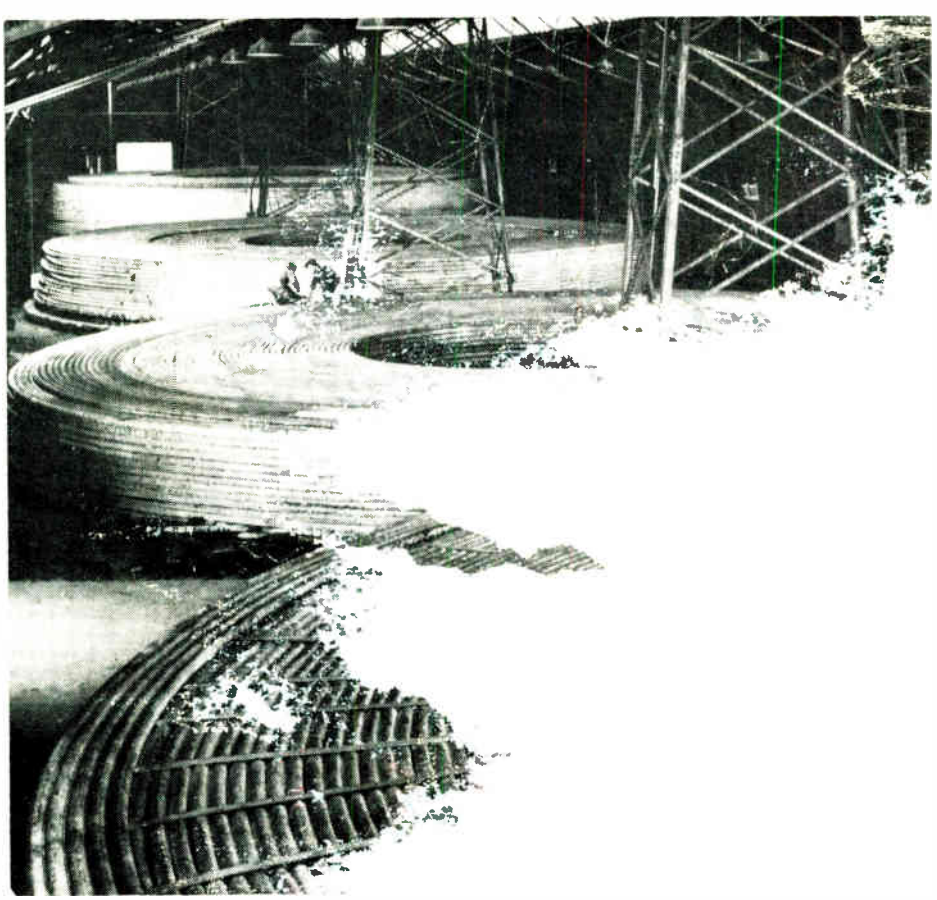
DESIGN MANUFACTURE ENGINEERING APPLICATION

ELECTRONICS AND COMMUNICATIONS



Picture shows submarine Vancouver for the British manufactured by British Insu of Manchester, England.

August, 1957

An AGE Publication
Toronto, Canada

Distribution Of This Issue Over 10,000 Copies

NEW

FOR . . .

ENGINEERING LABORATORY PROTOTYPE

Resistor Requirements

Have the Resistors you need at your fingertips. No costly engineering delays. This ruggedly constructed, compact cabinet has 77 individual sections, containing all your ½ and 1 watt resistor requirements.

Check these features:

Contents can be either ½ watt (IRC Type BTS) or 1 watt (IRC Type BTA) MIL Approved Composition Resistors.

All 77 standard RETMA and MIL-R-11 Ranges included. Drawers and Packs individually identified. Replacement stocks available from stock at all leading distributors.

Compact cabinet—only 18" x 18" x 5½" deep.

Contents are "exclusive" IRC "Pack-of-5"

- Factory Sealed
- Moisture-Proof
- Weatherproof
- Dustproof

"A PRODUCT OF CANADA"

IRC

INTERNATIONAL RESISTANCE CO. LIMITED

349 CARLAW AVENUE • TORONTO 8, ONTARIO

"25 Years of Canadian Manufacturing Experience"

Radiovision Sales Ltd.
325 Tenth Ave. West
Calgary, Alta.

SALES OFFICES:
492 Somerset St. West
Ottawa
Ont.

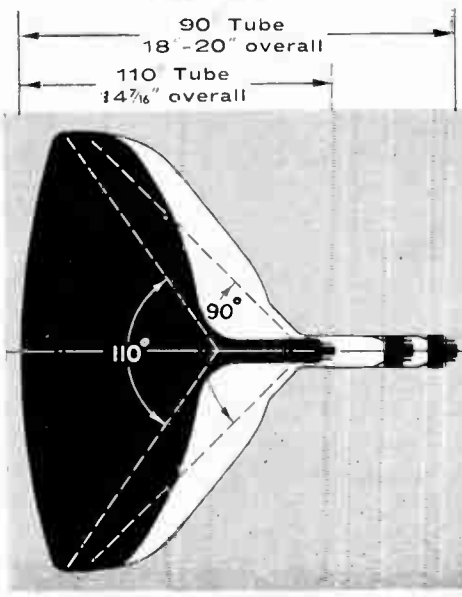
1500 St. Catherine St. West
Montreal
Que.

For further data on advertised products use page 65.

Announcing the All-New MARCONI 110° Picture Tubes

6 advantages

- 5½" shorter than the conventional 90° tube, opening new scope for cabinet design.
- Available with 90° faceplate allowing for conversion to 110° without retooling the mask.
- No ion trap required—you save on the cost of an ion trap and the labour for adjusting it.
- Integral glass button base eliminates any possibility of loose base-pin connection.
- Small neck allows 110° deflection with only slightly more power than is required for a 90° tube.
- Approximately one pound lighter.



As always Marconi is ready to supply the industry's latest needs. Marconi 110° tubes are now available from Canadian production to customer's specifications.

ELECTRONIC TUBE AND COMPONENTS DIVISION

CANADIAN **Marconi** COMPANY

830 BAYVIEW AVENUE, TORONTO, ONTARIO

BRANCHES: Vancouver • Winnipeg • Montreal • Halifax • St. John's, Nfld.

For further data on advertised products use page 65.

The Eimac high power amplifier klystron is installed in Collins Canada type 240E-2 one kw and 240D-1 10 kw troposcatter transmitters.

Collins Canada

uses Eimac klystrons in the manufacture of one kw and 10 kw troposcatter transmitters for the world market.

Canada with its rough, often impassable terrain, provided the need for a modern, reliable long distance communication system. It is here that such a system—a tropospheric scatter communication network was first installed.

Collins was a leading contributor to this network with one kw and 10 kw transmitters.

Now Collins Canada manufactures all of its company's one and 10 kw troposcatter transmitters, for the world market.

Collins engineers have selected Eimac high power klystrons exclusively for the final amplifier stages of all their tropospheric scatter transmitters.

Eimac First *for klystrons for tropospheric communication.*

Eimac **EITEL-McCULLOUGH INC.**

SAN BRUNO **CALIFORNIA**

The World's Largest Manufacturer of Transmitting Tubes

Represented in Canada by

THE AHEARN AND SOPER COMPANY LIMITED

384 BANK ST., OTTAWA, ONTARIO

5707

from this to this... in 3/5 of a second!*

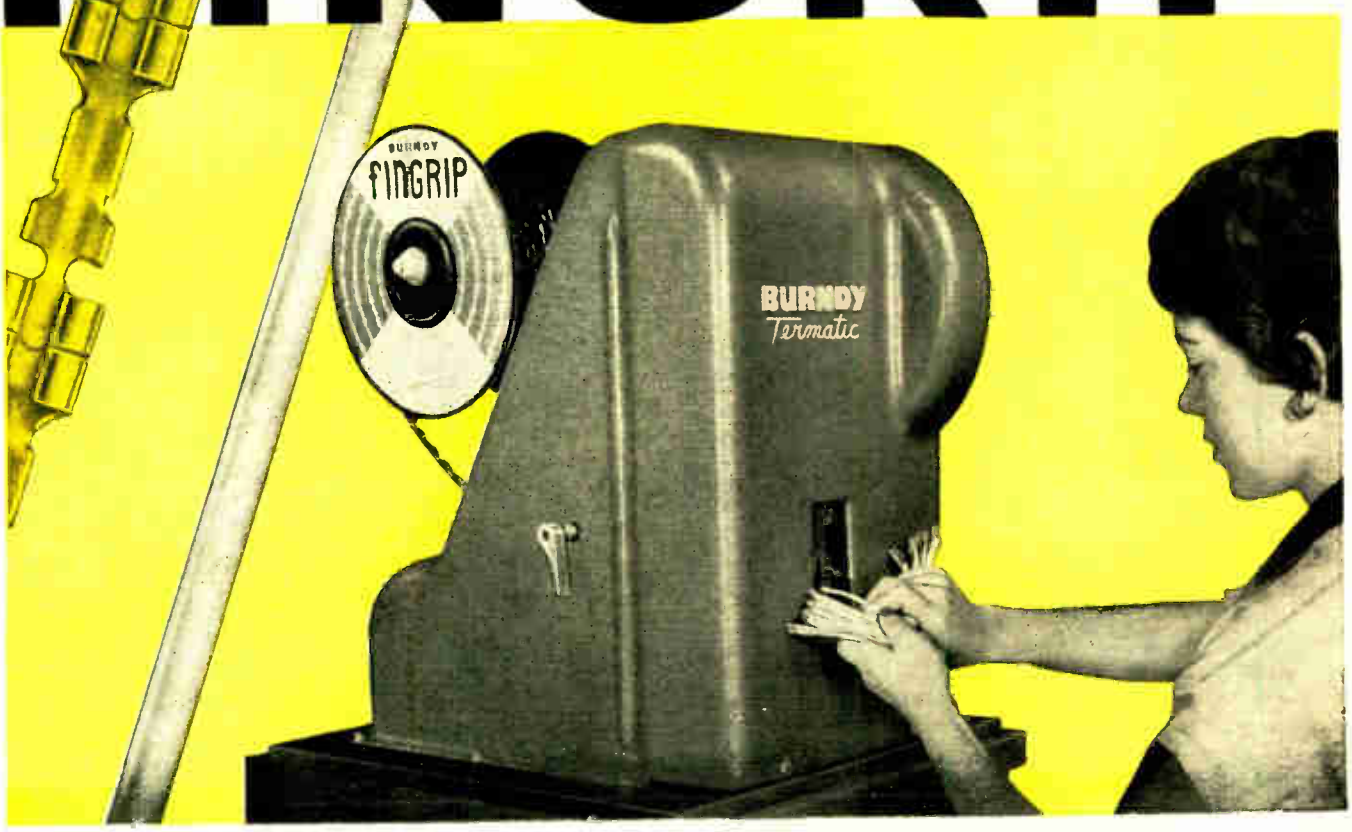
Two elements—the rugged, inexpensive FINGRIP, and the fully automatic, easily-loaded TERMATIC—form the new Burndy FINGRIP METHOD, permitting a speed and ease of uniform electrical termination never before possible. NO PEDALS OR LEVERS TO PRESS, and no pre-positioning of wire necessary—insertion of the wire end actuates the TERMATIC, virtually eliminating rejects and minimizing operator fatigue. The machine is quickly and easily loaded (less than 15 seconds) and is completely enclosed for operator's protection. The FINGRIP, an inexpensive quick-disconnect terminal, has FOUR individual pressure elements—permitting greater flexibility and abuse without damage.

Write Burndy, Canada Ltd., 381 Greenwood Ave., Toronto 8, Ont. for general information or for solutions to specific terminal problems. Our engineers are always available for personal consultation.

*6000 per hour by actual customer test.

BURNDY

FINGRIP



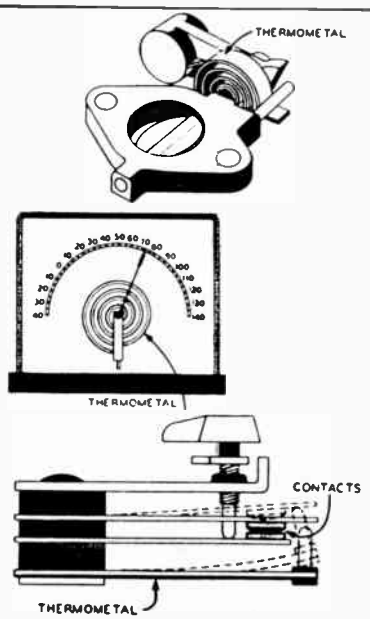
5623

BURNDY CANADA LIMITED

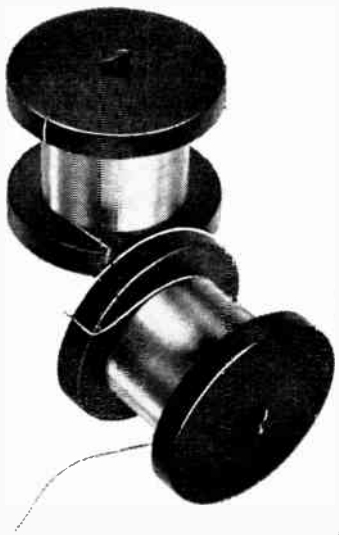
1530 Birchmount Rd. (Metropolitan Toronto) Scarboro, Ont., PLymouth 7-8761

Offices in Montreal, Winnipeg, Calgary, Vancouver

THERMOMETAL®...
for use in electrical appliances, thermal cutouts, heating controls... in any application involving the indication and accurate control of temperatures, electrical currents, voltages, etc. Supplied in strip form, rolled and slit to close tolerances and tempered to meet specifications. Also supplied as elements and sub-assemblies, with or without contacts attached, fabricated in accordance with specifications.



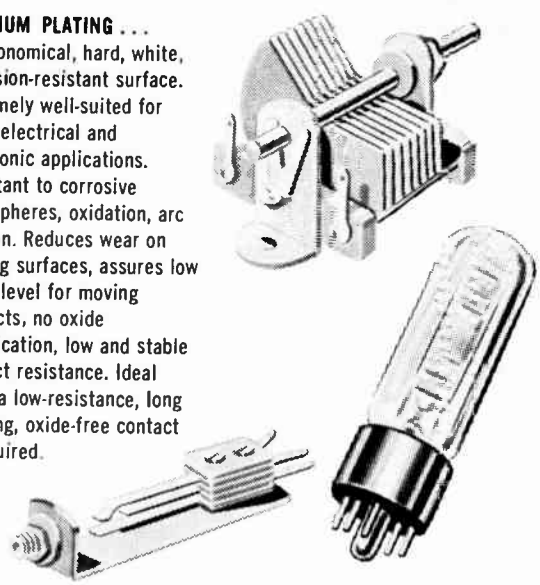
FINE WIRE...
of ductile and non-ductile materials for every application requirement. BAKER research has developed processes for bare drawing wire as fine as .0004". Where smaller fine wire is required, the Wollaston process, for ductile metals, and the Taylor and Extrusion methods, for non-ductile materials, are employed.



▶ for controlling temperature...
▶ for fine wire...
▶ for precious metal contacts...
▶ for corrosion-resistant surfaces...

PRECIOUS METAL CONTACTS
for long operating life and unvarying performance. Available in pure or alloyed forms of Silver, Platinum, Palladium, and Gold. These contacts provide extremely high resistance to atmospheric corrosion, deformation, arc erosion, sticking and metal transfer. They are supplied as wire, rod, sheet, and as fabricated forms.

RHODIUM PLATING...
an economical, hard, white, corrosion-resistant surface. Extremely well-suited for many electrical and electronic applications. Resistant to corrosive atmospheres, oxidation, arc erosion. Reduces wear on moving surfaces, assures low noise level for moving contacts, no oxide rectification, low and stable contact resistance. Ideal when a low-resistance, long wearing, oxide-free contact is required.



Write for complete catalog material and details.

BAKER PRECIOUS METALS

BAKER PLATINUM OF CANADA, LTD.
512 King Street East, Toronto, Ontario, Canada
SALES OFFICE: BAKER PLATINUM QUEBEC, LTD., MONTREAL

ENGELHARD INDUSTRIES

RESEARCH MAINTAINS BAKER'S LEADERSHIP IN PRECIOUS METALS

For further data on advertised products use page 65.

COLLINS NEW

Time Payment Plan

MAKES THE FINEST SSB EQUIPMENT

AVAILABLE NOW

Canadian Amateurs

Collins 75A-4 Receiver, SC-101 Station Control system, KWS-1 Transmitter and Power Supply. Not shown, KWM-1 Mobile and Fixed Station Transceiver.

STEP INTO THIS PICTURE

It's easier than you think

This can easily be a picture of *your* rig, and just as easily, you can enjoy the top performance in amateur history *now*. Here are the figures:

MODEL	CANADIAN PRICE	DOWN PAYMENT	18 MONTHLY PAYMENTS
75A-4	$ 695.00	$ 69.50	$ 38.00
SC-101	$ 695.00	$ 69.50	$ 38.00
KWS-1	$2095.00	$209.50	$114.50
KWM-1	$ 770.00	$ 77.00	$ 42.00

Accessories may be included. Sorry, no trade-ins.
Deliveries direct from stock.
Prices FOB Toronto, Ontario, include sales tax.
Submit three credit references with down payment check or money order.

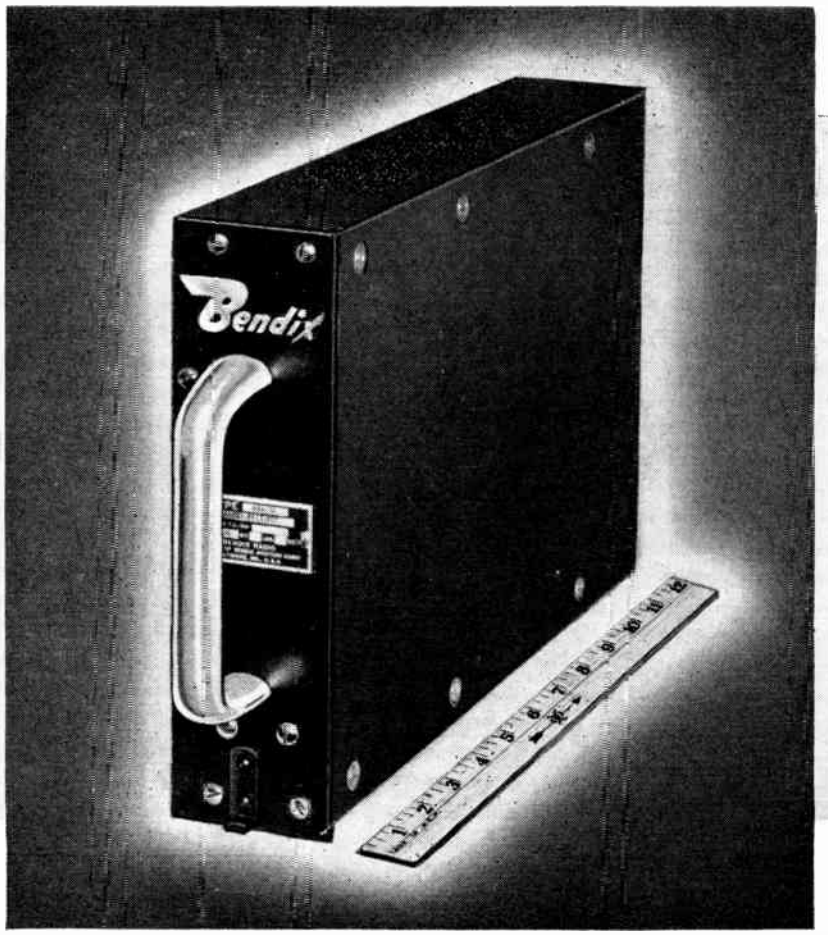
Collins CREATIVE LEADER IN COMMUNICATION COLLINS

COLLINS RADIO COMPANY OF CANADA, LTD. 11 Bermondsey Road, Toronto, Ontario

For further data on advertised products use page 65.

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.

5716

RESEARCH · ENGINEERING · DEVELOPMENT · CONSULTING · MANUFACTURE · CDC

COMPUTING DEVICES OF CANADA LIMITED

P.O. BOX 508 • OTTAWA • CANADA

WESTERN DIVISION — Commercial Building, Edmonton, Alberta.

For further data on advertised products use page 65.

ELECTRONICS AND COMMUNICATIONS

VOLUME 5 AUGUST 1957 NUMBER 8

FEATURES

DEPARTMENTS

PUBLISHED BY AGE PUBLICATIONS LIMITED
Founded in 1923 by Norton W. Kingsland

Publishers of Heating, Plumbing and Air Conditioning AGE • Restaurants and Institutions
Oil and Gas Heat • Wine, Beer and Spirits in Canada • Industrial Aeronautics

TORONTO, ONT., CANADA: 31 - 35 Willcocks Street, Tel. WAlnut 2 - 3115. MONTREAL, QUE., CANADA: Room 504, Dominion Square Building, 1010 St. Catherine Street West, Tel. UNiversity 6 - 7879.

SUBSCRIPTION RATES: Canada, U.S.A. and British Possessions - $5.00 per year • Foreign - $10.00 per year.

Authorized as second class mail. Post Office Department, Ottawa.

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PRINTED IN CANADA 60

IT'S THE NEW VARIAN VA-97 KLYSTRON . . . a tough, reliable local oscillator tube with performance and design features unmatched by any other klystron in the frequency range of 34.0 to 35.6 kMc . . . ideal as the microwave power source for airborne radar and similar applications.

RUGGED — provides reliable operation under severe environmental conditions.

COMPACT — small size and light weight takes up less high premium aircraft space.

HIGH PERFORMANCE AT LOW VOLTAGE — means better equipment design.

EXCEPTIONAL FREQUENCY STABILITY under all conditions, due to Varian's advanced external tuning cavity design.

SLOW TUNING — gives you more reliable system operation with less maintenance.

RATED FOR USE AT ANY ALTITUDE without pressurization.

These important features allow maximum latitude in equipment design and result in savings of time, space and money. A companion klystron — the VA-94 — is also available, providing comparable performance characteristics in a frequency range of 16.0 to 17.0 kMc.

	Frequency	Resonator Voltage	Power	Electronic Tuning Range
VA-97	34.0 - 35.6 kMc	400 V	15 mW	90 Mc
VA-94	16.0 - 17.0 kMc	300 V	40 mW	75 Mc

FOR TEST EQUIPMENT AND LABORATORY MEASUREMENT . . . Varian's V-39C and V-40C klystrons feature separate external cavities that afford an extremely wide tuning range for testing and laboratory research applications, in frequency ranges between 10.0 and 21 kMc.

NEW VARIAN KLYSTRON CATALOG . . . Now available, this fully-illustrated 16-page catalog describes the complete line of commercially available Varian klystrons and related microwave equipment.

Write for your copy today.

THE MARK OF LEADERSHIP

VARIAN associates

OF CANADA, LTD. • GEORGETOWN, ONTARIO

KLYSTRONS, TRAVELING WAVE TUBES, BACKWARD WAVE OSCILLATORS, R.F. SPECTROMETERS, MAGNETS, STALOS, UHF WATERLOADS, MICROWAVE SYSTEM COMPONENTS, GRAPHIC RECORDERS, RESEARCH AND DEVELOPMENT SERVICES

For further data on advertised products use page 65

RETMA Report

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

RETMA-IRE Golf Tournament

The annual joint golf tournament of RETMA and the Institute of Radio Engineers is due to take place on Tuesday, September 24th at the new Cedar Brae Golf and Country Club at Scarborough, Ontario, just east of Toronto.

Each year this golf tournament has been a very popular event in the calendar of RETMA and IRE activities and it is expected that attendance at this year's tournament will be in excess of previous events. The Components Division of RETMA will hold its annual meeting in the morning at the club house. Golf will be followed by dinner, presentation of trophies and prizes.

New Members of RETMA

The following members of RETMA were recently granted membership:

Membership in Components Division

W. Gary Wright Electronics Limited, Whitby, Ontario.
Manufacturers of quartz crystals.

Helipot Corporation, 3 Six Points Road, Toronto, Ont.
Manufacturers of precision potentiometers.

Sylvania Electric (Canada) Limited, 660 St. Catherine Street West, Montreal, Que.
Manufacturers of radio tubes.

Shakeproof-Fastex Division, Canada Illinois Tools Ltd. 67 Scarsdale Road, Don Mills, Ont.
Manufacturers of thread cutting screws, screw and washer assemblies, stampings (terminals – gears – lockwashers), plastic fasteners.

Membership in Electronics Division

Benco Television Associates Limited, 27 Taber Road, Rexdale, Ont.
Manufacturers of electronic equipment for installation of TV distribution and community systems, distribution and matching amplifiers, satellite transmitters.

Wind Turbine Company of Canada Limited, 51 McCormack Street, Toronto, Ont.
Manufacturers of towers, antennas, antenna systems and associated equipment for radio and television communication.

McCurdy Radio Industries Limited, 22 Front Street West, Toronto, Ont.
Manufacturers of audio amplifiers, power supplies, video amplifiers, McIntosh high fidelity amplifiers.

New Policy for Executive Committee of Component Division

At the Components Division meeting of June 20th, it was recommended, and approved, that membership on the Executive Committee of the Components Division be increased from six representatives to ten. Previously, this committee had consisted of six representatives all of whom were RETMA directors. However, to allow representatives from more member-companies to serve on this committee, and to widen the opportunity for younger men, it was decided to add four new members, not necessarily directors, to the committee. These four extra members will be elected on a yearly basis, at each annual meeting.

(Continued Overpage)

RETMA Report

RETMA Engineering Meetings at Ste. Adele

At the annual meeting of the Radio-Electronics-Television Manufacturers Association of Canada at Ste. Adele, numerous engineering committee meetings were held. This reflected the growing importance of engineering matters in the development of the association, and confirmed the statement of the retiring president when he said that the engineering services of RETMA were vitally necessary for the industry.

During the course of the annual conclave six engineering meetings were held. These were the Receiver Engineering Committee, Components Engineering Committee, Mobile Equipment Committee, Microwave, Radio Relay and Multiplexing Committee, Instrumentation and Data Handling Committee and the Sound Equipment Committee. In addition, the Electronics Division of RETMA held an inaugural meeting of the newly formed Engineering Panel. Under this arrangement, the various engineering committees of the Electronics Division report to an engineering representative on the Engineering Panel, the Panel reporting to the division. This is an organizational change which, it is expected, will streamline the engineering facilities of the Electronics Division and provide quicker procedural channels for the compilation of standards and other engineering work.

To co-ordinate the engineering activities of the three divisions, the Receiver Division, Components Division, and the Electronics Division, an Engineering Advisory Committee has now been formed. This committee is under the chairmanship of the RETMA Director of Engineering and reports to the Board of Directors.

Industrial Relations Panel

In connection with the recent RETMA annual meeting the Industrial Relations Committee sponsored a panel discussion on the subject of "Communications in Industry". Chairman was Keith Richan of the Industrial Relations Committee and manager, Industrial Relations, Canadian Radio Manufacturing Corporation Limited. The two panelists were Kenneth Rose, International Representative of the International Brotherhood of Electrical Workers Union and Ronald M. Robinson, Vice-President of the RETMA Electronics Division and Vice-President and General Manager, Electronic Equipment and Tube Department, Canadian General Electric Company Limited.

The chairman reviewed the difficulty experienced in industry in conveying accurate communications from management to employees, and introduced a film entitled "Operation 5118" which illustrated this theme and suggested a remedy for this deficiency. After the film, the two panelists were invited to express their views on the topic.

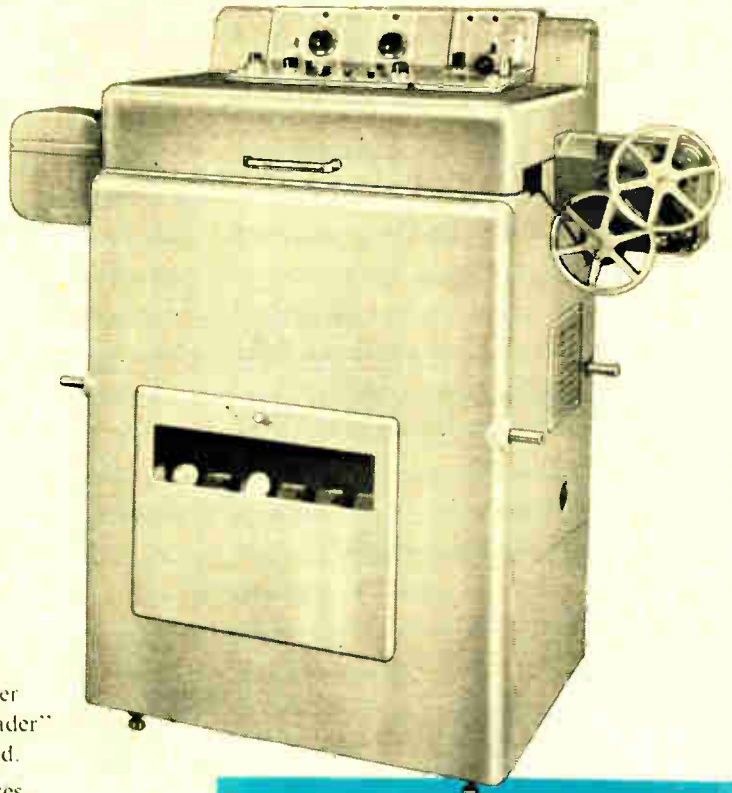
Mr. Rose said that a union had a responsibility in improving communications between management and workers and that co-operation, honesty and integrity were essential attributes around any conference table. He said that, in the union, management had the greatest means of communication to the employees.

Mr. Robinson said the management must have an honest intent in all communications to employees. Company policies must be well-formulated and documented before any attempt was made to communicate them to the employees. He noted that all communications to others are biased in that they were colored by the interests or prejudices of the communicator, and it was essential to look at all matters from the viewpoint of those being addressed. He said that the trend towards de-centralization in industry made the problem of conveying accurate communications more acute, as more "relay stations" had to be set up between the issuer and recipient of a communication.

For further data on advertised products use page 65.

AUTOMATIC TRI-FILM PROCESSOR

UP TO SIX FEET A MINUTE WITHOUT LOSS OF QUALITY!



THE transportable Mark 3 Automatic Tri-Film Processor develops and dries 16, 35 or 70 mm. film at 1½, 3 or 6 feet a minute! Four 400-ft. 16 mm. films can be handled simultaneously—or two 400-ft. 35 mm films—or one 400-ft. 70 mm length. The various film sizes are accommodated by simple adjustments of film separators. Separate temperature control of the processing solution is possible on each tank from 60 to 110 degrees F., within ± 1 degree. The latest high temperature chemical resistant plastics and Type 316 stainless steel are used in all chemical areas. Processing is controlled by a mechanical program unit after the film is loaded into the machine—no special "leader" or continuous tapes, chains or sprockets are used.

The need for stop baths and interbath rinses, normally required in many processes, is virtually eliminated because of a positive squeegee roller design.

A high-efficiency blower system and electrical heating ensure rapid drying in the machine. The Processor is perfect for newsreels, TV news on film, motion picture "rushes" in the field.—in all cases where speed plus quality are essential. Write for literature and quotations.

SPECIFICATIONS

AUTOMATIC TRI-FILM PROCESSOR TYPE T246 Mk3

Size:	54" long, 22" wide, 51" high
Weight:	400 lbs.
Power Consumption:	5 KVA maximum single-phase: 110 volts, 45 amps, or according to customer requirements
Process Capacity:	1 to 4 rolls 16 mm | length 1 or 2 rolls 35 mm | to 1 roll 70 mm | 400 ft.
Rate of Processing:	1½, 3 or 6 ft. per min.

Temperature-controlled solutions and dryer. Daylight operation except loading of film into magazine. Processes perforated or plain film.

Canadian Applied Research Limited

(formerly PSC Applied Research Limited)

1500 O'CONNOR DRIVE
TORONTO 16, ONTARIO, CANADA
PLYMOUTH 5-3371

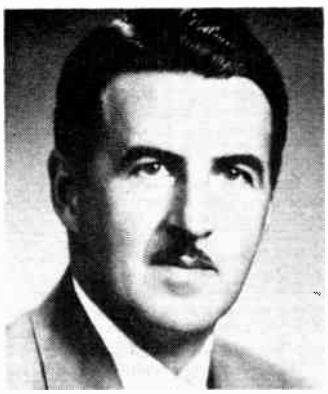
MEMBER: A. V. ROE CANADA LIMITED & HAWKER SIDDELEY GROUP

For further data on advertised products use page 65.

Electronics
AND
Communications

Volume 5 August 1957 Number 8

IRE Canadian Convention Objectives



The second IRE Canadian Convention and Exposition has been greeted with enthusiasm exceeding the most optimistic expectations of the Executive Committee. The response received from last year's exhibitors at the conclusion of the 1956 Show justified proceeding with plans for a 1957 Show and to set the stage for an annual venture.

In this respect the Committee has one major objective initially and for the future: to continually broaden the scope of the Convention and Exposition to include electronics in its broadest sense encompassing the fields of atomic energy, nuclear science, industrial applications, communications, aircraft management and education.

A review of the Advisory Committee of the IRE Canadian Convention and Exposition will indicate the scope of engineering activities which will be served in this venture and the enthusiasm of the Advisory Committee members has provided significant encouragement to the Executive Committee in the matter of substantiating their convictions that Canada needs and can justify a scientific convention and exposition of the type which proved so initially successful in 1956.

The technical program of the 1957 IRE Canadian Convention and Exposition which has already been issued in preliminary form has received many favorable comments — both from the standpoint of technical content and the broad concept of engineering phases which are covered.

With respect to the technical program and the engineers that will participate therein, it may reasonably be said that the role of the professional engineer in Canadian operations is a complex one and that there has been little opportunity in the past for the Canadian engineer to present his achievements publicly. It may be further said that few Canadian engineers have had the opportunity of presenting papers in the United States or elsewhere. The IRE Canadian Convention makes this opportunity available to them and is considered by many participating companies as an important phase in a broad engineering education development program. Growing interest in the technical program of the IRE Canadian Convention is indicated by an assured increase in attendance of delegates from outside Canada for the 1957 Convention but the Technical Program Committee are encouraged in the knowledge that the majority of papers will be presented by Canadian engineers.

In keeping with the policy of the Executive Committee of establishing the IRE Canadian Convention and Exposition as a Canadian Show, preference has been given to Canadian exhibitors and the enthusiastic response of Canadian participating companies — by far in the majority — has made it relatively easy to maintain this policy.

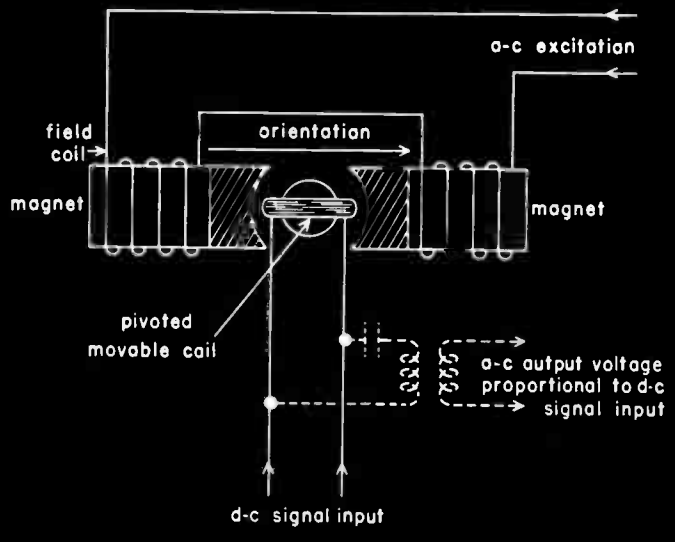
There is every indication that this year's Show will be better from all aspects than last year's venture. The Executive Committee has spared no effort to make this IRE Canadian Convention and Exposition a scientific highlight in 1957 and is most encouraged to know that the success of last year's Show and the publicity that has been afforded to this year's Show have created world-wide recognition of this scientific endeavor.

Clare Norris,
General Chairman, Executive Committee,
IRE Canadian Convention.

New Principle

OF D-C, A-C CONVERSION

(Actual size)



INSTRUMENTS *by* WESTON

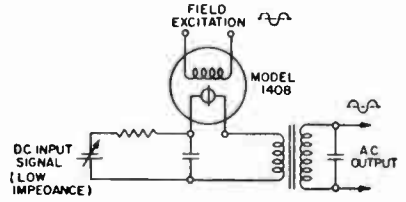
NEW WESTON INDUCTION MODULATOR

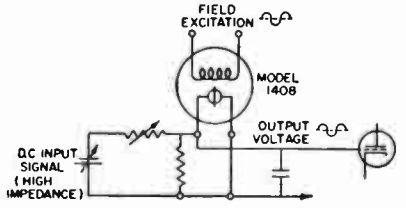
- has no contacts
- provides conversion gain
- output wave form sinusoidal

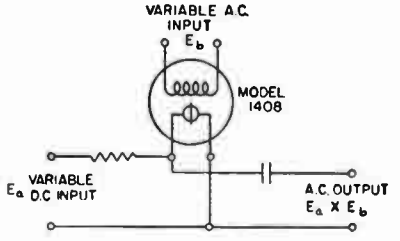
In contrast to conventional transducers, the compact light-weight Induction Modulator is of hermetically sealed-in construction, making it impervious to moisture, dust and other exposures . . . is never subject to contact troubles . . . presents a constant resistance to the d-c signal input, and is unaffected by pick-up from stray fields. Further it is extremely rugged, sufficient to assure trouble-free service in airborne devices and other electronic equipment. For complete information write, *Daystrom Limited, 840 Caledonia Road, Toronto, Ont., 5430 Ferrier Street, Montreal, Que., a subsidiary of Daystrom, Incorporated, or any office of Northern Electric Co. Ltd.*

5704

TYPICAL CIRCUITS







For further data on advertised products use page 65.

Now!

HAMLYN

5 and 10-channel HF Radio Equipment

PLUS a Low-Cost HTR-5 Conversion Kit*

ANTENNA CAPACITOR
Model HTRC-5

TRANSMITTER-RECEIVER
Models HTR-5 and HTR-10

CONTROL UNIT
Models HRC-5 and HRC-10

The new HTR-10 Model is the same size, weight and style as the popular HTR-5, but provides *10* preset channels. The new HRC-10 control unit has a 10-position frequency switch.

**For the many HTR-5 models now in use there is a new low-cost conversion kit, making it easy to change the HTR-5 into an HTR-10 Model.*

These HTR-5 and HTR-10 units are ideal for Canadian operations . . . have exceptionally rugged construction, long range and superior trouble-free performance in helicopters, light and medium-size aircraft. Built to military specifications, they are accepted as standard equipment in US Coast Guard helicopters...designated as AN/URC-13.

FREQUENCY RANGE — 5 or 10 preset channels between 2 and 12 mc.

REMOTE CONTROL — Simultaneous selection of transmitting and receiving frequencies.

HIGH POWER OUTPUT — Conservatively rated from 30 to 50 watts depending on antenna and frequency . . . ensuring maximum range.

LIGHT WEIGHT — Only 34 lbs. complete, including remote control and self-contained power supply.

MODULATION — 100% with speech clipping . . . ensures maximum performance.

ANTENNA TUNING — Either PI or L networks . . . permits set to be tuned into wide range of antennas.

ANTENNA CAPACITOR — A unique antenna terminating capacitor greatly improves antenna loading, thereby improving performance over conventional equipment.

RECEIVING SENSITIVITY — Better than 3 microvolts for 100 milliwatts output.

LOW POWER REQUIREMENTS — At 27.5 VDC input, only 2.8A for receiving and 9.8A for transmitting.

Low price includes unit complete with coils, cable connectors and crystals but less microphone and headset. Delivery from stock. Complete units, service and spares available.

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CANADIAN Bendix AVIATION CORPORATION AFFILIATE

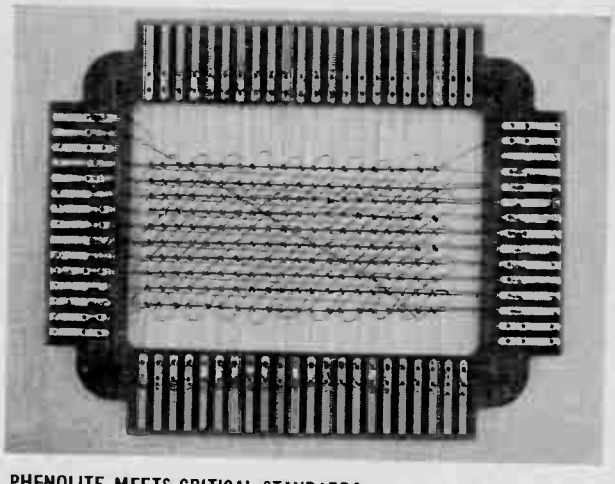
AVIATION ELECTRIC LIMITED

HALIFAX • MONTREAL • TORONTO • CALGARY • VANCOUVER

THE NATIONAL SCENE

KEEPING "ELECTRONIC BRAINS" FROM LOSS OF MEMORY. One of science's greater marvels is IBM's 705 Electronic Data Processing Machine—which makes intricate calculations and logical decisions in millionths of a second. Heart of this electronic "wizard" is its main magnetic core memory. Designed for use with the machine's high-speed printer is the IBM 760 Control and Storage Unit containing its own core memory of 1,000 positions which allows central processing to continue in the 705 while other data are being printed. Helping the 760 remember what information is to be printed is a job for PHENOLITE* Laminated Plastic. PHENOLITE's unique combination of properties makes it ideal for this application.

MOST ADVANCED FORM OF ELECTRONIC STORAGE. The 1,000-position core memory for the IBM 760 Control and Storage Unit—a portion of which is shown here—consists of pinhead size cores strung on copper-wired frames of PHENOLITE. Electrical impulses, passing through wires, alter the magnetic state of cores so that a group of them stands for a word or figure. Reversing the process recalls information from storage. PHENOLITE frames safeguard the circuit and permit stacking of core planes as shown.



PHENOLITE MEETS CRITICAL STANDARDS. Core frames like the one shown are punched out of laminated PHENOLITE by IBM. Each frame has printed circuit type terminal strips and soldered connections. PHENOLITE proves an ideal material for this application because it is mechanically strong and stiff, punches cleanly, etches well, remains flat, has high dielectric properties and withstands the heat of dip soldering.

For further data on advertised products use page 65.

the editor's page

A commentary on affairs pertinent to the electronics and communications industries.

Who Mentioned Working Hours?

The business edition of Electronics Magazine reports that progressive personnel relations as practised by Tulsa manufacturer Midwestern Instruments are keeping workers happy. The Oklahoma firm, in business since 1950, put up a three story production facility on the outskirts of Tulsa complete with swimming pool, bowling alleys, pool tables, a radio shack for the company's Hams, and a penthouse with bar atop the building. All facilities are available to company employees during the daytime leisure and offtime hours.

With 465 employees in Tulsa and 250 added by the acquisition of Magnecord division in Chicago the firm has cut employee turnover to less than one per cent and finds that it has no trouble hiring for expansion.

The company hires pinboys for the bowling alleys, has built a tower for the radio Hams and has subsidized the construction of a transmitter for them and keeps the palm bordered swimming pool at a comfortable 80 degrees temperature.

There would appear to be food for thought in this announcement for Canadian manufacturers badgered by the problem of either obtaining hard-to-come-by technical personnel or keeping them on the payroll once they have been hired.

Why, for instance, couldn't Canadian manufacturers who may be contemplating new construction seek a suitable site in the Laurentians? In addition to the amenities enjoyed by the employees of the aforementioned Tulsa manufacturer, all of which of course should be provided in any plant built in the Laurentian area, there would also be available winter sports facilities second to none in the world. Skiing, skating and bob-sledding, to say nothing of fishing through the ice and snow-shoeing, should provide an adequate program of sports activities if such is the secret of obtaining and keeping personnel. Of course it's to be taken for granted that any firm offering such inducements would also provide free housing in appropriate Chalet-type homes nestled in the side of the mountains or individually located convenient to the favorite slope or lake of the prospective employee.

Working hours?

Quiet please!

Simple Instructions Prove Best

Individuals helping to test atomic weapons face "considerably less danger" than the average automobile driver or pedestrian crossing a busy street, according to a speaker at the Semi-Annual Meeting of The American Society of Mechanical Engineers.

Marvin D. Martin, divisions head of the weapons engineering division of the University of California Radiation Laboratory, said that engineers and scientists are constantly working to make nuclear weapons safe for the people who use them and for surrounding civilian populations.

Mr. Martin pointed out that designers must guard against unintentional detonation as well as guarantee satisfactory performance when needed. If an aircraft should be unable to deliver its nuclear bomb to a target, for example, provisions must be made either for the plane to return to its base carrying a live bomb or to dump an extremely expensive weapon over an uninhabited area. "Not only must weapons be capable of being shipped by truck, airplane, railroad car and ship, but also they must have built-in safety features which insure that accidental nuclear detonations do not occur, even under unexpected emergency conditions such as fire or airplane crash."

Mr. Martin also pointed out that, with more atomic weapons being designed for use by troops in the field, designers must take into account the fact that they may be handled by comparatively inexperienced personnel. Engineers also concern themselves with the locations and climates in which weapons may be assembled and tested, methods of shipping and inspection, effects of high altitude and other factors.

Despite many elaborate tests and intricate safety devices designed to produce the safest and most reliable weapons possible, Mr. Martin added, the designers of nuclear devices "have occasionally arrived at the conclusion that the best, single, overall test to insure that our nuclear weapons will remain operative under all conditions is to give one to the average army private with instruction, 'be careful of this'."

We Wonder

A recent news report reveals that Avco Manufacturing Company has accepted a $769,000 American Navy contract for a design study and development of a radio pack-set for the United States Marine Corps. According to the release the radio equipment will be based on a new transistorized design that employs solid state techniques. The idea, according to the report, was conceived at the Electronics Research Laboratory of the Avco firm in Boston, Massachussets.

Such may be the case but it is significant to note that original development work on a similar communications set was carried out by engineers at the Weston, Ontario plant of the Avco company more than a year ago during the time that the Avco Canadian affiliate maintained a research facility.

The April, 1956 issue of Electronics and Communications magazine carried a full length feature article dealing with the development of a "portable communications unit using transistorized circuits" and there is little reason to doubt that the designers of this particular equipment had the Canadian services in mind as a potential customer. The development of the Canadian designed equipment was financed by private funds as a commercial venture but it is understood that the worthiness of the prototype communications equipment turned out by Canadian engineers evoked little interest from government authorities. It is also significant to note that shortly after the production of the prototype communications unit the research division of Avco in Canada packed up lock, stock and barrel and moved to Boston, Mass. We wonder, therefore, whether there may be some relationship between the Canadian designed communications unit, which evoked little interest from Canadian authorities and the communications set upon which there is to be based a $769,000 design and development study for the United States Navy.

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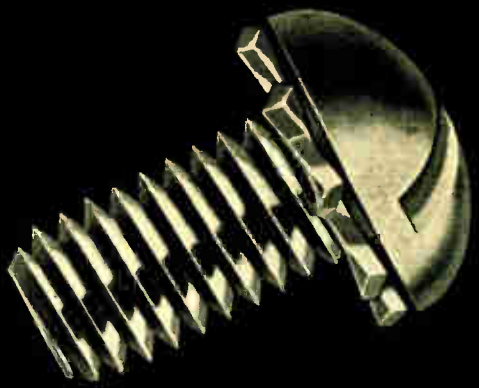

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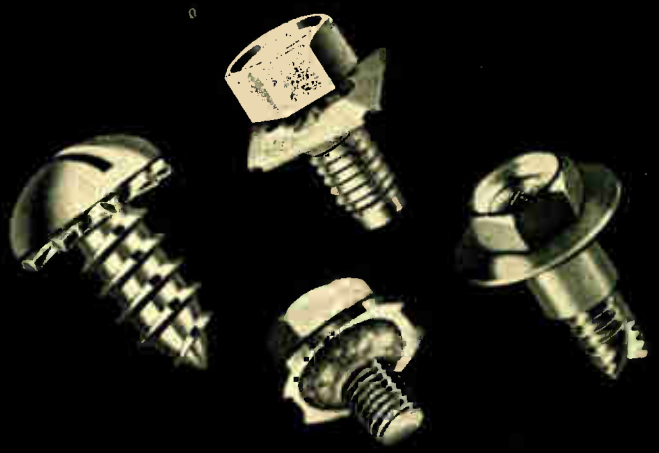

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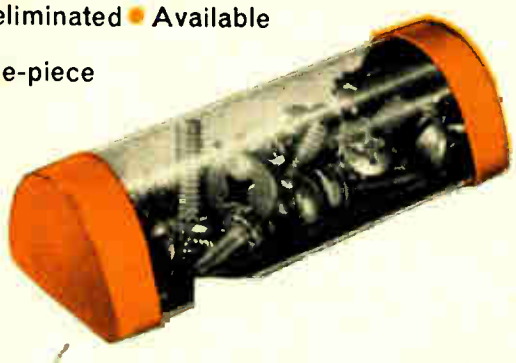

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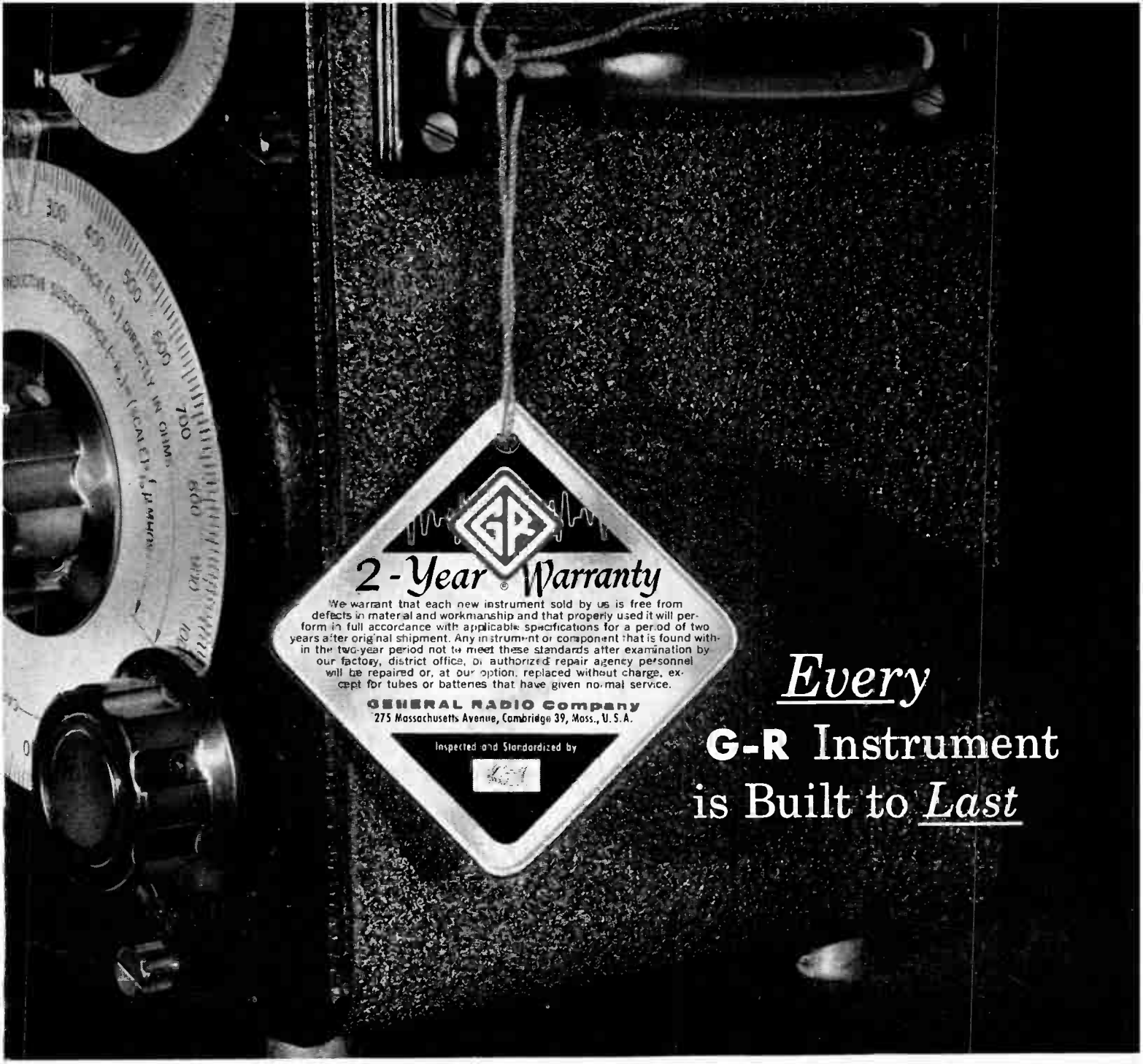


It is the essence of G-R's design and manufacturing philosophy that every General Radio instrument shall be built to operate as reliably years later as it did upon first purchase by the customer.

This policy has built the reputation for quality and long life which has come to be synonymous with the G-R trademark and now makes possible a *two-year warranty* to purchasers of G-R products. This warranty applies to all newly purchased General Radio products shipped after March 1, 1957.

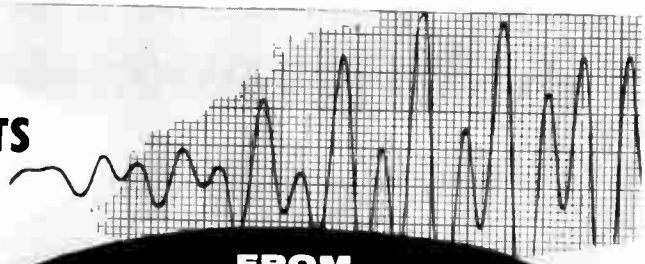
GENERAL RADIO Company

Cambridge, Massachusetts, U.S.A.

Canadian Office: 99 Floral Parkway, Toronto 15, Ontario

Arthur Kingsnorth Richard J. Provan

TECHNIQUES and DEVELOPMENTS in oscillographic recording



FROM SANBORN

DESIGN PRINCIPLES AND SOME APPLICATIONS OF A PREAMPLIFIER FOR LOGARITHMIC MEASUREMENTS

THE Model 150-1400 Log Audio Preamplifier (Figure 1), one of eleven plug-in "front ends" now available for 150 Series systems, permits measurements involving logarithmic or exponential functions. The "Log Diode" circuit (shaded portion of circuit block diagram in Fig. 2) is the heart of this instrument, and is based on the logarithmic relationship between the voltage across a thermionic diode and the current through it. If R is large, the current through the diode i_1 becomes proportional to the voltage e_1, and the logarithmic relationship of e_2 and i_1 is transformed into a logarithmic relationship between e_2 and e_1. Circuit constants for this Preamp were chosen to provide an accurately logarithmic relationship between e_2 and e_1, over the range of 200 to .63 volts for e_1. This is a 50 db spread, and the gain of the DC output amplifier (fed by e_2) is arranged so that a 50 db variation in e_1 produces a 50 mm stylus deflection.

Fig. 1

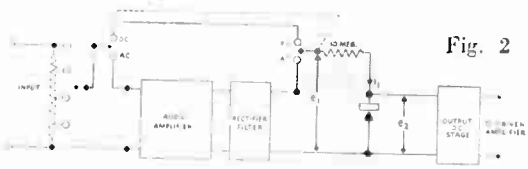


Fig. 2

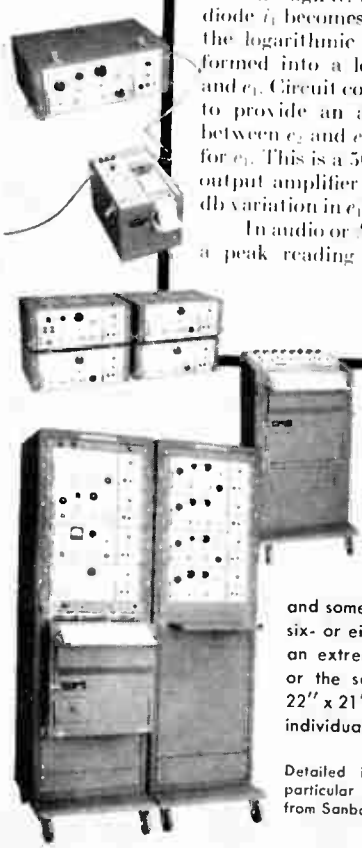
In audio or AC measurements, e_1 is derived from a peak reading type rectifier-filter circuit, which follows a high quality 20 cycle — 20 KC audio amplifier. With an input of 100 mv RMS, this amplifier will produce a 200 volt output from the rectifier. The 50 db chart, therefore, corresponds to a variation in AC input voltage of 0.316 to 100 mv.

In DC measurements, the audio amplifier is bypassed and the input applied to the diode circuit. Since the diode itself is a rectifier, used in the forward direction with its cathode near ground, the DC input must be polarized with the high side positive.

One broad area of application for the Log Audio preamplifier is audio level recording. For example, room reverberation time can be measured by recording sound level decay after the sound source is suddenly turned off, the reverberation time considered the period required for a 60 db decay to occur. Another example of audio signal recording is the plotting of frequency response curves of audio equipment such as microphones, filters, loudspeakers, etc. A multi-channel recording system with appropriate filters also makes possible audio spectrum analysis.

A second major type of application of this Preamp is the recording of DC voltages on a db basis. If the signals are small, a chopper can be used to convert DC to AC, thus taking advantage of the Preamplifier's audio amplifier. With an impedance matching transformer added to such an arrangement, the system becomes a logarithmic DC millivoltmeter or logarithmic DC microammeter of extreme sensitivity. Such a device could be used for plotting the volt-ampere characteristic of a germanium diode, which might be very helpful in selecting matched pairs of diodes. Another possibility is plotting the output of a fixed gain radio receiver and linear detector to a db scale, to rapidly record antenna performance data.

A comprehensive discussion of the design and these applications of the Log Audio Preamplifier is contained in an article by Dr. Arthur Miller, Chief Electrical Engineer of Sanborn Company, published in the Sanborn RIGHT ANGLE. Copies are available on request.



Which Oscillographic Recording "PACKAGE" fits your needs?

SANBORN "150's" are housed, basically, in either of two ways: o verticol mobile cabinet, or separate portable cases for amplifier and recorder units. This in itself provides a number of "packaging" possibilities, but the number is greatly increased by various other alternate, and sometimes special, housings. For example, an entire six- or eight-channel recording assembly is available in an extremely compact, mobile cabinet only 45" high; or the same recorder can be portobly housed in a 22" x 21" x 23" case. If field use of "150's" is planned, individual units in cases fitted with removable covers and carrying handles, connected by patch cords, may be the best answer. Occasionally only a "special" adaption will meet a specific need.

But whotever the "150" oscillographic recording "packoge" you use, you're assured of basic Sanborn "150" advantages: *inkless* recordings in true rectangular coordinates; *1% linearity*, resulting from high torque galvanometers and current-feedback driver amplifiers; *numerous chart speeds*, from 0.25 to 100 mm/sec.; choice of *single to 8-channel* systems, readily adapted to new requirements by plug-in Preamplifiers selected from *11* presently available types.

Detailed information, and assistance with your particular recording problem, is always available from Sanborn engineers.

SANBORN COMPANY
INDUSTRIAL DIVISION
175 WYMAN ST., WALTHAM 54, MASS.

For further data on advertised products use page 65.

business briefs & trends

★ A new instrument being used in Canada for government surveying is the tellurometer. This is a lightweight machine, weighing only 33 lbs., which may easily be carried on a man's back. By means of a tellurometer a surveyor is able to calculate the distance between two points by measuring the time it takes microwaves to travel from the master to the remote station and back. The equipment has a range of 35 miles and measurements can be taken day or night. By use of this equipment Dominion Government surveying costs are expected to be considerably reduced this year.

* * *

★ The first metropolitan telephone directory in British Columbia constituted a major printing job to complete the 375,000 copies required for its subscribers in Vancouver, New Westminster, North and West Vancouver, Richmond and Burnaby. Each of the four separate editions has its own Yellow Page Section, corresponding to the area covered, together with the 480-page White Section. Each book weighs from 2½ to 3½ lbs.

* * *

★ Canadian manufacturers are reaching the point where attempts to "increase efficiencies and reduce costs will bear smaller and smaller returns" to the company, George L. Wilcox, president, Canadian Westinghouse Co. Ltd., Hamilton, said recently. Speaking on a panel discussion before the 67th annual convention of the Canadian Electrical Association, Mr. Wilcox pointed out that electrical manufacturers, in particular, have used their efficiency and cost reduction programs in recent years, as the front line in meeting "almost unbelievably severe competition both from our big neighbor to the south, and from producers abroad." He emphasized, however, that "if the costs of materials, wages and everything else continue their upward movement in recent years, I think it is a grave question how much longer these increases can be countered by improvements in efficiency."

* * *

★ At the Saskatoon RCAF Station there is now operating a new type of equipment, a low-cost and easily portable Ground Control Approach unit called Quadradar, which enables an operator at a radar screen on the airfield to control an aircraft coming in to land by giving the pilot instructions over a two-way radio. The aircraft is visible to the operator as a moving dot on the face of the radar screen and the runway appears as a lighted line on the screen. The pilot is required to watch his altimeter, compass and indicated airspeed dials and adjust his altitude, direction and speed according to the operator's instructions. Quadradar combines in one unit, weighing less than a ton, the functions of four different radar systems.

* * *

★ United Kingdom exports of components and sound reproducing products in 1956 were valued at over £16 million, an increase of approximately 20 per cent on 1955. The United States was the largest purchaser with nearly £2.7 million. Australia, taking exports valued at £950,000, was the largest buyer of components excluding sound reproducing equipment. Other major buyers included Canada, India, South Africa and the Netherlands.

★ Retail price increases of $20.00 on each of three new 17-inch and three 14-inch 1958 Portable TV sets with 110 degree picture tubes were announced recently by Canadian Admiral Corporation, Ltd. Higher labor and material costs have made the new price schedule necessary. The increases became effective Monday, July 15th. List prices of the company's popular 10-inch portable TV sets remain unchanged.

* * *

★ Gulton Industries, Inc. of Metuchen, N.J. expects to be manufacturing in the near future a complete and standardized ultrasonic line of equipment that will permit them to establish a sizeable network of national dealerships where products can be stocked and distribution concentrated. The Canadian manufacturing associate of Gulton Industries is Titania Electric Corporation of Canada, Ltd., Gananoque, Ontario.

* * *

★ The CBC reports that 65 per cent of all Canadian families now own television sets and that in the more thickly populated areas ownership of TV sets may run as high as 80 per cent.

* * *

★ In the eight years since its inception, Computing Devices of Canada Ltd. has grown from an eight-man staff to a roster comprising 500, some 130 of whom are mathematicians, physicists and engineers engaged principally in research. The CDC operates in a modern, combined office building and laboratory and a plant situated nearby on an 88-acre site in a suburb of Ottawa.

* * *

★ A $3 million contract has been placed with Canadian Westinghouse Company Ltd. of Hamilton by Algoma Steel of Canada to build a giant electronic brain which will operate a proposed new mill. The system will permit one man and a stack of punch cards to run the entire steel-rolling operation. The project should be completed in 1959.

* * *

★ An engineer on the staff of RCA Victor Company, Ltd. has devised a way to operate two television stations on one and the same antenna. The equipment, the first of its type ever to be installed anywhere, has gone into operation at Quebec City, where a French-language station and a new English-language outlet are using a common antenna. Bruce MacKimmie, the Canadian engineer in question, led an engineering team at RCA Victor in designing and developing the new equipment, which is considered a major engineering achievement.

* * *

★ Five thousand visitors from more than 120 countries are expected to attend the National Radio Show, Earls Court, London, which will be held from August 28th to September 7th. This year's National Show will celebrate the 21st anniversary of the start of the world's first high-definition television service which took place on August 26th, 1936. Some of those who took part in the first B.B.C. broadcast will appear in anniversary programs. Commercial television will for the first time play a major role in the Exhibition. More than 100 manufacturers, including all the leading makers of radio and TV sets and sound reproducing and recording equipment will show their latest models.

business briefs & trends

★ The passing of the "bulge" in the back of TV set cabinets will not be mourned by purchasers of the new 1958 models with new 110° deflection picture tubes and "flush-to-the-wall" cabinets just 15 inches deep. But a small survey has now brought to light that this protrusion (it protects the thin glass "neck" of the picture tube) goes by many names among people in the TV trade. In Canada, it is commonly called an "end-bell", but in the United States it's a "tube-up" or "doghouse". More extensive enquiries would possibly turn up some further terminology for this now outmoded tube cover; some of which, we suspect, would not be fit to print. In the province of Quebec, where French-speaking Canadians are in the habit of using technical terms exactly as in English, but with a strong French pronunciation, this gadget is known as "un chapeau", which when translated means a hat (a derby or bowler, of course). To point up the advantages of "flush-to-the-wall" styling in the new 1958 TV models, one of the full page advertisements this fall for Admiral TV, will feature the headline "Admiral banishes the bustle!" The company confidently expects that this will round out and end the list of words used to identify the old-fashioned "end-bell" and retire it for all time to a prominent position among the museum-pieces of past decades, along with the ice-box, flat windshields and crystal-set radios.

* * *

★ Avro Aircraft has recently procured an electronic data processing machine to solve complicated and lengthy problems of calculation which the human brain would not have attempted to do. The computing machine is housed in a 25 by 50-foot room where 25 miles of wiring, 4,000 electronic tubes, and 13,000 circuit switching devices have been assembled to produce the $1½ million IBM 704. The main objective in hiring this computing giant is to work out mathematical problems arising from flight at speeds upwards of 1,000 miles per hour by their new CF-105 Arrow supersonic fighter.

* * *

★ The B.C. Telephone Company estimates that $4 million worth of cable will be supported by 1½ million feet of messenger wire in outdoor telephone work to be undertaken by it this year. Approximately 15,000 crossarms will be used, and between 100 and 150 new manhole covers will be required. Last year, 24,000 purchase orders were issued on more than 1,000 suppliers. Among the many items were paper cups, boring bits from Germany, various tools from the United States, switchboard plugs from Denmark, Honduras mahogany, and telephone parts from Canada, England and the United States.

* * *

★ The United Kingdom Government Stand at the Canadian National Exhibition, running from August 23rd through September 7th will comprise displays from Britain on four main themes — Aviation, Nuclear Power, Wool Textiles and Tourism — exemplifying both traditional skills and the most modern technical progress. The Aviation section will feature large color transparencies of famous British aircraft including the Comet, the world's first jet airliner. The Nuclear Power section is to be devoted to the peaceful uses of atomic energy in which Britain leads the world. The Wool Textiles section will depict many kinds of woollen cloth from famous British mills.

* * *

★ Prices on General Electric germanium tetrode transistors have been decreased up to 80 per cent. Types involved are the 4JD3A1, 4JD3A2, and 4JD3A3. These are high-quality industrial computer/military devices with useful power gain up to 120 mc, with alpha cutoff frequencies up to 80 mc.

* * *

★ RETMA in the United States has reported factory sales of transistors during the first five months of 1957 were almost 9 million compared to 3½ million in the same period in 1956. Manufacturers have sold 3,710,646 TV picture tubes and 185,847,000 receiving tubes in the five-month period of 1957, which figures run slightly less in each instance than for the same period a year ago.

* * *

★ Collins Radio Company of Cedar Rapids, Iowa, proposes to begin construction of a 235,000 sq. ft. manufacturing plant at an estimated cost of $2¾ million within the next several weeks. Occupancy of the new plant is scheduled for early 1959. The new premises will house the company's fabrication activities, including sheet metal, machine shop, engineering model shop etc. An engineering laboratory is also to be built immediately at Richardson, Texas, a suburb of Dallas. Both projects are the first steps in the company's long range plans for facilities expansion and consolidation.

* * *

★ The constant and growing demand for computer tape has caused Audio Devices, Incorporated, of New York City to plan for a 500 per cent increase in production of extra-precision magnetic tape for electronic computers. William C. Speed, president of the firm, claims that sales are increasing so rapidly that even this new production capacity probably will be inadequate in a short time, and plans for further expansion are being considered. Mr. Speed points out that computer tape must be far more precise than tape used for sound recording. The computer operation cannot tolerate a single microscopic variation in the tape coating that would cause faulty recording of a pulse.

* * *

★ The world's first closed-circuit three-dimensional color television system has been developed by the General Electric Company for remote servicing of reactors used in the development of a nuclear aircraft propulsion system. The color stereo system was developed to permit use of color-coded parts in reactor components and to provide the degree of precise depth perception required for their correct positioning. The new system makes remote adjustments of parts much simpler than by black and white, two-dimensional TV.

* * *

★ The new 110-degree television picture tube has been in production for several months at the Canadian Westinghouse tube division. It is expected by the end of 1957 that 75 per cent of the company's overall TV tube production will be taken up by the thinner 110-degree tube. L. A. McCalpin, general manager, tube division, said that by the end of 1957, Westinghouse expects to be able to run all production facilities on the 110-degree tube. The new tube reduces the length of the 17-inch tube from 15½ to 12½ inches. In the 21-inch tube size, the length is 14½ inches, a saving of 5½ inches.

* * *

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Eastern District
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But the job of succeeding generations will be made easier by continuous product research in the field of electrical conductors.

Indeed, Canada Wire is already planning for most of the known transportation improvements of the future.

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A Canadian Company Manufacturing and Selling Coast to Coast

Are We Educating Our Engineers For Yesterday's Jobs?

By Dr. George Sinclair*

A WELL-KNOWN engineer recently made the statement that the electrical engineering curricula of Canadian Universities are twenty-five years behind the times. A perusal of the calendars of Canadian Universities certainly tends to support this conclusion — one has to read the calendar very carefully to detect any important change in the curriculum compared to that of twenty-five years ago. There is little evidence that the subject matter taught in the courses is designed to equip the student with the fundamental training he will need to cope with the changes taking place in electrical engineering today.

The new ideas of automation, including computers, data processing and information theory, and servomechanisms appear to have little place in the curriculum. Nuclear energy is bound to have an important impact on electrical engineering, but Canadian universities are doing very little to prepare students to face the problems that will result.

While the problems are fairly clear, the solutions are not so evident. First it is necessary to decide on the aims of an engineering education. What are the fundamental needs of Canadian industry? Is it the training of engineering salesmen, production engineers, engineers for public service organizations or for research and development? Undoubtedly there will be a continuing need for all these types of engineers, the problem being mainly one of relative emphasis as among these types.

Engineering education is one subject on which nearly every engineer has an opinion, and there are as many different opinions as there are engineers. A good deal of discussion on this subject is taking place in the United States these days, and there is considerable controversy over the various curricula and teaching methods being used at different universities. At the one extreme there are the conservative universities who feel they are now doing an adequate job (as evidenced by the fact that there is a great demand for their graduates), and at the other extreme, the supporters of the M.I.T. viewpoint that a radical revision is in order.

The Massachusetts Institute of Technology is making sweeping changes in its engineering curriculum and teaching methods, which are bound to have profound effects on those of other universities. M.I.T. has eliminated all its standard machine laboratories, so familiar to engineering students in the past. The curriculum has been drastically revised to emphasize fundamental scientific principles, in place of straight design and manufacturing information. Subject matter is divided into four categories:

1. Fields and materials, covering the basic physics and utilization of fields and materials.
2. Circuit theory from the modern point of view of poles and zeros, network topology, signal flow graphs, etc.
3. Energy conversion processes, in place of separate courses on ac and dc generators and motors, transformers, etc.
4. Information theory, communication and data processing.

Conference Discussions Important

One Canadian university, namely British Columbia, is planning to introduce a modified form of the M.I.T. curriculum this fall. There is a feeling in some quarters that there will be difficulties with such a plan, since M.I.T. has a student body which is more select than that usually found in other universities. There is also the question of whether Canadian industry is prepared to absorb the graduates of this type of curriculum.

The planning of changes in curricula should not overlook the role to be played by the new technical institutes similar to the Ryerson Institute of Technology in Toronto. These technical institutes are capable of training students to fill many of the jobs now being filled by university graduates. University graduates who are thus being freed from engineering technician types of jobs, will find they need a more highly scientific training to fit them for the available jobs.

The main opportunities provided for engineering professors to discuss new trends in education are in the conferences and publications of the A.S.E.E. (American Society for Engineering Education). Very few Canadian professors are members of this society, and most Canadian universities are not represented at all on the rolls of the society. At the recent Annual Conference of A.S.E.E. held at Cornell University in June, only two Canadian universities were represented, Toronto and Western Ontario, and Ryerson Institute. (Western was probably unique among those represented in that its entire engineering staff was registered). Lack of travel funds is hardly an excuse for not attending the A.S.E.E. meetings, for, of all conferences, these are undoubtedly the least expensive.

The Institute of Radio Engineers pays traveling expenses for each member of the Regional Sub-Committees on Education to attend one Regional meeting of the sub-committee each year. Last year, the Region 8 Sub-Committee held its meeting in Toronto during the Canadian Convention of I.R.E., and representatives from nearly all Canadian universities attended. It appears likely that the Sub-Committee will meet regularly at the I.R.E. Canadian Convention, and there is thus provided a unique opportunity for discussion of problems of engineering education in Canada.

The Technical Program Committee of the Canadian Convention is scheduling a Panel Discussion on Engineering Education as one of its technical sessions on Thusrday, October 17th. The panel members are Dean J. D. Ryder of Michigan State University, former President of I.R.E., who is now organizing the I.R.E. Professional Group on Education, Dr. Frank Noakes of the University of British Columbia, Professor G. F. Tracy of the University of Toronto, and Mr. K. F. Tupper of Ewbank & Partners (Canada) Ltd. and formerly Dean of Engineering at the University of Toronto. The subject to be discussed is "are we educating our engineers for yesterday's jobs?"

*Professor Electrical Engineering University of Toronto, President Sinclair Radio Laboratories Ltd.

Instantaneous Gaging Of Steel Strip

Electro-mechanical devices permit read-out of steel strip thickness to three digit accuracy.

A NEW electro-mechanical device, which translates from the dials of two gages the measure of thickness of steel strip and presents the data as a three-digit number representing actual thickness in thousandths of an inch, has been developed by scientists at U.S. Steel's new Applied Research Laboratory in Monroeville, Penn.

The data can be presented instantaneously in printed form or transmitted as an illuminated figure to any number of desired "read-out" locations on the mill area. Thus, the new signal-converter makes for faster and more accurate reading of finished-strip thickness and helps coordinate the operation of the various controls on hot strip-rolling mills.

The new unit has been installed for field testing and evaluation on the 80-inch strip mill at U.S. Steel's Fairless Works in Fairless Hills, Bucks County, Pennsylvania.

Finished steel-strip thickness is determined by means of an X-ray gage located following the last finishing stand. The gage operates by measuring with a scintillation detector the intensity of X-rays passing through the steel. This intensity is in inverse ratio to the thickness of the steel being rolled.

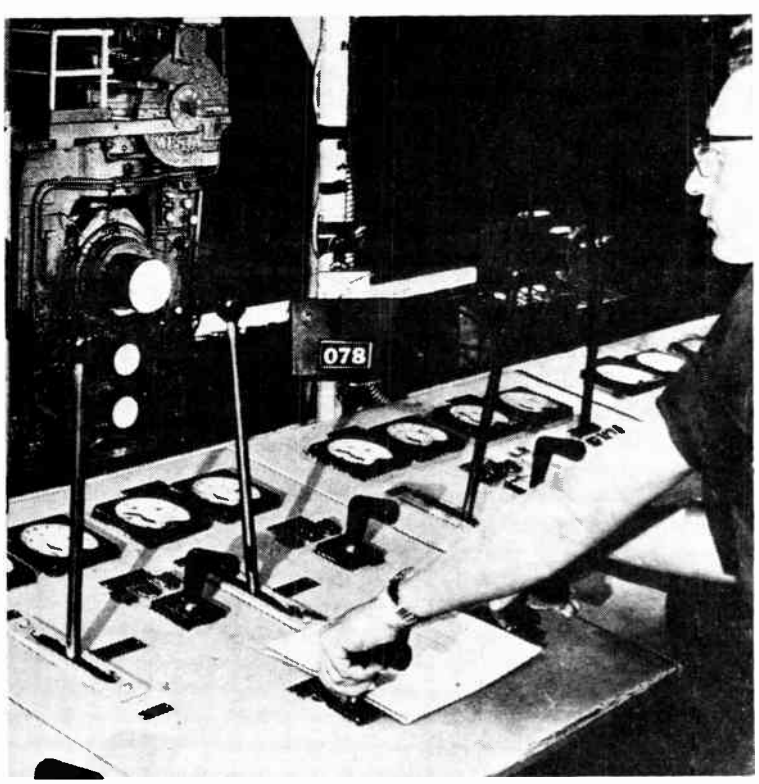
Basically, the operation of the X-ray gage involves the movements of a nominal-gage setting wedge and a deviation wedge in the X-ray beam so as to maintain constant signals at two different phototube detectors, and the translation of the positions of the wedges into strip-thickness units. The wedge positions are transmitted as shaft rotations by selsyns to a remote location. Two appropriately calibrated dials translate the shaft positions into nominal strip-thickness in inches on one dial and deviations from nominal thickness on the other. It is obvious that the operator, in order to read actual gage being rolled, must make a mental calculation summing the two dial readings.

The problem of simplifying the two readings into a digital presentation was submitted by Fairless Works to technical personnel at the Applied Research Laboratory. Here they developed the new unit which converts the shaft positions of the two meters into electrical voltages. These are then summed, applied to an analog-to-digital converter, and displayed in digital form as a row of three illuminated figures representing actual steel thickness in thousandths of an inch. The cycle-control system for the printing device to be operated by the converter was also developed at the Research Center.

"Read-outs" in the Fairless Works installation are now located at the speed control pulpit, the finisher's pulpit and in the coiling pits. Another is to be added at the observer's desk.

Signal-Conversion System

The signal-conversion system designed by the Laboratory consists of a shaft-position computer to convert the two dial-shaft positions into a single voltage representative of the sum of the angular displacements, an analog-to-digital converter to indicate



● A "read-out" located in the speed-control pulpit of U.S. Steel's 80-inch strip mill at Fairless Works, in Fairless Hills, Pa., indicates on clearly-illuminated lucite figures the gage — ".078" inch — being rolled. The numbers are translated from the shaft rotations of two dials through an electro-mechanical device developed at U.S. Steel's new Applied Research Laboratory in Monroeville, Pa.

the thickness in digital form, a printer for recording the thickness according to a predetermined cycle and a printing-cycle controller.

The shaft-position-computer is made up of two follower selsyns, two potentiometers, two standard voltage references and two adjustable resistors for making small changes in reference voltages. One of the selsyns follows the nominal-gage wedge, the other the deviation-wedge. Each selsyn drives the moving arm of a precision potentiometer.

Since the nominal-gage dial is calibrated from 40 to 220 mils in 324 degrees of rotation while the deviation dial is calibrated from minus 10 to plus 10 mils in 180 degrees, the angular displacement of the two detectors cannot be added directly. To obtain a representative voltage sum, two reference voltages adjusted by two resistors are provided to compensate for the two scale factors.

The analog-to-digital converter is a digital voltmeter calibrated to read 0. to 9.99 volts. It is equipped to operate a printer. The voltmeter is a stepping-switch-type, self-balancing digital potentiometer designed to measure, display and record d-c voltage automatically in digital form. The magnitude of the reference voltage is selected so that 0.01 volt is equivalent to 0.001 inch of strip thickness. Thus, the lighted display numerals directly indicate strip thickness as decimal parts of an inch.

The numerals are edge-lighted transparent lucite plates engraved with corresponding 1-inch-high numerals. The plates are stacked one behind the other in each of the three read-out windows. The reading thus is presented as a complete, luminous, in-line number clearly visible for distances exceeding 30 feet.

To operate the printer, the same switches that operate the lighted display control appropriate solenoids and cause the displayed number to be printed on adding-machine tape.

Automatic Printing Control

In addition to manual control and automatic fast and slow printing, it was necessary to design an automatic selective printing control whereby the prints would occur at the fast rate near the leading edge of the strip and near the trailing edge, while the remainder of the coil would be recorded at the slow rate.

This was accomplished by detecting the leading and trailing ends through load relays on the last mill stand and a preceding stand. When the strip enters the last finishing stand, the fast, one-a-second printing cycle is started by the closing of the load relay. After six prints, a stepping switch changes the printing speed to the slow, one-every-18-seconds rate. When the trailing edge of the strip leaves a preceding stand, a mill load relay opens and the stepping switch reinitiates the fast print rate until the coil leaves the stand.

The end of the coil is indicated on tape through an auxiliary relay network operated by the last-stand load relay. One extra solenoid on the printer is energized so that the last print contains an extra numeral. This print occurs when no strip is under the X-ray gage, so the auxiliary relay also disconnects the thickness-deviation signal and only the nominal-gage signal remains. Thus, the last print not only identifies the end of the coil but also records the desired thickness.

A Canadian First In Computer Design

The latest application of computing equipment on the Canadian scene

A "TAPE 650" magnetic drum data processing machine which consists of ten units including four auxiliary magnetic tape memory units is the first of its type to be assembled in Canada and has been installed in the head office of the Du Pont Company of Canada. It differs from other medium-sized computers in that it makes use of magnetic tapes for "memory" storage. This system provides greatly increased storage capacity, combined with a high degree of flexibility. The only other magnetic tape machine in Canada is the larger type 705 computer recently installed by the Canadian Pacific Railway in Montreal.

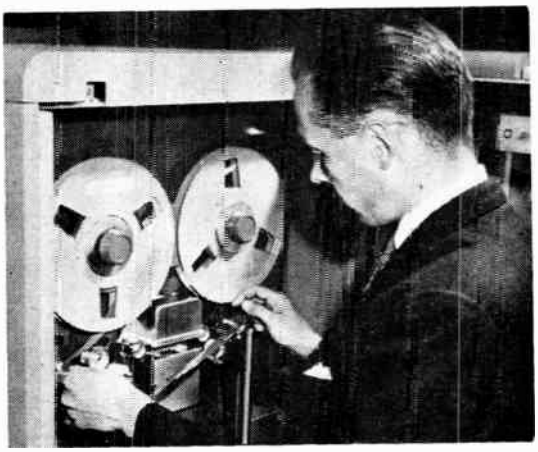
The magnetic tape equipment enables information to be stored by means of magnetized spots on a tape made of "Mylar" polyester film, which is essentially very similar to tape used in modern high fidelity tape recorders. A large amount of information can be stored in a small space and processed at great speed. (One reel of magnetic tape will hold up to 5,000,000 characters, which can be written on or read off the tape at the rate of 15,000 characters per second.)

The two most significant features of the 650 are its ability to check the accuracy of its answers and the magnetic drum "memory," from which the machine takes its name. Only four inches in diameter and 16 inches long, this drum can store up to 20,000 characters of problem and instruction data.

If, for instance, engineers wish to solve a series of complex mathematical equations, the 650 operator first "programs" the machine by feeding into it a series of punched cards. These cards contain operating instructions on how to solve the problem, step by step. Then, by the same method, the machine receives all empirical or established data which may have been taken from previous experiments or calculations or which could be in the form of known constants and tables of mathematical functions.

The punched card is the means of transition from the original source document to the language of electronic data processing systems. A unit called the "transceiver" translates the punched holes of the card into electrical impulses that may be transmitted over leased telephone or telegraph lines, thus forming a link which

● *An electronic computer, the first of its size and type in Canada, has been installed by Du Pont of Canada in its Montreal head office. The equipment, manufactured by International Business Machines Company Limited in Toronto, comprises all the features of a large-scale computer in the medium-size class and is capable of handling a wide variety of business, accounting, engineering and research problems.*



● One of the four Type 727 magnetic tape "read-write" units. These are auxiliary units of the new 650 electronic data processing machine installed by Du Pont of Canada.

enables data to pass from the individual plant to the computer center or vice versa. Each of these units can transmit or receive 660 - 80 column cards or 52,800 characters per hour.

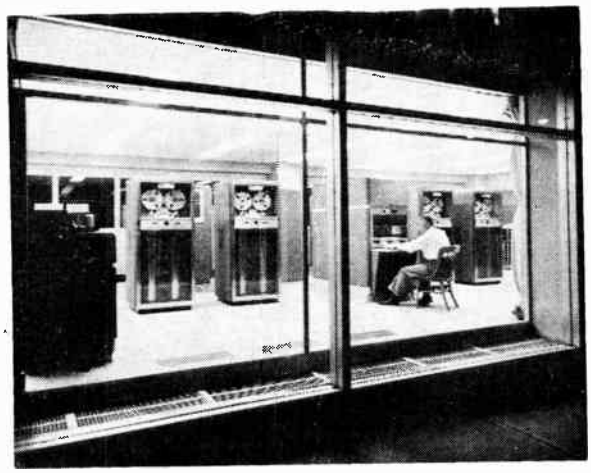
As the program and the established data are received by the magnetic drum "memory", each number is stored on the surface of the drum as tiny magnetized spots, and each group of spots has an "address" so that any number can be called for and made available immediately when required. The drum turns at the rate of 12,500 revolutions per minute, which means the average "address" (a total of 2,000 separate "addresses" can be stored) can be located in less than 3/1,000 of a second.

Next the problem itself — perhaps made up of scores of individual calculations—is transmitted to the machine by the punched cards and the calculating process begins. Highly complicated mathematical calculations are performed at an unbelievably fast rate. (In the time it takes a person to pronounce the word "multiplication," the 650 could handle 60 multiplications of two 10-digit numbers.)

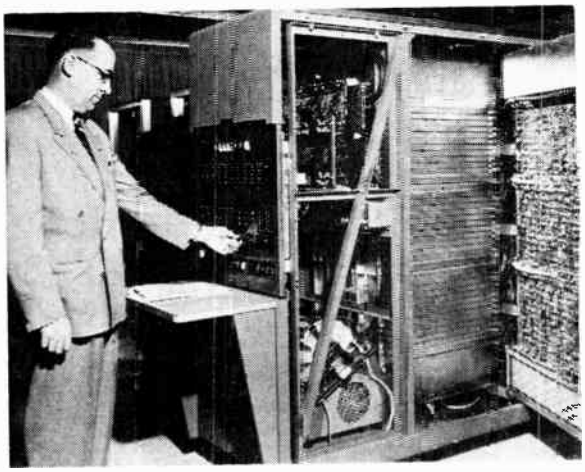
In solving the problem, the calculator follows the stored program, taking numbers from the input cards or from the "memory" which holds thousands of scientific facts, figures and formulae, performing the calculation called for, and automatically moving on to the next step. All this is done without human intervention but the operator may at any time make manual alterations or add to the stored data or program instructions by setting knobs on the control console. The machine will not act on illogical instructions and should it make a mistake (which rarely happens), it will indicate its own error. If the problem is a compound one with several answers, the machine may be reading cards, calculating, and producing answers simultaneously. Operation of the machine is at all times visible on the control console where flashing lights show each number as it moves through. Should the machine stop, or be stopped for any reason, the state of the calculation likewise becomes instantly visible to the operator.

If the 650 is to perform routine office work it must be programmed differently and the data stored in the "memory" will not be mathematical functions or other scientific data. Instead, for example, if the 650 is working on a weekly payroll, it will process payroll rates, overtime rates, tax deductions and other variable or constant information. Payroll calculations are carried out at the rate of complete man record every two seconds.

The new computer is housed on the ground floor of 505 Dorchester St. W. which required special structural alterations for this purpose. A special system of continuous air-conditioning also had to be installed — as the machine generates an enormous amount of heat, air-conditioning tolerance is extremely important to its successful operation. This data processing center, comparable to a "nerve center," will be linked to plants and sales offices of Du Pont of Canada in different locations in much the same way as nerve endings are connected through the central nervous system to the human brain.



● View from Dorchester Street West, Montreal, of the electronic data processing center. Picture shows IBM 650 electronic computer and auxiliary units.



● Picture shows control console of the IBM 650 electronic data processing machine. This unit also houses the magnetic drum "memory" which is one of the most important features of the machine.

Torque Indicator Teaching Aid

Assesses Specific Engine Performance Factors

TWO ASSETS — mobility and accuracy — have qualified a Torque Indicator for a West Point appointment. It is used as an instructional aid in the U.S. Military Academy to teach cadets some aspects of automotive engineering.

Long used in industry as a torque testing device, the equipment is sufficiently mobile to permit its use in the lecture hall, where an entire class of 300 cadets can observe it as well as in the laboratory for small group experimentation.

Accuracy of the Baldwin device enables cadets to collect specific data on an individual engine. Earlier equipment used at the Academy offered only comparative data on two or more engines.

Elements of automotive engineering at West Point is one of the courses conducted and all first classmen (seniors) must take it in order to qualify for a Bachelor of Science degree. The course is an important portion of the applied engineering requirement for the degree. The objective of the course is to teach the cadets how to apply the basic and engineering sciences which they have previously studied to an analysis of an integrated engineering system: the motor vehicle.

The tests involving the torquemeter are designed to teach the cadets proper methods of assessing specific engine performance factors. Prior to the availability of the torquemeter, the assessments were inadequate. There were two prior methods for loading the engines: a water brake and an electrical dynamometer. The water brake used couldn't absorb the torque of the engines tested and was not portable. In addition, it couldn't measure torque. As a result, the best data obtainable — from the water brake — permitted only comparing the general performance of two engines. Specific data on a given engine could not be obtained.

When the torquemeter was introduced into the course last year in conjunction with the electrical dynamometer, cadets were able to read or compute all essential engine performance factors in laboratory periods. Moreover, the whole test set-up can be moved from the laboratory into the lecture hall. Here the entire 300 cadets in the course could observe regular test work. This augmented the experiments conducted in the laboratory by small groups.

With the new torque set-up and the original water brake arrangement, cadets are taught to read the following values directly:

a. Engine speed in revolutions per minute.
b. Engine torque in inch-pounds.
c. Fuel rate in pounds per hour.
d. Air rate in pounds per hour.
e. Manifold vacuum in inches of mercury.
f. The temperatures of the exhaust gas, the carburetor venturi, the mixture at the throttle, the oil pan oil, the inlet water and the outlet water.

From the above data the cadets are taught to compute these values:

a. Engine brake horsepower.
b. The fuel to air ratio in pounds per pound.
c. Brake specific fuel consumption.
d. Per cent of volumetric efficiency.

The torquemeter is essentially an elastic member (usually in the form of a short length of shaft) to which a group of special strain gages are bonded at a 45 degree angle with the axis. At this angle maximum stress due to torsion is present.

The gages form a Wheatstone bridge, the corners of which are connected through silver slip rings to an instrument calibrated in units of torque. Errors due to inertia, speed and vibration are eliminated because no mechanical devices are employed in the measurement.

On initial data the equipment is accurate to within 0.25 per cent as compared to the five per cent accuracy of the spring scale-lever arm on the Prony brake.

Repeatability of readings with the torquemeter is excellent. Data from repeated tests on the same engine vary so slightly that the percentage of variation is insignificant. The improved repeatability is a combined function of the inherent repeatable characteristics of the torquemeter and the better loading control possible with the electrical dynamometer over a water brake unit. When an adequate water brake is used to obtain the same sort of data, exact repetition requires keeping the water pressure in the brake absolutely constant. Such constant pressure is difficult in any test set-up.

● Cadets discuss the results obtained with the SR-4 torque indicator. The black, cylindrical cartridge on the shaft in the foreground is the SR-4 torque pick-up.

● Cadet Cass adjusts the SR-4 torque indicator at the beginning of the test. From the torque measurements read on the instrument he will be able to compute brake specific fuel consumption and the volumetric efficiency of the engine.

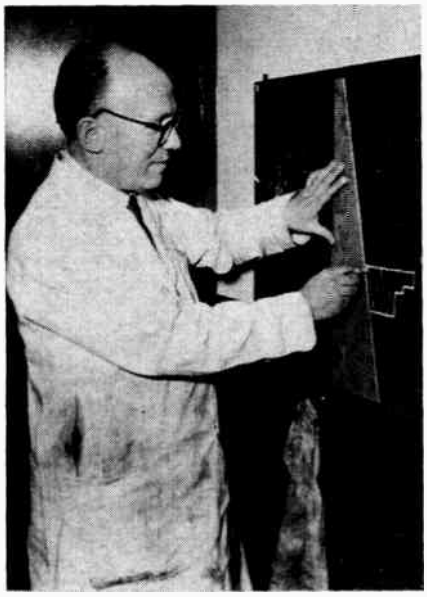
Ultrasonic Testing Of Meehanite Castings

A recently evolved non-destructive testing technique

Meehanite Metal is the registered name for a particular high duty cast iron. Castings produced by the Meehanite Process provide a range of materials to meet specific requirements of the engineering trades. The automobile and aircraft industries are prolific users of these castings, with refrigeration and hydraulic applications being of major importance.

However, as in all iron castings, there exists the problem of defects — their detection and prevention. The following brief notes indicate how a Meehanite foundry has approached this problem.

Messrs. Goulds Foundries Limited, Tredegar Foundry, Newport, Mon., Wales, well known for their high quality Meehanite Castings, first met the question of losses due to destructive testing during the production of automobile clutch castings. In a quality production process of this description, destructive testing is obviously unsatisfactory, being highly uneconomic.



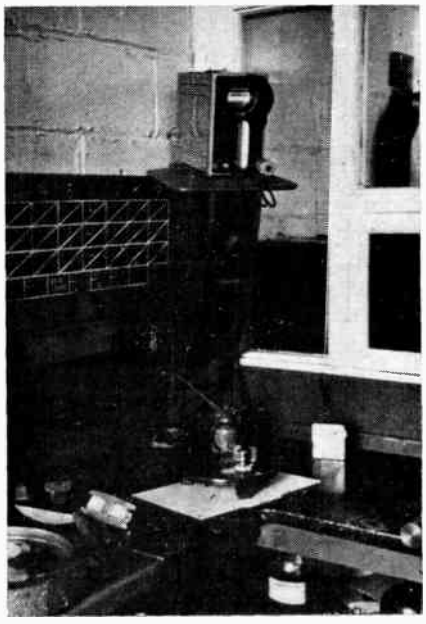
● The chief inspector, working out a technique for the ultrasonic testing of a particular casting. He is using a blackboard sketch of the casting and a 60° protractor to determine the angle of transmission of the Flaw Detector.

Initially, Goulds Foundries concentrated on this type of particularly large production run. The first method investigated was the use of X-Rays which proved to be too expensive whilst the Gamma Ray technique was too slow. Turning to Ultrasonics it was realized that cast iron is one of the most difficult materials to test by this method. However, with the co-operation of Messrs. Kelvin & Hughes (Industrial) Ltd., Goulds Foundries developed an ultrasonic testing technique, using a Mk.5 Supersonic Flaw Detector, which now operates on a full production basis and is proving eminently satisfactory. Using a combined transceiver probe, without shield, an almost unskilled operator is able to test each batch of castings at half hourly intervals. Any batch not giving the standard reading is immediately reported, tested destructively and the cause ascertained. The technique evolved differs from that of normal flaw detection, (where the presence of intermediate echoes indicates the presence of defects), in that the amplitude of the received signal is used to indicate the soundness of the casting. The basis of the technique lies in the calibration of the Flaw Detector, which is set up so that it indicates a specific amplitude on a standard sound casting. Loss of amplitude of the signal indicates porosity or other defect in the casting — no loss of amplitude is coincident with sound homogeneous metal. It is as simple as that in practice, and operators have been readily trained to recognize the different traces indicated on the Flaw Detector screen. A record of each batch of castings is made by simple entries in a rough log which is transferred to a permanent book thus preserving the record.

The chief inspector who has been responsible for evolving this production technique is convinced that, by using the Flaw Detector for diagnosis of production defects, costs can be cut and production of castings increased. Indeed on this particular application this point is amply proven.

Messrs. Goulds are now examining the ultrasonic testing of other, more complicated, types of castings — again using the Supersonic Flaw Detector as a practical tool (as distinct from a laboratory instrument), and again are meeting with success.

Establishment of an Inspection Standard is always difficult but once this has been attained and the Supersonic Flaw Detector calibrated, any deviation from a standard signal may indicate a defect. It has been found that with systematic preliminary testing, by intelligent use of the Flaw Detector and particularly with co-operation between foundry and customer, such standards may be achieved. As a result, more quantity production castings will soon be subjected to this accurate non-destructive testing technique by this company, ensuring the continuance of consistent high quality castings.



● The Kelvin Hughes Mk. 5 Supersonic Flaw Detector as it is set up at this factory. The transceiver probes are here shown on a clutch plate casting — note the amplitude signal on the screen on the instrument, indicating that the casting is sound. Also shown is the blackboard rough log. The oil is used to ensure perfect contact between probes and casting.

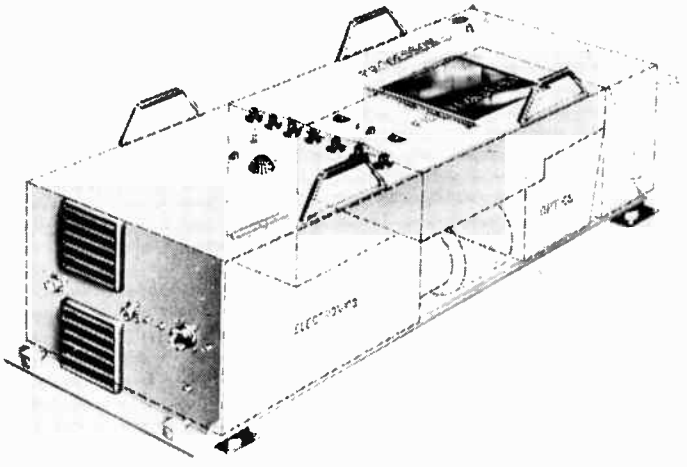
The Radar Strip Recorder

Previously navigators and pilots have had to rely on memory or hasty notes and calculations taken from radar presentations in the air. This new automatic device requires no operator; it combines electronics and photography to make it easy to determine the airplane's exact position and true flight path at any time desired in flight without relying upon memory or radio equipment on the ground.

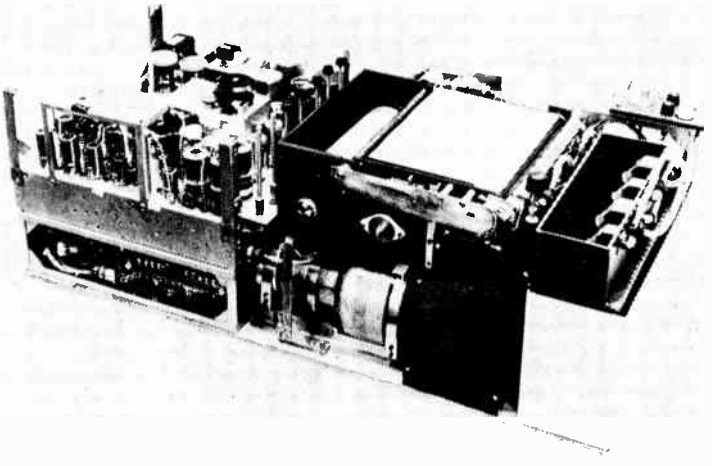
PILOTS and navigators have had many types of radar displays to interpret in flight. Over the past ten or more years, scores of different types of pictures have been presented on the faces of cathode ray tubes in flight compartments. Each new method is usually entirely different from all its predecessors. In general, none of them except the PPI-scope have resembled the actual lay of the land to any great extent. The great majority of radar presentations show a series of blips on a cathode ray tube which must be interpreted by highly-trained technicians. The PPI-scope, or plan position indicator oscilloscope presentation, looks very much like an actual map of the ground below. However, due to the very nature of airborne radar, the PPI presentation picture changes continuously while the airplane is in flight and while the radar antenna examines the ground below.

Now however, a Pasadena, California electronics company has developed a radar strip recorder which maintains the advantages of a PPI-scope presentation while eliminating most of the disadvantages. The radar strip recorder makes an actual photographic record of radar information on a slowly-moving strip of film. The film is 9½ inches wide and is passed over a viewing screen so that the observer looks at a transparency approximately 9 x 12 ins. in size. The transparency pictures the ground immediately aft of the airplane, exactly as it looked to high-precision radar twenty seconds previously. The film picture does not change, but rather the long strip of film is slowly wound from one spool to another. The speed of film travel can be controlled to correspond to airplane velocity. A permanent film record of the flight path of the airplane results; and in addition, the pilot, navigator, or observer has at his command a precisely accurate picture of the ground below which is reliable day or night, in clear weather or cloudy overcast conditions. The system combines the advantages of radar and photography.

One immediately apparent application of this radar strip recorder system is in precise navigation. The navigator can make measurements on the film transparency to determine exactly how far off course he is from a desired flight path. Since the strip recorder contains automatic circuits to "flatten"



RADAR STRIP RECORDER



● *Top picture* shows proportion of optics and electronics in Radar Strip Recorder. *Bottom*, Radar Strip Recorder with housing removed.

the ground picture as seen by radar, and manual controls for setting in ± 12° wind drift, the radar map which results in the machine can be compared directly with a topographical map or aerial photograph of the region below. Either of two areas of coverage can be selected with initial models of the strip recorder. If a 45 x 60 mile area is scanned, the resulting photographic map has a scale of 1:500,000. If a 22-½ x 30 mile area is chosen, the map presented has a scale of 1:250,000.

Previous radar presentations have been confined to qualitative pictures of the ground which last but an instant, only to be wiped away and replaced with new information in a second or less. The radar strip recorder maintains its picture for quantitative use in the air.

Analysis of Crashes

One use which the strip recorder might find is in the analysis of airplane crashes. A suitably mounted strip recorder could be recovered from a wrecked airplane, and its permanent film record would provide an indisputable record of the flight path of the ill-fated ship.

Installation of the radar strip recorder in an airplane is expected to replace, rather than augment, certain existing radar display installations. The information presented to the observer by the device will take the place of current, less sophisticated radar display systems which exist today.

Associated with the strip recorder and one of the key elements in making the device feasible, is a rapid film processor. The fast developing machine is an integral part of the radar strip recorder. Utilizing a monobath solution operating at high temperature (130°F), the rapid processor produces a completely developed film in ten seconds. The developed film is ready to view in strong light.

Combination of the electronic circuitry which couples almost any radar set to a precise optical-mechanical system with the unique monobath film-developing machine results in a radar strip recorder which is equally useful in the air or on the ground.

In ground applications, the strip recorder receives information from an airplane or missile via radio waves. This information is then immediately recorded on photographic film, and is ready for viewing twenty seconds later. A permanent record of the flight path of a missile, reconnaissance radar information of friendly or enemy territory, or any other type of data transmitted from the airborne vehicle can be used immediately or stored for later evaluation.

Separated from the electronics built into initial models of the recorder, the film processing portion of the device is applicable to rapid processing of many types of data which can be fed into the optical system by either mechanical, optical or electrical means. Civilian and military telemetering systems are expected to utilize the rapid, permanent readout features of the processor. Also, electronic computers can make efficient use of the up-to-the-minute, yet permanent, recording characteristics of the machine.

Precision electronics and optics, combined with utility and practical application, have been stressed in the development of the radar strip recorder.

Electronic Measurement Of Effects

The cathode-ray tube is now firmly established as a display element. Originally designed for indicating electrical variations, it requires but the addition of suitable mechano-electrical transducers and amplifiers in order to give an accurate representation of variations in pressure, force, strain, vibration or acceleration.

The display on the face of the tube is an immediate and continuous picture of the parameters involved, and is presented in the graphical form necessary for scientific analysis.

Depending on the size of the tube, sufficient accuracy of measurement of cyclic effects is possible by direct viewing of the tube face through a suitably engraved graticule. For detailed analysis and for investigation of transient and continuously varying effects a photographic record is desirable and can easily be provided.

Simultaneously varying phenomena can readily be investigated by allocating a separate channel of equipment to each. Up to twelve channels have been combined in a convenient lay-out, using small diameter tubes, and in this case a photographic record is essential. The limiting factor in increasing the number of channels is the decreasing size of each trace if the width of the photographic paper or film is not to be increased unduly.

Camera design has kept pace with the varied requirements, ranging from small snapshots of displays to long records of continuously varying phenomena. Daylight loading is possible and the record is available for examination and analysis within a few minutes if a dark room or portable automatic developer is at hand.

A great deal of effort and ingenuity has been employed in devising transducers to enable the mechanical impulse to be converted into an electrical signal suitable for feeding into the oscillograph.

One form of pressure transducer is a variable capacitance device in which the pressure is applied to one side of a metal diaphragm. The deflection of the diaphragm relative to the case is detected by an insulated electrode spaced a few thousandths of an inch from it. An electrical capacitor is thus formed which varies in value in sympathy with the pressure fluctuations. These changes can be detected and amplified by suitable circuits.

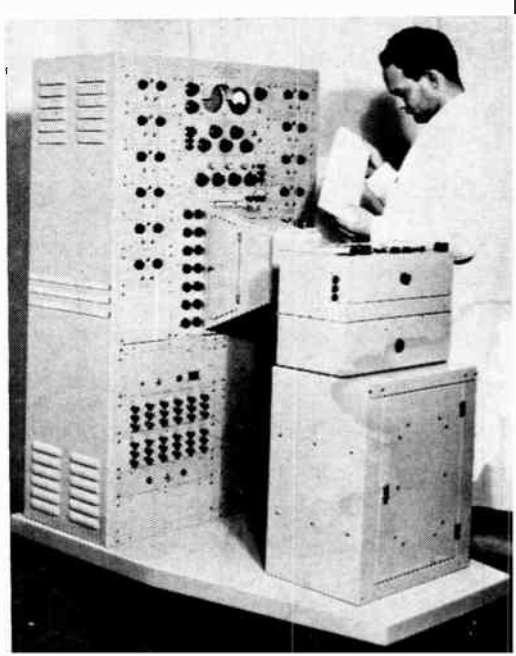
This device has been extensively used in conjunction with oscillograph equipment for measuring pressures within the cylinders of internal combustion engines, at different points in the induction and exhaust manifolds, and in the fuel injection system of oil engines.

Multiple strain effects can as readily be displayed and it is but a short step to the measurement of hydraulic pressures in pipelines, rocket motor thrust, strain in fibres and resistance of packaging to shock.

The applications are in fact legion and it can be said that the cathode-ray oscillograph in varying degrees of complexity has become an indispensable aid to the designer by displaying a true picture of the performance of equipment under operating conditions.

From the industrial point of view, the natural and desirable result is a reduction in design and test time and economy in materials by designing to established limits.

● Illustration shows technician examining photographic record containing details for later study and analysis.



The Growth Of Sonics In Industry

By Robert L. Rod

Robert L. Rod, President of Acoustica Associates Inc., in a recent address to the Ultrasonic Workshop Committee of the Acoustical Society anticipates that the "unsaturated market" for ultrasonic cleaning equipment alone is close to 2 billion dollars. Mr. Rod's remarks with respect to the outlook for the future of Sonics In Industry will be of interest to Canadian industry in which the use of Sonics will find wide application in future years.

FIFTEEN years ago the sonics industry as we know it today was virtually non-existent. With the exception of Sonar apparatus and fathometers, practically no equipment utilizing sonic energy for either gaining information or for performing useful work was available to the industrial market. The studies being conducted in the field were for the most part carried out by educational institutions with limited budgets, and, for the most part, any practical results were completely ignored by industry.

Today, the situation is quite different. We have an industry devoted to the practical application of sonic and ultrasonic energy, which is a recognized part of our economy. The members of the Ultrasonic Manufacturing Association alone manufacture equipment estimated at between $15,000,000 and $25,000,000 sales annually, excluding military-type sonar equipment. It is the opinion of many people close to the field that these sales figures will increase at least ten fold in the next decade as new techniques and applications develop.

In general, it is interesting to consider the types of sonics equipment in terms of those which either are used to gain information or to perform useful work and further to show which are presently available ("off the shelf" items) and those which undoubtedly will be obtainable in the near future. The Workshop Committee has defined these products as follows:

For Gaining Information:

A. *Available Now* — Non destructive Testing; Liquid Level Sensors; Delay Lines; Filters; Viscosimeters.

B. *Future* — Flowmetering; Communication — a. Paging, b. Remote Control, c. Underwater.

For Useful Work:

A. *Available Now* — Drilling; Grinding; Cleaning; Oil-Well Drilling; Degassing; Emulsification; Barnacle Inhibition; Inchworm; Soldering & Welding; Heat Transfer Improvement; Boiler Scale Inhibition.

B. *Future* — Plating; Flotation; Impregnation; Particle Precipitation; Pickling; Quenching; Etching.

The categories "Available Now" and "Available Future" are of interest because these two considerations comprise the core of the major problem facing the producer of a sonic or ultrasonic device; namely, how to create a product having the greatest mass production possibilities with a minimum of special custom tailoring to meet the needs of each industry served or even, in the worst case, each customer's special individualized needs. Although there is a reasonably lucrative market for so-called "ones and twos" or "specials", that is, devices for which there is no repeat business, the average manufacturer seeks at least one mass-produced line of equipment. The development of such a line is a credit to the scientists and engineers who envisioned the product and who followed through in producing it, as witnessed, for example, by the extraordinarily successful acceptance of a popular TV receiver utilizing four ultrasonic tuning forks in the hand-held remote control to signal changes in channels, to mute sound, etc., without wires, batteries, light beams or other encumbrances.

Market Surveys Necessary

In order to conduct a business on a firm financial basis, any manufacturer must conduct reasonably accurate market surveys to determine sales potential for existing equipment and areas of opportunity for new product development. Based upon these collected data, effort can be directed toward design of suitable equipment which would satisfy present as well as future requirements for mass penetration; the former, to maintain a status quo, the latter, to expand with the economy. How this works may be envisioned as follows:

In the case of ultrasonic cleaning, many of you are aware of present applications for semi-conductors, optics, precision electrical or mechanical components, bearings, gyros, gears, etc. For the most part, these present installations require some degree of hand-tailoring with respect to equipment and actual acoustic techniques involved. But despite these limitations which introduce certain difficulties to sales and service of cleaning equipment, it is estimated that some 500 firms representing approximately 0.01% of the manufacturing economy up to the present time, have made ultrasonic cleaning installations totalling $3,000,000 in value. As there are about 282,000 manufacturing concerns in the United States alone, all of whom with few exceptions, are involved with cleaning their product or the tools and machines that produce the product, it is fair to say that the so-called "unsaturated market" for ultrasonic cleaners is close to $2 billion alone. Incidentally, 10% of these firms employ one hundred or more persons. These figures just mentioned do not include the potential market for mass produced ultrasonic surgical instrument cleaners to some 7,000 American hospitals and medical institutions, ultrasonic dishwashers to 100,000 restaurants and 1,000 hotels, or perhaps, even to 40 million homes, and ultrasonic watch cleaners to 50,000 watch repairmen.

Digressing from cleaning we turn to other potential fields showing great promise of expansion where, once again, mass-produced sonic and ultrasonic devices show great promise. In liquid level control we can expect to see greater use of such devices as the unique ultrasonic level sensor and of sonar-type continuous level gages, particularly in missile work, tank gaging in the chemical, food, plastic, and petroleum process industries and in the enormous untapped petroleum storage market. In the field of metal working, ultrasonic drills, grinders and friction-reducing devices, as well as non-destructive testers, are becoming an integral part of routine manufacturing processes. The ultrasonic soldering iron is illustrative of a highly successful tool finding widespread use in the aluminum fabricating field.

In conventional and atomic power plant and in nuclear work, sonics and ultra-sonics are playing an increasingly important role in radioactive decontaminating, degassing of reactor fluids or boiler feed water, aerosol agglomeration for by-product recovery or smog control and emulsification processes. Heat transfer is improved by acoustic vibrations while deposition of boiler or chemical scale and precipitates on walls of tanks or in tubes is retarded by the same techniques.

Oil wells are drilled and cleaned sonically after the fields themselves have been located by acoustic techniques. Growth of barnacles on ships' hulls is inhibited by ultrasonics; leading brands of beer are defoamed at the capping machines by acoustic vibrations; ore flotation procedures are greatly improved by the application of cavitational energy ultrasound; and a host of other intricate industrial and chemical process applications are improved in a similar manner. Indeed, one can expect that in the next five years sonic or ultrasonic energy will be utilized in one form or another in the manufacture of the foods we eat, the beverages we drink, the clothes we wear, the cars we drive, the TVs we watch and in the weapons which guard us against attack. Certainly, the ideas which scientists develop in the acoustics laboratory can find their ways towards improving our standard of living and providing more work in the sonic and ultrasonic manufacturing industries which present them to the industrial community at large.

Germanium Rectifiers In Transmitter Use

First Application For Supplying High Voltage In Transmitters

A new 50,000-watt AM radio broadcast transmitter which is termed "the new look" in broadcast equipment is said to represent the most significant improvement in such equipment since the early days of radio. The new transmitter is also claimed to be more reliable, simpler in design, and easier to maintain than equipment available up to this time.

Overall dimensions of the new transmitter are thirteen-and-a-half feet long by four-and-a-half feet deep. This compares to the 29 by 5 feet dimensions of older transmitters made by the builder.

The key to superior reliability of the new transmitter lies in the use of germanium rectifiers. It is the first use of germanium rectifiers in transmitters for supplying high voltage and for reducing tube requirements, the builders state.

Through use of these comparatively small devices and other new components engineers were able to break through "the size barrier" to such equipment. As a result, company officials expect to see an industry trend to smaller and more reliable broadcast equipment.

By using germanium rectifiers engineers have reduced tube requirements from the 40 to 50 in present day transmitters to but 16 in the new one. In addition, weight of the final amplifier tube was reduced from a "hard-to-handle" 225 pounds to a mere 20 pounds.

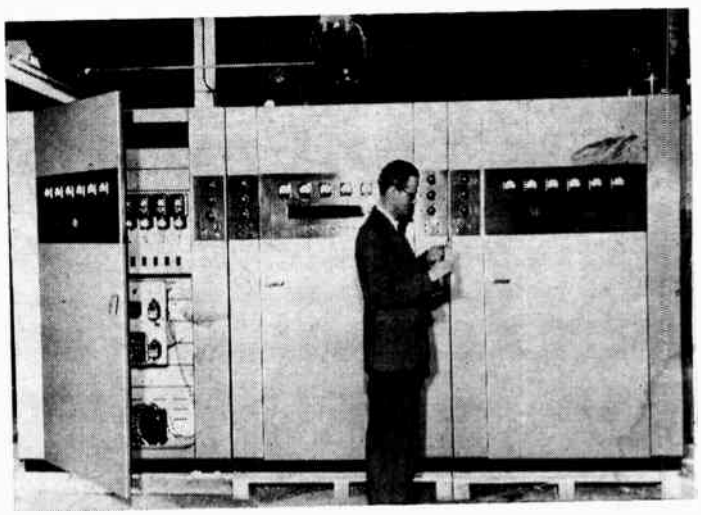
The tubes are also limited to but six different types, as compared to 12 or more types needed in older transmitters. This will result in lower spare-tube inventory requirements; another cost saving for station owners and a reduction in the number of tubes in transmitters usually resulting in greater operating reliability. Thus the new transmitter is expected to require a minimum of maintenance with less lost air time due to transmitter difficulties.

For maintenance, minimum aisle space will be required near the transmitter because the small-sized parts can easily be moved in and out of the unit. Older transmitters required larger aisle space to permit hydraulic lifts to be moved in and out for replacing final amplifier tubes.

In addition to smaller housing requirements for the new unit, the transmitter can also be housed in an unheated building, thus saving expense of installing a heating system. The transmitter has built-in provisions for remote operation.

Germanium rectifiers used in the transmitter have a longer life expectancy than tubes, and operating characteristics do not change with age. They can also be operated at much lower temperatures than tubes, thus simplifying remote operation in unheated buildings.

Lower operating costs are also expected to result through use of the new transmitter. In addition, its simplicity of design will require much less technical skill for maintenance and operation than do present day transmitters. According to officials of Canadian General Electric Company, manufacturers of the equipment, this is a very important feature in the face of the acute shortage of trained technical personnel.

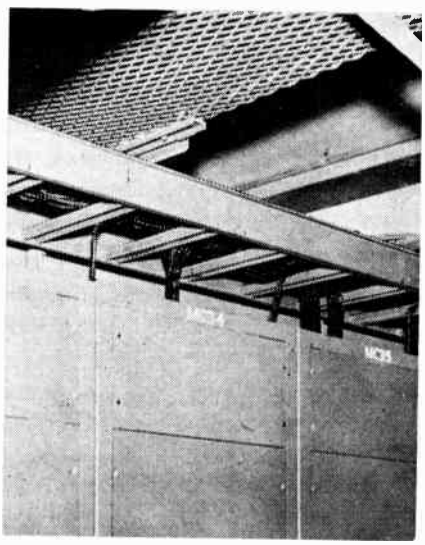


● View of part of the new 50,000 watt AM transmitter.

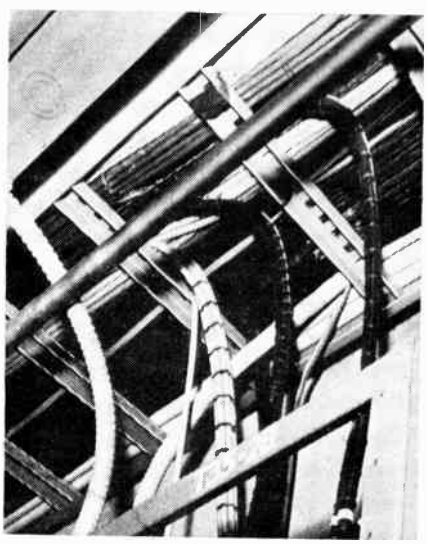
With An Estimated 10,000 Miles Of Wiring Installed In The New CBS TV-Radio-Recording Studio In Chicago Engineers Employed Unique Method Of - - - - - -

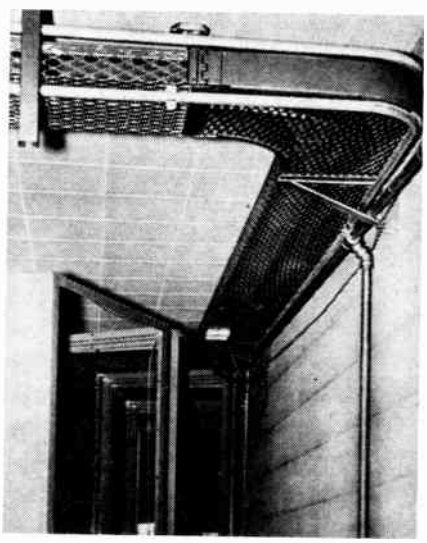
Wiring World's Largest TV Station

CBS recently completed the largest TV-radio-recording station in the world. At first, there will be no color broadcast but CBS expects that demand soon will require its use and is prepared for it. Even now, the technical facilities of the station are greater than can be found anywhere under one roof and, with the inclusion of color, the facilities will be unequalled.



● *Left:* Cable trough supports thousands of miles of wire and cable throughout the studio. Note the cantilevered supports to which the cable trough is secured. *Right:* Wires are transferred from cable trough to Cope Cable Ladder to facilitate drop outs to control panels.





● *Left:* Close-up of cable ladder. The ease with which cables can be dropped between the rungs reduces installation costs. *Right:* Cable trough provides a clean, neat installation and at the same time provides access to the cables for re-routing, maintenance, repairs, etc. Note Cope pin-type coupler by which sections are quickly connected. This type of coupler eliminates nuts, bolts, and washers, yet provides rigid support between sections and fittings.

The television section includes four large studios and one small one. The radio section includes five studios and, in addition. there are two Columbia recording studios. Presently, television broadcasts originate from 4:00 to 6:30 p.m. and from 10:00 p.m. to sign-off at 1:00 or 1:30 a.m. The balance of the broadcasts are network.

Construction of the station began July 1st, 1955, when the insides of an ice skating arena were demolished. Most of this work consisted of the removal of great quantities of concrete. Broadcasting began last fall.

One of the novel features of the new station is the wiring system that is used for control cables, telephone wires, audio and video signals, paging system, and so on — all of the wiring, in short, except the power system. It is, of course, impossible to give an accurate estimate of how much wire is installed. CBS engineers estimate that there must be at least 10,000 miles. When color broadcasting begins, this much again will be needed.

With such vast quantities of wire, and when even one failure could interrupt the operations, proper wire and cable installation and protection are vital.

Except for power cable, all of the wire is supported in about a mile of cable trough and cable ladder. The cable trough, an expanded metal system without covers, varies in width from 3 to 24 inches. Lengths of 8, 10, and 12 ft. are joined with various standard fittings into a very flexible cable supporting system. Even greater flexibility, however, is provided by the cable ladder system used over the racks where quantities of wire drop through at 22 inch intervals without the need for cutting or the addition of special fittings. While the flexibility of these systems is of paramount importance, CBS was gratified to find that the installed cost was lower than could have been realized with any other type of cable supporting system.

(Turn to page 54)

TOLL MAINTENANCE ISN'T EASY

Communication equipment has become increasingly intricate to cope with the requirements of modern communications. Consequently Toll Maintenance has become more and more specialised and complicated. The Toll Maintenance man is now a key figure in the modern communication picture. He requires qualities of knowledge, judgement, efficiency and endurance. But even then he has difficulties.

Realising these difficulties, the Lenkurt Electric Company have gone a long way to overcome them, with technical information of the highest quality. Detailed Test and Maintenance instructions exist for all Lenkurt equipment, including test procedures, block and level diagrams for trouble shooting, and condensed information in chart form.

This information is readily available to toll maintenance men. It is supplied with every order of equipment. If your copies are unavailable, use your Lenkurt Subscription Service or contact the nearest branch office of Automatic Electric Sales (Canada) Limited. Head Office 185 Bartley Drive, Toronto 16, Ontario. Branches in Montreal, Ottawa, Brockville, Hamilton, Winnipeg, Regina, Edmonton and Vancouver.

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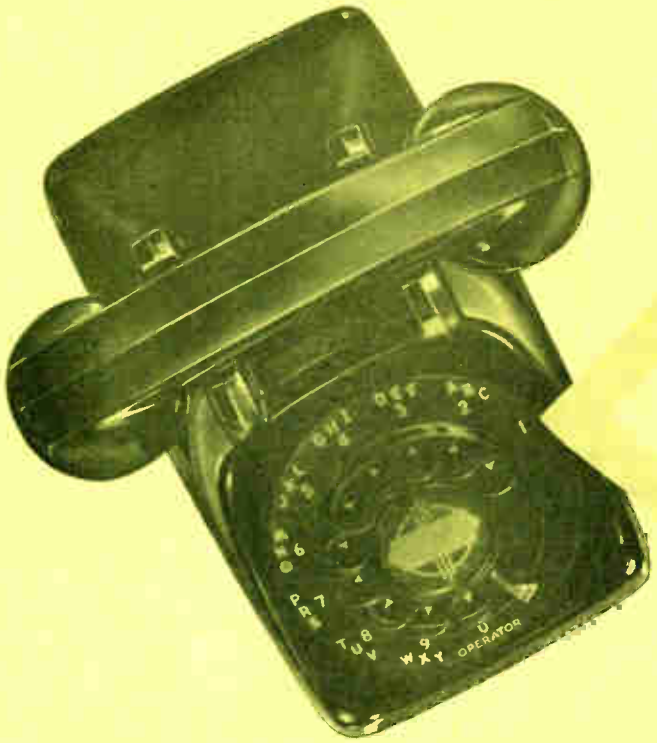
For further data on advertised products use page 65.



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SPECIFY
STROWG
AND BE SU

DEPENDABILITY

Strowger Equipment has been manufactured since 1889. The first dial office to use it opened in 1892. Equipment over 40 years old is still operating.

MAINTENANCE

There are few maintenance problems with Strowger. It is designed for a minimum of maintenance, easily and speedily accomplished. And it's made in Canada.

THE FUTURE

Constant research is your assurance that Strowger will not become obsolete. Among recent developments by Automatic Electric: direct distance dialing, Strowger automatic toll ticketing, electronic switching equipment.

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For further data on advertised products use page 65.

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ADAPTABILITY

Your equipment must adapt with changing requirements and conditions. Proof of Strowger's adaptability in the future is its record in the past. It has adapted easily to: direct distance dialing, "2-5" numbering, toll ticketing, director operation, etc., etc.

EFFICIENCY

Over its long period of development and manufacture, Strowger has acquired a reputation for unrivalled efficiency.

ECONOMY

Strowger saves you money because you buy only what you need. When you have to expand just order more equipment.

COST

cost of Strowger equipment is low, bearing in mind its ality, durability, and its "buy as you grow" qualities.

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

AUTOMATIC ELECTRIC

ORIGINATORS OF THE DIAL TELEPHONE

GENERAL SYSTEM

5762

For further data on advertised products use page 65.

New Products

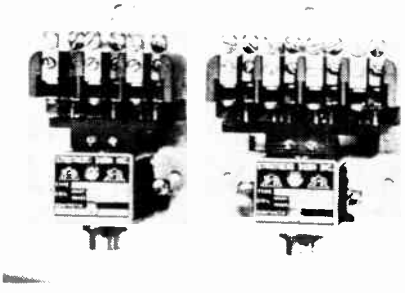
New Product specifications published in Electronics and Communications have been briefed for your convenience. If you require further information on any of the items published you may readily obtain such by using our Readers' Service, Page 65. Just mark the products you are interested in on the coupon on Page 65 and the information will be in your hands within a few days.

● *3- And 4-Pole Contactors*

Item 1631

J. R. Longstaffe Co. Ltd., Relay Division, announce that New Struthers-Dunn Type 48KXX (3 pole) and 48LXX (4 pole) Contactors are now available.

These units are single-unit versions of the popular Type 175KX mechanically-interlocked reversing contactor — long proven reliable over millions of operations in severe motor reversing applications such as hoists, motorized valves, window and door openers, etc.



Small, yet ruggedly built for long, trouble-free operation the new Types 48KXX and 48LXX are exceptionally well suited to built-in motor control applications. Fine silver, double-break contacts in melamine arc chutes afford a generous safety factor under high overload conditions. All coil and contact terminals are readily accessible from the front for easy installation even with heavy-gage wire. Heavy mounting plates offer rigid support and resist twisting or torsional strain which might cause misalignment.

Write for Bulletin 7048, to **J. R. Longstaffe Co. Ltd., 300 Campbell Ave., Toronto 9, Ontario, Canada.**

● *Servomotor-Rate Generator*

Item 1632

Helipot Corporation, a division of Beckman Instruments, Inc., has recently issued data sheet 872, giving details of the new Model 11 MG 460/460, which is a size 11, 115-volt, 400-cycle, Beckman Servomotor-rate generator.

Complete specifications, characteristics, 3-view drawing, and schematic tell the control systems engineer what he needs to know.

Weighing only 7.1 oz. the unit provides fast response, low power input, oscillation damping, signal-to-noise ratio of 25:1 and a linear torque-speed curve. A wide variety of electrical and mechanical modifications are readily available.

Environmental integrity is insured by the stainless steel housing, complete encapsulation of the windings, and precision craftsmanship.

Free copies of data sheet 872 are obtainable from **R-O-R Associates Limited, 290 Lawrence Ave. West, Toronto 12, Ontario, Canada.**

● *Single Channel Telephone Carrier Equipment*

Item 1633

A newly designed Single Channel Carrier for telephone use is being marketed by Pye Canada Limited. This new equipment is designed for use during power failure emergencies or in bush and woods operations where there is no power at the remote carrier end.

The PTC-1004 is a battery model and may be powered by a dry battery power-pack or by a converter operating from a 12 volt storage battery. The converter is transistor-operated and power consumption during transmission is extremely low. Power drain is nil when there is no conversation. On a battery pack, the batteries will last for their approximate shelf life and for 12 volt storage battery, approximately ½ amp. is used during conversation only.

The PTC-1005 operates directly from 110 volts, 60 cycle AC. Pye Single Channel Carrier may be installed or removed in a matter of minutes. It is completely enclosed and versatile with regard to placement and may also be mounted on a standard 19" rack.

This carrier equipment will provide standard talking levels and can operate over lines having considerable loss. It is designed to operate between magneto and/or common battery exchanges.

This new development in telephone carrier equipment offers users an instantaneous method of emergency communications at an extremely low cost. Further information and literature are available from **Pye Canada Limited, 82 Northline Rd., Toronto 16, Ontario.**

● *Photomultiplier Photometer Model PH-200*

Item 1634

The Model PH-200 Universal Photomultiplier Photometer is a general purpose instrument having wide application in the field of light measurement. Any commercially available photomultiplier or photoelectric tube may be used with assurance that the maximum capabilities of a particular tube can be realized. Separate zero-adjust and dark-current adjust controls, together with both a stepped and a continuously variable sensitivity control, further enhance the flexibility of the Model PH-200.

Combining laboratory accuracy with ease of operation and simplicity of maintenance, the Model PH-200 Universal Photomultiplier Photometer is one of the most useful tools yet offered to the science of light measurement.

These units which will provide full-scale deflection for a current of 1 millimicroampere provide meter, oscilloscope and recorder outputs. The extreme versatility, accuracy and reliability of the PH-200 make it one of the most useful and powerful tools yet offered to the science of light measurement. Typical applications bracket a wide range of scientific and industrial activities involving photometer techniques.

Represented in Canada by **Radionics Ltd., 8230 Mayrand St., Montreal 9, P.Q., Canada.**

● *Disk-Type Discharge Varistor Assembly*

Item 1635

A new 3-inch diameter disk-type discharge varistor assembly, the second resistor to be developed for direct installation in electrical circuits, was recently announced by Canadian General Electric's Magnet Section.

The Thyrite addition, according to C.G.E. engineers, supplements the 6-inch assembly designed to protect motors, generators, lifting magnets, magnetic chucks, solenoids, relays, large coils, etc., against high inductive surges resulting from sudden interruptions of inductive currents.

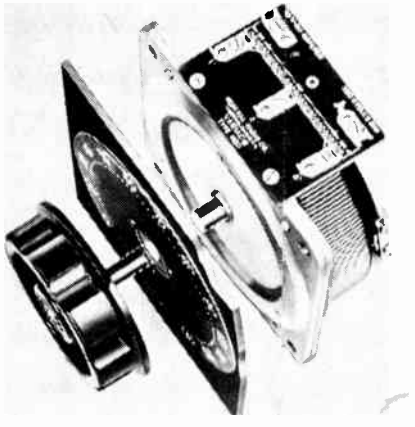
Referred to as the 9RV3A assembly, the new resistor is manufactured as a family of ready-mounted groups of 1 to 4 varistors, connected in series or in parallel. The 3-inch disks, which range from 0.080 to 0.375-inch thick, are bracket-mounted on a horizontal insulated bolt with a spring lock washer to provide contact pressure.

Besides being more suitable for applications where space requirements are at a premium, the new assembly family also offers the user different characteristics for specialized uses in circuits rated 6 to 600 volts. Further information is available from **Permanent Magnet Section, Canadian General Electric Company Limited, 940 Lansdowne Avenue, Toronto, Ontario.**

Variac® Autotransformers

Item 1636

Operation at any supply frequency between 350 and 1200 cycles is possible with the new General Radio Type M20 Variac® Auto transformers. The Type M20 is rated at 115 volts input with output up to 20 amperes at 0 to 115 or 0 to 135 volts. The unit, with knob and dial, weighs less than 13 pounds.



The Type M20 Variac is ruggedized, tropicalized, and designed to withstand the usual environmental operational shock and vibration tests (MIL-T-945A) normally required for military operation.

Further information and literature can be obtained from **Canadian Marconi Company, 6035 Cote de Liesse Road, Montreal 9, Que.,** who are Canadian distributors for General Radio Company.

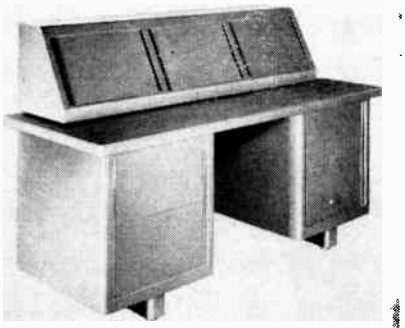
New Products

• *Hammond Consoles And Equipment Tables*

Item 1637

Adaptability is an important characteristic of a new line of Canadian made Consoles, Turrets, and Equipment Tables in 3 size ranges developed by Hammond Manufacturing Company Limited of Guelph.

This group of precision, metal components now added to the "Hammond" line of stock cabinets and electronic equipment enclosures has almost universal appeal and application.



For fixed locations (i.e.) production and quality control departments, sound distribution system, studios, film depts., broadcasting workshops and research laboratories, the Hammond Console will double as an office desk for the engineer-technician, providing a work area for check and test procedure, or the development of new circuitry. Panel and pull-out drawer space are interchangeable. Turrets are spacious with removable inner partitions.

Television studios will find the Consoles and Tables easy to light, and most photogenic! Suitable for panel discussions or for news and sport commentators, they may also be used to display products to advantage during live commercials.

They offer convenient and stable support for audio and video equipment, light enough to become a must for the operator "portaging" gear into inaccessible places; yet sufficiently strong to take the rough, every day punishment of truck or van life.

The stock finishes beige-brown, and grey Hammerlin with color-keyed Jaspe linoleum work areas, provide an attractive appearance and that "professional look" for original equipment.

Hammond Manufacturing Company Ltd., Guelph, Ontario, Canada.

• *Electronic Scale For Measuring Loads*

Item 1638

A completely automatic electronic scale for measuring vehicle, tank and hopper loads is now being marketed in Canada by Philips Industries Limited, Toronto.

Apart from the recording instruments, the new scale has no moving parts. Measurements are made by electronic load cells located under the weighing platform or bridge and the information is transmitted to the weight indicators by electrical wire. An electronic ticket printer available with the scale records the date, serial and code numbers as well as the gross weight of the vehicle, tank or hopper.

As the strain gage load cells are only a few inches high, structures do not have to be modified to accommodate the new scale. Maintenance costs are virtually nil and the recording instruments can, if desired, be located several hundred feet from the weight bridge.

Philips Industries Limited, Brentcliffe Road, Leaside, Ontario, Canada.

• *Narda Fine Wire Windings*

Item 1639

The NARDA line of fine wire windings consists of custom made resistance windings for use in transducers such as accelerometers, pressure gages, and linear displacement indicators. These windings are also used as pickoffs in rate and amount gyroscopes. Complete potentiometers can also be supplied.

Windings are made of low temperature coefficient platinum alloy wire of 0.0005 to 0.002 diameter, wound on copper mandrels. Other materials are also available. Both linear and one turn rotary windings are available. An exclusive NARDA process permits **tapping to a particular specified turn in a winding.** NARDA potentiometer windings typically have precise linearity, and will operate over the most extreme conditions of temperature, humidity, stock and vibration.

NARDA performance in the accurate production of fine wire windings is outstanding. On a recent order for 6000 linear windings for rate gyroscope pickoffs, only three units failed to meet the rigid linearity requirements.

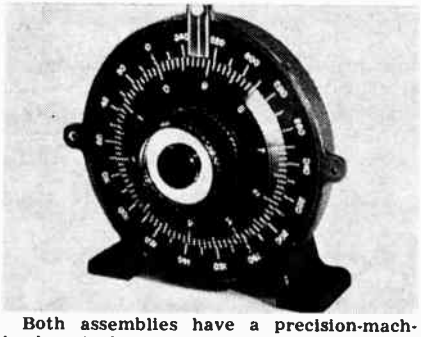
For further information, apply Canadian representative — **Mel Sales Ltd., Arnprior, Ontario, Canada.**

• *Concentric Dial Assemblies*

Item 1640

Two new concentric dial assemblies have recently been added to the Beckman Standard Electromechanical Bread-board Parts line.

Dial assembly BP-302-36 is a ¼" shaft diameter unit with a ratio of 36:1, allowing readings to an accuracy of 3 minutes. The BP-302-100 model has a ⅛" diameter shaft, a ratio of 100:1, and provides reading accuracy of better than 2 minutes.



Both assemblies have a precision-machined cast aluminum housing which insures absolute rigidity. The aluminum inner dial face is designed for low mass and inertia, and the plastic index marker may be set at 0°, 90° or 270° positions for convenient reference.

On special order, an instrument-quality control knob can be mounted on the dial face of either model to allow accurate pre-setting of system parameters, and to make the assembly easily adaptable to panel mounting with full control from the front.

Stock delivery of both dial assemblies available from Canadian sales representative: **R-O-R Associates Ltd., 290 Lawrence Ave., West, Toronto 12, Ontario, Canada.**

• *Metal Film Precision Resistors*

Item 1641

International Resistance Company Ltd. announce a new bulletin on Metal Film Precision Resistors.

These resistors, available in two molded sizes (Type MEC- ½ watt and Type MEF- 1 watt) are designed to combine high accuracy and stability with low and controllable temperature coefficients. They have excellent stability, particularly on load, provide extremely low temperature coefficient, low noise and negligible voltage coefficient and have low capacitance and inductance which permits their use in high frequency applications. They are designed to surpass characteristic A of specification MIL-R-10509B.

They are available in resistance values of 100 ohms to 2.0 megohms. Maximum rated voltage for the ½ watt type MEC is 350 volts DC and for the 1 watt type MEF is 500 volts DC. The wattage ratings listed are effective at an ambient temperature of 100°C.

The new IRC Precision Metal Film Resistors are particularly intended for the following applications:

1. Where a low controlled temperature coefficient is required.
2. Where the application calls for low inductance and/or shunt capacitance.
3. Where the size of precision wire-wound resistors is not tolerable.
4. Where a low noise resistor is necessary.
5. Where the application calls for a combination of high stability on load in addition to temperature coefficient requirements as in (1).
6. Where close tracking of the resistance values of 2 or more resistors over a wide range of temperature is desired.
7. Where the application requires good high frequency performance combined with accuracy and stability.
8. Where the application calls for high stability under severe humidity conditions.

For complete details write to **International Resistance Co. Ltd., 349 Carlaw Avenue, Toronto 8, Ontario, Canada.**

• *Wiring Device Catalog*

Item 1642

Renfrew Electric and Refrigerator Co. Ltd., announce the availability of their new 60 page Wiring Device Catalog.

This fully illustrated catalog covers the P & S complete line of wiring devices including switches, outlets, wallplates, lampholders, and the special "Polarized", "Turnlok", "Surfex" and "Despard" lines.

It is fully illustrated with literally hundreds of pictures, gives complete catalog listings, dimensions and specifications, and is fully indexed.

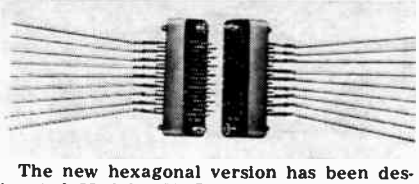
To obtain your copy of this catalog, write to: **Renfrew Electric & Refrigerator Co., Ltd., 300 Campbell Ave., Toronto 9, Ontario, Canada.**

• *Miniature Precision Connectors*

Item 1643

U.S. Components' standard Series MI, MI-SL and MH miniature precision connectors are now available with solderless taper-pin terminals for use with AMP Series 37 taper receptacles.

The new draw-pull and screw-locking versions have been designated Models MI-SDL and MI-SL-SDL, and are available in 7, 12, 14, 18, 20, 21, 26, 34, 41, 50 and 75 contacts. Insulation resistance is over 100,000 megohms, with voltage breakdown between contacts at 2600 volts AC (rms).



The new hexagonal version has been designated Model MH-SDL and is available in 4, 5, 7 and 9 contacts. Voltage breakdown between contacts at 2100 volts AC (rms). Alkyd, Melamie and diallyl phthalate insulating bodies can be supplied for all models to meet MIL specifications.

Design precision assures positive, dependable and quick wire assembly. Field interchangeability with existing U.S.C. solder-cup miniature connectors is guaranteed together with full conformance to the latest applicable military specifications.

Complete technical data may be obtained from **U.S. Components, Inc., 454 East 148th Street, New York 55, N.Y., U.S.A.**

New Products

• *Self-Adhering Wire Markers*

Item 1644

Self-Adhering E-Z-Code wire markers are the easy, fast and economical way to mark and permanently identify wires, cables, harnesses, miniature wires and components, etc.

E-Z-Codes are furnished on a speed-tab dispenser card that enables one to remove only one self-adhering marker at a time which is then wrapped around the wire with the assurance of a clean, non-contaminated adhesive. Thousands of stock items available or can be printed to customer's specific requirements.

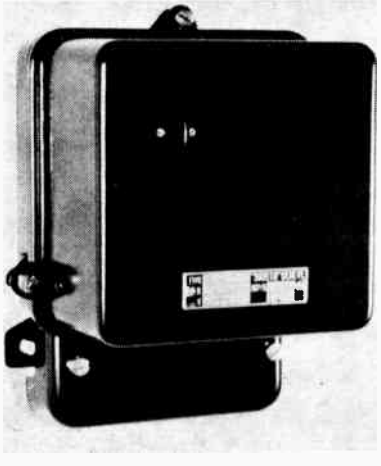
Available in both a high-grade industrial fabric or aluminum foil for both production and maintenance with temperatures ranging plus or minus 300cF. Meets military spec. MIL-D-10369B for fungus resistance and is also available in vinyl, acetate, glass-cloth, cellophane.

Northern Industrial Products, 41 Crock ford Boulevard, Scarborough, Ontario.

• *Sodeco Impulse Adaptor Type 1Tu . . .*

Item 1645

Electromechanical Impulse Counters operate best when the impulse series is an even square wave of constant amplitude and frequency. In practical applications, however, those ideal conditions are rarely satisfied. Thus a varying rotary speed for example will vary the duration of both the impulse and the interval. That difficulty has been overcome mechanically by the special design of the Sodeco Impulse Switches Tk . . . where the duration of the impulse is independent of the speed of the impelling motion, but that solution is limited to comparatively slow rotary or angular motions and does not meet the requirements of cases of high frequency counting, of linear motions, of photoelectric or acoustic impulse transmission etc. All those problems, and many more, are claimed to have been solved by the design of the new electronic Impulse Adaptors Type 1Tu which, connected between the impulse transmitter and the counter, will produce a square wave of ideal amplitude and optimum duration of impulse and interval, quite independently of the no matter how irregular characteristics of the primary impulse.



The mains operated (110, 125, 145, 220, 250 V, 50 or 60 c.p.s.) instrument with a power consumption of 15 watt, installed in a wall mounting case 5¼" x 6⅜" x 3½", produces its own 15 volt DC counting voltage with less than 1 mA burdeon on the contact, thus warranting a long life. The electronic control is effected by a Double Triode Type E92CC of special design and extraordinary dependability (10,000 hours warranty). A selector switch permits the selection of impulse frequencies of 15, 30 or 60 impulses per second. The instrument can also be used with negative voltage impulses up to peak voltages of 100 volts.

In addition to the standard model Type 1Tul with one counting channel, Model 1Tu2 with two counting channels is available, also special models for photo-electric or for acoustic control of the counter.

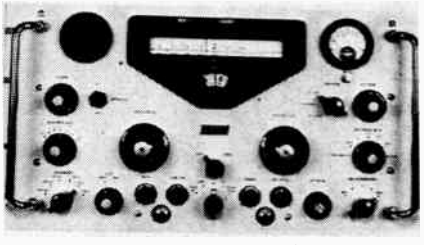
The manufacturers claim that the Impulse Adaptor always supplies the counter with impulses of the correct form and amplitude, thus providing the optimum conditions for its operation; that makes it possible, by using suitable counters, to increase impulse frequencies up to 60 imp/sec.; that the simplest primary transmitters, such as micro switches, spring contacts, even drops of a slightly conductive liquid may be used for the release of the impulse; that the low burdens and voltage make it possible to have the counter controlled by signals which, without the adaptor, would be too feeble for any direct control.

For more information, write to **The J. W. Ellis Industries, 42 Lombard Street, Toronto 1, Ontario, Canada.**

• *Racal Engineering Model RA-17*

Item 1646

The new Racal RA. 17 Communications Receiver is considered to be a major step forward in communications receiver engineering. It has been tested by the Defense Research Board, the Department of Transport and the Army.



Some of the special features of this equipment are as follows:

- 0.5 to 30 Mc/s in 30 bands.
- Band changing without switches or turrets.
- 60" film scale gives 200 c/s setting accuracy.
- Overall stability after warm-up within 100 c/s.
- Extreme sensitivity — 3 μ for 20 db S/N ratio (30% modulation).
- Undiscernible re-radiation.
- Negligible spurious responses.
- Extreme mechanical simplicity — no complex gear trains.
- Cast chassis gives exceptional rigidity.
- Modular construction allows easy servicing.
- Alternative British or American valves and connectors.
- Signal meter and sensitivity check.

Represented in Canada by **Instronics Ltd., P.O. Box 51, Stittsville, Ontario.**

• *Reference Guide For Communication Engineers*

Item 1647

All the information required on the proper selection of masts and antenna supporting structures is contained in a new book published by Beatty Bros. Ltd. This book contains data on all types of masts from single 80 ft. masts to 250 ft. H masts. All the information is at one's finger-tips — how to choose the right mast for the job — how to assemble and erect — how to order.

With emphasis on commercial communications, no engineer or installer should be without a copy of this long awaited, long needed book.

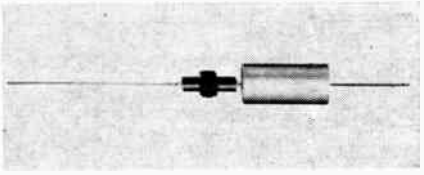
Write for a copy of reference guide to **Beatty Bros. Ltd., Fergus, Ontario, Canada.**

• *N-Capshells*

Item 1648

A new approach to the encapsulation of components is now offered by **E.P.M. Corp.** of 675 Barbey Street, Brooklyn, N.Y.

N-Capshells are custom machined of polyester or epoxy materials, and are available open-ended or with one end closed. Entry holes for leads are provided in the closed end when specified.



The use of N-Capshells eliminates the use of molds, reduces rejection rate and patch time because of molding imperfections.

N-Capshells are less expensive than the extruded or molded type of case, and can be supplied in any quantity without tooling or setup charges.

Write for a free sampling of typical N-Capshells to **E.P.M. Corp., 675 Barbey Street, Brooklyn, N.Y.**

• *Taped Teflon Dielectric Cable*

Item 1649

Amphenol Canada announce the availability of a new Taped Teflon Dielectric Cable electrically equivalent to RG-117/U.

These new cables are for any cable assembly applications requiring high power handling capabilities, a high degree of flexibility, good dimensional stability, and low VSWR characteristics. Type 421-121 provides, in addition, a high temperature fibre glass jacket for operation at elevated ambient temperatures. Type 421-103 is similar to to 421-121 but has a vinyl jacket. These cables are rated at 50 ohms, 10,000 volts RMS dielectric strength, Corona 7000 VRMS. Both types provide improved flexibility, dimensional stability, high power handling capabilities and retain all the desirable features of the solid dielectric cable.

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

• *Frezzo-Lite Model "500"*

Item 1650

Manufactured by General Research Laboratory of New York City, the model "500" Newsreel light will deliver a minimum of 24 minutes of high intensity light, enough to film up to 1,500 feet of 35 MM or 750 feet of 16 MM film. The new full wave high power charger will recharge the power pack automatically in approximately 2 hours. No manual operation or watching is necessary while charging. No replacement of water or electrolyte is ever needed. The power pack is fully leak proof.

The power unit can be transported and operated in any position. Troublesome liquid overflowing inside of airliners at high altitudes is a thing of the past. The cells are sealed in metal cases; completely hermetically sealed. No gassing occurs while charging.

The weather proof carrying case encloses all instruments on the inside of the case for protection in transportation and location filming.

Dimensions of unit are 9" high, 8¾" wide and 2¾" deep.

Model "500" power supply may be ordered with a special dual charger for recharging from 110 volts AC and from one's own automobile while driving.

Reflector unit is equipped with an adjustable light beam ranging from 10 to 90 degrees.

The power unit cannot be damaged even though left in a discharging condition for a long period of time.

Canadian distributor—**Alex L. Clark Ltd., 3745 Bloor Street West, Toronto, Ontario.**

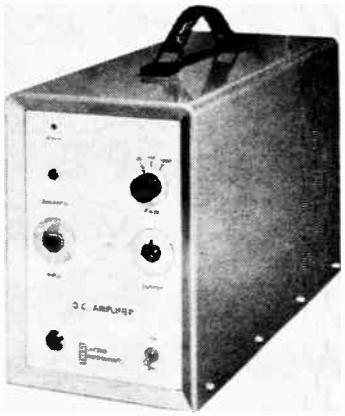
New Products

• *Differential DC Amplifier*

Item 1651

This new Electro Instruments DC Amplifier is characterized by true differential input and output features, providing a means to measure both in-phase and out-of-phase signals. Both cabinet and rack models are available.

The amplifier has been designed to provide extremely low noise and drift characteristics with input impedance of 100,000 Ω. With line regulation, drift is less than ±5 microvolts. Gain steps are provided from 0 to 1,000 with gain accuracy greater than 1% at 2 kc. This wide band DC amplifier has an open loop gain of 100 db out to 800 cycles and 150 db at DC.



The model A10 has integral power supply and is partially transistorized. Cabinet size is 7¾ x 11 x 15". Input power requirement is 100 watts.

For further information, apply to the Canadian representative: **Electromechanical Products, Markham Rd., Agincourt, Ont., Canada.**

• *General Electric Switchboard Instrument*

Item 1652

A new General Electric switchboard instrument for easy reading at better than 120-degree angles, surpassing ASA readability standards by 200 per cent, has been announced by Canadian General Electric Company Limited.

The new switchboard instrument is particularly useful for utility and mill installations where distant angular readings must be taken and maximum legibility is essential. It can also be used for general switchboard service, control panels, and special test equipment. The greatly increased angle of readability makes the instrument ideal for use on swinging brackets or other installations that are necessarily remote from the observer. Switchboard instruments with the improved angle of readability include voltmeters, ammeters, wattmeters, frequency meters, power-factor meters, varimeters, synchroscopes, temperature meters, and ground detectors.

Standard ASA specification for angles of readability in switchboard design is a plus or minus 20 degrees. Already producing an instrument 100 per cent above this standard, department engineers said the new switchboard design shows tested legibility and easy reading at plus or minus 60-65 degree angles. It increases — by at least 20 per cent — angles of readibility now possible in conventional switchboard instruments.

Cover overhang — major cause of scale shadows — has been eliminated in the improved instrument construction, making it possible to read markings clearly regardless of the angle of illumination. The instrument scale has been moved forward to a position flush with the front of the cover bezel, and a protruding, convex-type glass cover provides clearance for the scale and pointer. To eliminate parallax errors, the instrument scale is so constructed that the tapered pointer tip is on the same plane as the scale markings. Numbered divisions, accented for quick correlation between numerals and markings, are horizontally mounted and the legend cannot be obscured by the pointer.

The convex-type, anti-static, lime glass cover presents a minimum of flat surface and greatly reduces glare from angle lighting. For applications where unusual lighting problems lessen angles of readability, the instrument can be made with a special anti-glare glass, acid-etched to reduce glare. All instruments are thoroughly shielded from external magnetic fields and will stand instantaneous application of ten times the full-scale quantity for one second without mechanical damage. All spring-controlled instruments are provided with an external zero adjuster. Cases are constructed for semi-flush mounting and protected with an outside "tropicalized" finish.

Canadian General Electric Co. Ltd., 214 King St., West, Toronto, Ontario, Canada.

• *Two New Miniature Switches*

Item 1653

Two new miniature switches called the "Button-Switch" and "Tini-Switch" have been made available by Switchcraft, Inc., of Chicago, Ill.

The "Button-Switch" is an unusually small, completely enclosed push-button type, with metal housing. They are available with red or black push buttons, non-locking, and in the two different designs illustrated: No. 903 for behind panel mounting and No. 923 for mounting from front. Both are available in two contact arrangements. (1) Single "make", single "break", single "make-break" and (2) "make before break". Rated at 250 mils, non-inductive load A.C. 30 watts maximum.

903 923 953

The "Tini-Switch" No. 953 is similar to the Switchcraft "Littel Switch" except sub-miniature design. Springs are insulated and interlocked by notched phenolic washers; a one-piece plastic shaft (red or black) eliminates any need to remove button when inserting switch through the mounting panel; integral contacts suitable for low level circuits where low resistance is not a factor. Available: Single "make"; Single "break"; One "Break-make", with red or plastic push button, non-locking.

Distributed through Radio Parts Jobbers.

Full details may be had by writing the Canadian representatives: **Atlas Radio Corporation Ltd., 50 Wingold Avenue, Toronto 10, Ontario.**

• *Bulletin re Electromagnetic Delay Lines*

Item 1654

International Resistance Company Ltd., announce the availability of Bulletin S-2 covering distributed - constant Delay Lines.

An Electromagnetic Delay Line is a component of inductances and capacitances exhibiting signal delaying properties. It is a physically shortened "long" transmission line where the input signal is fed into one end and taken out the other end after an interval of time equal to the time transmission. Conventional transmission lines of the Coaxial type can be and are used as delay line in those applications where the desired delays are in the millimicrosecond region.

IRC delay lines have a dielectric strength of 300 volts DC, maximum operating temperature 65°C and typical units measure rise times of 0.09 microseconds or less as measured across Series RL termination. Impedance is 500 ohms to 2500 ohms. Both higher and lower impedance lines are available on special request.

Some of the more common applications of delay lines are color television transmission and reception, digital computers, radar, guided missiles, oscilloscopes and nuclear physics instrumentation.

IRC's extensive mass production experience in the manufacture of continuous lengths of precision wirebound resistance elements has been employed to produce a high quality, low cost, distributed - constant delay line.

For complete information write for 4 page bulletin S-2 to **International Resistance Co. Ltd., 349 Carlaw Ave., Toronto, Ontario, Canada.**

• *Oil Tight Push Buttons*

Item 1655

Designed for accessibility of wiring, distinctive appearance and flexibility, these new heavy duty Oil Tight push buttons are rated to 550 volts AC-DC. Because of standardization and interchangeability, more combinations of Oil Tight push buttons are now available with fewer parts.

Available from Davis Automatic Controls Ltd., this new line includes push buttons, selector switches, selector push buttons, pilot lights and accessories such as mushroom head, lever and key lock. All units are built around one standard contact block. No rights or lefts. These contact blocks can be used singly or in tandem, mounted vertically or horizontally.

A special oil seal prevents oil from entering the enclosure and the switching mechanism. There are no diaphragms to rupture or puncture. All visible metal parts are chrome plated or anodized. Standard buttons are used for all accessories. The mushroom head, lever or key lock are front mounted without removing the unit from the panel. Accessories can be easily shifted from one button to another without interrupting the operation of the panel.

Oil tight pilot lights are built for direct voltage, transformer or neon application. Extend shatter-resistant lenses provide the greatest angle of visibility.

How to select the right push button and accessories for every application is fully described in Catalog 5606, obtainable from **Davis Automatic Controls Ltd., 4251 Dundas St. W., Toronto 18, Ontario, Canada.**

• *Magnetic Clutch*

Item 1656

Marsland Engineering Limited of Kitchener, Ontario, announce production of Magnetic Clutch Model M-134.

The body and mounting are similar in size to 18 Bu Ord. motor. All ball bearings. Maximum speed 4,000 R.P.M.

Application: Servo mechanisms and computers.

Energizing Power: 24 V D.C., 3 watts.

Minimum Torque: 35 oz. inch.

For further information, write **Marsland Engineering Limited, Kitchener, Ontario, Canada.**

New Products

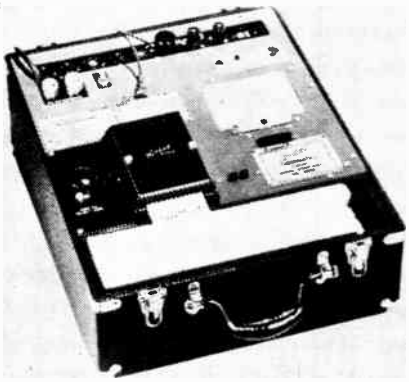
• *Cardamatic Tube Tester*

Item 1657

Prior to the design of the model 123 Cardamatic, only the Hickok Model 700 laboratory type tester permitted the exact setting of all the different voltages to the different elements of a tube. Now, with the engineered perfection of the Hickok 123, an infinitely large number of exactingly controlled voltages are available for each element of a tube under test. In fact, through use of the Hickok Cardamatic system, the design engineer can now choose a great variety of voltages for design testing of tubes used in special purpose circuits.

The tough vinyl type cards of the Model 123 slide in easily to instantly and positively trip the automatic mechanism which makes all the electrical connections required for the testing of any receiver tube.

The unusually low 0.22 volts RMS signal used on the grid was previously available only in laboratory type testers such as the Hickok Model 539B or 700. This low voltage system now furnished in the Model 123 is necessary in testing the newer more sensitive type tubes in order to avoid test distortion.



The 123 Cardamatic is the only commercial tube tester available anywhere with this decisive test advantage. The "Knee" test is especially valuable to the service engineer who can now instantly and accurately evaluate the ability of a tube to work in a TV sweep output circuit. Another feature of this tube tester is the speed in testing a tube. An unskilled operator can check a tube in just 8 seconds including life and gas tests after the tube warm-up.

For additional information and catalogs, write **Stark Electronic Instruments Limited, Ajax, Ontario.**

• *Universal Impedance Bridge Assembly*

Item 1658

A new universal impedance bridge assembly, Model 291, complete with ac and dc generator and detector units, is being announced by Electro-Measurements, Inc., 7524 S. W. Macadam, Portland, Oregon.

"Human Engineering" has produced an instrument having unusual simplicity of operation with convenient "in-line readout" provided by the exclusive ESI DEKADIALS. Advanced engineering provides extremely accurate measurements of inductance, capacitance, resistance, and conductance over a very wide range.

The instrument is contained in an attractive portable carrying unit. When closed, the instrument, including all panel controls, test leads and accessories, is completely protected. The bridge may also be mounted in a standard 19 inch relay rack.

For dc measurements of resistance and conductance, the built-in dc generator, operated from a 115 volt, 50-60 cycle ac power line, can provide either 10 volts or 300 volts to the bridge. During the balancing operation, bridge nulls are detected on a light beam type galvanometer having a deflection sensitivity of 30 millimeters per microampere.

An adjustable 0 to 15 volt power supply, operable from 100 cycles through 10 kilocycles, is available for ac impedance measurements. Frequency selections are made by means of plug-in networks. Visual detection of bridge balance is provided for by use of a dual electronic ray indicator having instantaneous response to a wide range of signal changes. Terminals are provided for accommodating other types of detectors when desired. Ample gain allows null indicator sensitivity to 20 microvolts or less.

The operating ranges and accuracies for this bridge have been improved. They are now 0.1 milliohms to 1.2 megohms, accurate to ±(0.1%); 0.1 micromicromhos to 1.2 mhos, accurate to ±(0.1%); 0.1 micromicrofarad to 1200 microfarads, accurate to ±(0.2%); and 0.1 microhenry to 1200 henrys, accurate to ±(0.3%). The high precision possible with this bridge is achieved through the use of E S I close tolerance, wire-wound resistors and the exclusive DEKASTAT rheostat. The main LRC dial has a scale with 11,000 effective graduations spaced approximately 1 millimeter apart.

Exclusive Canadian sales representatives: **Mel Sales, a Division of Measurement Engineering Ltd., Arnprior, Ont., Canada.**

• *Octave Band Analyser*

Item 1659

Equipment for fast, easy band analysis of complex wave forms over the frequency range 20 cycles to 10 kilocycles has been developed by Dawe Instruments Ltd. An illustrated leaflet describing this and other Dawe equipment is now available on request.

The analyser itself is said to be small, compact and light in weight and to measure sound levels even in the presence of other sounds. Typical applications are the analysis of aircraft, vehicle, machinery, and office noise etc. and noise level acceptance tests in production inspection. The equipment can also be used for determining the acoustical characteristics of rooms.

The analyser measures 15 inches by 9 inches by 13½ inches high. It weighs 32 lbs.

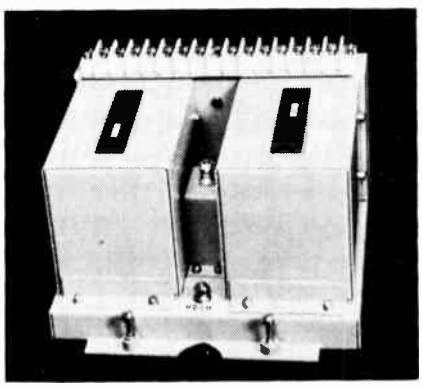
Detailed information is available by writing to **Dawe Instruments Ltd., Canadian Division, 1654 Bank Street, Ottawa 1, Ont., Canada.**

• *Transistor Servo Amplifier*

Item 1660

Marsland Engineering Limited are manufacturing at their Kitchener, Ontario plant Transistor Servo Amplifier, Model AM-101 (AM-104 + AM 105).

Built into this unit are power supplies, null voltage suppressor, tachometer generator phasing network, speed adjustment and quadrature rejection circuit.



Application: High gain, 400 c, synchronous amplifier for highest accuracy velocity integrating servo-loop, using up to size 18 Bu. Ord. motor/tachometer generator.

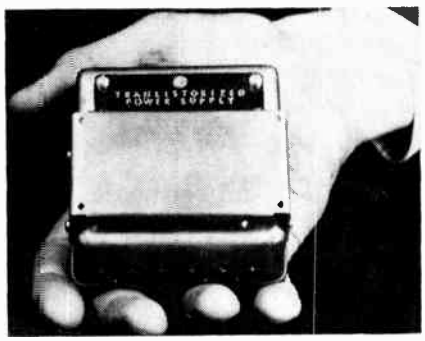
Marsland Engineering Limited, Kitchener, Ontario, Canada.

• *Transistorized Power Supply For 2-Way Radio Units*

Item 1661

A new transistorized power supply designed to provide greater reliability in two-way radio communication equipment and to effect substantial savings in component replacement is now available from Canadian General Electric Company Ltd.

The unit is the first of its kind to be introduced as "commercially available" by a major mobile communications manufacturer. It replaces the receiver portion of the mobile power supply and, with life expectancy equal to that of an entire mobile combination, will help accomplish cost reductions in maintenance for both small and large fleet radio users.



G-E's new transistorized power supply reduces the need for frequent replacement of vibrators. The low expense of installing the new supply will be written off quickly in savings from reduced maintenance costs.

Designed around a printed wiring board, the unit measures 3½ inches wide, 4 inches long and 1¾ inches deep. It is lightweight — 12 ounces — and is small enough to be mounted on the front exterior of a standard General Electric two-way radio case. In other units, it may be mounted wherever it is most convenient.

Additional information on the new transistorized power supply may be obtained from the **Electronic Equipment and Tube Department, Canadian General Electric Co. Ltd., 830 Lansdowne Avenue, Toronto 4, Ontario, Canada.**

• *Circuit Balancing Potentiometers*

Item 1662

Bourns Laboratories Inc. of Riverside, California, recently announced a revolutionary advance in miniature circuit balancing potentiometers since they introduced the original Trimpot Potentiometer several years ago.

The unit is microminiature in size, featuring humidity proof construction and high power dissipation in addition to performance under extremes of vibration, shock and acceleration.

The $\frac{3}{8}$ inch by $\frac{3}{8}$ inch by 1 inch model 220 Trimpot Jr permits 17 units to be mounted in one square inch of panel space. Stable electrical settings are assured by the self locking feature of the 15 turn adjustment shaft. A new wiper assembly idles at the mechanical limits preventing possible damage by forcing adjustments. The Trimpot Jr is a precision wire-wound potentiometer with a power rating of 2 watts and a maximum operating temperature of 175°C.

The instrument has 100 per cent dutiful potentiometer range and is available in a wide variety of standard resistances. All internal electrical connections are welded to insure reliable performance under extreme environmental conditions. Extremely rugged, the Trimpot Jr will meet or exceed Government specifications for shock, vibration and acceleration. The instrument is also impervious to other common environments such as salt spray, fungus, sand and dust.

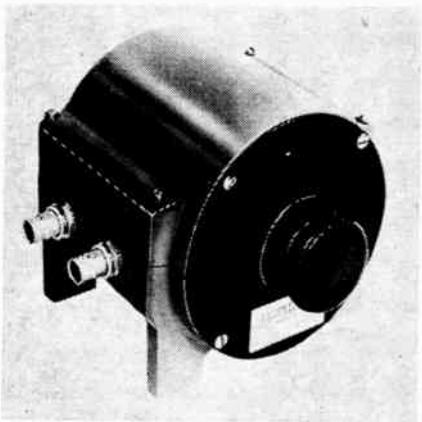
Additional details are available through the Canadian sales representatives — **Electromechanical Products, Markham Road, Agincourt, Ontario.**

New Products

• *Coaxial Turret Attenuators*

Item 1663

The Narda Corporation, Mineola, New York has developed three new coaxial turret attenuators, Models 705, 706 and 707, which offer the designer or laboratory development engineer twelve steps of attenuation in the UHF range from dc to 1500 megacycles. A single unit can give a maximum of 30 db. Two units can also be used in series to permit a wide range of control in small steps.



Designed for either bench use without further mounting, or for mounting into a test equipment package, the new turret attenuators are housed in a sturdy cast case which is provided with tapped mounting holes. All models use type BNC connectors and have twelve snap-in attenuator pads in a convenient turret arrangement.

The new units have a zero insertion loss position for use in applications where it is necessary to obtain the full output of the signal source into the load. This zero insertion loss position also provides a convenient point for calibration without physically removing the attenuator. A spring-loaded detent assures alignment of the pad selected. An engraved dial indicates the attenuation values.

A data sheet containing descriptions, specifications, photos and prices of the new coaxial turret attenuators is available on request from the Canadian sales representatives, **Mel Sales, a Division of Measurement Engineering Limited, Arnprior, Ontario.**

• *CH General Purpose Recorder*

Item 1664

A new CH general purpose recorder — 50 times more sensitive than its predecessor — has been announced by General Electric's Instrument Department.

The new highly-sensitive instrument measures and records d-c millivoltage signals as low as one millivolt full-scale and is used primarily in scientific research, pilot-plan studies, laboratory experimentation, trouble-shooting, and with various transducers.

DC amplifier and power supply are completely self-contained within standard CH recorder case. Furnished with two sets of input signals, the d-c instrument can also be used as a standard 5-ma recorder. Four millivoltage ranges — 1, 2, 5, or 10 millivolts — are easily changed by replacing a plug-in resistor located on the amplifier chassis.

According to instrument engineers, the new d-c recorder employs a high-gain, chopper type amplifier to strengthen the d-c millivolt signal. The strengthened signal operates a standard 5-milliampere d-c measuring mechanism, with less than one microamp of "drain" on the measured circuit. Response time for full-scale deflection is ¾ of a second.

The d-c recorder features "throw-away" type plastic inkwell, 150-ft. record roll, and weatherproof case. Synchronous-motor chart drives (up to 28 chart speeds) or 60-day spring-clock drives are available.

The "throw-away" plastic inkwell has been further improved by the addition of a baffle which helps eliminate any "sloshing" and consequent spilling of ink as the portable recorder is moved about.

For further information, write for descriptive bulletin, GEC-1319: **General Electric Company, Schenectady 5, New York, U.S.A.**

• *Ferranti Business Transactor*

Item 1665

Ferranti Electric Limited, of Industry St., Mount Dennis, are preparing to unveil a highly versatile new access equipment. This desk type unit is known as the Ferranti Transactor and provides combined input and output facilities in electronic digital data processing systems.

Developed for T.C.A., its initial use will provide a demonstration reservation system.

The transactor reads pencil marked cards statically and records output with punch marks on the input card. A complete input and output record of each transaction is kept on the input card.

The static reading process permits exceptional flexibility in card layout and the transactor should find application in many other business systems.

For further information, write **Ferranti Electric Limited, Industry Street, Mount Dennis, Toronto 15, Ontario, Canada.**

• *High Temperature Ceramic Triode*

Item 1666

A new premium quality ceramic planar triode, recently added to the Eimac line of electron power vacuum tubes, has been announced by Eitel-McCullough, Inc., San Bruno, California. Designated the 3CX100A5, this high temperature ceramic triode has been designed to overcome all disadvantages of the 2C39 types, and is mechanically and electrically interchangeable with that series.

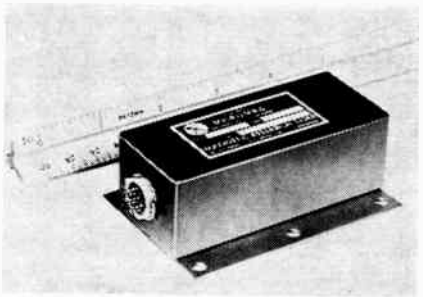
Among the advantages achieved over the 2C39 family are: longer life, 10 per cent more power output at 2500 Mc., full ratings to 60,000 feet, lower inter-electrode leakage and sustained performance at temperatures to 300°C. It can be employed to 3000 Mc. High quality and close tube-to-tube uniformity are achieved by a series of rigid production tests including a long pulse cathode evaluation test and a positive grid voltage-current division test.

For further information contact the Canadian representatives: **The Ahern and Soper Co. Ltd., 384 Bank St., Ottawa, Ontario, Canada.**

• *Magnetic Low-Level DC Signal Amplifier*

Item 1667

A new type magnetic low-level DC signal amplifier capable of operating from a 28 volt aircraft or missile system, is announced by Magnetic Research Corporation, Hawthorne, California.



Designated the Micromag MMO-528, the compact unit features a built-in transistor oscillator which generates its own frequency, enabling operation from a DC source. The unit is therefore free from the ± 10% variations normally present when excitation is provided by an AC line supply. Input is electrically isolated from the output. A built-in voltage regulator eliminates the need for a separate power supply. Having a voltage gain of 500, the MMO-528 achieves 5VDC output from 10 millivolt DC input signal. Designed for amplification of signals from thermocouples, strain gages and similar low-level transducers, the amplifier has virtually no zero drift, and is temperature compensated to provide excellent gain stability. Compensated temperature range is O to 60°C, and can be extended to 85°C on request.

No tubes are used and no warm-up time is necessary. The unit is potted and hermetically sealed to insure reliable operation, and is designed to meet MIL-E-5272A specs.

Further information may be obtained **from Magnetic Research Corporation, Sales Engineering Department, 3160 West El Segundo Blvd., Hawthorne, Calif., U.S.A.**

• *Portable Ham And SWL Receiver*

Item 1668

A new, portable, Ham and SWL receiver which can be used in four ways is being distributed in Canada by the Electronic Tube and Components Division of Canadian Marconi Company

The receiver, Model N-66, has been developed by the National Company of Malden, Mass. It can be used as a three-way portable, an SWL receiver, a Ham receiver, and as a marine receiver. In addition, it can be used either indoors or out.

The Model NC-66 can be operated on either 115 V. AC/DC or a battery; it has five band coverage from 150 kc to 23 mc, an electrical bandspread with logging scale, and a fixed-tune, CW oscillator. The receiver is equipped with a full view, slide-rule dial, a five inch PM speaker, a phone jack, and two built-in antennas (ferrite loop for DF and BC bands and whip for the SW bands).

For boat owners there is a special marine band from 150 kc to 400 kc covering the DF frequencies, and provision for an external direction finder (Model RDF-66 Loop accessory). The unit is also salt-spray tested, receives voice or code; and has a separate switch for stand-by operation.

The new receiver is housed in a sturdy two-tone chrome trimmed metal cabinet, and is equipped with a carrying handle. Weight is 16 pounds, less battery. Dimensions are: width, 12-5/16 inches; height, 9-1⅛ inches; depth, 10 inches.

Electronic Tube and Components Division, Canadian Marconi Company, 830 Bayview Ave., Toronto, Ontario, Canada.

News Report

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

J. T. Rochford Manages High Fidelity Show

Sponsored for the first time by a group of high fidelity manufacturers and sales representatives who have formed a Canadian organization known as the Dominion High Fidelity Association, with headquarters in Toronto, the third annual Toronto High Fidelity Exposition is scheduled to take place in the Park Plaza Hotel, Toronto, from October 30th through November 2nd.

R. C. Kahnert, president of Dominion High Fidelity Association, has announced the appointment of John T. Rochford, well known throughout the radio and electronic industry, as show manager. He assumes this responsibility in addition to his duties as national secretary-treasurer of Canadian Electronic Wholesalers Association.

Three floors of the new north wing of the Park Plaza have been reserved for this year's high fidelity show. Several high fidelity authorities have been invited to speak on various aspects of the art, among them being Emery Cook of Cook records fame, R. W. Merrick of the British Ferrograph Recorder Company, and Harold Leak, the amplifier man.

Additional information concerning the 1957 Toronto High Fidelity Exposition may be obtained from the show manager, John T. Rochford, 25 Taylor Drive, Toronto 6, Ontario.

Canada Wire Builds Vancouver Plant

It was announced recently by O. W. Titus, president of Canada Wire and Cable Company Limited that the company will proceed immediately to build the initial unit of a new plant located on a 15-acre site on the Annacis Industrial Estate adjacent to the growing city of Vancouver.

The new plant will provide double the manufacturing area of the present plant which has been in operation since 1949. It is anticipated that twice the present staff will be required to man the plant. On completion of this new unit, Canada Wire's operation in Vancouver will be the largest of its kind west of Toronto.

Canada Wire's decision to locate its expanded West Coast operation on Annacis Industrial Estate has focused attention on one of the most interesting and rapidly growing industrial sites in Canada.

The warehouse and sales office of the company will remain at its same location, 1494 Powell St., Vancouver, for the convenience of customers.

New Divisions At Canadian Westinghouse

A major organizational change creating divisions from four departments within the industrial products group has been announced by the Canadian Westinghouse Co. The new change brings to seven the number of new operations divisions announced in the past two months by the company.

R. H. Williams, general manager, industrial products group, said the industrial products division will be eliminated and the four departments will be known as the industrial control division, meter and relay division, distribution apparatus division and lighting division. The B. F. Sturtevant Company of Canada Ltd., Galt, Ontario, a Canadian Westinghouse subsidiary, will also operate under the industrial products group.

NORTHERN ELECTRIC COMPANY APPOINTMENTS

D. C. McKELLAR

P. THOMPSON

M. A. WILSON

D. K. ATKINSON

C. T. BALL

F. J. FORTIER

J. G. ROGAN

P. G. GREEN

L. G. BARTLETT

C. E. LITTLE

● (Top row): D. C. McKellar has been appointed Central zone manager of Northern Electric Company, Limited, with headquarters in Toronto. P. Thompson has been appointed assistant Central zone manager. M. A. Wilson has been named Western zone manager, with headquarters in Winnipeg. D. K. Atkinson has been made assistant Western zone manager. C. T. Ball has been appointed Eastern zone manager, with headquarters in Montreal.

(Bottom row): F. J. Fortier is assistant Eastern zone manager, with headquarters in Montreal. J. G. Rogan has been appointed assistant region manager, with headquarters in Ottawa. P. G. Green has been appointed Maritime region manager, with headquarters in Halifax. Mr. Green succeeds M. A. Wilson, who has become Western zone manager. L. G. Bartlett has been appointed Manitoba region manager, with headquarters in Winnipeg. C. E. Little has been appointed Calgary branch manager and succeeds L. G. Bartlett.

News Report

Pye's Instrument Division Moves To Toronto

Eric Sullivan, manager of the Pye Scientific Instrument Division, has announced the removal of his office from Ottawa to the head office in Toronto.

The new location of the Instrument Division is considered an improvement, since Mr. Sullivan will be able to give his personal attention to customer inquiries. For the first time, sales, service and stores are consolidated and increased efficiency has been realized.

Mycalex Corp. Appoints Director Of Research

The appointment of Arthur J. Warner as director of research for Mycalex Corporation of America and associated companies has been announced by Jerome Taishoff, president of the organization.

Mr. Warner has had a distinguished career in research and development, both in the United States and in his native England. He has served on many national industry committees, both in the United States and in England, among them terms as secretary of committee D-20 (Plastics) of the American Society for Testing Materials, and as secretary of the National Research Council Conference on Electrical Insulation.

A. J. WARNER

Mr. Warner will assume the responsibility for materials and product development in an expanded program to be initiated by Mycalex Corporation of America in electronic components as well as glass-bonded mica and ceramoplastic insulation and synthetic mica.

Adalia Computations Ltd. Installs Datatron System

Adalia Computations Limited recently announced the installation of a complete Datatron Electronic Data Processing System in its head offices in Montreal. This latest step in the expansion of Adalia Computations has been taken to meet the growing demand for electronic business data processing services as well as scientific and engineering computing.

The new computer and its associated auxiliary equipment, valued at well in excess of $350,000, is the latest and most modern equipment of its class, and is claimed to be the largest and most elaborate computer installation in Canada.

A staff of more than 50 problem analysts, programmers, mathematicians and engineers is available for problem preparation and for operating the computer. Its data processing services will be available on an hourly rental basis to Canadian business, industry, government, universities, research establishments, etc.

The advantage of these improved facilities installed by Adalia Computations lies in the fact that it is now possible for small and medium sized Canadian companies to make full use of the modern miracle of electronic data processing at very modest cost without any investment in acquiring expensive equipment or highly trained staff.

Westinghouse — GPL Sign Marketing Agreement

An agreement signed recently appoints the electronics division of the Canadian Westinghouse Company Limited, Hamilton, exclusive Canadian distributor for a wide range of television studio equipment manufactured by General Precision Laboratory, Inc., Pleasantville, New York, U.S.A.

Under the terms of the agreement, Westinghouse will market GPL Telecine equipment and, as in the past, closed-circuit television equipment and closed-circuit projection television equipment.

Additional Representation For Dawe Instruments

Dawe Instruments Ltd. (Canadian Division) of 1654 Bank Street, Ottawa 1, announces that it has been appointed Canadian sales representative for Evans Electroselenium Ltd. of Harlow, Essex, England, and also for Cinema-Television Ltd., of London, England.

Evans Electroselenium manufactures a wide range of instruments used in spectrographic and chemical analysis, such as portable Calorimeters, Flame Photometer, Reflectance Spectrophotometer, Reflectometer, Densitometer, Opacimeter, etc.

Cinema-Television manufactures test equipment, including bridges, pulse generators, counters, etc.

Canadian Hunting Companies Appoint Corporate Secretary

M. E. Dedrick has been appointed Corporate Secretary of all Canadian Hunting companies with the exception of Hunting Associates Limited, the holding company. The announcement was made by Douglas N. Kendall, founder and operating head of these companies.

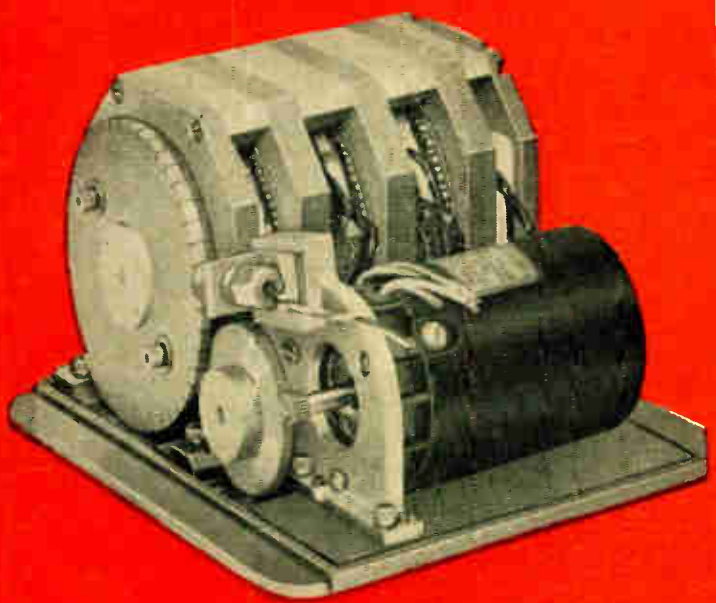
Mr. Dedrick previously was chief accountant of The Photographic Survey Corporation, of Toronto, the original Hunting company in Canada. He also was assistant treasurer of Hunting Associates, a position he continues to hold. He has had much to do with the growth of the organization which started 11 years ago.

M. E. DEDRICK

Mr. Dedrick, a chartered accountant, articled with Price Waterhouse & Co. of Toronto. A native of Owen Sound, he holds M. Comm. and B. Comm. degrees from the University of Toronto.

(Turn to page 50)

DESIGN ACHIEVEMENTS WITH **SUPRAMICA*** ceramoplastics



MYCALEX TM Commutation Switch for Telemetering, Using Precision-molded SUPRAMICA* 555 ceramoplastic Commutator Plates. MYCALEX ELECTRONICS CORPORATION Under Exclusive License of MYCALEX CORPORATION OF AMERICA

Precision-molded SUPRAMICA* 555 ceramoplastic Commutation Plate, CP-368, with 368 Contacts and 2 Slip Rings. Other Standard Plates are Available.

SUPRAMICA* ceramoplastics

PROVIDE NEW STANDARDS OF RELIABILITY FOR DESIGNERS

HIGHER TEMPERATURES . . . RADIATION RESISTANCE . . . TOTAL, PERMANENT DIMENSIONAL STABILITY . . .

SUPRAMICA ceramoplastics are precision-molded insulations with temperature endurance greater than any comparable material. Molded parts, such as the commutator plate illustrated above, have complete, permanent dimensional and electrical stability under extreme conditions of humidity and temperature.

Metal inserts molded in SUPRAMICA ceramoplastics cannot loosen during thermal cycling because coefficients of expansion are closely matched. There is no possibility of shrinkage, growth, or age polymerization, as the materials are completely inorganic, made with Synthamica* synthetic mica. Other desirable properties are high dielectric strength, radiation and arc resistance, low electrical loss, imperviousness to moisture, oil and organic solvents.

In thousands of military and industrial applications, SUPRAMICA ceramoplastics are contributing to better, safer, more reliable operation of electrical and electronic equipment

SUPRAMICA* 560 — for temperatures over 500°C. (932°F.)
SUPRAMICA* 555 — for temperatures up to 650°F.
SUPRAMICA* 500 — sheet and rod material for machining.

Write for complete information.

*SUPRAMICA is a registered trade-mark of Mycalex Corporation of America 555 and 560 and 500 are trade-marks of Mycalex Corporation of America SYNTHAMICA is a trade-mark of Synthetic Mica Corporation, a subsidiary of Mycalex Corporation of America

MYCALEX
CORPORATION OF AMERICA

SUPRAMICA® CERAMOPLASTIC · SYNTHAMICA SYNTHETIC MICA · MYCALEX® FINE INSULATORS

EXECUTIVE OFFICES:
30 ROCKEFELLER PLAZA
NEW YORK 20, NEW YORK

GENERAL OFFICES AND PLANT:
CLIFTON, NEW JERSEY

CHICAGO — LOS ANGELES — DAYTON
WASHINGTON — MIAMI

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

News Report

Canadians To Attend U.R.S.I. Assembly

Delegates from many countries, including Canada, will meet in Boulder, Colorado, August 22nd to September 5th, when Commissions of the Union Radio Scientifique Internationale will hold their 12th general assembly. The Canadian delegation of scientists will be headed by Dr. D. W. R. McKinley of Hamilton, Ontario, chairman of the Canadian Committee of U.R.S.I.

Other members who will accompany Dr. McKinley to represent Canada at Boulder are:

Dr. J. T. Henderson, National Research Council, Ottawa and President of the Institute of Radio Engineers
Dr. J. S. Marshall, McGill University
Mr. J. C. W. Scott, Defense Research Board, Ottawa
Mr. A. E. Covington, National Research Council, Ottawa
Dr. H. P. Koenig, Laval University
Dr. George Sinclair, University of Toronto.

Dr. D.W. R. McKinley

Dr. G. Sinclair

The nine hundred delegates attending at Boulder, including some from behind the Iron Curtain, will represent their own country rather than any particular institution, group or university. The assembly, held every three years, is purely scientific and its purpose is to promote international co-operation in radio research.

International chairman of committee VI-3 of the U.R.S.I. and responsible this year for organizing several of the technical papers for the assembly at Boulder, is Dr. George Sinclair whose work at the University of Toronto's electrical engineering department is concerned chiefly with the theory of antennas. Formerly a student of Ohio State University, he remained there in war research, building up a project which later became the Antenna Laboratory, where considerable government research is done. By reason of his interest in other associated fields of radio, Dr. Sinclair has been appointed for the second year in succession as chairman of the technical program committee of the Institute of Radio Engineers' Canadian convention-exposition to be held in Toronto in October. His abstracting of some 120 technical papers was an important contributing factor to the success of the I.R.E.'s 1956 convention.

PSC Applied Research Limited Announces Change Of Name

One of Canada's best-known instrumentation development, engineering and production firms has changed its name and now will be known as Canadian Applied Research Limited. It was formerly known as PSC Applied Research Limited.

Recently incorporated into the group of companies owned by A. V. Roe Canada Limited, Canadian Applied Research Limited will continue to supply to the world's aviation industry many of its complex aircraft instrumentation devices such as the R-Theta Navigation Computer System, the Dual-Probe Icing Detector, De-Icing Controller, the Rocket-Firing Intervalometer.

Besides its present plant and offices at 1500 O'Connor Drive, Toronto, the firm has just moved into an additional 16,000 square feet area on Bermondsey Road where production facilities are being installed for the manufacture of the company's larger varieties of special instruments. The addition now provides 56,000 square feet for the firm's engineering, production and environmental test laboratory facilities.

E. D. Rushbrook Named Secretary And Treasurer

Edward D. Rushbrook, C.A., 35, has been appointed secretary and treasurer of the newly-named Canadian Applied Research Limited of Toronto, Canada. Formerly known as PSC Applied Research Limited, the company has gained world-wide recognition for specialized aircraft instrumentation devices and for other scientific instruments now in wide use.

E. D. RUSHBROOK

Mr. Rushbrook gained his articles in 1950 while with Price, Waterhouse & Co., after service with the Royal Canadian Navy. He joined A. V. Roe Canada Limited as assistant comptroller in 1955 and left that position to accept his new post when Applied Research was acquired by A. V. Roe Canada Limited and the Hawker-Siddeley Group.

Aero-Com Symposium At Utica, November 6 - 7

The Institute of Radio Engineers Professional Group on Communications Systems has arranged for a National Aero-Com Symposium to be held at the Hotel Utica, Utica, N.Y., on November 6th and 7th, 1957.

Last year's Symposium, held in October, was acclaimed a tremendous success and was well received by over 600 government and industrial representatives from all parts of the country and foreign lands.

The 1957 Symposium will stress the requirements, progress and challenge of aeronautical communications in all its phases in this, the Atomic Age.

Prominent engineering and manufacturing concerns in the communications field will exhibit their products, and a host of original technical papers will be presented by authorities working in this rapidly advancing field.

For further data on advertised products use page 65.

News Report

Ontario Section C.E.W.A. Elects Officers

At a meeting of the Ontario section of the Canadian Electronic Wholesalers' Association, the following officers were elected for the ensuing year: chairman: Jack Keshen, of Rono Vision Distributing Company Limited; vice-chairman, W. F. Saynor, of Wholesale Radio & Electronics Limited, Toronto, and secretary, H. E. Abrams, of Fisher Radio Company Ltd., London, Ontario.

The meeting was held in the King Edward Hotel in Toronto on Tuesday, July 16th and was addressed by Percy J. Houghton, manager (Ontario Division), The Canadian Credit Men's Trust Association Limited, Toronto.

Change Of Location For Pye's Vancouver Office

Pye Canada Limited, through its Western sales manager, Murray Laidlaw, has announced that the Western sales office is now located at 6692 Main Street, Vancouver 15, B.C.

The new location provides larger office and showroom facilities as well as ample customer parking. The telephone number is ELgin 1822.

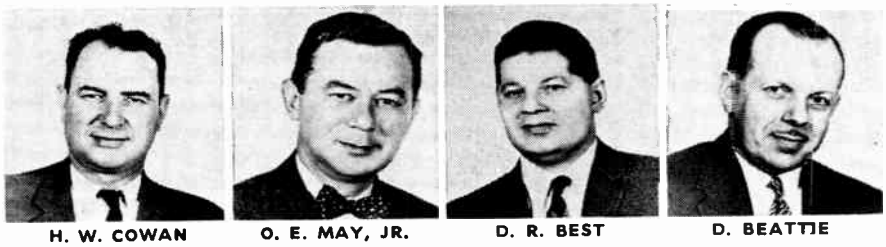
Earl M. Brydon Passes In 57th Year

Earl M. Brydon, age 57, died July 28th, 1957, at his Winnipeg home.

Mr. Brydon was a Professional Engineer with a B.A. Sc. degree from the University of Manitoba, class of 1924.

In 1931, Earl Brydon joined Canadian Line Materials Ltd. and was Ontario sales manager until 1949. He then formed the E. M. Brydon Ltd., 292 Princess St., Winnipeg, and exclusively represented CLM in Manitoba as well as acting in an advisory capacity in Alberta and Saskatchewan.

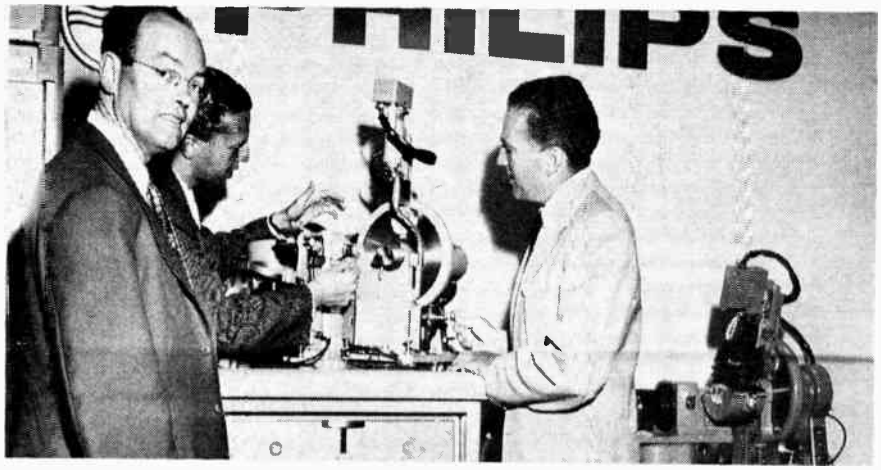
"Dooley" as he was fondly known, will be sadly missed by his many business friends.



H. W. COWAN | O. E. MAY, JR. | D. R. BEST | D. BEATTIE

● Subsequent to its recent purchase of the Weston Electrical Instrument Company, announcement was made by Daystrom Inc. of Murray Hill, New Jersey, that a Canadian company had been formed under the name of Daystrom Limited with headquarters in Toronto. Executives of the Canadian company will include (left to right above): H. W. Cowan as manager, and Otto E. May, Jr. as comptroller. Manager of the Montreal branch is D. R. Best, P.Eng., and D. Beattie, M.E.I.C., P.Eng., is in charge of Toronto sales.

For further data on advertised products use page 65.



● Over six hundred of the world's leading crystallographers took part in the Union Crystallographers' Fourth General Assembly and International Congress held at McGill University July 10-17. Photo shows E. Batler (right) Manager, Professional Products Division, Philips Industries Limited, explaining one of his company's exhibits to European delegates. Canada, Great Britain, United States, Russia, Japan, France and the new African state of Ghana were among 26 nations represented at the Congress.

C.N.R. Hotel Rooms Feature Entertainment

The new Canadian National Railways hotel, the Queen Elizabeth Hotel, which is scheduled to open officially early next spring in Montreal, will have radio, television and recorded music available in every room.

Behind this achievement lies a story of engineering and constructing a miniature radio-TV network, believed to be the largest and most elaborate of its kind ever installed in Canada.

From the master control room, technicians will be able to select and distribute programs on six of nine possible TV channels and on six of ten possible radio and audio circuits.

Among the special features are facilities for distributing closed circuit telecasts, and an emergency signal system for every room.

The entire communications network . . . involving some 35 miles of wire and five months' work . . . is being installed for the C.N.R. by RCA Victor Company of Canada.

B.C.'s First Copper Mill

Financing has been completed and construction will commence immediately on British Columbia's first copper mill, according to a recent announcement by Richard M. Reiner, president of Western Copper Mills Ltd., Vancouver.

The project, which was originally announced over a year ago as a $3½ million investment, will run to in excess of $8½ million. It will be completely underwritten by Canadian funds.

Originally scheduled to employ 200 workers at full capacity, the plant on completion is expected to employ 350 with a maximum capacity of 18,000 tons annually.

Products will cover a variety of items for the electrical industry, principally buss bars for high as well as low tension switchgear installations, etc. Other industrial products will be a complete line of brass rods and shapes, and copper rods for the local wire and cable mills.

Using mainly Canadian and U.S. copper, the mill will supply the needs of Western Canadian industry primarily and will also seek markets across Canada and abroad.

News Report

Supplementary List Of Exhibitors At IRE Canadian Convention

Further to the list of exhibitors at the IRE Canadian Convention published in the June 1957 issue of ELECTRONICS AND COMMUNICATIONS magazine are the following names:

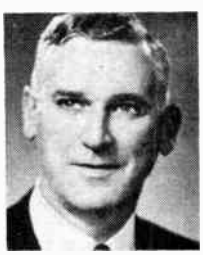
Alpha Aracon Radio Co. Ltd., Toronto, Ont.
Amalgamated Electric Corporation, Toronto, Ont.
American Electrical Heater Company, Detroit, Mich.
British Physical Laboratories, Radlett, Herts., England.
Alex L. Clark Limited, Toronto, Ont.
The Constanta Company of Canada Limited, Montreal, P.Q.
D & B Sound & Signals Inc., Montreal, P.Q.
Electronic Instruments (Canada) Limited, Toronto, Ont.
Electrodata, Division of Burroughs Adding Machine of Canada Ltd., Ottawa, Ont.
General Adding Machine Company, Toronto, Ont.
Radio Speakers (Canada) Limited, Toronto, Ont.

There is a change in name of one exhibitor shown on the original list as PSC Applied Research Limited, Toronto, Ont. The name of this organization has been changed to Canadian Applied Research Limited.

RCA Victor Announces Appointment Of Two New Vice-Presidents

Mr. P. J. Casella, president of RCA Victor Company, Ltd. has announced the appointments of John J. Kingan as Vice-President and Assistant to the president, and J. D. Houlding, as vice-president, technical products.

Mr. Kingan comes to RCA after years of experience in the electronics and communications fields in Canada and abroad. His last position was vice-president and general manager of the Canadian Marconi Company.



J. J. KINGAN

J. D. HOULDING

Mr. Kingan was born in Manchester, England and received his education at Norwood and Sydney Colleges, England. He came to Canada with his parents as a young man.

Mr. Houlding, a native-born Canadian has years of experience in the fields of electronics and atomic energy. Previously, he was employed by the Canadian Westinghouse Company, and held the positions of manager, Electronics, Industrial Products, and Atomic Energy Division.

(Turn to page 55)

● H. V. Slade (left), managing director of the Garrard Engineering & Mfg. Co. Ltd., Swindon, England, greets Leonard Carduner and Eugene Carduner of Garrard Sales Corp., Port Washington, N.Y., and C. G. Pointon of Charles W. Pointon Ltd., 6 Alcina Avenue, Toronto, Ontario, upon their arrival in London. Exclusive sales agents for Garrard record changers and turntables in the U.S. and Canada, respectively, Messrs. Carduner and Pointon travelled to England to visit the 1957 Radio Components Show.

For further data on advertised products use page 65.

Wiring World's Largest TV Station (Cont'd from page 36)

Since the cable trough is made of galvanized expanded metal with openings of approximately 1¾ inch diamonds, the wire is given continuous support and protection. These wires carry very little current and can be heaped in the trough. The supporting capacity of the trough, therefore, is dozens of times greater than the capacity of conventional conduit. Moreover, as additions are made to the station, still more cables can be laid in existing trough. To be sure, when color is added more trough and ladder will be needed but these additions can be made economically and the finished system will be both neat and clean.

CBS used cable ladder wherever a run included cables and wires that were continually dropping out to control racks. The ladder has rungs spaced on 10 inch centers. Both wire and cables are draped over these rungs and dropped through as needed.

Material And Time Saving

Audio and video signals are separated throughout the system. In the ladder they are tied together on different sides; in the trough they are separated by a barrier strip. Since both the trough and ladder systems leave the wire exposed to view, but not to damage, it is readily available for inspection, maintenance, and repair. In addition it is available for rerouting. It is a great help in tracing a wire to have it open to view over its entire length.

Trough and ladder save CBS quantities of much needed space in the crowded control rooms. There is no other system that would permit so many cables to be brought to the same point — and frequently many must be brought to the same point.

Installed costs of ladder and trough can be broken down into savings in materials and in time. Materials savings, while considerable, probably amount to less than the time savings when translated into dollars. Many sections of trough include a thousand or more cables and wires. If all these had to be supported in conduit, material costs alone would have been very high. And the weight would have been difficult to support. The trough and ladder, by contrast, are much more economical. A 24 inch width trough that is 10 feet long, for example, weighs only 54 lbs.

CBS engineers have computed accurately the dollars or days saved by the supporting systems adopted and are sure that this saving in time is even greater than the savings in material. The Cope Trough and Cope Ladder systems that were installed have a pin-type coupler that permits a connection to be made in a very few minutes, three or four at the most. This coupler consists of interlocking barrels that are welded to the sides of the ladder or trough and are secured by a pin. A plate fits over the bottom edges of the trough and protects the cables. Only three pieces are required to complete a connection. Often several sections could be hooked together on the floor and lifted into place as a unit.

The Cope Trough and Ladder systems include a wide variety of fittings for turns, risers, drop outs, "Y" connectors, and so on that greatly simplify installation. These fittings, like the straight sections, are secured by the pin. Where nuts, bolts, and washers are required a connection might take as long as half an hour to complete instead of the moment or two with the pin.

The strength of both systems is due in part to the pin being tightly secured in the barrels. Strength also is provided by all steel construction.

For further data on advertised products use page 65.

News Report

Electrodesign Named Canadian Rep.

Fred R. Lesser, sales and marketing manager for Electrodesign, 736 Notre Dame Street West, Montreal, P.Q., announced recently that his company had been appointed exclusive Canadian sales representatives for Laboratory for Electronics of Boston, Mass., U.S.A.

Electronic Flash Approach System For Dartmouth Air Base

A new airport approach lighting system expected to increase flying safety, allow more all-weather flights, reduce flight delays and cancellations and solve many air control problems, will be installed first in Canada at H.M.C.S. Shearwater, Naval Air Station at Dartmouth, Nova Scotia.

Contract for installation of the new high-intensity equipment known as EFAS — for Electronic Flash Approach System — has been awarded by the Department of Transport to Sylvania Electric (Canada) Ltd. The R.C.N. base at Dartmouth is being used by commercial as well as military aircraft.

The Electronic Flash Approach System will be manufactured at Sylvania Canada's plant at Drummondville, Que., where the company produces a wide range of fluorescent and incandescent lighting, photo lamps and electronic equipment.

APPOINTMENT

● Wilfrid Gagnon, Chairman of the Board of Canadian Aviation Electronics Limited, announces the election of James F. Tooley, to the Board of Directors and his appointment as Chief Executive Officer of the firm with the title of Managing Director. Mr. Tooley was formerly a Vice-President of Canadair Limited.

News Report

Manager For Telecables & Wires Ltd.

H. O. Coish has been named manager of Telecables & Wires Ltd., Fort Garry, Manitoba. Telecables & Wires is the first company west of the Great Lakes to produce a complete line of standard polyethylene and paper lead telephone cables.

"This appointment," stated O. W. Titus, president of the company, "indicates the continuing growth of the company since it was established in 1956. The Fort Garry plant is now making every effort to meet the constantly growing demands for telephone service in western Canada."

Specialized Catalog For Electronics Industry

Electro Sonic Supply Company's new catalog is available to those who write the company at 543 Yonge St., Toronto 5.

It is the first radio parts catalog devoted to the specialized electronic components and devices used in the Aircraft, Industrial, Military, Laboratory and Engineering fields.

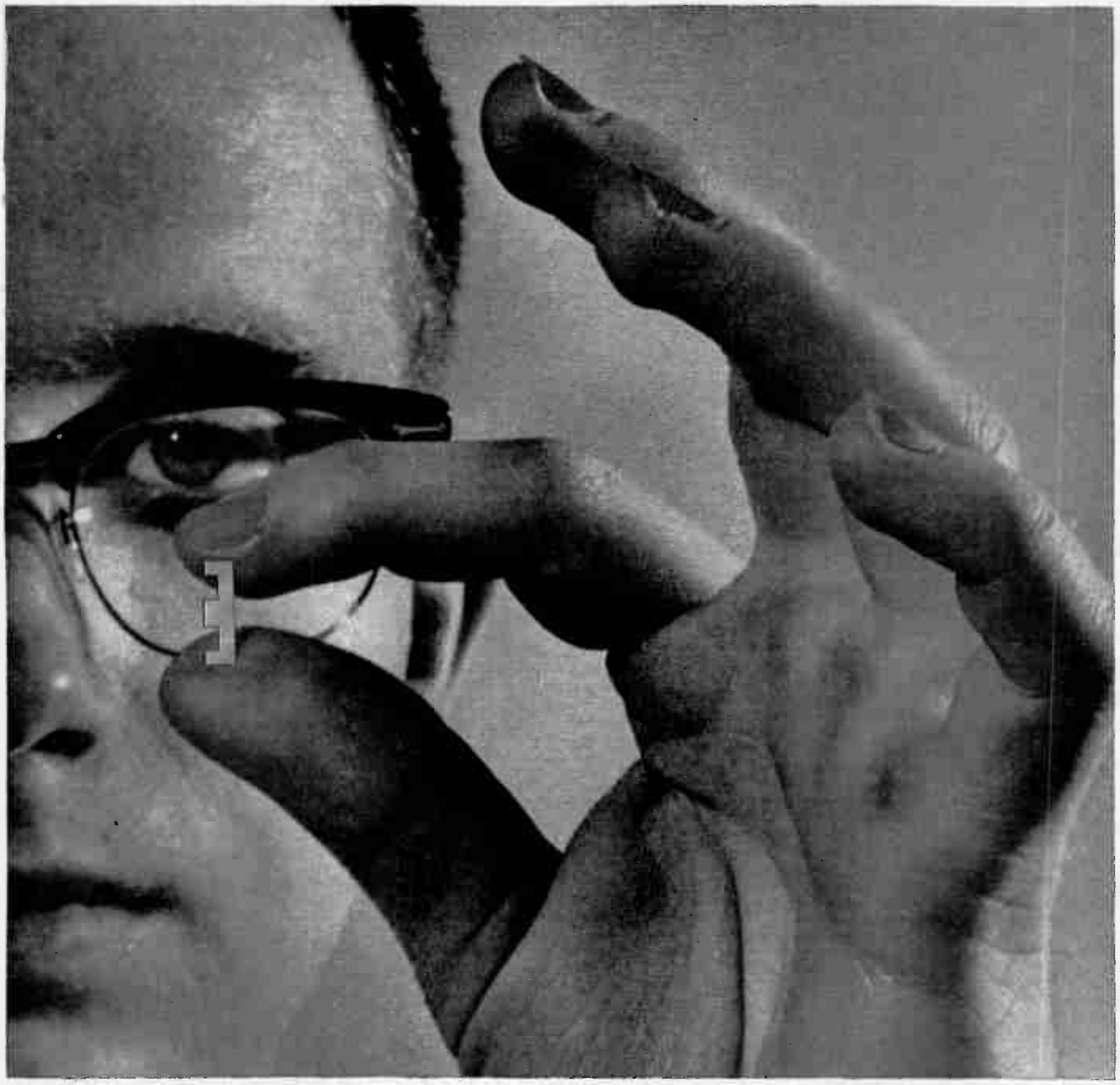
Porter Appointment

The appointment of Elmer J. Goetz as general manager, Federal Wire and Cable Division, is announced by Harold F. Nunn, vice-president, H. K. Porter Company (Canada) Limited of Guelph, Ontario.

E. J. GOETZ

Mr. Goetz received his education in Guelph and on graduating from high school joined the staff of Federal Wire and Cable. During his association with this firm he has progressed through assignments as assistant superintendent, superintendent and works manager, bringing with him to his present appointment a wealth of knowledge of the wire and cable industry.

(Turn to page 58)



Here are laminations for miniaturization

If you are making transformers for transistorized or other miniaturized equipment, information about our ultra-small size "performance-guaranteed" laminations can be important news to you. These nickel-iron laminations are produced in standard gauges, and are available in Hy Mu 80, 48 Alloy and, if required, Orthonol.

Dry-hydrogen annealed by our exclusive process, these laminations provide all-important uniform quality. This annealing at a dewpoint of –60°C. brings our Performance-Guaranteed laminations to ultimate permeability from as little as 5% of that value in the unannealed state.

Like all laminations from Magnetics, Inc., the "miniatures" are packed in standard nine-inch boxes to facilitate handling in your plant, and are immediately available from stock. These features alone provide substantial savings.

Edges of these fine tolerance laminations are cut off squarely and cleanly to minimize air gap where mating parts are butted. Thus, high operating efficiency is insured.

There's no room here for the really detailed story, but for complete information on our "Performance-Guaranteed" magnetic laminations, send for our newest catalog—just published—ML-301. Write today. *Magnetics, Inc., Dept. EC 41, Butler, Pennsylvania.*

MAGNETICS inc.

For further data on advertised products use page 65.

News Report

Canadian General Electric Advances Executives

Two important appointments at Canadian General Electric Company Limited have been announced.

Vice-President Charles A. Morrison, who was formerly general manager of the wholesale department, will report to Board Chairman Harold M. Turner and in his new capacity will be concerned with broad company marketing problems, working in close co-operation with the nine operating departments and departmental sales organizations on a national scale. To his assignment Mr. Morrison brings over twenty-five years of marketing experience in all the company's major product lines. Mr. Morrison was elected a vice-president in 1951.

C. A. MORRISON

W. G. WARD

Walter G. Ward succeeds Mr. Morrison as general manager of the wholesale department. Mr. Ward is a widely known electrical industry executive with broad management experience in the electronics, appliance and apparatus segments of the industry. Prior to his present appointment, which is effective June 1st, Mr. Ward was manager — Induction Motors at Peterborough. In his new capacity Mr. Ward reports to company president James H. Goss.

Both Mr. Morrison and Mr. Ward will have their headquarters at the company's head office in Toronto.

Empire Devices Buy New Plant

Empire Devices Products Corporation, engaged in the development and manufacture of field intensity meters, communication receivers, electronic test equipment, microwave components, etc., have moved from Bayside, L.I., N.Y., to Amsterdam, N.Y., where they have purchased their own plant, a six-story building comprising 150,000 square feet of floor space. Factory staff will probably be increased by 100 per cent by the end of the first year of operation, according to Michael T. Harges, president of the Empire Devices Products Division, which handles electronic production.

Empire Devices is represented in Canada by Cossor Canada Ltd., 758 Victoria Square, Montreal, P.Q.

(Turn to page 64)

For further data on advertised products use page 65.

9 REASONS

why your Advertising in Canada should be in

1. A successful publication that pioneered in this field 5 years ago.

2. A publication tailored to meet the distinctively different needs of the Canadian market.

3. A publication edited by a staff with decades of experience in business paper publishing.

4. A publication that tells management what your product can do and tells the engineers how it does it.

5. A periodical edited by men with engineering technical background and years of experience on sales engineering and market research in this market in Canada.

6. A publication which has been an important factor in rapid development and progress of this field during the past 5 years.

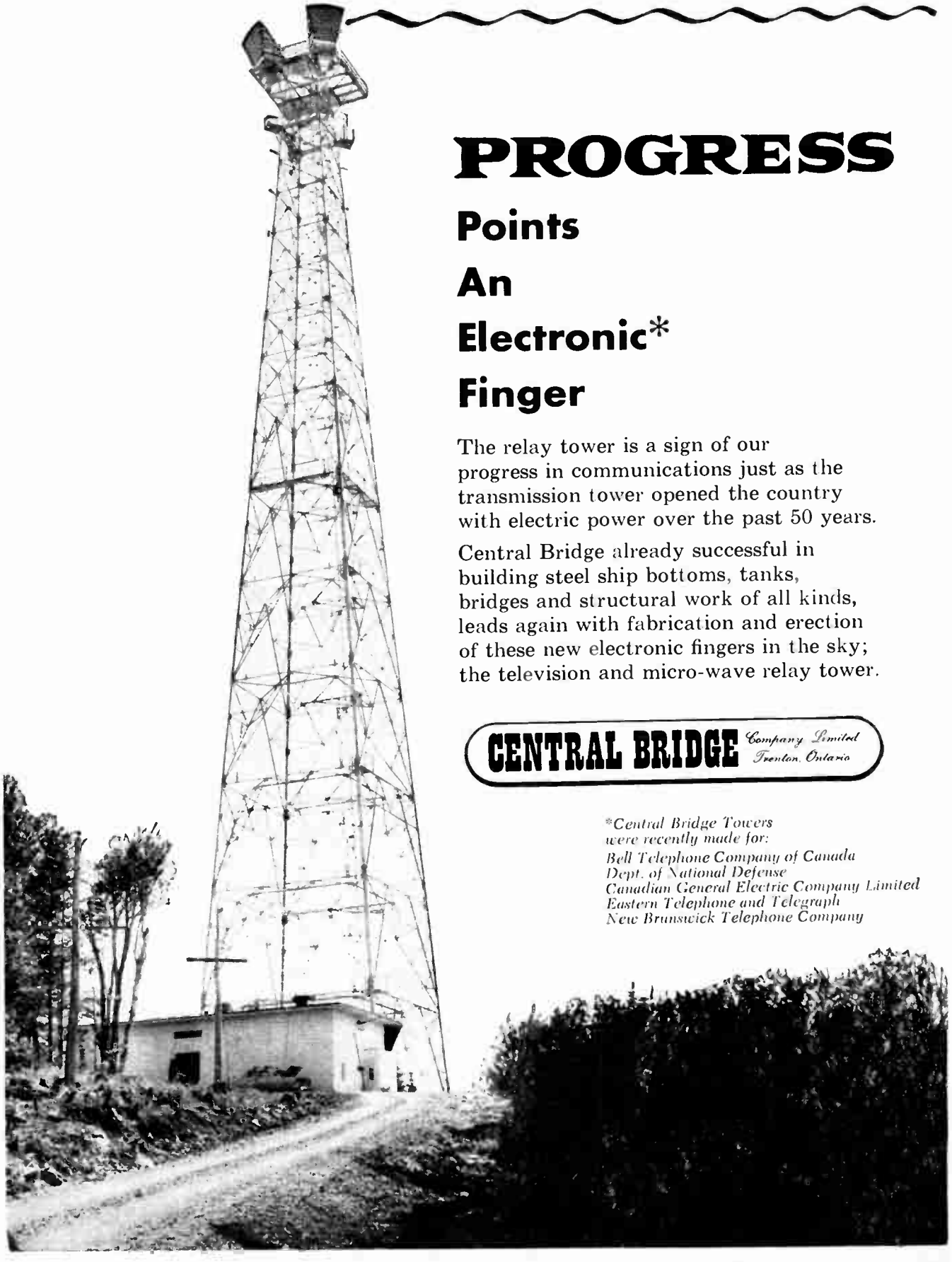
7. A publication that has the largest circulation in its field and whose circulation lists are the result of five years careful checking, eliminating and adding where needful to bring it up to the utmost in efficiency.

8. A publication that carries more technical advertising to more electronic engineers than any other publication in the field.

9. A publication whose technical articles are being listed regularly in the monthly survey of the world's top electronic engineering articles.

ELECTRONICS and COMMUNICATIONS
31 - 35 Willcocks Street Toronto 5, Ontario

For further data on advertised products use page 65.



PROGRESS

Points An Electronic* Finger

The relay tower is a sign of our progress in communications just as the transmission tower opened the country with electric power over the past 50 years.

Central Bridge already successful in building steel ship bottoms, tanks, bridges and structural work of all kinds, leads again with fabrication and erection of these new electronic fingers in the sky; the television and micro-wave relay tower.

CENTRAL BRIDGE *Company Limited* *Trenton, Ontario*

**Central Bridge Towers were recently made for:*
Bell Telephone Company of Canada
Dept. of National Defense
Canadian General Electric Company Limited
Eastern Telephone and Telegraph
New Brunswick Telephone Company

For further data on advertised products use page 65.

electronics

in business & industry

time device

An electronically operated time dispensing device has been installed recently in the Saskatoon telephone exchange. This automatic service replaces the previous 24-hour service given by operators working on shifts. Recorders similar to small, portable record players are synchronized electronically with the time, and work together with pick-up heads to produce one continuous phrase such as "The time is 3:30 and 25 seconds". The enquirer merely has to dial the number 104 to get results.

* * *

navigation

The Nippon Electric Co. Ltd. of Tokyo, Japan, is working to extend the application of its Noctovision system to the field of navigation. By radiating infrared rays and looking through a special type of image tube, this device penetrates darkness so that it is possible to see an object on land several hundred meters distant. For use on vessels together with radar, its effective distance must be extended to at least 1,000 meters. Fishing companies are urging the furtherance of this equipment for application in their industry.

* * *

ultrasonics

Claimed to be a major development in the application of ultrasonics to industrial inspection problems, "Autosonics" is being marketed in Great Britain by Kelvin & Hughes (Industrial) Ltd. The company claims that "Autosonics" eliminates operator fatigue, one of the major causes of inconsistent standards of ultrasonic inspection and provides permanent records for future reference and analysis. It also inspects material automatically at speeds many times greater than possible with other methods and ensures consistent and accurate results.

* * *

banking

A bank in New Jersey has just installed a Post-Tronic machine, said to be the world's first electronic equipment designed for posting only. Compared with more complex and more costly electronic computers, the Post-Tronic is relatively cheap at $11,000 per unit.

* * *

traffic control

An electronic eye traffic control system went into operation in New Westminster, British Columbia, this spring. The lights are controlled by radar and are of the most modern type to be used in Canada. Lights for pedestrians are operated by pushbutton.

* * *

cleaning

An ultrasonic cleaning device for industrial cleaning of small precision parts has been developed. Known as the Glennite Model U-621, this cleaner operates at a frequency of 40kc. The cleaning tank capacity is two pints and no special fluids are required for the process.

* * *

transportation

A series of talks between Western Union Executives and Riddle Airline officials at Miami has resulted in arrangements for an electronic installation to go into operation on the cargo airline's Miami-Atlanta route. This is the first step in a program that will lead to electronic control of deliveries, air waybills, operations, inventory and space reservations.

* * *

oil wells

The use of electronic brains to speed oil well drilling was predicted recently by a General Electric Company spokesman. The company is exploring the use of computers to analyze drilling conditions and automatically control drilling rigs so that they will bore for oil more quickly and economically.

For further data on advertised products use page 65.

News Report

R. W. Hutchins Appointed Executive Assistant

Roger W. Hutchins has been appointed executive assistant to Douglas N. Kendall, founder and operating head of the Hunting Canadian companies. As the former Aircraft sales manager of one of these companies, Field Aviation Company Limited of Oshawa, he is well known in the business and aviation world.

A graduate of McGill University in mathematics and physics, Mr. Hutchins was Montreal plant manager of Federated Metals Canada Limited, a subsidiary of the American Smelting & Refining Co. before joining Field. While in Montreal he developed slag resistance smelting of low tin secondary residues.

R. W. HUTCHINS

In his new duties, Mr. Hutchins will be associated with such other Canadian Hunting companies as The Photographic Survey Corporation Limited, Aeromagnetic Surveys Limited, Hunting Technical & Exploration Services Limited, Kenting Aviation Limited and Kenting Helicopters Limited, all of Toronto.

COSSOR APPOINTMENT

H. CLARKE

● Cossor Canada Ltd. announces the appointment of Harry Clarke as Commercial Sales Manager. Mr. Clarke has been with the company for two years in the capacity of Maritime Sales Manager and was previously employed with the equipment branch of Famous Players Theatre Corporation in Canada. His experience includes 14 years with the British Thomson Houston Co. Limited, being responsible for heavy electrical and sound reproduction installations.

INDEX TO ADVERTISERS

Page number is on the right. Key number for use with READER SERVICE CARDS is on the left.

Circulation Manager:

☐ **My proper address is shown below.**
Check

(My old address is ..... City .....)

☐ **Please add my name to your Electronics & Communications' mailing list.**
Check **(No obligation)**

Name ..... **Position** .....

Company ..... **Nature of Business** .....

Company Address ..... **City** ..... **Prov.** .....

Signature .....
8-57 (Not valid without signature)

PLEASE SEND FURTHER INFORMATION ON THE FOLLOWING NEW PRODUCT ITEMS AS NUMBERED BELOW — USE PRODUCT ITEM NUMBERS

PLEASE SEND FURTHER INFORMATION ON THE FOLLOWING ADVERTISEMENTS AS NUMBERED BELOW — USE KEY NUMBER

Name ..... **Position** .....

Company ..... **Nature of Business** .....

Company Address ..... **City** ..... **Prov.** .....
8-57

PLEASE SEND FURTHER INFORMATION ON THE FOLLOWING NEW PRODUCT ITEMS AS NUMBERED BELOW — USE PRODUCT ITEM NUMBERS

PLEASE SEND FURTHER INFORMATION ON THE FOLLOWING ADVERTISEMENTS AS NUMBERED BELOW — USE KEY NUMBER

Name ..... **Position** .....

Company .....

Street ..... **City** ..... **Prov.** .....
8-57

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in Canada

5c POSTAGE WILL BE PAID BY

ELECTRONICS AND COMMUNICATIONS

31 - 35 Willcocks Street

Toronto 5, Ontario

CANADA — POSTES — POSTAGE
5 CENTS
13241

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in Canada

5c POSTAGE WILL BE PAID BY

ELECTRONICS AND COMMUNICATIONS

31 - 35 Willcocks Street

Toronto 5, Ontario

CANADA — POSTES — POSTAGE
5 CENTS
13241

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in Canada

5c POSTAGE WILL BE PAID BY

ELECTRONICS AND COMMUNICATIONS

31 - 35 Willcocks Street

Toronto 5, Ontario

CANADA — POSTES — POSTAGE
5 CENTS
13241

INDEX — Continued

Your request for further information on New Product items or additional information concerning advertisements in Electronics and Communications will be promptly acknowledged.

It's Somewhat Soiled And Thumb-marked...

The Third Annual Directory. It's been on the job ever since January, 1957 working steadily and effectively for its many thousand readers all over Canada and on behalf of its many hundred advertisers.

It carried over 87 pages of carefully compiled listings — supplemented by the informative advertising of over 225 key suppliers.

It will continue its useful career for the balance of this year, when its successor will take over.

NOW IN PREPARATION

The Fourth Annual Directory and Buyers' Guide

for the

Electronics and Communications' Market in Canada

The Fourth Annual Directory will be bigger — more comprehensive — more carefully compiled and laid out for easier, quicker reference.

It goes to press December 12th and starts its year-long useful career in January, 1958 among prospective buyers in over 10,000 establishments across Canada. The circulation list is the result of five years careful checking and compiling.

So if you sell in Canada — or would like to sell in Canada — the Fourth Annual Directory can work for you during all of 1958.

Write for advertising rates, they are so reasonable it would not be logical to pass up this opportunity.

ELECTRONICS AND COMMUNICATIONS

The pioneer journal in the field

Published by

AGE PUBLICATIONS LIMITED • • 31 Willcocks Street, Toronto 5, Ont., Canada

News Report

Collins Radio Company Form Systems Division

Collins Radio Company of Cedar Rapids, Iowa, announced recently the creation of a Systems Division in a move to expand its operation in the complete design, manufacture, installation and maintenance of communication systems of any scope.

In making the announcement, L. Morgan Craft, vice-president, operations said: "We expect to expand our operations in the supply of complete communications systems, which are now in the fields where microwave and transhorizon transmission are used, and subsequent expansion will probably include systems incorporating single sideband and data transmission. Communication systems of this sort include design of the system, including required buildings, towers and primary power equipment, as well as the selection of the radio equipment required to perform the expected service; engineering site surveys; construction of access roads and buildings; purchase and erection of towers and antennas."

All of these activities will be integrated into the Systems Division. John D. Nyquist, formerly director of manufacturing, has been designated executive director of the new division.

The Canadian affiliation of Collins Radio Company is Collins Radio Company of Canada, Ltd., 11 Bermondsey Road, Toronto 16, Ontario.

Eimac Appoints Manager Commercial Marketing

Robert T. Plummer has been named manager, commercial marketing for Eitel-McCullough, Inc., San Bruno, California, manufacturer of Eimac electron-power tubes. In that position, where he replaces O. H. Brown, recently promoted to director of marketing, Mr. Plummer will handle commercial sales and coordinate the activities of Eimac field engineers.

R. T. PLUMMER

Mr. Plummer joined Eimac in January, 1956 as assistant to the advertising manager, then transferred to commercial marketing in early 1957. He spent four years during World War II as a flight radio officer and navigator with Pan-American Airways, was a field engineer for Philco Corporation during 1950 and 1951, and for three years was a technical editor with Hughes Aircraft Co.

Eimac is represented in Canada by The Ahearn and Soper Company Ltd., 384 Bank Street, Ottawa, Ontario.

For further data on advertised products use page 65.

For further data on advertised products use page 65.

Book Review

Analysis Of Electric Circuits by William H. Middendorf, Assistant Professor of Electrical Engineering, University of Cincinnati.

The author sets forth six basic physical laws and definitions which were established by the early experimenters. He shows the reader that he needs only to learn the full meaning of these six laws and to apply them with complex algebra to advance to our present wealth of knowledge.

Basing his presentation on successful experience in his own classroom, Professor Middendorf treats only those topics most necessary to a basic understanding. These basic concepts are presented in detail and are accompanied by a variety of numerical examples and problems.

The book is conveniently arranged into three sections. The first section provides all that is essential to meet the problems encountered in the usual undergraduate course. The latter two sections extend the scope of the work for electrical engineering majors. An unusual feature is the inclusion of a valuable chapter on communication circuits.

Analysis Of Electric Circuits is published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N.Y., contains 306 pages, hard cover bound, price $6.00.

Television, How It Works (Second Edition), by J. Richard Johnson.

This book explains the how and why of modern television receivers in the simplest and most direct terms, and yet in a complete and professional manner. It is designed for the service technician, the TV student, the experimenter or hobbyist, and any of the other thousands of people who are interested in how television works. The only prerequisite is a rudimentary working knowledge of electricity and radio circuits.

Because the treatment covers the latest circuits and principles applied in TV receivers, it will be found especially useful to the radio or TV man who wishes to bring his previous knowledge up to date.

Television, How It Works (Second Edition) is published by John F. Rider Publisher, Inc., 480 Canal Street, New York 13, N.Y., contains 352 pages, paper cover bound, price $4.60.

Electronic Components Handbook, edited by Keith Henney and Craig Walsh, Technical Writing Service, McGraw-Hill Book Co., Inc.

This book was sponsored by the Electronic Components Laboratory, Wright Air Development Center, U.S. Air Force, and represents the efforts of a working staff of editors listed on the title page.

It gives designers of military electronic equipment data on four types of electronic component parts — resistors, relays, capacitors, and switches — to enable them to use these components so that the maximum reliability of the end product results.

The book concentrates on those types of components for which a co-ordinated tri-service military specification has been written. For each component the book gives a general description of all kinds of the given component, and describes the several kinds, giving their good and bad points, where they should and should not be used, and the effects on each of unfavorable environment — heat, humidity, high altitude, low pressure, shock, vibration, etc.

Electronic Components Handbook is published by McGraw-Hill of Canada Ltd., 253 Spadina Rd., Toronto 4, Canada, contains 244 pages, hard cover bound, price $10.80.

Tube Selection Guide 1956-1957 compiled by Th. J. Kroes.

It is the aim of this book to enable the user of electronic tubes to quickly determine which tube is to be preferred in different cases. The book contains the following tables:

1. Tables of all tubes which can also be found in the Philips manufacturing range or which can be replaced by suitable equivalent types.
2. Tables in which the tubes are so grouped according to their most important properties that quick and correct selection is possible.
3. Tables of types which should preferably be used in the new apparatus.
4. Tables of tubes which should exclusively be used in existing apparatus.
5. Tables of tubes which may be used for replacement of obsolete tubes.
6. Description of type-number systems and data of a number of tube bases and tube holders.

Tube Selection Guide 1956-1957 is published by Philips' Technical Library, N.V. Philips' Gloeilampenfabrieken, Eindhoven, Holland, contains 124 pages and 32 illustrations, paper-bound, price $1.50.

An Introduction To Junction Transistor Theory by R. D. Middlebrook, M. A., M. S., Ph. D.

This book serves as a connecting link for the "electronic" engineer between the physical processes in semi-conductors and the circuit properties of a junction transistor. In this area it forms a bridge between the domain of the physicist and that of the engineer.

The major purpose of the study is to provide a continuous development of basic junction transistor theory, starting from fundamental physical principles and closing with practical circuit representations. It presents a new practical equivalent circuit which represents the small-signal behavior of a junction transistor over its useful frequency range as an amplifier.

Much of the material offered in the book can be found nowhere else in book form. Some of it has appeared only in various isolated papers on the subject, and some, notably that contained in the chapter on equivalent circuit work, originates with the author.

The presentation is clear and logical. It is written from the viewpoint of the electrical engineer, presupposing only an elementary knowledge of electronics, physics and mathematics.

An Introduction To Junction Transistor Theory is published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N.Y., contains 296 pages, hard cover bound, price $8.50.

Electrical Engineering Circuits by Hugh Hildreth Skilling, Professor of Electrical Engineering, Stanford University.

This lucid presentation of a-c circuits accomplishes a two-fold purpose. First, it gives students a strong foundation in the subject by devoting approximately two-thirds of its coverage to traditional topics. Secondly, it offers meaningful discussions of newer concepts, preparing students for advanced courses in electrical networks and system design.

Electrical Engineering Circuits is published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N.Y., contains 724 pages, hard cover bound, price $8.75.

News Report

Engineers Hear About Broadcast Automation

Remote control operation of radio station transmitters can now become almost "standard practice" through automation of the engineer's "log".

Automatic logging of transmitter functions makes practical the completely automatic operation of unattended broadcast transmitters, according to a treatise entitled "Automatic Recording of the Critical Parameters of a Directional-Antenna System and a Standard Broadcast Transmitter", prepared by Gus Ehrenberg, application engineer for Honeywell Controls' industrial division in the United States.

The author points out that, by applying a logging system that has been in use in the process industries for many years, the manual logging of transmitter functions could be done automatically, and remotely, with readings telemetered to the studio over a single pair of telephone wires.

The system Mr. Ehrenberg describes utilizes a multi-point strip chart recorder, a telemeter transmitter and transducers. As many as twenty-four independent variables can be telemetered and recorded remotely on the recorder with a few seconds' interval between points.

The system has been tested as an experiment in a small radio station in Philadelphia.

B.C. Telephone Company Expands TV Facilities

The B.C. Telephone Company began a major expansion of its television transmission facilities with the announcement by W. S. Pipes, vice-president and general manager, that a switching center for the province and an extensive television cable network will be installed in Vancouver.

The switching center, to be located in the company's headquarters building on Seymour Street, will be ready for the opening of the B.C. section of the Trans-Canada microwave radio relay system in June, 1958, while the first local special events television broadcasts will be picked up on the cable network within three years. In the meantime, remote control television programs can be beamed to nearby television outlets by a mobile microwave relay system.

The television cable network will be installed in conjunction with B.C. Telephone Company's trunking cable program. The switching center will be equipped to monitor and to switch television programs originating in eastern Canada and the U.S. to stations that can be reached by the company's microwave radio relay facilities.

At the zero second everything must function without failure. ANDREW HELIAX cable is used in postassembly and preflight checkouts of missile radiofrequency systems. The cable forms a closed circuit over which interrogation and response signals are transmitted between checkout equipment and airborne radio frequency packages. The HELIAX cable runs from a mobile trailer to connecting points on the missile.

The ruggedness of HELIAX makes it well suited to this challenging task, where its low VSWR, low RF leakage and low attenuation give accurate measurement of systems performance. Flexibility permits the cable to be taken down, recoiled and subsequently reused many times.

If you require similar characteristics in a cable, consider the special advantages of HELIAX.

HELIAX is normally supplied as an assembly, complete with end fittings factory attached, reducing installation labor and improving quality.

Complete uniformity throughout its entire length gives HELIAX *superior* electrical characteristics.

HELIAX is always less difficult, less costly to install, *easier to handle.*

HELIAX is available in 7/8"size (Type H0) and 1 5/8" size (Type H1).

WRITE FOR FREE SAMPLE LENGTH

ANTENNAS • ANTENNA SYSTEMS
TRANSMISSION LINES

Andrew
ANTENNA CORPORATION LTD.
606 BEECH ST. WHITBY, ONTARIO
OFFICES: CHICAGO • NEW YORK • BOSTON • LOS ANGELES

EACH DAY ANOTHER COMPANY TAKES THE LEAD WITH PACE

Wherever engineers assemble, the name PACE has become known as the signature for the latest developments in the art of Analog Computing. The industry has confidence in EAI's PACE Analog Computing Equipment, because it has a proven record, in actual operating hours, of unbeatable accuracy, unmatched speed, and complete dependability. Pictured above are the PACE Analog Computing Systems 16-31R and 16-131R. Write for full details on PACE Equipment and on time rental at EAI's Computation Centers in Princeton, N. J., Los Angeles, Calif., and Brussels, Belgium. Please address all inquiries to: Electronic Associates, Inc., Dept. EC8, Long Branch, N. J.

ELECTRONIC ASSOCIATES Incorporated

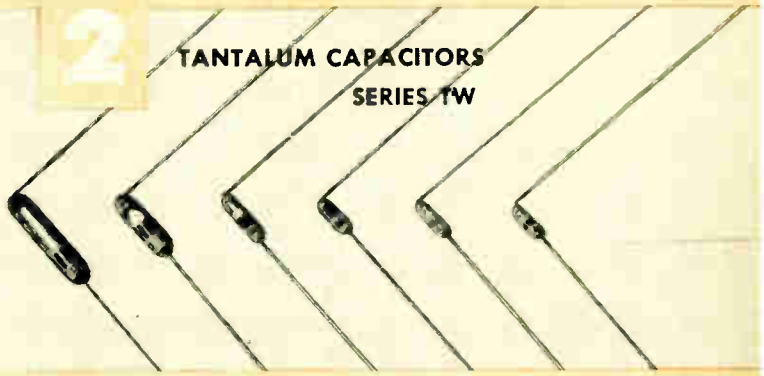
EAI SETS THE P PRECISION A ANALOG C COMPUTING E EQUIPMENT ®

LONG BRANCH • NEW JERSEY

For further data on advertised products use page 65.

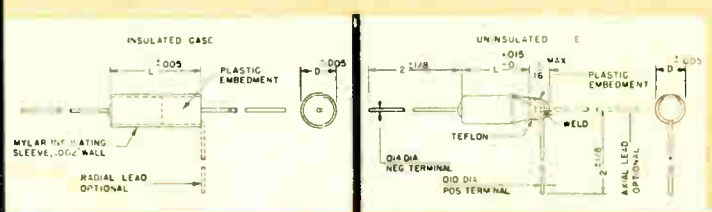
2 new components from OHMITE®

subminiature wire-type tantalum capacitors and variable transformer



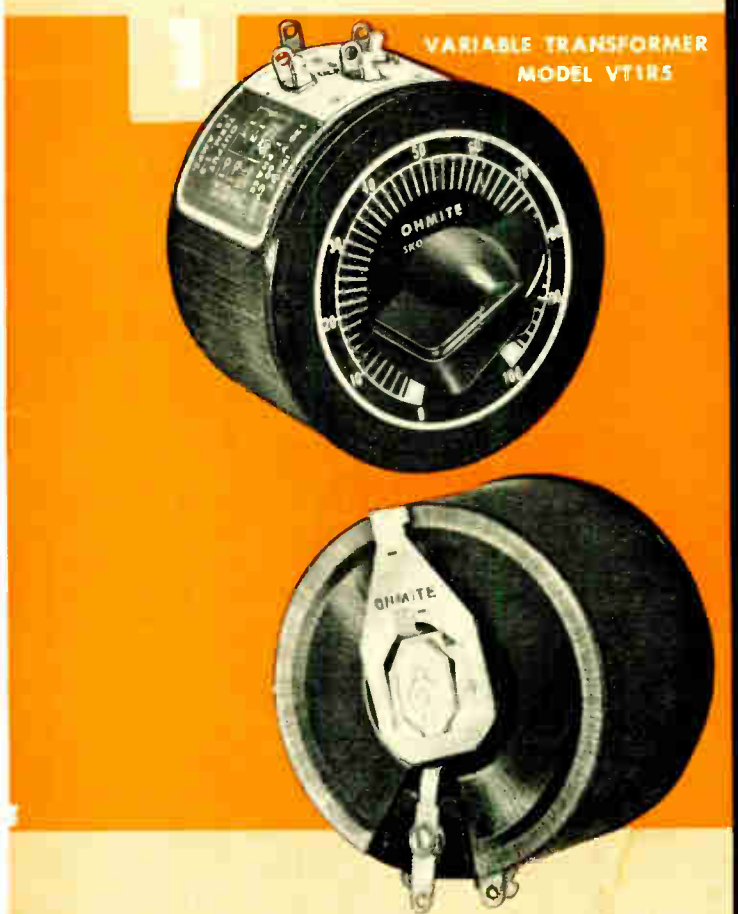
GREATER CAPACITANCE PER UNIT VOLUME

The new Series TW Ohmite subminiature Tan-O-Mite® TANTALUM CAPACITORS are wire-type units that feature greater capacitance per unit volume, lower leakage current and power factor, and small capacitance drop at extremely low temperatures as compared to other types of electrolytics. Ultrasmall for low-voltage DC transistorized electronic equipment, these new tantalum capacitors have *high stability, high capacitance, long shelf life,* and excellent performance under temperature extremes of −55° C to +85° C. They are available in six *subminiature sizes:* 0.1 to 60 mfd. over-all capacitance range.



SIZE	UNINSULATED		INSULATED	
	D (inches)	L (inches)	D	L
T	.075 (5/64)	.156 (5/32)	.082	.203
S	.075 (5/64)	.187 (3/16)	.082	.234
M	.095 (3/32)	.172 (11/64)	.100	.218
A	.095 (3/32)	.250 (1/4)	.100	.312
B	.125 (1/8)	.312 (5/16)	.134	.375
C	.125 (1/8)	.500 (1/2)	.134	.562

Smallest size is .075 (5/64) x .156 (5/32) inches; the largest is .125 (1/8) x .500 (1/2) inches. Five stock sizes are available in a wide range of capacitances, voltages. Units insulated with a tough Mylar® plastic sleeve can be furnished. *Write on company letterhead for Bulletin 148B.*



MORE CAPACITY FOR EQUAL SIZE

The rating of 1½ amperes represents a continuous rating at any brush setting. This "bonus" in current capacity is the result of a unique core design by Ohmite. The new Ohmite VARIABLE TRANSFORMER model VT1R5 features: Long-wearing, nonoxidizing, rhodium-plated coil contact surface, a ceramic hub that mounts the contact arm, and provides 3000 VAC insulation between parts at line potential and shaft assembly; positive brush to center-lead connection because brush pigtail shunt is bonded into solid copper-graphite slip ring. Input voltage is 120 V, 60 cycle; output voltage is 0-120 V—0-132 V. Mounted by ⅜"-32" bushing and nut. *Write for Bulletin 151.*

BE RIGHT WITH

OHMITE®

RHEOSTATS · RESISTORS · RELAYS · TAP SWITCHES
TANTALUM CAPACITORS · VARIABLE TRANSFORMERS

OHMITE MANUFACTURING COMPANY
3689 Howard Street, Skokie, Illinois

Canadian Representatives
A. C. Simmons & Sons, 100 Merton St., Toronto, Ont.
G. M. Robinson Co., 189 Market Ave. East, Winnipeg 2 Man.

TECHNICAL PERSONNEL AVAILABLE

ELECTRONIC ENGINEER — P.Eng., experienced in development of transmitters, pulse circuitry, installations, several years in supervisory and administrative positions in charge of technical, product design and production units. Estimates, schedules, budgets, hiring and customer liaison all in stride. Good character references. Seeking commensurate supervisory position in Ottawa district. Reply to Box 509, Electronics and Communications.

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.

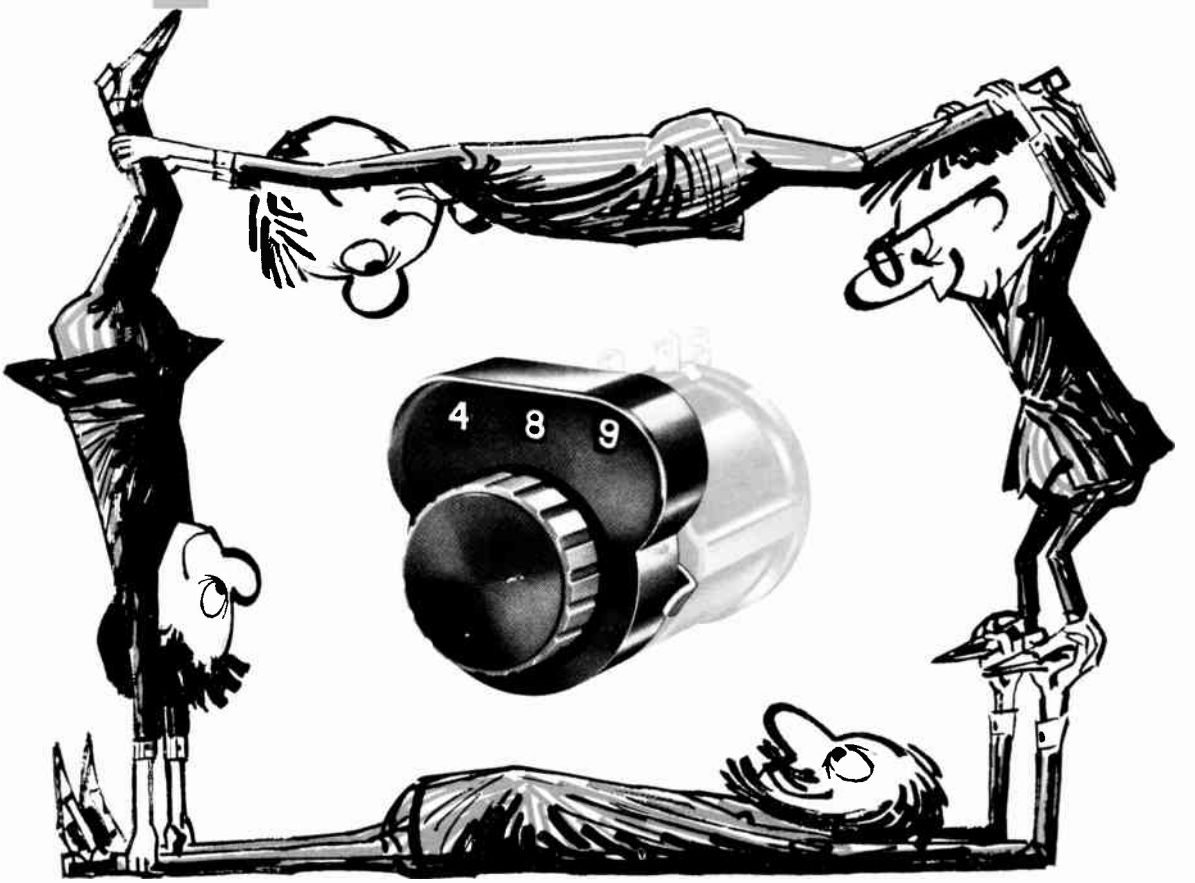
IMPORTANT!

Mailing list regulations compel us to provide verification of names, addresses, and occupations of all recipients of ELECTRONICS & COMMUNICATIONS. It is, therefore, essential that we receive your request for regular monthly issues whether you are now receiving complimentary copies or not.

PLEASE COMPLETE AND RETURN CARD ON PAGE 65

For further data on advertised products use page 65.

Another product surprise from Helipot!



A Dial to reckon with

When position is everything, you can count on the new DIGIDIAL* ten-turn decimal-counting dial . . . for indicating shaft position from 0° to 3,600°. . . with reading resolution of 0.05% of full scale or better.

The DIGIDIAL reads by the numbers. This means farewell to interpolations and operator errors . . . hail and hello to fast, accurate reading from as far as six feet away . . . from just about any angle except behind the panel. You'll welcome its compact construction, light weight, simple installation and smooth operation. You'll utter gleeful greetings to the positive, non-distorting locking mechanism.

If position is important to you, you'll want to know more about the DIGIDIAL . . . to get the whole story, write for data file 82E.

Helipot *Corporation a division of Beckman Instruments, Inc.*
Canadian Factory: No. 3 Six Points Rd., Toronto 18, Ont.
Sales Representative: R-O-R Associates, Ltd., 1470 Don Mills Road, Don Mills, Ont.

1163 ® Trademark

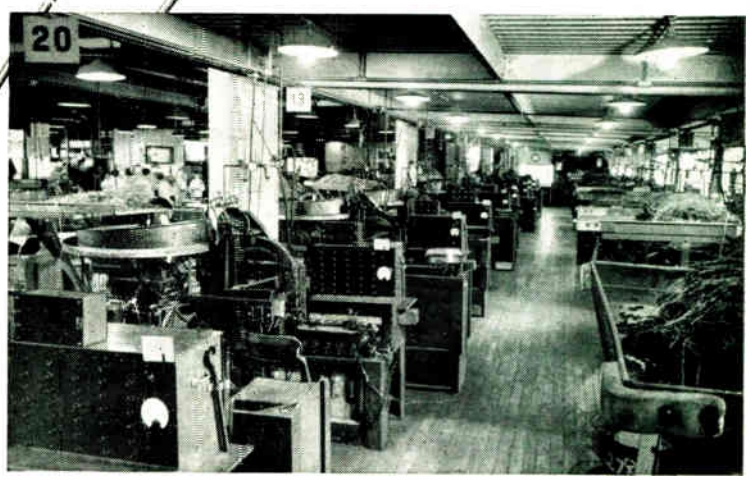
TESTED 200% *plus!*

YOU'VE probably noticed the steadily growing preference for Stackpole fixed composition resistors in critical military uses as well as in a high percentage of today's television, radio and industrial electronic equipment.

There are two main reasons: Outstandingly dependable products backed by equally dependable, personalized service.

Dependability is assured by the most modern manufacturing techniques *plus* constant testing. From preliminary sorting tests to the final 100% test and numerous quality control tests extending from raw materials through production, it is conservative to say that Stackpole resistors are tested well over 200%.

As for service in meeting resistor requirements accurately and when promised, [illegible] is a Stackpole factor that is [illegible] and tested as [illegible].



ELECTRICAL TESTING— Each Stackpole fixed composition resistor gets a final test on automatic machines like these. Other tests before and during production bring the total test percentage to well over 200%.

SERVICE IN THE MAKING— A portion of the huge fixed composition resistor stock Stackpole strives to maintain to assure prompt deliveries.

STACKPOLE RESISTORS