

# electronics • and communications



an age publication  
APRIL 1960

Let's put some "meat" into  
association meetings — page 34

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# "OJ"

*brings  
telephone  
communications  
up-to-date*

Northern Electric research scientists have made another forward stride in the field of communications with the introduction of "OJ" — the latest and most modern carrier system and the first such system completely developed by this Company. The name "OJ" signifies that the system utilizes the modern techniques of the open wire "O" system and is compatible with the trans-continental "J" system. With the "OJ" system and with other great advances Northern Electric's skilled research and development team is setting the pace in the science of communications.

**RESEARCH and DEVELOPMENT LABORATORIES**

# **Northern Electric**

COMPANY LIMITED

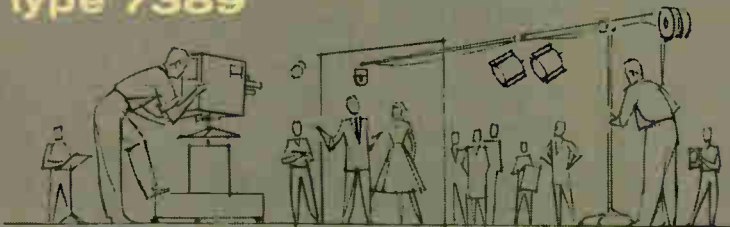
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Again  
**MARCONI** improves  
**TV** picture quality with  
**NEW**

**4 1/2"**

# IMAGE ORTHICON

type 7389



Once more from Canadian Marconi . . . the latest technical developments incorporated into a TV camera tube for better-than-ever picture reproduction. The new 4 1/2" Image Orthicon type 7389 with increased target capacitance offers:

- Improved signal to noise ratio
- Increased straight portion of light/signal transfer
- Reduced edge and halo effects

In operation, the tube is more suited to studio productions where some measure of control over scene illumination is possible, so enabling the full benefits to be realised. Its sensitivity is, however, adequate for outside broadcasts under normal conditions.

Operational sensitivity is in the region of  $f/5.6$  at 25 footlamberts. The photocathode has a spectral response closely approaching that of the eye, so permitting the portrayal of colours by their true monochrome equivalents.

*For full data on the new 4 1/2" Field Mesh Image Orthicons write:*

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# VIBRATION RESISTANT MOISTURE RESISTANT

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*New miniature connectors  
for avionic equipment  
meet MIL-C-26482 (ASG)*

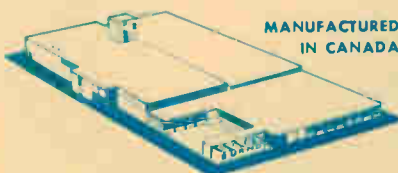


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photo shows  
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coupling type  
Double stub  
type available  
Both types  
completely  
interchangeable  
with other mini-  
ature connectors.

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For complete details check No. 12 on handy card, page 71



an age publication

# electronics and communications

Canada's pioneer journal in the field of electronics and communications engineering

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### COVER STORY

*Printed circuit, plug-in logic boards simplify AN/ASN-24 maintenance. Here computer technician of Librascope, Incorporated, Glendale, Calif., checks out operation of logic circuit. Operating program includes test problem to detect improper component function. Well developed checkout programs follow up trouble to locate circuit and component producing malfunction.*

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# ROGERS

## REFERENCE BULLETIN NO. 4

### EC157 Disk Sealed Triode guaranteed for 6000 hours

The EC157 triode serves as an amplifier tube in beam transmitter relay stations for the transmission of TV and telephony link broadband signals at 4000 mc/s. Station breakdowns in microwave communications are costly in time and money. The EC157, with a *guaranteed life of 6000 hours*, assures against early breakdowns, saves time and money. Its longer life means a more reasonable operating cost — *not more than 2.3¢ per hour of service.*

The EC157 triodes offer many desirable features — peak performance, dependable service and outstanding uniformity from tube to tube.

#### TECHNICAL DATA

HEATER	$V_h = 6.3 \text{ V}$ $I_h = 0.73 \text{ A}$
TYPICAL CHARACTERISTICS	nom. min. max. nom.
Anode voltage	$V_a = 180 \text{ — — } 180 \text{ V}$
Anode current	$I_a = 30 \text{ — — } 60 \text{ mA}$
Grid voltage	$V_g = -2.8 \text{ — } -4.0 \text{ — } -1.8 \text{ V}$
Mutual conductance	$S = 17 \text{ — } 13.5 \text{ — } 19 \text{ mA/V}$
Amplification factor	$\mu = 43 \text{ — } 33 \text{ — } 52 \text{ — } 43$

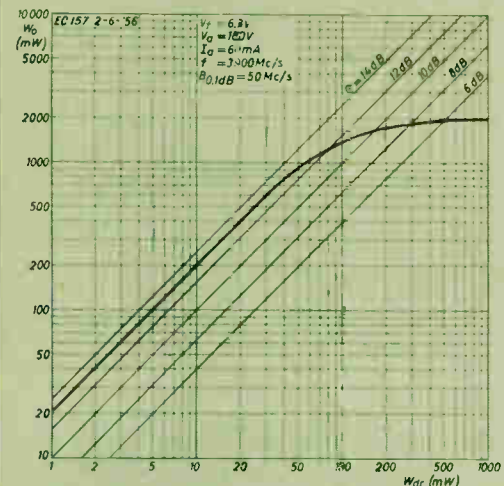
#### OPERATING CONDITIONS

##### AS GROUNDED GRID AMPLIFIER AT 4000 Mc/s

Anode supply voltage	$V_{ba} = 200 \text{ V}$
Grid supply voltage	$V_{bg} = +20 \text{ V}$
Cathode bias resistor	$R_k = \text{max. } 500 \text{ } \Omega$
Anode current	$I_a = 60 \text{ mA}$
Bandwidth (0.1 dB down)	$B = 50 \text{ Mc/s}$
Output power at 8 dB power gain ( $V_f = 6.3 \text{ V}$ )	$W_o = 1.8 \text{ W (min. } 1.5 \text{ W)}$

#### MAXIMUM RATINGS (absolute maxima)

Anode voltage at zero anode current	$V_{ao} = 500 \text{ V}$
Anode voltage	$V_a = 300 \text{ V}$
Anode dissipation	$W_a = 10 \text{ W}$
Cathode current	$I_k = 70 \text{ mA}$
Grid current	$I_g = 10 \text{ mA}$
Driving power (grounded grid)	$W_{dr} = 1 \text{ W}$
Direct grid voltage (positive)	$V_g = 0 \text{ V}$
Direct grid voltage (negative)	$V_g = -50 \text{ V}$
Heater to cathode voltage	$V_{kf} = 50 \text{ V}$
External resistance between cathode and heater	$R_{kf} = 20 \text{ k}\Omega$
External resistance between grid and cathode	$R_{gk} = 25 \text{ k}\Omega$
Anode seal temperature	$t_a = 150 \text{ }^\circ\text{C}$
Grid seal temperature	$t_g = 75 \text{ }^\circ\text{C}$
Cathode seal temperature	$t_k = 75 \text{ }^\circ\text{C}$



Output power ( $W_o$ ) of the EC157 as a function of the driving power ( $W_{dr}$ ) with lines of constant power gain (G); ( $f = 3900 \text{ Mc/s}$ ,  $B_{0.1 \text{ dB}} = 50 \text{ Mc/s}$ ,  $V_a = 180 \text{ V}$ ,  $I_a = 60 \text{ mA}$ ).

This reference sheet is one of a series from Rogers to keep you fully informed of electronic developments. A specially designed file folder for these bulletins is available from Rogers on request.

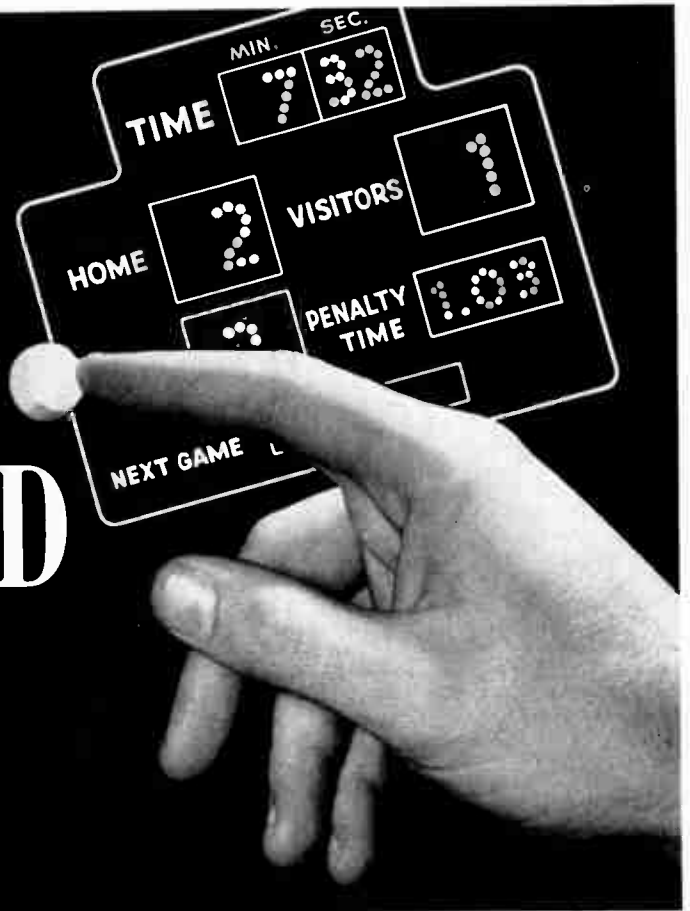
You are invited to make full use of Rogers Application Engineering Service at any time, on any problem. Just phone or drop us a line.

# ROGERS

electronic tubes & components

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# IN REMOTE CONTROLS MARSLAND has made a good name



... and that name is "LEDEX"

Rotary Solenoids • Circuit Selectors and Stepping Relays

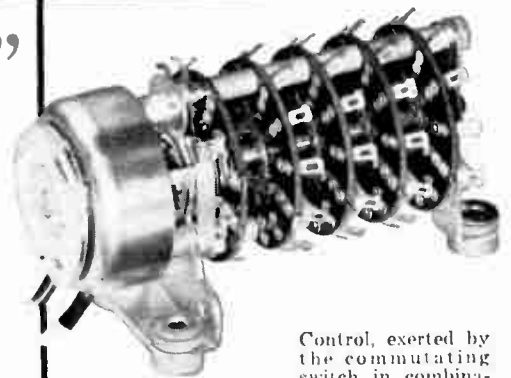
In properly designed applications rugged, shock proof "Ledex" Rotary Solenoids will perform their operation millions of times consecutively without special care or maintenance. Combined with rotary type wafer switches they provide many versatile designs of stepping, counting, adding and subtracting, latching and circuit selecting relays, for both DC and AC power supplies.

An extensive number of mechanical features are available in 8 basic sizes in a wide voltage range to meet all requirements.



Manufactured and sold in Canada under license from G. H. Leland Inc., Dayton, Ohio by "LEDEX" Rotary Solenoid Division of

Marsland Engineering have made many special assemblies to customer requirement. Marsland will design and build custom equipment utilizing Rotary Solenoids, and will co-operate in strictest confidence at the design level on problems or equipment involving remote control.



Control, exerted by the commutating switch in combination with the control wafer switch makes it possible to select multiple circuits connected by a single manually operated switch. Circuit wafers are made with 8, 10, 12, 18 and 24 positions and provide many combinations. The 12 position switch may utilize factors of 12 . . . 1P-12T, 2P-6T, 3P-4T or 4P-3T.



"Ledex" Solenoids have employment ranging from control of small precision mechanisms to the actuation of rugged components in heavy duty equipment. They provide remote control and reduce the number of mechanical parts required.

## MARSLAND ENGINEERING LIMITED

154 Victoria Street, Kitchener, Ontario.  
For complete details check No. 36 on handy card, page 71





# offers

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## represents

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- Dymec, Inc.** —  
Electronic Instrumentation Systems.
- Gertsch Products, Inc.** —  
Frequency measuring equipment and ratio transformers.
- Kintel, Division of Cohu Electronics, Inc.** —  
Wide range of DC instrumentation and closed  
circuit television.
- Massa, Division of Cohu Electronics, Inc.** —  
High speed recording systems.
- Tel-Instrument Electronics Corp.** —  
Voltage regulators and vibration calibrators,  
TV test equipment.
- Sierra Electronic Corporation** —  
Transmission line test equipment.
- Electro Products Laboratories, Inc.** —  
Magnetic pickups and proximity controls.
- Erik A. Lindgren & Associates**  
R.F. screen rooms
- Skydyne, Inc.** —  
Test equipment transit cases and mobiles.
- Taller & Cooper, Inc.** —  
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This mobile demonstration  
laboratory features the  
latest in electronic  
instrumentation in operating  
display.

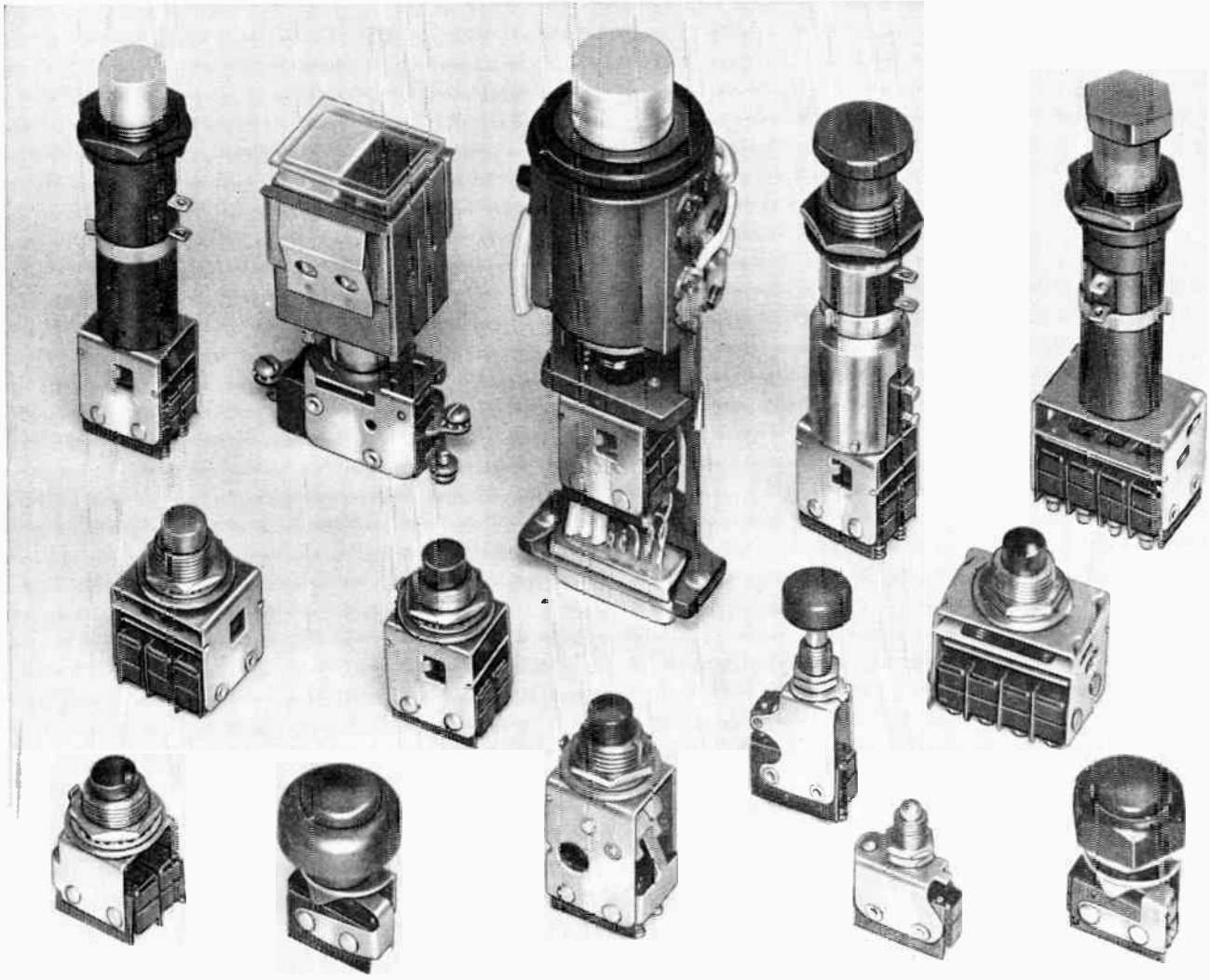


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## Need pushbutton switches?

*Here is a sampling of a very wide choice*

These assemblies are typical of many different series of MICRO SWITCH pushbutton switches. Each series offers many variations of electrical and operating characteristics.

Operational characteristics include: momentary action, lock-down, alternate action, two-position alternate action, and magnetically held. Direct control of up to fourteen double-throw circuits is offered. Short and long button strokes can be provided. Sealed switches are available when protection is required from oil, water, sand, or salt spray. Special shock and vibration-resistant features are built into switches for

rugged duty service. Switches with illuminated pushbutton display are available. These include switch devices with interchangeable modular indicator and pushbutton units.

Experienced engineering assistance to help you select the pushbutton switch best suited to your requirements is as near as your nearest Honeywell office. Or write Honeywell Controls Limited, *Precision Components Division*, Toronto 17, Ont.

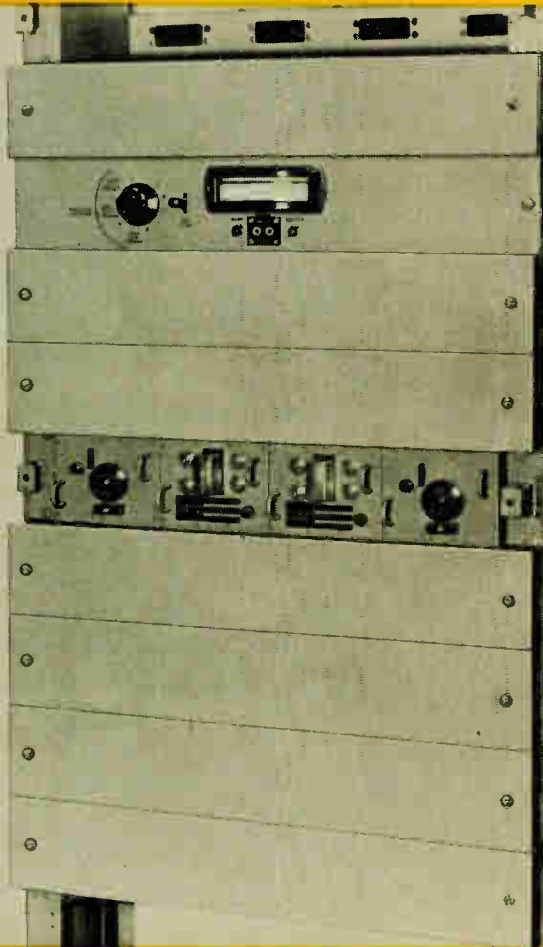


**Honeywell**  
MICRO SWITCH Precision Switches

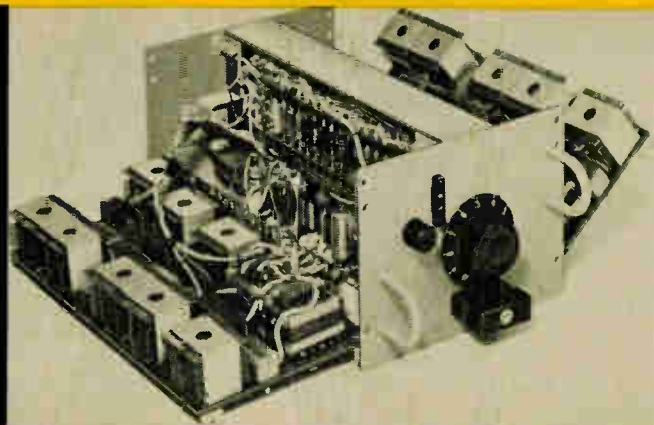
For complete details check No. 28 on handy card, page 71

# FULLY TRANSISTORIZED CARRIER TELEPHONE EQUIPMENT

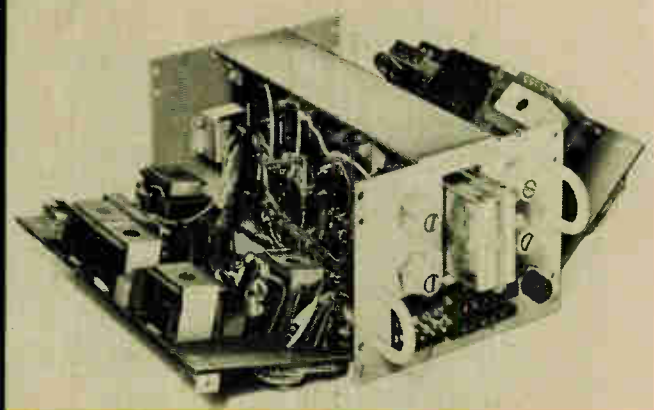
*for use with RADIO and CABLE SYSTEMS*



*Cover removed to show Channel and Signalling Units  
— 2 Channels per panel.*



*Channel Unit.*



*Signalling Unit.*

## TECHNICAL FEATURES:

- 300-3,400 c/s Channel Bandwidth
- 4 kc/s spaced.
- Optional Inbuilt Out-band signalling (3825 c/s at -20 dbm0).
- Fully transistorized.
- 96 Circuits without signalling or 48 circuits with signalling per 9 ft. rackside (20½ in. x 8½ in. floor dimensions).
- Compact plug-in units with hinged, card-mounted components give maximum component accessibility.
- Can be supplied on racksides or a complete basic group on a sub-frame.
- Available in 60-108 kc/s basic channel groups or as systems for 12-circuit 2-wire cable operation or multicircuit, for radio links.
- Conforms with CCITT and BPO requirements.



**TELEPHONE MANUFACTURING CO., LTD.**

SAXONY BUILDING, 26 DUNCAN STREET, TORONTO 2B, ONTARIO

# C RTPB newsletter

Prepared by Canadian Radio Technical Planning Board.

## NSRC Work Terminated

The U.S. National Stereophonic Radio Committee has terminated its technical studies of various proposed systems of stereo FM, AM, and TV transmissions as a result of the refusal of the Federal Communications Commission to establish a TASO-type organization to carry on the activity, it was recently announced by EIA of the United States. The NSRC, formed by EIA early in 1959, could not complete its work because of the FCC decision but it will be maintained on a standby basis in case the FCC requires its services in the near future.

The EIA of the United States requested the FCC last autumn to take over the technical work of the NSRC and establish a government-chaired organization similar to the television allocation study organization so that the work on stereo could be completed.

## Recent CRTPB Meetings

The CRTPB Executive Committee met early in March in Toronto to deal with routine business. The Tropospheric Scatter Committee also met recently. It dealt with frequency allocations for scatter, and with general business.

Two CRTPB meetings were held in Montreal — the Stereophonic Sub-Committee of the Broadcast Committee met to discuss reports and technical papers. The meeting was followed by an enjoyable inspection tour of radio station CJAD transmitter facilities. This is the station which is just commencing AM stereophonic broadcasting in Canada and is the first station on the North American continent to do so. The other committee that met in Montreal recently was the Television Committee. Members discussed the FCC allocation scheme, docket No. 13340, and the Department of Transport Radio Standard Specification 155.

The Microwave Task Force on Communication System Parameters met in Toronto on March 11.

## DOT Air Services School Graduates

Air traffic controllers recently graduated from the DOT Air Services School at Ottawa Airport. The graduates learned their jobs with the aid of closed-circuit television and a two-way communication system, part of a synthetic air traffic control trainer.

The equipment consists of two main units. One projects a picture of an airport or other area, with all its air navigation facilities, on the ceiling of the classroom. A group of "pilots" reproduce the movements of their aircraft, on the ceiling picture, each man having a controllable unit that projects a dot of light for this purpose.

Before becoming full-fledged Department of Transport air traffic controllers, the students receive three months 'on-the-job' training at various airport traffic control towers, at the end of which they must pass practical tests.

## CRTPB Comments On Radio Standards Procedure 105

Comments by sponsors of CRTPB on DOT Radio Standards Procedure 105 "Procedure For The Listing Of Low Power Communication Equipment Acceptable For Licensing In Certain Bands Between 1605 KC/S to 470 MC/S" were recently sent to the Department of Transport by the CRTPB Office.

## DOT Radio Standard 116, Issue 3

The DOT has informed the CRTPB that Radio Standard Specification 116, Issue 3, entitled "Land Station A.M. Communication Transmitters Operating In The 1.6 Mc/s To 20 Mc/s Band with Power Outputs Not Exceeding 500 Watts", will be effective on April 1, 1960.

Issue 3, which is in final form, will replace Issue 2, which is provisional only. This means that after April 1, 1960, all new installations of radiotelephone equipment covered by Specification 116 must be type-approved under Issue 3. Current type-approval numbers granted under previous issues of Specification 116 will be cancelled on April 1, 1960 and new type-approval numbers will be issued for equipment that fully meets the requirements of Issue 3.



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INSTRUMENTS



PORTABLE  
AND LABORATORY  
INSTRUMENTS



ELECTRONIC  
INSTRUMENTATION

Only a complete Canadian instrumentation facility can offer the kind of service Canadians need. Bach-Simpson Ltd. is complete — in research, design, tooling and manufacture.

If our standard line of instruments, complete as it is, won't meet your requirements, ask us to demonstrate the unique combination of skills we can offer in the design of specialized instrumentation to meet your specific problem.

Others have, and have been  
completely satisfied!



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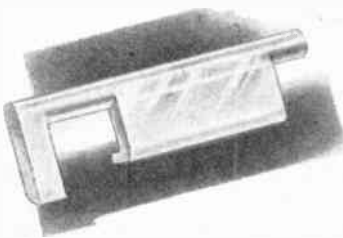
# Bach-Simpson now provides Canadian source for special military aircraft instrument



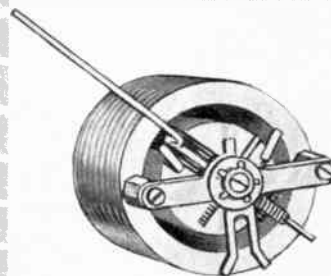
An improved, compact base of thermo-setting plastic for the range switch contacts was engineered, tooled and molded in our own plant.

## for special military aircraft instrument

As an item which had never been produced in Canada, the specialized dual function volt-ammeter presented an opportunity and a challenge to our ingenuity. It posed an interesting problem — that of improving the product through the use of the latest materials and techniques, while maintaining interchangeability with equipment already in service, and employing standard Bach-Simpson components, where possible, in the interests of economy.



A simpler and more compact contact actuating mechanism employing a new thermoplastic material was designed, tooled and molded by Bach-Simpson Ltd.



Weight reduction (by 50%) and reduction of stray field effects on adjacent magnetic compasses were achieved by the use of Bach-Simpson's self-shielded core-magnet movement.

  
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An experienced design and engineering staff . . . one of the most complete tooling facilities in its field . . . a precision production facility backed by in-plant plating, molding and machining departments . . . and environmental test equipment designed to reproduce the most exacting service conditions, enabled us to produce an improved product at a competitive price.

**OUR SKILL AND EXPERIENCE ARE AT YOUR DISPOSAL.**

For complete details check No. 11 on handy card, page 71

K2196

# the industry's business

## Varian Associates of Canada responsible to group executive

Dr. E. L. Ginzton, board chairman of Varian Associates of Palo Alto, Calif., announced recently a major organization change in the appointment of Emmet Cameron and Howard Patterson to two newly-created positions of group vice-presidents and of Ralph Kane to the new post of vice-president of foreign operations.

Under the new organization, Emmet G. Cameron, formerly executive vice-president and general manager of the Palo Alto facility, becomes group executive of all tube operations. In addition to his supervision of tube research, production and sales for the company's U.S. plants, Mr. Cameron will assume executive responsibility for Varian Associates of Canada, Ltd., of Georgetown, Ontario.

## Numbers to replace exchange names

The Bell Telephone Company of Canada announces that a new telephone numbering system, which will ultimately eliminate exchange names, will be introduced in several Ontario and Quebec communities who are due for dial conversion later in 1960.

The new system — known as All Number Calling (ANC) — will substitute figures for the letters now used to designate exchanges.

An important advantage of ANC to the telephone user is that calls may be dialed more quickly and accurately, using numbers only. Tests have been made that indicate that seven-figure numbers are as readily remembered as name-and-figure numbers.

The new plan will not affect existing two-letter five-figure telephone numbers for some time, but conversion to ANC will be made gradually over a period of years, as changing conditions provide propitious opportunities.

## Network symposium

The tenth in a series of International Symposia organized by the Polytechnic Institute of Brooklyn will be held on April 19, 20 and 21, in the auditorium of the Engineering Societies Building, 33 West 39th St., New York City.

This "Symposium on Active Networks and Feedback Systems" will have the co-sponsorship of the Institute of Radio Engineers and U.S. Defense Research Agencies.



Rush shipments of RCA Victor 120 channel microwave equipment leaving RCA Victor's Montreal plant via truck for re-shipment by boat to Brazil.

## RCA Victor builds microwave equipment for Brasilia

High-capacity microwave telecommunications equipment to link Brazil's new capital city, Brasilia, with the rest of the world is being built in RCA Victor's Montreal plant, according to J. G. Sutherland, vice-president, Technical Products, RCA Victor Company, Ltd.

This contract, won over bids from competing companies in the United States, England, France and Germany, represents still another advance for Canada's growing electronics industry. RCA Victor already has supplied

microwave systems for Israel, Pakistan, Colombia, Australia and Arabia, and recently won the contract, over foreign competitive bids, to construct a \$20 million-plus microwave system for Canadian National Telegraphs along the 1,200-mile stretch of the Alaska Highway from Grande Prairie, Alberta, to the Yukon-Alaska border.

The 120 channel RCA Victor microwave equipment will span mountain and jungle to serve Brazil's fabulous new capital city rising deep in the country's interior.

## Inflated "balloon" aids P.O. machinery installers

A huge balloon — actually a giant floating building within a building — is helping speed completion of a new \$20 million fully mechanized post office in Montreal. It is designed to enable workmen to begin installation of sensitive electro-mechanical equipment while the construction of the new post office building continues around it.

The inflated structure is the largest of its type in the world, measuring 200 feet long, 80 feet wide and 40 feet high.

Engineers of International Telephone and Telegraph Corporation's

Intellex Systems, Inc., decided to literally take to the air. The result is a vinyl-covered nylon building, supported only by air and enclosing 12,500 square feet of space.

The ITT-built post office is scheduled for completion in the fall of 1960.

## H. C. Machin & Associates Canadian reps

H. C. Machin and Associates Limited, P.O. Box 34, Station K, Toronto 12, Ontario, have been appointed exclusive Canadian representatives for Heldor Manufacturing Corporation of Paterson, New Jersey, manufacturers of conventional terminals, lock-in terminals, drawn cans and covers, and fabricated cans and covers.

## D. D. P. Contracts

Ahearn & Soper Co. Ltd., Ottawa, Ont., electronic equipment, \$11,328; Ampex American Corporation, Ottawa, Ont., electronic equipment, \$25,233; Andrew Antenna Corporation Ltd., Whitby, Ont., electronic modification kits, \$15,517; Canadian Arsenals Ltd., Ottawa, Ont., radar equipment, \$283,707, electronic equipment, \$145,452; Canadian General Electric Co. Ltd., Toronto, Ont., electronic components, \$14,480; Canadian Marconi Co., Montreal, Que., electronic tubes, \$320,908; Canadian Westinghouse Co. Ltd., Ottawa, Ont., electronic tubes, \$70,570; Computing Devices of Canada Ltd., Ottawa, Ont., aircraft navigational aids, \$500,000, course selector indicators, \$23,400; A. Crosbie & Sons Ltd., Montreal, Que., ships' telegraph transmitters and receivers, \$163,716, supervisory services ships' telegraph transmitters and receivers, \$21,000; Honeywell Controls Ltd., Toronto, Ont., automatic flight control systems, \$1,600,000; Instronics Ltd., Stittsville, Ont., radar test sets, \$17,820; Plessey Co. of Canada Ltd., Montreal, Que., communication equipment, \$4,970,291; Railway & Power Engineering Corporation Ltd., Montreal, Que., aircraft instruments, \$1,658,561.

Ampex American Corporation, Ottawa, Ont., communication equipment, \$20,543; Aviation Electric Ltd., Montreal, Que., aircraft electrical and instrument equipment during two years ending March 31, 1962, \$25,000; Bach-Simpson Ltd., London, Ont., aircraft instruments, \$10,093; Canadair Ltd., Montreal, Que., aircraft system trainer, \$57,950; Canadian Arsenals Ltd., Ottawa, Ont., repair and overhaul of electronic equipment, \$10,000; Canadian General Electric Co. Ltd., Toronto, Ont., electronic components, \$17,932; Canadian Marconi Co., Montreal, Que., electronic tubes, \$73,819; Collins Radio Co. of Canada Ltd., Toronto, Ont., electronic components, \$27,027; Dictaphone Corporation Ltd., Ottawa, Ont., communication equipment, \$11,060; Raytheon Canada Ltd., Ottawa, Ont., electronic tubes, \$72,430; Rogers Electronic Tubes & Components, Toronto, Ont., electronic components, \$11,922.

## Date set for 1961 IRE Canadian Convention

The actual dates for the next IRE Canadian Convention and Exposition have now been decided upon as October 4, 5 and 6, in 1961. Announcement was made by Fred J. Heath, general chairman, IRE Canadian Convention.

Mr. Heath further announced that the Montreal Section of the IRE has made plans to conduct a symposium on communications with exhibits on November 4 and 5, 1960, at the Queen Elizabeth Hotel, Montreal. This event, he said, will maintain the continuity of an annual meeting in the Canadian Region. Advance enquiries regarding exhibit space should be directed to E. P. Turton, chairman, IRE Montreal Symposium, c/o Northern Electric Co. Ltd., 420 Lagachetiere Street West, Montreal.

## CEWA fifth national convention

The Canadian Electronic Wholesalers' Association will hold its fifth annual national meeting and convention in the Queen Elizabeth Hotel, Montreal, on April 25, 26 and 27. O. L. Bell of the Big "A" Company Limited, Belleville, Ontario, president of the association, and Leo Rosenberg, chairman of the board of Lee Bern & Company, Winnipeg, Manitoba, will host the convention and act as co-chairmen.

Business sessions will be held during the three days of the convention. In addition to receiving the report of the president, the chairman and the secretary-treasurer, the Association will elect its new officers and board members for the ensuing year and appoint committee chairmen.

The annual convention banquet will take place in the evening of Tuesday, April 26.

## Burroughs open new data processing center in Ottawa

The Burroughs Adding Machine of Canada, Limited, maintains a Data Processing Center at 1322 Carling Ave., Ottawa 3, Ontario.

Two Burroughs electronic computer systems are featured in the center. One is the Burroughs 205 system and the other an E101 desk-sized computer.

The Burroughs Electronic Data Processing Center provides the staff and

equipment to handle all data processing and scientific problems, on a contract basis. The Center is also available on an hourly lease basis for operation by the customer's trained personnel.

The Center is available to solve the computer problems of both government and industry from coast to coast.



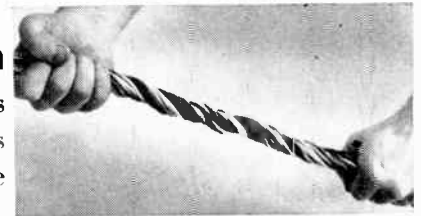
Interior view of Burroughs' new Electronic Data Processing Center in Ottawa shows the complete Burroughs 205 electronic computer system, one of the main units of the center which has been equipped to meet the data processing needs of Canadian government and business. The center also has a complete Burroughs E101 computer system. The center's facilities are available to serve Canada from coast-to-coast.



# FEDERAL PUTS A TWIST IN TELEPHONE CABLE

## Special 'Unilay' Construction

Twist it's open . . . twist it's closed! Just as simple as that, this one-direction cabling technique gives easy access to inner conductors . . . makes possible faster, more efficient mid-span taps.



### A feature in . . .

#### FEDERAL TYPE B RURAL DISTRIBUTION WIRE

Because of its high tensile strength, it is ideal where longer spans are required. Its rugged construction gives excellent service life and permits re-use after emergency operation. Thus, considerable time and expense are saved in new construction. Engineered for maximum dielectric strength, low transmission loss and cross talk, Federal Rural Distribution Wire provides the best in subscriber service at minimum cost.

### Another fine product . . .

#### FEDERAL TYPE NC TELEPHONE DROP WIRE

is specially built for life-long resistance to severe wind and ice-loading conditions. Its high dielectric rubber insulation is securely bonded to No. 18 copperweld conductors. The tough, reinforced neoprene sheath is ribbed for quick polarity identification by touch. It comes in solidly taped 1,000 foot "Tangle-proof" coils for fast, efficient installation. Buy Federal quality for dependable service.

**FEDERAL WIRE**



**& CABLE DIVISION**

**H.K. PORTER COMPANY (CANADA) LTD.**

**PORTER SERVES INDUSTRY:** with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; PEERLESS ELECTRIC DIVISION; Specialty Alloys. RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRATORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A., and in Canada, Refractories, "Disston" Tools, "Federal" Wire and Cable, "Nepcoduct" systems. H. K. PORTER COMPANY (CANADA) LTD.

For complete details check No. 41 on handy card, page 71



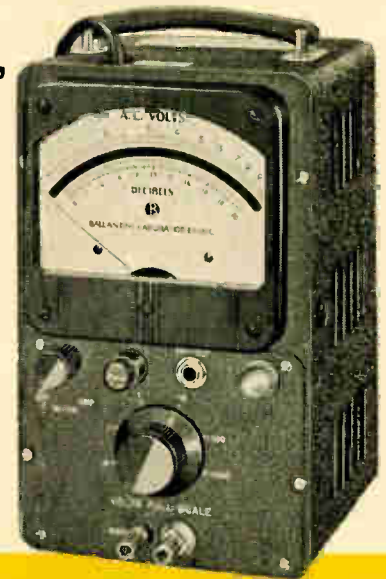
# BALLANTINE ELECTRONIC VOLTMETERS

Famous since 1935 for Accuracy, Sensitivity and Reliability

Ballantine Voltmeters feature the same accuracy of reading on a logarithmic voltage scale. Alone or in combination with Ballantine accessories, they may be used to measure AC voltages from 20 microvolts to 10,000 volts, DC voltages from 10 microvolts to 100 volts, and AC and DC currents from 0.1 microampere to 10 amperes.

Prices for modifications in mountings, finishes, special scales, terminal arrangements, etc., will be furnished on request.

All prices shown are net, F.O.B. Boonton, New Jersey, and are subject to change without notice.



MODEL	FREQUENCY RANGE	VOLTAGE RANGE	INPUT IMPEDANCE	ACCURACY OVER ENTIRE SCALE	APPLICATIONS	PRICE
300 Voltmeter	10 CPS-150 KC	1 MV-100 V	0.5 meg shunted by 30 pf	2%	General purpose, precision laboratory AC VTVM.	\$220
300-D Voltmeter	10 CPS-250 KC	1 MV-1000 V	2 meg shunted by 15 or 25 pf, depending on voltage range	2%	General purpose, precision laboratory AC VTVM, a product improvement on the Model 300.	\$255
300-E Voltmeter	30 CPS-100 KC	300 $\mu$ V-300 V	2 meg shunted by 20 or 30 pf, depending on voltage range	2%	For mounting on 9 1/2 inch relay rack. Rear connections for input, power, and decade switching.	\$255
302-C Voltmeter, Battery Operated	2 CPS-150 KC	100 $\mu$ V-1000 V	2 meg shunted by 10 or 25 pf, depending on voltage range	3% 5 CPS-100 KC; 5% elsewhere	Portable, battery-operated, no hum, with gain to 60 db. May be used on ungrounded or symmetrical circuits.	\$255
305-A Voltmeter Peak Reading	5 CPS-500 KC, sine waves. Pulses, 0.5 $\mu$ s up and 5 PPS up	1 MV-1000 V Peak or Peak-to-Peak	2 meg shunted by 10 or 25 pf, depending on voltage range	2%, sine waves 20 CPS to 200 KC; 4% elsewhere 3%, pulses above 3 $\mu$ s and 100 PPS, and up to 5% other conditions	Measures Peak or Peak-to-Peak value of any repetitive waveform, distorted or undistorted sinewaves, or pulses. Its operating mode can be selected to respond to a peak to peak and positive or negative peak of the waveform.	\$395
310-A Voltmeter	10 CPS-2 MC or 5 CPS-4 MC as a null detector	100 $\mu$ V-100 V (Down to 40 $\mu$ V at reduced accuracy)	2 meg shunted by 9 or 19 pf, depending on voltage range	3% 15 CPS-1 MC; 5% elsewhere	Multi-purpose broadband VTVM for measurements such as low and high-level acoustics, low-level vibration, carrier telephone transmission, ultrasonic, and rf measurements. For use as an extremely sensitive null detector for signals as low as 10 microvolts	\$250
314 Voltmeter Wide Band	15 CPS-6 MC	1 MV-1000 V (100 $\mu$ V-1 MV without probe)	11 meg shunted by 8 pf with probe, or 1 meg shunted by 25 pf without probe	3% 15 CPS-3 MC; 5% elsewhere	Wide-range unit of great sensitivity to facilitate development and servicing of equipment in video applications, and R.F. heating, vibration, ultrasonics, piezo-electricity, etc.	\$300
316 Voltmeter Very Low Frequency	0.05 CPS-30 KC	0.02 V-200 V Peak-to-Peak	10 meg shunted by 17 or 40 pf, depending on voltage range	3%	For development, design and routine testing of automatic control systems involving low frequency servomechanisms and where sub-audio frequencies down to 0.01 cps are encountered. Minimum pointer "flutter" down to 0.05 cps.	\$330
320 Voltmeter True RMS	5 CPS-500 KC	100 $\mu$ V-320 V	10 meg shunted by 8 or 18 pf, depending on voltage range	3% 15 CPS-150 KC; 5% elsewhere	Determines true root-mean-square magnitudes of periodic complex waves or voice potentials. Built-in calibrator. Crest factor range at full scale is 4.5 for high voltage scale and 15 for low voltage scale. Immune to severe overload.	\$445
220-C Decade Amplifier, Battery Operated	10 CPS-150 KC	Amplifies precisely 10 times or 100 times, as selected	5 meg shunted by 15 pf	2%	To increase sensitivity of Model 300 to 20 $\mu$ V. Provides no-hum pre-amplifier of accurate gain over wide band. Output source impedance less than 900 ohms in series with 2 $\mu$ f for 10 x gain, and less than 7000 ohms in series with 2 $\mu$ f for 100 x gain.	\$110

420 DC and AC Precision Calibrator

Provides accurate, convenient way of calibrating voltmeters, oscillographs, and other voltage-sensitive devices. Voltage Range: 0-10 V RMS, Peak-to-Peak, or DC. Frequency: 1 KC. Accuracy: better than 0.5% above 1 MV. Distortion and Hum: less than 0.25%. Setting Resolution: approaches 0.01% above 10 MV. Output Impedance (AC): 2-20 ohms depending on range setting. Output Impedance (DC): 0-4000 ohms depending on dial setting. Price: \$365

520 Direct Reading Capacitance Meter

Provides one of the most convenient ways of measuring capacitance over an extremely wide range of values as encountered in paper, plastic, mica, ceramic, and air-dielectric types. Capacitance Range: 0.01 pf to 12  $\mu$ F. Accuracy: 2% above 0.1 pf; 5% below 0.1 pf with dissipation factors as high as 0.05. Test Frequency: 1 KC. "Go-No-Go" acceptance limit pointers may be set to any desired limits, making it easy for completely untrained personnel to make accurate selections. Price: \$295

700 Sensitive Inverter

A stable, precise voltmeter accessory that permits the measurement of DC potentials as low as 10 microvolts by converting the DC into a precisely amplified AC signal to which a Ballantine voltmeter is responsive. Input Voltage Range: 10  $\mu$ V - 100 V DC. Features a built-in calibrator of 0.25% accuracy. Accuracy: better than 1% above 100  $\mu$ V; Input Resistance: 10 meg for 1:100 or 50 meg for 10:1. May be used with Ballantine series 600 Shunt Resistors to measure DC from 0.01  $\mu$ A to 10 A. Price: \$365

710 Linear AC to DC Converter

Converts an AC voltage to a precise DC voltage which can be measured with a DC device such as a Type K Potentiometer, Digital DC Voltmeter, Recorder, etc. Features accuracy better than 0.25%. Input Voltage Range: 1 MV - 1000 V. Frequency Range: 30 cps - 250 KC. Input Impedance: 2 meg shunted by 15 pf, except 2 meg shunted by 25 pf on most sensitive range. Accuracy:  $\pm$ 0.25% 50 cps - 10 KC;  $\pm$ 0.5% 30 cps - 50 KC;  $\pm$ 1% above 50 KC. Price: \$450



BALLANTINE LABORATORIES, Inc.

Boonton, New Jersey

DEerfield 4-1432

Represented by BAYLY ENGINEERING LTD., First Street, Ajax (Toronto), Ontario, Canada

For complete details check No. 39 on handy card, page 71

# industry personnel



J. D. Houlding

## John D. Houlding RCA Victor president

Charles M. Odorizzi, chairman of the board of RCA Victor Company, Ltd., has announced the election of John D. Houlding, formerly vice-president and general manager, as president of the company. P. J. Casella, formerly president, and recently appointed to the position of executive vice-president, Consumer Products, Radio Corporation of America, continues as a director of the company and chairman of the executive committee.

Mr. Houlding first joined RCA Victor in 1957 as vice-president in charge of Technical Products. Shortly afterwards he was also given full responsibility for the operations of the Defense, Tubes and Research Divisions. In 1958 Mr. Houlding was elected a director of the company and in the same year was appointed vice-president and general manager.

## Robert R. McCreary president CBEMA

Robert R. McCreary, of Executone Communication Systems Ltd., Toronto, has been elected president of the Canadian Business Equipment Manufacturers' Association for 1960. CBEMA is the sponsor of the Canadian National Business Show, which will be held June 6, 7 and 8 in the Automotive Building, Exhibition Park, Toronto.

## Veeder-Root establishes Toronto plant

Veeder-Root of Canada Limited announce that they have purchased a plant at 26 Fieldway Road, Toronto 18, and will be moving their office and service department to that address shortly. This new plant, with improved facilities, is designed to give more efficient and better service to the company's customers all over Canada.



D. J. McDonald



B. H. McGregor



J. G. Sutherland



F. J. O'Hara

## Bruce McGregor forms sales organization

Bruce H. McGregor, P.Eng., formerly sales engineer, Electronics Division, A. C. Wickman Ltd., has announced the formation of a sales organization under his name, to offer instruments, transducers and control systems, as well as application and service assistance, to laboratories and industry across Canada. The address of the firm will be P.O. Box 156, Station "H", Toronto 13, Ontario.

Mr. McGregor has been associated with the electronics field in Canada for many years, in connection with microwave, power utilities, and test laboratories.

## RCA Victor appointments

Appointment of F. J. O'Hara and J. G. Sutherland to the positions of vice-presidents, RCA Victor Company, Ltd., has been announced by John D. Houlding, president.

These appointments have been made in recognition of the growing importance of the Technical Products and Tube Divisions in RCA Victor's operations.

Mr. Sutherland has been general manager of RCA Victor Technical Products Division since 1958, and responsible for Engineering Products, Research and Defense Systems.

Mr. O'Hara has been general manager of the Electronic Tube and Semiconductor Division since 1957. Also operated under his direction is the Transistor Department.

## CBC purchasing director appointed

Appointment of C. E. Stiles, of Ottawa, as director of purchasing and stores was announced recently by J. P. Gilmore, the CBC's vice-president, engineering and operations.

Mr. Stiles, a CBC veteran, will fill a key role in controlling all CBC purchasing; a task involving the buying of items — many of them of a complex technical nature — required in the operation of a national broadcasting system involving networks in both television and radio.



R. A. Oliver



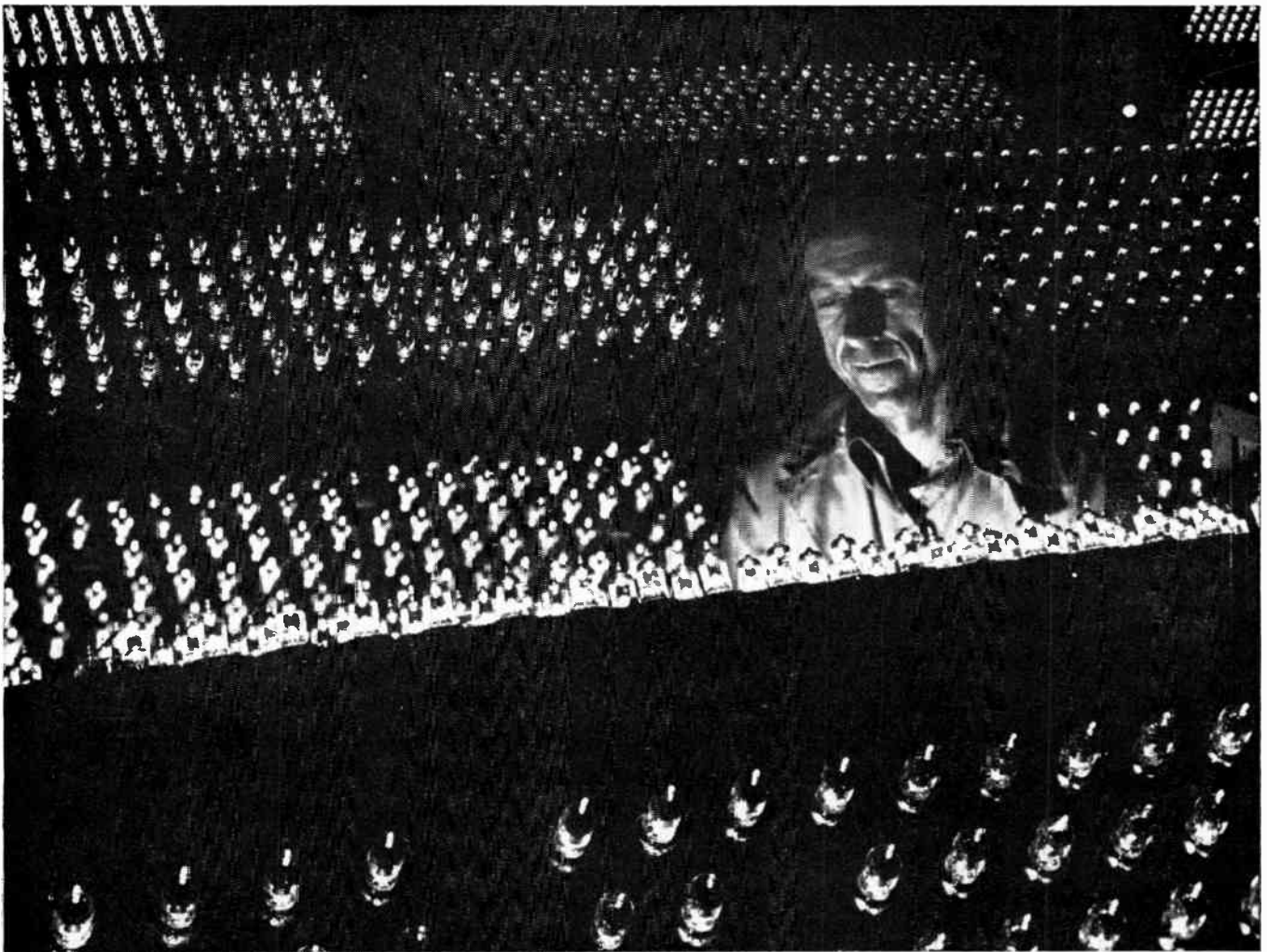
J. R. Simpson

## Automatic Electric sales appointments

Automatic Electric Sales (Canada) Limited, announce the appointment of John R. Simpson as radio sales specialist, Carrier and Radio Division, located at the company's head office, Toronto, and of Richard A. Oliver as sales representative on carrier and radio products, located at Montreal.

*Continued on page 45*

# STABILIZED



Factory Burn-in Increases 5-Star Reliability

## ONE FACTOR IN THE HIGH RELIABILITY OF GENERAL ELECTRIC 5-STAR TUBES



All General Electric 5-Star tubes are subjected to a special 48 hour burn-in process to weed out possible early failures and promote more uniform tube performance.

The *stabilized characteristics* of General Electric 5-Star tubes means you can count on them to meet critical requirements at all times.

Stability is only one factor that contributes to the ultra-reliability of General

Electric 5-Star tubes. There are many others—the ability to resist shock and vibration—special manufacturing environments—and extremely severe electrical and mechanical tests.

Give your equipment the extra protection of Canadian-made General Electric 5-Star tubes. For full information contact: Electronic Tube Section, Canadian General Electric Co., Ltd., 189 Dufferin St., Toronto, Ontario.



**GENERAL ELECTRIC  
INDUSTRIAL AND  
MILITARY TUBES**

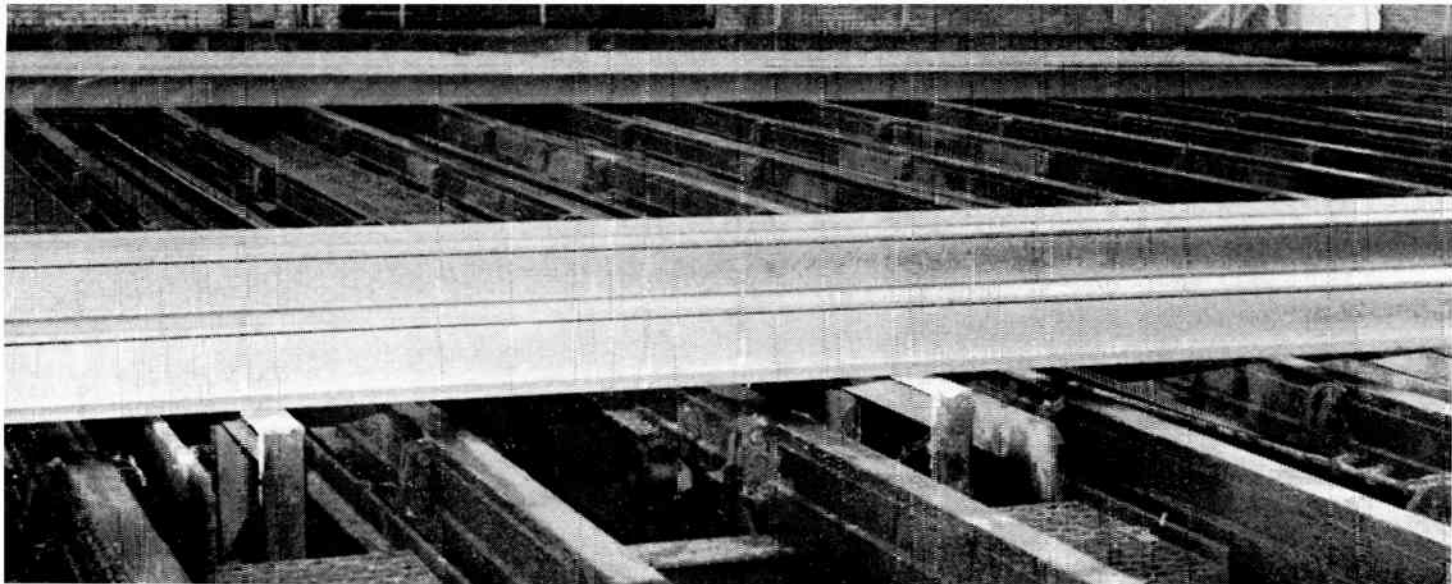
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ELECTRONIC TUBE SECTION,  
CANADIAN GENERAL ELECTRIC COMPANY LIMITED

For complete details check No. 15 on bandy card, page 71

ELECTRONICS AND COMMUNICATIONS. April, 1960

19



*Held in mid-air, a 40-foot I-beam is weighed electronically on the hot bed of a large Eastern Pennsylvania steel mill. Short support rails, shown between hot bed rails, transmit weight of raised beam to SR-4 load cells beneath bed.*

## STEEL MANUFACTURING

# Mill precision earns savings with I-beam weighing system

*Electronic strain gauge guarantees specification*

Whole I-beams — as long as 40 feet and weighing as much as 2500 pounds — are being weighed immediately after rolling at a large Eastern Pennsylvania steel mill.

The weighing is done on an electronic device, the first practical development for doing the job.

Prompt weighing has important advantages:

1. It permits accurate rolling to specifications.
2. It reduces waste.

SR-4 load cells, products of Baldwin-Lima-Hamilton Corporation's Electronics and Instrumentation Division, Waltham, Mass., are the sensing elements of the weighing system.

They make the system possible.

Before the SR-4 electronic weighing system was installed, an entire beam could not be weighed. Instead, a sample draft, cut from a beam was weighed on a mechanical scale located in another building. Even if the draft showed the beam over or under weight, during the time required by this method several more beams could be rolled incorrectly.

If the cross-section were too small, the beam might not meet the customers' specifications. If it were too large, steel was wasted.

In addition, the draft-weighing method did not show accurately whether the beam from which the draft was cut was over or under weight. The sample section

*Automatic weighings of I-beams on the hot bed of a large Eastern Pennsylvania steel mill are controlled from this console. Located near the hot bed, the console shows the weight on a dial while simultaneously printing it on the card in the operator's right hand.*



might have been taken from a portion of the beam with a cross-section larger or smaller than the average.

With the new electronic system, instructions can be flashed instantly to the roller, should his beams be outside of the two per cent tolerances allowed. Subsequent rollings can be adjusted to fall within prescribed tolerances.

I-beams are produced from a large ingot of steel, which is rolled while hot into a long beam of the shape and weight specified. After rolling, the beam is cut with a large circular saw into shorter lengths. Each beam is conveyed to one of four hot beds — a series of parallel rails eight to ten feet above the ground — on which the beams cool.

With the electronic system, a beam is weighed at the front of the hot bed before it is moved to the rear for cooling. Between the hot-bed rails eight support rails project from a platform beneath the bed. This platform rests on four 2000-pound SR-4 load cells — one on each corner. Between the base of each load cell and the concrete piers that support the system is an elevating superstructure, which, by means of an electrical drive mechanism, can raise the weighing support rails above the level of the hot bed.

This arrangement protects the support rails and superstructure from possible damage. The system is out of reach below the hot bed except when it is weighing a beam.

As the elevating structure raises a beam for weighing, an immediate reaction occurs in the SR-4 load cells. A change of resistance within the load cell — proportional to the weight of the beam — is transmitted as a change in voltage via an amplifier to serve and balance motors located in the dial mechanism of a console. The signal moves the pointer on the calibrated dial until the exact weight of the beam is indicated. The weight is simultaneously printed on a logging card, which the operator places in a slot beneath the dial. After the weighing, the elevating mechanism automatically lowers the beam to the hot bed.

### Simplicity of operation

With no moving parts and extreme simplicity of operation, the SR-4 load cell is ideally suited for such a job as this I-beam weighing application. While a mechanical scale might be arranged to raise and lower beams and weigh them accurately, maintenance of such a mechanical system would be complicated and expensive. In addition to the extreme amounts of dust and dirt normal in a steel mill, large quantities of oil, placed on the hot-bed rails so the beams will slide more easily, bathe everything beneath the bed. The sludge of oil and dirt would have a particularly corrosive and destructive effect on pivot points, bearings and other moving parts of a mechanical scale located beneath the bed.

Because SR-4 load cells are self-enclosed, oil and dirt cannot damage the cell interiors. Likewise there are no mechanical parts to be damaged, since electrical cables transmit the weight from the load cells to the dial. There are no knife edges, no bearings, no hydraulic systems to maintain, nor any pivot points to lubricate.

The electronic weighing system is flexible. Through the use of SR-4 load cells, any beam can be weighed quickly and easily. Generally the beams weighed are 40 feet long and range in weight from 10 to 67 pounds per foot — 400 to 2500 pounds per beam. The capacity of the hot bed limits the beam length to 50 feet.

*Continued on page 25*

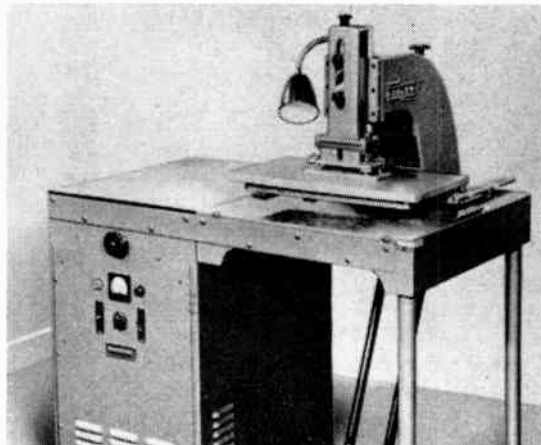
## H. F. equipment eases plastic welding problems

Recent developments in generator design have made possible the use of higher frequencies in plastic welding equipment to permit the welding of difficult materials such as polyurethane foam and extremely thin plastics.

Dominion Electrohome Industries, Limited, distributor in Canada for the industrial radio frequency heating equipment manufactured by Radio Heaters, Ltd., of Wokingham, England cite one successful application of higher frequency plastic welding has been the upholstering of door trim in automobiles, an operation which requires 30 KW of power. Using this process, a complete assembly of materials for a door interior panel is bonded together and inlaid with patten in 30 to 50 seconds, depending on size.

Other plastic welding equipment is now in operation to make such products as bookbinders, telephone book covers, raincoats, boots as well as containers and cases.

Such jobs in the metals field as soft soldering, brazing, annealing and hardening are also handled



*Radyme Thermoplastic Welder, Model FW2.*

by induction heating equipment. A successful application in this area has been the use of a single 25 KW induction heater in conjunction with other equipment for the case hardening of tie rod studs, valve seat and tip hardening. Electrohome induction generators which are rated from three KW to 100 KW output can be tooled with special fixtures whenever complete process equipment is required.

New techniques and higher frequencies in dielectric heating equipment have led to the development of tunnel ovens for drying a wide range of products and for preheating and after baking. Preheaters are used for heating plastic preforms prior to molding in a press, reducing cycle time by up to 80 per cent. Radio frequency generators up to 25 KW have been incorporated into presses for edge gluing of core stock and laminating formed plywood panels.



## ULTRASONICS

*A significant application of ultrasonic cleaning equipment is found in the radio crystal manufacturing industry. Such an application is shown at left in the plant of C. L. Snelgrove Co. Ltd., crystal manufacturers of Don Mills, Ontario.*

# Ultrasonics making clean sweep through wide range of industry

*Dirt comes clean with ultrasonic treatment*

Ultrasonic cleaners are marvelous new machines which employ high power inaudible sound waves to disintegrate soil — the modern approach to difficult cleaning problems in the dental trade and profession. DiSONtegrators are composed of ultrasonic tanks and electronic generator power supplies.

Operation is as simple as that of a radio; the generator is plugged into any convenient source of 117-volt 50/60 cycle current and consumes no more current than a light bulb. Cleaning begins as soon as the tank is filled with a suitable cleaning solution such as solvent or water and detergent and the switch is flipped on. Integral with the tank is a transducer which converts electrical energy from the generator into sound waves of such high frequency that human ears cannot hear them. When ultrasonic energy is propagated in a cleaning solution, the fluid is exploded 90,000 times per second into millions of submicroscopic vacuum bubbles. This bubble bombardment disintegrates injurious soils clinging to the object to be cleaned. Complete precision cleaning of all types of soils is achieved, not only on the surface, but in the smallest, hard-to-reach crevices in a matter of seconds. Intricate parts can be cleaned without disassembly.

Instruments, burrs and hand pieces, when immersed in water, water and detergent or germicidal solutions (alcohol or water and an iodophor) in the ultrasonic tank will be cleansed of cement, enamel, and tooth decay matter. This soil, difficult to remove even with hand scrubbing, is removed in seconds and eliminates carry-over of decay particles from one patient to the next. Diamond and carbide drills, clogged with contaminants which have become so impacted and cemented as to become dull and unusable, can be salvaged in minutes.

Food particles, nicotine and foreign matter are removed in a few minutes from bridges, dentures, plates and crowns, using water and detergent. Buffing and polishing compound residues are disintegrated in seconds using the same solution.

Investment or plaster materials on castings are treated in an ultrasonic bath of SONitizer No. 9. When necessary, removal of tenacious plasters is accomplished by using sulfamic, hydrochloric or nitric acids. By partly filling the ultrasonic chamber with water and detergent, then immersing a glass beaker containing the acid and part to be cleaned in the water, the cleansing operation is completed in a matter of seconds.

### Range of applications

Other items which may be cleansed by ultrasonic techniques are orthodontic appliances, inlays, models, dentures, glass slabs, alloys, tools and instruments. Similarly, buffing compounds, waxes, stains (tartar, nicotine) oxides, cements, corrosion products and other contaminants may be removed effectively by the application of ultrasonic methods.

While the above description of ultrasonic cleaning applies to the dental profession, the technique is being used in countless manufacturing processes where absolute cleanliness of parts is essential. It is interesting to note that ultrasonic cleaning is catching on fast in Canadian industry and early in 1960 Conway Electronic Enterprises Reg'd, who are the exclusive Canadian distributors for Ultrasonic Industries Inc. of Albertson, L.I., N.Y., will establish a manufacturing facility in Toronto for the manufacture of the complete range of DiSONtegrators.

## MACHINE CONTROL

# How to obtain four figure repeatable accuracy in machining operations

A numerically controlled, double spindle turning and boring machine will precision machine inside and outside contours of hemispheres, cylinders, and other related metal parts with infinite variations from a hemispherical contour to a repeatability of 0.0001-inch.

The two-axis numerically controlled machine tool system was designed and built co-operatively by the Heald Machine Company, Worcester, Mass. and the Industrial Controls Section, Bendix Aviation Corporation.

Adapting numerical control to this single point, 2-axis turning and boring machine makes possible machining to a tolerance of plus-minus 0.0001-inch. In many instances, tolerances of plus-minus 0.000070-inch are achieved to maintain critical inside and outside diameters. The Bendix numerical control system pro-

vides a command pulse value to each of the two machine slides of 0.000025-inch or 40,000 pulses per inch of slide travel.

In operation, one spindle of the machine tool is used to machine the outside diameter and the other spindle is used to machine the inside diameter of the part. Only one spindle at a time is operated on this machine.

The work piece is clamped in a rotating fixture attached to the spindle. A single point tool, which is mounted on two hydraulically operated slides, is numerically controlled in two axis (longitudinal and transverse) to machine the desired part shape to extremely close tolerances.

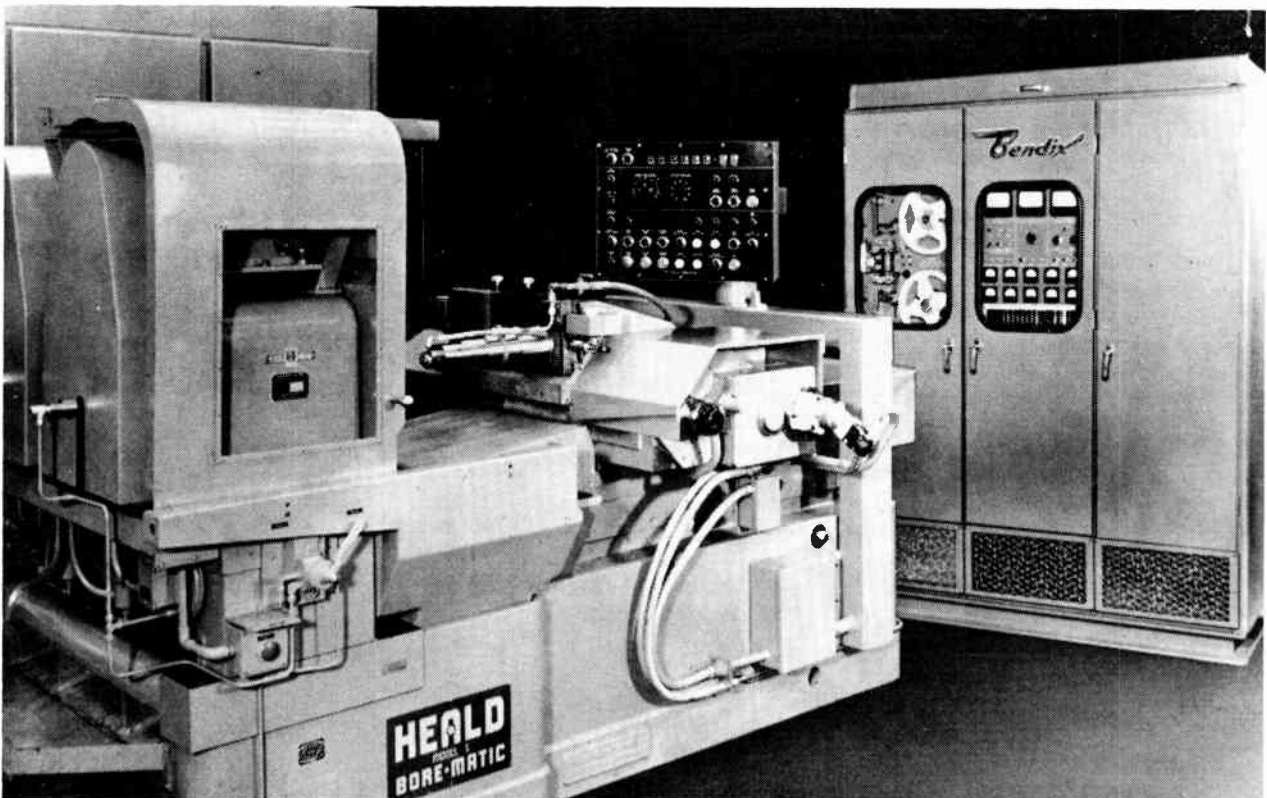
This numerical control system provides an extremely versatile method of machining any number of different part shapes with only one machine tool. In addition to versatility, this system reduces tooling costs, increases production and shortens the overall manufacturing cycle when compared to conventional machining methods.

### Numerical control operation

A control tape which contains in binary coded form all information necessary to machine a specific part, is first mounted on the tape reader of the Bendix 2-axis machine control unit. The operator then positions the cutter manually to the setup point corresponding to the initial position on the tape and depresses the tape "start" button. Automatic machine operations then begin.

The first block of information on the tape is read by a photoelectric tape reader and held in temporary storage. At the same time, each line is simultaneously

*Continued on page 66*



*The new Heald Bore-Matic precision turning and boring machine which is equipped with a Bendix numerical control system will produce hemispheres, cylinders, free form turned shapes and other related type hollow metal parts to extremely close tolerances.*



## SURVEYING

*A close-up of a Tellurometer demonstrates its compactness and simplicity. Operators converse freely across the miles by radio-phone. The receiver is almost identical to the transmitter or "master".*

# Electronic surveying slashes cost by thousands and time by months

*Ninety mile readings possible with Tellurometer*

Tellurometer, the new electronic surveying device already in extensive use in Canada and the U.S.A., measures distance by use of microwaves similar to the familiar radar method.

A master unit sends out microwaves towards a remote unit which can be stationed many miles away. The time it takes these waves to return is immediately revealed on a cathode ray tube in millimicroseconds, which are then translated into miles and feet.

Only one man is required to set up the portable transmitter, and another to operate the receiver. Experienced operators, it is claimed, can set up their gear, take readings and make their computations in 30 minutes. They keep in touch by built-in radio-phone.

The new device, which originated in South Africa, is expected to outmode the traditional triangulation system of measuring long distances, particularly in rolling or rough terrain.

It is capable of measuring far greater distances than ever before possible. 25 miles in one "leg" is normal. Measurements of 50 miles have been made on many occasions. And recently the Royal Navy took an accurate measurement of over 90 miles.

### Highly accurate

The Tellurometer is accurate up to three parts per million, plus or minus two inches. Though "line of sight" conditions must generally prevail, the Telluro-

*Continued on page 63*

*Highway departments and consulting engineers are using the light-weight, portable systems to set control points for location of the new superhighways in the 41,000-mile National Interstate System.*





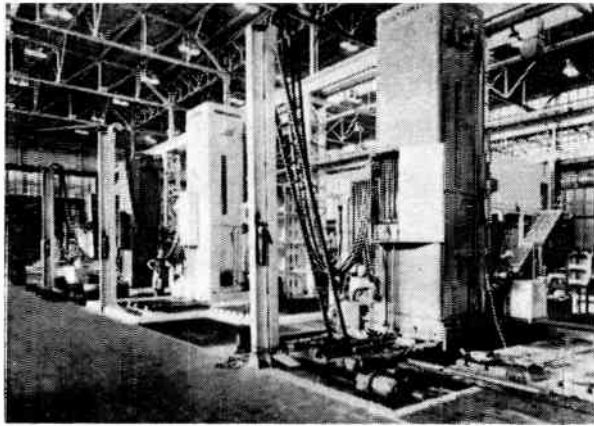


Figure 2 above shows Giddings & Lewis floor-type milling machine being controlled by 3-D electronic tracer.

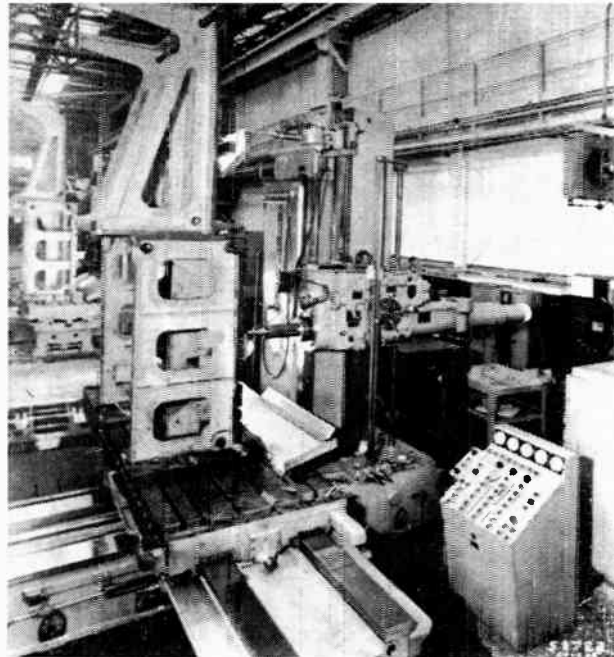


Figure 1 at right shows Giddings & Lewis boring machine under electronic control. Note 3-dimensional tracer head following contour tracer.

## Tracer control sees in 3-D

### *A recognized industrial requirement*

Automatic control of machining operations is now a recognized industrial requirement, especially when applied to the production of workpieces having forms which are not inherently simple to obtain by manual control of the machine tool.

When such workpieces are to be produced, considerable economies may be achieved by supplying the machine with "information" in the form of a template or model, the shape of which can then be reproduced automatically as the workpiece.

The British Thomson-Houston Company has developed several forms of tracer control equipment which are applicable to a wide range of machine tools.

Tracer control equipment may be used to control any number of feed motions on a machine tool, the most interesting being application of control to three dimensions (i.e. automatic control of three mutually perpendicular feed motions).

In machine tools such as vertical and horizontal

boring and milling machines, the saddle, table and headstock can be placed under simultaneous automatic control if required. This enables the machine to reproduce complex three dimensional shapes.

Steering control can also be readily applied to the B.T.H. 3-D control system. It can be used for initially directing the stylus to the model at the commencement of automatic copying, and alternatively, it is very useful for rough machining operations, and controlled facing operations independently of tracer control.

The accompanying photographs show various applications of 3-D tracer control to machine tools. A Giddings & Lewis boring machine operating under electronic control at the Ford Motor Company in Great Britain is illustrated in Figure 1. Note the three dimensional tracer head following the contour at the top of the machine. Figure 2 shows a view of Giddings & Lewis floor type milling machine at Briggs Bodies Ltd. in Great Britain.

## Mill precision earns savings *Continued from page 21*

The system is calibrated weekly. Fifty-pound weights are used to simulate a beam. In the near future a calibrated beam, suspended from the ceiling, will be lowered onto the scale for calibration. With this method the scale can be calibrated in a few minutes rather than the 20 to 30 minutes now required.

Basic construction of the B-L-H load cells is extremely simple. The basic element of the device is the SR-4 bonded wire strain gauge. A matched set of four is bonded to a high-strength steel column machined to close tolerance. The four gauges are connected electrically in the form of a wheatstone bridge, initially balanced. Temperature-compensating resistors are included in the circuit to provide accurate measurements over a wide range of temperatures.

When a load is placed on the cell, the steel column is compressed. The wires bonded to it are also compressed, creating a change in resistance which un-

balances the bridge circuit. The variation of voltage at the bridge circuit, when amplified, gives an indication on the dial of the exact load.

During a six month period that the I-beam scale has operated, the only maintenance required was routine inspection and lubrication of the elevating superstructure and drive mechanism. Aside from the drive mechanism, there are no moving parts to lubricate. Weighings are made at an average rate of one to two per hour throughout 20 eight-hour shifts per week. The electronic system has been in service around the clock with no downtime recorded.

One reason for selecting the SR-4 equipment was the success of a previous installation in a shipping section of the plant. For some time there, SR-4 load cells have successfully weighed heavy rods, pipes and other steel products.

## BROADCASTING

# Convenience of operation in a master control system

*Designing for compactness provides arms-length reach of equipment for station operator*

by C. A Gray, P.Eng.\*

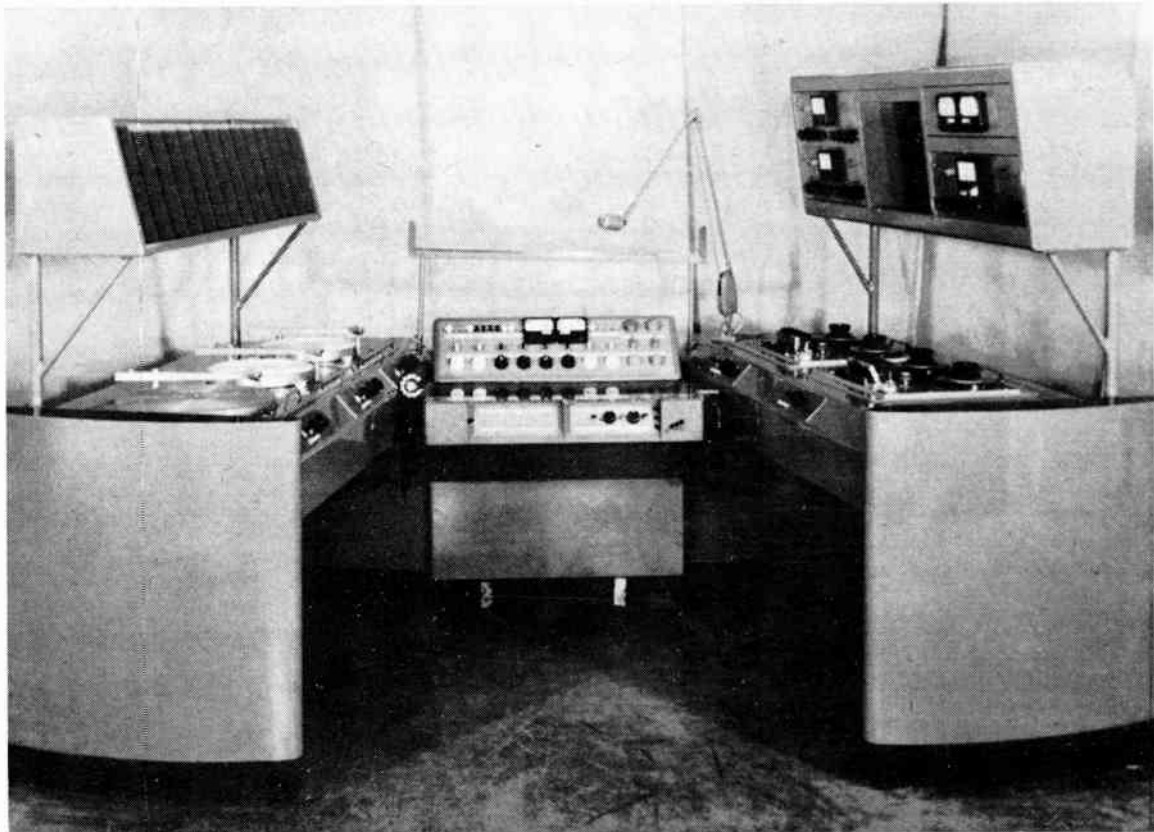
A Master Control System which consists of a package unit containing all the faculties required for the production and control of monaural and stereophonic radio programs and which has been named the the 5470 Master Control System has been produced by the Northern Electric Company Limited.

Facilities provided by this equipment include control console, disc reproducing equipment, monitor amplifiers, cue amplifiers, jackfield and telephones. Space and wiring are provided for Ampex 351 tape recorders which may be factory installed if desired. Record and tape storage space is provided.

The control room equipment is mounted in an open "U" shaped cabinet, with the record playing area on the left, control functions in the center and tape playing area on the right as viewed from the open end. The knee area is open and clear from one end of the structure to the other without projections or controls to interfere with the movement of the operator.

The record playing section includes two 12 inch and one 16 inch turntable, five fixed equalizers, cue pre-amplifier, turntable control unit and three monitor amplifiers. The 12 inch turntables are wired to reproduce both monaural and stereophonic discs while the 16 inch turntable is used for monaural discs only. All turntables are 3 speed, high quality, rim driven units. Automatic start facilities and delayed audio output are provided by the turntable control unit. Fixed RIAA equalization is provided by the equalizing amplifiers on all turntable outputs. Record storage is provided by bins mounted above the turntable section so that a clear view of the studio is retained while still placing the records within easy reach of the operator.

\* Engineering Dept., Northern Electric Co. Ltd., Montreal.



The above illustration of the Northern Electric Master Control System shows the convenience of the facilities provided in the control system. The equipment includes control console, disc reproducing equipment, monitor amplifiers, cue amplifiers, jackfield and telephones. Accommodation is also provided for tape recorders and storage.

The center section contains the control console, power supplies, cue amplifiers, speaker relays and telephones. The control console is an R5430A speech input equipment modified to control monaural and stereophonic program sources. Changeover from monaural to stereophonic programming involves only the operation of one telephone type key switch. Talkback facilities are provided for control room to studio communications. Monaural and stereophonic monitor controls are located in this section. Colored knobs and key handles are used to associate control operations and functions for maximum ease of operation. A complete dial telephone is mounted on the left-hand side of this section. On the right-hand side, a local battery type telephone is provided for station communication.

#### **Operator convenience**

The tape recorder section is wired to accommodate an Ampex 351-2U dual track tape recorder and an Ampex 351-1U full track tape recorder. The dual track tape recorder is used for both monaural and stereophonic recording and reproduction while the single track tape recorder is used for monaural programs only. The electronic units for the tape recorders are located above the tape transport mechanisms. Here again the upper section is elevated to retain a clear

view of the studio while still placing the tape recorder controls and tape storage bin within easy reach of the operator. A meter panel is provided to check the signal level on the output lines to the transmitter or transmitters. The jackfield is recessed at the end of the tape section. The well in front of the jackfield provides a convenient place for the patch cords to hang when in use or may be used as storage space for patch cords not in use.

All inputs, outputs, external control circuits and jacks are wired to terminal blocks on the rear of the tape section. Terminals are provided for external customer wiring. Cross jumpering between these terminals determines the operating functions of the system. This feature provides extreme flexibility without the need to disturb the original system wiring. The power panel for all power supplies and amplifiers is also located at the rear of the tape section.

Two monitor loudspeakers are provided for the control room and one monitor loudspeaker for the studio. An announcer control turret is provided for the studio which allows the announcer to turn his microphone on or off. This unit controls two microphone input channels, thus permitting the use of a stereophonic microphone or two separate microphones, as desired.

## **FOOD PROCESSING**

# **Food flavor enhanced by ultrasonics**

### *Punctured beans taste better*

Patents were issued recently to the Reflectone Corporation of Stamford, Connecticut, covering the use of ultrasonic energy as a means of increasing the flavor life of roasted coffee, while at the same time reducing the cost of roasting, packaging and distribution.

The use of ultrasonics to increase the flavor and cooking characteristics of foods is not new. For instance a short time ago a method for tenderizing frozen meats by the use of ultrasonic waves created quite a stir among meat processors all over the country, many of whom are today studying means of applying the basic invention to their own needs. This is the first intimation, however, that dried fruits or vegetables could also be improved by the use of ultrasonic energy.

Coffee, according to the Coffee Brewing Institute, develops rancidity in a relatively short time, once it has been exposed to the air. This change is caused by the oxidation of vegetable oils natural to the beans, and very difficult to remove. Roasting the beans tends to inhibit rancidity, but even roasted beans will become rancid within 10-12 days. Refrigeration has little, if any effect. Vacuum packing is one protective measure, but this is costly, and still offers no protection after the vacuum seal has been broken. In fact, a good deal of the high cost of coffee is due to efforts of the industry to protect flavor through roasting,

packaging and maintaining fresh inventory. The new process aims directly at this problem.

The new ultrasonic process for coffee or other dried foods seems simple at first glance, and its effects are readily discernible. The full process is highly complex, however, many of its ramifications being still under study. In the case of coffee, the green beans are submersed in a liquid bath of plain water and subjected to a controlled bombardment of ultra high frequency sound waves. These sound waves puncture the shell of the coffee bean with microscopic holes. As a result, the subsequent roasting process is more effective and substantially shortened in time, and because the minute punctures allow for deeper heat penetration and more complete release of coffee oils, the danger of rancidity is decreased. Coffee flavor is also improved; this is directly related to the quality of the roasting.

It is felt that ultrasonic treatment of coffee beans will be beneficial not only to producer, processor and retailer, but to the consumer as well. Producer and processor should be able to cut the cost of roasting and packaging, decrease waste, provide a better product, retailer should be able to offer the public a better product at less cost, eliminate the problem of reducing stale inventory; and, of course, the consumer may find his daily cup of coffee more flavorful and less costly.

## ENGINEERING COMPUTERS

# Computers for industry no longer a rich firm's luxury

*New models built to grow with industry*

Electronic analog computers are now within the price range of even the smallest of the nation's engineering firms. What's more, they can now "grow" — by the addition of components — with the expanding needs of those firms.

The development of such a low-cost analog computer designed for "desktop" use has been announced by Bowmar Instrument Corporation.

About the size of a television set, in its basic model, and priced to sell as low as \$2,000, the new unit now makes available a problem-solving facility to engineers at all levels.

One of the most important factors is that the computer is the only unit designed to expand with the needs of small, growing firms. The basic model can be purchased for about \$2,000 and then, because the unit is built on a "modular" system, more complex components can be added to the computer as requirements dictate. However, even after all necessary components have been added, the unit's cost will still remain less than half of that of standard console equipment, which sell for \$50,000 and up.

This overcomes a major problem confronting small and medium-sized firms today. Although they can easily purchase a small plant and later add to its facilities, they cannot do the same thing with their computer equipment. They must either invest a huge sum in highly complex consoles, or else purchase an inexpensive model that must later be discarded for a more versatile unit.

The development of this type of computer may have tremendous impact in "de-centralizing" the computation facilities of large firms. Whereas most engineering firms operate with all computation equipment centralized in one area, the new desktop unit can place the problem-solving ability right at the engineer's

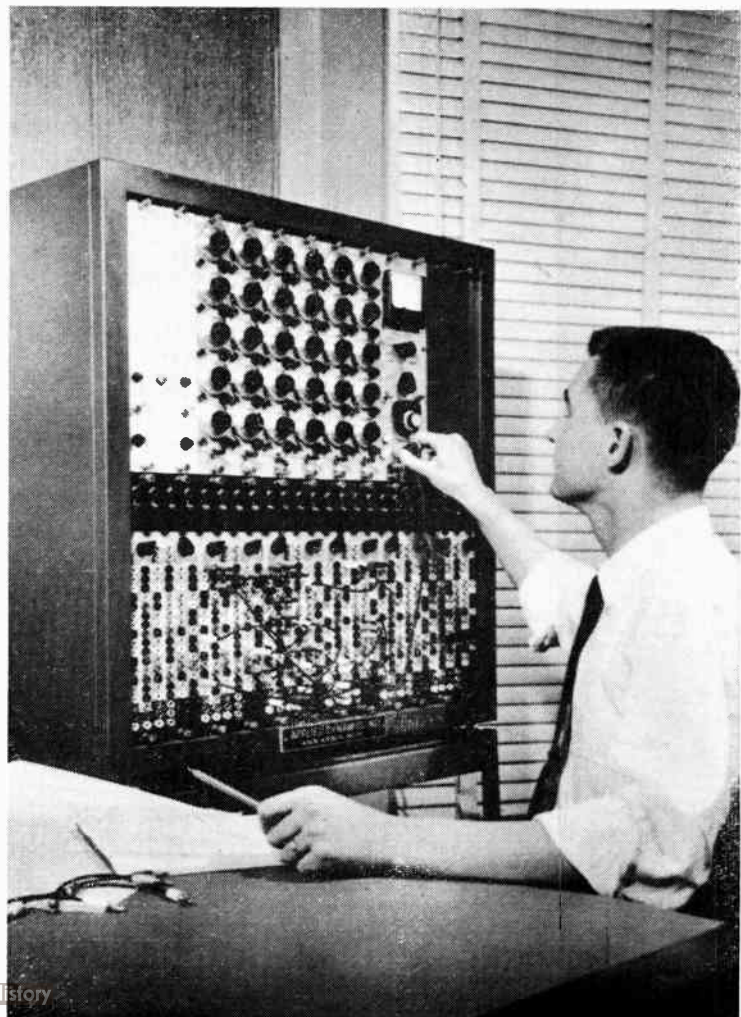
fingertips — thus speeding the research and analysis process.

The science of analog computation is of much more recent origin than the most familiar "digital" computation. First developed in the 1930's as a means of electronically simulating problems of aircraft flight, analog computers have been quietly making a host of vital contributions to the fields of design and control, including the famous Norden Bombsight, shipboard gunnery systems, lock-on-target systems in fighter aircraft, and numerous pilot training devices such as the Link Trainer.

In contrast to the digital data processing computers, the analog system is an actual "electronic model" of problem under study; i.e., electronic circuitry is designed to be directly "analogous" to the aircraft, missile, ship, etc., which is being built, as well as the forces such as weather, shock, friction, etc., to which it will be subjected.

Through this electronic method, therefore, design engineers have been able to "test-fly" — in the drafting room — a jet liner, eight weeks before the airframe was even constructed, and test a gas pipeline distribution system long before actual installation. Hence, in addition to cutting engineer problem-solving time by a frequent ratio of 1,000-to-one, the new science also answers questions that would be impossible to solve without actual construction and testing.

*Grandson of the familiar "console" type analog computer, this new desktop unit brings problem-solving facility to the fingertips of today's research engineers. The unit was recently developed in spare time by four University of Michigan professors.*



## Module construction

Although there are other analog computers that have been reduced from console size, the new unit — in addition to being one of the smallest — has the added feature of expandability. This feature, offering vital flexibility, is becoming increasingly important to small firms whose research and computation needs grow almost over night. The new computer can be expanded in utility and capability by the simple procedure of plugging in additional modules or even an entire additional cabinet, "like building blocks".

Moreover, it is designed to sell for as much as 20 per cent less than standard desktop models and has

more advanced electronic features. By expanding the basic desktop unit to a complex floor model at a cost of about \$25,000, a firm can add such components as a pre-programmed, removable patchboard system, up to 64 amplifiers, electronic multipliers and diode function generators — all requiring less power than an ordinary toaster!

Called the "AD-1" Electronic Differential Analyzer, the shrunken computer is the brainchild of four University of Michigan engineering professors who collaborated in a spare-time project. Incorporating themselves as Applied Dynamics, Inc., the group was in final development stages when it was acquired by Bowmar Instrument Corporation.

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# Tuned circuitry in pipe tracing

*Confusion from extraneous signals can now be eliminated*

A major step forward in eliminating most of the problems of time and labor-waste in tracing pipes, conduits, and similar metallic underground installations has been announced by Sharpe Instruments of Canada. Sharpe Instruments has applied the principle of "Tuned Circuitry" to pipe tracing.

Until now, the major problem of pipe tracing has been the inability of the standard unit to discriminate between the multitude of signals within the audio range. Thus, if a 1 Kc signal is used as the source frequency, tracing efficiency remains high only as long as the background noise frequency levels remain low. However, the moment extraneous noise sources (power lines, etc.) start to produce signals at a higher volume than the trace frequency being used . . . tracing becomes extremely difficult . . . if not impossible.



The new Tuned Circuit Tracer enables an engineer to locate, trace and triangulate underground pipes anywhere . . . even those that run parallel to power lines and similar audio-frequency producing sources . . . with accuracy and efficiency that has hitherto been unmatched.

Operation of the Tuned Circuit Tracer is extremely easy. A ground stake and the pipe or conduit to be traced, are connected to

the lightweight transmitter unit. The transmitter is switched on and tuned to the highest signal.

The receiver, or tracer unit is now switched on . . . and this, too, is tuned to the audio-frequency of the transmitter. Drift is so low that re-tuning is unneces-

sary, once the transmitter and receiver are set to the same frequency. The field coil and receiver of the Tracer Unit are so light, and so highly sensitive, that tracing can take place at a fast walk. Signal volume in the headphones is maintained at a very high level for miles . . . since outside interference is eliminated almost completely. For added convenience, the Receiver of the Tracer Unit is fully transistorized so it may be carried in the shirt pocket, if desired.

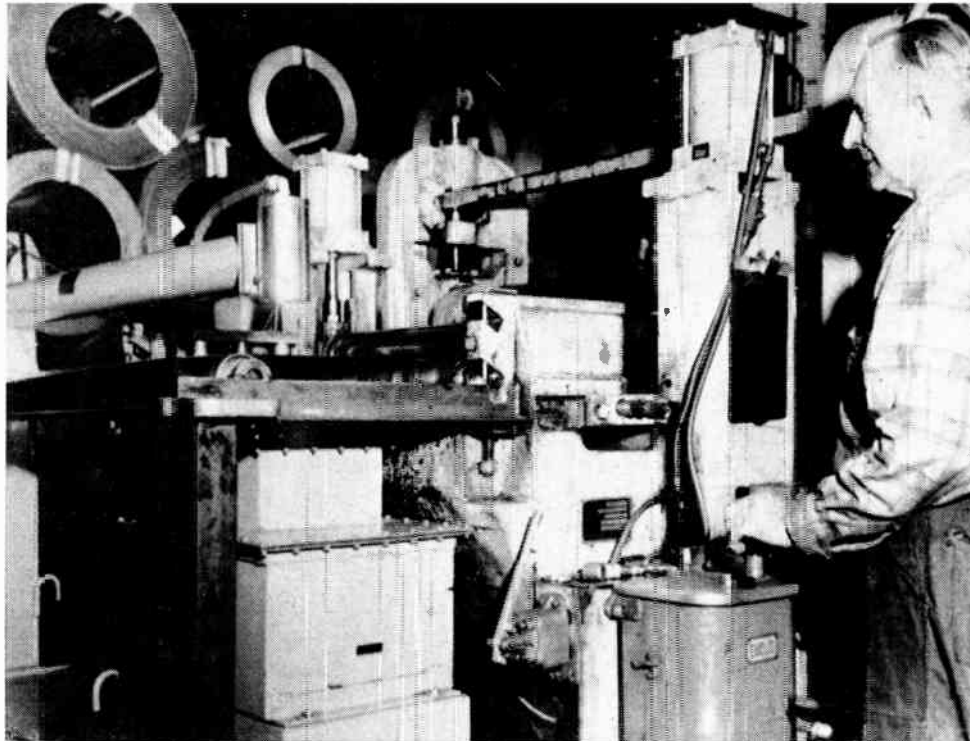
The Tuned Circuit Tracer adds two features that will be of great convenience to the engineer. First . . . the Field Coil Head is rotatable with positive "lock stops" at 90°, 45° and 180° to the ground. In the vertical 90° position, signal strength increases on each side of the pipe being traced, with a sharp audio null-point directly over the underground installation. This is the position used for complete "end-to-end" tracing of pipe or conduit.

The 45° position of the Field Coil is used for rapid (and remarkably accurate) depth location by use of simple triangulation. Accuracy is within 3" on any depth up to 20 feet. The 180° position (coil axis parallel to ground) will be of great use to the engineer who wishes to locate an underground pipe without tracing from the transmitter source. In this position, the signal strength increases as the operator approaches the buried pipe. When the audio signal is at its maximum, the field coil can be switched to the 90° position for pinpointing the pipe location.

In tests carried out to date in the field . . . signal strength and accuracy have remained constant throughout a five mile tracing range with absolutely no drop in signal volume received in the operator's headphones!

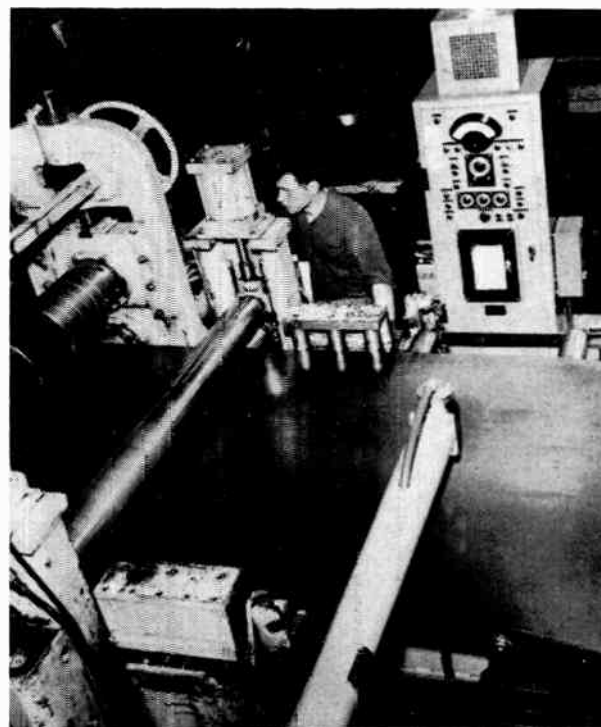
The second additional benefit available in the Tuned Circuit Tracer is the optional addition of remarkable Liquid-Seal Headphones. These patented headphones, with Liquid-Seal Ear Cushions . . . and an amazing 40 db of extraneous noise cancellation, allow the operator to use the Tuned Circuit Tracer in the highest imaginable noise situations. (Tracer is normally supplied with high-impedance, high-efficiency phones.)

In portability, in sensitivity, in accuracy, and efficiency under adverse operating conditions, the new Tuned Circuit Tracer can be classed as Canada's finest, and among the best anywhere in the world.



*Mill operator at Coil Steel Corporation adjusts power source for X-ray gauge used on slitting line.*

*At right, X-ray gauge receiver unit transverses sheet steel before being slit.*



## MEASUREMENT CONTROL

# Production increased 30% with X-ray thickness gauging

*Rejects eliminated in processing warehouse steel*

Gauging custom-processed warehouse steel with high-accuracy x-ray thickness gauges has eliminated rejects thereby increasing production as much as 30 per cent at the Coil Steel Corporation, Cleveland, Ohio.

The non-contact type radiation gauge measures more than 50 varieties of de-coiled and custom-slitted coil and sheet steel and aluminum. In addition to processing stock material, the Corporation — with two plants in the Cleveland area — also custom-slits customers' steel as part of its normal service operations.

A mobile unit, the x-ray thickness gauge is used on the slitting line to gauge thickness of the coils. This gauging is done for coils as they are slit on the

Wean slitter, with which the x-ray gauge is used, and to pre-gauge coils before they are slit on other lines.

Thickness measurements of coils and sheet steel up to 54-inch widths are made by passing a pencil-size x-ray beam through the steel being slit or cut and collect the energy transmitter with a receiver unit. Energy collected is converted instantly into an electric signal which indicates thickness on thickness indicators and chart recorders installed in a supervisory console located near the slitter.

Called the XactRay, the thickness gauge was developed and manufactured by the Weston Instrument Division of Daystrom, Incorporated, Murray Hill, N.J.

Officials of the Coil Steel Corporation, a warehouse company, report the x-ray gauge has provided fast, accurate thickness measurements which permit operators to turn out specialty slit coils and cut sheets in 30 per cent less time than that required in previous operations.

The gauge has been an economical, time-saving feature for operations, since coils which do not meet required tolerances are not started through slitting or cutting processes.

### Servicing customer needs

In processing steel, warehouses, like Coil Steel, normally maintain large inventories of different types of steel to meet individual customer requirements. Customers usually order in small quantities of exact sizes and tolerances. Thus the steel warehouse often must meet a wide variety of specifications which means a definite emphasis is placed on servicing customer needs.

These specifications range from the usual commercial tolerance of approximately plus or minus 10 per cent to tolerances as close as plus or minus a few per cent. This means the gauge must be capable of indicating accurately — and on an easily-read scale — thickness variations of as much as .005 inch or as little as .000040 inch.

During processing, a graph or strip chart is made of all coils. Customers are given a mean reading, or if requested, the graph for each coil is sent with the coil itself so that customer can determine which coils — or portion of a coil — can be used for tight or loose tolerances.

Previously, strip steel coils and sheets were spot checked with a hand micrometer during processing. This was time consuming and troublesome because "miking" could check only a limited distance in from each side of the coil. Since rolling mill processes normally produce a crown effect on the coil, there was

no way to determine the cross-section thickness until the strip was slit or the customer attempted to utilize the bands. The XactRay, on the other hand, can be set to scan the entire width and length of the unslit coils and in addition, record the thickness of the entire area.

Obvious advantages of the x-ray gauge are its faster measurements and high accuracy. All measurements are continuous from side to side and end to end. If necessary, these measurements can be made at speeds up to 6000 feet per minute (this speed is used in rolling mill operations employing the x-ray thickness gauge).

A non-contact type precision thickness gauge, the XactRay uses an x-ray beam to measure and record nominal thickness in thousandths and deviations from this in thousandths. For example, thickness measurements by the x-ray gauge may be set for a nominal gauge of .100, with limits of .090 and .110. The desired nominal gauge is always centered on the thickness indicator, and plus or minus deviations from this thickness is shown continuously on the same indicator. Thickness variations from this nominal gauge are indicated on the meters and recorded on graphs. If significant portions are beyond tolerances, automatic alarm signals are actuated, and the operator can return the coil to stock and select material to fit the particular requirements.

All x-ray gauge measurements are set up by the slitter operator. Using simple dial adjustments, the operator sets the thickness to be slit or cut, adjusts the gauge to nominal thickness, and begins slitting operations.

Since no physical contacts are made — and there are no moving parts — x-ray gauges experience practically no wear. Maintenance of the XactRay at Coil Steel consists of occasional electrical checks and infrequent replacement of tubes. The XactRay gauge x-ray tube is generated at so low a level of radiation that it will last indefinitely without measurable deterioration.

## Technique for automatic die casting

*No skilled help required here*

New programming methods, evolved by engineers at E.M.I. Electronics Ltd.'s laboratories, now make it possible to produce first-class dies on milling machines, direct from the drawing, without the use of an external computer.

Special mathematical techniques were devised to provide continuity in 'blending' between the co-ordinates shown on the normal blueprint and produce fully three-dimensional work pieces. As in the other E.M.I. control systems, punched tape feeds instructions into what is in effect a built-in computer which controls the mill.

This system gives several outstanding advantages over the conventional method of diesinking from mahogany or metal models.

For a typical medium-sized product, the tape can be programmed in about half the time required to make a wooden prototype. As girl programmers can be employed instead of skilled model-makers, the cost per hour is also greatly reduced. It is found in practice that the machining

time too is considerably less than by normal methods.

The new system ensures a consistent accuracy of  $\pm .002$ " — much greater than could be achieved by the use of wooden models made to an accuracy of  $\pm .01$ " and subject to subsequent swelling or shrinkage.

Forging, casting and plastic molding dies can all be produced on machines equipped with the E.M.I. system. Turbine blades, car rear lights and telephones are just three examples of the type of articles for which dies can be produced more efficiently.

Most surprising of all, perhaps, is the fact that an electronically controlled vertical milling machine costs very little more than a conventional copying diesinker of the same size. This is expected to make the E.M.I. equipment particularly attractive to medium-sized manufacturers in this country and throughout the world.

# Measuring techniques for industry\*

*Impressive dollar savings foreseen for industry with the use of high power transistors and rectifiers*

Two and a half years ago, while working to the exacting requirements of guided missiles, de Havilland (Canada) entered the field of high-power static inverters and similar devices with the design and manufacture of a highly successful missile-borne static unit rated at 1 KW, delivering single and multi-phase closely regulated power to the missile circuits. Encouraged by the success of this unit, a smaller 400 cps static inverter was designed and a number installed in several of the company's Otter aircraft. It is significant that none of these inverters has required servicing since the aircraft were delivered nearly two years ago. This fact emphasizes the higher reliability inherent in these devices.

Returning to the high-power bracket, the company designed an entirely new transistorized power controller for the Caribou de-icing system; two inverters being installed in each aircraft and supplying over 3 KW of power to the electrically heated windshields. This represents the largest static inverter installation currently in full production and service in aircraft in North America.

Constantly refining techniques and contributing to the art, the company is presently supplying 250 VA, 3-phase static inverters to the Royal Canadian Navy, while even higher power devices are in current development.

There is every indication of a bright future for solid-state power handling devices, largely because of their high reliability, freedom from routine maintenance, and exceptionally high conversion efficiency. Invasion of the industrial field may be expected in the near future as high power transistors and silicon controlled rectifiers replace bulky machines and

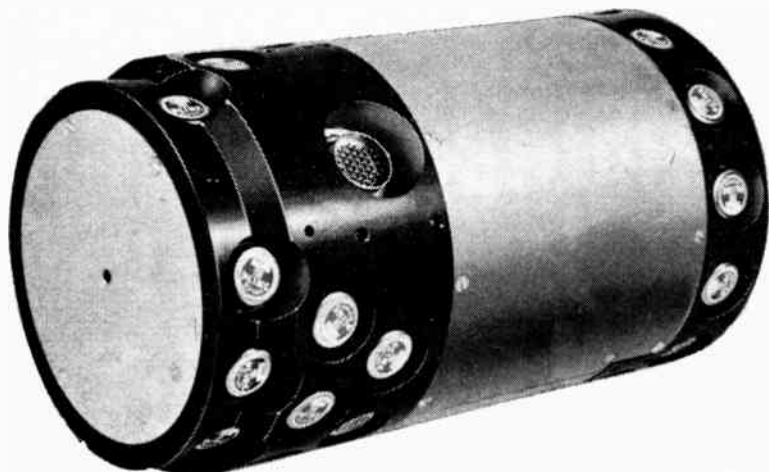
mercury vapor thyratrons, giving silent and instantaneous control of machine and processes and the company's extensive military and airborne experience is now being applied to these new areas.

Paralleling the development work in the solid-state power handling field, the company has recently completed an extensive survey of the problems involved in the production of wire, cable, rubber and plastic extrusions. The results show that many thousands of dollars are lost annually to these industries due to the lack of a means of accurately measuring the size and temperature of the respective products while they are being processed.

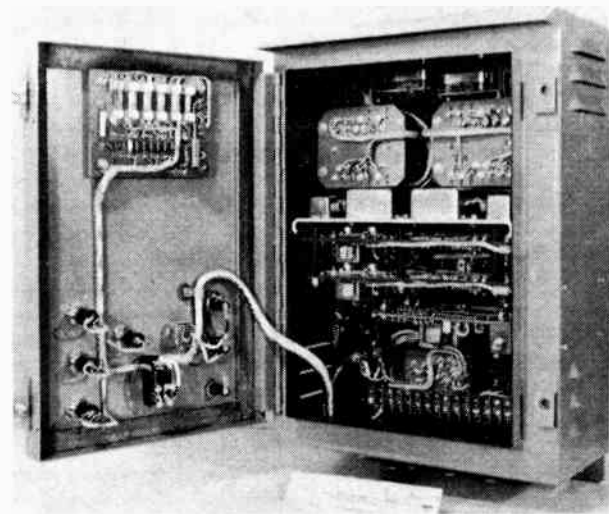
In seeking a solution to the above problems, the Special Products Division engineering team adapted specialized techniques, evolved for guided missile applications, to give accurate remote measurements of size and temperature. Today, instruments suitable for use in performing these tasks are in an advanced state of development, and it is confidently anticipated that these instruments will enable positive remote linear measurement to within 0.003 inch, and temperature measurement to within one degree.

The use of these instruments by the wire, cable, rubber and plastic industries is capable of effecting extremely impressive dollar savings to the users, waste being reduced considerably, while increasing the accuracy of the end product, thus enhancing the sales and marketing potential.

\* Acknowledgment is made to the following authors of this article: A. E. Maine, chief electronics engineer, J. B. Driffield, senior project engineer, and J. W. Dring, senior supervisor, technical publications, Special Products Division, The De Havilland Aircraft of Canada, Ltd.



DHC Type M-15 Static A.P.U. for use in air-to-air guided missiles.



250 VA — 3 phase Static Inverter produced for the Royal Canadian Navy.



# Let's put some 'meat' into our association meetings

by T. W. Lazenby, Editor

Why aren't engineers attending the meetings of their professional societies? This was the topic of a panel discussion which formed the recent joint meeting of the Toronto AIEE Communications Group and the Toronto Chapter of the IRE Professional Group Communications Systems.

Chairman of the panel, J. S. Ford, in opening the discussion posed the question: Why in an age of increasing technical problems should the attendance at the meetings of professional societies be dropping off?

According to H. M. Reid, Marketing Manager of Canadian Motorola Electronics Limited, a panel member, engineers after a hard day's work on technical problems are not disposed to sit through an evening discussion listening to an abstract dissertation on further technical problems requiring deep thought and concentration. Mr. Reid suggested that if more social atmosphere was injected into the meetings, it might help to increase attendance.

J. R. Warren, another member of the panel and Manager, Manufacturing Electronics, Canadian General Electric Company Limited, was disposed to think that the interests of Canadian engineers were much broader than those of American engineers and that the highly specialized subject matter dealt with at the meetings of the professional groups of various societies tended to lessen the interest of engineers. He further pointed out that the subjects dealt with at society meetings jumped from one specialized subject to another with the result that there was no continuing interest for engineers, hence their lack of attendance at the meetings.

G. R. Slemon, Professor of Electrical Engineering, University of Toronto, also a member of the panel suggested that the diminishing attendance at meetings of the professional societies may be due to a split loyalty on the part of engineers who belonged to more than one professional group. Professor Slemon, in citing his experience with student engineers, pointed out that rivalry existed between the various professional societies to enlist student engineers among their members with the result that students had developed the attitude that one society was as appropriate as another and it didn't make much difference which group they joined. Professor Slemon offered the idea that it may be a good thing if a Canadian society of electrical engineers was formed to embrace all engineers in one society.

J. T. Fisher, Chief Engineer, Toronto Area, Bell Telephone Company of Canada, also on the panel,

*Acknowledgment is made to Mr. and Mrs. R. J. Horne, Toronto, for permission to use the accompanying photograph of their son Martin.*

## Do you have the answer?

If technical meetings are to remain technical meetings, it is obvious that they cannot be turned into box socials for the express purpose of rallying large turnouts. It may be well for the officers of professional associations to consider the fact that one of the reasons why engineers join professional societies is for the prestige that goes along with membership. If, therefore, members are to be permitted to continue to enjoy this professional prestige, then it would not be unreasonable to require them to pay more than their annual membership fee for the privilege. A stipulation requiring that they attend a minimum number of society meetings would surely not be considered too high a price to pay for membership in their chosen society. While it may be argued that forced attention at meetings is not entirely democratic it may prove to be the method of re-stimulating genuine interest in the activities of professional associations' meetings.

The recent joint meeting of the Toronto AIEE Communications Group and the Toronto Chapter IRE Professional Group Communications Systems was convened by reason of a real sense of concern arising from the declining attendance of engineers at the meetings of the two groups. If as a member of either of the two groups you may have any suggestions as to how attendance at the meetings may be stimulated you are invited to include them in a letter to the Editor of *Electronics and Communications*. If you choose to remain anonymous we will respect your wish.

The Editor

proffered the thought that in a large city such as Toronto there were too many other activities competing for the engineers' evening hours. In this respect he cited community activities, church activities, baby-sitting while the wife attended her bridge club, watching television and, in some instances, political activity. Mr. Fisher thought that it might be a good idea to get after younger engineers and arouse their interest in society meetings, thereby stimulating attendance.

### Question period

A request for suggestions from the floor of the meeting brought forth the thought that in former years it was possible to attend society meetings and keep

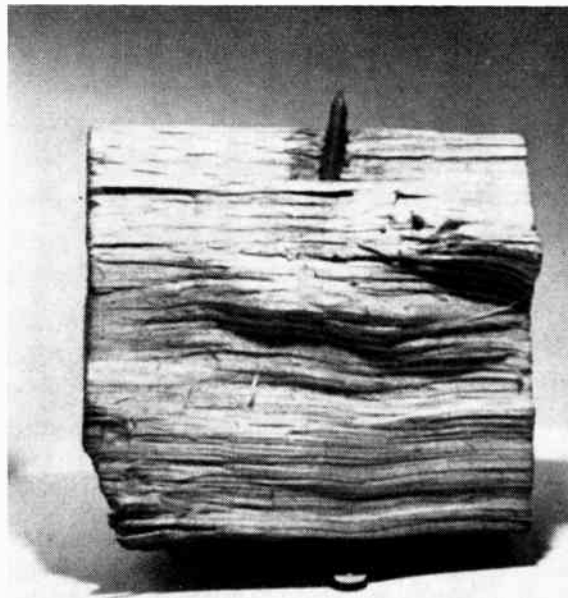
*Continued on page 48*

## APPLICATION

A foreign body such as the spike shown in the accompanying picture below can cause many thousands of dollars' worth of damage to expensive equipment. It is the job of the Tramp Metal Detector to prevent this type of accident.



Above is general view of the Tramp Metal Detector installation scanning logs for foreign matter or objects.



# Electronic detection of foreign matter saves industry millions annually

*War-time mine detector forerunner of valuable industrial application*

The modern metal detector is a development arising from the wartime mine detector. It will economically locate all tramp metals, ferrous or non-ferrous.

The equipment consists of two main parts, the Search Head and the Control Unit. The product to be examined is passed, usually on a conveyor, chute, or vibration system, through the Search Head Aperture.

The Control Unit houses the Oscillator, Stabilized Supply Unit, and the Amplifier.

When the equipment is operating, the Oscillator generates a continuous signal which is passed to the Search Head coil. This signal is then returned to the Amplifier in the Control Unit.

When a piece of metal is passed through the field of the coil, it alters the electrical characteristics of the

field. If the particle of metal introduced is small, so will the change of field be small, but there will be a change. This change can be amplified, and made to operate a relay, which in turn can be connected to a warning bell or lamp, may be used to mark the defective package, to remove it from the conveyor, or to stop the conveyor.

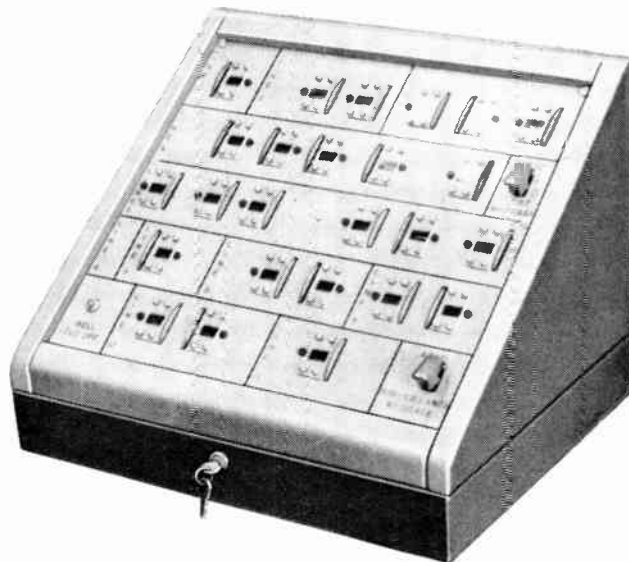
The problem of long term stability is a major one that manufacturers of metal detectors have had to solve.

Faced with the requirement that the equipment must run for long periods of time unattended, it is also vital that no "false alarms" be given. When the critical nature of the equipment is considered, i.e. its ability to locate minute particles of metal, it is seen

*Continued on page 48*

# AUTOMATION

## in TELETYPE TRANSMISSION

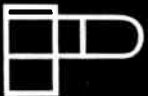


*The Telesignal Dispatcher Model TD 1  
by Philco-Canada*

### DOES NOT REQUIRE SKILLED OPERATOR!

- Sends fixed or variable messages over conventional teletype circuit.
- Messages can contain letters, symbols or figures as required.
- Handles up to 400 characters.
- Fixed information is permanently wired into circuit.  
Readily changed as required.
- Automatically "holds" a manually set message for any transmission desired.
- A 24-hour time clock prints the time the message is sent in teletype code.
- Several different messages can be composed at one time.
- Messages can be sent individually or in rapid succession.
- Messages can be easily checked for accuracy before transmission.
- Custom symbols can be added as required.

*Automatic teletype transmission — gives greater accuracy, and savings in time, expense and personnel.*

	<b>PHILCO</b> <i>government and industrial division</i>
<p style="text-align: center;"><i>Please clip this coupon and send to:</i></p> <p style="text-align: center;"><b>Philco Corporation of Canada,</b> Govt. &amp; Industrial Division, Don Mills, Ontario</p>	<p>Please rush me "Automation in Teletype Transmission" by return mail, without obligation.</p> <p>NAME .....</p> <p>STREET .....</p> <p>CITY OR TOWN ..... PROV. ....</p>

For complete details check No. 40 on handy card, page 71

# The Institute of Radio Engineers 1960 International Convention

*65,000 scientists and engineers attend  
New York gathering — 40 countries represented*

Sixty-five thousand of the world's leading experts in electronics, space technology, and communications gathered in New York on Monday, March 21, to unveil their newest scientific advances, as the international convention of the Institute of Radio Engineers, the world's largest engineering society, got underway at the Coliseum and the Waldorf-Astoria Hotel. The four-day program of technical papers and exhibits was expected to draw engineers from 40 countries.

When the Radio Engineering Show at the Coliseum opened its doors at 10 a.m. Monday, March 21, some 25,000 different pieces of electronic apparatus of nearly every type and size — ranging from microminiature electronic components to huge computing machines — were ready for display. Much of the apparatus was in actual operation, requiring one and a half million watts of electrical power a day to keep it going. The 2¼ miles of exhibits, covering the latest technical developments of 856 electronics firms, was the largest technical exhibition ever staged anywhere.

During 54 technical sessions at the Waldorf Astoria and Coliseum, some million words or more were spoken in formal presentation of 270 papers, covering new developments in almost every field and phase of the modern world of electronics science. The sessions covered 28 branches of the art, ranging from communication satellites to stereophonic sound. Reports were heard on a wide variety of topics, including radio relaying by reflection from the sun, weather forecasting and control, implantable cardiac pacemakers, electronics in agriculture, and devices which simulate the portion of the brain concerned with perception.

The program was highlighted by a special symposium at which eight of the nation's top authorities discussed "Electronics — Out of This World". The symposium is one of four sessions devoted to space technology.

The technical session program was preceded by the opening meeting of the convention on Monday. The featured speaker was Dr. Lloyd V. Berkner, President of Associated Universities, Inc., and international President of the International Scientific Radio Union, who spoke on "Can the Social Sciences Be Made Exact?"

On Wednesday evening IRE members and guests attended the annual banquet in the Waldorf Astoria Grand Ballroom where the speaker of the occasion was H. I. Romnes, President of Western Electric Company, whose topic was "Flood Tide in Electronics". Ronald L. McFarlan, IRE President, announced the Institute's annual awards. The toastmaster for the occasion was Bernard M. Oliver, Vice-President of Hewlett-Packard Company. Spokesman for 76 new Fellows was Eric E. Walker, President of Pennsylvania State University.

## 856 exhibits fill

**New York's coliseum  
with latest electronic  
components and equipment**

## Awards

The Founders Award, which is bestowed only on special occasions, was given this year to Haraden Pratt, Secretary of the IRE and consulting engineer, "for outstanding contributions to the radio engineering profession and to The Institute of Radio Engineers through wise and courageous leadership in the planning and administration of technical developments which have greatly increased the impact of electronics on the public welfare."

The Institute's highest technical award, the Medal of Honor, went to Harry Nyquist, consulting engineer, "for fundamental contributions to a quantitative understanding of thermal noise, data transmission and negative feedback."

The 1960 Morris Liebmann Memorial Prize Award was won by J. A. Rajchman, RCA Laboratories, Princeton, N.J. "for contributions to the development of magnetic devices for information processing."

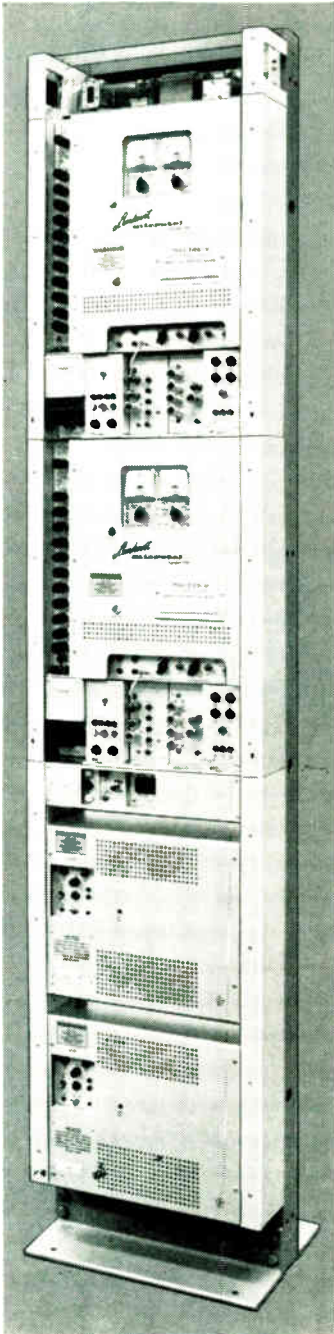
K. A. Norton, National Bureau of Standards, Boulder, Colorado, received the Harry Diamond Memorial Award "for contributions to the understanding of radio wave propagation."

The 1960 W. R. G. Baker Award went to E. J. Nalos, General Electric Company, Palo Alto, California for his paper entitled "A Hybrid Type Traveling-Wave Tube for High-Power Pulsed Amplification" which appeared in the July 1958 issue of the IRE Transactions on Electron Devices.

J. W. Gewartowski, Bell Telephone Laboratories, Murray Hill, N.J. was the recipient of the 1960 Browder J. Thompson Memorial Prize Award for his paper, "Velocity and Current Distributions in the Spent Beam of the Backward-Wave Oscillator" which appeared in the October 1958 issue of IRE Transactions on Electron Devices.

*Lenkurt*

**microtel**



A full diversity 74A2 Terminal

## **TYPE 74A2 MICROWAVE EQUIPMENT**

### **AN INVESTMENT IN RELIABILITY**

Reliability and product acceptance go together. With microwave equipment, this is particularly true. The proven reliability of Lenkurt's Type 74A has led to its wide acceptance by communications companies throughout Canada and the United States.

A versatile, medium-haul system, the Type 74A2 has greater channel capacity, improved noise characteristics, and a variety of new mechanical features—including built-in metering. Improved system linearity has expanded the usable baseband to 1300 Kc, and this has increased rated channel capacity from 240 to 264 channels of 45BX or 300 channels of "L" carrier. And even with this increased loading, total noise has been reduced 4db or more.

If you would like complete information on reliable, performance-proven Type 74A microwave equipment by Lenkurt, call or write any Automatic Electric office today.

***AUTOMATIC ELECTRIC***

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**GENERAL TELEPHONE & ELECTRONICS**



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For complete details check No. 8 on handy card, page 71

# COLOURED pa

can mean 30%



For complete details check No. 9 on handy card, page 71

# paystations

## higher revenues — or more

People respond to colour—in seconds. To wide awake telephone companies this can mean many thousands of dollars in extra revenues. In one location, when *coloured* paystations were installed, revenues shot up more than 30%—almost overnight.

“80-series” paystations by Automatic Electric—in ten pleasing, cheerful colours—can bring similar bonus revenues to *your* company. They’re easier to see, even in crowded locations . . . they brighten their surroundings . . . remind people to make the calls they intended, or to call their friends or relatives more often. And they also make new installations much easier to sell to the merchants in your area.

**Ten rich colours to blend or contrast with any background.**

*Jade Green—Forget-me-not Blue—Camellia Pink—Gardenia White—Garnet Red—Turquoise—Sunlight Yellow—Dawn Gray—Classic Ivory—Sand Beige.*

### **CUSTOMER AND MERCHANT SELLING FEATURES**

- **Lighter, easier-to-hold handset**
- **True-to-life transmission . . . lower sidetone**
- **Easier, surer dialing . . . large, clear marking**
- **Reinforced, burglar-resistant housing**
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- **Magnetic slug ejector for 25¢ coin channel**

Plan now to put coloured “80-series” paystations to work earning extra revenues for *you*. Send today for Automatic Electric’s new circular 1877-CA, giving you full details.

# ***AUTOMATIC ELECTRIC***

Subsidiary of

## **GENERAL TELEPHONE & ELECTRONICS**



6026

**CHARACTERISTICS THAT DETERMINE  
RELAY SELECTION ..... NO.2**



*Class S—the calipers set at 1/4" clearly indicate small dimensions.*

# where a **small,** **light** relay is required

**Helpful selection data Class S Series**

**OPERATING VOLTAGE:**

Up to 115 volts *d.c.* only

**CONTACTS:**

Normally twin, Code 0-20 ga. Will carry up to 135 watts (max. 2 amps) inductive or non-inductive load. Special contacts as required.

**CONTACT CAPACITY:**

1 pile-up, maximum 7 springs

**COILS:**

Up to 7,000 ohms

**OPERATING TIME:**

Range, 0.002 to 0.030 second

**RELEASE TIME:**

Range, 0.005 to 0.085 second

**RESIDUAL:**

Fixed (armature or chromium plated)

The Class S relay by Automatic Electric, is extremely small and weighs less than two ounces, yet it will carry a contact load of 135 watts — or more. Designed to operate in aircraft and on other small-space, high-reliability applications, the Class S has been thoroughly proven under extreme operating conditions, and will pass armed services shock and vibration requirements to 10G. Because of its small mass and slight self-inductance, it can be relied on for fast pulse response.

This is a precision-built, quality relay unaffected by temperature extremes or by high humidity. Uniquely shaped contact springs provide maximum contact dependability . . . either of the twin contacts can complete the circuit alone . . . and their self-cleaning action assures positive contact and low resistance — every time.

The Class S is one of the finest relays of its type on the market.

For full information call or write your nearest Automatic Electric Office.

**AUTOMATIC ELECTRIC**



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**GENERAL TELEPHONE & ELECTRONICS**



A  
F  
V  
H  
F

**EIMAC  
FIRST**



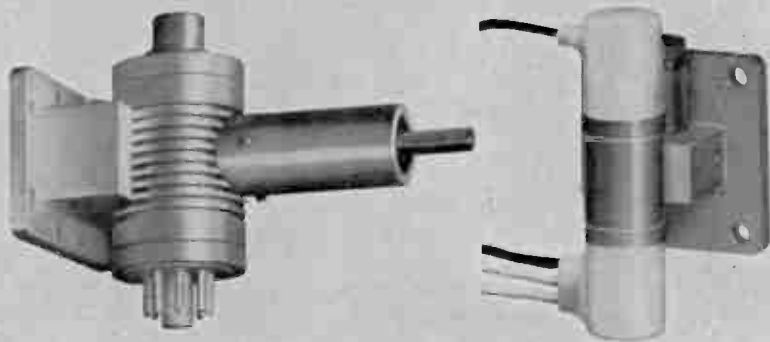
**Covering the Spectrum  
with Reliable Ceramic Tubes**

U  
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F



From audio into super high frequencies, Eimac covers the RF spectrum with modern ceramic tubes. This incomparable ceramic electron tube family—more than one-third of the Eimac line—includes reflex and amplifier klystrons, negative grid tubes, rectifiers, pulse modulators, and receiving tubes. The tubes illustrated are typical of more than 40 Eimac ceramic tube types that are being selected by leading equipment manufacturers for use in all types of applications — from tropo-scatter to industrial heating, from single sideband to pulse. The advantages of reliable Eimac ceramic tubes include: resistance to damage by impact, vibration, and heat; smaller size; and better processing techniques.

S  
H  
F

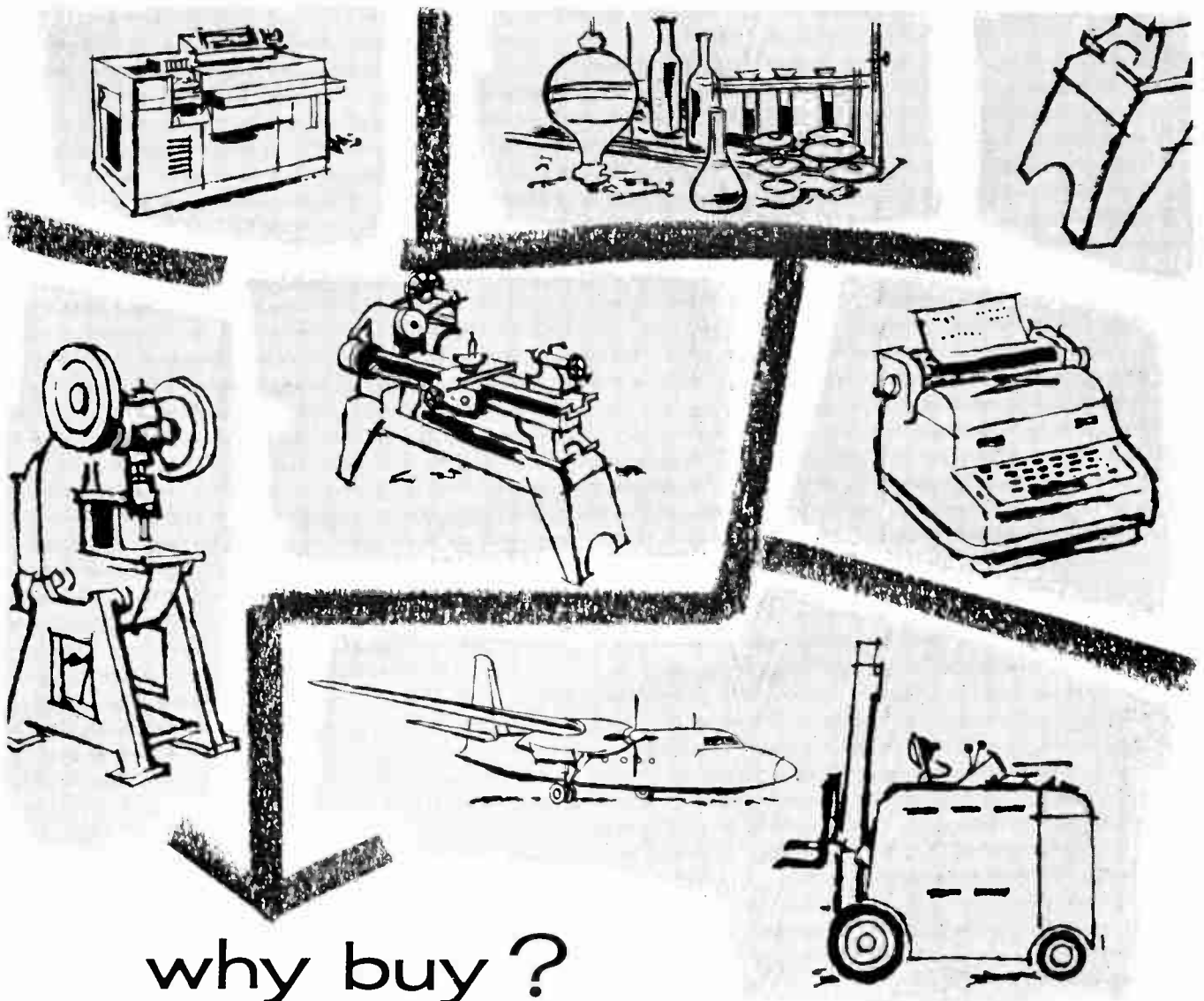


**EITEL-McCULLOUGH, INC.**  
SAN BRUNO · CALIFORNIA  
*Eimac First* with ceramic tubes that can take it

- PRODUCTS DESIGNED AND MANUFACTURED BY EIMAC
- Negative Grid Tubes
  - Reflex and Amplifier Klystrons
  - Ceramic Receiving Tubes
  - Vacuum Tube Accessories
  - Vacuum Switches
  - Vacuum Pumps

*The World's Largest Manufacturer of Transmitting Tubes*  
Canadian Representative:  
**R. D. B. SHEPPARD**  
2036 Prince Charles Road, Ottawa 3, Canada

Includes the most extensive line of ceramic electron tubes  
WorldRadioHistory



why buy ?

## lease your equipment

### ...and free capital for other uses

One of the great challenges facing Canadian business today is the need for *expansion and modernization* to meet competition. The practical means of acquiring equipment today, without cutting into capital or raising new money, is *leasing*.

Leasing provides the plant and facilities you need to realize greater operating profits, stay competitive.

Leasing frees capital for other profitable uses.

Leasing avoids obsolescence. Machines that were ultra-modern ten years ago are now, in many cases, out of date and costly.

Leasing conserves credit lines. Costs are met on a "pay-as-you-earn" basis, enabling you to derive profits from both equipment *and* capital.

What can you lease? Practically any non-expendable item, from an office typewriter to an aircraft.

Let a CDL representative explain how leasing can help you in *your* business.

For full information write for CDL's free brochure "Leasing".



*"Profits are earned through the use — not the ownership — of assets"*



# CANADIAN-DOMINION LEASING

CORPORATION LIMITED

Canada Permanent Bldg., 320 Bay St., Toronto, Ontario, Telephone — EM. 3-4021  
For complete details check No. 53 on handy card, page 71

**H. K. Porter appointments**

C. L. Holbert, president, H. K. Porter Company, Inc., of Pittsburgh, Pa., recently announced the appointment of three group vice-presidents, each to have responsibility over a group of the company's divisions.

James A. Drain, one of the newly-appointed vice-presidents will have group responsibility for the company's electrical divisions and Canadian operations, represented by H. K. Porter Company (Canada) Ltd., which has an important stake in the Canadian electrical market with its Federal Wire & Cable operation.

**E & C sales force expansion**

In line with the growing importance of *Electronics and Communications* within the electronics field in Canada, Age Publications Limited is pleased to announce the elevation of H. E. (Bud) Dallyn to the position of sales manager.



H. E. ("Bud") Dallyn



Derek Reynolds

Coincident with this, Derek Reynolds, who until recently held the position of eastern manager with a wellknown Vancouver publishing house, joins *Electronics and Communications* in the capacity of advertising manager.

**Electronics inventor retires from Kodak**

Russell G. Thompson, an inventor in the field of electronics, has retired recently from the Eastman Kodak Company. He joined Kodak in 1944 and has been a senior supervising engineer in the research and development department of the company's Apparatus and Optical Division in Rochester, N.Y.

The multiple stylus electronic printer, which can print address labels at the rate of 45,000 an hour, was developed, engineered and built under Mr. Thompson's direction at Kodak.

Mr. Thompson, who was a pioneer in the development of the electric typewriter, has been granted a total of 82 patents.

*Continued on page 49*

**Precision welding equipment**

Four-page, short-form catalog, illustrates Weldmatic precision electronic welding equipment. It contains descriptions, design and performance features, prices, and illustrations of stored-energy power supplies, column-mounted welding heads, and light-to-heavy-duty handpieces. Power supplies operate from 112-125 VAC and are produced in 40, 80, 160, 250 and 500 watt-second capacities

Information on Weldmatic's sample welding service and a list of representatives are also given. Weldmatic Division of Unitek Corporation, 380 N. Halstead Ave., Pasadena, Calif.

**Recording oscillograph**

Illustrated 16-page brochure covers evaluation by dynamic testing, a complete description of the 18- or 26-channel Type 5-114 Recording Oscillograph, specifications and features, a description of the Datarite rapid-access magazine and other accessories, and a table of specifications for galvanometers. Copies of Bulletin 1500 are available from Consolidated Electrodynamics Corporation, 360 Sierra Madre Villa, Pasadena, Calif.

**Walk-in space chambers**

Two-color brochure describes features and capabilities of walk-in space chambers and pictures many applications. The huge chambers include a variety of specifications for the simulation of extreme conditions of space, such as altitudes to 1.5 million feet, temperature from -150° to +2000°F., humidity to 95 per cent, rainfall to 24 inches per hour, ram air flow, varied altitude climb and dive rates, solar radiation to 140 watts per square foot, radiant heat assemblies, dissipation of live or static loads and vibration accommodation.

Chambers are shown in use by both private industry and government installations. Tenney Engineering, Inc., 1090 Springfield Road, Union, N.J.

**Airborne power supplies**

A bulletin describing and illustrating the SIE airborne transistorized power supplies, Models TPC-18A and 19A, includes applications, schematic drawing and specifications. Products are designed for direct, plug-in replacement of D-10A dynamotors as the power supply for aircraft communi-

cations and navigation receivers, using a transistor multi-vibrator circuit to deliver voltage at high efficiency with good regulation and provide protection against overload or short-circuit. Southwestern Industrial Electronics Co., 10201 Westheimer Rd., P.O. Box 22187, Houston 27, Texas.

**Protective coatings**

"How to Use HumiSeal Protective Surface Coatings in Electronic Applications" is the subject of a 20-page booklet just released by **Columbia Technical Corporation**. Filled with many useful tips, this booklet covers such highly informative phases of applying humidity-proof protective surface coatings as conventional dipping procedures and what to do for dipping, draining and air-drying and curing.

Valuable charts and slide rule settings are also included.

A copy of this booklet can be secured by writing to the manufacturer of HumiSeal, **Columbia Technical Corporation, 61-05 Thirty-First Ave., Woodside 77, N.Y.**

**Digital control systems**

A new 76-page handbook on data reduction and digital control systems is now available without charge from **Coleman Electronics, Inc., 133 E. 162nd St., Gardena, Calif.**, a subsidiary of Coleman Engineering Company, Inc.

The handbook covers the theory behind the Coleman Digitizer, a shaft position encoder, which has become a fundamental component in the automation field; Digitizer systems; input, processing and output components; accessories; and case histories of representative systems now in use in varied industries throughout the United States.

**Variable resistors**

Technical Data on precision wire wound and composition variable resistors is being offered in the new 24-page engineering catalog just published by **Reon Resistor Corporation of Yonkers, N.Y.**

This engineering data book is filled with charts, diagrams and data of particular interest to engineers concerned with the application of resistors. It can be secured by writing directly to the manufacturer, **Reon Resistor Corporation, 155 Saw Mill River Road, Yonkers, N.Y.**

**THE AIRLINES OF THE WORLD\* HAVE ON ORDER MORE EDO LORAN EQUIPMENT THAN ALL OTHER LONG RANGE NAVIGATION SYSTEMS COMBINED • THE AIRLINES OF THE WORLD HAVE ON ORDER MORE EDO LORAN EQUIPMENT THAN ALL OTHER LONG RANGE NAVIGATION SYSTEMS COMBINED • THE AIRLINES OF THE WORLD HAVE ON ORDER MORE EDO LORAN EQUIPMENT THAN ALL OTHER LONG RANGE NAVIGATION SYSTEMS COMBINED**

- \*18, to date—Aerolineas Argentinas  
 • Air France • Alitalia Airlines  
 • BOAC • Canadian Pacific Airlines  
 • Cubana • Eastern Air Lines  
 • Irish Air Lines • Japan Air Lines  
 • KLM • Lufthansa • Northwest  
 • Pan American • Qantas • Sabena  
 • SAS • Swissair • Varig  
 • also used by MATS  
 Complies with FAA TSO C60



For complete data on Edo Model 345 Loran, send for Technical Manual to Dept. D-1.

**Edo CORPORATION** College Point, L. I., New York  
**Edo (CANADA) LTD.** Cornwall, Ontario

For complete details check No. 20 on handy card, page 71



## WELWYN

announces a **FIRST** in  
*medium power resistors  
 manufactured in Canada*

Do you require a resistor which can give you:

1. Higher values than wire-wound types of a similar size?  
 (Values from 10<sup>Ω</sup> to 68,000<sup>Ω</sup>).
2. Unequalled performance for withstanding overload surges — unobtainable in wire-wound resistors?
3. Extremely rugged and durable properties?
4. Low cost with great reliability?
5. Sizes of 4, 6, 8 and 10 watts?
6. Standard tolerance of ± 5%?

The Welwyn F Series power resistors are composed of a metal oxide element, bonded to a porcelain rod at red heat. This process results in a resistor which is extremely rugged, both electrically and mechanically.

The durable coating which is applied is intended to provide an insulating cover rather than to protect the element which in itself is highly resistant to mechanical damage and effects of moisture.

Comprehensive tests have proved that operating these resistors under the most arduous conditions will not cause failure.

For further information write for data sheet W-1014.

### WELWYN CANADA LIMITED

1255 BRYDGES STREET LONDON, CANADA

For complete details check No. 52 on handy card, page 71

## letters

### Likes front cover

The Editor:

I gave your "Electronic Product Preview" issue a thorough "going over" from cover to cover. I must first congratulate you on the front cover design; it must rank among the best you have used to-date.

I agree with this product preview type of issue; and, at the risk of sounding like a traitor to my own profession, I would just as soon see the quantity of product releases appearing in other issues kept to a minimum.

J. A. O'Connor,  
 H. K. Porter Company  
 (Canada) Ltd.

### Amazed at volume of products

The Editor:

Thank you for sending us a copy of your Electronic Product Review Issue for 1960. We enjoyed reading it but were amazed at the volume of products you were able to squeeze into such a publication. We appreciate very much your carrying an item on IBM's Character Sensing Equipment. We are sure that this will be seen by a great number of people who we hope will benefit from the information.

Thank you again for your consideration, and may we wish you continued success with your publication.

H. Austin Winch,  
 International Business  
 Machines Company  
 Limited

### A job well done

The Editor:

Your February issue of *Electronics and Communications* featuring an Electronic Product Preview Issue for 1960 has been received and has been in constant use and of great assistance in keeping abreast with new industry developments.

Such an issue can only be produced as a reflection of interest and enthusiasm on the part of the publisher to be an integral part of an industry that culminates in progressive accomplishments. My compliments to you on a job well done.

William M. Hummel,  
 Prime Electronic  
 Components Ltd.

## E & C's niche in fame

The Editor:

The February 1960 issue of *Electronics and Communications* was unique and certainly enjoyed by me, and in addition, deeply appreciated by us for the editorial coverage given our products.

We can imagine that you have a problem in deciding whether press releases should be played down or played up. If you over-emphasize this feature, we feel your paper will degenerate into an "equipment news" type, which while valuable is not the niche in fame which I believe you envisage for "E & C".

My own opinion would be that you might be wise to continue your present policy of giving whatever space is practical each month to new products, then once (or possibly twice) a year devote an issue to the function filled by the February 1960 issue.

Best wishes for your continued success.

R. Spencer Soanes,  
Canadian Research  
Institute,  
Toronto 5, Ontario.

## Readers interested

The Editor:

Thank you for the presentation of Dr. Herwald's article. I certainly appreciate your interest, and I think it is a subject in which a lot of your readers will also be interested.

It would appear that you had a fine selection of news and articles for this issue. It looked very very good.

J. B. Davenport,  
Canadian Westinghouse  
Co. Ltd.,  
Hamilton, Ontario.

## Outstanding accomplishment

The Editor:

The February 1960 issue of *Electronics and Communications*, being the 1960 electronic product preview, is without question the result of a tremendous effort.

You and your associates can be justly proud of this very fine cooperative effort which stands as a record of outstanding accomplishment in the Canadian technical publishing field.

R. H. Hackbusch,  
Hackbusch Electronic  
Limited,  
Toronto 4, Ontario.

Continued on page 58

# INDUSTRIAL AUTOMATION...

## from computers to 'scopes—

SPECIFY

# E. M. I. COSSOR

SOLE CANADIAN AGENTS FOR

## ● E. M. I.

Computers  
Dynamic Balancing Machines  
Commutator Undercutting  
Automatic Weighing etc.

## ● COSSOR

Oscillographs  
Ultrasonic test equipment  
Salinometers  
Pulse Generators

## ● DAWE

Ultrasonic Cleaning Equipment  
Stroboscopes  
Sound & Vibration meters  
Moisture Meters

## ● CINTEL

Universal counter timers  
Printed circuit panels  
Delayed pulse & sweep generators  
Transistorized Industrial Metal Detectors

WHITELY ELECTRICAL RADIO  
STENTORIAN HIGH FIDELITY LOUDSPEAKERS



# C O S S O R

ELECTRONICS LIMITED

MONTREAL

TORONTO

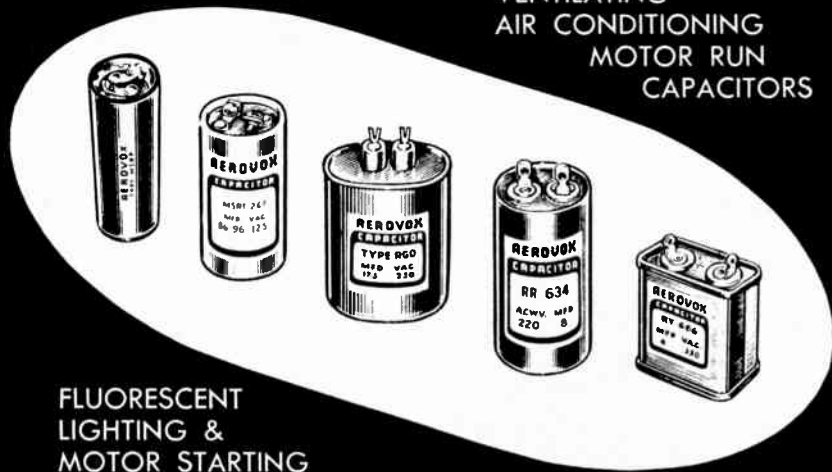
HALIFAX

For complete details check No. 19 on handy card, page 71

# AEROVOX

industrial capacitors . . . . .

HEATING  
VENTILATING  
AIR CONDITIONING  
MOTOR RUN  
CAPACITORS



FLUORESCENT  
LIGHTING &  
MOTOR STARTING  
CAPACITORS

## AEROVOX CANADA LIMITED

HAMILTON  
ONTARIO

For complete details check No. 2 on handy card, page 71

## Electronic detection — *Continued from page 36*

that highly stable running conditions are necessary. The situation may be likened to that of a radio where every crackle on the receiver represents an interference. In a metal detector, each crackle would be equivalent to a false alarm being given. Thus, all outside electrical interferences, and variations in the performance of the detector components must be eliminated.

Coupled with this difficulty is another, due to the effect of the moving (or even the presence) of large metal objects near the search head, through which products to be examined are passed. The equipment must be capable of denoting the presence of a speck of metal inside the search head while ignoring the passage of large metal objects just outside the aperture. Therefore very efficient shielding of the search head must be achieved. Also, the materials comprising the search head itself must not become distorted owing to heavy vibration or shock as such distortion will affect the precisely balanced field.

Modern design has overcome all of these problems. Research to improve stability and sensitivity has advanced steadily and today metal detection equipment is a very practical answer to the problem.

The largest tramp metal detectors ever produced were installed recently by Measurement Engineering Ltd. at the paper plants of Anglo Canadian Pulp & Paper Co. Ltd. at Quebec City and at Gaspesia Sulphite Ltd. at Chandler, Quebec.

### Costly damage avoided

Pieces of metal which get into the logs can cause severe damage to chippers and cause costly maintenance. The metal detectors are set to detect any piece of metal as large as a 2" nail and will automatically stop the conveyor so that the "defective" log may be removed.

The detectors are sensitive to all metals in various degrees and are relatively independent of location of metal within the aperture — even when completely buried within a log.

The unit illustrated has an aperture 60" x 48" and while the largest to date, does not necessarily represent the practical limit.

Metal detectors may be applied to all forms of production, and to almost all non-metallic products. The available sensitivity is governed primarily by the height of the search head aperture. It is therefore advisable to keep this dimension as low as possible. Each search head is designed for the particular application.

The aperture dimensions are dictated by the width of the transport system around which it is installed, and the height of the product under examination.

The protection afforded by metal detectors may be split into two categories:

- (i) Consumer protection.
- (ii) Manufacturer protection.

Protecting the consumer assures against his biting a piece of metal in his tablets, medicine or food. It also makes sure that the insulation properties of plastics are not diminished by the presence of small metallic inclusions.

Whilst these dangers are reflected in complaints to the manufacturer, the manufacturer himself may well be primarily concerned in possible danger to his machines. Grinding machinery in chemical processing plants as well as in quarries and mines can be easily damaged, especially by the larger pieces of metal. Vibratory screens and mixers can be similarly damaged, as can be pipe lines and retorts etc. The chemicals may themselves suffer decomposition and in extreme cases lose their useful properties.

Metal in surgical dressings and sanitary towels can prove a source of danger. In the manufacture of these items metal detectors are often fitted to the cotton opening machine. If metal were to pass into the machine, parts of the machine could be damaged, and most dangerous of all, a single spark could cause a disastrous fire. Many mill fires are caused by this means. The installation of a metal detector on this machine gives both manufacturer and consumer protection.

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## Association meetings — *Continued from page 35*

abreast of the art of communications, but today the state of the art had expanded to such an extent that this was not possible. A suggestion that societies with overlapping interests should mutually arrange their meetings so there would be no conflict of subject matter to be dealt with by speakers may help the situation. Fred Heath, Canadian General Electric Company Limited, stated that when he attended a meeting his great interest was in meeting and chatting with other engineers employed in similar fields to his own. Listening to one speaker, Mr. Heath contended, was of little interest.

Another engineer at the gathering likened the meetings of professional societies to the Proceedings of IRE. He stated that he received this esteemed publication every month, but in order to understand much of its contents he would have to go back to college. His suggestion, insofar as meetings were concerned, was that, instead of conducting them on a formal technical level the subjects dealt with should be presented in

plain and simple English.

Ian Dutton, associate editor of a Canadian electronics journal, was of the opinion that there was little need to provide highly specialized technical subjects to Canadian audiences since there was little real research being carried on in Canada and that material of this nature, if required, could be obtained from American and European publications. Mr. Dutton also put forward the idea that industry may well consider the possibility of sponsoring society meetings by defraying the cost of pre-meeting dinners as a means of stimulating attendance.

Young engineers today, according to one IRE member in attendance at the meeting, have been brain-washed with the idea of preparing themselves for management positions and as a consequence have lost interest in immediate engineering subjects. As a result of this trend it was suggested that if speakers at society meetings were selected for their knowledge of

*Continued on page 67*

## **industry personnel**

### **RCA Victor appoints products VP**

The appointment of George L. Mansour to the newly created position of vice-president, Consumer Products, RCA Victor Company, Ltd., has been announced by John D. Houlding, president.

In this capacity, Mr. Mansour will have full responsibility for all product development, marketing, manufacturing, distribution and administrative activities pertaining to consumer products including television receivers, radios, Victrolas, records as well as RCA Whirlpool Appliances.

Mr. Mansour was formerly vice-president and general manager of RCA Victor's Record Division.

### **Beckman names Canadian as financial VP**

Appointment of **Walter E. Gordon**, formerly operations analysis manager for the Ford Motor Co. of Canada Ltd., as controller for the Spincor Division of Beckman Instruments, Inc., and the company's subsidiary Shockley Transistor Corp., is announced by William W. Wright, financial vice-president.

Both Beckman units are headquartered in Palo Alto, Calif.

Gordon joins the Beckman organization after ten years with Ford in Windsor, Ontario, where his managerial positions included controllership and budgetary responsibilities, as well as financial analysis. Earlier, he was associated with T. Eaton Co., Ltd., of Toronto.

### **Pyle-National elects vice president**

Election of O. J. Hayles as vice president and general manager of Pyle-National (Canada) Ltd., manufacturers of electrical equipment, has recently been announced by William C. Croft, president.

Mr. Hayles has had broad experience in design engineering, factory engineering, electrical sales and plant management. He is a graduate of the University of British Columbia (Bachelor of Applied Science and Electrical Engineering) and McGill University, Montreal (Master of Engineering). His experience also includes three years of teaching electrical engineering at the University of Vermont.

Mr. Hayles was formerly plant manager of Sylvania Electric Company of Canada.

*Continued on page 59*

## **EIA report**

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

### **EIA Resolutions on Color-Television Broadcasting**

At a recent meeting of the Board of Directors of this association the following resolutions were unanimously adopted:

**Resolved:** That the Board of Directors of the Electronics Industries Association of Canada requests the Board of Broadcast Governors to take early action in recommending the introduction of color telecasting in Canada.

**Resolved:** That this association, both by representation to the Board of Broadcast Governors and through its sponsorship in the Canadian Radio Technical Planning Board, press for the immediate approval, by the Department of Transport, of the National Television Systems Committee color television technical standards which were approved by this association on June 8, 1956 and submitted to the Department of Transport by the Canadian Radio Technical Planning Board in January 1957.

**Resolved:** That the Board of Broadcast Governors be requested:

(a) To recommend that licenses of present television stations which do not include permission to transmit color television programs be amended to do so;

(b) To recommend that new licenses that may be issued to television stations include permission to transmit color television programs as well as black-and-white;

(c) To recommend that television stations equipped to transmit color television programs be authorized to receive such color programs as are available on the network and re-transmit them in color, or originate their own color broadcasts either as live programs, or on tape or film, without restriction.

The existence of the Canadian electronics industry is based on the continual application of engineering technology. The industry advances or lags in direct relationship to the advancement or retardation of that technology. The whole industry, since the early 1920's, has been built up on the continuing development and manufacture of new products to serve public communications, entertainment, defense and other industries.

Although the segments of the industry concerned with defense and industrial electronic equipment are important ones, the design and production of consumer products comprise about half the annual volume of business of the industry. These consumer products consist of television and radio receivers, record players, phonograph combinations, and high-fidelity and stereophonic equipment. In fact, this segment of the industry is the broad base on which the defense, industrial electronics, and components segments have been built up. To some large measure, the costs involved in research and development for defense and industrial applications have been borne by the consumer home products segment of the industry.

Because the survival of the electronics industry depends on the continual application of the technology that it develops, it is essential that the obstacle to the next step of progress be removed. This obstacle is the restrictive nature of the present licenses which prevent broadcasting stations transmitting color programs.

### **Interim Transmission In Color**

In making our request that television stations have their licenses extended now to give them the right to broadcast color television signals, we point out that some existing stations are already in a position to broadcast Canadian color programs. Although, as is to be expected, these would be of a limited nature at first, it would be a beginning, and stations would be able to extend their color broadcasts as the number of color television receivers in use increased. Both the English and French-speaking areas of Canada could be served

*Continued on page 50*

# JERROLD

## R. F. Test Equipment

### Quantitative Measurements Using Sweep Frequency Techniques



**Model 900A—THE MOST VERSATILE SWEEP GENERATOR**

CENTER FREQUENCY—VHF 0.5 to 400 MC  
UHF 275 to 1000 MCS—SWEEP WIDTH—  
up to 400 MCS—FLATNESS— $\pm 0.5$  db over  
widest sweep!



**Model 707—ULTRA FLAT SWEEP GENERATOR**

Featuring  $\pm 5/100$  db flatness—Plug-in osc. heads\*; variable sweep rates from 1/min. to 60/sec.; all electronic sweep fundamental frequencies; sweep width min. of 1% to 120% of C.F.

\*Heads available within the spectrum 2 to 265 MCS

**Models 601/602—PORTABLE GENERAL PURPOSE \$295.00**

COVERAGE—Model 601—12 to 220 MCS. Model 602—4 to 112 MCS—  
FLATNESS —  $\pm 0.5$  db  
OUTPUT—up to 2.5 V RMS  
WIDTH—1% to 120% of C.F.



**Model FD-30**

High speed DPDT coaxial switch permitting oscilloscope measurements without calibration—all measurements referenced continuously against standard attenuators.



**Model AV-50 Variable Precision Attenuator**

Long life rotary switches; dual wiping silver contacts on "Kel-F" dielectric. 0-62.5 db in  $\frac{1}{2}$  db steps; DC to 500 MCS.

Write for catalog and technical Newsletter series on measurements using sweep frequency techniques. Prices and data subject to change without notice.



**ELECTRONICS (Canada) Ltd.**  
50 Wingold Avenue, Toronto 19

Jerrold Electronics Corporation, Industrial Products Division, Department 37, The Jerrold Building, Philadelphia 32, Pa. ITE-23

For complete details check No. 35

## EIA report — Continued from page 49

by the various stations in these areas, so that both cultural segments could develop simultaneously.

When the restrictions have been removed from television station licenses, programs in color could be broadcast over the trans-Canada network system immediately by re-transmitting some of the color programs originating in the United States. Under the present restrictive regulations, Canadian television stations are prohibited from telecasting color. In fact, the color signal is removed from the network programs coming in from the U.S. to prevent Canadian stations from re-broadcasting these color shows, which are under Canadian sponsorship, in color.

Color transmitting does not cost very much more than black-and-white, and some television stations are already in a position to start color transmissions. The cost to equip an existing station to re-transmit, in Canada, color programs available on the network is relatively low — only \$15,000-\$20,000.

### In Summary

The EIA presentation may be summarized as a request for an announcement by the Board of Broadcast Governors that early action will be taken to remove the two obstacles that prevent the normal development of color television in Canada. These obstacles are:

1. The delay by the Department of Transport in approving the NTSC color television technical standards recommended for approval by all interested parties.

2. The restrictive nature of the present telecasting licenses issued to stations which treats color telecasting as a separate entity from black-and-white telecasting.

## Problem

This problem is only for recipients of ELECTRONICS AND COMMUNICATIONS that are engaged in the manufacture of components or complete units vital to the communications field (whether this be radio, telephone, telegraph, microwave or scatter propagation).

Let  $x$  = the number of C-men\* on the mailing list of E & C.

Let  $y$  = the number of components or complete units that are required by said C-men ( $x$  above).

Therefore  $\frac{xy}{z}$  = potential market represented

by ELECTRONICS AND COMMUNICATIONS (where 'z' is a variable factor dependent on the scope and variety of communications interest of any one C-man).

Now here's the problem: if you don't advertise your particular product, how much of  $\frac{xy}{z}$  can you expect to influence?

Send your solution and requests for more detailed advertising information to —

### ELECTRONICS AND COMMUNICATIONS

450 Alliance Ave., Toronto 9, Ont.

\* C-men are those engaged in the communications field



*Electronic*

# COUNT-PAKS

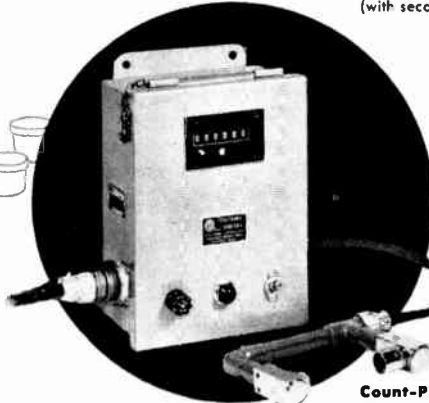
*for Fast,  
Accurate,  
All-Purpose  
Counting*



**Count-Pak No. 1660**  
speeds to 3000 cpm,  
instant pushbutton reset.



**Count-Pak No. 1661**  
speeds to 30,000 cpm  
(standard) 300,000  
(with second decade).



**Count-Pak No. 1697**  
new low-cost, heavy-duty  
unit designed for  
speeds up to 2500 cpm.



**High Speed, Quick  
Reset Magnetic  
Counter, No. 1591**  
basic counting unit of  
Count-Pak series.  
Available as separate unit  
for remote indication.



Parts, packages, units, pieces, cans, bottles, boxes — at speeds up to 300,000 per minute — can be easily counted and *controlled* with one of these Veeder-Root Counting Packages.

Count-Paks are supplied with compact, vibration-proof photohead, designed exactly to your specifications. All counting is non-contact, and impulses as short as .0002 seconds will actuate counter.

Each one is a complete unit, designed as a rugged industrial device, using transistors and printed circuits, for sustained accuracy, long life and dependability.

Improve your *Countrolling* with Count-Pak! Send for complete information and specifications or request application assistance from Veeder-Root Counting Engineer. Call or write, today.



**VEEDER-ROOT of CANADA, Ltd.**

955 St. James St., Montreal 3

**"THE NAME THAT COUNTS"**

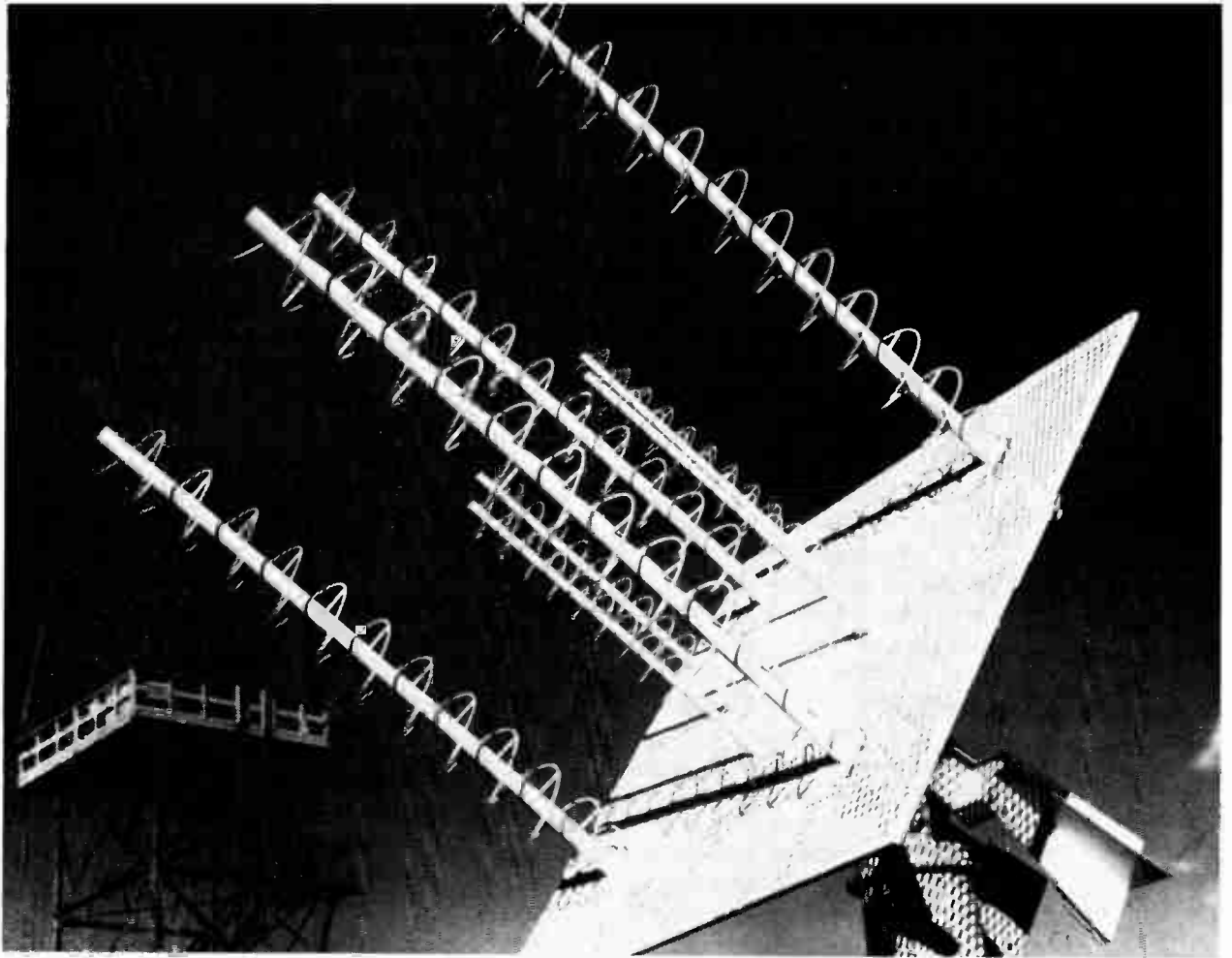
Main Office & Factory:  
Hartford 2, Conn., U.S.A.

Office & Agents in Principal Cities

New York • Chicago • Los Angeles • San Francisco • Seattle • St. Louis  
Greenville, S. C. • Atlanta, Ga. • Montreal. Offices and Agents in other principal cities

For complete details check No. 51 on handy card, page 71

ELECTRONICS AND COMMUNICATIONS, April, 1960



*A unit of the antenna complex that will circle the globe at installations following approximately the path of an equatorial orbit is shown in the above photograph. Design and manufacture of the all-ground based telemetry, communications and command control units for the NASA project Mercury are being carried out by CANOGA, a subsidiary of the Underwood Corporation.*

## close-up

**looking lenswise  
at your industry  
in action**



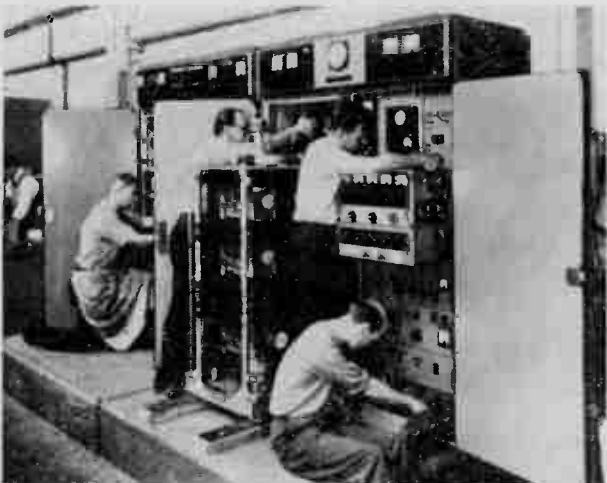
*Small wonder that the pendant-shaped metal crystal suspended in the glass column commands the rapt attention of Salo E. Miller of Battelle Memorial Institute. The indium antimonide specimen, to be used in low-temperature transistors and infrared detectors, represents the purest crystal ever made of any compound. It has 99.99999+ purity.*



Canada's first "White Room" for meter making is now in full operation at Stark Electronic Instruments Limited, Ajax, Ontario. This "White Room" is especially designed for the manufacturing of meters with complete control of dust, humidity and temperature.



A radar specialist at the General Dynamics Corporation uses a "primary" precision attenuator to check performance of a "secondary standard" attenuator mounted in the microwave network mounted on the worktable behind him.



Marconi engineers engaged in the assembly of the transmitters for the 50 cm high-power surveillance radar system which is to be installed at the new Wellington Airport, New Zealand, later this year.



Nerve center of a new building protection and security system designed by Minneapolis-Honeywell Regulator Company is this centralized console. With it, a single guard can supervise an entire building security system.

# product panorama

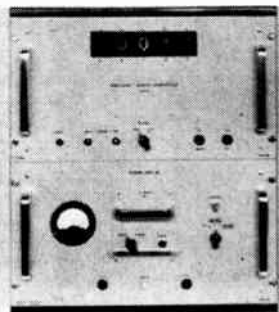
For further information on New Products use Readers' Service Cards on pages 71 and 72.

## Analog/digital converter

Item 388

The d-mac Analog/Digital Converter is designed to convert voltage levels to decimal digits with sign and with a resolution of one digit in 1999.

The output digits are available in parallel form, as is required for the illuminated visual display, or they may be serialized for printing or punching on cards or paper tape.



The three decade Kelvin Varley Potentiometer and balancing amplifier employed provides a balance time of less than 0.5 second for any number. A "secondary store" facility enables "type out" or "punch out" to be concurrent with conversion. This enables the instrument to output two four-digit readings per second, and thus operate a typewriter continuously at full speed.

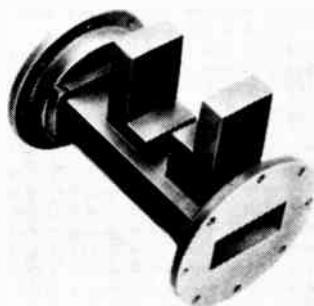
With two standard scales of 10 mV per digit and 100 mV per digit, the unit also includes built-in reference power supplies so that input resistances may be digitized.

For full details contact Tellurometer Canada Ltd., 1562 Carling Avenue, Ottawa, Ontario.

## Microwave filter

Item 389

A compact microwave filter which passes a specific frequency band while sharply rejecting other frequencies above the pass band is announced by Airtron, Inc., a Division of Litton Industries, Morris Plains, New Jersey.



Initial designs constructed are for C-band operation, but Airtron reports they can be developed for any waveguide size or frequency range from 3,000 to 36,000 MCPS and for larger or smaller pass and stop bands. The unit consists of a straight section of waveguide with four E-plane cutoff stub arms located along one broad wall of the waveguide. Higher rejection in the stop band

is obtained by employing additional stub sections.

Stub sections are properly proportioned to yield a certain value of cutoff frequency; stub lengths are chosen so as to be resonant within the rejection band and are stagger-tuned so the rejection band is of the desired width. Microwave energy at frequencies below the stub cutoff frequencies is transmitted through the guide with minimum loss, since each stub appears as a small reactive element in series with the waveguide.

Filters of this design, to withstand high power without breakdown, find application in microwave systems for CW and pulse separation or as frequency band rejection components.

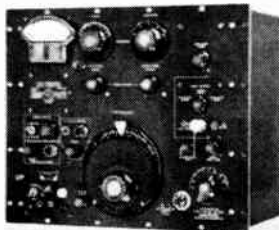
For further information write: Litton Industries, Morris Plains, N.J. or Lake Engineering, 123 Manville Road, Scarborough, Ont.

## Video generator

Item 390

A tri-function wide-range beat-frequency video generator (Type 1300-A), suitable for point-to-point, transient and sweep testing, has been developed by the General Radio Company.

It can be used as a source for acoustic and ultrasonic tests, and testing of video systems, amplifiers, discriminators, networks and both wide and narrow-band



video filters. Ranges are 20 cps to 20 kc (sine or square wave) for audio, 20 kc to 12 Mc (sine) and 20 kc to 2 Mc (square wave) for video signal and video sweep, with the latter at a 60 cps sinusoidal sweep rate. All signals are monitored by an output voltmeter and are available from an output attenuator.

General Radio Company, 99 Floral Parkway, Toronto 15, Ont.

## Properties of silicone fluids

Item 391

Assembled in a handy design file with charts, engineering properties of silicone fluids are available to design engineers and others from Bakelite Company, Div. of Union Carbide Canada Limited, Toronto. Those receiving the file will get a registration card to be completed and returned, so that additional sheets and revisions may be sent out as prepared.

The file is one of the most thorough, useful compilations of the mechanical properties of silicone fluids yet published. It is not simply a reference guide, but a working tool. Some of the graphs are on 17" by 11" sheets, so that the designer can work right on them.

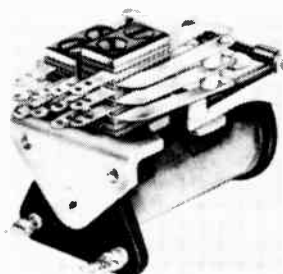
For further information write Bakelite Company, Div. of Union Carbide Canada Limited, 40 St. Clair Avenue East, Toronto 7, Ont.

## Telephone type relay

Item 392

Ohmite Manufacturing Company, Skokie, Illinois, once again supplements its extensive line of relays with a new DC type — the Model "TO". This is a medium size, telephone-type unit which provides increased operating sensitivity, as compared to certain miniature telephone types, because of its longer coil.

Hinge pin armature construction is employed, and a staked-in polepiece eliminates the air gap between polepiece and frame for increased operating sensitivity. A wide range of operating voltages — up to 220 volts DC — is available. Contacts are normally rated at 3 amps but 5 amp contacts are available.

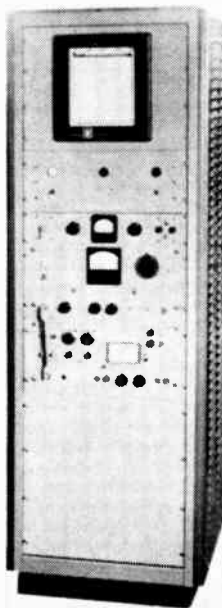


For additional information concerning this new relay, write Ohmite Manufacturing Company, 3665 Howard Street, Skokie, Ill.

## Radioactivity monitoring system

Item 393

A high sensitivity monitoring system specifically designed for measuring trace amounts of radioactivity in a city's water supply system is reported in an announcement by The Victoreen Instrument Company, Cleveland, Ohio.



By continuously monitoring and recording beta and gamma levels, the Victoreen scintillation flow monitoring system affords a

means of safeguarding the city's inhabitants against unnecessary exposure to dangerous radioactive fallout, radioactivity caused by fallout, radioactive rain, or other contaminants.

Heart of the Victoreen scintillation flow monitoring system is a thallium-activated sodium iodide crystal detector, sensitive to both beta and gamma radiation. It is contained in a detector housing made of 3-inch-thick lead with a stainless steel liner which can be removed for decontamination. The crystal is protected by a radiation-transparent rubber cover.

Radionics Limited, 8230 Mayrand Street, Montreal 9, Quebec.

## Cable connectors

Item 394

A new series of crimp type BNC connectors featuring simplicity of assembly are now available from Amphenol Canada Ltd.

Designated the 31 series their features include:

- Quick assembly . . . only 3 basic parts plus rubber boot to assemble and crimp. Two hand crimping tools cover full series.
- Increased reliability . . . cable retention and strain release is greatly improved by crimping.
- Critical assembly operations are eliminated by crimping.
- Weatherproof.

Amphenol 31 series quick crimp connectors are available for use with several RG cables in a variety of plugs and jacks, right



angle plugs, bulk head jacks, and cable terminations.

For further information and a copy of catalog write to Amphenol Canada Limited, 349 Carlaw Ave., Toronto 8, Ontario.

## Solid-state microwave limiter

Item 395

Two new solid-state microwave limiters designed to protect all UHF receivers against overload and burnout are available from Microwave Associates, Inc.

Models MA-3400 and MA-3401, both having Type N coaxial fittings for input and output, can be used not only as low-level crystal protectors in duplexer applications, but can serve as solid-state protectors for use with travelling wave tube amplifiers; communication receivers; and, as part of a low-insertion loss switch, can be used in front of parametric amplifiers.

Advantages of the solid-state limiter over gas-tube crystal protectors are: (a) generally no bias is required, thus eliminating need for "keep-alive" power supply; (b) immediate attenuation at high level incident powers essentially eliminates spike leakage; (c) elimination of gas-fill prevents poor performance resulting from gas leakage or gas cleanup; (d) instantaneous recovery time (fraction of microsecond); and (e) minimization of effective noise temperature of the protector device.

For further information write to: E. G. Lomas, 227 Laurier Ave. West, Ottawa 4, Canada.

## Laboratory stop clocks

Item 396

The Electronic Equipment Group, Philips Electronics Industries Ltd. has announced the availability of A. W. Haydon Co. Laboratory Stop Clocks for bench use by testing laboratories, scientific and research organizations, production test departments, inspection departments, engineering



groups and others. These compact, high performance instruments are designed to satisfy all major requirements in a wide range of timing applications.

Complete information on these precision instruments is available from the Electronic Equipment Group, Philips Electronics Industries Ltd., 116 Vanderhoof Ave., Toronto, Ontario.

## Silicon solar cells

Item 397

The commercial availability of highly reliable diffused-junction silicon solar cells featuring efficiencies as high as nine per cent has been announced by Texas Instruments Incorporated.

The TI silicon solar cells are available in a rectangular configuration measuring one by two by 0.05 centimeters, both in single units and shingle arrays. The units possess a high degree of mechanical ruggedness and when formed into shingle arrays are guaranteed to resist a minimum static load of 16 ounces per contact without rupture.

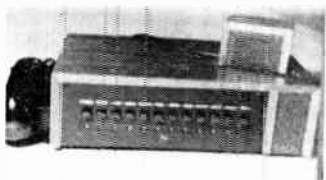
The TI N2009, one of the new series of standard diffused-junction silicon solar cells, provides a typical efficiency of nine per cent and a spectral emissivity of 0.7 at four microns wavelength illumination, 0.4 at 11 microns. The N2009 cells are capable of 22.5 milliwatts output at 55.5 milliamperes and 0.4 volts per cell when operated under sunlight levels as found in near space.

Further information from: Materials and Sensors Dept., Texas Instruments Inc., Semiconductor Components Div., P.O. Box 312, Dallas, Texas.

## Transistorized inter-com

Item 398

For offices, plants, government and armed services establishments, institutions, public utilities, etc., FONEX provides the most advanced type of transistorized intercommunication available today. No batteries or tubes



required — operates directly from the Hydrø 110-volt supply. New automatic push button operation

— easiest, fastest, most direct method. A bugbear of telephone systems generally — "cross-talk" — has been eliminated completely, even on very large systems.

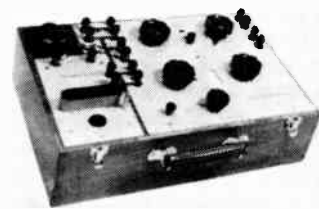
Another new feature is the locking lamp memo signal from executive station calls; this memo may be left "burning" or released at will. Many other optional features available.

For further particulars write Telecom Limited, 163½ Church St., Toronto 2, Ontario.

## Portable D.C. potentiometer

Item 399

This potentiometer is a medium grade instrument suitable for general laboratory use, such as calibration of instruments, measurement of resistance, voltage and current, calibration of wattmeters, thermocouple measurements, photo-electric measurements etc. The instrument is completely self-contained, having a built-in sensitive spot reflecting galvanometer, standard cell and supply battery. The measuring circuit consists of a switch dial having 18 steps of 0.1 volt and calibration slidewire 6" diameter covering from — 0.005 volts to 0.105 volts, the smallest division being 0.0005 volts. The resistance materials is of selected manganin

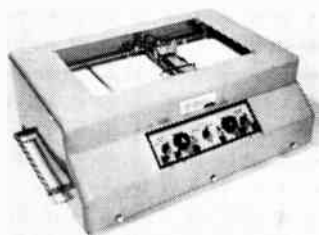


with the exception of the slide-wire, which is a precious metal alloy. The potentiometer has an independent standardizing circuit so that standardization against a standard cell may be effected independently of the setting of the main dial. The circuit incorporates a device which automatically compensates for changes in standard cell voltage due to ambient temperature changes. Further information available from The Glendon Instrument Company, Ltd., 46 Crockford Blvd., Scarborough, Ontario.

## D-mac plotting table

Item 400

The d-mac 1018 table is an X-Y recorder with a plotting area of 18" x 10".



Made by Dobbie McInnes Electronics Ltd. of Glasgow, it has coarse and fine scaling controls on each axis which allow sensitivity to be varied continuously from 10 mV per inch to 10V per inch. Origin can be set to any point on the table and is independent of sensitivity.

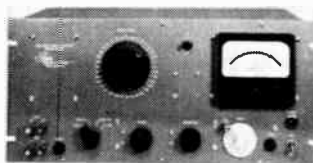
With a plotting speed of 8 inches per second and positional accuracy of 0.2% f.s.d., the d-mac 1018 table is suitable for many laboratory and industrial applications.

For further information contact Tellurometer Canada Ltd., 1562 Carling Ave., Ottawa, Ontario.

## Resolver function bridge

Item 401

Deviation from the ideal sine or cosine output-function of precise computing resolvers is directly displayed as a percentage error. Designated as the Resolver Function Bridge, Model RF-1, this instrument will test any resolver regardless of its other electrical or physical characteristics. The manufacturer states that each resolver winding may be fully measured and recorded in less time than 2 minutes compared to 45 minutes by previous methods.



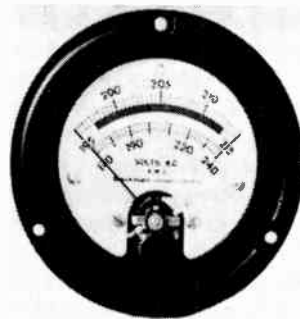
The device contains its own phase-sensitive voltmeter and phase reference so that accessory equipment is not required. Specifications: Range, 0° to 360° in 5° increments; Instrument error, .002% or less; Size, 19 in. wide by 8¾ in. high by 12 in. deep for rack mounting. Price upon request. Availability, 90 days.

Theta Instrument Corporation, 520 Victor Street, Saddle Brook, New Jersey.

## Expanded scale voltmeters

Item 402

The Helipot Division of Beckman Instruments, Inc., Toronto, Ontario, has the answer to installations where the highest voltage-monitoring accuracy is a must and panel space is limited. Beckman's expanded scale AC and DC voltmeters, which linearly



expand a selected, narrow voltage range with ± 0.3% accuracy, are now available with up to three separate ranges in a single meter. Each range can be read accurately to a fraction of a volt at the flick of a switch... with no warmup delays.

AC meters, which read true rms regardless of input waveform, consist of a panel mounting meter with custom dial face and a small, separate MLL-T-27 transformer can containing the matched expansion network and gain resistor circuitry. The expansion network may be mounted any reasonable distance from the meter.

AC meters are available with any centerscale value between 5 and 230 volts. Expansion is calculated as a percentage of this selected voltage to each side of centerscale. The minimum voltage range that can be expanded across the full meter scale is 5% to each side of centerscale; maximum range is 17% to each side.

Units are available for delivery from R-O-R Associates, Limited, 1470 Don Mills Road, Don Mills, Ontario. \*Trademark

## Testing equipment

Item 403

A new line of electronic testing equipment, manufactured in Scotland by Allscott Electronics, is being introduced to the Canadian market by Ferranti-Packard Electric Limited, Toronto.

The Spectrum Analyser is a sensitive and accurate instrument for use at audio and supersonic frequencies to analyze the spectrum of a complex or simple signal. The frequency range of the standard instrument is from 1 Kc/s to 90 Kc/s, but custom built equipment for other frequency ranges is manufactured to order.

Noise Measuring Equipment is also available. Developments in microwave navigation systems demand high-power oscillators or oscillator-amplifier combinations and impose severe limitations on the deviations (e.g. spurious modulations) in both amplitude and frequency which may be allowed. There is therefore a requirement for a measuring set to enable the magnitude and spectrum of such spurious modulations to be determined. The Noise Measuring Equipment incorporates an R.F. Frequency Discriminator in the form of a waveguide bridge to overcome the difficulties of crystal burn-out, and the necessity of rejecting AM of the carrier when studying spurious FM.

Technical details and prices for both the Spectrum Analyser and the Noise Measuring Equipment are available from Ferranti-Packard Electric Limited, Industry St., Toronto 15, Ontario.

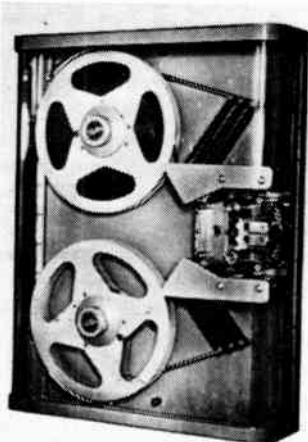
## Magnetic tape transport

Item 404

400,000 character/sec. transfer rate is featured by the completely redesigned Model 906 (Mark II) Magnetic Tape Transport now available from the Potter Instrument Company, Plainview, L.I., N.Y. This exceptional performance is achieved with complete program freedom at 120 in./sec. with 10½ inch reels of 1 inch wide tape and 16 channels of the Potter High Density Recording System.

The new transport design includes a redundant guide system and an improved braking mechanism, both contributing to minimum tape wear. A non-adjustable, fully interchangeable head mounting assures precise tape alignment at all times. Simplified loading with virtually instantaneous reel hub release and lock minimizes reel change time.

Solid state electronics supported by logically arranged plug-in boards provide the servo drive and control. DC control logic is included in the basic equipment with many variations and options.



For further information Potter Instrument Company Limited, Sunnyside Blvd., Plainview L.I. N.Y. or Intronics Limited, Stittsville, Ontario.

# ADCOLA

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## MODERN SOLDERING EQUIPMENT

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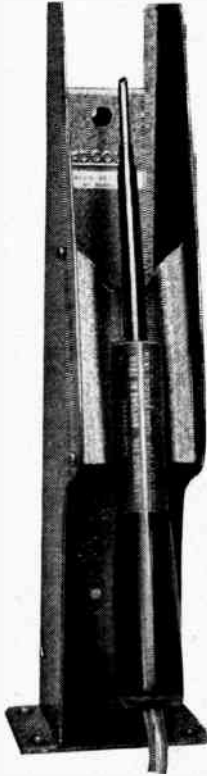
Instrument  
Cat. No. 70

and

Protective Shield  
Cat. No. 68

Canadian Sales  
and Service

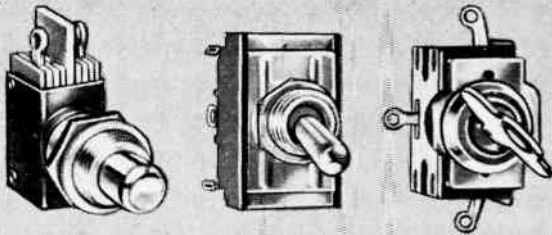
L. J. LAMB  
Box 103  
Weston, Ont.  
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Newfoundland  
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for wiring  
the 2-way  
submerged  
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repeater  
amplifiers.

For complete details check No. 1 on handy card, page 71



There's a  
small, compact  
**ARROW-HART SWITCH CONTROL**  
for every electronic application!

Arrow-Hart offers a complete range of quick make, quick break switches for radio and electronic equipment and all your small motor control requirements. Send for your copy of the new, illustrated Bulletin Z-10 today.



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Quality MOTOR CONTROLS • WIRING DEVICES • APPLIANCE SWITCHES

6004

For complete details check No. 6 on handy card, page 71

56

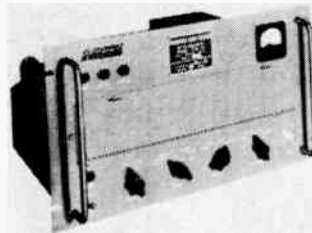
## product panorama

### Frequency shift exciter

Item 405

This crystal controlled frequency shift exciter converts teletype or telegraph line signals into a stable low frequency radio teletype frequency shift signal. The high degree of frequency stability will permit narrower shift operation and hence reduce channel bandwidth.

Design is such that the amount of shift may be varied by a single control from  $\pm 10$  cps to  $\pm 100$  cps, a vernier control of center frequency permits adjustment of center frequency of  $\pm 50$  cps. Output frequency may be changed by replacement of a single, standard, CR 47/u crystal without affecting the shift circuits. Output frequency may be between 50 and 220 Kc/s (higher frequency units available) providing an output power of 2 watts adjustable on 50 or 75 ohms, having harmonic and spurious content of  $\pm 40$  db or better. Frequency Stability is  $\pm 2$  cps center plus  $\pm$  cps at shift extremes. C. W. Facilities are also provided.



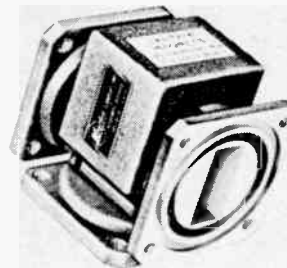
The equipment was developed and is produced by F. V. Topping, Electronics Ltd., 94 Laird Drive, Toronto 17, Ontario, and is now in service with the Royal Canadian Navy and the Department of Transport.

### High power circulator tee

Item 406

A new High Power Circulator Tee with excellent isolation to insertion loss characteristics has recently been announced by Kearsott Company Inc., Microwave Division, Van Nuys, California, manufacturers of precision microwave components and test equipment.

The all new Model 380864-1A Circulator Tee will be particularly valuable in those applications where power requirements usually necessitate a larger unit. Building high power into the new Kearsott Tee and yet reducing the size and weight makes this new model ideal for missile and space vehicle applications, transponders, beacons and other airborne radar systems.

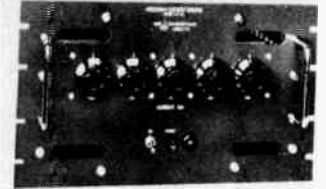


Further information on the new Model 380864-1A High Power Circulator Tee is available on request to Kearsott Company, Microwave Division, 14844 Oxnard Street, Van Nuys, California or Lake Engineering, Co. Ltd., 123 Manville Rd., Scarborough, Ont.

### Transistor tester

Item 407

A unique programable constant current source of unusual design has been introduced by North Hills Electric Co., Inc., Mineola, L.I. New York. Designed especially for transistor and semiconductor measurements, the CS-111 constant current source has a range of 10  $\mu$ A to 500 ma from 0 to 200 V.D.C.



Current is set to five places by decade knobs arranged to provide a digital inline readout. Line and load regulation are better than 0.05% with stability assured by a chopper stabilized feedback system. The current may be programmed or modulated by a remote signal.

Transistor avalanche and zener voltage measurements are easily made at controlled current thus preventing destruction of the unit under test.

Stark Electronic Sales Company, Ajax, Ontario.

### Breakdown tester

Item 408

Latest in their line of high voltage dielectric strength test sets, Canadian Research Institute, 46 St. George Street, Toronto 5,



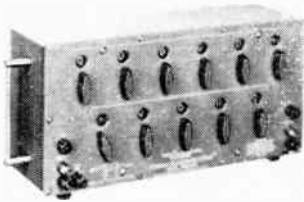
Ontario have just announced the new Model DV-12V Direct Current Breakdown Tester. This instrument makes available to the operator a metered voltage of from 0 to 12 kilovolts filtered DC at a current capacity of up to 5 milliamperes. Any of the standard Canadian Research Institute Plug-in Sensors may be used with the Model DV-12V to give a wide variety of sensitivities of fault indication from the microampere region up. Originally designed as a DC Spark Tester for the continuous inspection of plastic covered wire, such as Flameseal immediately after the extruder, this test set finds wide use in chemical and electrical laboratories as a variable DC power supply and adjustable sensitivity breakdown tester.

Further information from: Canadian Research Institute, 46 St. George Street, Toronto.

## Ratio transformer

Item 409

Gertsch Products, Los Angeles, announce the PDR 1100 — a ratio transformer that measures ratio deviation in per cent. The unit



is used where specifications call out a fixed ratio with a  $\pm$  per cent tolerance, such as in testing transformers, transducers and resolvers. Reading this tolerance directly in per cent, the instrument saves time and is convenient to use in production testing or incoming inspection. Instrument permits setting ratios to 3.11111, and measuring deviations from 0 to  $\pm 9.999\%$ .

Maximum input voltage for the PDR 1100 is .35f (f in cps), or a four-place, per cent deviation ratio transformer.

All units have built-in switching transient suppression, and accuracy as good as 0.001%.

For further details contact the Canadian distributor — Atlas Instrument Corporation Ltd., 50 Wingold Ave., Toronto 19, Ont.

## Quick disconnects

Item 410

Designed for industrial application use, in switch and control circuit applications, a new series of "quick disconnect" terminals has been announced by ETC Incorporated, Cleveland, Ohio. The new terminals give push-on high-pressure spring-loaded connections that incorporate a special locking action.

The new ETC series includes insulated and non-insulated models, straight and flag types. Wire range is 18-14 A.W.G. All feature the ETC closed-barrel construction for quick, easy crimping on wire and for a rugged, positive connection.

Samples and literature are available on request to the Canadian representatives — Douglas Randall (Canada) Limited, 126 Manville Rd., Scarborough, Ont.

## Panel meters

Item 411

2½" military style panel meters are now being delivered 30 days after receipt of order by Helipot Division of Beckman Instruments, Inc., Fullerton, California.

The new line features 61 standard models built in accordance with MIL-M-10304A, including voltmeters, ammeters, microammeters, and milliammeters. A complete line of 3½" panel meters are also available from Helipot.



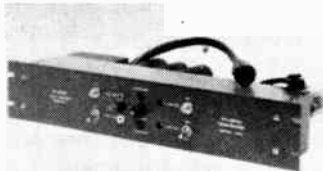
Complete specs., prices, drawings, and other order information are available from R-O-R Associates, Limited, 1470 Don Mills Road, Don Mills, Ontario.

## Power supplies

Item 412

George A. Philbrick Researches, Inc., 285 Columbus Ave., Boston, Mass., announces Models R-500, R-300, and R-100B, the first of a series of high-performance, regulated DC power supplies having tracking dual outputs of plus and minus 300 volts at 500, 300 and 100 milliamperes respectively. These power supplies are characterized by an output impedance at DC lower by an order of magnitude than one foot of No. 14 wire.

Among the features contributing to their greater reliability, are the low dissipation provided by silicon junction diodes, and power transformers having 30°C rise at 25% overload, circuit breakers with thermal sensing elements in the secondary which



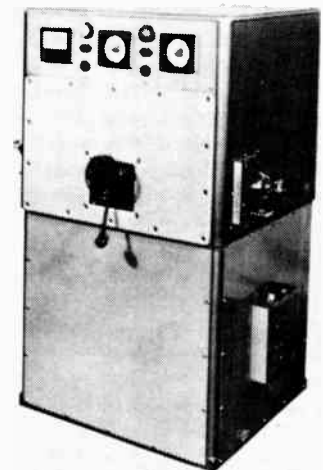
open the primary, and series filter capacitors for protection against line voltage surges.

Write for further information to George A. Philbrick Researches, Inc., 285 Columbus Ave., Boston 16, Mass.

## Heating generator

Item 413

Philips Electronics Industries Ltd. announce the availability of the Philips type PH 1206, 6kW H.F. Dielectric Heating Generator. Re-designed to offer versatility and economy, the Philips



PH 1206 is ideal for applications such as glue setting, drying and heating of non-conductive materials by means of high frequency. Its relatively low cost puts it in the price range of manufacturers who wish to explore the possibilities of incorporating dielectric loss heating into their facilities.

The PH 1206 is extremely simple to operate. The only controls necessary are an on-off button, timer and an output power regulator handwheel. Output power can be read directly from a meter calibrated in Kilowatts.

Complete information can be obtained from the Research and Control Instruments Group, Philips Electronics Industries Ltd., 116 Vanderhoof Avenue, Toronto 17, Ontario.

Continued on page 60

## TAILOR THE TERMINAL TO THE BOARD



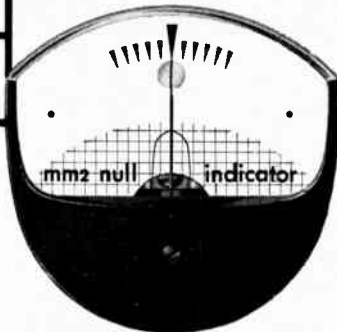
CAMBION Swaging Tools are designed to precisely seat and securely stake all CAMBION Terminals. For each type of terminal there's a CAMBION punch-and-anvil combination. Precision-machined from fine steel for long wear, standard sets are available for only \$5.00 each to match the following CAMBION Swaging Machines:

HAND SWAGERS for small volume staking. Can be used manually, in a kick press, or in a riveting machine. PRESSURE SWAGERS for normal production. These sturdy, hand-operated, cam-action rolling tools are easily adjustable for a wide range of board thickness. HOPPER STAKERS for high production. These semiautomatic stakers faultlessly feed and stake thousands of terminals without interruption at a rate of approximately 100 a minute. Write Cambridge Thermionic Corporation of Canada, Ltd., 2425 Grand Boulevard, Montreal 28, P.Q., for full details.

# GAMBION®

The guaranteed electronic components

For complete details check No. 13 on handy card, page 71



## MEDALIST\* null indicators

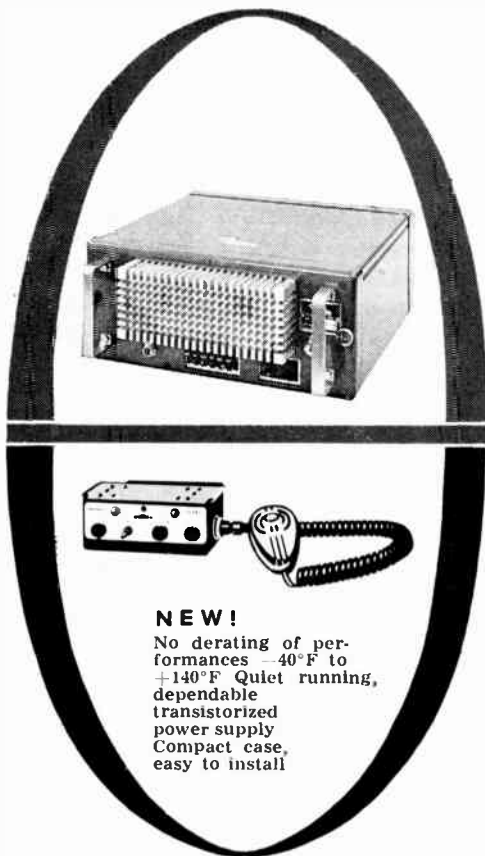
READABLE . . . WIDE RANGE SENSITIVITY

Modern MEDALIST design provides far greater readability and modern styling in minimum space. Unique core and magnet structure provides ½ uA/mm sensitivity at null point with sharp square law attenuation to 100 uA at end of scale in Type A. Internal resistance is 2000 ohms. Other sensitivities available. ASA/MIL 2½" mounting. Standard and special colors. Bulletin on request. Honeywell Controls Limited, Precision Components Division, Toronto 17, Ontario.

# Honeywell

First in Control  
SINCE 1885

For complete details check No. 30 on handy card, page 71



CANADIAN - MADE

**DU MONT**®

**MOBILE  
RADIO**

**NEW!**

No derating of performance -40°F to +140°F Quiet running, dependable transistorized power supply Compact case, easy to install

**HI-POWER**

*Mobile units with the equivalent power of a conventional base station.*

**HIGH STABILITY**

*through use of high precision low drift crystals.*

**COMPLETE YET COMPACT**

*Transmitter, receiver power supply and all relays in one compact case.*

**SEALED SELECTIVITY**

*If selectivity determined by directly interchangeable fixed frequency filters for either split channel or adjacent channel operation.*

**DEALER  
ENQUIRIES INVITED**



**NOW! YOUR CHOICE**  
Of  
**2 HIGH POWER RATINGS**

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**ACROSS THE BAND**

Now manufactured in Canada . . . ERD-Du Mont "300" series mobile systems are designed to provide high power mobile communication in the 144-174 Mcs band. In addition to high output, Du Mont systems provide clear reception at maximum working distance. New electrical features give top-efficiency operation, lowest maintenance, long service life. Get the facts about the Du Mont "300" series . . . built to meet the requirements of highest quality performance regardless of conditions.

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Calgary - Alberta

Eastern Sales Office:  
3534 Dundas Street W.  
Toronto - Ontario

For complete details check No. 22 on handy card, page 71

**letters**

**Widely read and accepted**

The Editor:

We considered ourselves very fortunate to have obtained space in the Electronic Product Preview for 1960 in the latest issue of *Electronics and Communications*. There is no doubt that the magazine is widely read and accepted as the newspaper for the Electronics Industry in Canada. The number of enquiries received here for more information about Marsland Products is very gratifying.

Please keep up the good work.

G. M. Cox,  
Vice-President and  
General Manager,  
Marsland Engineering  
Limited,  
Kitchener, Ontario.

**A very good effort**

The Editor:

We think that your February New Product issue was a very good effort. It will undoubtedly go on many engineering library shelves as a reference, and so should prove valuable to organizations like ourselves (as well as to the engineers who require equipment), over many months.

We are particularly pleased with the facilities your magazine offers for publicizing of new equipment, because we are a very small organization and have quite rapidly taken on a lot of new lines. Your publication of new product releases will, we hope, give us an idea what products we should spend money on for conventional advertising.

R. K. Rosebrugh,  
General Manager,  
Tellurometer Canada  
Ltd.  
Ottawa, Ontario.

**Offer congratulations**

The Editor:

Your February issue listing 337 New Products might well be considered a 'special issue' and we, for only one of your many advertisers, would thoroughly welcome such an issue becoming a yearly 'special'.

We would like to take this opportunity to offer our congratulations to you and your associates for a 'job well done'.

J. R. Foster,  
The Ahearn and Soper  
Company Limited,  
Ottawa, Ontario.



## industry personnel

### **E.M.I. Electronics appointment**

W. Pigdon, who for the past nine years has been general manager of the Wells factory of E.M.I. Electronics Ltd., in England, is shortly taking up a new appointment as executive vice-president of E.M.I.-Cossor Electronics Ltd., in Halifax, N.S.

The E.M.I.-Cossor Electronics company, which was formed last year, has recently moved to a new air-conditioned factory near Halifax. At present, production there is largely concerned with Canadian Government work, but the number of commercial projects being grafted onto the Canadian factory from the parent company at Hayes, England, is growing from month to month. Following a recent visit to Canada, Clifford Metcalfe, C.B.E., managing director of E.M.I. Electronics said: "I am very hopeful that we can help the electronics industry of Canada by transplanting some of the tremendous know-how at Hayes".

Mr. Pigdon will be responsible for co-ordinating this development in the months to come.

## industry's business

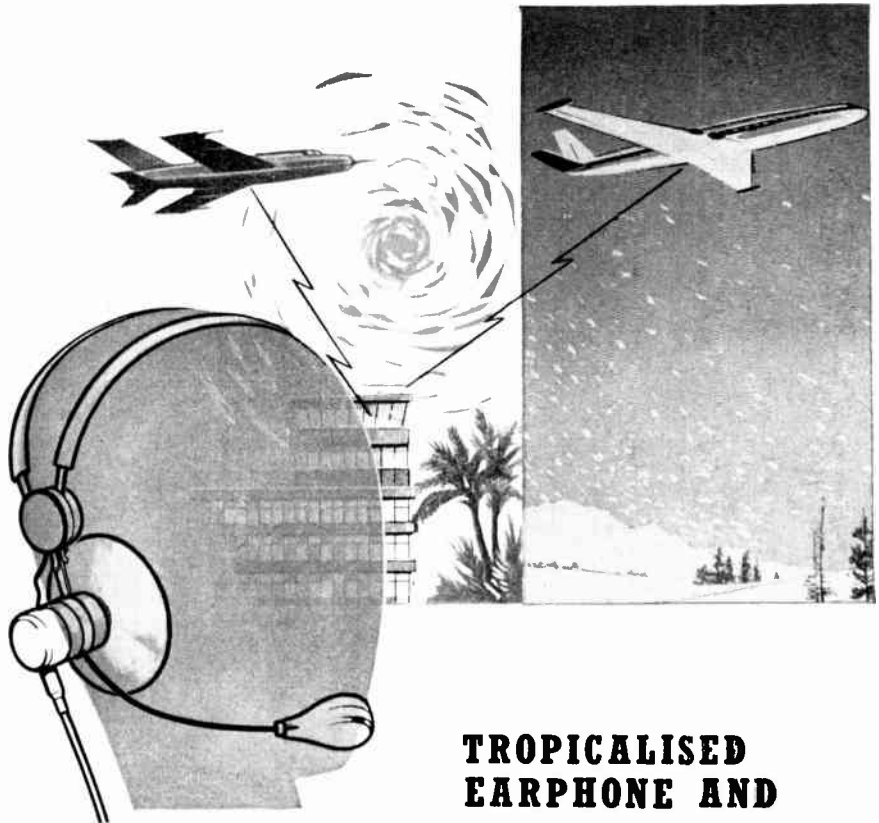
### **CGE Pinetree radar units**

The first of the height-finding radar units being built for the Pinetree line in northern Canada has been shipped from a plant of Canadian General Electric Co. Ltd.

The radar units are being produced under a \$9,000,000 contract awarded C.G.E. by the Department of Defense Production, on behalf of the United States Air Force. The equipment will be installed as part of the North American integrated defense system.

R. M. Robinson, C.G.E. vice-president and general manager of the firm's electronic equipment and tube department, said delivery of the first unit was "right on schedule." The height-finding equipment order, of which a sizeable percentage is being sub-contracted to Canadian suppliers, is expected to be completed in the last quarter of 1960.

Mr. Robinson said the order represented one of the first major U.S. radar production contracts being undertaken by a Canadian manufacturer in accordance with U.S.-Canadian production-sharing agreements.



## **TROPICALISED EARPHONE AND MICROPHONE INSETS**

For Military and Commercial Communications



Service Approved and NATO Designated

13125 Mask Microphone and Switch with response specially designed for oxygen mask use.

13150 Miniature earphone designed for maximum speech intelligibility.

13750 Noise Cancelling Microphone giving up to 35 dB noise reduction.



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for these leaflets

### **Other Products**

Headphones, Headsets and Helmets,  
Microphones and Earphones,  
Communication Systems,  
Ear Defenders,

**AMPLIVOX**  
LIMITED

**INDUSTRIAL DIVISION**

Wembley, Middlesex

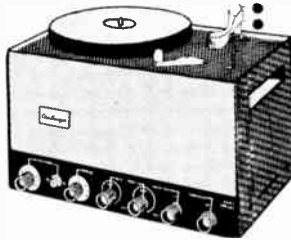
Telegrams & Cables: Amplivox, Wembley

For complete details check No. 5 on handy card, page 71

# SOUND PERFORMANCE by

## Challenger

**FOR ALL APPLICATIONS  
LOW COST,  
HIGH QUALITY**



**CHALLENGER** spells economy plus exceptional performance in a range of amplifiers from 10 to 75 watts including mobile models. Versatility of controls and negative feedback circuitry, provide better response, lower distortion and superb regulation.

**CHALLENGER** model CHA20 gives 20 watts of power and has outstanding styling. Individual controls for base, treble, microphone and phono. 1 mic and 1 phono inputs. Good frequency response. Also available with phono top with 3-speed motor and turnover cartridge at extra cost. For mobile use there is the 6 watt or 12 watt and the 20 watt Universal Mobile amplifier for operation on 110 watt SC, 6 or 12 volt DC. Write for information on the models you are interested in.

**FREE!** Challenger complete Catalogue on request

*Wholesale distributors*

## CANADIAN ELECTRICAL SUPPLY CO. LTD.

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OTTAWA: 838 Somerset St. W. Tel. CE. 2-2696  
TORONTO: 877 Yonge Street. Tel. WA. 1-5111

For complete details check No. 23 on handy card, page 71

## FREED VARIABLE TEST VOLTAGE MEGOHMMETER



NO. 1620

The Freed Type 1620 Megohmmeter is a versatile insulation resistance measurement instrument with a continuously variable DC test potential from 50 to 1000 volts.

Components such as transformers, condensers, motors, printed circuits, cables and insulation material can be tested at their rated voltage and above, for safety factor.

- Resistance — 0.1 megohms to 4,000,000 megohms.
- Voltage — variable, 50 - 1000 volts.
- Accurate — plus or minus 5% on all ranges.
- Simple — for use by unskilled operators.
- Safe — high voltage relay controlled.
- Self contained — AC operated.

### OTHER MEGOHMMETERS AVAILABLE:

**Type 1620C MEGOHMMETER** — a type 1620 with additional circuitry for testing capacitors.

**Type 1020B MEGOHMMETER** — a 500 volt fixed test potential. Range 1 megohm to 2 million megohms.

**Type 2030 PORTABLE MEGOHMMETER** — battery operated, 500 volt test potential. Range 1 megohm to 10 million megohms.

Send for **NEW 48 page transformer catalog**. Also ask for complete laboratory test instrument catalog.

## FREED TRANSFORMER CO., INC.

1716 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N.Y.

Sales Agents for Canada: **CONWAY ELECTRONIC ENTERPRISES**  
1514 Eglinton Ave. West, Toronto 10, Ontario

For complete details check No. 14 on handy card, page 71

60

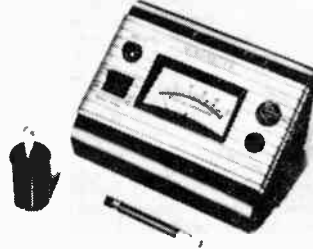
# product panorama

## Charger-reader

Item 414

A new charger-reader for immediate, high-visibility readout of indirect-reading pocket dosimeters and stray-radiation chambers is announced by The Victoreen Instrument Company.

Designated as the Victoreen Model 687 Minometer, the instrument features fullscale electronic readout on a large 4-inch mirrored and illuminated scale on either of its two range settings of 0-20 mr or 0-200 mr. The unit is fully transistorized and employs printed circuits for rugged, lightweight portability.



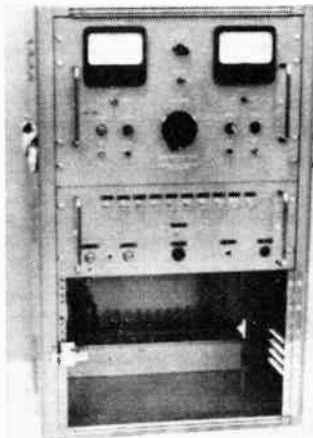
The manufacturer states that the Minometer can be used either with or without film badges since a log of Minometer readings can be used for legal records. Furthermore, because the Minometer gives immediate indication of dosage to which personnel have been subjected, there is no delay caused by processing, nor is there any weekly or monthly processing charge. Use of stray-radiation chambers placed in potentially hazardous areas serves as a continuous monitoring system.

Full details on the Victoreen Model 687 Minometer, dosimeters and stray-radiation chambers are available on request to The Victoreen Instrument Company, 5806 Hough Avenue, Cleveland 3, Ohio.

## Semi-automatic test set

Item 415

Features integral construction for non-destructive hipot testing a group of components or multi-conductor cable. The table top cabinet shown above houses a 0-10 KV AC/DC sensitive hipot tester, a central panel for control of testing sequence, and a heavy lucite interlocked door leading to a large compartment for the group of components to be tested.



Panel controls enable instantaneous high-voltage switching from AC to DC testing at up to 10 KV, push button control

for selection of proper component out of a group or selection of order for testing sequence, and indicator lamps which remain lighted showing position within a group of faulty components or circuit, and reset circuitry — all to facilitate production testing.

High voltage switching from one component to another is done within a small oil tank by special high voltage relays.

The position of the built-in test cage, in the lowest compartment of the table-top cabinet, is a convenience to the operator sitting at a table and doing production testing on an all day basis.

Further information from: **Stark Electronic Sales, Ajax, Ont.**

## Motor generator

Item 416

Kearfott Company, Inc., Little Falls, New Jersey, a subsidiary of General Precision Equipment Corporation, has announced the availability of the V846-001 60 cycle motor generator. Designed especially for applications in precise industrial control systems, this economical and reliable unit is utilized in industrial servo systems used for such procedures as remote control of weighing operations and dangerous processes, indication of water levels



and gate or valve positions, and indication of temperature and machine tool operations. Constructed of corrosion resistant materials and effectively sealed to prevent entrance of dust or dirt, this rugged and durable unit features stable output voltage over the temperature range specified, excellent linearity of output, minimum size and weight, long life and dependable service.

For further information contact: **Lake Engineering Company Limited, 123 Manville Road, Scarborough, Ontario.**

## Small motor-blower assemblies

Item 417

Ripley Company's wide-range line of small motor-blowers offers a selection with a variety of models . . . . . one ideally suited for any specific job. Compact, rugged construction. In stock from the small #1 Unit, 8 CFM at 1" static pressure, running at 20,000 RPM — to the #3 Unit, 150 CFM in free air running at 6000 RPM.

These small motor-blowers are especially adaptable for applications where space and weight are prime factors. Blowers or Impeller Wheels are available as component parts. Literature on all models is available from **Prime Electronic Components Ltd., 868 Dundas Highway East, Dixie, Ontario.**

## Coaxial ratio transformer

Item 418

A sub-miniature coaxial ratio transformer measuring only  $2\frac{1}{2}$ " in diameter, qualified to MIL Specs, accurate to 0.001%, and designed to operate under severe environmental conditions is designated the RatioTran and is manufactured by Gertsch Products, Inc.



The unit has a shock resistance of 50 g's for 7 milliseconds, and is certified to meet military specifications for vibration, salt spray, drip proof, fungus and humidity. The RatioTran has a 5-place resolution and is available with either panel or servo ring mounting.

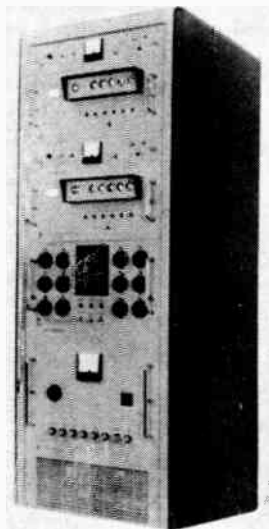
For further information please write or call Atlas Instrument Corp. Ltd., 50 Wingold Ave., Toronto 19, Ont. RU 1-1674.

## Electronic data accumulator

Item 419

A new high-speed data accumulator and recording system employing a modular concept has the capability to accept up to six independent data inputs through the addition of individual module accumulator units.

The Telecordex Model 180 is a multiple input recording and indicating data accumulator which records and stores sequential measurement pulses. Bi-directional input pulses at rates up to 15,000 per second can be accepted from measurement devices that



generate sequential pulses as a function of the parameter being measured. Each channel has a maximum storage of plus or minus 999,999 counts.

The output of the system can be recorded by electric type-

writer at 600 characters per minute, by IBM Key punch or Summary Punch at 50 cards per minute, or by a tape perforator. The new system represents design refinement over previous models and incorporates more than ten years of engineering and operating experience.

For additional information write Data Instrument, Division of Telecomputing Corporation, 12838 Saticoy Street, North Hollywood, California.

## Transistorized P.A. amplifier

Item 420

The d-mac Scamp transistorized public address amplifier has been specially designed for field use. With an output of 15 watts, ranges of up to a mile can be covered satisfactorily.

Designed for operation from a 12 volt storage battery, it may be operated, with reduced output, from a six volt battery, or even from dry cells.

Weighing only 7 lbs. it is particularly insensitive to vibration and shock, and has a very low power drain. Thus it is ideal for use in vehicles or boats; for sporting events, construction



work, civil defense, fire fighting and police work, etc.

For full information contact Tellurometer Canada Ltd., 1562 Carling Ave., Ottawa, Ontario.

## Ratio bridge

Item 421

A new complex ratio bridge manufactured by Gertsch Products, Inc., Los Angeles, Calif., measures both in-phase and quadrature voltage ratios with high accuracy. Unit is used to test 3- or 4-terminal networks such as transformers, synchros, resolvers, gyros and transducers.

Instrument cancels quadrature effects, giving a sharp, true null. In eliminating quadrature voltage, the bridge achieves an in-phase ratio accuracy as good as 0.001%. Quadrature voltage ratios are read as rectangular co-ordinates, tangent of phase-shift angle, or magnitude of phase-shift angle in degrees directly.



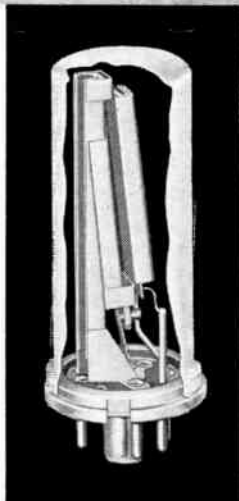
Bridge is supplied in two frequency ranges — 30 to 1000 cps, and 50 to 3000 cps — cabinet or rack — mounted models.

For further information please write or call Atlas Instrument Corp. Ltd., 50 Wingold Avenue, Toronto 19, Ont.

Continued on page 64

# G-V RED/LINE

industrial thermal timing relays for dependability and long life previously available only in high cost relays



• Delays of 2 Seconds to 3 Minutes

• Energizing Voltages— 6.3 to 230 AC or DC

• Rugged Stainless Steel Mechanism

• Tamper Proof

• Shatterproof —No Glass

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• Steel Encased Heaters

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LIVINGSTON, NEW JERSEY

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## briefing the industry

■ A pocket-size radiation detector is being offered for sale to nuclear research establishments in Canada and elsewhere. This device, which will be produced by **RCA Victor Company Ltd.** of Montreal, was developed in a co-operative effort by the scientific team of RCA Victor in collaboration with **Atomic Energy of Canada Ltd.** and the **Defense Research Board.**

■ One of the major challenges to designers and engineers in the next decade lies in the barely-tapped potential of laminated and reinforced plastics for the manufacturing industries and for the conquest of outer space, says **Robert F. Bogart**, marketing coordinator, **National Fibre Co. of Canada, Ltd.,** Toronto, Ontario. In electronics, he points out, the trend to more compact design of components means further miniaturization and more effective insulation.

■ A series of cold weather trials of the LACROSSE guided missile system are being carried out by a joint American-Canadian team at **Fort Churchill, Manitoba.** Members of the joint test team are composed of both U.S. and Canadian troops. LACROSSE is described as the first U.S. field artillery missile developed for close support of combat units.

■ The third **Canadian National Business Show** will be held in the Automotive Building, Exhibition Park, Toronto, on June 6-8 of this year. The announcement was made by **Beverley E. Smith**, of **International Business Machines Co. Ltd.,** Toronto, chairman of the Show Committee.

■ **Brig. Gen. David Sarnoff**, RCA's chief executive officer, has predicted twice as many color TV receivers to be produced in 1960 as in 1959. He further predicted industry sales of \$25 billion a year by 1965, as against an estimated \$14 billion in 1959.

■ A new **Canadian General Electric** plant for the manufacture of distribution transformers will be erected at Sackville, N.B. Con-

struction will start in April and the plant is expected to be in operation before the end of 1960.

■ The world's largest brokerage firm, **Merrill Lynch, Pierce, Fenner and Smith**, has recently announced plans to process its stock transactions on the most powerful computer ever to be installed in New York's financial district. This is the financial industry's first order for an IBM 7080 electronic data processing system, to be installed within 24 months. The **Toronto office of Merrill Lynch** will be among the 130-world-wide branches of the brokerage firm feeding information into the machine.

■ The first step towards the formation of a **Canadian Nuclear Association** was taken recently in connection with the first Canadian Conference on Uranium and Atomic Energy in Toronto. **J. L. Olsen**, of **Canadian General Electric Co.** was named chairman of an ad hoc steering committee.

■ The Madawaska Valley Telephone Company has been purchased by **The Bell Telephone Company of Canada.** The Ontario Telephone Authority, a branch of the Ontario Department of Agriculture, which controls the sale of municipal and privately owned rural telephone systems in Ontario, announced that the Bell bid of \$615,000 was the highest submission received.

■ **Canadian Marconi Company**, Montreal, is to supply Irish Airlines with nine of its CMA-620 dopplers sensor installations, according to a recent report. This Irish order brings the total production figure by Marconi of the dopplers to over 100 units.

■ A polar satellite, to be launched in 1961, will be the joint effort of Canada and the United States. The Defense Research Telecommunications Establishment of Canada will provide part of the equipment and will arrange for a network of stations on Canadian soil to receive data telemetered from the satellite.

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In Canada and throughout the free world, Cannon Plugs are answering the specialized problems of industry and defence.

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Montreal, Montreal Airport, Dorval, P.Q.

Ottawa, 1168 Gertrude Street 6001  
For complete details check No. 17

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Hackbusch Electronics Limited offer you a complete range of high quality Stromberg-Carlson communication and intercommunication systems. Each system represents the most outstanding development within its field—Pagemaster, Key-Municator, Dial-X and conventional sound systems. Complete equipment, replacement and parts facilities are maintained to provide the ultimate in coast to coast service.



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**DIAL-X** solves communication problems by giving two systems, two phones—one for 100% service and one for 100% outside service. Dial-X reduces telephone costs.

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For complete details check No. 26 on handy card, page 71

international



exhibition

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OLYMPIA, LONDON 23-28 MAY 1960

More than 450 British and 100 foreign manufacturers of electronic equipment and scientific instruments will be showing their newest products at the 1960 I.E.A—the largest exhibition of its kind ever held in the world. If you are in this field, or planning automation in your office or plant, you should be there for nowhere else can be seen such a comprehensive display of the world's latest scientific achievements.

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British Embassy or nearest  
Consulate, or

INDUSTRIAL EXHIBITIONS LIMITED, 8 ARGYLL STREET, LONDON, W.1., ENGLAND

For complete details check No. 31 on handy card, page 71

## Product Panorama

### Miniature indicator

Item 422

A miniature  $\frac{1}{2}$ " indicator has been introduced by Honeywell Controls Limited as part of its Marion line of instruments.

The indicator has a micro-miniature moving coil with a core magnet indicator. Length is  $31\frac{32}{100}$  inches and weight 10 grams. It is sealed.



The indicator is available with a pointer or flag display in a wide variety of electrical sensitivities and functions.

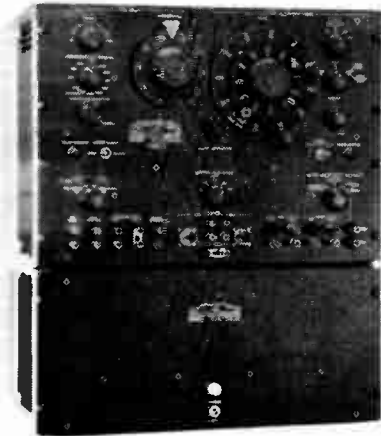
Inquires for further information should be addressed to B. Colwell, Honeywell Controls Limited, Toronto 17, Ontario.

### Pulse, sweep and time-delay generator

Item 423

The Type 1391-B is a versatile laboratory instrument which generates push-pull pulses, linear sweep voltages, time delays, and delayed trigger pulses which can be used independently or to delay the initiation time of the sweep and main pulse relative to the input driving signal.

Signals of almost any wave shape will trigger the input timing circuits. Transition times of the output pulses (0.015  $\mu$ sec rise time) are compatible with most present-day oscilloscopes.



Pulse duration is 0.025  $\mu$ sec to 1.1 sec between half amplitude points, with repetition rates up to 300 kc. The time delay range is from 1.0  $\mu$ sec to 1.1 sec and has a maximum PRF of 400 kc. Sweep duration range is 3  $\mu$ sec to 0.12 sec, and the maximum repetition rate for 3  $\mu$ sec sweep is 250 kc.

If the precise timing circuits are not used, but the pulse-generating circuits are triggered directly from an external oscillator, pulses can be generated at repetition rates up to at least 3 megacycles.

High accuracy, fast pulse rise time, low jitter, lack of duty-ratio restrictions, and wide ranges of pulse duration and delay are some of the important features of this instrument.

General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass., U.S.A.

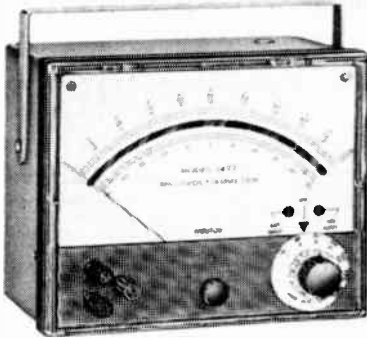
**New zero load milli-volt/ammeter measures dc current and voltages**

*Item 424*

Available as a single compact unit, a new electronic milli-volt/ammeter — with zero-drift comparable to permanent magnet moving coil instruments — has been announced by Daystrom's Weston Instruments Division.

The new electronic milli-volt/ammeter — designated as Model 1477 — is designed for the measurement and amplification of a wide span of DC currents and voltages ranging from 10 to 1000 microamperes and 1 to 1000 milli-volts.

The versatile milli-volt/ammeter is a true DC meter with essentially zero power-drain from the source being measured combined with power-gain sufficient to supply 1 ma output to drive its own indicating meter and any external load of 5000 ohms or less.



Since zero-drift is dependent only on a position of the galvanometer coil, long-time drift can be maintained to less than 2 micro-volts after a few minutes warm-up time.

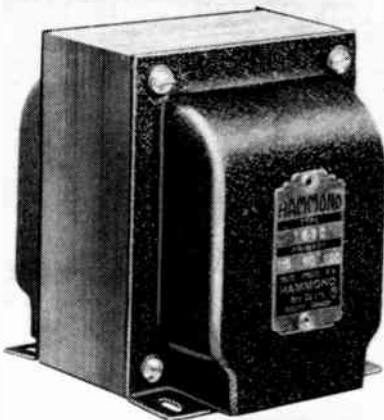
For further information write to: Daystrom's Weston Instruments Division, 840 Caledonia Road, Toronto, Ontario.

**Transformers for DC power supplies**

*Item 425*

A new series of low-voltage, high-current transformers designated by the makers as "Type 210", is designed for use with a compatible choke, and silicon, selenium or germanium rectifiers to provide DC power.

The "210" transformer offers seven of the "most wanted" VA ratings, ranging from 7 volts AC at 2 amperes to 37 volts AC at 10 amperes.



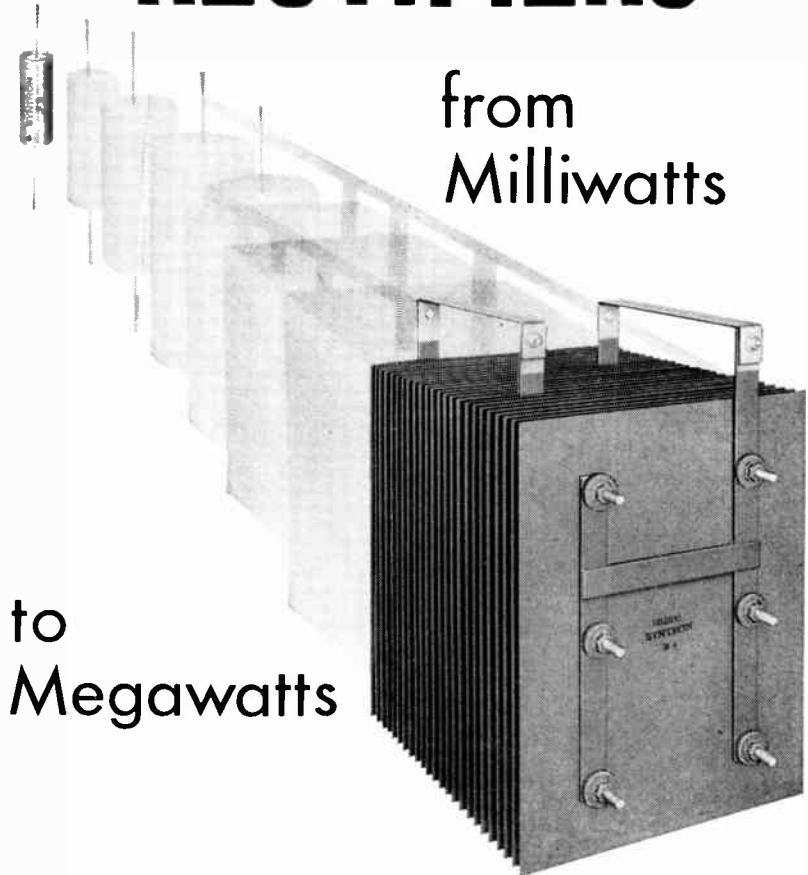
Efficient power supplies may be built around the "210" transformer and appropriate components to provide DC power for battery charges, motors, models, generator fields, bench testing of mobile communications, electroplating and DC operated relays or solenoids.

Manufactured by Hammond Manufacturing Company Limited, Guelph, Ontario, Canada.

*Continued on page 68*

# SYNTRON SELENIUM POWER RECTIFIERS

from  
Milliwatts



to  
Megawatts

A choice of 355,000 stack combinations available in each of our 20 different cell sizes.

We can supply selenium stacks for any d-c requirements — in production quantities.



*Call on your SYNTRON Rectifier Engineer or write*

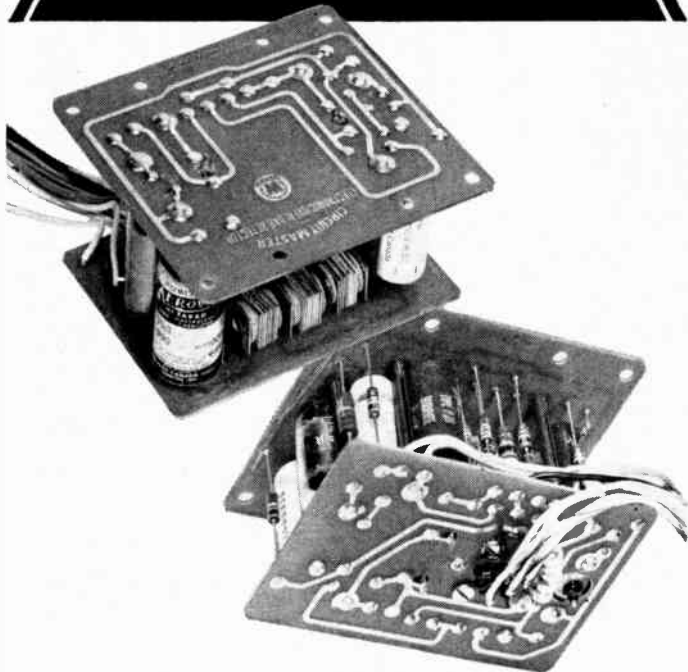
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928 Queenston Road Dept. "K" Stony Creek, Ontario

For complete details check No. 45 on handy card, page 71

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### Printed Circuits Make It Possible

The parallel circuit construction of this electronic press control demonstrates the compactness which can be achieved with printed wiring boards. This electronic package is responsible for the automatic protection of expensive equipment and must perform reliably over a lengthy span of time under fluctuating operating conditions.

Printed Wiring Boards are available single or double sided, with solder or precious metal finish and eyeletted or with plated-through holes.

Completely assembled units can be dip or hand soldered. Moisture-proofing to military specification is optional. All units are thoroughly tested.

United-Carr has the facilities to design and build printed circuits or complete electronic assemblies to your specification, in production quantities.

For detailed information contact our Technical Representative

**UNITED-CARR FASTENER COMPANY OF CANADA LIMITED**

231 Gage Avenue North, Hamilton, Ontario

Sales Offices: Hamilton, Toronto, Montreal

For complete details check No. 50 on handy card, page 71

## Repeatable accuracy

*Continued from page 23*

checked to insure that the tape is punched and read correctly. This error detection circuitry prevents reading any erroneous information into the interpolator.

An interpolator then accepts the block information from temporary storage and generates continuous trains of command pulses for both the longitudinal and transverse axes of motion. The number of pulses generated for each axis is proportional to the distance to be moved along the axes. The rate at which these pulses are generated is proportional to the programmed cutter feed rate.

Feedback devices are attached to both the longitudinal and transverse axis. These devices accurately measure the actual movement of these axes and produce feedback pulses, each of which is equal to the same increment of travel as a command pulse.

Error registers (one for each machine axis) then receive command pulses from the interpolator and feedback pulses from the quantizer. These signals are then compared and their accumulated difference, known as the error signal, is transmitted to a servo amplifier. This error signal is then converted by the servo amplifier into analog form and amplified. This amplified signal then actuates a torque motor which operates a proportional control servo valve. This valve then controls the flow of oil to a hydraulic rotary motor to drive the longitudinal and transverse slides of the precision turning and boring machine.

The control signal, which is actually delivered to the servo drives is proportional to the instantaneous difference or error between the total number of command pulses and feedback pulses received by the error register.

While any motion is being executed, the photoelectric reader reads the next block, thus loading temporary storage with the next straight line increment of motion. When the interpolator completes the processing of a block of data, it is instantaneously reloaded from temporary storage and interpolation continues uninterrupted. Tool motion is, therefore, continuous.

### Machine specifications

The numerically controlled Heald Bore-Matic machine tool has a 14-inch maximum swing and can accommodate parts up to 18-inches long. The two spindle heads are driven by a variable speed a-c motor drive unit which provides constant surface cutting speed over a 5:1 ratio. Spindle speed can be varied from 50 to 1500 rpm, by changing sheaves and drive arrangements. Table travel is 20 inches and cross slide travel is 15 inches. The top of the table slide and the base of the cross slide are integral. Precision gib adjustment allows accurate tracking over full slide travel within 0.000025-inch. Stick slip friction is 1.3 to 1.

The base weldment is normalized to provide extreme, permanent accuracy. The slide ways are hardened and ground box steel bars. A bridge mounted on the base holds two super precision heads having a spindle runout of 0.000020-inch. They are oil-mist lubricated to maintain constant temperature in operation.

This new numerically controlled turning machine has passed all customer acceptance tests and is now in service.



## Electronic surveying

Continued from page 24

meter is not dependent on visibility and can be operated at night, in fog and under other adverse weather conditions.

The units are light and portable, the latest weighing only 45 to 50 lb. One man can carry a Tellurometer, its tripod and battery into points inaccessible by vehicles, and set it up alone.

Despite the comparative novelty of the Tellurometer in North America it has already proved itself in several fields.

In Virginia, where the device was used in establishing the hundreds of control survey markers in 1,000 miles of interstate highway routes, the employment of the device slashed over \$300,000 from the original surveying estimate of \$750,000.

In Canada, the mapping of the Ungava Peninsula was slated to take between two and three seasons by normal methods. However, two pairs of Tellurometers were sent to do the job. 2,700 miles of control were to be established. Work started on July 7, helicopters being used to transfer the instruments and operators. Thirty five working days later, on August 26, the job was completed, the crews having measured as many as 120 miles in a single day. \$150,000 was saved.

All over Canada, parties of surveyors working for widely scattered interests and industries are successfully employing the Tellurometer to cut time and save money.

Surveyors from the Geodetic Survey use the device to map the more remote areas of the country. It is also being used in the massive forest and timber industry and by provincial governments to hurry their road programs.

Time and distance, at least in the surveying field, are now more manageable. Tellurometer has contributed in no small way to this fact.

## Association meetings

Continued from page 48

management affairs as opposed to technical problems, it may have the effect of attracting larger audiences.

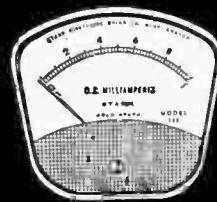
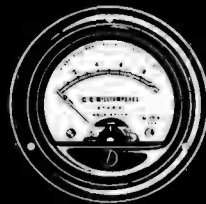
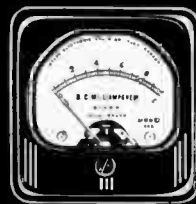
An AIEE member claimed that lagging attendance at some of the societies' meetings had been considerably improved by asking other members of the society to discuss their hobbies instead of presenting technical papers, while another member of the audience was of the opinion that engineers were losing their interest in the technical field. To substantiate this claim he cited that while attending a recent course in business administration at the University of British Columbia, a large percentage of the class was made up of graduate engineers, while a simultaneous course in advanced electrical engineering attracted only five engineers.

While no definite conclusions were reached at the meeting as to what the real answer to the problem was, it would appear from the remarks of many in attendance that by the time five o'clock rolls around engineers in general have had their stomachs filled with enough technical problems for one day and are not disposed to sit through an evening of the same diet.

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Now everyone can afford quality meters by Stark. Never before have meters of such quality, accuracy and reliability been offered at such low prices.

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# QUICK-CRIMP BNC CONNECTORS



31 SERIES

## CUTS RF ASSEMBLY TIME IN HALF

Assembly-time savings of 50%, measurable increase in systems reliability — these are the clearcut advantages of AMPHENOL'S Quick-Crimp BNC connectors! There are only 3 basic parts plus an optional boot to assemble (Compared with as many as 10 in a standard BNC). Quick-Crimps are prepared in half the usual time, even by inexperienced personnel! Critical pre-assembly work has already been done. The finished Quick-Crimp assembly is highly reliable. Let Quick-Crimps solve your RF assembly problems!

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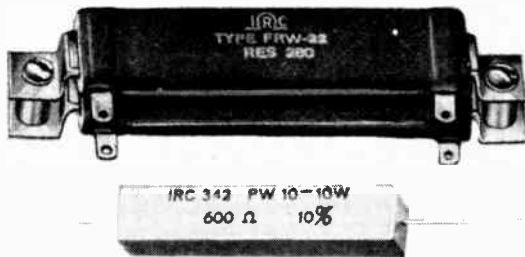


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TO HELP YOU SELECT THE PROPER  
POWER WIRE WOUND RESISTOR  
WRITE FOR COMPLETE CATALOG C-1C

TUBULAR      FLAT      ADJUSTABLE      TAPPED & MULTISECTION  
NON-INDUCTIVE      FERRULES      PW TYPES

Local Distributor Stocks for popular types, ranges,  
available across Canada



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SALES OFFICES: OTTAWA • MONTREAL • CALGARY

For complete details check No. 33 on handy card, page 71

## product panorama

### Communications test set

Item 426

This complete Communications Test Set made by Stewart Brothers, Division of Instrument Laboratories, consists of one Transistor Oscillator, Model J, one Communications DB Meter, Model K, and leather case with space for leads.

The Transistor Oscillator supplies stable 1000 cycle constant voltage. Output, 0, -13, -16 DB into 600 ohm line. Output impedance 600 ohms.



The DB Meter is designed for testing at audio and carrier frequency accurate 60 cycles to 600 KC. Readable from -20 to +43 DBM. Rotary switch for range changing. Meter and switch markings, red for DBM readings and black for AC volt readings. Volt ranges, 1, 5, 25 and 125.

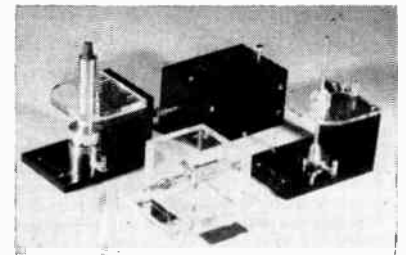
Self-contained loads of 150 and 600 ohms can be selected by switch if desired.

If further information required, write: Stewart Brothers, Division of Instrument Laboratories, 315 W. Walton Place, Chicago 10, Illinois, U.S.A.

### ASTM breakdown electrodes

Item 427

Electrodes for the high voltage testing of a wide variety of materials to ASTM specifications are now made in Canada by Canadian Research Institute of Toronto. Jigs are available for testing dielectric strength or breakdown on electrical tapes, plastic, sheets, insulating oils, pitches, and compounds and for testing arc resistance. Precision fabricated from carefully selected



materials, these ASTM electrodes may be used with high voltage testing equipment made by Canadian Research Institute or by other instrument makers.

Canadian Research Institute, 46 St. George Street, Toronto 5, Ontario.

## Light image intensifier tube

Item 428

A new light image intensifier tube, Type WL-7257, is now available from the Canadian Westinghouse Company Limited. Light images at levels as low as 10<sup>-7</sup> foot-candles can be intensified over 1000 times.

Incoming radiation impinges on an output photosurface five inches in diameter, converting the light image to an electron image. The electron image is focused and accelerated toward an aluminum-backed phosphor screen with a useful output diameter of one inch. The photocathode is deposited on the inner side of the polished bulb face and is capable of becoming an integral part of an external optical system.

The WL-7257 produces an image of reduced size having a brightness increase of 1000 times minimum for input color temperature of 2870 degrees Kelvin, and 2500 times minimum for actinic blue input. The light quantum gain is approximately 50 for input color temperature of 2870 degrees Kelvin. For actinic blue input, the quantum gain of the WL-7257 is 100.

With an input of one lumen at color temperature of 2870 degrees Kelvin, the brightness from the output phosphor at 30-kv anode voltage is 7500 foot-lamberts. For a fixed input, the output light level varies linearly from 0 to 30-kv anode voltage.

There are three types of output phosphors available for purchaser requirements.

For further information, please write: Information Department, Canadian Westinghouse Co. Ltd., Hamilton, Ontario.

## Military panelscope

Item 429

Aviation Electric Limited is offering a complete line of Waterman Panelscopes which can be custom-designed to applicable military specifications.

The Panelscope illustrated is a typical unit designed for inclusion in military equipment. It features a "single knob control" for simple and reliable operation. This single front panel selector makes it possible to operate the Panelscope using just one knob.

Waterman Panelscopes can be custom built to meet practically any operational requirement and are specifically designed for use by relatively untrained personnel.



Panelscopes are miniaturized cathode ray oscilloscopes, intended for panel mounting. They are units which are widely used as an integral part of electronic equipment in commercial products, factory test stands, field trouble shooting kits, electronic system monitors, etc. The twist of a single rotary switch can provide a synchronized portrayal of nine (maximum) incoming signals making it ideal for monitoring and trouble shooting, thus eliminating multi-knob operation. The static adjustments for beam, focus, positioning, and graph screen illumination, are mounted on the cathode ray tube escutcheon for accessibility.

For descriptive literature and complete information, write to Aviation Electric Limited, 200 Laurentien Blvd., Montreal 9, P.Q.

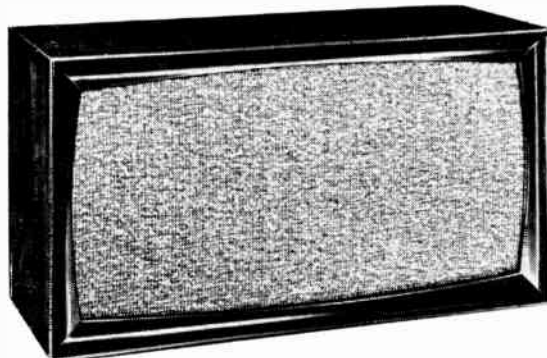
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*Duette*

2 WAY SPEAKER SYSTEM



SUGGESTED  
RESALE \$108.00

A high quality, economically priced 2 way "bookshelf" system. Has high compliance 8" FLEXAIR Woofer and 3½" tweeter in a tube vented enclosure. Smooth base response down to 36 cycles. Complete with balance control and crossover at 2,000 cps. Measures approx. 26" wide, 14" high and 10" deep. Choice of finishes.

SAVE WITH NEW UNFINISHED CABINET. Same speaker components as above with extra grille former. Perfect for custom built in systems. Model DF-1U . . . suggested resale \$81.50.

WRITE TODAY FOR BROCHURE GY AND  
NAME OF YOUR NEAREST JENSEN  
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# Jensen SPEAKERS

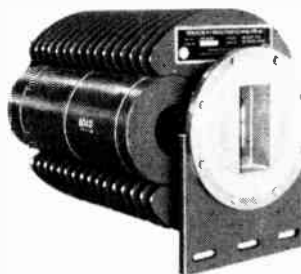
Division of Renfrew Electric Co. Limited

RENFREW • ONTARIO

For complete details check No. 34 on handy card, page 71

# S BAND ISOLATOR

FOR HIGH POWER OPERATION  
AIR COOLED



ANOTHER DEVELOPMENT IN A  
CONTINUALLY GROWING LINE OF  
MICROWAVE COMPONENTS  
MANUFACTURED IN CANADA

## TYPICAL ELECTRICAL CHARACTERISTICS:

Frequency range: 2700-2900 Mc/S

Isolation: 10 db min.

Insertion loss: .4 db max.

VSWR max: 1.15 (with a load VSWR of 1.5 to 1)

Power handling capabilities:

5 megowatts peak

4000 Watts average, with a pressure of 38 psi

INQUIRIES INVITED

*Airtron* CANADA LIMITED

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For complete details check No. 3 on handy card, page 71

# and now!

## FOR 50-60 c/s WORKING MUIRHEAD SERVOMOTORS AND MOTOR TACHOMETERS

In the standard frame sizes adopted by Bu. Ord. and R.A.E. for 400 c/s types, a range of 60 c/s servomotors and motor tachometers, suitable for 50 c/s operation also, is now in production. These efficient, high torque-inertia ratio motors are useful wherever a mains supply is available.

Size 18, 15 and 11 two phase motors are being produced similar to the Mark 8 Mod. 1, Mark 7 Mod. 1, and Mark 14 Mod. 2 400 c/s counterparts and motor tachometers similar to the Mark 16 Mod. 0 and Mark 12 Mod. 0. A 60 c/s size 11 motor tachometer, without a Bu. Ord. parallel, is also available.

These motors may be operated from a two phase supply or single phase supply split with a capacitor. Windings to suit customers' voltage requirements can be supplied.

		60 c/s Information			
Type		Stalled Torque	No load Speed	Output Voltage per 1000 r.p.m.	
<i>Motor</i>					
Size 18	18M10B4	3.5 oz. in.	3300	—	
Size 15	15M10A4	1.45 "	3300	—	
Size 11	11M10A10	0.63 "	3300	—	
<i>Motor Tachometer</i>					
Size 18	18M10D6	3.5 oz. in.	3000	1.25	
Size 15	15M10B8	1.45 "	3000	1.25	
Size 11	11M10E1	0.6 "	3200	0.2	

Full Canadian manufacturing, sales, parts and service facilities

MUIRHEAD INSTRUMENTS LIMITED, Stratford, Ontario.

Tel: 3717 & 3718

416/3ca

## product panorama

### Hot-Line hand tools

Item 430

The A. B. Chance Company of Canada Ltd. is now supplying 1¼" diameter Hot-Line Hand Tools with poles of a new, man-made insulating material called Epoxiglas. Epoxiglas-Pole Hand Tools feature high insulation strength, reduced care and maintenance, superior mechanical strength, and light-weight handling ease.

A result of four years of research and development by the Chance Company, Epoxiglas consists of layers of epoxy-resin-coated glass fibers wound around and laid lengthwise over an unicellular plastic foam core, formed into a single unit by curing in an oven maintained at a constant temperature.

Epoxiglas Poles have high insulation strength and moisture-absorption resistance. While these new tools demand the careful treatment safety equipment must have, under normal conditions heated trailers and drying rooms are not required to maintain their safe insulation level. Routine testing on the automated Epoxiglas production line checks each inch of every pole for micro-ampere leakage.

Additional data on these tools is available from A. B. Chance Company of Canada Ltd., 100 Howden Road, Box 10, Toronto 13, Ont.

### Ten-turn precision potentiometers

Item 431

Helipot Division of Beckman Instruments, Inc., Toronto, announces production of a new series of ¾" diameter, ten-turn precision potentiometers.

Two standard temperature ranges are available for immediate delivery . . . 7220 models with a power rating of 2 watts at 25°C, derating to zero at 85°C; 7230 models rated at 2 watts at 65°C, derating to zero at 125°C; both have a minimum operating temperature of -55°C.



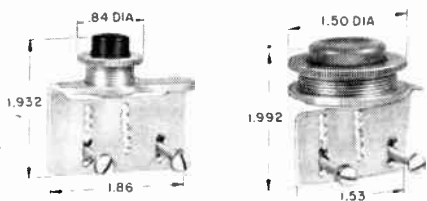
Standard resistance range of the 7220 is 10 to 125,000 ohms ±5%, 7230 is 300 to 90,000 ohms ±5%. Standard linearity tolerance is ±0.50%; best practical linearity ±0.05%.

A rugged stop strength of 128 oz. in. was designed into the pot to prevent damage to the component or system caused by servomotor overshoot. Other mechanical features include 0.02 gm. cm.<sup>2</sup> moment of inertia; 0.6 oz. in. starting torque; 0.5 oz. in. running torque; 0.6° backlash and 0.003" end play.

Environmental requirements of NAS 710 and MIL-R-19 are met or exceeded, including 2,000 cycles vibration at 20G's; 60G's acceleration and 50G's shock.

Units are available for delivery from R-O-R Associates, Limited, 1470 Don Mills Road, Don Mills, Ontario, sales representatives for Helipot Division of Beckman Instruments, Inc.

Continued on page 76



12MA1 Actuator      12MA5 Actuator

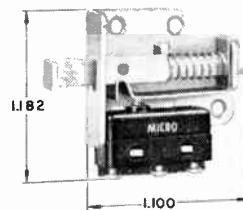
### Pushbutton actuators are versatile, low cost

These actuators accept three families of basic pin plunger switches permitting their use in a wide range of applications. Two button sizes— $\frac{1}{2}$ " and 1"—and choice of red, green or black buttons give panel distinctiveness. Switch and actuator mounting hole arrangement permits use in panels from .060" to .312" thick, and simplifies button travel adjustment. Data Sheet 155.

New subminiature "TM" toggle switch uses minimum panel space

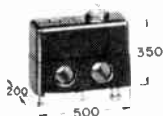


The 2TM1-T offers considerable reductions in space and weight in manual control of compact equipment. Weight— $4\frac{1}{2}$  grams. Only  $\frac{1}{2}$ " square at the base. Dependable operation from  $-65^{\circ}$  to  $+200^{\circ}$ F. Low circuit resistance. Rating: 7 amps. resistive, 28 vdc. DPDT. Data Sheet 158.



### New subminiature safety door interlock

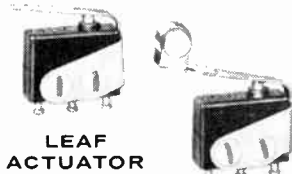
The 17AC1-T cuts off power in equipment cabinets when a service door is opened. Manually pulling the rod actuator to maintained contact position closes circuit for checking. When door is next closed, switch returns to normal... resets itself to safety position. Dependable in temperatures from  $-65^{\circ}$  to  $+250^{\circ}$  F. SPDT. Data Sheet 159.



ACTUAL SIZE

### Sub-miniature series switches

These remarkable switches combine smallest available size with "regular size" electrical capacity, operate dependably in temperatures from  $-65^{\circ}$  to  $+250^{\circ}$ F. Weight— $\frac{1}{28}$  oz. Qualifies as Military Standard Part Number MS24547-1. Rating: 5 amps., 230 vac; 7 amps. resistive, 28 vdc. Data Sheet 148.



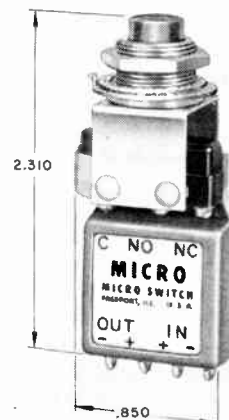
LEAF ACTUATOR

ROLLER LEAF ACTUATOR

Auxiliary actuators add to the versatility of application. Two are shown. Others are pivoted lever and pivoted roller lever. All are stainless steel.

### "One-Shot" switches simplify circuit development

Time-consuming custom development of circuits is made unnecessary by "1PB600" Series "One-Shot" pushbutton switches. These switches produce one square wave pulse per operation. Pulse widths from 0.1 to 10.0 microseconds. Applications include computer and radar consoles, electronic test equipment, setting and resetting flip-flops, and reflected pulse systems. Data Sheet 150.



## Selections from a line large enough to solve almost any switching problem

MICRO SWITCH makes many hundreds of switches and switch devices especially useful to the electronic designer. Here are a few of them, in a considerable range of sizes, electrical capacities, and functions. MICRO SWITCH development engineers are constantly widening the choice with new switches and devices to meet new requirements. The designer can go ahead with a switching arrangement he has in mind with confidence that MICRO SWITCH can supply his need.

Engineering assistance in switch applications is available without obligation from your nearest Honeywell office, or write Honeywell Controls Limited, Precision Components Division, Toronto 17, Ont.



# Honeywell

MICRO SWITCH Precision Switches

For complete details check No. 29 on handy card, page 71

## scatter matter

### *Scanning the international scene*

According to press reports the largest nuclear power plant in the world will be constructed by the **British Government** at a cost of some \$170 to \$180 million. The plant, which is scheduled for completion in 1965, will have two reactors with a total capacity of 650,000 kilowatts.

The electronic industry's tube sales may hit an all-time high of \$900 million in 1960, according to **Douglas Y. Smith, RCA, Electron Tube Division**, vice-president and general manager. Color television picture tube sales should also continue to increase, says Mr. Smith.

Announcement of major transistor price cuts was made recently by the **Lansdale Division, Philco Corporation**. Philco's expanding silicon transistor production is evidenced by the fact that the division is nearing completion of an additional \$3½ million manufacturing facility to be devoted exclusively to the production of silicon units.

An agreement aimed at greatly increasing the sale of British-designed electronic equipment in the United States was reached recently. Under the agreement the **Fairbanks Whitney Corporation** of New York undertakes to market most of the range of electronic equipment designed and manufactured by **E.M.I. Electronics Ltd.**, one of the leading British companies in the field of computers and industrial electronics.

Available in the Canadian market this year will be two new items from the **Japanese** electronics industry. One is a portable transistor-powered television set, weighing 13 pounds, with an eight-inch screen. The second item is a machine which transcribes sound — in the form of electrical impulses — on the back of specially treated paper, which can be mailed in a regular business envelope.

A technical consultancy service to enable firms in any part of the world to purchase electronic

and electro-mechanical equipment has been inaugurated by **Lloyd Instruments Ltd.** of Woodford Green, Essex, England. W. J. Lloyd, director of the company, says that anyone requiring British instruments, but who does not know the best manufacture, can obtain them through his firm.

The Italian Trade Commissioner in Toronto announces the **38th Milan International Trade Fair** to be held April 12-27 inclusive. Exhibits are grouped into eight principal divisions, one of which is: Electronics — radio and television — electronic, radio and television components and instruments — optical, photographic and motion picture equipment — electrical engineering — lighting.

The largest electronic switching equipment production contract, either military or commercial, ever awarded anywhere in the world was recently awarded to **North Electric Company** by the **General Electric Company**, the prime contractor for an Air Weapons Control System. The sub-contractor's contribution to this project consists of advanced electronic switching techniques capable of providing communications and control for a wide variety of defense and offensive weapons to answer needs of air space management outside the continental United States.

Great Britain is to hold a second **Electronic Computer Exhibition** at the Olympia, London, from October 4 to October 12, 1961, and a second **Business Computer Symposium** will be held concurrently.

**Britain's National Physical Laboratory** is now building a hypersonic shock tube to simulate the condition of missile speeds up to 18,000 miles per hour at heights of over 30 miles. The new shock tube incorporating specially bored stainless steel bars with a two-inch diameter hole to close tolerances is capable of withstanding 1,000 atmospheres pressure.

## Canadians attend Electronic Parts Distributors Show

Present predictions are that some two hundred members of the Canadian electronics industry will journey to Chicago to attend the 1960 Electronic Parts Distributors Show to be held in the Conrad Hilton Hotel, May 16 to 18. This contingent will represent about every segment of the electronics industry of the Dominion at manufacturer, representative and distributor level. It is anticipated that a number of the Canadian electronic jobbers will attend this year's educational forums and seminars, as they did last year.

"Canadian Headquarters" will be located in Room 18 on the fourth floor of the Conrad Hilton, where, from Monday morning until the close of the show on Wednesday, Canadians engaged in the business of electronics merchandising may register and meet friends from across the Dominion.

The seventeenth annual Canadian reception and luncheon will be held in the "Bel Air" and "Beverly" rooms of the Conrad Hilton on Tuesday, May 17. This event will be under the chairmanship of E. G. "Ted" Hill, chairman of Canadian Electronic Sales Representatives.

The annual breakfast meeting of the members of the C.E.S.R. will be held in the Palmer House, Chicago, on Wednesday morning, May 18. This is a closed meeting for members only.

## Canada participates in trans-Pacific cable

Announcement was made in the House of Commons during February by the Honorable George Hees, Minister of Transport, that a trans-Pacific cable will be laid between Vancouver and Sydney, Australia, a tentative target date for completion being early in 1964.

Canadian Overseas Telecommunications Corporation, responsible for Canada's external communications, will own the portion of this cable from Vancouver to a point approaching 2,700 miles distant, while the section from that point to Sydney will be the joint property of Australia, New Zealand and the United Kingdom.

The proposed trans-Pacific cable will constitute a second leg in a global cable project which the Commonwealth has been studying for the last four years. The round-the-world cable system will take approximately 10 years to complete.

# NOW!

**Constant output level**  
**Constant modulation level**  
**3 volt output into 50 ohms**  
**Low envelope distortion**

**50kc**  
**TO**  
**65MC**



## New -hp- 606A HF Signal Generator

Here at last is a compact, convenient, moderately-priced signal generator providing constant output and constant modulation level plus high output from 50 kc to 65 MC. Tedious, error-producing resetting of output level and percent modulation are eliminated.

Covering the high frequency spectrum, (which includes the 30 and 60 MC radar IF bands) the new

606A is exceptionally useful in driving bridges, antennas and filters, and measuring gain, selectivity and image rejection of receivers and IF circuits.

Output is constant within  $\pm 1$  db over the full frequency range, and is adjustable from +20 dbm (3 volts-rms) to -110 dbm (0.1  $\mu$ v rms). No level adjustments are required during operation.

### SPECIFICATIONS

**Frequency Range:** 50 kc to 65 MC in 6 bands.  
**Frequency Accuracy:** Within  $\pm 1\%$ .  
**Frequency Calibrator:** Crystal oscillator provides check points at 100 kc and 1 MC intervals accurate within 0.01% from 0° to 50° C.  
**RF Output Level:** Continuously adjustable from 0.1  $\mu$ v to 3 volts into a 50 ohm resistive load. Calibration is in volts and dbm (0 dbm is 1 milliwatt).  
**Output Accuracy:** Within  $\pm 1$  db into 50 ohm resistive load.  
**Frequency Response:** Within  $\pm 1$  db into 50 ohm resistive load over entire frequency range at any output level setting.  
**Output Impedance:** 50 ohms, SWR less than 1.1:1 at 0.3 v and below.  
**Spurious Harmonic Output:** Less than 3%.  
**Leakage:** Negligible; permits sensitivity measurements to 0.1  $\mu$ v.

**Amplitude Modulation:** Continuously adjustable from 0 to 100%.  
**Internal Modulation:** 0 to 100% sinusoidal modulation at 400 cps  $\pm 5\%$  or 1000 cps  $\pm 5\%$ .  
**Modulation Bandwidth:** Dc to 20 kc maximum.  
**External Modulation:** 0 to 100% sinusoidal modulation dc to 20 kc.  
**Envelope Distortion:** Less than 3% envelope distortion from 0 to 70% modulation at output levels of 1 volt or less.  
**Spurious FM:** Less than 0.0001% or 20 cps, whichever greater.  
**Spurious AM:** Hum and noise sidebands are 70 db below carrier.  
**Frequency Drift:** Less than 0.005% or 5 cps, whichever greater.  
**Price:** (cabinet) \$1,200.00 (rack mount) \$1,185.00.  
*Data subject to change without notice. Prices f.o.b. factory.*

### HEWLETT-PACKARD COMPANY

Represented in Canada by ATLAS INSTRUMENT CORPORATION, LTD., 50 Wingold Ave., Toronto, Ont.; 106-525 Seymour St., Vancouver, B.C.; 3333 Cavendish Blvd., Montreal, Que.



world's most complete line of signal generators

For complete details check No. 27 on handy card, page 71

**The Magneto-ionic Theory and Its Applications to the Ionosphere** by J. A. Ratcliffe.

Mr. Ratcliffe's monograph gives a detailed account of the magneto-ionic theory which plays an important part in theories of radio wave propagation through the earth's ionosphere and through the ionised envelopes of radio stars. Two approaches have been adopted: a macroscopic one in which the properties of the medium are averaged out and a microscopic one based on the motion of individual electrons.

In Part II of the book the results are summarized in graphical form and simple rules demonstrated for computing curves of refractive index and absorption index as functions of electron density. Part III treats applications of the theory to the earth's ionosphere and mentions a wide range of phenomena capable of explanation in terms of the magneto-ionic theory of a homogeneous medium.

**The Macmillan Company of Canada Ltd., 70 Bond St., Toronto, Ont., contains 206 pages, hard cover bound, price \$6.75.**

**Feedback Control Systems — Analysis, Synthesis, and Design** by J.-C. Gille, M. J. Pelegrin and P. Decaulne.

Written by three French engineer-scientists, this book provides a synthesis of the most important servo problems by uniting in one volume the overall theory (linear and non-linear) and the components of servo systems. The subject matter can be roughly divided into two categories; material constituting a consistent textbook in the basic theory of servomechanisms; and material constituting additional data and particular or more advanced methods.

**McGraw-Hill Company of Canada Ltd., 253 Spadina Rd., Toronto 4, Ont., contains 793 pages, hard cover bound, price \$19.00.**

**Electric Energy Conversion** by Y. H. Ku, Sc.D., University of Pennsylvania.

This book has been written to provide students of engineering with a unified treatment of the theory of electrical machinery and to co-ordinate the different branches of the subject in a uniform manner by approaching the entire area from the standpoint of the underlying principles of electromechanical energy conversion.

The book has been written primarily

as a college textbook for the introductory course in electrical machinery required of junior or senior electrical engineering students, although much of the material will be useful in graduate-level courses.

**The Ronald Press Company, 15 East 26th St., New York 10, N.Y., contains 522 pages, hard cover bound, price \$10.00.**

**Elements of Solid State Theory** by G. H. Wannier, Bell Telephone Laboratories, Inc.

This book, the author states, represents an attempt to provide a coherent and brief outline of the theory behind present-day solid state physics. It is aimed at advanced students or scientists with good all-round knowledge, but does not assume previous acquaintance with this speciality.

The book is based on lecture courses which the author has given to students at the Bell Telephone Laboratories and at the University of Geneva.

**The Macmillan Company of Canada Limited, 70 Bond Street, Toronto, contains 270 pages, hard cover bound, price \$6.00.**

**Microminiaturization of Electronic Assemblies** edited by Eleanor F. Horsey and Laurence D. Shergalis.

This is the first and only reference volume to cover the important new developments and techniques in miniaturizing electronic equipment. A valuable reference and working tool, the book details the latest techniques in "two-dimensional" packaging and similar new developments.

**Hayden Book Company, Inc., 830 Third Ave., New York 22, N.Y., contains 278 pages, hard cover bound, price \$11.00.**

**A Table of the Incomplete Elliptic Integral of the Third Kind** by R. G. Selfridge and J. E. Maxfield.

This book contains the first complete 6-place table of values of incomplete integrals of the third kind. The table was prepared under the auspices of the Research Department of the U.S. Naval Ordnance Test Station. It was calculated in response to the need for such a table in the solution of specific problems after a search of the literature had disclosed that no complete set of values of these integrals were available.

**McClelland & Stewart, 25 Hollinger Rd., Toronto 16, Ont., contains 805 pages, hard cover bound, price \$8.25.**

## Brochure on solderless wiring devices

Item 432

A new brochure is being offered by ETC Incorporated, Cleveland, Ohio, showing the user how to choose the best kind of terminal for his particular wiring application.

A wide choice of basic types of electric terminals and connectors is presented, ranging from the "Ring" and other standard tongue designs through multiple-wire connectors and quick-disconnects.

The five ETC barrel styles are illustrated, including insulated, non-insulated and vibration-proof styles. Performance features of each are compared.

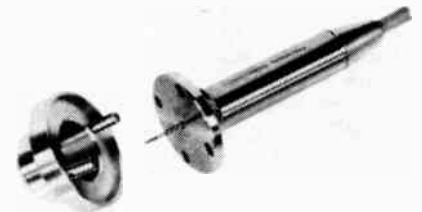
A cutaway view shows construction details of a typical terminal. All ETC terminals feature the full 1/4" barrel length that eliminates squeeze-outs and shearing and allows a wider crimp for extra-strong connections.

A free copy of this brochure is available from Douglas Randall (Canada) Limited, 126 Manville Road, Scarborough, Ontario.

## Displacement transducers

Item 433

Two models of Sanborn linear displacement transducers are complete units ready for connection to the required preamplifier and input source. These transducers include Sanborn differential transformers, are encased in stainless steel shields and have carbide tipped, spring-return contact rods, 10 foot integral cable and suitable adapters.



The new Model 580 and 581 transducers are designed primarily to be used with Sanborn 150-, 350- and 850-Series Carrier Amplifiers, or 150-, 350- and 850-Series Phase Sensitive Demodulator Amplifiers with a separate oscillator for transducer excitation. Both models have a maximum stroke of  $\pm 0.050$ " (0.100" total); 0.5% linearity; and operate from 5 volts, 2400 cps excitation. Resolution is infinite and a choice of 100, 25 or 10 gram contact pressures is available.

When used with Sanborn Carrier Preamplifiers and recorders, these transducers give full scale deflection (50 chart divisions) per 0.001" displacement.

Further information is available from the Industrial Division, Sanborn Company, 175 Wyman Street, Waltham 54, Mass., U.S.A.

## Pocket industrial receiver

Item 434

Multitone of Canada Limited has announced a new type of pocket receiver for its staff location system. Known as the Type 5 Industrial Receiver, this unit gives a call signal audible above any noise level normally experienced in industrial premises. The speech facility is omitted from this version.

The unit is extremely sensitive to signal; this enables it to be used in heavy steel structures where absorption formerly made it difficult to use an inductive paging system. It also has a very high power output which permits its use in the noisiest areas where bell or P.A. System cannot be heard. Each receiver can be called independently as part of the "Personal Call" system.

Weighing only 5 3/4 oz. the Type 5 receiver measures 5 1/4" x 2 1/8" and can be carried comfortably in the pocket.

Multitone of Canada Limited, 24 Merton St., Toronto, Ontario.



# TRANSISTOR

testing  
matching  
selecting

for

PRODUCTION  
RUNS

The Tektronix Type 575 Transistor-Curve Tracer is a valuable production tool as well as an engineering instrument. The most intricate test procedures devised by engineers become high-speed operations by production personnel...through the use of a simple setup chart.

### Here's how it works:

1. The engineer devises the test procedure required to attain the desired end result.
2. The engineer designates the control settings for the Type 575 on the chart, and draws a picture of the display, outlining the limits for acceptance or rejection. If desired, separate graticules for each test setup can be marked with colored lines or tapes.
3. The production-test facility takes over at this point and performs the test operation with speed and accuracy.

Operational curves displayed on the Type 575 provide information desirable even in relatively simple tests. A convenient switch makes it easy to check test setups against a standard, and to make direct comparisons. You'll be ahead using the Type 575 in any test procedure where a meter reading is not entirely adequate.

Your Tektronix Field Engineer has a supply of the test set-up charts, and will be happy to help you with any phase of this operation. If you are not already acquainted with the performance characteristics of the Type 575, ask your Field Engineer for a demonstration.

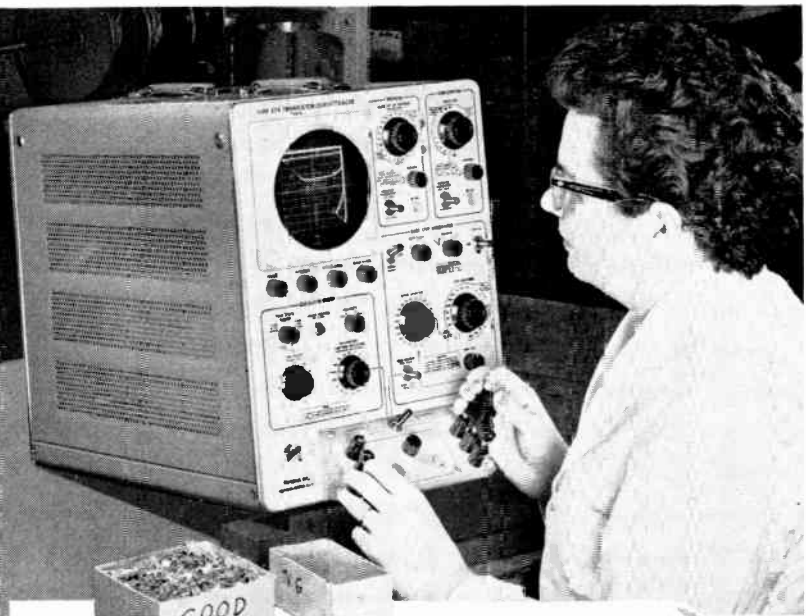
Type 575 Transistor-Curve Tracer . . . . . \$975

f.a.b. Factory

## Tektronix, Inc.

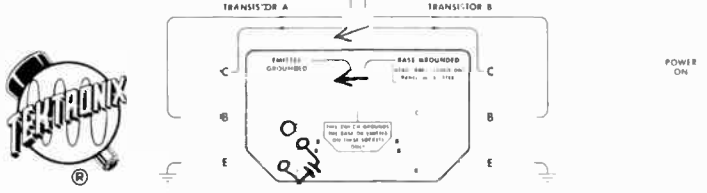
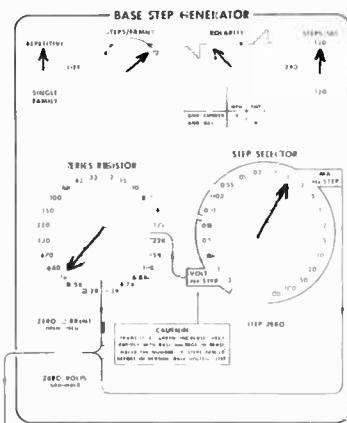
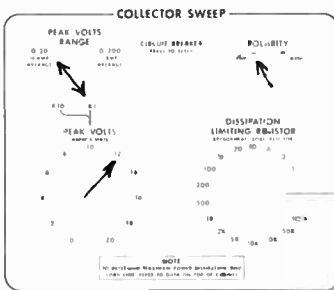
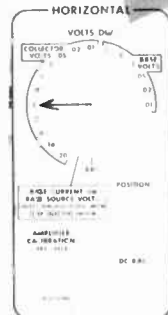
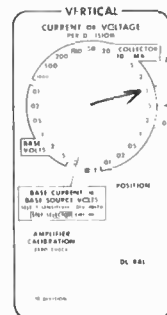
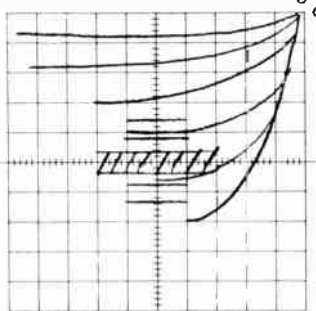
CANADIAN FIELD OFFICE:

3 Finch Avenue East, Willowdale, Ontario  
Phone: Toronto, BAldwin 5-1138



### TYPE 575 TEST SET-UP CHART

TYPE 575 TRANSISTOR-CURVE TRACER



COMPONENT: 2N70D 151-027

TESTING: BETA SEGREGATION

PROCEDURE: USE SPECIAL SOCKET WITH BYPASSED BASE LEAD

TEKTRONIX FIELD OFFICES: Albuquerque, N. Mex. • Atlanta, Ga. • Baltimore (Towson, Md.) • Boston (Lexington, Mass.) • Buffalo, N.Y. • Chicago (Park Ridge, Ill.) • Cleveland, Ohio • Dallas, Texas • Dayton, Ohio • Denver, Colo. • Detroit (Lothrop Village, Mich.) • Endicott (En3well, N.Y.) • Greensboro, N.C. • Houston, Texas • Kansas Cit. (Mission, Kan.) • East Los Angeles, Calif. • West Los Angeles, Calif. • Minneapolis, Minn. • New York City Area (Albertson, L.I., N.Y. • Stamford, Conn. • Union, N.J.) • Orlando, Fla. • Philadelphia, Pa. • Phoenix (Scottsdale, Ariz.) • San Diego, Calif. • San Francisco (Palo Alto, Calif.) • St. Petersburg, Fla. • Syracuse, N.Y. • Toronto (Willowdale, Ont.) • Canada • Washington, D.C. (Annandale, Va.)

TEKTRONIX ENGINEERING REPRESENTATIVES: Hawthorne Electronics; Portland, Oregon • Seattle, Washington. Tektronix is represented in twenty overseas countries by qualified engineering organizations.

For complete details check No. 46 on handy card, page 71

ELECTRONICS AND COMMUNICATIONS, April, 1960

# opportunities

These classified advertisements are published to assist those in the trade who have articles for sale, positions available, positions desired, sales agency openings or business opportunities. Charges are 25c per word or figure, not including heading or box number. Minimum charge is \$5.00 payable on submission. No agency commission paid. There is absolutely NO CHARGE for "positions desired" advts.

Send all material to the attention of the advertising manager of ELECTRONICS AND COMMUNICATIONS, 450 Alliance Ave., Toronto 9, Ontario.

## Future SALES MANAGER industrial ELECTRONICS CANADA

Large U.S.A. electronic equipment manufacturer seeks an ambitious, personable man for an extremely rare career opportunity in Canada. Must be Canadian citizen, between 30 and 40, with some technical sales experience and some formal education in electrical engineering or electronics.

Job begins with year of training in U.S.A. factories, then builds into district sales managership for substantial Canadian area. Once on job, about 50 per cent of time will be travel. Eventually, will supervise about 15 people in sales, technical jobs.

Starting salary, benefits outstanding; career rewards, limited only by individual's capability. Send resumé, in complete confidence.

Box 197

Electronics and Communications  
450 Alliance Ave., Toronto 9, Ont.

### NEW OIL CAPACITORS

60 GE 1/2 MFD 25,000 VDC \$29.50 ea.  
300 POTTER 16 MFD 660 VAC \$2.35 ea.

Navilog, Box 9  
Englewood, New Jersey

### GRADUATE ELECTRONIC TECHNICIAN

seeks employment in a research, development or adaptation laboratory. Willing to re-locate anywhere in Canada. For complete information as to experience please write to —

Box 5030

Electronics and Communications  
450 Alliance Avenue, Toronto 9, Ontario

### AMERICAN TELETYPE EQUIPMENT

Models 15, 14, Morkram, Weathstone. Keyboards, Rectifiers, Tables etc. Numerous spares and kits. British Creed Teleprinters and Spares. Telephone Material American and British. Lists on request.

Suplex Lamps Limited  
239 High Holborn, London, W.C. 1, England

### EXECUTIVE (36) — P.ENG., B.A.S.C.,

desires Vancouver location. Seeks appointment in administrative, technical liaison or sales capacity in telecommunications or related fields. Well versed in all levels negotiations, both Government and Commercial aspects. Experience includes technical knowledge of communications systems, financial and budget controls, project planning, sales management, contract preparation, negotiation administration.

Box 5031

Electronics and Communications  
450 Alliance Avenue - Toronto 9, Ontario

### SALES ENGINEER

required in our Commercial Products Department. Applicant must have had practical engineering experience, be interested in electronic components and be compatible with present staff. For further details contact —

Lake Engineering Company Limited  
Scarborough, Ontario. PL. 7-3253

### ENGINEERING TECHNOLOGIST

desires part-time position in Toronto. Thirty-four years of age, with 6 years' experience in design and development of electronic measuring — sound reproduction — and industrial equipment.

Box 5032

Electronics and Communications  
450 Alliance Avenue, Toronto 9, Ontario

### RADIO ANNOUNCER

seeks appointment in radio or TV announcing — any location. Age 22, Grade XI education, married (no children). Has just completed announcing course with leading station in Western Canada.

Box 5033

Electronics and Communications  
450 Alliance Avenue, Toronto 9, Ontario

### GRADUATE TECHNICIAN

with unique combination of technical know-how, sales and management ability, seeks position in administration, technical liaison or sales capacity. Grade technician, radio and TV, Technical Maintenance Officer R.C.C.S. Wide experience in telecommunications systems, domestic and European, civil and military. Varied and successful sales experience coupled with technical teaching and sales management.

Box 5034

Electronics and Communications  
450 Alliance Avenue, Toronto 9, Ontario

TO EXPEDITE  
TEXAS  
INSTRUMENTS  
SEMICONDUCTOR  
COMPONENTS

TO THE  
EXPANDING  
CANADIAN  
ELECTRONICS  
MARKET . . .



We Announce the  
Appointment of

*Paul Zuk*

To a New TI Office

Elmhurst Plaza

1364 Islington Avenue North  
Rexdale, Ontario

Phone: ROGers 6-6420 6-6429

Mr. Zuk's experience in electronics dates to 1945 with the Royal Canadian Navy. After formal training at University of Saskatchewan he entered industrial electronics in 1951 serving in production supervision, standards specifications, analysis, design and development projects, and sales engineering. For quick, accurate transistor, diode, rectifier, capacitor, and resistor product data call on Paul Zuk... serving all Canadian markets.

SEMICONDUCTOR-COMPONENTS  
DIVISION

TEXAS  
INSTRUMENTS

INCORPORATED

REXDALE, ONTARIO

For complete details check No. 48

Plant Manager  
Jack Sparks says:



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next job!

A 30,000 foot modern  
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Printing, Copywriting,  
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Editing.



Commercial Printing Division

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WHEN QUALITY COUNTS }



CHOOSE THE BEST IN

**R. F. ATTENUATION**



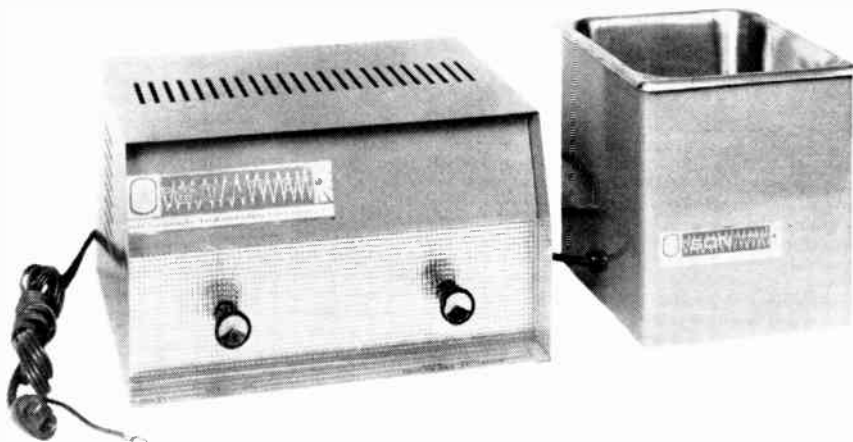
**PYLON ELECTRONIC DEVELOPMENT company, Ltd.**

Communications Systems and Equipment

161 CLEMENT ST., LASALLE, MONTREAL 32, QUE.

For complete details check No. 42 on handy card, page 71

# ultrasonics for industry



**DI SON TEGRATOR  
SYSTEM 40  
ULTRASONIC CLEANER**

is **FAST  
VERSATILE  
and LOW COST**

U.I. System 40 is widely used in the  
Electronic, Optical, Glass, Clinical, Biological,  
Textile, Oil, Food, Paper, Dental, Plastic, Drug,  
Rubber, Wood, Chemical, Isotope,  
Geological, Agronomical, Metallurgical,  
Anthropological, Paleontological, Petro-  
chemical, Ceramics, Dairy, Brewery, Beverage,  
Confectionery, Laboratories, Photographic,  
Paint, Bottling, Cosmetic, Pharmaceutical,  
Metal Working, Metal Finishing, Die-Casting,  
Foundry, Plating, Metal Treating, Automotive,  
Aircraft, Horological, Jewelry, Medical,  
Marine, Mining, Utilities, Power Plant fields.

**ONLY \$140<sup>50</sup> Full 1/2 gallon capacity**  
SALES TAX EXTRA

Other models available shortly: 1 1/2 gal., 2 1/2 gal., 5 gal., 10 gal., 30 gal., 75 gal.  
A full range of specially formulated detergents and solvents for ultrasonic use  
is available.

# CONWAY ELECTRONIC ENTERPRISES

1514 Eglinton Ave., Toronto 10, Ontario, Canada

RU. 3-6576 — RU. 3-6676

For complete details check No. 18 on handy card, page 71

# the industry's business

## Canadian Admiral 19-inch TV

Stuart D. Brownlee, president of Canadian Admiral Corporation, Ltd., told Admiral sales personnel at a recent company sales meeting that Canadian Admiral is the first television company in Canada to introduce the new wide-angle 19" TV sets.

"The new tube," Mr. Brownlee said, "provides more than 10 per cent greater picture area than the 17-inch, and the viewing area, with squared off corners like a movie screen, consists of a full 172 square inches."

## Douglas Randall rep for International Rectifier

Announcement is made by International Rectifier Corporation of El Segundo, California, that, effective March 1, Douglas Randall, Canada, Ltd., of Scarborough, Ontario, became the exclusive representative for that organization to distributors and manufacturers in Canada. The new arrangement was made in order to provide Canadian customers with a complete coast-to-coast service on International Rectifier's line of semi-conductor diodes and rectifiers.

Inquiries re sales and engineering matters, formerly handled by International Rectifier of Canada Ltd., should now be addressed to: Douglas Randall, Canada, Ltd., 126 Manville Road, Scarborough (Toronto) Ontario. Telephone: OXford 8-3081.

In British Columbia only, customers will continue to be serviced by the Fred H. Haight Company, 3212 Eastlake Ave., Seattle 2, Washington. Phone: EAsT 2-1818.

## National Material Handling Show

A number of leading Canadian associations in trade, industry and transportation are giving enthusiastic support to the Third Canadian National Material Handling Show and Conference to be held in Montreal's Show Mart, September 26 to September 30 inclusive.

The Show and Conference is being sponsored by the Montreal Chapter of the American Material Handling Society in collaboration with all the other Canadian chapters.

## Aviation Electric adds to sales force

In keeping with the company's policy of strengthening its rapidly expanding sales activities, the appointment of George Knapp, as assistant sales manager (Industrial) has been announced by Durham Garbutt, sales and service manager of Aviation Electric Limited.

Mr. Knapp has been responsible for the growth of AEL's activities in the industrial field during the past two years. In his new capacity, Mr. Knapp will continue to co-ordinate all industrial sales activities, with emphasis on automatic control systems.

Frank Mark, formerly associated with Davis Automatic Controls, in the capacity of division manager, has recently joined the Industrial Division bringing with him a wide knowledge of industry's requirements in the automatic control field.

## Two-way radio for C.N.R.

A radio communications system, used successfully on the Royal Train during the Queen's last Canadian visit, has been introduced by Canadian National Railways on trains operating in the mountain area of British Columbia and Alberta.

By means of two-way radio, engineers and train crews can now communicate with the ease of making a 'phone call. This will substantially improve on-time performance and increase safety.

One of the important advantages of the new system is that it enables train crews and despatchers to obtain immediate information on track conditions and emergency situations. It also eliminates the need for a conductor or trainman to walk the length of a freight train in order to communicate with the engineer.

## E. E. Whittaker changes firm name

Ernest E. Whittaker, president of Whittaker Electronics Limited, 2137 Niagara Drive, Ottawa 1, announced recently that his company had taken over the representation of firms previously represented by E. E. Whittaker.

Stocks of several lines will be maintained at the Ottawa office. Stock lists are available directly from Whittaker Electronics Limited.

## Houston Instruments Canadian rep.

Houston Instrument Corporation, of Houston, Texas, have appointed B. H. McGregor, P.Eng., P.O. Box 156, Station "H", Toronto 13, as Canadian representative for their recorders and amplifiers.

## Toronto IRE closes 1959-1960 season

The final meeting of the Toronto Section of the Institute of Radio Engineers for the 1959-60 season consisted of a joint meeting with the Hamilton and Waterloo sections in Hamilton, Thursday, April 14th, 1960. The meeting took the form of a tour of the Nuclear Reactor at McMaster University.

## Telegraph service to Frobisher Bay, NWT

Canadian National Telegraphs recently announced the inauguration of telegraph service to Frobisher Bay, Northwest Territories.

A. C. Jerrett, superintendent of Canadian National Telegraphs, Newfoundland, said the new CNT service would replace that provided by the Department of Transport for construction company employees working on defense and other projects in the area, Transport Department staff and those employed by various commercial establishments such as banks, airlines and oil companies.

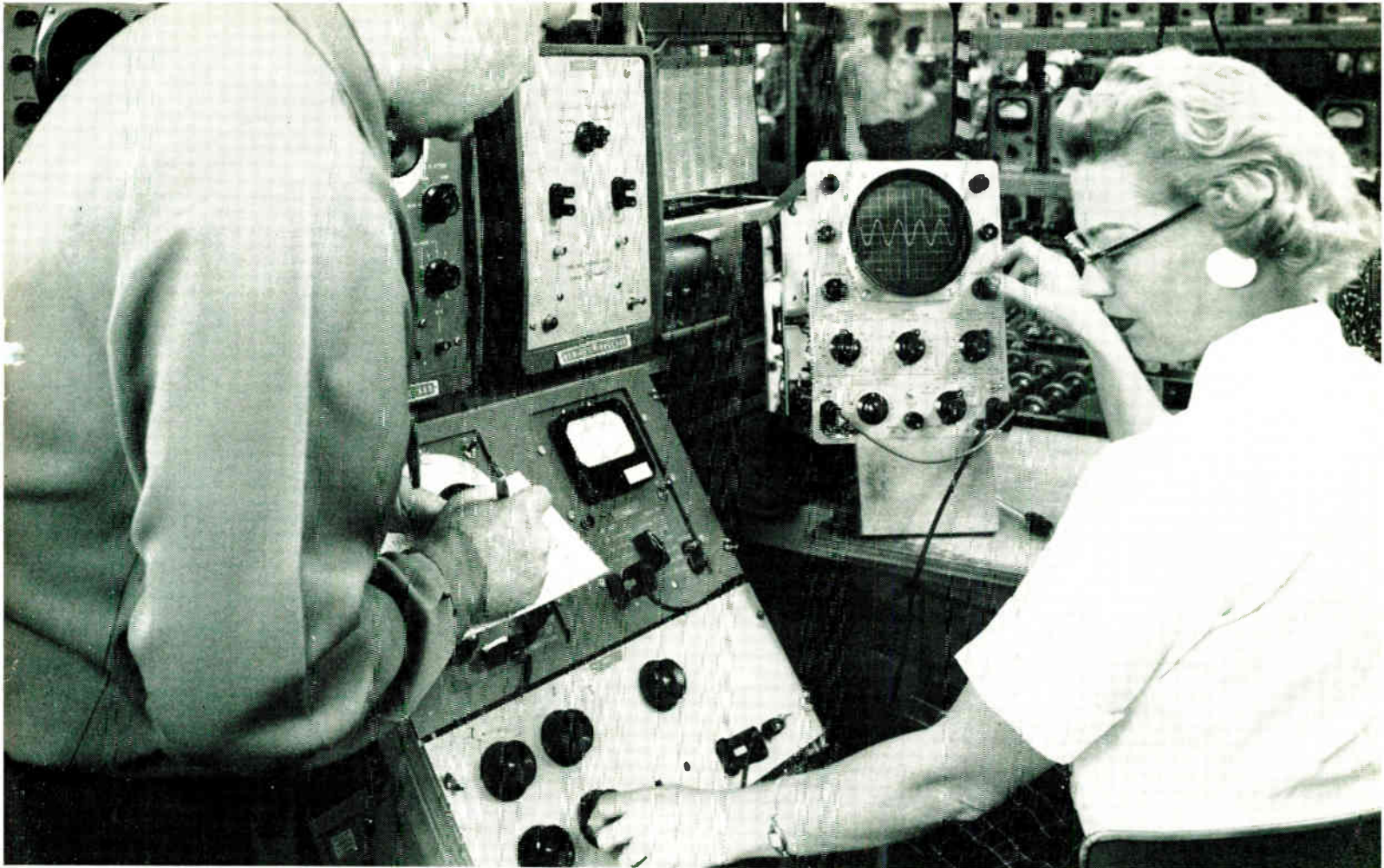
Mr. Jerrett predicts that the office will soon be handling two to three thousand telegrams a month.

## Change of address

Tele-Radio Systems Ltd. of Toronto has recently moved to new premises on the same street. Whereas they were formerly at 3534 Dundas St. W., the address in future will be 3633 Dundas St. W., Toronto 9, Ont. The telephone number remains unchanged — ROger 2-8224.

## Tellurometer rep for Millivac Instruments

Tellurometer Canada Limited, 1562 Carling Ave., Ottawa, manufacturers of electronic surveying instruments, have been appointed agents in Canada for Millivac Instruments, a division of Cohu Electronics Inc. of Schenectady, N.Y.



## HEWLETT PACKARD specifies Tung-Sol tubes for high stability calibration generator

The Hewlett-Packard Voltmeter Calibration Generator calibrates high impedance voltmeters and oscilloscopes with extreme accuracy. An exceptionally stable source for a wide range of precision voltages, the premium instrument speeds up production and maintenance testing.

To assure high stability and low distortion performance, which are listed among the unit's principal advantages Hewlett-Packard selected Tung-Sol 6550's for the 400 cycle power amplifier. As Hewlett-Packard reports: "Tung-Sol's 6550 shows unusual insensitivity to load changes."

What this means, of course, is that under varying loads the 6550 drive, with its tight characteristics, holds to a minimum any change in the unit's already minimal distortion (less than 0.2%). In addition the 6550 helps to provide long-term stability.

Like all Tung-Sol components, the 6550's optimum performance and dependability stems from

Tung-Sol's deep-rooted component know-how. Every step in the manufacturing process is carefully disciplined. Stringent quality control guarantees uniformly high performance in any one lot or from lot to lot. And exhaustive life tests under severe overload assures adequate safety margins.

Maybe you're up against some exacting component requirements. If so, you'll be steering a wise course by getting in touch with Tung-Sol applications engineers. They're component experts who will gladly study your design and recommend the units that will do the job . . . precisely. In Canada: Abbey Electronics, Downsview, Ont.

For prompt and competent technical consultation on Tung-Sol components call the Tung-Sol Commercial Engineering office near you. SALES OFFICES: Atlanta, Ga.; Columbus, Ohio; Culver City, Calif.; Dallas, Texas; Denver, Colo.; Detroit, Mich.; Irvington, N. J.; Melrose Park, Ill.; Newark, N. J.; Philadelphia, Pa.; Seattle, Wash. Canada: Montreal, P. Q.

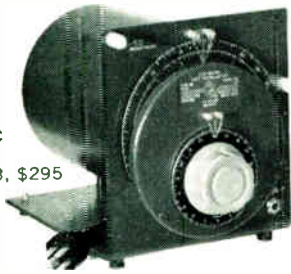


 **TUNG-SOL®**

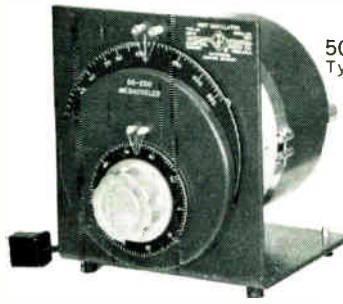
For complete details check No. 49 on handy card, page 71



0.5 to 5 Mc  
5 to 50 Mc  
Type 1211-B, \$295



50 to 250 Mc  
Type 1215-B, \$210



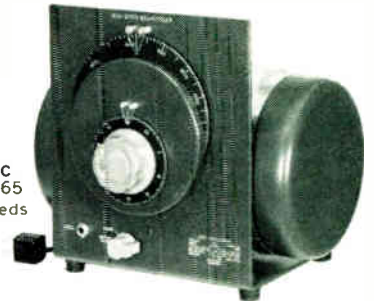
180 to 600 Mc  
Type 1209-BL, \$260



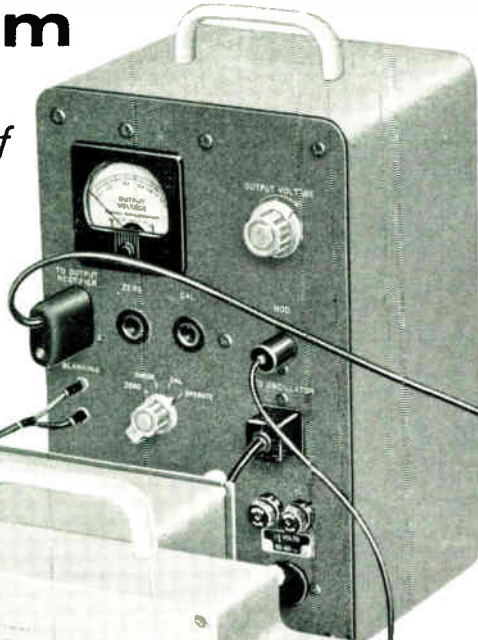
# Sweep Oscillator System

*with Plenty of  
Frequency  
Coverage*

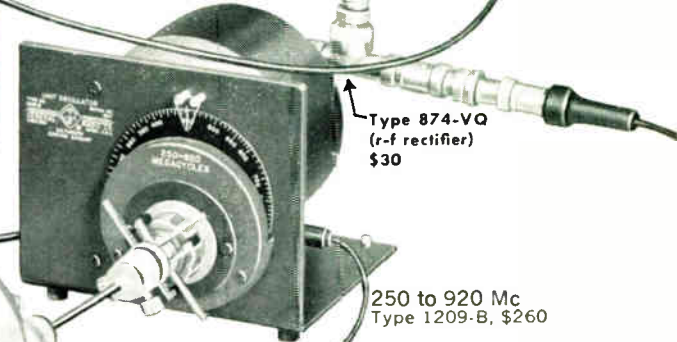
900 to 2000 Mc  
Type 1218-A, \$465  
(for use at sweep speeds  
to 1 cps)



Type 1263-A  
Regulated Power Supply  
\$305

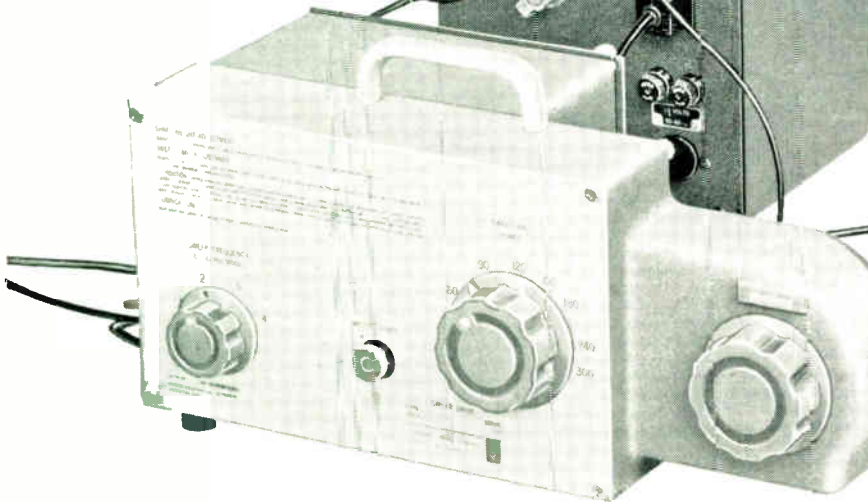


Type 874-VQ  
(r-f rectifier)  
\$30



250 to 920 Mc  
Type 1209-B, \$260

Type 1750-A Sweep Drive, \$470



By merely substituting basic oscillator units in this system, you can cover, in narrow or wide sweeps, segments of the frequency range from 500 kc to 2000 Mc. More than this, you can control sweep speed, center frequency and frequency span over wide ranges by simple knob adjustments.

The Type 1263-A Regulated Power Supply is designed to power the Unit Oscillator as well as to keep the oscillator's output constant over wide ranges of frequency. It does this by comparing the rectified r-f output of the oscillator against an internal reference voltage, and applying any necessary corrections to the oscillator through its plate voltage supply. With this setup output is maintained within 2% over the oscillator's entire frequency range.

Write For Complete Information

- ★ Sweep Drive's claw-like arm attaches to knobs and dials up to 4 inches in diameter, and to 1/4- and 3/8-inch shafts to convert oscillators, signal generators, and receivers to sweep operation.
- ★ Sweep-speed, sweep-arc, and sweep-center frequency are completely adjustable even while the Drive is in motion.
- ★ Wide range of sweep speeds... reciprocating motion, adjustable from 0.5 to 5 cps.
- ★ Sweep arc adjustable from 30° to 300°. At sweep speeds below 1 cps, arc can be

increased by coupling Drive directly to Oscillator dial rather than to control knob attached to vernier reduction-drive.

- ★ Rated maximum torque is 24 ounce-inches. Limit-switch circuit disconnects and brakes motor should limits of shaft travel be accidentally exceeded.
- ★ Generates a horizontal deflection voltage proportional to shaft angle for scope displays and x-y recorders.
- ★ Blanking circuit shorts out CRO trace during return portion of cycle and produces a reference base line.

## GENERAL RADIO COMPANY

WEST CONCORD, MASSACHUSETTS

Canadian Engineering Office in TORONTO

99 Floral Parkway, Toronto 15, Ontario  
Arthur Kingsnorth • Richard J. Provan  
Tel: CHerry 6-2171

Repair Service: Bayly Engineering Ltd., Ajax, Ontario

For complete details check No. 25 on handy card, page 71