.**

• *IDL Shaft Angle Converter*

Item 1692

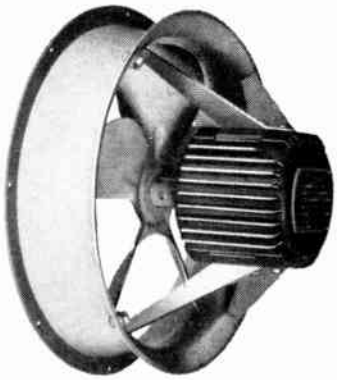
The new, lightweight, IDL shaft angle converter is designed for reliable, high speed computing accuracy and recording ease. It converts rotary motion into an accurate coded system of numbers for use in airborne, military and industrial applications. It provides a binary decimal read-out of 1 in 3600 counts at 40 codes per revolution of the input shaft. Special intermittent gearing and precision bearings provide extremely low driving torque.

The input shaft can rotate at speeds up to 300 r.p.m. in either direction and will provide digital output coding "on-the-fly." The code drum cylinder is .65" in diameter and approximately 1⅛" long. The cylinder is composed of an epoxy fiber glass tube with a .005" wall thickness copper tubing bonded to its outer surface. The fiber glass tubing provides a mechanical method of supporting the code drum and provides a strong, rigid member for translating motion to the first stage of gearing. The brushes are rated at 40 volts d.c. at 20 ma current and can operate directly into most associated circuit. They operate at low noise and negligible bounce. The drive system translates each code read-out within the least significant figure.

The entire converter is 1.87" in diameter and 2.37" long. It weighs slightly more than 3 ounces. Its total expected life is in excess of 1000 hours and it withstands environmental conditions represented by MIL D-5272A.

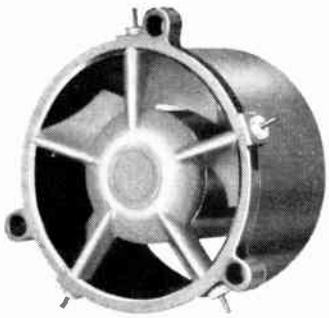
For further information contact **Mel Sales Limited, Arnprior, Ontario, Canada.**

For further data on advertised products use page 101.



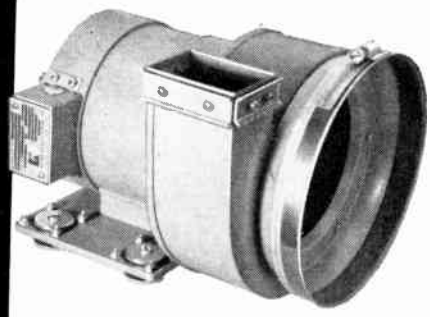
PROPELLER FANS

$N_s = 150{,}000$



VANEAXIAL FANS

$N_s = 65{,}000$

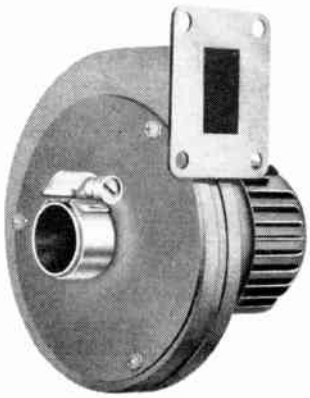


CENTRIF. BLOWERS—LOOSE SCROLL

$N_s = 40{,}000$

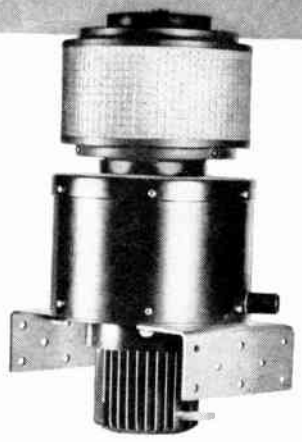
CENTRIF. BLOWERS—TIGHT SCROLL

$N_s = 15{,}000$



RADIAL WHEEL BLOWERS

$N_s = 13{,}500$



MULTISTAGE BLOWERS

$N_s = 2{,}000$

Your project merits the right type of fan or blower...

ROTRON MAKES ALL TYPES

FOR IMMEDIATE HELP CONTACT OUR CANADIAN REPRESENTATIVE: HOOVER CO., LTD.
GAGE & BARTON STS., HAMILTON, ONTARIO • PHONE: LIBERTY 5-1151

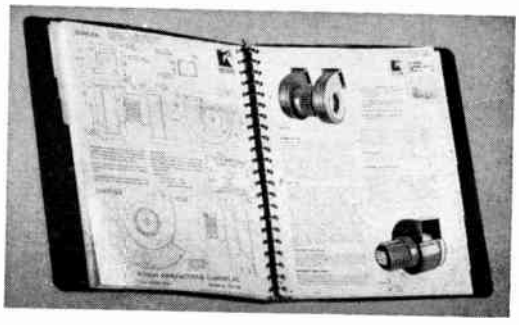
ROTRON

Get a copy of Rotron's APPLICATION NOTE #20201-5 and select the most efficient type of fan for any project on a mathematical basis.

ROTRON

MANUFACTURING CO., INC.

SCHOONMAKER LANE • WOODSTOCK • NEW YORK



• For full description of ALL products see ROTRON'S 200 page ring-binder catalog. Subscription free to potential customers with permanent revision and addition service.

• For "commercial specification" products see ROTRON'S 60 page "CC" catalog. Free to potential users.

For further data on advertised products use page 101.

business briefs and trends

★ Outstanding success of the transatlantic cable between Canada, the United Kingdom and the United States is evidenced by the fact that Canada and the United Kingdom are to lay a second cable and that the United States are reported to be definitely interested in laying a third.

* * *

★ Television marked another communications milestone in Boston with what is believed to be the world's first transmission of a TV picture on a light beam. According to Professor Jonathan Karas the transmission represented a major achievement in transmission of signals via a light beam. Previous experiments dealing with transmission of voice or music over a light beam were elementary compared with what was attempted during the Boston telecast, according to Karas.

* * *

★ General Electric's John T. Thompson, distributor sales manager of the company's Electronic Components Division, told visitors to the Fifth Annual Clinic and Fair of the Texas Electronics Association that 100,000 radio and television service technicians in the United States are averaging a gross business of $20,000 a year each. Mr. Thompson also stated that the radio and television service industry in the United States has reached a $2 billion gross level.

* * *

★ According to Ray Scharmach, head of the analytical laboratories of the Arner Company, the most popular man in the laboratory today is the man adept with the soldering iron and tube-testing equipment.

* * *

★ Industrial research in the United States is growing at the rate of 12 per cent a year, according to E. D. Reeves, executive vice-president of Esso Research & Engineering Company. According to Mr. Reeves, industrial research has become one of the nation's largest businesses amounting to 1½ per cent of the gross national product. Mr. Reeves told a gathering of business officials that the major responsibilities of research organizations are to know just what technology a company needs; create the needed technology; and to assist in the efficient use of technology.

* * *

★ The annual sales of transistors and other semiconductors will reach the $1 billion mark within the next ten years. This is the prediction of James H. Sweeney, manager of marketing for General Electric's Semiconductor Products Department. Mr. Sweeney expects sales this year to exceed $140 million.

* * *

★ Underlining the potential of the radio service industry in the United States, H. F. Bersche pointed out to a recent gathering that as of January 1, 1957, there were 150 million radios, 42 million TV sets, 20 million record players, 2 million tape recorders and thousands of hi-fi installations in American homes.

* * *

★ Among the "big time" items of electronic gadgetry in the United States is the electronic garage door opener. According to one manufacturer, the foreseeable annual market for this item is around $2½ million. The price of the units is $199.95 installed.

* * *

★ TelePrompTer of Canada has purchased 10 new large screen TV projectors for use in their rapidly expanding Group Communication Division. Spence Caldwell, President of TelePrompTer, reports that the new GPL PB 611 A projectors "will allow us to extend closed-circuit TV operations from one end of the microwave relay system to the other. In other words, today Quebec City to Saskatoon is hooked up — next year it will be from coast to coast."

(Continued Overpage)

business briefs and trends

★ The National Research Development Corporation of England is reported to be financing the development of a flat picture tube which is claimed to differ in many ways from the Kaiser tube. D. Gabor of the Imperial College of Science and Technology at London University has developed the tube.

* * *

★ The Minnesota Mining and Manufacturing Company have announced production of the world's first commercially available magnetic video tape for recording TV sight and sound. Quantities of the video tape are scarce because of production difficulties.

* * *

★ A report from the British Radio Industry Council points out that the United States was Britain's best hi-fi customer and states that more American buyers attended the Radio and Electronic Component Show in London than in any previous year.

* * *

★ The growing use of computers has placed a heavy demand upon educational institutions for qualified programmers. M.I.T. authorities in Boston claim that no less than five thousand programmers will be trained in the Northeastern States alone in 1958. This is ten times the number the area will turn out this year.

* * *

★ In the ten-year period 1946-1956 production of radio components in Great Britain has increased sixfold. Production last year amounted to $226.8 million compared to $207.2 million in 1955. American firms imported British sound reproducing equipment valued at $6,720,000 in 1956. Imported components reached $798,000. The total of $7,518,000 was 113 per cent greater than for 1955.

* * *

★ The value of the present annual market for electronic medical equipment is $150 million. One-half of this is for the purchase of x-ray equipment, with the remainder being shared equally by therapeutic and diagnostic devices.

* * *

★ Siemens Edison Swan of Woolwich, England, have been awarded a contract for the provision of specialized telephone equipment for use in the North American continent-wide toll dialling system. The equipment will link the automatic trunk exchange at Edmonton and Winnipeg.

* * *

★ The Aluminum Company of Canada's North American Teletype system, largest industrial network in the British Commonwealth, has expanded its Pacific Coast communications arm even further. The new circuit linking Vancouver with Los Angeles joins the existing coast-to-coast network which ties Kitimat and Vancouver into the company's major control and relay center at Montreal. The company has also revamped its present Vancouver-Kitimat link, making it a two-way, 75-word-a-minute circuit that means that messages can be received and despatched simultaneously from the relay center in the Marine Building.

* * *

★ Stuart D. Brownlee, Executive Vice-President of Canadian Admiral Corporation Ltd. and Chairman of the Receiver Division of the Radio-Electronics-Television Manufacturers Association of Canada, asked to comment on recent press references to heavy inventory of television receivers and possible plant lay-offs this fall issued the following statement: "The Canadian television industry has never been in a healthier condition. Sales in the first seven months of 1957 were down slightly (not 50 per cent as erroneously reported) from the peak sales of 1955-1956 but inventories of TV receivers are lower than they have ever been at this time in the past several years. Statistics issued by RETMA in August show manufacturer and distributor inventories of 21" TV sets to be 38 per cent less than in August, 1956. Dealer inventories are estimated to be comparably lower than last year."

INDEX TO ADVERTISERS

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Mail copies to my ☐ home, or ☐ business address as noted below.

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If you have recently CHANGED your address for receiving copies of E & C please note former address here:

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No Postage Stamp Necessary if Mailed in Canada

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ELECTRONICS AND COMMUNICATIONS

31 - 35 Willcocks Street

Toronto 5, Ontario

INDEX — Continued

For further data on advertised products use page 101.

New Products

• *Remotely Controlled Coaxial Switch*

Item 1693

Andrew Corporation of Chicago recently announced that a new and improved version of their coaxial switch is now available. This new Andrew switch, Type 6710, provides four-second switching of 3⅛" coaxial transmission line to standby equipment at frequencies up to 1000 MC. It can be used in high power communication systems, as well as UHF and VHF television stations.

Use of these switches eliminates time-consuming manual changes of coaxial transmission line connections. Standby equipment may be quickly and easily checked under actual operating conditions. In the event of main equipment failure, the spare equipment is switched in with negligible "off-the-air" time.

This remotely controlled switch is operated by a dependable, long-life motor. The AC motor normally supplied operates on 115 volts, 60 cycle, alternating current. Other motors are available on special order. Control circuitry includes a wafer switch for use in remote position indication circuits. The microswitch is mechanically linked to the switching mechanism so that transmitter power is removed before switching and is re-applied only after new contact is made.

For detailed information, write Andrew Antenna Corp. Ltd., 606 Beech Street, Whitby, Ontario, Canada.

• *Electronic Ignition Analyzer Kit*

Item 1694

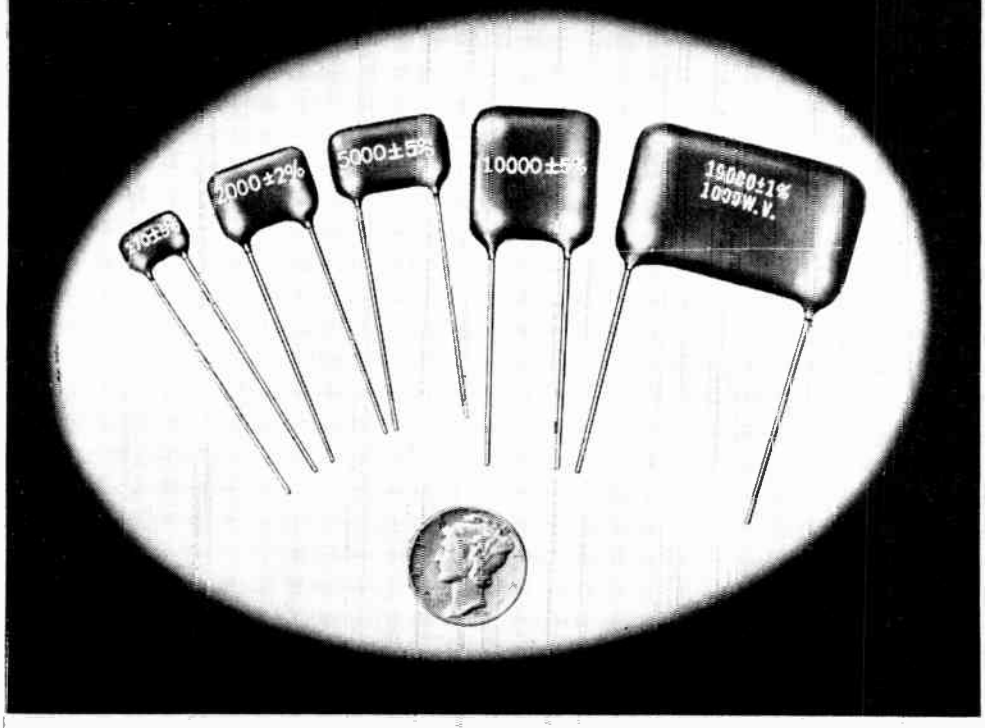
Previous electronic experience is not necessary to build this ignition analyzer. The construction manual supplied has complete step-by-step instructions plus large pictorial diagrams showing the exact placement and value of each component. All parts are clearly marked so that they are easily identified.

The IA-1 is an ideal tool for engine mechanics, tune-up men, and auto hobbyists, since it traces the dynamic action of voltage in an ignition system on a cathode-ray tube screen. This analyzer will detect inequality of spark intensity, a poor spark plug, defective plug wiring, breaker-point bounce, an open condenser, and allow setting of well-time percentage for the points. An important feature of this instrument is its ability to check dynamic performance, with the engine in operation (400 to 5000 r.p.m.). It will show the complete engine cycle, or only one complete cylinder. Can be used on all types of internal combustion engines where breaker-points are accessible. Use it on automobiles, boats, aircraft engines, etc. Shipping weight 18 lbs.

Heath Company (A Subsidiary of Daystrom, Inc.), Benton Harbor, Mich., U.S.A.

For further data on advertised products use page 101.

ELMENCO DUR-MICA CAPACITORS



FOR USE IN CIRCUITS REQUIRING HIGHEST RELIABILITY UNDER SEVEREST ENVIRONMENTAL CONDITIONS

•

Now Available:

DM-15 DM-19 DM-20 DM-30 DM-42	CAPACITY VALUES from 1 mmf. to 70,000 mmf.

The Dur-Mica Capacitor is a silvered mica capacitor coated with a specially developed material which provides maximum protection at environmental extremes of moisture and temperature. This combination provides a reliability and life expectancy which far surpasses anything heretofore obtained.

OPERATING TEMPERATURE RANGE
—55°C. to +125°C.

•

MINIMUM INSULATION RESISTANCE
25000 megohms at 25°C.
1000 megohms at 125°C.

•

TEMPERATURE COEFFICIENT
less than 50 parts per million per degree centigrade.

•

STABILITY (CAPACITY DRIFT)
±0.05% +0.1 mmf. max.

ARCO Dur-Mica Kits

PACKED IN INDIVIDUAL TRANSPARENT PLASTIC SNAP BOXES PROPERLY IDENTIFIED FOR EASE OF HANDLING.

ARCO DM-15 KIT #10

This handy DM-15 kit consists of five each of 51 capacity values from 1 mmf. to 820 mmf. Tolerance ±5%.

SPECIAL KIT LIST PRICE **$95.00**

ARCO DUR-MICA KIT #11

This Dur-Mica kit contains five each of 72 capacity values from 2 mmf. to 10,000 mmf all 500VDCW and ±5% tolerance.

SPECIAL KIT LIST PRICE **$250.00**

COMPONENT RELIABILITY

Life tests presently being performed at 125° C. and 150% rated voltage have passed 10,000 hours without a single failure. This is roughly equivalent to more than 20 years of operation under normal operating conditions.

ARCO

64 WHITE STREET
NEW YORK 13, N. Y.

ARCO ELECTRONICS INC.
CHICAGO 5, ILLINOIS

ARCO ELECTRONICS INC.
DALLAS 19, TEXAS

ARCO CAPACITORS INC.
LOS ANGELES 35, CALIFORNIA

SEE US AT THE IRE CANADIAN CONVENTION • BOOTH No. 560

New Products

• *Power Converters*

Item 1695

Mr. J. C. Conway of Electronic Enterprises Regd., Toronto, Ontario, announces that a series of lightweight, compact, highly efficient DC to AC Power Converters for enabling portable, aircraft and vehicular electronic equipment to be battery powered are now available from the above organization.

These compact, transistorized units are rugged, lightweight, efficient improvements on heavier, much less efficient inverters, dynamotors and vibrator power supplies. Standard units are available that produce up to 250 VA from 28 volts VDC input; custom units are available to 2 KVA. Units can be made to meet MIL specs and can be as compact as ⅔ cu. in. per VA and as light as half an ounce per VA. Typical of this series Model UAC 100 VA/115-1000, which delivers 100 VA (100 volts AC, 1000 cycles per second at 1 amp.)

Weighs only 3½ lbs. and comes in a compact $3\frac{3}{8}$" x $3\frac{1}{16}$" x $5\frac{7}{32}$" package.

Enquiries are invited on any power supply application.

Electronic Enterprises Regd., 551 Oakwood Avenue, Toronto 10, Ontario. Telephone: REdfern 6576.

• *Miniature Inertia Switch*

Item 1696

A new miniature Inertia Switch, the smallest yet known, operates by a radically new, simple principle. It is designed to eliminate usual "stiction" (causing unreliable function), costly, complicated mechanisms, and waste space. One single moving part, frictionless in operation, momentarily closes electrical contacts, following impact or acceleration above a preset value. Switch setting easily adjustable from 1.5 G up, tolerance ± .15. Volume ½ cubic inch, weight ¾ ounces. Used now for aircraft, missiles, electronic, automatonic components, etc. Model 510, and installation-ready assembly; model 410, inertia cartridge alone. Special designs to your specifications. **Safe Lighting, Inc., 527 Lexington Ave., New York 17, New York, U.S.A.**

• *Self-Feed Air Drill*

Item 1697

A new "Midg-a-matic" self-feed air drill, only 1" in diameter and $10\frac{3}{16}$" long, is announced by Aro Equipment of Canada Ltd., Toronto, Ontario. This new tool drills holes automatically with a capacity to $\frac{1}{16}$" holes and under. It can be used singly or in multiple.

Low center-to-center distance aids use where space is a factor. The drill operates with low air consumption, according to the manufacturer. Speed is 20,000 r.p.m. Stroke length $1\frac{3}{8}$".

The use of Midg-A-Matic makes it possible to drill small holes automatically, and at extremely low cost, whether singly or in multiple set-ups. It is suitable for many applications in aircraft, automotive, radio and television, household appliance and woodworking fields.

Complete information, catalog and price list are available on request to: **Aro Equipment of Canada Ltd., Kipling Ave., at Rexdale Blvd., Toronto 15, Ontario.**

For further data on advertised products use page 101.

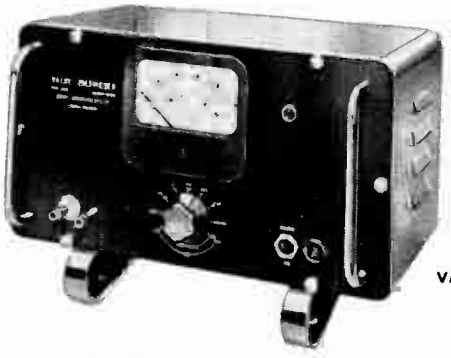
Don.
suggest we see these instruments at the
I.R.E. Canadian Convention - Booth No. is 332 /

SOUND-LEVEL METERS

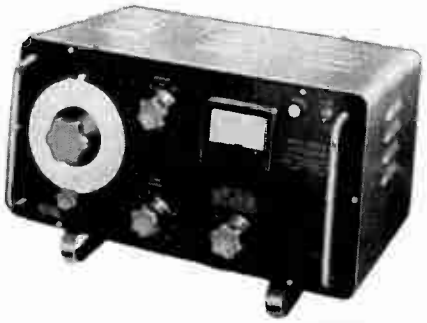
STROBOSCOPES

THICKNESS GAUGES

PULSE GENERATORS



VACUUM TUBE VOLTMETERS



OSCILLATORS

if your business requires fast, accurate measurement of noise, vibration, thickness, balance, or speed—call Dawe Instruments for technical information and advice without obligation. Ask for our free booklet "Dawe Instruments in Industry".

DAWE INSTRUMENTS LIMITED

CANADIAN DIVISION—1654 Bank Street, Ottawa, Ontario

5501-R

Oh — they make good stuff! I understand they now represent Cinema-Television and Evans Electroscience of England as well. DLL

TECHNICAL PERSONNEL AVAILABLE

PROFESSIONAL ENGINEER—8 years experience in electronic components and chemical industries. Has excellent background in design, development, quality control, production trouble shooting, sales engineering, specifications writing. Desires position, preferably of supervisory nature with progressive organization. Reply to Box 510, Electronics and Communications.

APPLICATION ENGINEER or SALES CO-ORDINATOR — Factory management, technical sales and application engineering background. Radio-electronics, V.F. Telegraphy and Carrier Telephone fields. Seeking responsible position as co-ordinator for field and factory operations, application engineering co-ordinator or other activity suited to above background. Reply to Box 511, Electronics and Communications.

ELECTRONIC TECHNICIAN — age 27, with 9 years experience in repair, service and testing desires responsible position with company engaged in development and production. Extensive professional training in radio and television, pulse and microwave techniques. Worked 3 years in Canada with VHF and UHF amplifiers and related equipment; during past 14 months head of Production Quality Control. Final goal: P. Engineering. Reply to Box 512, Electronics and Communications.

ELECTRONIC TECHNICIAN or ENGINEERING TECHNICIAN — age 26, with considerable experience in communications. Has worked extensively with microwave at 2000 and 6000 mcs., AM and FM radio at HF, VHF and UHF frequencies. Has also had experience with power line carrier, telephone, telemetering, remote control, multiplex, etc., equipments. Reply to Box 513, Electronics and Communications.

ELECTRONIC TECHNICIAN — with fifteen years' experience in all phases of electronics, desires *part time* work on maintenance or construction of electronic equipment. Reply to Box 514, Electronics and Communications.

ELECTRONIC TECHNICIAN — age 31, fifteen years' experience in radio, electronics, servicing and army communications, the last three years in Canada, seeks responsible position with opportunities for betterment. Willing to relocate anywhere. Reply to Box 515, Electronics and Communications.

For further data on advertised products use page 101.

a comprehensive
Telecommunication Engineering Enterprise

The largest telecommunication manufacturing organisation in the British Commonwealth **Standard Telephones and Cables Limited** covers the whole waterfront of telecommunication engineering and is engaged in the research, development, manufacture and installation of all types of communication and control systems.

The Company is in an unrivalled position to undertake, within its own organisation, the co-ordinated systems-planning of complete communication projects involving inter-dependent systems of various types.

'Standard' productions include:—

Telecommunication Line Transmission Equipment
Radio Broadcasting Equipment
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Railway Communication Apparatus
Railway Control Equipments
Telephone Cable
Sound-Reinforcement Systems
Public and Private Telephone Systems
(Automatic and Manual)

Standard Telephones & Cables
Mfg. Co. (Canada) Ltd.

9600 ST. LAWRENCE BLVD., MONTREAL 12, P.Q.

For further data on advertised products use page 101.

announcement...

HEATH Company — A SUBSIDIARY OF DAYSTROM, INC.
MANUFACTURERS OF Heathkit PRECISION ELECTRONIC INSTRUMENTS
305 TERRITORIAL ROAD • BENTON HARBOR, MICHIGAN • WALnut 5-1175

September 23, 1957.

Dear Customer:

Heathkits are now available for Canadian customers from Daystrom Limited, 2 Raitherm Road (corner of Caledonia Road), Toronto 10, Ontario.

All orders for Canadian delivery should be directed to this location.

For the convenience of customers residing in the locality, a plant outlet has been established for over-the-counter sales and will be open during the hours of 8:30 A.M. to 4:30 weekdays, and 8 A.M. to 12 noon Saturdays.

For your convenience, Canadian prices prevail and include customs, excise levies, and delivery charges to Toronto. The only additional charge is for postage from Toronto, Ontario, to destination, if you order by mail.

Thank you,

R. Erickson

Robert Erickson, Pres.,
Heath Company.

P.S. The same, friendly, reliable service you are accustomed to receiving from Heath Company is assured in dealing with DAYSTROM LIMITED, our sister company.

SEE US AT THE SHOW
BOOTH 142

IRE

DAYSTROM LIMITED — *A Subsidiary of Daystrom, Inc. Distributor of Heathkits in Canada* — **2 RAITHERM ROAD TORONTO 10, ONT.**

For further data on advertised products use page 101.

world's finest electronic equipment in kit form...

HEATHKIT®

High Quality
Advanced Design
Reliable Performance
Real Economy

Heathkit DX-20 CW TRANSMITTER KIT

MODEL DX-20
$47.95
Shpg. Wt. 18 lbs.

Outstanding dollar-per-watt value! 50 watts plate power input, bandswitching for 80, 40, 20, 15, 11, and 10 meters. Crystal or external VFO excitation. Pi network output—"potted" transformers—TVI suppressed—pre-wound coils. Uses 6CL6 oscillator, 6DQ6A final.

Heathkit PHONE & CW TRANSMITTER KITS

Both the DX-100 and the DX-35 are designed especially for you—with the features most important to efficient and practical amateur operation!

MODEL DX-100
$254.95
Shpg. Wt. 107 lbs.

Shipped motor freight unless otherwise specified. $50.00 deposit required on c.o.d. orders.

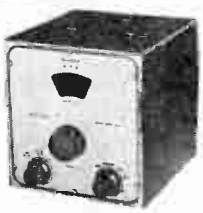
This transmitter is rapidly becoming the accepted standard in its price class. An outstanding dollar value!

100 watts RF output—build in power supplies—built in VFO and modulator—bandswitching on 160, 80, 40, 20, 15, 11, and 10 meters—phone or CW operation. 100 watts output on phone, and 120 watts on CW. TVI suppressed—pi network output coupling—extensive shielding—matches 50 to 600 ohms—VFO dial and meter face illuminated—high quality components used throughout. Uses 1625 tubes in push-pull to modulate 6146 tubes in parallel. Complete schematic diagram and technical specifications available on request.

MODEL DX-35
$74.95
Shpg. Wt. 24 lbs.

This exciting new kit features phone and CW operation on 80, 40, 20, 15, 11, and 10 meters. Completely bandswitching. Plate power input up to 65 watts on CW, with controlled carrier modulation peaks to 50 watts on phone. Features built-in modulator, power supplies, pi network output circuit. Separate 12BY7 buffer stage assures plenty of drive to the 6146 final. Switch selection of three crystals, or may be excited from external VFO. Panel meter reads final grid or plate current. Complete schematic and specifications on request.

Heathkit VFO KIT

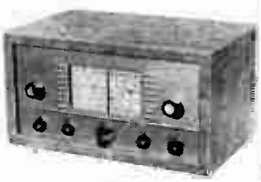


MODEL VF-1
$25.95
Shpg. Wt. 7 lbs.

Go VFO for added convenience and flexibility. Functions with Heathkit AT-1 or DX-35- or with most modern transmitters. Covers 160-80-40-20-15-11 and 10 meters. Three basic oscillator frequencies provide better than 10 volt average RF output. Plug provided for crystal socket of transmitter. VR tube for stability. Requires only 250 VDC at 15 to 20 ma. and 6.3 VAC at 0.45A.

Heathkit ALL BAND COMMUNICATIONS TYPE RECEIVER KIT

Unusual sensitivity and selectivity for price. Covers 550 kc to 30 mc in 4 bands. AC power supply—electrical bandspread—antenna trimmer—separate RF and AF gain controls—noise limiter—headphone jacks—AGC—BFO. Cabinet available separately as shown.



MODEL AR-3
$42.95
(less cabinet)
Shpg. Wt. 12 lbs.

Heathkit GRID DIP METER KIT

MODEL GD-1B
$23.95
Shpg. Wt. 4 lbs.

Use as a signal source, for determining unknown frequency, for checking resonance of tuned circuits, or for adjusting wave traps. Equally valuable in ham shack, service shop, or laboratory. Features 500 ua meter with sensitivity control, for indication. Covers 2 mc to 250 mc with five coils, supplied with kit. Coils pre-wound, dial scale precalibrated. Easy to build, and extremely valuable for literally hundreds of jobs.

Heathkit "Q" MULTIPLIER KIT

MODEL QF-1
$12.95 *Shpg. Wt. 3 lbs.*

Adds selectivity and flexibility to your receiver, and rejects undesired signal or hetrodyne. Tunes any signal within IF of receiver with effective Q of approximately 4,000. Provides sharp "Peak" or "null." Surpasses crystal filter in flexibility of operation. Use with receiver having 450—460 kc IF. Will not function with AC-DC receivers. Requires 6.3 VAC at 300 ma. and 150-250 VDC at 2 ma. Cable and plugs supplied for connection.

Heathkit "AUTOMATIC" CONELRAD ALARM KIT

MODEL CA-1 **$17.95**
Shpg. Wt. 4 lbs.

The CA-1 Conelrad Alarm can be used with any radio receiver that has AVC. Automatically cuts AC power to your transmitter and lights a red indicator when monitored station goes off the air. Features heavy-duty 6-ampere relay, a thyratron tube to activate relay, and built-in power supply. Sensitivity control adjusts to various AVC levels. Complete instructions provided with kit.

Heathkit ANTENNA IMPEDANCE METER KIT

Use this instrument, with a source of RF signal, to determine antenna impedance, line impedance, and to solve impedance matching problems with fixed or mobile antennas or transmission lines. Also, will double as field strength indicator, or phone monitor. Uses 100 ua meter and features calibrated impedance scale on control knob. Covers 0 to 600 ohms. A valuable device in any ham shack.

$16.95 MODEL AM-1
Shpg. Wt. 2 lbs.

DAYSTROM LIMITED

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Distributor of Heathkits in Canada

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Heathkit HARMONIC DISTORTION METER KIT

MODEL HD-1

$59.95

Shpg. Wt. 13 Lbs.

Use with low-distortion audio generator to measure harmonic distortion of audio amplifiers. Reads distortion on meter as percentage of input signal. Operates between 20 and 20,000 cps. High impedance VTVM built in for initial reference settings and final distortion readings. VTVM ranges are 0-1, 3, 10, and 30 volts full scale. 1% precision resistors employed. Distortion scales are 0-1, 3, 10, 30, and 100% full scale.

Heathkit HANDITESTER KIT

This compact model easily slips into tool box, glove compartment, or coat pocket. Valuable as "extra" instrument in service shop, and ideal for the home experimenter. Very popular with appliance repairmen and electricians. Measures AC or DC voltage at 0-10, 30, 300, 1000, 5000 volts full scale. Direct current ranges are 0-10 ma and 0-100 ma. Attractive black bakelite case. Ohmmeter ranges are 0-3000 and 0-300,000 ohms.

MODEL M-1

$19.95

Shpg. Wt. 3 Lbs.

Heathkit "Q" METER KIT

The Model QM-1 measures the Q of inductances and RF resistance and distributed capacity of coils. Employs a 4½" 50 microampere meter for direct indication. Features built-in signal source for tests at frequencies of 150 kc to 18 mc in 4 ranges. Measures capacity from 40 mmf to 450 mmf within ±3 mmf. Indispensable for coil winding, and for determining unknown capacitor values.

MODEL QM-1

$53.95

Shpg. Wt. 14 Lbs.

Heathkit CRYSTAL RECEIVER KIT

MODEL CR-1

$10.95

Shpg. Wt. 3 Lbs.

This crystal radio covers the standard broadcast band from 540 to 1600 kc. It employs two high Q tank circuits that are tuned separately for the desired station. A sealed germanium diode is featured for detection. No critical "cat's whisker" to adjust. Kit includes a pair of high impedance head sets, and is easy to build, even for a beginner. Construction manual takes "educational" approach and explains theory of signal reception. Requires no external power for operation. Ideal standby unit for emergency reception of civil defense signals in case of power failure.

Heathkit 6-12 VOLT BATTERY ELIMINATOR KIT

MODEL BE-4

$44.95

Shpg. Wt. 17 Lbs.

Will supply either 6 or 12 volt output to take care of auto radios on even the most modern cars. Output voltage is variable from zero to 8 volts DC or 0 to 16 volts DC. Will deliver up to 15 amperes at 6 volts or up to 7 amperes at 12 volts. Two 10,000 microfarad output filter capacitors insure smooth DC output. Panel meters monitor output current and voltage. Will double as a battery charger.

Heathkit VARIABLE VOLTAGE REGULATED POWER SUPPLY KIT

MODEL PS-3

$47.95

Shpg. Wt. 17 Lbs.

Supplies regulated DC output that can be manually controlled from 0 to 500 volts. It will supply up to 130 ma at 200 VDC, and up to 10 ma at 450 VDC. Large panel meter monitors output voltage or current. Also provides filament voltage at 6.3 volts AC, up to 4 amperes. Filament and B+ circuits are isolated from ground. Ideal lab power supply.

Heathkit IMPEDANCE BRIDGE KIT

MODEL IB-2A

$69.95

Shpg. Wt. 12 Lbs.

Features a built-in oscillator and amplifier. Measures resistance, capacitance, inductance, dissipation factors of condensers, and storage factor of inductance. D, Q, and DQ functions combined in one control. Employs 1% resistors and 1% silvermica capacitors. 100-0-100 ua. meter indicates null. Two section CRL dial provides ten separate units with accuracy of .5%. Fractions of units read on variable control.

Heathkit BROADCAST BAND RECEIVER KIT

You can build your own radio receiver with confidence, even if you are a beginner. Complete step-by-step instructions insure success. Features transformer-type power supply, high gain miniature tubes, built-in antenna, 5½" speaker, and planetary tuning from 550 kc to 1600 kc.

CABINET: Fabric covered plywood cabinet with aluminum panel as shown. Part #91-9A, shipping weight 5 lbs. $6.95

MODEL BR-2

$26.95

(less cabinet)

Shpg. Wt. 10 Lbs.

HEATHKIT AUDIO TEST EQUIPMENT

You can equip your shop for complete analysis and test of high fidelity audio equipment by employing Heathkit instruments. Professional equipment you can afford!

AUDIO OSCILLATOR KIT (SINE-WAVE – SQUARE WAVE)

MODEL AO-1

$28.95

Shpg. Wt. 10 Lbs.

Produces sine wave or square wave signals from 20 to 20,000 cps in three ranges. Designed for use in service shop, or home workshop. Employs thermister for output regulation. Features high level output, low distortion, and low impedance output. Produces sine waves for audio testing, or will produce good, clean square waves with a rise time of only 2 microseconds. Very simple to build from complete instructions supplied.

AUDIO GENERATOR

MODEL AG-9A

$40.95

Shpg. Wt. 8 Lbs.

This generator features low distortion (less than .1%). Ideal for use with Model HD-1, or in other applications requiring low signal distortion. Frequency accuracy within ±5%. Features step-type tuning from 10 cps to 100 kc, with three rotary switches to provide two significant figures and a multiplier. Output monitored on a large 4½" meter. Meter calibrated for output voltage or db. Output ranges are—.003, .01, .03, .1, .3, 1, 3, and 10 volts.

AUDIO ANALYZER KIT

MODEL AA-1

$59.95

Shpg. Wt. 13 Lbs.

This combination instrument provides the functions of an AC VTVM, audio wattmeter, and intermodulation analyzer. Includes built-in high and low frequency oscillators for intermodulation distortion tests. VTVM ranges are .01, .03, .1, .3, 1, 3, 10, 30, 100, and 300 volts rms. Wattmeter ranges are .15 mw, 1.5 mw, 15 mw, 150 mw, 1.5 w, 15 w, and 150 w. IM scales are 1%, 3%, 10%, 30%, and 100%. Provides internal loads of 4, 8, 16, or 600 ohms. An extremely valuable instrument for the audio engineer, or serious audiophile.

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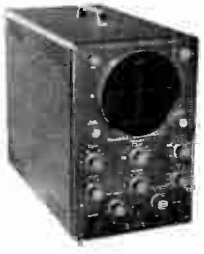
HEATHKIT ETCHED CIRCUIT
OSCILLOSCOPE KITS

You may choose from two different oscilloscope models when you purchase a Heathkit scope. Both units employ printed circuit boards for increased circuit efficiency and simplified assembly. Construction time cut almost in half. Outstanding dollar values for you!

5" COLOR TV



MODEL O-11

$82.95

Shpg. Wt. 21 Lbs.

Amplifier response essentially flat from plus 2 db -5 db from 5 mc down to 2 cps without extra switching. Extended sweep oscillator range allows single-cycle observation of signals up to 500,000 cps, and will sync signals even higher. Uses etched metal circuit boards. Push-pull vertical and horizontal amplifiers—built in peak-to-peak calibrating source—step attenuated input—preformed and cabled wiring harness. A professional oscilloscope, ideal for color TV work in the lab or service shop. The 11-tube circuit features 5UP1 CRT.

FULL SIZE 5"

The Model OM-2 with a 5", 5BP1 cathode ray tube has many big scope features—yet it is priced reasonably. Features etched-metal circuit boards. Incorporates 3-step input attenuator—phasing control—built-in peak-to-peak voltage calibrator—and push-pull vertical and horizontal amplifiers. Vertical amplifier flat within ±3 db from 2 cps to 200 kc. Sweep circuit functions from 20 cps to 100,000 cps.

MODEL OM-2

$49.95

Shpg. Wt. 21 Lbs.

Heathkit VOLTAGE CALIBRATOR KIT

MODEL VC-3

$14.95

Shpg. Wt. 4 Lbs.

Use as a source of calibrating voltage for oscilloscopes or peak-to-peak VTVM's. Produces near-perfect square wave signals of known amplitude. Precision 1% attenuator resistors and multivibrator circuit for sharp square waves. Output frequency 1,000 CPS. Switch-selected outputs are: .03, 0.1, 0.3, 1.0, 3.0, 10, 30 and 100 volts peak-to-peak.

Heathkit AUDIO VTVM KIT

MODEL AV-3

$39.95

Shpg. Wt. 5 Lbs.

Designed especially for audio measurements and low-level AC measurements in power supply filters, etc. An entirely new VTVM circuit that is essentially flat from 10 CPS to 200 KC. Input impedance is approximately 1 megohm at 1,000 CPS. AC (RMS) voltage ranges are 0—.0F, .03, .1, .3, 1, 3, 10, 30, 100 and 300 V. Db ranges cover —52 db to +52 db .1% precision resistors employed for maximum accuracy. Easy to build, and essential in audio work.

Heathkit ETCHED CIRCUIT VACUUM TUBE VOLTMETER KIT

The Heathkit Model V-7A features a 200 ua meter, 1% precision resistors, and an etched metal circuit board. Very simple to build. Measures DC voltage, ACV (rms) ACV (peak-to-peak), and resistance. AC (rms) and DC voltage ranges are 0-1.5, 5, 15, 50, 150, 500, and 1500 volts. Peak-to-peak ranges are 4, 14, 40, 140, 400, 1400, 4000 volts. Ohmmeter ranges provide multipliers of X1, X10, X100, X1000, X10K, X100K, and X1 megohm. DB scale also provided. 11-megohm input impedance,

MODEL V-7A

$32.95

Shpg. Wt. 7 Lbs.

Heathkit 20,000 OHMS/VOLT VOM KIT

MODEL MM-1

$39.95

Shpg. Wt. 6 Lbs.

This instrument is especially valuable for portable applications where AC power is not available. Sensitivity is 20,000 ohms-per-volt DC and 5,000 ohms-per-volt AC. Black bakelite case 4½" 50 ua. meter-1% precision resistors. AC and DC ranges are 0-1.5, 5, 50, 150, 500, 1500, and 5000 volts. Direct current ranges are 0-150 ua., 15 ma., 150 ma, 500 ma, and 15 a. Resistance multipliers are X1, X100, and X10,000. DB range from -10 db to +65 db.

Heathkit DIRECT-READING CAPACITY METER KIT

This unique measuring instrument indicates capacitor values in mmf, or mfd, directly on a large 4½" 50 ua meter. It provides ranges of 0-100 mmf, 0-1,000 mmf, 0-.01 mfd, and 0-.1 mfd. Residual capacity less than 1 mmf. Scales are linear. Merely connect the capacitor to the instrument and read its value directly on the scale. Instrument not susceptible to hand capacity effects. Will measure even small value trimmers or variable air capacitors.

MODEL CM-1

$34.95

Shpg. Wt. 7 Lbs.

Heathkit ELECTRONIC SWITCH KIT

MODEL S-3 **$25.95**

Shpg. Wt. 8 Lbs.

This new instrument design allows simultaneous oscilloscope observation of two input signals by producing both signals, alternately, at its output. The all-electronic circuit provides 4 switching rates, selected by a panel switch. Provides actual gain for input signals, and features frequency response of ±1 db from 0 to 100 kc. Employs 7 miniature tubes. Sync output provided to control scope sweep. Functions at signal levels as low as 0.1 volt. Ideal for observing amplifier input and output simultaneously for comparison purposes.

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For further data on advertised products use page 101.

LOAD CELLS

(Continued from page 40)

frequency; that is, it is capable of following, accurately, very rapid changes in applied force. Some of the most spectacular applications of load cells are in testing rocket engines, jet aircraft supersonic wind tunnel models and the like.

Successful industrial weighing applications of load cells by Streeter-Amet, IBM, and others include problems of motor truck logging on turnpikes, railroad switch yard weighing, and the like. In several industrial problems involving repetitive operations on product weight, on which Leeds & Northrup has worked, the high speed of response possible with load cells was an important factor in achieving a satisfactory solution. In industrial laboratories such as the helicopter rotor test stand (Fig. 5), load cells and load cell instrumentation played a vital role in accurate measurements.

Awkward Structures

Properly supporting certain types of structures, and at the same time realizing a useful weight measurement is an awkward problem which has considerably promoted the use of load cells. A dramatic example is the railroad track scale installed several years ago by Baldwin-Lima-Hamilton and since repeated in several forms by other companies. Fig 6 shows the simplicity of foundation and structural support achieved.

Large tanks utilize load cells in a very simple form of support with an output signal proportional to weight. (Figs. 7 and 8). Some of the most awkward mounting problems have come because of space limitations. Lack of space available in equipment for accurately measuring and controlling wire tension during winding dictated the use of a load cell and a high speed electronic instrument.

Portable equipment demands characteristics which encourage the use of load cells, such as small size, light

weight and rigid construction. Cox & Stevens Aircraft Company has made portable aircraft weighing equipment using load cells for several years. Baldwin-Lima-Hamilton and Harnischfeger Corp. have successfully mounted electric load cells in crane-scale hook assemblies. Electric transmission of output signals is particularly convenient for portable equipment. The principal problem is protecting the cells against accidental overloads, particularly those from shock or impact.

Indicating, Recording And Control

High-speed electronic instruments, developed and refined to a high degree for allied industrial measurements, such as temperature, flow, and pressure, have been readily adapted to the special problem of measuring and recording weight. They are available as round-chart, strip-chart, and indicating instruments. Various means are also available for making permanent digital records either as printed or punched cards, for later automatic processing by accounting machines.

One of the most important techniques possible with load cell instrumentation is multiple-point measurement, wherein several load-cell signals are measured sequentially on a single recorder or indicator. On an Atomic Energy Commission installation for

(Turn to page 118)

For further data on advertised products use page 101.

Load Cells (Continued from page 117)

which L&N supplied equipment, weight of material in each of ten separate storage locations is recorded on a single instrument.

A logical extension of weight measurement is control of loading equipment or the process which feeds, or is being fed by, materials handling equipment. The wide variety of automatic control equipment developed by the instrument industry offers packaged components for weight control, such as motor operators, servo amplifiers, and three-function control bridges. Several examples suggest the versatility of the equipment.

Batch addition of several ingredients in preset amounts can be automatically controlled on a weight basis. In one foundry, for example, three kinds of sand are fed in prescribed weights into the cradle as shown in Fig. 9. Load cells, arranged as on the cradle shown in Fig. 4, connect to the control panel which automatically switches sand hoppers as the present weights are added.

Another interesting application combines weight measurement and electric power measurement to automatically control most efficient loading of a ball mill. A particularly important use is flow-ratio control of the several different materials into a continuous process — a technique which is a straightforward extension of totalizing and ratio circuits originally developed for electric power distribution, and regenerative furnace control.

Fig. 10 shows the control panel for measuring several charges of molten iron to a multiple-flask centrifugal casting machine.

News Report

W. WILSON

● Bayly Engineering Limited, Ajax, Ontario, has announced the appointment of Wally Wilson as district sales representative for Ottawa and Montreal. Mr. Wilson recently opened a new branch office located at 48 Sparks Street, Ottawa.

Mr. Wilson was formerly with the Electronics Branch, Department of Defense Production, as senior technical adviser. He has developed an extensive knowledge of the electronics and communications field in Canada, and is widely known in the armed services and governmental departments.

For further data on advertised products use page 101.

On August 1st, General Radio Company opened a factory branch office for **Canada.** This is an extension of G-R's long-established policy of direct-sales offices operating from headquarters in Cambridge. This arrangement terminates a long and cordial association with the Canadian Marconi Company, our representatives for many years.

The new office is in charge of Arthur Kingsnorth, ably assisted by Richard J. Provan. Both are well known to Canadian scientists and engineers through their long experience with G-R equipment as associates of our former representatives.

The new Canadian office is located at 99 Floral Parkway, Toronto, just south of Route 401 at the Keele Street turn-off. The telephone number is CHerry 4-6221.

A substantial stock of the latest instruments will be available for inspection. A telephone call or letter directed to the Canadian Office will receive prompt attention both in advice on the selection of appropriate G-R apparatus to suit your particular problem, and in supplying delivery and ordering information.

General Radio service and repair work will continue to be handled by Bayly Engineering, Ltd., of Ajax, Ontario.

GENERAL RADIO Company

Cambridge, Massachusetts, U.S.A.

Canadian Office: 99 Floral Parkway, Toronto 15, Ontario

Arthur Kingsnorth Richard J. Provan

Telephone: CHerry 4-6221

Repair Service:
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IRE Canadian Convention
Toronto, October 16-18, 1957

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PAPER CAPACITORS	MOLDED PAPER TUBULAR — TYPE AM	BATHTUB PAPER CAPACITOR — TYPE ADM	METEOR* BATHTUB CAPACITOR — TYPE ADZ	METEOR* METAL-CASED POLYESTER PLASTIC CAPACITORS — TYPE XQF
	CERAMIC CASED PAPER TUBULAR — TYPE AP	OIL-FILLED METAL TUBULARS — TYPE AR MF	MOLDED PLASTIC TUBULAR — BLUE POINT® — TYPE BP	METEOR* SUBMINIATURE GLASS-TO-METAL SEALED TUBULARS — TYPE AQF TQF
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	METALITE® CARDBOARD TUBULARS — TYPE ML	METALITE® METAL-CASED TUBULARS — TYPE MRF	METALITE® TERNEPLATE "SQUEEZE SEAM" CASES — TYPE MXJ	METALITE® HY-MET* BATHTUB CAPACITORS — TYPE MDL
			METALITE® HY-MET* SUBMINIATURE BATHTUB — TYPE MTL	METALITE® HY-MET* GLASS-TO-METAL SEALED TUBULARS — TYPE MQL
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