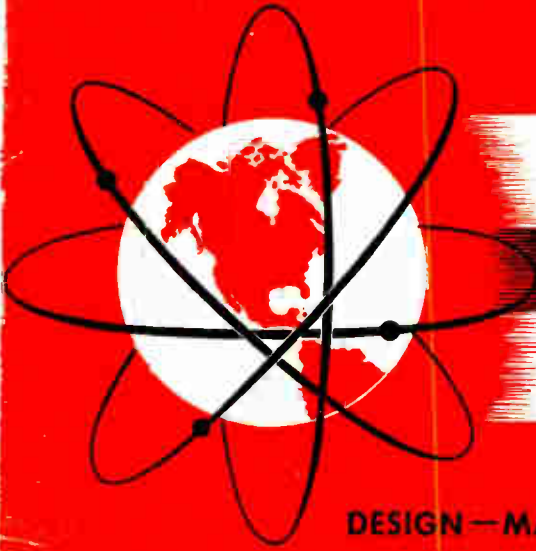


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ELECTRONICS *and* COMMUNICATIONS

DESIGN — MANUFACTURE — ENGINEERING — DISTRIBUTION — APPLICATION

New Ideas For Modern Management

- **Electronic Safety Controls For Bulk Fuel Loading Is A Sure Investment In Safety For The Fuel Industry. page 26**
- **Canadian Development Overcomes Crystal Ageing By The Use Of New Assembly Techniques. page 40**
- **Commercial Fishermen Can Now Seek Out And Examine Their Catch On The Ocean Floor By Electronic Equipment. page 42**
- **Modern Controls Increase Speed Accuracy And Efficiency Of Plant Operation. page 63**
- **The Latest Equipment For Cooking Is The Radarange And It Cooks By Microwave. page 68**



Officers of the Royal Canadian Air Force Staff College, Armour Heights, Toronto, are shown inspecting hydraulic assemblies in the Canadian Aviation Electronics plant in Montreal.

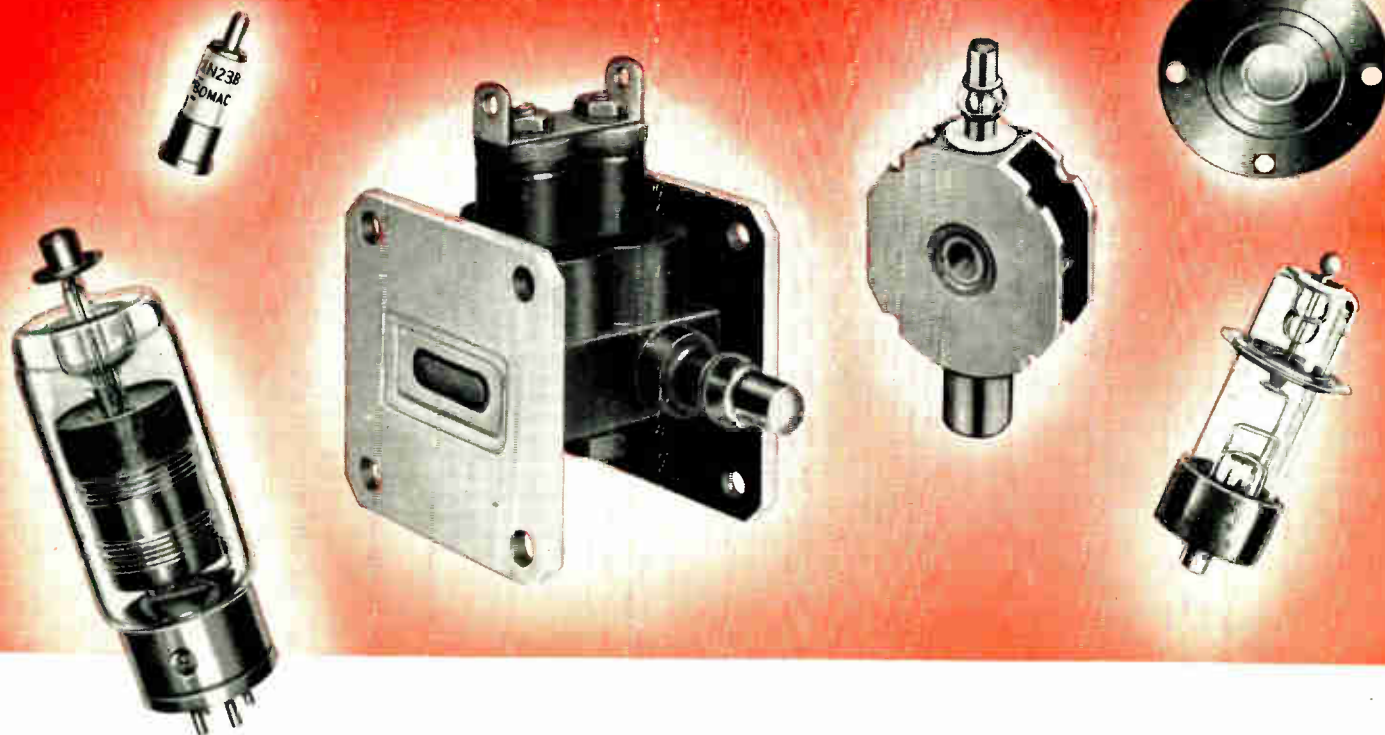
Mar.-Apr. 1955 ★ \$5.00 a year
An AGE Publication, Toronto, Canada

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GAS SWITCHING TUBES — Bomac carries the most extensive line of TR, ATR, Pre TR and attenuator tubes available for all frequency bands and power levels.

SHUTTER TUBES — Bomac has introduced a new concept in TR switching, offering continuous crystal protection through wave guide shorting plus TR tube action.

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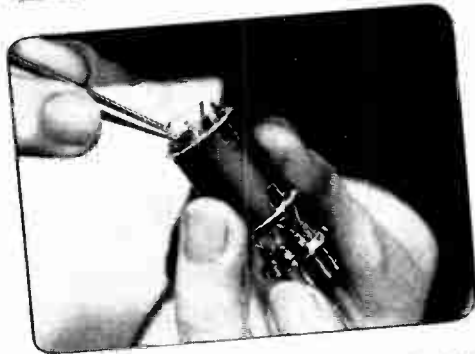
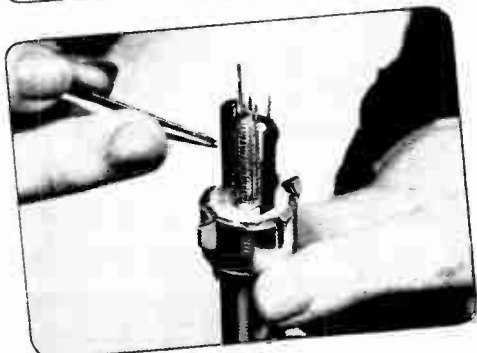
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Bomac Laboratories, Inc.

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patiently perfected . . .

Everyone engaged in the making of Marconi tubes keeps one important fact in mind—each tube is a piece of equipment on which someone's listening pleasure, convenience or even life is going to depend. So every single Marconi RVC tube is made with as much care as if it had been specially ordered for a particularly important application.

YOUR customers' satisfaction is the dividend Marconi earns by setting higher standards for the industry.

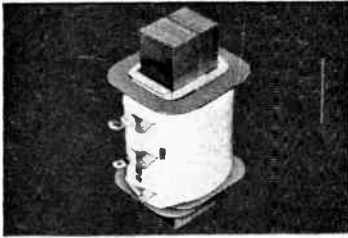
MARCONI RADIOTRONS

Canada's finest radio and television tubes

CANADIAN MARCONI COMPANY

VANCOUVER, WINNIPEG, TORONTO, MONTREAL, HALIFAX, ST. JOHN'S, Nfld.



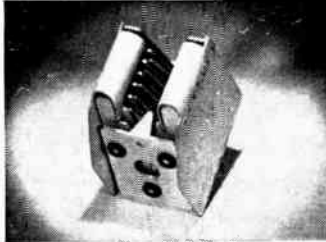


DIELECTRIC STRENGTH. National Vulcanized Fibre gives electrical parts high dielectric strength—plus toughness and excellent forming properties. Has ideal application as insulation.

**NATIONAL
VULCANIZED
FIBRE**



DURABLE — TOUGH — RUGGED. National Vulcanized Fibre rail joint insulation withstands years of continuous exposure and heavy pounding of today's high-speed railroading. Will not corrode or deteriorate.

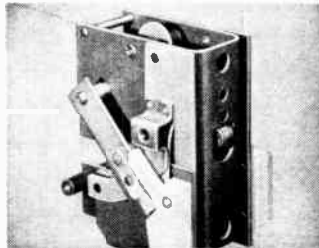


ARC RESISTANCE. In circuit breakers, National Vulcanized Fibre safely curbs electrical arcing without carbonizing or tracking. Easy to bend, punch and form. Light in weight. Heat and shock resistant.

FOR MEN WITH IMAGINATION...

**two
materials
of
unlimited
application**

MACHINABILITY — MECHANICAL STRENGTH. New paper-base Phenolite not only has excellent arc resistance, but superior machining qualities as well. Great compressive and tensile strength.

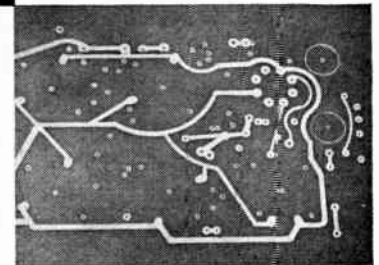


CHEMICAL RESISTANCE. Chemical-resisting grades of Phenolite are unaffected by most corrosive fluids and atmospheres. Retain high strength, resiliency and dimensional stability.

Here are six ideas to spur your imagination. They only *suggest* the many things that can be done with National Vulcanized Fibre or Phenolite Laminated Plastic.

The full list of current uses for these materials would more than fill this page and many more pages! Yet more are coming up almost every day. For NVF is not only the world's largest producer of vulcanized fibre. We also make a fulltime job of thinking up new improvements to our products—and new ways of using them to improve *yours*. Result: designers call our materials the most versatile ever.

Looking for an easy, economical way to improve production—or products? Team up with NVF. We're prepared to assist you all the way from initial design to the delivery of precision fabricated parts. Our new 16-page Catalog will give you full information about our products and services. Write for it on your business letterhead to Dept. AD-3.



COMPACT DESIGN—ECONOMY—HIGH TEMPERATURE RESISTANCE. Printed circuits made of copper-clad Phenolite permit compact design, simplify production, reduce assembly time.



NATIONAL

FIBRE COMPANY OF CANADA, LTD.

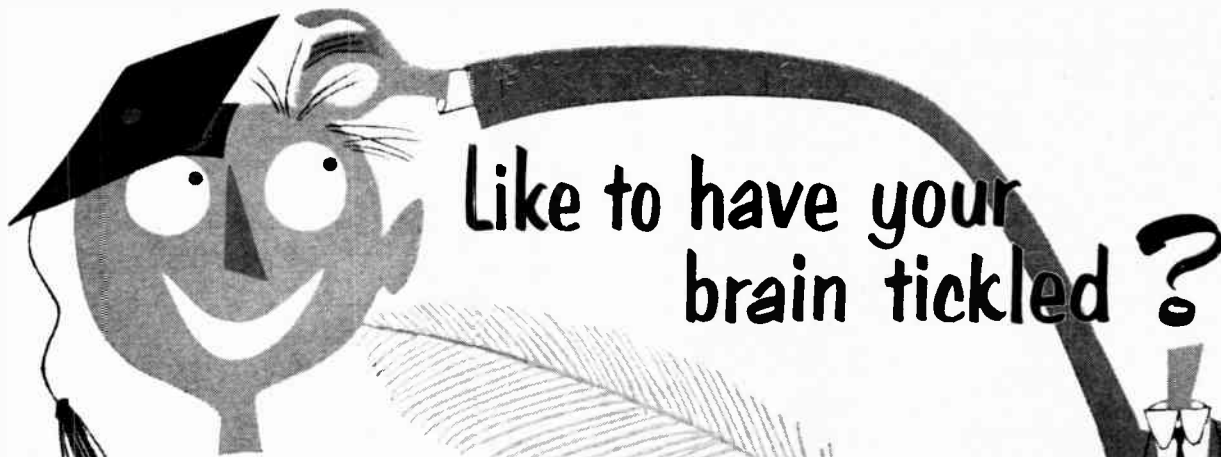
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Also Manufacturers of Peerless Insulation,
Materials Handling Receptacles,
Vul-Cot Wastebaskets and Textile Bobbins.

Typical parts
fabricated
by NVF



For further data on advertised products use page 54.



Like to have your brain tickled?

Then Centralab's new monthly Electroni-Kwiz is your dish - for fun and prizes*

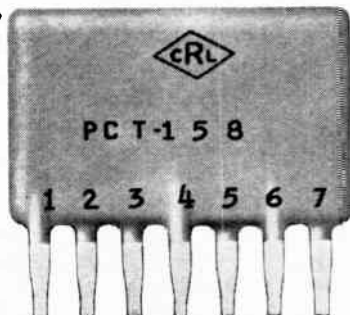
Answer the Electroni-Kwiz question in 50 words, more or less (who counts?), and you're eligible to win a prize.

Now, we're not giving away any oil wells (a big national advertiser beat us to that), but we do promise awards well worth your time and effort. This month's major prize is an Evinrude 3-hp Outboard Motor. A leading editor in this field will pick the winner.

Here's this month's question: In your opinion, what electronic development in recent years has made the greatest impact on commercial applications — and why?

Sharpen that pencil — flex those mental muscles — mail your entry to us before April 30.

**Nothing to buy. Employees of Centralab and their advertising agency not eligible. Duplicate prizes awarded in case of tie.*



Speaking of important developments, here's another from Centralab:

To help speed assembly of circuit boards, Centralab developed Centralab Plug-In Printed Electronic Circuits† with Twin-Tapered Tab Leads

Write for detailed engineering bulletin EP-40R

More proof that if it's a job for electronic components, it's a job for Centralab

Centralab's creative engineering and production methods pay off for many users of standard and special electronic components



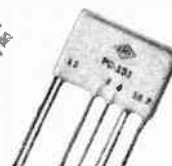
Volume Controls



Capacitors



Switches



Printed Electronic Circuits



Ceramics

†Trademark



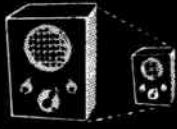
A DIVISION OF GLOBE-UNION INC.

964C E. Keefe Avenue • Milwaukee 1, Wisconsin
In Canada: 804 Mt. Pleasant Road, Toronto, Ontario

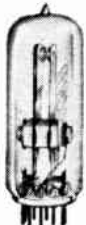
MINIATURIZING YOUR EQUIPMENT?

Specify **SIMPLEST, MOST COMPACT**
AMPERITE
**THERMOSTATIC
DELAY RELAYS**

MOST ECONOMICAL, HERMETICALLY SEALED



STANDARD



MINIATURE

Provide delays ranging from 2 to 120 seconds.

- Actuated by a heater, they operate on A.C., D.C., or Pulsating Current.
- Hermetically sealed. Not affected by altitude, moisture, or other climate changes.
- Circuits: SPST only — normally open or normally closed.

Amperite Thermostatic Delay Relays are compensated for ambient temperature changes from -55° to $+70^{\circ}$ C. Heaters consume approximately 2 W. and may be operated continuously. The units are most compact, rugged, explosion-proof, long-lived, and — very inexpensive!

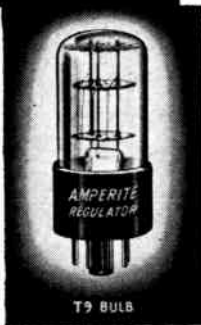
TYPES: Standard Radio Octal, and 9-Pin Miniature.

PROBLEM? Send for Bulletin No. TR-81

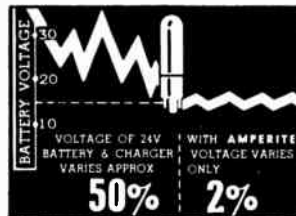
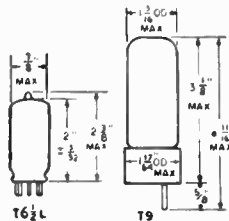
BALLAST-REGULATORS

- Amperite Regulators are designed to keep the current in a circuit **automatically regulated** at a definite value (for example, 0.5 amp).
- For currents of 60 ma. to 5 amps. Operates on A.C., D.C., or Pulsating Current.
- Hermetically sealed, light, compact, and most inexpensive.

Maximum Wattage Dissipation:
T6½L—5W. T9—10W.



T9 BULB



Amperite Regulators are the simplest, most effective method for obtaining automatic regulation of current or voltage. Hermetically sealed, they are not affected by changes in altitude, ambient temperature (-55° to $+90^{\circ}$ C), or humidity. Rugged; no moving parts; changed as easily as a radio tube.

Write for 4-page Technical Bulletin No. AB-51



AMPERITE CO. Inc., 561 Broadway, New York 12, N. Y.
In Canada: Atlas Radio Corp., Ltd., 560 King St., W., Toronto 2B

The Editor's Space



Included among the many hundreds of exhibits at the recent I.R.E. Show held in New York was one reported to show the fire-control system as fitted in the Canadian CF-100 jet fighters while another exhibit was reported to have shown a working model of a code converter developed in the United States for the Royal Canadian Navy. While both equipments presumably still remain tightly wrapped up in Canadian security

regulations the inconsistency of their being exhibited to the world at the New York show leads one to wonder how secure our Canadian security regulations are.

Was more than delighted to meet Sir Robert Watson-Watt known throughout the world of electronics as the "father" of radar. In a brief chat with Sir Robert at the New York I.R.E. Show I learned with interest of the world-wide activities of his company, Sir Robert Watson-Watt and Partners Limited, the Canadian subsidiary of which is Adalia Limited of Toronto. Sir Robert, who now resides on the outskirts of Toronto, is, without doubt, one of the world's leading electronic engineers and it is with pleasure that we express the hope of publishing an article by Sir Robert in an early issue of *Electronics and Communications*.

Management of the Canadian electronics industry need not be too surprised if they are approached in the near future for their views with respect to the establishment of a Canadian electronics show. There is little doubt that the Canadian electronics industry is now large enough and active enough to support such an undertaking and the results of such an enterprise could not help but be of mutual benefit to both the electronics industry itself and to the buyers of electronic end products in industry generally.

The second annual Canadian Room operated for the convenience of visiting Canadians to the I.R.E. Show and Convention held annually in New York wound up five days of bustling activity last March 25th. Committee member in charge of lost and found articles reports that Mr. X's pants were successfully retrieved from the Barclay Hotel and returned in good order and that Mr. Y's lower denture was quickly located by a check with the room clerk in the Lexington Hotel. There is, however, one outstanding mystery of the Canadian Room that has yet to be cleared up and that is: how Mr. Milt Stark of Stark Electronics can remove a man's shirt without first removing his suit coat.

There is little doubt that the Canadian electronics industry is now generally recognized as an industry unto itself and a self-contained segment of the Canadian economy. One wonders, therefore, when the Dominion Bureau of Statistics in Ottawa will regard it as such, at least to the extent of publishing its relative statistics in an individual folder devoted exclusively to the electronics industry. This treatment is afforded to the twine, swine, wine and macaroni industries. Surely the electronics industry is now large enough to merit similar recognition.

Mr. S. G. L. Horner, Superintendent of Radio Communications for the Hudson's Bay Company in Winnipeg reports that his company has spent three years developing what will be the first single side-band system of two-way radio telephone communications in Canada. The system is expected to be put into operation this summer.

(Turn to page 12)



cae* electronics serve

- Agriculture
- Aviation
- Mining
- Manufacturing
- Medicine
- Shipping

Equipment and Systems for:—

Multi-Channel
Microwave/Communication
Systems

Flight Simulators

Nuclear Instruments

Moisture Meters

Visual Omni-Direction Radio Range

Aviation Communication Systems

Marine Communication Systems

Radar Systems

Search and Rescue and Homing
Equipment

Automatic Flight Control Systems

Protection Systems

Hydraulic and Pneumatic Cylinder
Systems

Sintered Plate Batteries
(Nickel-Cadmium Type)



with FACILITIES FROM COAST-TO-COAST

The science of electronics is one of the major contributors to Canada's unprecedented economic expansion. Almost daily the electronics industry is discovering and developing more efficient and more economical means of performing many vital functions on land, at sea and in the air. Canadians everywhere are enjoying a higher standard of living and a more secure future through the practical application of electronics to every walk of life.

In skilled personnel, in modern precision equipment and in practical experience, CAE is qualified to undertake a wide variety of assignments in practically every phase of electronics.

CAE CONSUMER PRODUCTS

Dumont Television

Sonoramic

Radio-Phono Combinations

*cae specialists are readily available for consultation
on your electronic problems*

cae

*** CANADIAN AVIATION ELECTRONICS, LTD.**

MONTREAL • OTTAWA • TORONTO • WINNIPEG • VANCOUVER

THE LARGEST CANADIAN-OWNED ELECTRONICS COMPANY

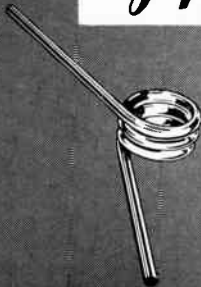
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COMPRESSION

Precision



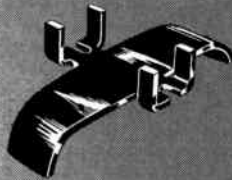
TORSION

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TENSION

Springs



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Send blueprint,
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sample for quotation

BOHNE INDUSTRIES LIMITED
1153 QUEEN STREET WEST, TORONTO 3

LONDON REPORT

A summary of developments in the
British Electronic industry.

The next British National Radio Show is to be held at Earls Court, London, from August 24 to September 3, 1955, with a preview for overseas and other special visitors on August 23.

All the leading manufacturers of radio and television receivers will exhibit, as well as many manufacturers of gramophone and sound reproduction equipment, components and valves. It is expected that there will again be special demonstrations of electronic equipment for industry and research, a training display and Services' exhibits of communications and navigational aids.

The B.B.C. will again show television programmes in production and as the exhibition will approximately co-incide with the beginning of commercial television in England, it is likely that there will be competitive TV productions within the Show for the first time.

By the time the Show is held, VHF (EM) sound broadcasting will be extending in Great Britain and this will be the subject of many exhibits and demonstrations.

Organizers of the Exhibition are the Radio Industry Council, 59, Russell Square, London, W.C.1.

The 12th British Radio Component Show, organized by the Radio & Electronic, Component Manufacturers' Federation (22, Surrey Street, London, W.C.2.), is to be held at Grosvenor House, London, from April 19 to 21, 1955. There will be 142 exhibitors. Exports of British radio and electronic components increased in value in 1954 by about 30 per cent as compared with the previous year and buyers are expected again from some 30 countries.

* * * *

A. C. Cossor, Ltd., one of the pioneer firms in radar, which made much of the R.A.F. war-time equipment, has exhibited a Secondary Surveillance Radar System which provides an Air Traffic Controller with a positive method of identifying all aircraft fitted with "Transponder" equipment within line of sight at distances up to 150 nautical miles and at altitudes up to 50,000 feet.

The controller has only to request the pilot to adjust the "Transponder" to radiate a certain number of pulses when triggered by the airfield's radar in order definitely to identify the aircraft whose position, of course, is visible on the display.

The airborne Transponder equipment is designed to have minimum side lobe response so that it is not affected by other radar transmissions.

* * * *

Permanent echo clutter is removed by a moving target circuit incorporated in the Cossor ACR MK 6 Primary Aircraft Control Radar, as installed at London Airport and at airports in Holland and Switzerland. When used in conjunction with a precision approach radar the ACR MK 6 provides all facilities for a ground control approach system.

* * * *

One of the most interesting airborne communication instruments is the Marconi AD 307 130 watt multi-channel transmitter/receiver. Basically this provides 200 crystal controlled channels, but by substituting an alternative drive circuit 4,000 channels are provided in the 2 — 24 Mc/s frequency range.

Remote control facilities are available from one or two positions in the aircraft. This control is entirely automatic and tunes all circuits including the aerial tuning unit.

* * * *

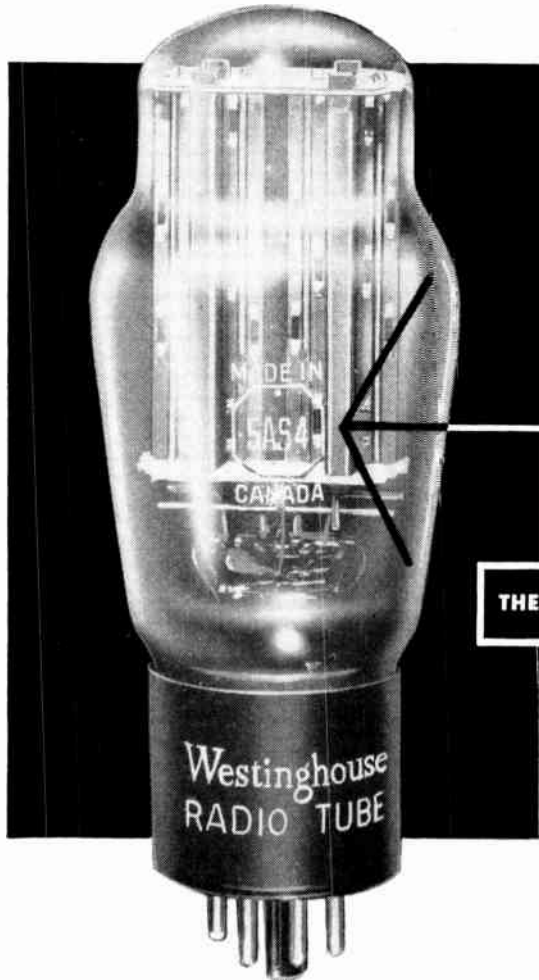
Amalgamated Wireless (Australasia), in conjunction with the Marconi Wireless Telegraph Company have displayed an "Airmite" three-channel miniature VHF transmitter/receiver. This weighs less than 10 lbs. and provides intercom facilities. At an altitude of 5,000 feet the approximate range of communication is 50 miles.

(Turn to page 83)

For further data on advertised products use page 54.

ENGINEERED IN CANADA BY WESTINGHOUSE

TO MEET HIGHER DC POWER REQUIREMENTS



THE NEW WESTINGHOUSE 5AS4 FULL-WAVE VACUUM RECTIFIER

- OPERATES AT HIGHER PEAK AND AVERAGE CURRENTS
- REPLACES THE 5U4G, 5AW4, 5U4GA AND 5U4GB

Modern, large-screen TV receivers require high DC power output. To meet this need, Canadian Westinghouse has designed the 5AS4 . . . completely engineered in Canada for the Canadian Television Industry. The Westinghouse 5AS4 has new plate, cathode and mount designs. The large mount structure, enclosed in an ST-16 envelope provides for more uniform heat distribution and permits operation of the tube at higher peak and average currents than the prototype 5U4G.

The 5AS4 is designed as a mechanical and electrical replacement for the 5U4G and for

similar types such as the 5AW4, 5U4GA and 5U4GB. The Westinghouse 5AS4 has a maximum peak inverse plate voltage rating of 1550 volts and a peak plate current of 1.0 amperes/plate. Typical operation of this rectifier calls for capacitor input to filter. Under these conditions, with an AC plate-to-plate supply voltage of 600 volts rms, the 5AS4 can deliver a DC output voltage of approximately 290 volts to the filter at a DC current of 300 milliamperes.

For further information on the 5AS4, or on any tube problem, write the Tube Marketing Section, Canadian Westinghouse Company Ltd., Hamilton, Ont.

FOR EVERYTHING IN ELECTRONICS

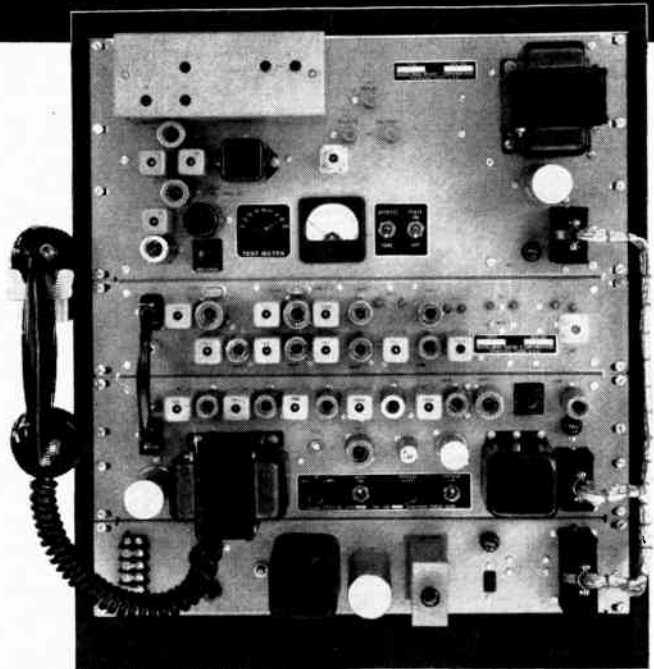
YOU CAN BE SURE...IF IT'S **Westinghouse**



Announces

**EXCLUSIVE
REPRESENTATION in CANADA
OF
BUDELMAN RADIO CORPORATION
STAMFORD CONN.**

- one to five-channel telephone carrier equipment for subscriber or trunk use — manual or dial (E & M) signalling.
- point-to-point radio links, one to eleven channels — 450, 960, and 2000 mc/s.
- high quality 450 mc/s studio transmitter broadcast links.
- specialized public address systems up to 250 watts for industrial applications.
- VHF paging transmitters and pocket receivers.
- power line carrier systems.
- high power transmitters, HF and VHF.
- frequency deviation meters.



Type 14BN 960 mc/s single-channel point-to-point radio terminal showing transmitter, receiver and control panel. Wide-band version 14BW provides up to ten multiplexed channels in addition to the normal service channel, using Budelman carrier units. Available for any frequency 450 to 2300 mc/s.

Representation of Budelman is another step calculated to provide our Canadian customers with a complete communications engineering service from one of the world's leading organizations in the electronics field.

We welcome enquiries regarding your communication problems.



SERVICE FROM COAST TO COAST

193 E. Hastings St.
VANCOUVER

1191 University St.
MONTREAL

83 Birmingham St.
HALIFAX

For further data on advertised products use page 54.

business briefs & trends



★ The value of contracts awarded to the Canadian electronics industry by the Department of Defense Production in January last, amounted to \$738,247.00. The total includes only contracts in excess of \$10,000 and does not include orders for classified equipment.

* * *

★ The development of the flat type transparent television picture tube has been brought a step closer to realization by William Ross Aiken, Director of Research of The West Coast Electronics Laboratories. A television picture tube of this type developed by Mr. Aiken was demonstrated by the United States Navy. The picture tube is approximately the same size as a city telephone directory and about three inches thick.

* * *

★ The specialized language and phraseology of the microwave and communications engineer has now been collected together and published in book form. The work, which has been compiled for the benefit of those engaged in the communications industry, contains something in the order of 39 pages of definitions as well as a list of abbreviations of the most widely used technical terms used by the communications engineer.

* * *

★ Automation for the small office is on the way in the form of a new I.B.M. accounting machine which requires only one operator to manage an electric typewriter, three "slave" typewriters, a machine that produces punch cards or tapes, an electronic punch card analyser and a computer.

* * *

★ Pierre H. Boucheron, GE design engineer, speaking in Chicago before a joint meeting of the Society of Motion Picture and Television Engineers and the Institute of Radio Engineers, said that GE has developed an improved color broadcasting method which assures a sharp monochrome picture on a home black and white receiver when the program is telecast in color.

* * *

★ Television, on the pay-as-you-view basis, would appear to be only awaiting approval of the Federal Communications Commission in the United States before it becomes available to the public. This from the fact that Zenith Radio Corp., who have filed a petition with the F.C.C. to commence toll television immediately.

* * *

★ Two years ago transistors were out of the question for mass producers of consumer and industrial products. Now, by virtue of better manufacturing techniques which has increased the rate of production and lowered the cost, transistors are becoming more widely available to the electronics industry. So much so that salesmen can now talk business on large orders for transistors and specify delivery dates.

* * *

★ The significance of the transistor is well known to those engaged in the electronics industry. An occasional reminder however, serves to indicate just how far the transistor has gone to replace the old fashioned vacuum tube. A good example is the new I.B.M. computer that uses 2,200 transistors. In comparison, the new computer is equivalent in capacity to I.B.M.'s 604 calculator that is equipped with 1,250 tubes. In the new machine, the use of transistors has reduced the power consumption by 95 per cent.

★ Major General G. B. Howard, general manager of the Canadian Industrial Preparedness Association has stated "that the electrical manufacturing industry is one of Canada's principal industrial bulwarks against aggression".

* * *

★ Atomic development in the United States is off to a good start in the hands of private enterprise. Latest move in this direction is the award of a contract from the Battelle Institute of Columbus, Ohio, to the American Machine and Foundry Company of New York, for the design, engineering and construction of a nuclear reactor.

* * *

★ The first power line carrier, utilizing transistors, to be produced commercially has been announced by Motorola Inc., in the United States. In making the announcement, company officials stated that the new narrow band frequency shift apparatus uses transistors to achieve maximum reliability and unexcelled continuity of service with a minimum of maintenance.

* * *

★ Ricardo Muniz, manager of Canadian Westinghouse Company's Radio and Television Division says that color television will provide sufficient enjoyment and entertainment to create a public demand for color programs that will result in the black and white receiver becoming an oddity within fifteen years.

* * *

★ The Canadian Radio Television Manufacturers Association has forecast that Canadians will buy approximately 3000 color television receivers in 1955. The R.T.M.A. further forecasts that most of these sets will be purchased in the last quarter of 1955.

* * *

★ Engineers of the Canadian Westinghouse Company have completed an economic analysis of the production of color receivers which shows that until 4000 to 5000 sets can be scheduled for production in a Canadian plant economical manufacture will not be possible. The study shows that 100 sets will cost approximately twice as much each as a quantity of 5000 sets. With the present knowledge of the art of color TV production a scheduled program of 5000 sets may permit their retailing at between \$900 and \$1000. Production of only 100 sets would bring the color price to very nearly \$2000 to break even.

* * *

★ Described as one of the largest purchases of airborne radio communications equipment ever to have been made by an airline company is the order recently awarded to Collins Radio Company by the United Airlines Company for \$1,000,000 worth of VHF radio equipment. The new transmitter receiver equipment which will be installed in the company's aircraft next summer will increase the number of channels available to pilots from 50 to 360.

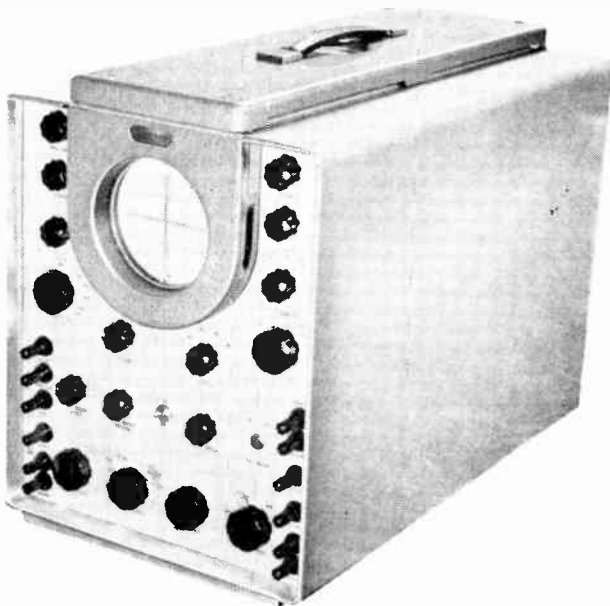
* * *

★ The "first permanent" industrial television installation "of its kind" in the railroad radio field has been introduced at Potomac Yard, in Alexandria, Va. In operation, television cameras take a picture of each freight car entering the yard at a speed of about 10 miles an hour from the south and flash it on a screen nearly two miles distant, where clerks record car numbers and initials for subsequent checking with waybills covering car contents and destination to determine the track to which each car is to be switched for placement in appropriate outbound trains.

COSSOR

Model 7514C

HIGH SPEED OSCILLOSCOPE



A complete waveform measurement instrument.

The Cossor Model 7514C oscilloscope is a versatile high gain wide band instrument for general laboratory and industrial applications. The Model 7514C brings to this price range the accurate quantitative measurement found heretofore only in more elaborate and expensive equipment. The Amplifier handles signals from 5 cycles to 10 Mc.

Time Base speed from .01 sec. to 0.1 microseconds per cm., plus expanded and delayed sweeps.

Built-in voltage and time marker generators giving 0.1 to 100 V square waves and a range of locked oscillations to 0.2 microseconds.

650 ohm 1/4 microsecond delay line available.

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Editor's Space (Cont'd)

A news report states that the United States Navy's largest aircraft carrier the *U.S.S. Forrestal*, recently christened at Newport News has been equipped with sixteen of the largest amplifiers ever built by the Stromberg Carlson Company. The report leads us to wonder how construction is progressing on the aircraft carrier that is being built for the Canadian Navy at Harland and Wolff's shipyard in Ireland and to what extent Canadian equipment is being used in fitting out this ship. There is a lot of thinking people who, notwithstanding their lack of knowledge concerning Canadian naval policy or planned strategy, may justifiably wonder what the Canadian Navy wants to be fooling around with an aircraft carrier for when it could better devote its time and money to maintaining and operating smaller craft and leave the operation of this type of warship to countries more strategically in need of them and financially more able to afford them. Since Canada is destined to have one however, it would be a comforting thought to know that one or two million dollars worth of the many millions of dollars worth of equipment that will be fitted in the ship will bear a "made in Canada" tag. We doubt that it will however!

* * *

Television manufacturers spend millions of dollars to advertise their products and win the goodwill of the public. There is little doubt that when the products of these firms leave the factories they represent the best that modern engineering and science can produce. It is disturbing therefore, to the point of alarm, to suspect that some retailer has resorted to the unscrupulous practice of tampering with the products of reputable manufacturers by removing components from new sets and replacing them with reconditioned used parts.

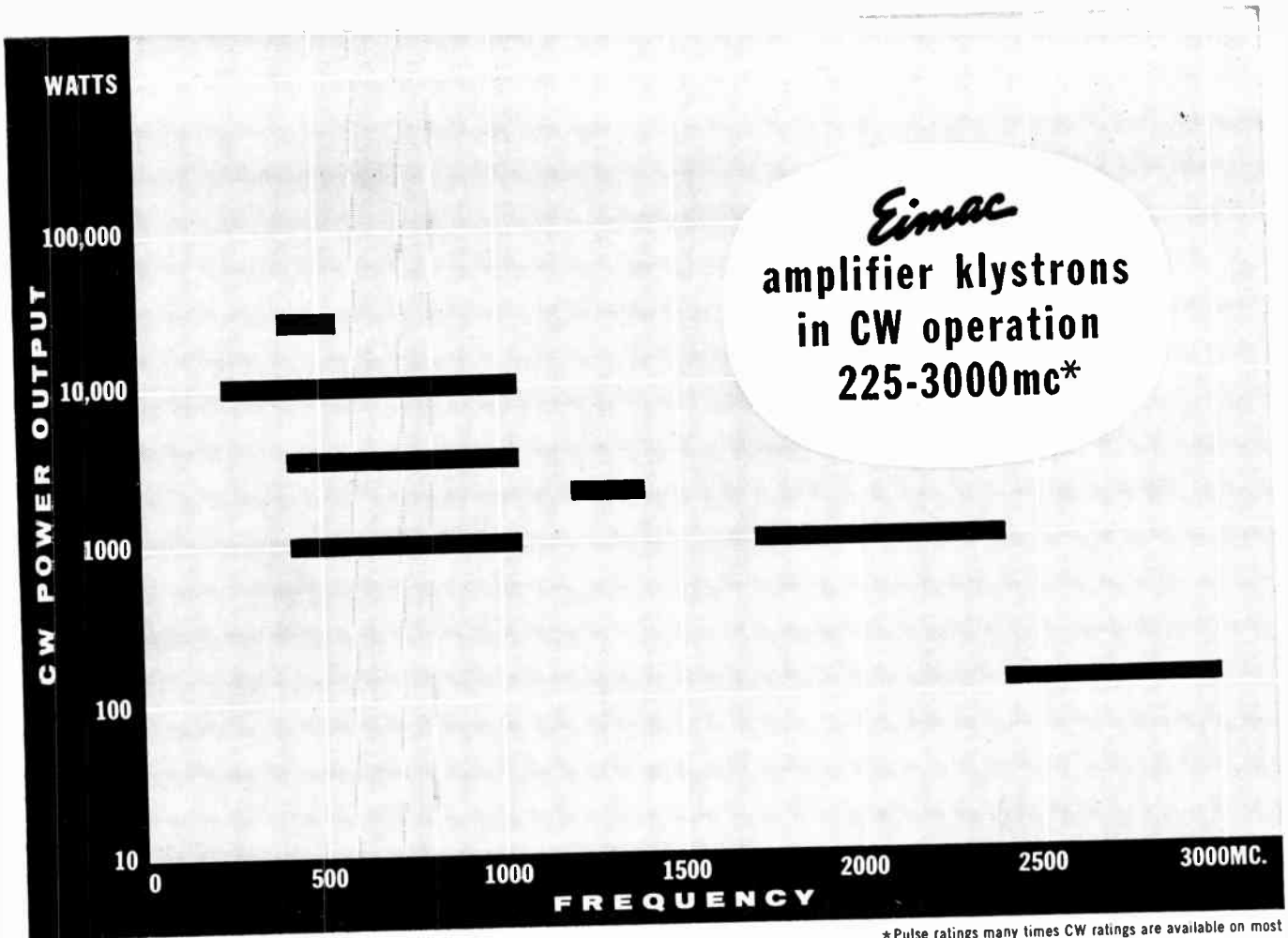
Stooping to this degree of dishonesty for the sake of realizing a few more dollars on the profit side of the ledger is a practice to which one would hardly give credence. When circumstances leaves one no other alternative than to believe that the removal of an entire chassis assembly and its replacement with a second-hand unit has been effected in a television set sold under the guise of a new set, then it is considered time that the condition should be investigated by those concerned.

Because of such possible dishonesty the practice could place a stigma on the whole retail trade and a doubt in the minds of the buying public that may encompass the entire television retail business. The consequences of such a practice also extends to the manufacturer whose reputation for product quality is seriously jeopardized.

Such a practice, however small it may be, is capable of costly loss to both the manufacturer and the purchaser. The act is a fraudulent one and therefore criminal. In the interests of their own reputations manufacturers should exert every effort to seek out any wrong-doers and disfranchise them. By so doing they would be protecting their large dollar investment in developing a public reliability upon their name products. By the same measure manufacturers would further impress upon the public their concern and determination to provide the public with quality merchandise and honest business practice.

* * *

Thanks to Mr. J. R. Longstaffe for his recognition at a recent reception that members of the press also have human frailties and sometimes get thirsty while waiting to take the pictures of guest speakers et al.



*Pulse ratings many times CW ratings are available on most Eimac klystrons.

Eimac amplifier klystrons are performance proved in extended range UHF and microwave communications systems

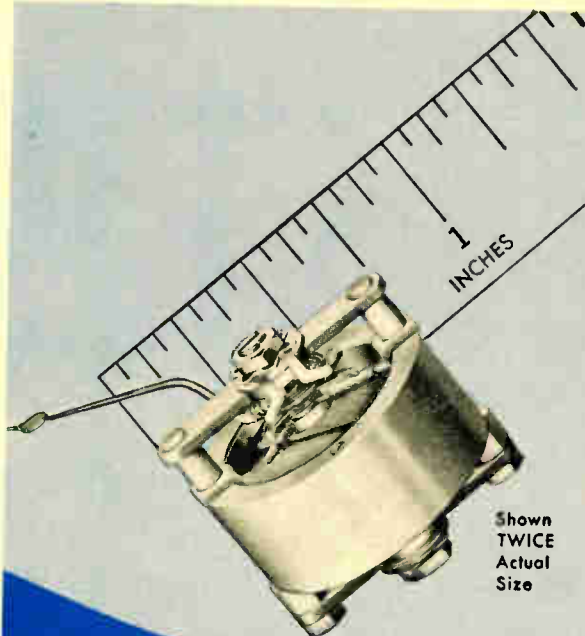
Eimac amplifier klystrons, performance proved in high power extended range microwave communications systems, now cover the spectrum from 225-3000mc. The Eimac 3K50,000L series, with 10kw/CW power output, power gains of over 1000 times, over 40% operational efficiency, long life and reliability, are typical of Eimac high power UHF klystrons. Of copper and ceramic construction, Eimac klystrons offer wide range tuning and easy

input and output coupling through the use of external resonant cavities which leave the vacuum system free of RF circuitry. Light weight, allowing easy installation and maintenance, plus simplified design, minimizing production and stockpiling problems, make Eimac klystrons more practical and economical than any other.

See the klystrons selected to pioneer high power extended range microwave communications systems by visiting the Eimac booths, 549-551, at the I.R.E. show in New York March 21-24. Management and Engineering representatives will be on hand to discuss Eimac tubes and their application.



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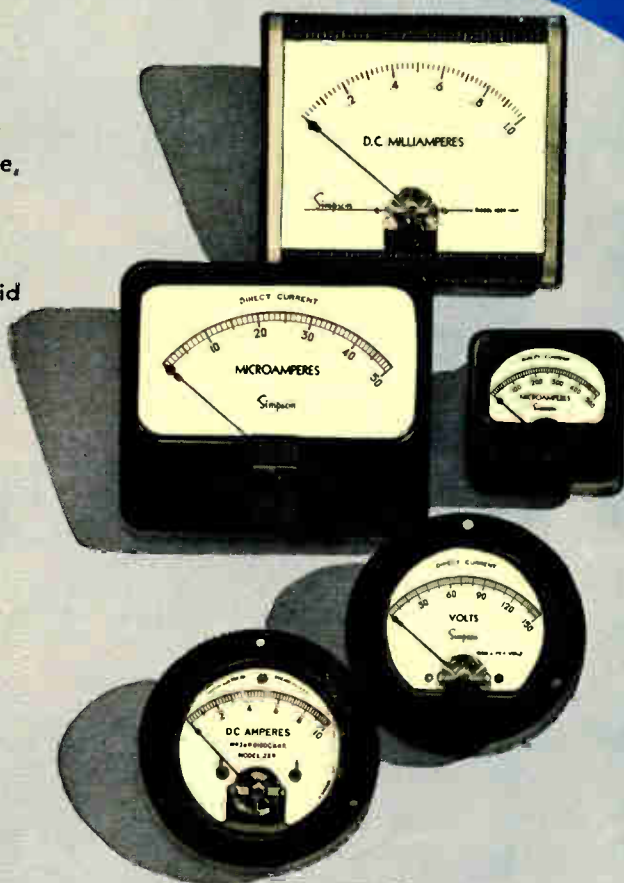
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Rugged... yet built like a fine watch!

Here's the new Simpson *Magnetic Core Meter Movement*. It's a more compact, more sensitive, *self-shielding* movement that gives electrical measurements with laboratory accuracy, yet has the ruggedness to withstand severe shocks. Its accuracy specifications are so rigid that Simpson engineers had to devise unusual production techniques. Let Simpson engineers design panel meters using the new core movement to your special instrument requirements. Simpson continues to lead with its large selection of standard panel meters in over 700 sizes and ranges, available through distributors.

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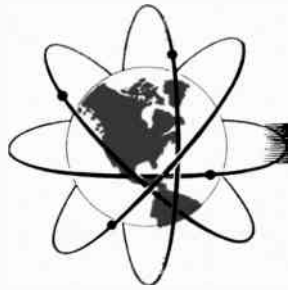
LONDON, CANADA

"Simpson Electric Company, 5200 W. Kinzie St., Chicago 44, Ill."

For further data on advertised products use page 54.

World Radio History

MARCH · APRIL, 1955



ELECTRONICS *and* COMMUNICATIONS

Vol. 3

No. 2

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60
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About This Issue

The Canadian electronics industry in the short space of about 35 years has grown from a side-line activity of the electrical industry into a self contained industry producing and maintaining over a half a billion dollars worth of goods and services annually. The Canadian electronics industry has, as yet, only scratched the surface, and its future is limitless. The brief history of the industry as told by Basil Jackson which appears on page 24 of this issue is considered of timely interest to those engaged in the industry.

* * *

The article entitled Electronic Safety Controls For Bulk Fuel Loading which appears on page 26 of this issue will be of interest to the oil and fuel industries. It outlines an electronic method which we describe as "foolproof" for the elimination of static from loading operations. It is an apparatus which, in our opinion, management in the fuel business will regard as an investment in safety.

* * *

Indicative of the value of closed circuit television to the medical profession was the recent demonstration of the Salk vaccine which was viewed in Canada by more than 1000 doctors from a live telecast originating at Michigan University. A description of the use of television in the demonstration of operating techniques is given in the article entitled Closed Circuit Television Aids Medical Training, the article appears on page 28 of this issue.

* * *

Transistors — Why And When? an article by Dr. Leslie Hill, Ph.D. on page 30 of this issue may well be looked upon by some readers as a pessimistic outlook for the future of transistors. The article is based on information gathered by Dr. Hill while on a recent tour of England and Europe and it should be noted that the article deals with transistors from an international point of view and emphasizes the more cautious approach to, and appraisal of transistors, by the British and European electronics industries the management of which is perhaps more hesitant to enthuse than is the case with their American counterparts.

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- Constant output over wide frequency range.
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The DAWE Wide Range Oscillators, Series 400, employ a frequency selective, resistance-capacitance network with positive feedback applied to provide regeneration. Negative feedback is used to stabilize the output amplitude over the wide frequency range.

As a result, the resistance-tuned oscillator is fundamentally much more stable and produces less distortion than the common types of variable frequency audio oscillators on the market to-day.

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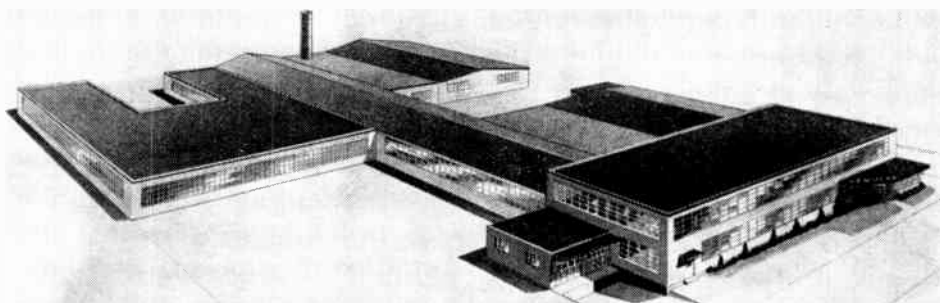
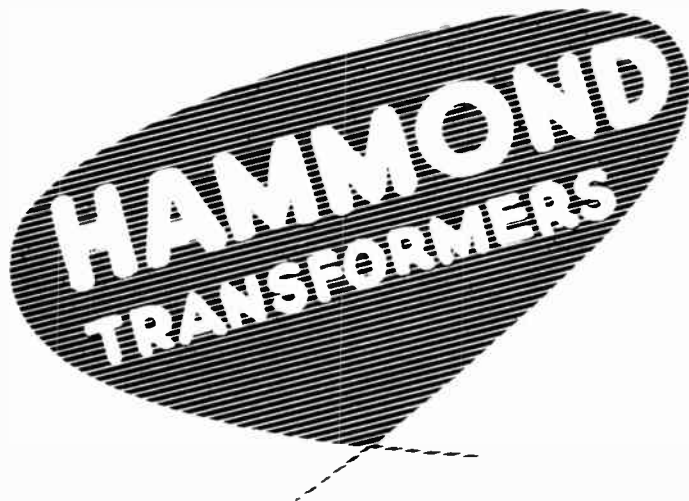
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(single and 3 phase)

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That is why more and more industrial concerns depend upon Hammond for Transformers.

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THE ONE INSTRUMENT YOU NEED



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Color

JACKSON COLOR BAR / DOT GENERATOR

Signal Outputs

1. Composite video of either polarity, adjustable amplitude to 2 volts across 90 ohms.
2. Modulated R.F., channels 3 through 5, 0.1 volt across 300 ohms.
3. Horizontal sync., positive polarity, 1 volt across 200 ohms.
4. Color subcarrier, 4 volts across 200 ohms at burst phase.

Synchronizing Signals

1. Horizontal sync. and blanking (F.C.C. standards).
2. Vertical sync., serrated and locked to horizontal.
3. Vertical blanking.
4. Color burst (N.T.S.C. standards).

Video Signals

1. Dots (nominal 108 dots)
2. Crosshatch (nominal 12 by 9)
3. Color bars (5 switch positions)

Position 1—Multi.

8 Bars in the following sequence:

1. White, relative luminance 1.0, chrominance zero
2. Yellow, relative luminance 0.89, chrominance 0.44
3. Cyan, relative luminance 0.70, chrominance 0.63
4. Green, relative luminance 0.59, chrominance 0.59
5. Magenta, relative luminance 0.41, chrominance 0.59
6. Red, relative luminance 0.30, chrominance 0.63
7. Blue, relative luminance 0.11, chrominance 0.44

8. Black, relative luminance zero, chrominance zero

Luminance and chrominance held to 10 percent, phase angles to ± 5 degrees

Position 2—Color Difference.

7 Bars of zero luminance in the following sequence:

1. Black, relative chrominance zero.
2. I, relative chrominance 0.25
3. Q, relative chrominance 0.25
4. Black, relative chrominance zero
5. R-Y, relative chrominance 0.25
6. B-Y, relative chrominance 0.25
7. Black, relative chrominance zero

Phase angles held to ± 2 degrees.

Positions 3, 4 and 5—Single bars, luminance 0.3, chrominance 0.5, occupying approximately 60% of screen width.

1. Red (position 3)
2. Green (position 4)
3. Blue (position 5)

Sound Carrier, approximately 25% of peak picture carrier, placed 4.5 megacycles from picture carrier.

Panel Controls

1. R.F. carrier tuning, channels 3 through 5.
2. Video output amplitude.
3. Horizontal lock.
4. Standby switch (sound on, sound off).
5. Video output polarity switch.
6. Power switch.
7. Function switch (crosshatch — dots — color bars)
8. Color bar switch (Multi, Color Diff., Red, Green, Blue).

Internal Adjustments

1. Burst amplitude.
2. 3.58 frequency vernier.
3. Sync. lock controls.

Tube Complement

| | |
|-----------|-----------|
| 12AT7 — 8 | 6J6 — 10 |
| 12AX7 — 4 | 5U4-G — 1 |
| 6AL5 — 1 | 6BJ7 — 1 |

Circuit Operation

1. Color sub-carrier and sound frequencies are determined by crystal oscillators.
2. Color phase angles are determined by an accurate, low impedance delay line.
3. Direct gating of proper chrominance phase is employed for each color bar to attain maximum stability and reliability rather than usual methods utilizing quadrature encoders.
4. Serrated vertical sync. is maintained an integral divisor of horizontal rate.
5. Luminance and chrominance levels are reliable and stable. No multivibrators are employed in generating color bars.
6. No internal or external adjustments are necessary for proper bar widths, luminance or chrominance levels. For use on 105-125 volts 60 cycle AC.

Physical Characteristics

Dimensions—16½" wide x 9½" high x 10¼" deep. Designed to match other Jackson TV Equipment, both in styling and exterior dimensions.

Weights—27 net pounds. Shipping 32 pounds.

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"Service Engineered" Test Equipment

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Electronic Tube & Components Division

CANADIAN **Marconi** COMPANY

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For further data on advertised products use page 54.

World Radio History

IN

Complete Telemeter PACKAGE

BY

BENDIX - PACIFIC

These compact, rugged FM/FM telemetering packages are available for many types of applications. Numerous models of plug-in subcarrier oscillators and associated components are available as standard equipment to provide for maximum versatility and efficiency.

CUBICAL CONFIGURATION



Vertical Components

RECTANGULAR CONFIGURATION

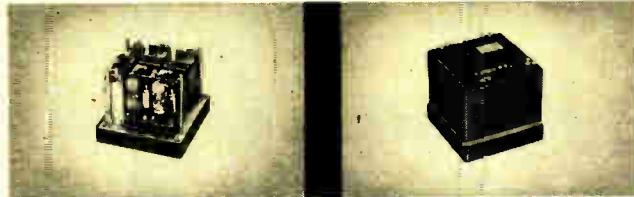


Horizontal Components

CYLINDRICAL CONFIGURATION

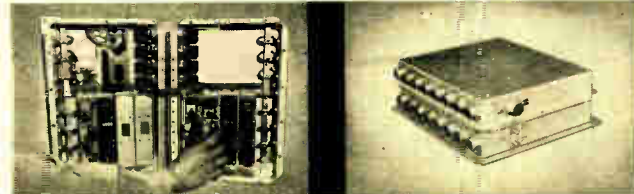


Wedge Shaped Components



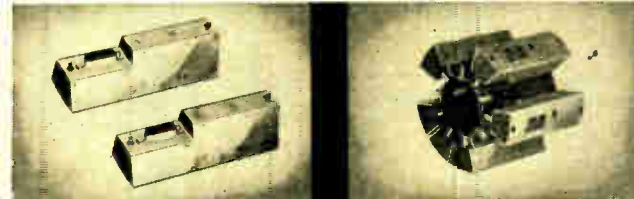
Compact Four Band Telemeter, Models TATP-3 and TATP-4

These packages, each incorporating four plug-in subcarrier oscillators, when used with a power supply and RF transmitter, form a compact, rugged system for telemetering various functions. Each package contains its own voltage regulator and calibration relays. The packages may be combined to form an 8 or 12 band system. Each package measures approximately 4.5" in each dimension and weighs approximately 3 pounds including oscillators. Standard power supplies are available for operating up to 3 packages and a 2 watt RF transmitter. The model TATP-3 operates in any 4 of the RDB bands below 22 kc; the TATP-4 in any 4 of the bands from 22 kc up.



Universal Eight Band Telemeter, Model TATP-2

Operates on any eight RDB bands from 1.7 to 70 kc permitting any combination of 8 resistance, voltage or inductance type measurements to be made by merely plugging in the proper subcarrier oscillators. The unit has provisions for mounting a model TXV-13 crystal controlled transmitter. Connectors are provided for a minimum of eight remotely located pickups. Standard power supplies are available for operation from 6, 12, 28 VDC or 115 VAC 400 cps power sources. Dimensions—14"x12.4"x4.75".



Cylindrical Telemeter Configuration, Model TJW-1

These packages are built up of individual 30° wedge shaped components which plug into a cylindrical mounting assembly, Model TJW-1. As many as 10 subcarrier oscillators or other components can be installed into a 6.5" circular opening, 5.5" long. A center opening, approximately 1.5" in diameter, can be utilized for cables and pressure lines. A two-watt crystal controlled RF transmitter is also available for mounting in this configuration.

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OVERHAUL OF AIRCRAFT INSTRUMENTS AND ACCESSORIES

ELECTRONICS & COMMUNICATIONS, MARCH-APRIL, 1955

For further data on advertised products use page 54.



639b FEATURES

Dynamic moving coil type pressure element and an improved ribbon type velocity element • Six patterns • Discrimination between front and back averages 20 db. • Impedance 35 ohms • Output level:—56dbm, 10 dynes/sq.cm.

**670****FEATURES**

Ribbon-type element coupled to an acoustical network • Three basic patterns • Discrimination between front and back averages 18db • Impedance 30/50 or 150/250 ohms • Output level—58 dbm 10 dynes/sq.cm. • Case of rugged high impact plastic.

**671a FEATURES**

Improved low inertia velocity element • Two stage wind filter • Essentially uniform frequency response from 30 to 16,000 cycles at 5 ft. • Impedance 30 50 or 150 250 ohms • Output level—56.5 dbm, 10 dynes/sq.cm. • Case of rugged high impact plastic.



Thinking of buying MICROPHONES?

Do you want a cardioid microphone which will give unexcelled performance in a studio, theatre or auditorium and handle the most difficult jobs? We suggest the type 639B with its six patterns and a greater sensitivity than most microphones of its class.

Do you want a cardioid microphone which will give outstanding performance in control room, studio, theatre or auditorium work? We suggest the 670 for its ability to efficiently exclude unwanted noise while providing a wide angle of program pick up.

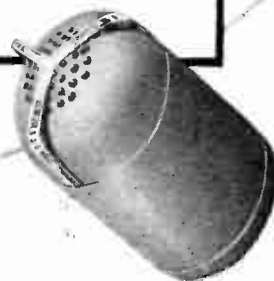
Do you want a velocity microphone which has high signal to noise ratio and extremely low hum pick up? The 671A will prove especially valuable in many difficult situations.

Do you want an all round, efficient, and rugged microphone for nearly every type of broadcasting requirement from remotes to auditoriums? We suggest the 633 dynamic microphone.

Sounds easy to pick the right one—sure it is; and for further details, if you require them, please contact your local Northern Electric Branch Office.

633 FEATURES

Highly efficient pressure unit • Rugged • Dependable • Low price • Output level—59 dbm, 10 dynes/sq.cm. • Non-directional or semi-directional.



Northern Electric

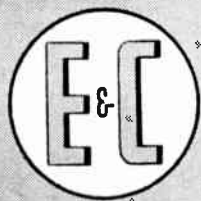
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| TRAIL | PENTICTON | VERNON | PRINCE GEORGE | NEW WESTMINSTER | VANCOUVER | VICTORIA | | NANAIMO |

For further data on advertised products use page 54.

World Radio History



EDITORIAL

What Automation Means To Labor

J. A. Calder, Montreal president of the Canadian Manufacturers' Association in a recent address to the British Columbia branch of the Canadian Manufacturers' Association advocated the increased use of automation in Canadian industry as a means of meeting the threat of low-wage foreign competition.

There is little reason to doubt Mr. Calder's contention that there is a great need for inventions in Canadian industry today and technological improvement or modernization of industry, if it is to incorporate the latest advances of science, must of necessity include automation.

Automation of industry is regarded with no few misgivings by some sections of industry. To labor the word implies a reduction of the labor force but a careful

examination of the application of automation to industry indicates that its use would result more in an adjustment of the labor force rather than a reduction.

In his discussion of the subject Mr. Calder discounted the theory that an increased use of automatic machines would create more unemployment. In Mr. Calder's opinion, and we are inclined to agree with it . . . "All that automation can mean is that the nature of employment will change. A broad upgrading of labor will occur. The unskilled will be made into highly trained maintenance men and skilled tradesmen into technicians. Production will be raised immeasurably with a consequent rise in our standard of living. Production costs will be lowered and give increased benefits in goods, prices, real wages and hours of work".

A Significant Decision - - -

Recent legislation of the United States Congress in making available to industry permission to develop atomic energy for peaceful purposes may well be looked back on in future years as one of the most significant decisions of the atomic age. Prior to the recent legislation of Congress, the development of atomic energy was the jealously guarded prerogative of the government. The policy of the United States government in having retained the secrets of atomic knowledge for the past ten years may have been amply justified from a standpoint of security but it has retarded to a considerable extent the broadening of its applications for industrial use and its development for the good of society generally.

For the past ten years government atomic scientists have been increasing their knowledge of nuclear physics but because of the pure scientists lack of engineering know-how they have only been able to assume how it may be applied to perform useful work. On the other hand, industry, with its vast knowledge of operating techniques and ability of its engineers to design equipment of a highly specialized nature has been forbidden the use of the information with which it could have acquainted itself with the nature of atomic energy. It has thus been prevented from devising ways and means of employing the vast power of the atom for the good of mankind. This period of stalemate has now passed, and with the handing over of atomic knowledge to industry it can reasonably be assumed that the next few years will see startling advances in the application of atomic power that will affect our everyday living.

In Canada, Atomic Energy of Canada Limited, the Crown company to which has been entrusted the de-

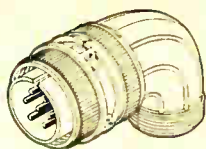
velopment of atomic power is also working in cooperation with industry through its Commercial Products Division. It is doubtful, however, whether the Canadian method of developing the use of atomic applications for peaceful uses through the liaison and consultation services of the Commercial Products Division of Atomic Energy of Canada Limited will be as effective or productive in advancing the peaceful use of atomic energy as the system which is now in operation in the United States. Under the new Congressional ruling, industry — subject to regulation — is now free to carry the atomic ball all the way, even to the point of owning and operating nuclear reactors which, if desired, it may even build, sell and export.

Apart from the marketing of radio isotopes for use in medicine, agriculture and industry, the Commercial Products Division of Atomic Energy of Canada Limited maintains a consulting and operating service which includes experimental or research work on a contract basis with particular reference to design and the use of special equipment and industrial processes involving the use of radioactive material. This service apparently limits the extent to which Canadian industry may participate in the development of atomic power for peaceful uses.

In view of the trust that the Atomic Energy Commission of the United States has now placed in the ability of free enterprise to advance the cause of society by furthering the use of atomic energy through research and development in its own laboratories it may well be that Canadian authorities should consider revising their thinking along the same lines and hand Canadian enterprise the same unfettered privileges to advance the state of atomic energy applications on similar terms.

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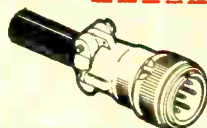
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Electronics, Instruments

AN

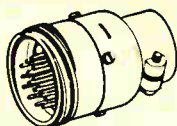
AN Series . . . conforming to Specification MIL-C-5015B. 15 diameters and 260 insert layouts. 6 shell styles, AN3100 to AN3108.



For Aircraft
Vibration Resisting—Moisture Proof

AN-E

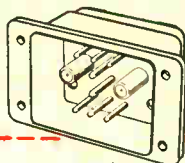
AN-E Series . . . environment resisting. Meets Specification MIL-C-5015B. Completely sealed from cable to cable. Integral cable clamp. New grounding lugs. Improved sealing grommet and new grommet follower. Resilient inserts.



For General Circuitry in
More Rugged Applications

K, RK

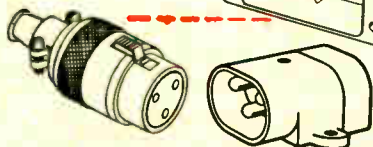
K, RK Series . . . *Special Acme thread*. Rugged. 8 basic shell shapes, 8 diameters, and 204 catalogued insert layouts. The all-purpose line.



For Rack-and-Panel
Applications

DP

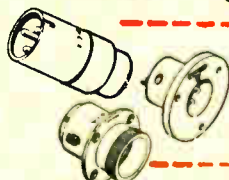
DP, DPB, DPD, DPD2, DPD2R, DPR, DPA (miniature), and DPM Series . . . rectangular in shape with many insert layouts in DPB and DPD.



For Audio

P, O

P and O Series, the original microphone series . . . 22 shell styles and 7 insert layouts.



For Low Level Circuits

X, XK, XL

X, XK and XL Series . . . 23 basic shell styles and 8 insert layouts for cord-end or wall mounting.



For Portable Radio and
Other Audio Circuitry

D, U

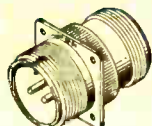
Sub-Miniature Connectors . . . The D and U Series for cord-end, rack-and-panel, or wall-mounted applications. The D Series has 3 basic shapes, up to 50 contacts. The hermetically-sealed U Series, cylindrical with 4 basic shell sizes, accommodates up to 12 contacts in 12 insert layouts. DH Types used for hermetically-sealed miniature components.



For High Pressure
Applications

GS

Hermetically-Sealed Connectors . . . with steel shells and contacts to withstand high pressures. Available in the GS, KH, DH, and U Series. Insulation is a vitreous material, fused under high temperature to shell and contacts, thus forming a true hermetic seal.



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STEEL SHELL FIREWALL

AN-K and Cannon K Firewall or High Temperature Connectors . . . offer you the greatest variety of this type of connector. Cannon made the first firewall connector and is still the leader in the field. Wall- or box-mounting receptacle. Straight or angle 90° plugs. Crimp-on contacts . . . no solder to melt. Inserts of asbestos-filled or glass-filled material.

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Guide

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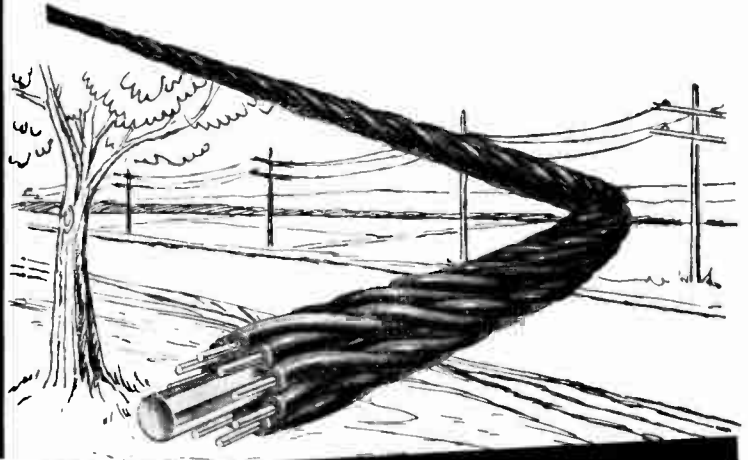
CANNON ELECTRIC

For further data on advertised products use page 54.

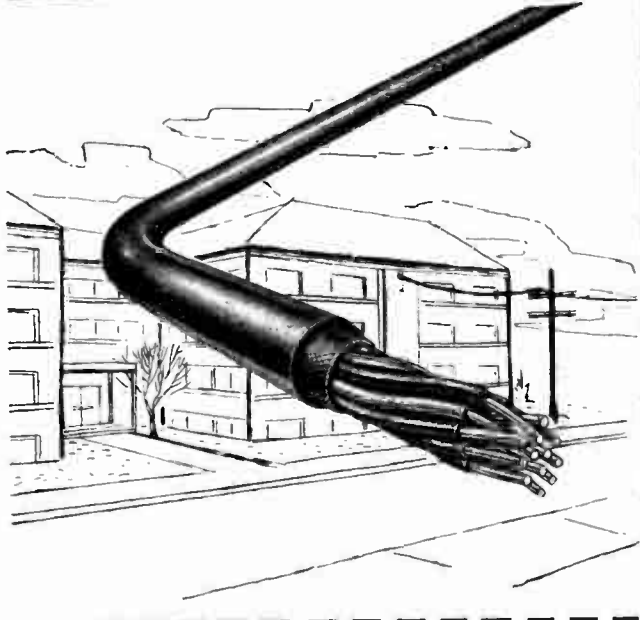
TWO NEW Phillips TELEPHONE CABLES

● **PHILLIPS RURAL DISTRIBUTION CABLE**

Rubber neoprene No. 20 gauge copper conductors cabled around a steel core. This cable has good transmission characteristics and is available in 5 pair. One conductor of each pair is identified by a raised ridge on the insulation. Light weight and ease of handling contribute to low installation cost. The high strength steel core allows this cable to be used for spans up to 200 feet. Used to extend or increase existing open wire facilities on the same pole line.



to help you reduce both installation and maintenance costs



● **PHILLIPS DROP WIRE CABLES**

Used as a self-supporting Drop Cable to an apartment or group of dwellings. Available in No. 19 gauge copper in pair sizes of 5, 10, 15 and 25.

● **PHILLIPS RINJ DROP CABLE**

Rubber insulated conductors paired and cabled with an overall Neoprene Jacket.

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Polyethylene Conductor Insulation with high molecular weight polyethylene sheath possessing superior weathering properties, withstanding sunlight and extremes of temperature.

Phillips Telephone Wires and Cables are also distributed in Canada by Automatic Electric Sales (Canada) Ltd.

Phillips Electrical Company (1953) Limited,
26 Hollinger Road, Toronto 16.

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ELECTRICAL COMPANY (1953) LIMITED

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THE CANADIAN AFFILIATE OF THE B.I.C.C. GROUP
26 Hollinger Road, Toronto 16
MONTREAL • OTTAWA • BROCKVILLE • HAMILTON • WINNIPEG
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The Growth Of The Canadian Electronics Industry . . .

From Crystal Sets To Klystrons

By BASIL JACKSON

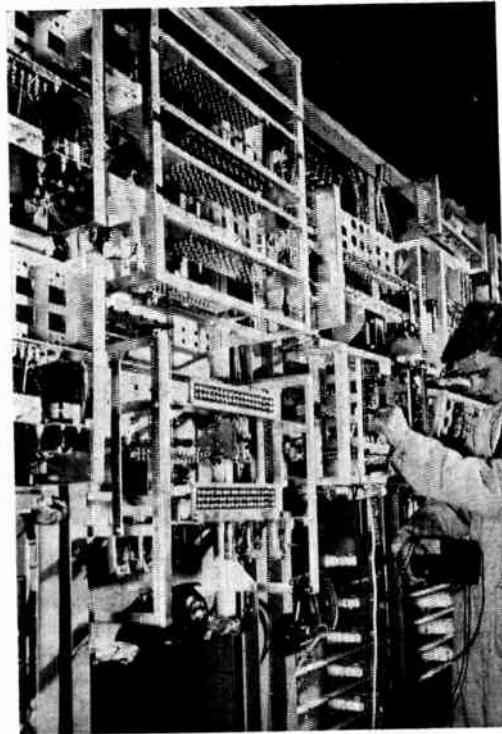
Radio Television Manufacturers Association of Canada

The Canadian electronics industry is nearly 35 years old. Perhaps it can be stated that it was born on the night of November 4th, 1920, when the first radio station to broadcast regularly in Canada, the Canadian Marconi station KWA (later called CFCF) in Montreal, began transmitting. Before this time some wireless receiving equipment had been made in Canada for war-time use and for the growing band of enthusiasts who built their own apparatus. However, it was not until broadcasting became a regularly nightly entertainment that the manufacture and sale of radio equipment developed into the nucleus of a new Canadian industry.

The Canadian electronics industry is now well established and the following account of its present position in the Canadian economy is considered timely.

During the relatively brief space of 35 years the Canadian electronics industry has grown from a few thousand dollars a year sideline of the existing electrical power line equipment companies to an industry having a separate identity and now annually producing and maintaining over half a billion dollars worth of electrical goods and services.

The new industry quickly expanded its production to meet the public demand for crystal sets, one-tube radios, and accessories such as earphones, aerials, and insulators, while the invention of the loudspeaker, screen grid tubes, power-supply operated receivers, superheterodyne and super-regenerative circuits, further developed the industry until, in 1929, a group of radio



● The above photograph shows a Marconi technician testing microwave radio relay equipment in one of Canada's large electronic plants.

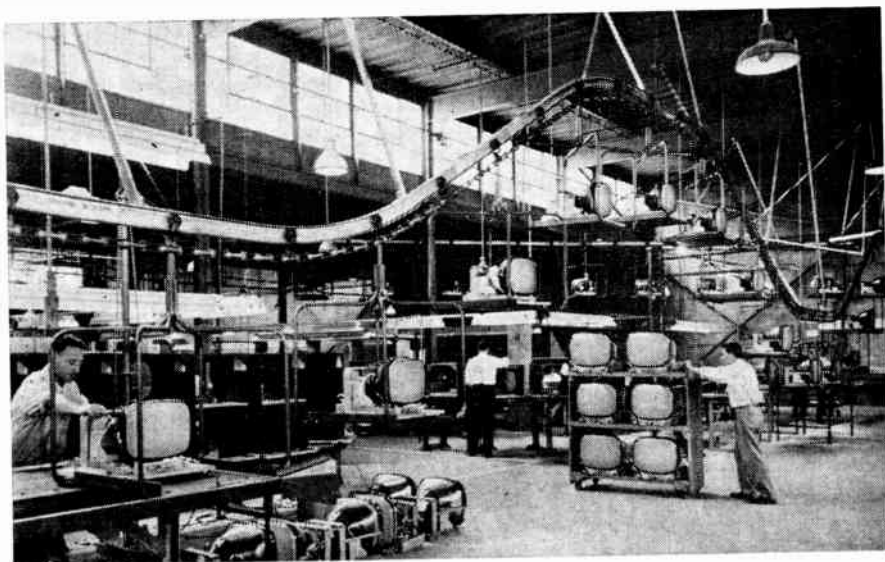
manufacturers formed the Radio Manufacturers Association, a non-profit trade organization to foster cooperation and goodwill for the benefit of the industry. The original RTMA ("T" for television being added at a later date) had only eleven members. Today this trade association has over one hundred member companies including over seventy in the Parts and Accessory Division, over twenty in the Receiver Division, and the remainder in the Technical Products Division.

During World War II the electronics industry produced a wide diversity of equipment for all branches of the services and for the armed forces of allied nations. Radar, which played such an important part in the control of RCAF fighter interception, formed a large proportion of this material, as also did submarine detection apparatus, receiver-transmitter sound communication equipment, and many other types of electronic devices and apparatus.

The Impact of Television

There is no doubt that developments resulting from the invention of the cathode ray tube have helped to stimulate the Canadian electronics industry. Since the first small-screen television receivers were demonstrated at the Canadian National Exhibition in 1948, over 1,250,000 units have been manufactured in Canada. And, at the pre-

● Some indication of the size of the television manufacturing business and the modern methods of material handling which are used to speed production can be had from the photograph of the conveyor system used in the Brantford TV plant of the Canadian Westinghouse Co.





● General view of one of the new Canadian Marconi Research Laboratories, Montreal.

sent time, one Canadian-made television set is sold every six seconds. According to carefully compiled statistical information, in 1955 the public will spend more money on radio and television receivers than on any other durable consumer commodity except motorcars, and the Dominion Bureau of Statistics reports that television receiver sales alone have displaced refrigerators as being second only to motorcars both in number of units sold and in total dollar value. With approximately 90 per cent of the Canadian population within range of Canadian television transmitters, it is obvious that future development in domestic television manufacturing and sales are bright. Although, naturally enough, the impact of television is being felt in the selling field, its effect is not nearly as detrimental to radio sales as at first might be expected. Television definitely does not push radio out of the house — although it sometimes pushes it out of the living-room when the family television receiver arrives. Thus the trend is away from the larger type of console radio receiver and towards the small mantel type, portables, and clock-radios, located in various rooms of the house to be listened to on occasions when the television set is not being used. The kitchen, bedroom, den, and recreation room are now the chief locations for these “personalized” types of radio receivers. In addition, there are now over 1,000,000 motorcars in Canada equipped with radio receivers and over 150,000 car-radios are sold every year. There is no doubt that the use of the transistor will stimulate new interest in the radio receiver field and it will also simplify television circuits, as printed circuits, dip soldering, and automation are now doing, while color television is looked forward to in

Canada when the technical and other difficulties have been eliminated.

Defense Production

The contribution to the defense program by the Canadian electronics industry is well known. Although in the past certain orders have been contracted for outside the boundaries of Canada, there is no doubt that the Canadian electronics industry is capable of producing these components if the opportunity were given to develop more research facilities economically. This fact is recognized by the Defense Research Board and the recent appointment of a representative from the industry in the person of Mr. R. M. Brophy, is indicative of the realization that the need for more research facilities is required.

The Defense Research Board has already set up the Electronic Component Development Committee (ECDC) under the chairmanship of Mr. M. L. Card, Deputy Director, Canadian Military Electronics Standards Agency (CAMESA). The members of this committee advise the Defense Research Board on Canadian research and development programs aimed at supplying new and improved electronic components to the armed services.

Accessories And Technical Products

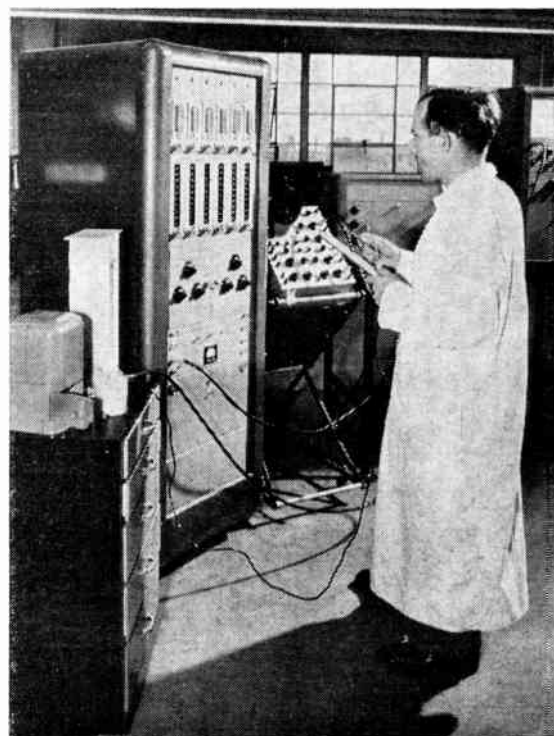
That portion of the industry producing parts and accessories is extremely important because a piece of equipment, whether it is a portable radio receiver or a giant microwave antenna, can operate efficiently and dependably only if the parts of which it is comprised are well-designed,

● Dr. Z. Szepesi, Canadian Marconi physicist using the versatile pulse amplitude analyzer to determine energy distribution in a radio-active sample.

properly made, and rigidly tested. There are, in Canada, over seventy manufacturers, large and small, of parts and accessories, their products ranging from grommets to gauges, from transistors to terminals, and consisting literally of thousands of different components for all purposes.

Since World War II the science of electronics has assumed great importance in its application to methods of making war. All the fighting services as well as civil defense depend on electronics, not only for communications, but for the automatic remote control of radio stations, direction finding, and gun firing. Nuclear weapons depend upon electronics for their control and monitoring, while guided missiles are guided by electronic means. The vast development programs undertaken in Canada by the Government and industry have resulted in equipment being designed, developed, and put into production in Canada which hitherto had been only partly produced here, or even wholly imported. In the event of war, it is most definitely conceivable that sources of supply from abroad, including the United States, would be curtailed due to priority of delivery being given to the armed services of the other countries concerned.

The picture is not one-sided. Electronics are now used in many peaceful applications and there are many industrial uses in factories, steel mills, commercial stores, banks, police work, harbor traffic control, aircraft landing systems and many others. In the domestic field there is no doubt that more electronic devices will be sold and used on a commercial scale and the electronics industry will expand still further as a result.



Safety Engineering

Electronic Safety Controls For Bulk Fuel Loading

Provides Fool-Proof Security
Against Costly Loss

TESTS have recently been conducted which reveal that the majority of transports entering a bulk station loading rack carry a substantial static charge. This charge, if not dissipated before the loading procedure begins, represents a serious exposure to fire or explosion from either of the following sources:

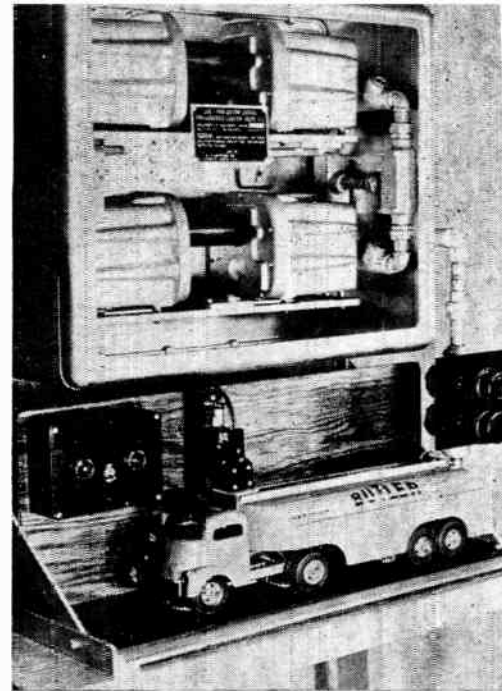
- (1) A static charge on the shell of a transport may discharge between the side of the compartment opening and the loading spout causing ignition of the vapors within or issuing from the opening after loading begins, and
- (2) During loading, any static discharge from the transport shell to the rack structure or from individuals contacting the transport can result in ignition of vapors issuing from the dome opening and flowing to the ground.

It is known that a static charge can be generated by the flow of petroleum

products into a transport compartment during loading. If this charge is not continuously drained off through a grounding arrangement, it can build up to the point where it will discharge across the compartment opening to the loading spout or to some other adjacent circuit to ground. A fire or explosion may easily result from such an electrical discharge. The problem, therefore, is how to provide a dependable ground for dissipating the static charge which may exist on a transport at the time it enters the loading bay or which may develop during loading.

In order to prevent the accumulation of hazardous electrical charges before or during the handling of inflammable liquids, it has long been customary to require a careful grounding — In the United States the Fire Protection Association has recommended that safety precautions outlined in the standards of the National Board of Fire Underwriters relating to the handling and use of inflammable liquids be adhered to.

- Loading platform with four trucks being loaded with gasoline. The truck on the left is grounded with the static eliminator.



- Model G-5, consisting of lamp unit, photo cell unit, meter unit and photo electric relay, all contained in an aluminum ventilated case, which is wall-mounted above a model of a gasoline truck.

These standards for the bonding and grounding of equipment, when properly carried out, greatly reduce the possibility of fires or explosions in the handling of inflammable liquids. The difficulty lies in the present type single wire bonding or grounding cable arrangement which is not dependable as there is no way to determine the value of the circuit unless it is tested with an instrument each time the connection is made. Even then the circuit can be interrupted if the ground cable or connections are defective in any way or if the clamping device is disturbed while loading is in progress. The fact that a mere mechanical connection exists between transport and ground is not proof of an adequate bonding circuit. To believe otherwise is false security.

In order to have a grounding system that gives positive assurance that no build-up of static or stray electric charges can occur, it is necessary to:

- (a) Provide for continuously proving the effectiveness of the grounding circuits from the moment of ground cable attachment until loading is completed.
- (b) Provide that any failure of the circuit after ground cable attachment be indicated through warning devices, electrical interlocks, or a combination of both. An interlocking system that automatically blocks loading operations in the event of improper grounding is an important safety control device for handling inflammable liquids; and
- (c) Provide control equipment that satisfies the requirements of the underwriters' laboratories.

(Turn to page 55)

Communications

Choice Of Fifty Million Telephone Numbers Will Be
At Subscribers' Fingertips By Use Of

Automatic Dialing Equipment

continent just as they now dial across town.

The Toronto machine, and a similar one to be located in Montreal, will go into use in 1955-56. In an initial stage they will make it possible for telephone operators, on most long distance calls, to dial directly to telephones in distant cities without having the calls relayed by other operators.

Direct dialing by operators has been in use for several years, and now about one-third of all long distance calls in Canada are handled in this way. When the crossbar equipment goes into use it will raise this fraction to three-quarters.

The automatic switching equipment will take over as soon as the operator has accepted the call and dialed it on its way. The machinery will select the route, seek out an idle circuit to the called city, and ring the telephone there.

Customer Toll Dialing

In a later phase of the development, called "customer toll dialing," the machinery will do all the work now done by operators. As soon as the caller dials, the machinery will accept the call and look up the route with an electronic card index. It will start selecting and trying routes until it

finds an idle circuit, and will then switch the call through to the called telephone, and ring it.

This phase will require the use of "Automatic Message Accounting" machines which will record the calling and called telephone numbers and the date, time and duration of the call. This will be punched out on paper tape in a form that can be used in billing. The machine will cancel its records for unanswered or busy calls.

Telephone companies throughout Canada and the United States are co-operating to make customer toll dialing possible. The two countries have been divided into some 90 numbering areas, each with a three-digit code. For instance, the three digits for the Toronto area are 4-1-6, and British Columbia is 6-0-4.

A uniform numbering system is also being adopted throughout the two countries to make the project possible. Under this two-five numbering plan, as it is called, all telephones in the two countries will have numbers with two letters and five digits. It will then be necessary to dial 10 digits to place a call from one numbering area to another. The first three digits will take the call to the new area, the next three — representing the first two
(Turn to page 49)

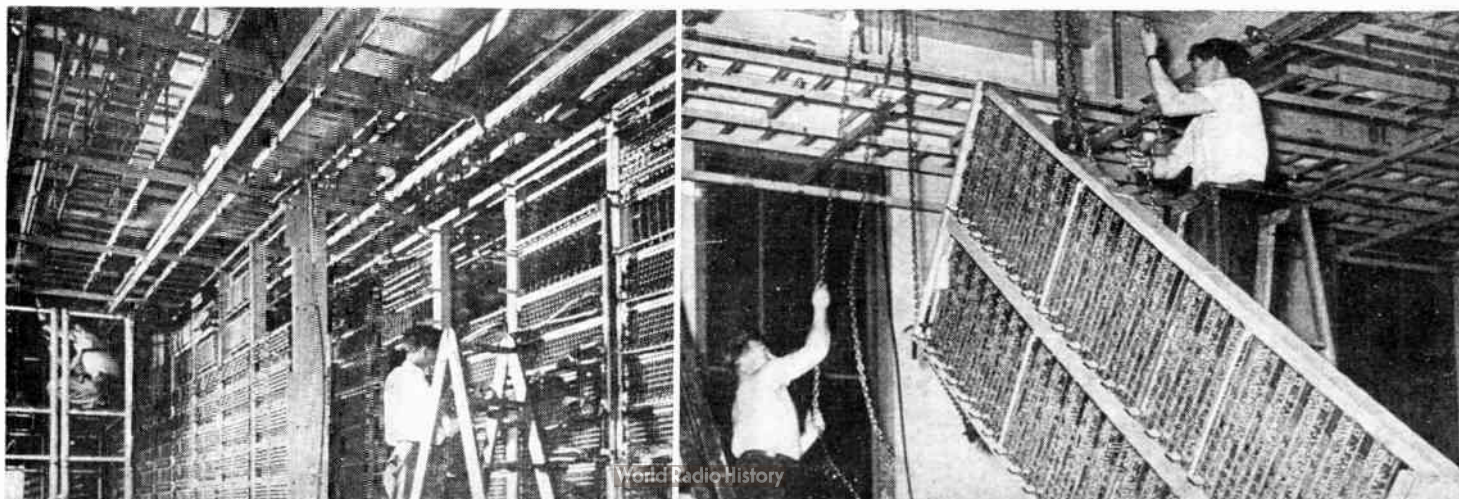
● A row of "in" frames, at which the dialed numbers will be received prior to being routed and sent on their way to the called telephones, is shown in place.

I NSTALLATION of Canada's first automatic long distance switching equipment, which will enable telephone users to dial their own long distance calls, is now in full swing in Toronto.

The "4-A Toll Crossbar" equipment is being installed for The Bell Telephone Company of Canada by the Northern Electric Company and is the largest telephone project ever undertaken by the latter firm. Installation will take a year to complete.

The Toronto crossbar machine is one of several which will go into use throughout Canada and the United States, turning the two countries into one vast telephone exchange, within the next few years. These machines, and associated equipment, will eventually enable callers to dial across the

● *Left:* Northern Electric installers, two of 180 working on the job of preparing the crossbar machinery for operation, are shown connecting the frames. They will be ready to go into use next year, playing their part in automatically connecting and routing long distance calls. *Right:* Two workmen are shown uncrating a frame that has just been hoisted from the street and brought into the building through a window. The frames have to be placed up on end for installation. The installation job will take a year to complete.



Education

Closed Circuit Television Aids Medical Training

The Demonstration Of Surgical Operating Techniques Hitherto Restricted To Limited Numbers Of Students And Doctors Is Now Available To Hundreds By The Use Of Closed Circuit Television.

The use of closed circuit television systems for demonstrating purposes in medical schools and hospitals is gaining in popularity. Specially designed equipment for televising operating techniques has been the object of research and development on the part of several manufacturers.

One of the companies who have recently produced this special type of equipment is Kay Lab. A demonstration of their equipment was held at the recent annual meeting of the

American Denture Society in Chicago.

The apparatus includes a small lightweight television camera and a number of monitoring screens through which several hundred dentists attending the meeting were permitted to view a dental operation.

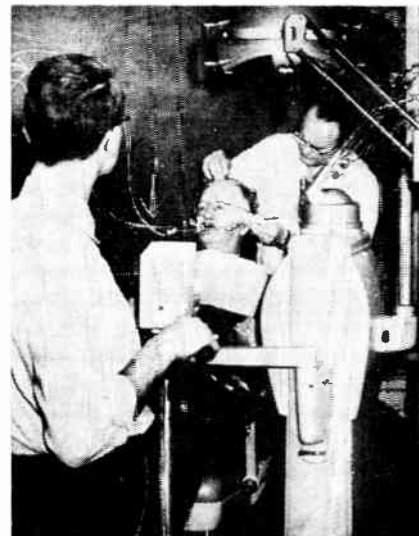
In the demonstration ten, 21-inch receivers were set up in an auditorium adjacent to the operating room and an intimate picture of the operation being performed within the mouth of the patient together with a running commentary of the operative techniques employed was carried to the audience.

Manufacturers of the equipment plan on demonstrating it at several dental and medical conventions to be held within the near future to acquaint these professions with its advantages.

Laboratory Application

A further application of Industrial television developed for use in laboratory work combines a closed circuit television camera with a microscope. In this combination the camera is mounted vertically on the microscope stand. This application is important both in educational and industrial installations. A microscope image can be presented on a large television screen, thus making it readily viewable by a large group of students or observers, and eliminating considerable eye fatigue. This application is also extremely valuable in production operations in which a large number of miniature precision parts are being examined continually. Considerable savings in time results from the increased efficiency of the observer. Any number of remote viewing monitors

● A further application of industrial television is that which has been developed for use in laboratory work which combines a closed circuit television camera with a microscope.



● Two small television cameras focussed on the patient's mouth enabled hundreds of dentists in an adjoining room to follow every detail of an operation. The compact camera, is about the size of a shoe box and weighs six pounds.

can be connected to the system, and the monitors can be located thousands of feet from the camera.

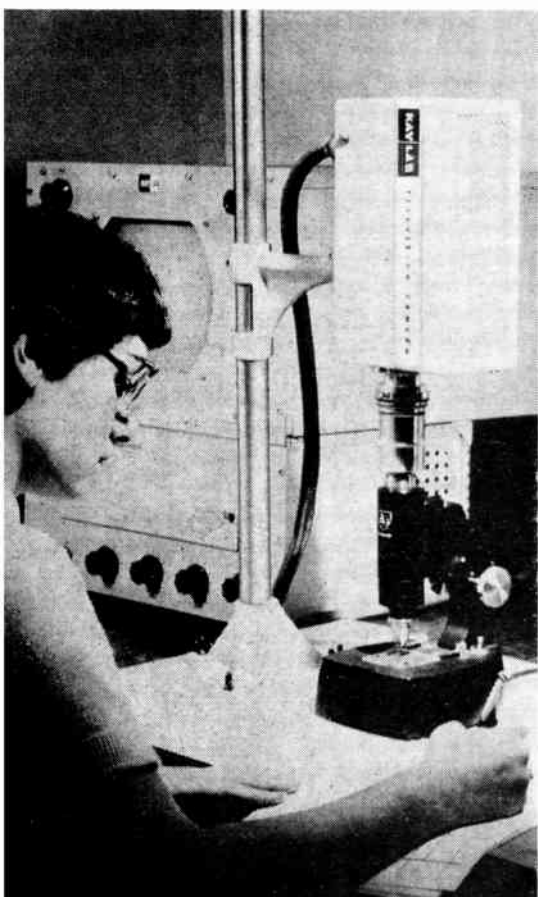
General Electric Equipment

A new technique of magnifying the microscopic details of pathological tissue, and projecting their images, in full color, onto a six foot screen, was also demonstrated by the General Electric Company in Chicago recently for the American Medical Association's national conference on postgraduate medical television education.

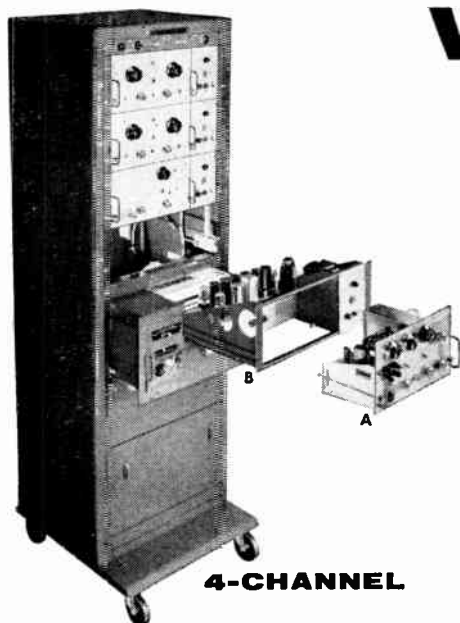
The magnifying system, which features the use of closed circuit color television, can magnify microscopic specimen, live or dead, up to 15,000 times.

The color television-microscopy system was demonstrated at the conference in conjunction with a talk by Ralph S. Yeandle, of General Electric, who discussed some of the more important applications of this system in the field of medicine.

He said that the requirements for entertainment television equipment do not have to be the same for the closed-circuit fields of TV. Closed circuit television is not broadcast like the entertainment variety, but is transmitted to the receiver by means of cables or microwaves. Only those television receivers having a direct connection with the TV camera can pick up the broadcast. For this reason, Yeandle said, simplified color TV equipment can be used offering advantages over commercial color TV broadcast equipment. He listed the advantages as: a smaller, more manoeuvrable camera may be used; the system is more economical to operate; fewer high priced technicians are needed; and a higher quality color picture results.



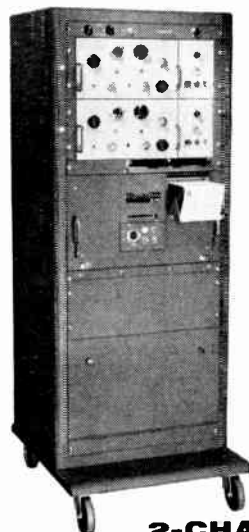
WHICH "150" fits your oscillographic recording need?



4-CHANNEL

As a graphic example of the design idea that has brought new versatility to industrial recording, a Carrier Preamplifier (A) is shown above in position to plug into a Driver Amplifier in framework with Power Supply (B) which are normally already in place in the Basic Cabinet Assembly.

The identical design principles of the four-channel system are provided in the two-channel, the only difference being the number of channels.



2-CHANNEL

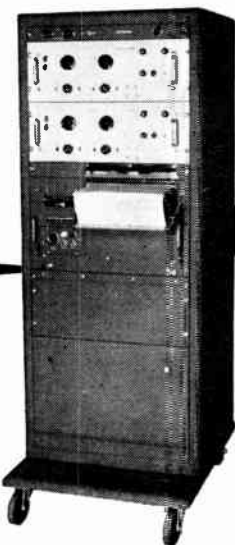
Sanborn "150" Recording Systems that put to use the original design concept of amplifier interchangeability (illustrated at the left) start with either a four-channel or two-channel standard Basic Assembly, to which the user adds whatever selection or combination of preamplifiers (A) are needed for his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

Advantages common to ALL Sanborn Recorders are: inkless recording (by heated stylus) on plastic coated strip chart paper, and in true rectangular coordinates . . . high torque galvanometer movement . . . time and code markers . . . numerous paper travel speeds.

"150"

COMPLETE FOUR-CHANNEL SYSTEM FOR USE WITH ANALOG COMPUTERS

This "150" system consists of a Cabinet Assembly, a four-channel Recorder, and two dual channel DC Amplifiers. Each amplifier is complete with a common power supply. Each measures and records two separate single-ended signals, at sensitivities between one and one hundred volts per centimeter. The two-channel version of this system will comprise Cabinet, two-channel Recorder, and one dual channel amplifier.



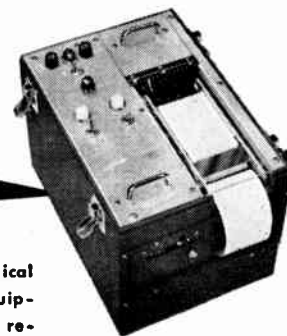
CANADIAN SALES - SERVICE ROR Associates

290 Lawrence Ave. West
Toronto 12, Ontario, Canada
Phone: ORchard 3003

"150"

SINGLE-CHANNEL RECORDER

A compact, lightweight unit for use when only one channel is required — provides permanent, inkless recording in true rectangular co-ordinates; five paper speeds (5, 10, 25, 50, 100 mm/sec.); extra stylus for either manual or remote timing and coding marks. Designed for simple, patch cord connection to any of the several "150" preamplifiers (plus driver amplifier and power supply), available soon in portable metal cases.



Catalog and technical data on all "150" equipment available on request.

SANBORN COMPANY

Industrial Division

CAMBRIDGE 39, MASS.

The Following Article Concerning Transistors May Be Regarded By Some As A Bit Gloomy. It Should Be Noted However, That The Article Deals With Their Development In The United States And Europe. On The Latter Continent Mass Production Methods Do Not Pay Off As Fast And The Author Has Taken This Into Account.

Transistors – When And Why

By Leslie L. Hill, Ph.D.

Contributing Editor, *Electronics & Communications*

IN this time of feverish electronic development when the word "impossible" is being eliminated from the technical dictionary, it is exceedingly difficult to make a faithful assessment with regard to a device which has claimed the undivided attention of practically all scientists engaged in the field of radio and electronics.

There are few technical magazines dealing with the subject of electronics which do not carry detailed accounts about transistors. Among them one finds highly colorful reports, confused impressions, and many convey a somewhat exaggerated idea concerning the progress made in the manufacture of transistors, while it may be said that some of the articles contain reckless prophecies.

Transistors were discovered about six years ago and it is difficult to provide a detailed survey of either their existing applications or possible future applications. Some of these, however, are obvious and on solid ground, others are hazy and some even hazardous. It should be stated at this point that the following article is not intended to convey the impression that transistors are a failure. On the contrary—the article will portray a favorable picture with even brighter prospects than those presently available, since it seems obvious that transistors have become fundamentally important.

The following account, therefore, is an impartial one and deals only with the commercial and technical facts in an attempt to prove that the big question concerning this wizard of the family of germanium diodes, silicon mixers and junction rectifiers is not the possibility of future applications and aspects, but *when* these applications may be achieved. There is every reason for faith in the future of transistors but it would be wise to study carefully what may be regarded in some instances as reckless exaggerations concerning their immediate future.

The scope of this article does not permit a detailed description on the operation of transistors but in order to weigh all the facts in their favor it is necessary to review their basic construction.

The importance of the transistor lies in the fact that it is able to perform many of the functions which, in the past, were the undisputed monopoly of the

thermionic valve. Evident advantages of the transistor in comparison to the thermionic valve are simplicity, robustness, small size and indefinitely long life. No vacuum is necessary for their use, no heater or filament has to be energized. Furthermore, the transistor is able to amplify with a supply voltage of one volt or less. All these facts guarantee a considerable economy in operation, there is no limiting factor on life and there seems to be no doubt that eventually the transistor will be cheaper to produce than the valve.

Point-Contact Type

One of the first types of transistor was the point-contact type shown in Fig. 2. This type consists basically of a piece of germanium generally no more than 1mm² with two pointed wire contacts touching it.

The separation between the wire contacts is between 2 and 4/1000ths of an inch.

Another type, which was invented a couple of years after the point-contact transistor, is the junction type, which

has two zones of germanium, each containing one kind of impurity, separated by another zone of germanium containing a different kind of impurity. Each of the 3 zones has a wire attached to it. The total amount of material is very small.

It is known that alternative materials to germanium have been thoroughly investigated, since most germanium devices decline in performance with rising temperature. The upper limit for satisfactory function for germanium is 70°C, while for silicon at least 150°C is permissible. Silicon, however, is much more difficult to prepare. At present, germanium gives a quite useful performance under normal conditions, and it is considered that the importance of temperature has been overstressed because of service specifications.

Recent intensified investigations have produced other materials for development work. These materials, however, are available in very limited quantities. It may be that Silicon will meet all the demands, and maybe other substances of compounds of group 3 and 5 elements in the Periodic Table will have still better results with regard to temperature and other properties.

The time and effort to put a new development into production is not always recognized and sometimes minimized. Many unforeseen difficulties and troubles have to be mastered to match achievements in production. It is considered that the progress in the production of transistors has been extremely rapid in comparison with other devices such as color television. It is further considered to be wishful thinking to expect the plentiful or cheap production of transistors in the immediate future. In making such a prediction one must consider that, under the present conditions of speed in the field of technical developments, business management may sometimes hesitate before initiating large scale mass production under the ever-present threat that what is new today is obsolete tomorrow.

Transistors are manufactured by the following methods: pulled or grown; rate grown; alloyed; fused or diffused; surface barrier, or any combination of these methods. Commercial transistors

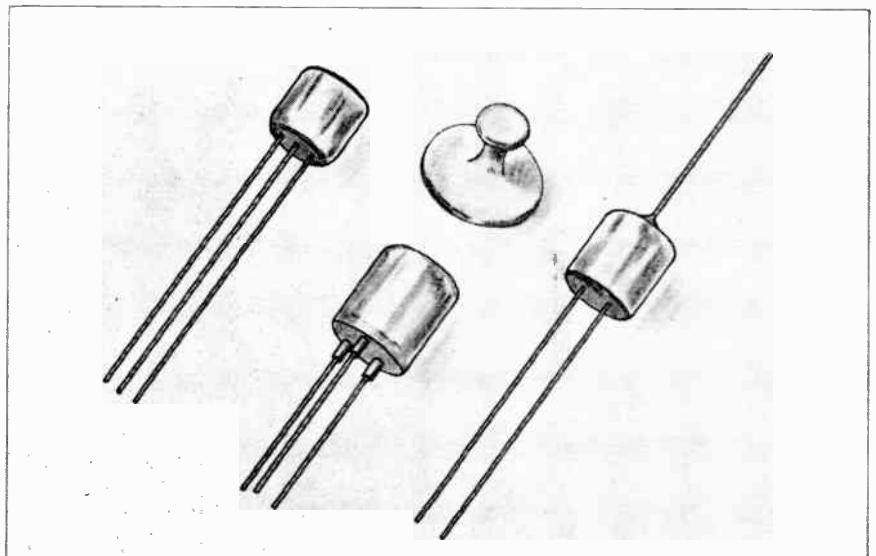


Figure 1

- Some transistors scaled against a collar stud.
- Left to right are an h.f. point-contact type, a junction type and a point-contact transistor in current production.

have been made mainly by growing or alloying. It has been generally assumed that grown transistors had a higher quality but the latest alloyed types exceed some of the qualities of the grown transistor and their cost is very low in comparison with figures in the past.

Point Contact

The production of point contact transistors varies in different countries but they have not yet reached mass production standards. The delay is due mainly to difficulties in making a consistent product from germanium with an impurity content of only a few parts in 10^4 and grown as a single crystal. The positioning of two spring-type contacts on the face of the crystal, taking into account the required infinitesimal separation of the springs has not made the production problem any easier.

The author does not believe that there are any large applications yet for the point-contact transistor. The Bell Telephone system in the United States uses them for trunk routing, otherwise, development of this transistor is still in progress and its shortcomings include low noise factor, poor frequency response, and low power handling capacity. Another limiting factor is the still relatively high price.

It seems obvious, therefore, that full economical advantage may only be achieved by fully transistorized equipment. It is not likely that the cost of the point-contact type transistor will diminish until manufacturers enter into large scale mass production and, at the present time, management would seem to be reluctant to do this, pending the development of junction-type transistors to carry out the same functions.

In this connection, however, it is considered important to point out that the point-contact transistor is believed to be the foremost one for efficient r.f. operation. It is also believed that this type is highly valuable in the matter of gaining experience generally and especially so on transistor circuits which, as a matter of course prove different from up-to-date valve practice.

Some applications in high-frequency versions (50/100 Mc/s) exist, but the price still appears too high for successful competition with the thermionic valve.

Junction-Type

These types, not depending on point-contacts, are far more suitable to mass production. Low-power junction transistors have been in production for some time. Their dissipation is below 100 mW. Their main trouble in the beginning was drifting because of imperfect sealing against moisture, but now, hermetically sealed junction transistors are on the market. Their main application is in hearing aids. Battery consumption is reduced to 20 per cent or less in comparison to a valve instrument. Such an application fully warrants the use of transistors, even if their price is higher than that of valves. This seems the most popular use of junction-type transistors.

High-Power Transistors

Another type is the high-power transistor, samples of 25W have been on the market and some current 2W transistors seem to have reached production level, but any large scale manufacture is not expected for about two years.

Summarizing the situation, junction transistors seem to be the closest to mass-production, but up to the present are restricted to audio frequency range

or possibly at the lower radio frequencies. There are types with an additional contact called junction tetrodes, which still have a satisfactory performance at about 10 Mc/s.

It is quite evident that junction transistors will be very useful in portable equipment, such as "walkie-talkies" for police, fire, and the armed forces, where the price would not be as important as the small size and low current consumption. Their use in domestic radios will be dependent upon a cut in their cost.

Other types still in the development stage are the surface-barrier and the field-effect transistor. Both have a considerable h.f. performance and their application should reach the V.H.F. region.

An attempt to overcome the high-frequency problem has been made by adding another layer of very high purity germanium, p-n-i-p and n-p-i-n junction transistors have been developed (Bell Telephone Laboratories grow an n-i junction and alloys indium dots into opposite sides). These types function up to 95 Mc/s, (theoretical considerations

revolutionary transistor would be appropriate.

In this respect it is likely that the transistor will eventually completely oust the thermionic valve. All developments suggest this theory. Replacement of valves by transistors will occur on technical grounds, but in many instances the economical advantage will be decisive and here the transistor is still a long way off. In many cases tubes will still remain.

On the other hand, there will be applications for transistors where nobody would ever think of using a thermionic valve. Many promising projects have had to be abandoned because of the fragility and the limited life of tubes.

The only disadvantage of transistors is their relatively high cost. Before completely replacing the valve, it must definitely show economical assets. There may be an early change, earlier than people expect, the only question will still be, whether the device is technically as well as economically advantageous.

Recent demonstrations have shown

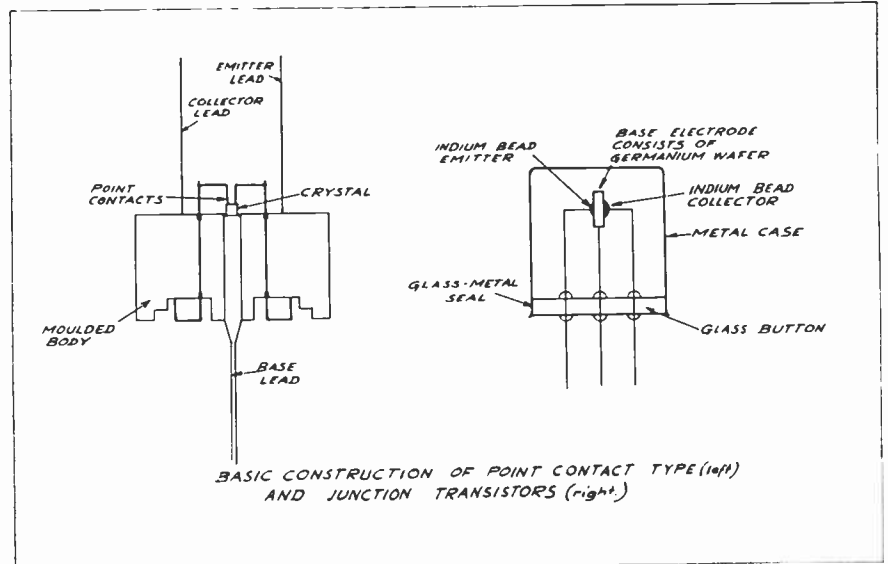


Figure 2

indicate a maximum of 3000 Mc/s.)

Some of the most promising applications of transistors may be summed up in the following:

- (1) Portable radios with transistorized circuits already on the market. Car radios will soon follow.
- (2) Audio amplifiers for dynamic microphones replacing a carbon microphone have been designed.
- (3) Portable transistor audio oscillators with spot frequencies of 400 and 1000 c/s for setting levels and checking continuity of circuits are available.
- (4) A transistor version of a computer has been constructed containing over 2000 junction transistors in replacement of tubes of half the size of the valve set and requiring only 5 per cent of its power.
- (5) Transistorized pre-amplifiers for sound projectors are in production.
- (6) Servo-amplifiers show a combination of transistor pre-amplifiers.
- (7) High-voltage low-current supplies operate with transistors.
- (8) An automatic pilot has been produced which is entirely transistorized, etc., etc.

At this point a comparison between the well-established valve and the

radio and television receivers working exclusively with transistors but as impressive as they have been one may, with reasonable assurance, assess the future of transistors as follows:

First, transistors will be generally used in battery-driven portable receivers and car radios, where space and consumption are essential. By this use transistors will simplify and improve circuits in mains-driven radio and television receivers.

In conclusion it may be said that transistors will not only replace valves but many new applications will be found and an increasing portion of receiving valve functions will be taken over by transistors. The time will also come when the price of mass produced transistors will be competitive with the price of valves. It is not likely, however, that the mass production of the various types of transistors will be achieved in less than two years. The faith which industry has placed in the prospects and potentialities of transistors is marked by the millions of dollars which have been spent on research and development. Many millions will yet be spent and there is little doubt that the large scale manufacture of transistors will eventually be achieved.

Described By Thomas W. Eadie, Bell President As
 "The Most Effective And Economical Means Of
 Providing Large Scale Requirements For Voice
 Communications Circuits" Canadian Telephone
 Authorities Build For The Future By

Extending Microwave Facilities From Toronto To Winnipeg

EASTERN and Western Canada will soon be linked by another form of communications, microwave radio relay.

Work is now under way on a Toronto-to-Winnipeg network, designed to provide additional communications facilities between the two sections of the country.

The overall network, when completed in the latter part of 1956, will comprise a line of some 45 radio relay towers placed at 25 to 30 mile intervals over more than 1,200 miles from Toronto through North Bay to Winnipeg.

Testing to determine the six tower sites between Toronto and North Bay has already been completed, and Bell crews are now testing for some 36 towers between North Bay and the Ontario-Manitoba border. The Manitoba Telephone System will test to locate the three towers necessary between Winnipeg and the provincial border.

The towers between Toronto and North Bay will be located near Uxbridge, Beaverton, Gravenhurst, Bracebridge, Huntsville and Trout River. From North Bay westward the route will parallel Highway 11 (the Trans-Canada Highway) through New Liskeard, Cochrane, Hearst, Fort William, Dryden and Kenora.

Actual construction of the line of towers is expected to begin about the middle of 1955.

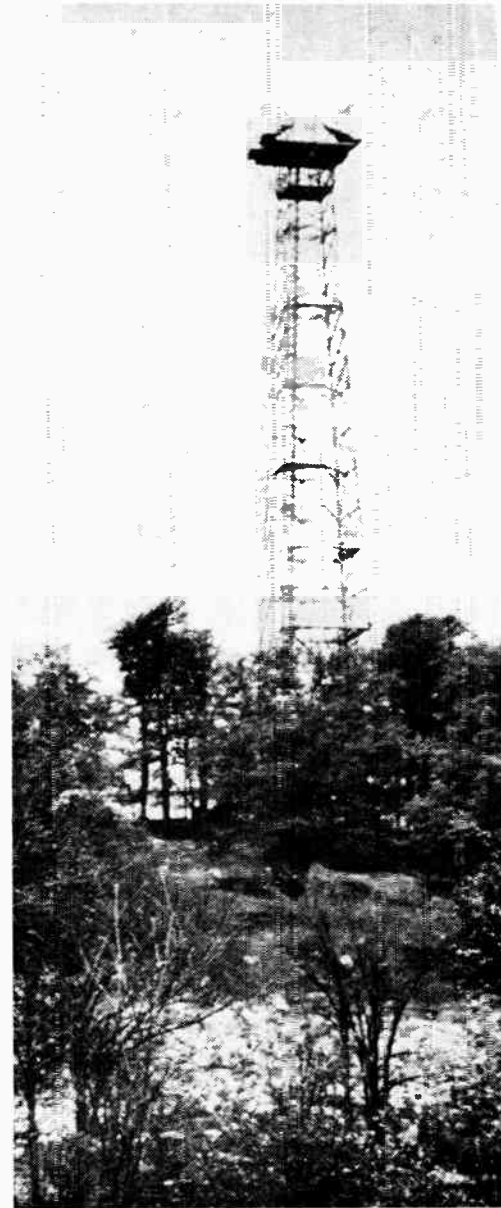
East-West Traffic Increase

This extension to the Bell's microwave network connecting Toronto, Ottawa and Montreal has been made necessary because of the ever-increasing number of telephone calls between Eastern and Western Canada in recent years. Like the existing Toronto-Ottawa-Montreal network, the new system will also be capable of transmitting television programs if required.

Initially, the microwave facilities will consist of two channels capable of carrying several hundred telephone calls simultaneously or a television program in each direction. Additional channels can be placed in service when required.

The Toronto-Winnipeg network will join with the Bell's Toronto-Ottawa-Montreal microwave link at Toronto. The Toronto-Ottawa-Montreal route has been in operation, for both telephone and television communication, since May 14, 1953. A further link to Quebec City is under construction.

Tentative sites for the 36 relay stations between North Bay and the Manitoba-Ontario border will be chosen in advance by means of topographical profiles of the territory



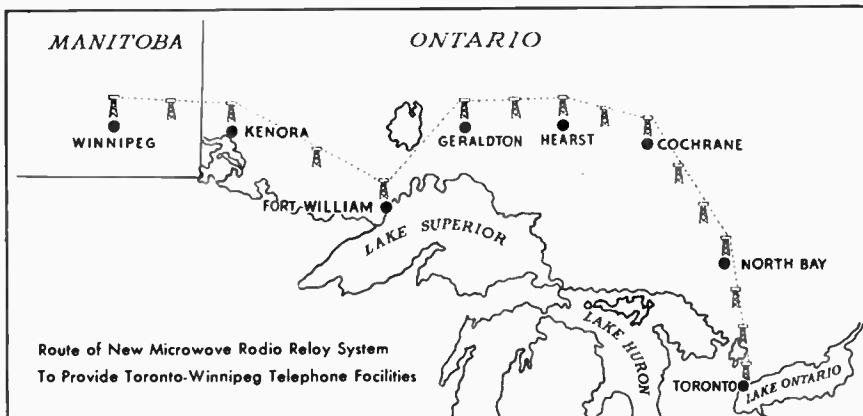
● One of the typical radio relay towers which are spaced at 25 to 30 mile intervals and which will stretch for over 1,200 miles from Toronto to Winnipeg.

bordering the highway route. The profiles, prepared from aerial photographs, indicate the high points of land along the route.

The initial tests are to make certain that a clear-line-of-sight exists between each of the tentative sites. Because microwaves are super-high-frequency waves that travel in straight lines like the beam of a searchlight, an obstacle-free path between the relay towers is essential.

The preliminary "path-testing", as it is called, is done in leap-frog fashion by engineering crews using three portable 200-foot relay towers made up of eight-foot sections, which can be assembled or dismantled in a few hours.

Microwave radio relay has been described by Thomas W. Eadie, Bell President, as "the most effective and economical means of providing large-scale requirements for voice communication circuits". The Toronto-Ottawa-Montreal system was the first in Canada capable of transmitting both television programs and telephone calls.



● Route of the microwave relay system between Toronto and Winnipeg.

Plant Modernization

Automatic Exchange Equipment Answer To Rural Growth

Modern Apparatus Is Becoming A Must
For The Rural Telephone Industry

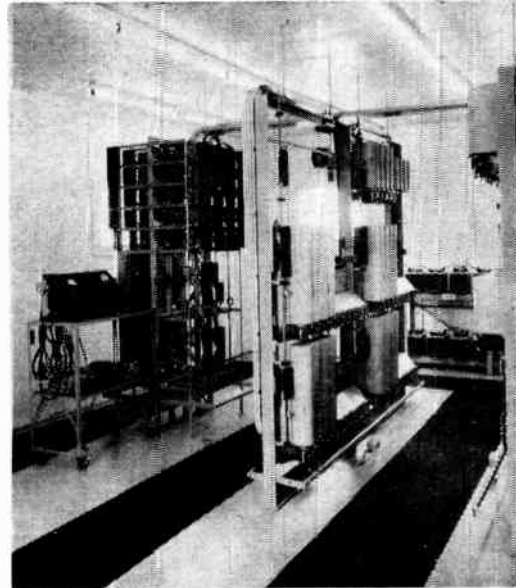
Keeping pace with the rapidly developing suburban areas of Toronto the Bethesda and Stouffville Telephone Company have recently installed a modern automatic telephone exchange at Gormley about twenty-two miles northeast of Toronto. The new automatic exchange is the first to be installed by the 50-year-old Bethesda and Stouffville Telephone Company, one of the oldest rural telephone companies in Ontario.

The company which serves between 2,200 and 2,300 subscribers covers an area embracing several towns which maintain thriving business centers. Some of the larger centers served by the company are Claremont, Goodwood, Gormley, Victoria Square, Ringwood and Altona. The new equipment has been installed to cope with the

rapidly increasing demand for service in the Gormley and Victoria Square areas.

The equipment is located in the company's own building at Gormley and has an initial capacity for supplying service to 400 telephones, but the increase in requirements since the announcement of the intention of installing this office will necessitate extending the equipment in the near future.

The Gormley office is unstaffed, all long distance and service calls are handled by the Stouffville operators. If any fault occurs within the exchange, the equipment is designed to automatically give a signal to the operator. By installing this office the Telephone Co. is able to remove some of the traffic from its Stouffville office and so proceed with its program of making



● Interior view of the new automatic exchange of the Bethesda and Stouffville Telephone Company. The automatic exchange is located at Gormley and will serve about 400 telephones in the locality.

improvements to meet everyday expansion.

According to Mr. Rae, secretary-treasurer of the company, it is anticipated that another automatic exchange will be installed to serve the Claremont area in the near future.

The exchange was officially opened and went into service last February. Opening ceremonies were attended by officers of the company, including A. D. Bruce, president and founder of the company, T. B. Rae, secretary treasurer, and F. G. Ratcliffe, vice-president.

Other officials attending the opening were: Mr. J. Prince, representing Prince and Roberts, installers of the equipment and L. W. Jones and Noel Holmes, representing British General Electric Company (Canadian) Limited, suppliers of the equipment.



● Mr. Noel Holmes, representative of the British General Electric Company (Canadian) Limited is shown right presenting the ownership papers of the new exchange to Mr. A. D. Bruce, President and founder of the Bethesda and Stouffville Telephone Company.

For The Packaging Industry

An electrotherm continuous electronic bag top welder to fill the need for a high speed closure apparatus capable of integration into a packaging production line or co-ordination with automatic filling equipment and capable of increasing production and cutting operating costs is the latest electronic gimmick for the packaging industry.

The filled open-top bag is fed automatically or by hand into one end of the welder where it is gripped by continuously moving belts and carried through the unit, positioned between a continuous over-riding buffer strip and the continuously high-firing electrodes, providing a uniform seal made completely across the top of the bag of any width.

NEWS



G. W. Swan Appointed Sales Manager For Minnesota Mining

The appointment of Gordon W. Swann as sales supervisor for the Irvington Varnish & Insulator Division of Minnesota Mining & Manufacturing of Canada Ltd., London, is announced by Robert T. Todd, general sales manager, electrical products.



G. W. SWAN

Mr. Swann joined the company as sales representative in September, 1946, and subsequently served in this capacity in all Irvington Varnish territories across Canada.

To his new position Mr. Swann brings a wide background of practical experience in electrical and related fields served by the Irvington Division.

During March he will tour Western Canada, paying special visits to offices in Winnipeg, Calgary, Edmonton, Vancouver and Victoria. Later Mr. Swann will tour the Eastern Provinces.

Electro Sonic Supply Appointed Toronto Reps For Amerite Towers

Electric Sonic Supply Company Limited, 543 Yonge Street, Toronto have announced their appointment as exclusive Toronto distributors for Amerite Towers, a product of the American Tower Company of Shelby, Ohio.

KCS Data Control Ltd. Offers Computing Service

KCS Data Control Limited of Toronto have announced plans to specialize in the design, application and programming of high speed electronic computing machines and systems, data processing and automatic control equipment. With the high speed computing service that will be offered by the company it will be possible to handle calculations in the fields of design, engineering and business and it has been announced that these calculations even if of moderate scope can be dealt with economically.

The company will also engage in the application of electronic methods to statistical analyses, automatic inventory control and production scheduling.

Members of the firm include Dr. J. Kates, P.Eng., and L. Casciato, P.Eng.

Canada's First Magnetron Plant To Be Built By Marconi

A plant to manufacture magnetrons and various types of transmitting tubes in Canada will shortly be erected by Canadian Marconi Company in the Montreal suburb of Town of Mount Royal, Quebec, it was announced recently.

The new factory will have approximately 30,000 square feet of floor space, and will be immediately adjacent to Marconi's head office and factory at 2442 Trenton Avenue, Montreal 16. The building and equipment have been designed specially for the manufacture of this type of electronic tube.

Construction will start shortly and it is expected that the plant will be in production early in 1956; it will employ approximately 100 people at the outset.

The erection of the new plant represents a major step in the progress of the Canadian electronic industry. Magnetrons and similar tubes are becoming increasingly important in the electronics and communications fields, and Canadian demand is increasing rapidly. Particular applications are in the development of microwave relay stations, radar and certain defense requirements.

Mr. H. A. Rice, formerly Manager of Marconi's Commercial Products Division, has been named General Manager of this new project.

Mr. C. P. McNamara has been named to succeed Mr. Rice as Manager of Marconi's Commercial Products Division.

B. R. Tupper Vice-President North-West Telephone Co.

B. R. Tupper, Vancouver engineer who has been outstanding in the development of commercial radio-telephony in B.C., has been appointed



B. R. TUPPER

Vice - President and General Manager of the North-west Telephone Company. Mr. Tupper, a graduate of U.B.C., has been connected with the North-west Telephone Company since its inception in 1929. Since 1952, he has

been Manager and Chief Engineer. For his work in the application of radio techniques to the extension of toll telephone services in Canada, Mr. Tupper, last year, was made a Fellow of the Institute of Radio Engineers. Only 13 Canadians have been so honored.

C. P. McNamara Commercial Products Division Manager

C. P. McNamara has been appointed Manager, Commercial Products Division, it has just been announced by the Canadian Marconi Company. Mr. McNamara succeeds H. A. Rice, whose appointment as General Manager of new facilities for the development and manufacture of magnetrons, and various types of power tubes was announced at the same time.



C. P. McNAMARA

During the war, Mr. McNamara served as an officer with the Royal Canadian Corps of Signals. In the immediate post-war period, he helped direct communications for the Army's Operation Muskox in the Arctic, and was later seconded to the Scientific Staff of the Defense Research Board, under Dr. O. M. Solandt, Chairman of the Board. He remained with the Board until he joined the Engineering Staff of Canadian Marconi.

Mr. McNamara entered Canadian Marconi in 1951. The following year he was promoted to head the Radio Relay Group Engineering, and a short time later was named Assistant to the Manager of the Commercial Products Division.

The Commercial Products Division encompasses Marconi's Research & Development Laboratories, Electronic Engineering and the manufacture of electronic devices for use by industry, police and fire departments, trucking fleets, hospitals, shipping, aviation, broadcast and television stations, as well as equipment for national defense and in many other fields.

J. F. Mattuck and R. B. Huber Appointed By Canadian Video Craft

Officers of Canadian Videocraft Limited have announced that Joseph F. Mattuck and R. B. Huber, formerly with Edwin I. Gutham and Company of Chicago, Ill., are now associated with their company. Mr. Mattuck will assume the position of Director of Manufacturing and Mr. Huber that of Chief Engineer.

Expanded facilities will provide for the manufacture of deflection yokes, horizontal output transformers, permanent magnet focus devices and loop and ferrite rod antennae.

Raytheon Opens Canadian Office

The Raytheon Manufacturing Company, Waltham, Massachusetts has announced the opening of a central office at Toronto, Ontario for its operations in Canada.

The office, which is located at 119 Bay Street, will be under the management of John R. Cann, McGill Graduate, former RCAF officer, and Canadian electronics engineer and consultant who joined Raytheon in 1953 as senior systems engineer.

"While Raytheon will continue to be represented by Canadian firms acting as our distributors, the rapid expansion of Canada's industrial activities necessitates the opening of a central Canadian office", stated Ray C. Ellis, vice-president in charge of Raytheon's International Operations.

Erwin Joins Handy & Harmon Sales Staff

T. H. Gallagher, Vice-President and Managing Director, Handy & Harman of Canada Limited announces the appointment of Harold B. Erwin to the Company's sales staff.



H. B. IRWIN

Mr. Erwin brings 28 years of experience in the precious metal and refining fields to his new position. Previously connected with the Goldsmith Bros. Smelting & Refining Company, where he was employed in a diversified range of capacities, Harold is well-known to the trade he has served.

A native of Ireland, Harold Erwin came to Canada in his teens and has spent all of his business life in the field of precious metals.

Radio Receptor Names Two New Sales Representatives

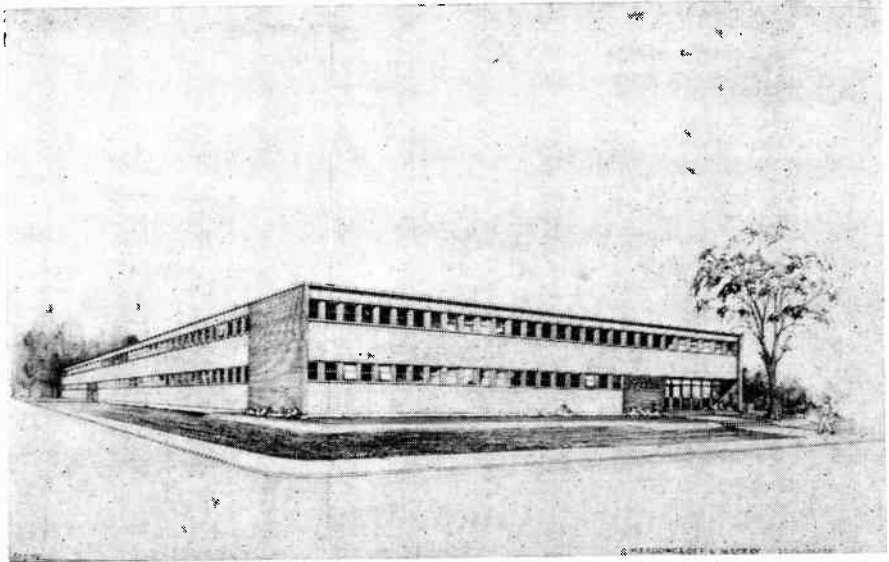
Two new sales representatives have been appointed by Radio Receptor Co., Inc. for its Semi-Conductor Division.

Charles W. Pointon Ltd. of Toronto will cover all of Canada, and the Gates Company, Salt Lake City, Utah, will represent Radio Receptor in Utah, Wyoming, New Mexico, Colorado and parts of Texas, Idaho, Montana and Nebraska.

M. M. Elliott Appointed National Television Sales Manager

Announcement of the appointment of Mr. M. M. Elliott as national television Sales Manager for the Canadian Westinghouse Supply Company Limited has recently been made.

Mr. Elliott who is a well-known figure in the Canadian electronics industry was formerly employed by Motorola Canada Limited.



● Architect's drawing of the new magnetron plant of the Canadian Marconi Company. Construction of the new plant in the town of Mount Royal is expected to begin immediately.

Raytheon Appoints Canadian Manager

The appointment of John R. Cann as Manager of Raytheon's Canadian Operation has been announced by Ray C. Ellis, Vice-President, International Operations, Raytheon Manufacturing Company, Waltham, Massachusetts.

In 1948, he became radar engineer for Canadian Aviation Electronics Ltd. and in 1950 he became Assistant General Manager.

In 1951 he joined the Transducer Corporation of Boston as senior engineer, becoming project engineer until 1953, when he accepted a position as senior systems engineer for Raytheon, in which capacity he has served until his present promotion.

K. A. Hovington Cossor Sales Manager

Cossor (Canada) Ltd. announce the appointment of Kenneth A. Hovington as Sales Manager and Manager of Contracts and Administration. Mr.



K. A. HOVINGTON

Hovington was previously Branch Manager of Cossor's Montreal Office, covering the Province of Quebec and the City of Ottawa. Mr. Hovington was born in England, and served during the war as an observer in the Royal Naval Air Force. He also spent some years assisting in the development and procurement of radio and radar equipment for the Naval Air Service. At the end of the war, Mr. Hovington came to Canada where, before his arrival in Montreal, he was in business in Vancouver.

S. G. Smallwood Opens Acton Plant

Former premises of the Storey Glove Company of Acton, Ontario, have been taken over by the electronics firm of S. G. Smallwood Limited of Kitchener.

This nine-year-old firm which was established in Kitchener by Stanley G. Smallwood has taken over the Acton premises in order to provide additional space required to cope with the demand for the company's products which are marketed throughout Canada to end producers of electronic equipment and appliances.

Opening of the new plant of the S. G. Smallwood Limited will provide additional employment in Acton as the plant becomes equipped with production machinery. Openings in the engineering department will be available to men who will be required to train as technicians, and there will also be openings for female help.

Musimart of Canada Ltd. Take On Additional Lines

Fred R. Lesser, Manager of the Electronic Division of Musimart of Canada Limited, Montreal, Quebec, has announced that his company are extending the activities of their electronic division and have taken on the exclusive Canadian representation for the following companies: Messrs. Birmingham Sound Reproducers Ltd., manufacturers of record players and record changers; Messrs. Goldring Mfg., Co., (Great Britain) Ltd., makers of reluctance cartridges and other high fidelity pick-up components; Messrs. Walter Instruments Ltd., (England) manufacturers of electronic components and Amplifone Corp., of Chicago, manufacturers of horizontal output transformers for color and black and white television sets.

(Turn to page 36)

NEWS

New Brochure Shows One Way To Business Success

Like every business man, you're constantly seeking ways to increase output without increasing expenses, reduce costs without sacrificing quality, step up employee efficiency without impairing employee relations and improve service to attract and hold more customers.

Upon analysis, you'll find that all of these desirable goals depend on three basic factors: the proper use of employees' time and effort, the spirit of teamwork in your organization and effective supervision. Your products or services depend on the efficiency of those who produce them — achieved through proper application of their abilities, close co-operation with you and all members of your firm, and effective supervision. All three factors depend, in turn, on the communications that bind executive to executive, supervisor to worker, department to department — all down the line. Such communications are the life blood of modern business operations, and are described in a handsome new brochure entitled "Dial Your Way to Greater Business Success" available from Automatic Electric Sales (Canada) Limited, 185 Bartley Drive, Toronto.

L. T. Bird Recent Marconi Appointment

L. T. Bird has been promoted from Chief Engineer to Assistant Manager of Canadian Marconi Company's Commercial Products Division according to an announcement made by C. P. McNamara, Manager of the Division.



L. T. BIRD

Mr. Bird has been with the Marconi organization since 1922, and during that time has been engaged mainly in electronic equipment design and development engineering.

In his new duties, Mr. Bird will assist in the general management of the Division's operations, with special emphasis on all technical phases.

The research functions of the present Marconi Research and Development Department will be carried on separately by the Research Department headed by Dr. D. A. Anderson, Chief Physicist, and all the other former activities of the Research and Development Department will be maintained by the Engineering Department, under Mr. J. G. Kahan, who has been named Chief Engineer.

Toronto Section I.R.E. Elects New Executive

"Some Applications of Electronic Techniques to Measurements in Fluid Mechanics Research" was the subject of an address by Dr. J. G. Hall, Research Associate of the Institute of Aerophysics, University of Toronto, to the Toronto Section, Institute of Radio Engineers meeting held last March 28th. During Dr. Hall's talk it was made evident that such research was becoming more dependent on the use of electronic equipment for successful consumation.

Elect Executive

The March 28th meeting was the annual meeting of the Toronto Section I.R.E. and a new executive for 1955-56 was elected as follows: Chairman, A. P. H. Barclay, Canadian Radio Corporation; Vice-Chairman, Fred Heath, Canadian General Electric Company; and Secretary-Treasurer, H. W. Jackson, Ryerson Institute of Technology.

C.S.A. Specification Covers Communication Line Hardware

The Canadian Standards Association has announced the recent publication of a specification covering communication line hardware which replaces a previous edition published in 1950 under the title "Pole Line Hardware".

The new editions are available complete with drawings of the hardware items or for those who already possess a copy of the second edition, may be purchased less the drawings. Each specification is complete with an up-to-date list of drawings.

These Specifications are prices as follows:

C83.1-1954 — \$4.00

C83.2-1954 — \$3.00

Without drawings each may be purchased at 75 cents. Additional drawings are also available at 10 cents each.

Two Thousand Years Of Experience In Electronics And Communications

Close to two thousand years of accumulated service in the world of electronics and telecommunications were represented when the members of the Canadian chapter of the Marconi Veterans gathered for their annual reunion dinner in Montreal recently.

Qualifications for belonging to this select group is twenty-five years' employment with the Marconi organization or twenty years' Marconi service plus an additional five years with an associated organization. The total membership of 191 Marconi Veterans is scattered across the country from Newfoundland to Vancouver Island and many of these were on hand to attend the annual dinner.

R. M. Brophy Represents Industry On Defense Research Board

The Canadian electronics industry is now represented on the Defense Research Board, which advises on research and development for the National defense program. It has been announced by The Honorable Ralph Campney, Minister of National Defense, that Mr. R. M. Brophy has accepted the appointment as a member of the Defense Research Board.



R. M. BROPHY

Mr. Brophy, a Director and Past President of RTMA, is well-known in the electronics industry. In 1950 he represented Canada in a NATO Task Force which studied defense production facilities in Western Europe and in 1951 he joined the Department of Defense Production as Co-ordinator of Production. In 1952 Mr. Brophy was appointed Deputy Minister of Defense Production, a position he filled until September, 1954, at which time he returned to industry.

It is of interest to note that Mr. Brophy was first President of the Canadian Radio Technical Planning Board, a post he filled from 1945 to 1949.

The Canadian Radio Technical Planning Board is a non-profit organization set up to advise the Government and the electronics industry on the best way to use the ether wavebands in the public interest. A recent achievement of the Board is the publication, for the first time in Canada, of the Canadian Radio Frequency Allocations Chart, in full color, showing how the wavebands are used and allocated in this country.

Electronic Memory Cell Unveiled At The I.R.E.

Unveiled for the first time at the 1955 National Convention of The Institute of Radio Engineers in New York, March 21-24, were two revolutionary developments by Canadian Marconi Company. One of these was a new memory cell which will "remember" electronic signals in the same manner as does the human brain. When fully developed this amazing cell will give electronic computers a memory approaching that of man; and much more reliable. Research indicates the great possibility of this being used as a new medium for recording TV programs with more efficiency and economy.

The second development introduced was a semi-conductor photocell which is extremely sensitive to light rays. It was demonstrated operating an electric motor directly from the ordinary light available in a room.

Canadian Electronic Sales Representatives 12th Annual Canadian Luncheon

Plans for the Electronics Parts Show held annually in the Conrad Hilton Hotel, Chicago and which will be held this year from May 16 to 19 have been made to accommodate what is expected to be one of the largest gatherings of industry and sales representatives ever to attend this show.

Canadian electronic sales representatives, members of the Canadian Electronic Sales Representative Association will again be in attendance at the Parts Show and the program covering their activities has been announced by Mr. J. T. Rochford, secretary of the association.

The program as announced by Mr. Rochford is as follows:

Canadian Headquarters — Room 13, 4th floor, Conrad Hilton Hotel, open for three days, Monday, Tuesday and Wednesday, May 16, 17 and 18.

CESR Breakfast Meeting — In Private Dining Room No. 4, third floor, Conrad Hilton Hotel, 8:30 a.m., Tuesday, May 17. Open to members of Canadian Electronic Sales Representatives only.

12th Annual Canadian Luncheon — Waldorf Room, 12 o'clock noon, Wednesday, May 18. Open to all visiting Canadians. Assessment \$5.00 per person. Tickets for the 12th Annual Canadian Luncheon may be obtained in advance from the secretary, Mr. J. T. Rochford, 25 Taylor Drive, Toronto 6, Ontario.

Winnett Boyd Appointed Reps For D.S.D. Mfg. Co.

Cecil H. Wood, General Manager of Winnett Boyd Limited, 745 Mount Pleasant Road, Toronto, has announced the appointment of his company as sole Canadian representative for the D.S.D. Manufacturing Company of Hamden, Connecticut, manufacturers of hollow stainless steel "O" rings sold under the trade name of "Toruseal".

Cossor (Canada) Limited Appointed Agents For Empire Devices

Cossor (Canada) Limited have been appointed exclusive Canadian agents for Empire Devices Products Corporation of New York for their variable frequency power supply equipment.

The recent announcement made on behalf of Cossor (Canada) Limited describes the equipment as enabling aircraft, electrical and electronic manufacturers as well as repair and overhaul firms to simulate aircraft and other power supplies in their shops.

Office Machinery Exposition To Show Electronic Equipment

"Controlling Office Costs" will be the theme for the 36th International Conference and Office Machinery and Equipment Exposition of the National Office Management Association in Toronto, May 22-26.

The Conference will open on Sunday, May 22, at the Royal York Hotel. The Exposition in the Toronto Mutual Arena will open Monday, May 23.

New and improved developments in automatic machinery and equipment for the office will be shown. These will include automatic controls, automatic handling equipment and the latest in electronic accounting machinery.

Electronic accounting was once used only by big businesses and government agencies. Recent advances place electronics within reach of all businesses. Exhibits at the NOMA show will feature electronic installations for the small or average sized firm as well as the big office operations. Even firms too small to buy or rent such installations have this equipment available to them on a service bureau basis.

C. W. Cranfield Telephone Sales Manager For Hackbusch Electronics

Ralph Hackbusch, F.I.R.E., P.Eng. announces the appointment of C. W. Cranfield as Telephone Sales Manager



C. W. CRANFIELD

of Hackbusch Electronics Limited following the retirement of A. S. McPhail.

Mr. Cranfield joined Stromberg-Carlson during August, 1943 and has served as field Telephone Sales Representative in Ontario, and as Ontario Telephone Sales Manager. Mr. Cranfield is well known throughout the Canadian Independent Telephone field, and his new appointment will we know be welcome news to his many friends in the industry.

(Turn to page 38)

IS YOUR INDUSTRIAL FINANCING PROBLEM DIFFERENT?

More than a thousand industrial projects of all sizes in Canada have found an Industrial Development Bank loan the answer to plans for establishment or expansion. Familiarity with industrial projects of the widest variety has equipped I.D.B. to tailor financing efficiently to particular needs. Some projects have benefited from I.D.B. suggestions that have made them feasible for regular commercial financing.

Whether or not you have a customer who is seeking advice on financing you might find it worthwhile to be fully informed on the procedure and facilities of the Industrial Development Bank. Enquiries should be addressed to:

INDUSTRIAL DEVELOPMENT BANK

MONTREAL • TORONTO • WINNIPEG • VANCOUVER
901 Victoria Sq. 85 Richmond St. W. 195 Portage Ave. E. 475 Howe St.

H. A. Rice To Manage Magnetron Operations

The appointment of Harry A. Rice as General Manager of new facilities for the development and production of magnetrons, and various types of power tubes has been announced by Canadian Marconi Company.



H. A. RICE

Construction of a new factory in the Town of Mount Royal, Quebec, will commence immediately.

Mr. Rice first became associated with Canadian Marconi in estimating and commercial equipment sales work. In 1942 he was made Assistant Factory Service Manager and later was appointed Planning Superintendent. At the end of the war he was named Manager of the Company's Maritime Division which post he retained for two years. He was then moved to Toronto as Assistant Manager of the Ontario Division, becoming Manager in 1949. Four years ago he was appointed Manager of the Commercial Products Division, which manufactures electronic devices of all types for Canadian industry.

Music While You Buy At Cescos

Facilities for playing background music have been installed in the four stores of Canadian Electrical Supply Co. Ltd. at Montreal, Ottawa, Toronto, and Edmonton.

The music is played on pre-recorded tape through a sound system. This is one of the many new improvements that will shortly be introduced in all of the CESCO stores aimed at increasing service and convenience to customers.

Electrodesign Move To New Premises

Electrodesign have announced their recent move to new premises at 736 Notre Dame Street West, Montreal. The new business location of Electrodesign provides the firm with six thousand square feet of floor space which is devoted to the engineering design department, precision laboratory, development shop, repair and calibration department and the provision of a stock room.

C.R.T.B. Publishes Radio Frequency Allocation Chart

For the first time in the history of electronics in Canada, a colored chart has been prepared and is being published showing the radio frequencies allocated to various services in this country. The chart is the work of the Canadian Radio Technical Planning Board, in co-operation with the Telecommunications Division of the Department of Transport.

The Canadian Radio Frequency Allocations Chart, measures approximately 34 inches by 30 inches, and is in full color. The chart includes a color key, a table of frequency nomenclature, a colored band showing microwave absorption characteristics, and general explanatory notes on the allocations.

Regular price of the chart is \$5.00. However, technical personnel, companies and organizations affiliated or connected in any way with the contributing sponsors to the CRTPB may purchase the chart for \$2.00. Orders, prepaid, should be sent to the Secretary-Treasurer, Canadian Radio Technical Planning Board, Room 410, 200 St. Clair Avenue West, Toronto 7, Ontario. Money orders or cheques should be made payable to Canadian Radio Technical Planning Board.

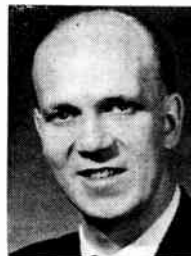
C.S.A. Specification Covers Power Operated Transmitters

An electrical Approvals Specification issued by the Canadian Standards Association under Part II of the Canadian Electrical Code is now available. It applies to power-operated radio transmitting equipment, irrespective of the type of modulation employed, designed to be used on standard supply circuits in accordance with the rules of Part I of the Canadian Electrical Code. The Specification covers equipment for general non-commercial and commercial purposes and includes installations under the jurisdiction of skilled operators.

Copies are available from the Canadian Standards Association, National Research Building, Ottawa at \$1.00 each.

F. Breston Telephone Sales Rep For Hackbusch

C. W. Cranfield, Telephone Sales Manager, of Hackbusch Electronics Limited has announced the appointment of Roy Breston as Telephone

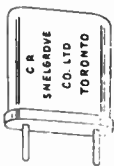


ROY BRESTON

Sales Representative in the Province of Ontario. Roy Breston joined the Stromberg-Carlson organization during November, 1947, serving in various capacities during the past seven years.

Immediately prior to his new appointment, Roy acted as General Receiver, Shipper and Warehouse Supervisor and, therefore, is thoroughly familiar with the various products handled by the Company, and will be in a position to adequately serve the Canadian Independent Telephone field.

For the Best in **QUARTZ CRYSTALS**



Specify **SNELGROVE**

Wide range of types and frequencies

Approved by D.N.D.

Similar units may be supplied to commercial specifications.

FOR EVERY APPLICATION

C. R. SNEGROVE CO. LIMITED
391 SAMMON AVENUE - TORONTO, ONT.

Manufacturers of Precision Lowdrift
Quartz Crystals for the Military and Industry



for **POWER RESISTOR** needs
COME TO . . .

Greenohm* HEADQUARTERS



Power Resistor Decade Box — any resistance from 1 ohm to 999,999 ohms—in working circuit.



"Standees"* or above-chassis-mounted power resistors in ceramic casings, with Greenohm cement filling.

The toughest power resistors made! That's why you find Greenohms in radio-electronic and electrical assemblies noted for dependable performance and longest life.

These green-colored power resistors are available in *standard* and *special* types. Protected by the exclusive cold-setting inorganic cement, these units withstand severe overloads and extreme temperature changes without altering their resistance values or appearance. Resistance windings remain unimpaired in the manufacturing process.

Your needs most likely can be met by the extensive selection of fixed and adjustable Greenohms. But if your needs are extraordinary, then Clarostat is prepared to design your special power resistors and to deliver any quantities to meet any assembly schedules.

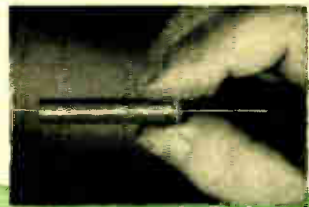
Engineering Bulletin on Greenohms, sent on request. Let us have your power resistor requirements for engineering collaboration, quotations, delivery schedules.



Stacked Greenohms for banking several power resistor sections.



Typical of special Greenohms — a screw-base resistor with handy knob for fast replacement, in changing resistance values.



Greenohm Junior or miniature resistor in ceramic casing filled with Greenohm cement.

STAND PAT WITH

CLAROSTAT

Controls & Resistors

*Trade-marks

Ask your Distributor now or write to:

ELECTRONIC TUBE & COMPONENTS DIVISION
 CANADIAN **Marconi** COMPANY

830 Boyview Avenue, Toronto, Ontario.

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

Development

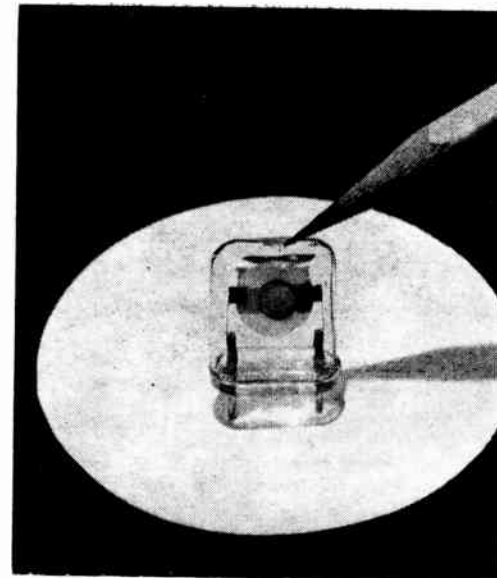
The Development Of Special Equipment To Evacuate Glass Envelopes Of Crystals And Provide Air-Tight Seals Between Envelope And Base Is Achievement Of Canadian Company In

Quartz Crystal Manufacturing

AN all glass military type quartz crystal which will overcome electronic equipment failures due to crystal ageing is the all Canadian development of the firm of Rogers Majestic Electronics Limited, Toronto. Development of the new component was made known to *ELECTRONICS AND COMMUNICATIONS* magazine by M. C. Patterson, manager of the Company's Tube and Component Division.

The new crystal now ready for mass production and use in civilian and

military communications, was demonstrated recently to members of the Electronic Component Development Committee of the Defense Research Board. Its production in commercial quantities is made possible through the development by Rogers of machinery to evacuate the glass envelope containing the quartz crystal and provide an air-tight glass seal between the envelope and glass base. The quartz crystal is contained in a high vacuum where it maintains its activity



● The all glass quartz crystal which has been developed by engineers of the Rogers Majestic Electronics Company. Production of the new component has been made possible by the development of special assembly techniques.

and frequency stability under external operating conditions which cause frequent failure to crystals in metal type containers.

The usual source of trouble in quartz crystals of the metal type, Mr. Patterson explained, is the mechanical failure of the seal and the migration of the holder and sealing materials with resulting contamination of the crystal elements. This causes a loss of activity and a frequency drift which results in failure of vital military and commercial communication equipment. This has long been a problem to designers of military and commercial equipment.

Rigorous testing by Rogers engineers had proved some time ago that placing the crystal in an evacuated glass container would increase its activity and life. The trick was to design an enclosure of the shape and small size required for modern military communications which could also be mass produced. This difficult problem was solved by a team of Canadian engineers.

Installed in military type, portable radio transmitters, the new all glass crystal was subjected to conditions which simulated extremes of arctic and tropical weather. It also underwent several months of ageing under extreme conditions of humidity and temperature. No appreciable loss of activity or change of frequency occurred throughout the duration of these tests.

The new crystal is interchangeable mechanically and electrically with the most commonly used types of military crystals. It has the same shape and dimension as the metal HC6/U holder which encloses types CR18/U, CR23/U and CR27/U.

Plan NOW to Attend...

THE 1955 ELECTRONIC PARTS SHOW

Conrad Hilton Hotel, Chicago, May 16 to 19, inclusive

VISIT CANADIAN HEADQUARTERS

Room 13 — 4th Floor

While attending the Show make Room 13 your headquarters. Drop in and register. Obtain your CANADA badge and wear it throughout the Show. Meet your friends in Room 13 and enjoy a cup of coffee with our compliments.

CANADIAN ELECTRONIC SALES REPRESENTATIVES

Members' Breakfast Meeting
Tuesday, May 17th, 8:30 A.M.
Dining Room No. 4 — Third Floor

All members CESR urged to attend this important annual meeting.

12TH ANNUAL CANADIAN LUNCHEON

Wednesday, May 18th, 12:00 Noon, Waldorf Room
Guest Speaker — S. M. Finlayson, President, Canadian Marconi Co.

Sponsored by



All Canadian visitors to the Show are invited to attend this special event. Tickets are \$5.00 each and may be obtained from the secretary.

Fred Harris, Chairman
C. G. Pointon, Vice-Chairman
A. T. R. Armstrong, Treasurer
Chas. L. Thompson, Vice-Chairman
John T. Rochford, Secretary, 25 Taylor Dr., Toronto 6, Ont.

For further data on advertised products use page 54.

Telemetry Totalizers

Sophisticated Adding Units Assist In Automatic Power Station Control

AN electronic control system capable of automatically masterminding the operation of power generating stations uses self-correcting electronic control to regulate the power plant's output and frequency in accordance with electrical demand changes. The new system, according to development engineers, is claimed to be faster acting, more accurate than conventional mechanical systems which are adjusted manually, and less complicated and expensive than earlier electronic models. Signals to each station require only one channel as contrasted to the multiple channels needed for present systems.

Like Automatic Dispatcher

Functioning much like an "automatic dispatcher", the new system achieves accurate, high-speed control through individual servo units which supervise three different methods of control. Signals, or "pulses" characterizing load swings — caused by variations in industrial demand, storms or system changes — are telemetered to the servo units. They electronically compare the signals with the standard operating levels; if a discrepancy is detected they initiate control action — by adjusting the turbine governors — to bring the system load and frequency back to normal. The individual servos are interlocked, chain fashion, to provide cumulative control of the system.

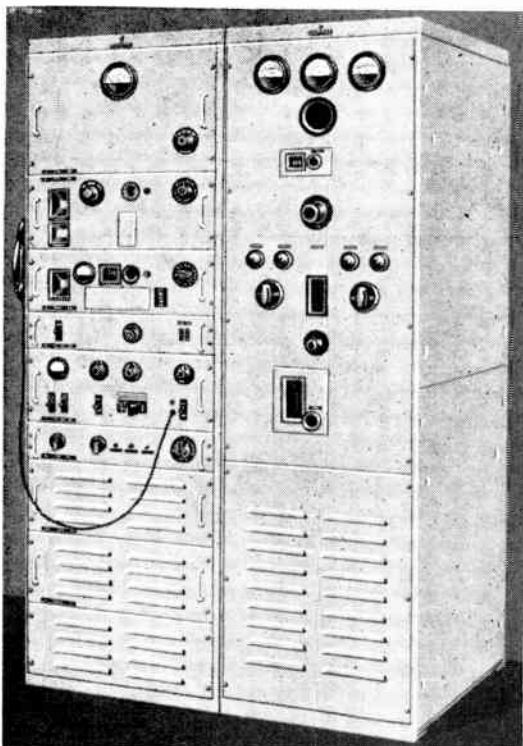
Modular Construction

Telemetry totalizers (sophisticated adding units) are incorporated in the system to tally up the power measurements. Such totals are needed for area and net load readings.

The system has an unlimited range. It can be built into new or existing power plants, either steam or hydroelectric. It uses wire, carrier or microwave forms of transmission.

Power engineers from Honeywell — who invented the system believe that the modular "or building block" — construction of the new system will result in relatively low-cost installations. Standardization of the basic servo units will facilitate assembly and expansion as well as minimizing maintenance.

24-CHANNEL VHF FM RADIO SYSTEM FOR LONG LINKS



This radio system makes possible toll-grade transmission of up to 24 3400-cycle telephone circuits over links of 100 miles or more in length. Transmission is in the band of 41 to 68 mc, which is ordinarily available for fixed point-to-point service in remote or inaccessible areas. Transmitter powers of 30, 250 and 1500 watts and antenna gains of 12 to 24 db are available. A single broad-band antenna is used for both transmitting and receiving. The associated carrier-telephone system consists of two 12-channel groups of the type F60 system, and operates in the band of 6 to 108 kc.

Type FM24/50 Radio Transmitter of 1.5 KW output power.

RADIO ENGINEERING PRODUCTS

1080 UNIVERSITY STREET, MONTREAL 3, CANADA

Telephone: University 6-6887

Cable Address: Radenpro, Montreal

MANUFACTURERS OF CARRIER-TELEGRAPH, CARRIER-TELEPHONE AND BROAD-BAND RADIO SYSTEMS

CONSTANT CURRENT or CONSTANT VOLTAGE

DUAL PURPOSE REGULATED DC POWER SUPPLY



Model PS-110

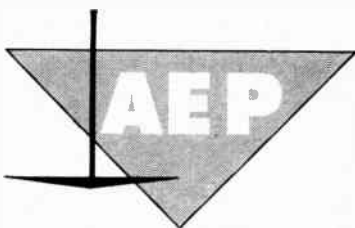
Continuously variable thru zero from full output of either polarity to full output of opposite polarity

- Constant current to 50 ma, 100 volts max.
- Constant voltage to 200 volts, 50 ma max.
- Wide range selection permits fine control to zero
- Provisions for modulation by external signal
- Voltage regulation $\frac{1}{4}\%$ or 0.3 volts, no load to full load
- Current regulation $\frac{1}{4}\%$ or $0.3\mu a$, all scales, except $\frac{1}{2}\%$ for 50 μa and 100 μa scales, max. voltage to short circuit



TELETRONICS LABORATORY, INC.

54 KINKEL STREET
WESTBURY, L. I., N. Y.



A technical sales and engineering design organization staffed by graduate engineers and offering a wide range of electronic and avionic components.

ELECTRICAL EQUIPMENT COMPONENTS



TRANSISTORS

Multiple transistor socket strips by Hydro-Aire Inc.

CAPACITORS

By Vitramon. Tiny and tough. Porcelain. Low loss—long life.

POTENTIOMETERS

Ultra low torque. Extreme precision. Made by Electro-Mec.

TRANSFORMERS

Miniature, sub-miniature, micro-miniature and standard. Made by the Microtran Company.

SYNCHROS

Reliable, interchangeable units, used in closed loop servo systems. Made by American Electronic Mfg.

RELAYS

A wide range of midget and standard DC and AC types. Made by Sterling Engineering and Potter & Brumfield.

SWITCHES

Miniature, snap-acting for control and indicating circuits. Made by Unimax.

Waterproof and Thermal switches by Control Products Inc.

Ask for details from

AEROMOTIVE
Engineering Products

MONTREAL ELWOOD 9602
5257 Queen Mary Road
TORONTO EMPIRE 4-1017
P.O. Box 760, Brampton, Ont.

Electronic Aid To Commercial Fishing

Electronic Device Will
Let The "Poor Fish"
Get Away But —
The Big Ones Better
Watch Out



● The "Fishscope" with which commercial fisherman can locate schools of fish and even examine them for size beneath the surface of the ocean.

THE list of endeavors from which the element of chance has been eliminated by the application of electronics seems still to be growing in length. The latest to be added to this list is an electronic fish-finding device which not only indicates the whereabouts of schools of fish below the surface of the water but enables the captain of a fishing trawler to view the fish on a television tube and actually identify the type of fish. The instrument, aptly named a "Fishscope" by its makers, employs the latest applications of electronics and sonar which have been developed during years of extensive research development and manufacture of underwater detection equipment.

The Fishscope consists basically of a unit which is mounted in the wheelhouse and which gives the captain an actual view on a television tube of the ocean bottom and other submerged objects. It has a range of 0 to 250 fathoms and, because of the relatively large size of the picture tube, readily picks up schools of fish below. Once such a school is spotted, the Fishscope magnifies that particular view 25 times, permitting in some cases actual identification of individual fish.

This magnification is accomplished merely by flipping a selector switch to change the range from 0 to 250 fathoms to a ten-fathom sector. A large, vernier-controlled dial is then turned to center the greatly enlarged view of the fish school in the face of the tube. The exact depth is then read off the dial.

Single Transducer

The information comes from a single transducer mounted in the ship's hull which sends out a conical "beam" of sonic waves, whose width is 100 feet at 100 fathoms depth. Since the transducer also receives these returning echo signals, a second receiver in the hull bottom is not necessary.

Because of the tremendous magnification of fish schools on the Fishscope, a trawler captain can get a much clearer idea of the potential catch and can even determine the type

of fish found. It tells him whether a set would be fruitless or profitable and also gives him warning of obstacles or obstructions which might damage his nets. Because of its clear picture it also tells the skipper when further trawling will not be profitable.

The instrument also serves as a very accurate depth indicator.

The indicating unit itself is contained in a heavy-duty cast aluminum cabinet which is rugged and spray-proof. It is gimbal-mounted and can be installed on a pedestal, bulkhead or overhead. The motor generator set can be installed anywhere to convert 6, 12, 32 or 115 DC to 110 AC current.

Designed For Serviceability

Particular attention has been paid by engineers to quick serviceability while at sea. The electronic equipment consists of basic assembled units, which can be unplugged or plugged in the same manner as an electronic tube. By carrying spares of these units, virtually any malfunction can be quickly corrected by replacement. Assessability is assured since the chassis can be quickly removed from the case. Heavy duty ribs protect equipment when the chassis is turned over or laid on its side. Dimensions of the compact unit are 15" wide, 14" high and 19" deep.

The Fishscope has already been installed on several fishing vessels and preliminary results have been hailed as outstanding with better than average hauls in far less time than normal.

The "Fishscope" is another of the many electronic aids which is being increasingly used by the fishing fleets of the east and west coast fishing industries. The application of this equipment has increased the efficiency of the industry to the point where one vessel can now perform the work hitherto required of as many as ten vessels.

For further data on advertised products use page 54.



special shapes for any requirements

FEDERAL

MAGNET WIRE

FEDERAL are specialists in the design and manufacture of electrical conductors. In Magnet Wire, all sizes and shapes . . . insulation and protective coverings . . . all are specifically designed for maximum service satisfaction. Moreover, "quality-control" through every stage of manufacture increases the excellence of the product. Thus, whether you require shaped wire for winding or rewinding electrical equipment, FEDERAL Magnet Wire will exactly meet your needs. Our engineering and production specialists will be glad to quote on your requirements. Write to-day!

FEDERAL WIRE



& CABLE COMPANY LIMITED
Guelph, Ontario

NEWS

S. G. Paterson Appointed President And General Manager Rogers Majestic Electronics

Mr. R. M. Brophy, Chairman of the Board, Rogers Majestic Electronics Limited, has announced the appointment of S. G. Paterson as President and General Manager.



S. G. PATERSON

Company.

For the past three years, Mr. Paterson has been a Director of Canadian Radio Manufacturing Corporation Limited and was recently appointed a Director of B.N.A. Holdings Limited.

Lenkurt Records \$11,500,000 Sales In 1954

A record total of \$11,500,000 in net sales was recorded in 1954 by the

Lenkurt Electric Co. of San Carlos, Calif. and Vancouver, B.C., officials of the electronics firm have announced.

The 1954 total was more than 20 per cent higher than the previous high of \$9,400,000 established in 1952 and equalled in 1953.

While increasing its sales and production activity last year, Lenkurt also stepped up engineering research work in carrier and microwave, the company announced.

One factor contributing to the record sales last year, Lenkurt officials said, was availability of newly developed 45-class carrier equipment. The company began volume production of Type 45A equipment and delivered nearly 100 of these 12-channel wireline carrier systems in Canada and the United States during the year.

In 1954 Lenkurt also began producing a 48-channel radio carrier system; completed much of the development work on a new 24-channel cable carrier system, and began development of a new 4-channel open-wire carrier system.

The company said another favorable factor in its sales picture has been the increasing demand for telephone carrier and multi-channel microwave systems in Canada. Sales to Canadian customers last year were about 30 per cent higher than in 1953, the company reported.

J. Ross, Eastern Sales Manager For S & T Sales Limited

S & T Sales Ltd. of Vancouver, Spilsbury & Tindall Distributors, announce the appointment of Jack Ross as Manager of their newly opened Eastern Sales Division with offices at 25 Clybourne Ave., Ottawa 3, Ont. Mr. Ross was with the company's Head Office in Vancouver prior



JACK ROSS

to moving east. S & T Sales Ltd. represent Spilsbury & Tindall, Comco, Raytheon and many other electronic firms.

Westinghouse Supply Names New TV-Radio Sales Manager

M. M. (Pete) Elliott has been named Sales Manager for television and radio at the Canadian Westinghouse Supply Company and will direct all marketing, pricing and service operations for those products in the coast-to-coast organization.

(Turn to page 48)

Unsurpassed

in versatility and performance



PHILIPS GM 6010 D.C. AND V.H.F. MILLIVOLTMETER

An unusually sensitive and reliable laboratory and field instrument for the following applications:

D.C. MILLIVOLTMETER: six ranges, 1 to 300 mv f.s.d.

D.C. VOLTMETER: six ranges, 1 to 300 V f.s.d.

D.C. MICROAMMETER: smallest range 0 to 1.5 millimicroamps.

Greatest range 0 to 3 microamps and 10 intermediate ranges.

MICRO-OHMETER

INSULATION METER (millions of megohms).

ELECTRONIC GALVANOMETER

Ideal for thermocouple and biological measurements. Extremely high input impedance.

V.H.F. COMBINATION

The GM 6010 utilized with the GM 6011 calibrated crystal probe and GM 6011V Attenuator permits voltage measurements from 5 mV to 100 V in frequency range 2-800 mc/s.

WEIGHT: 25 lbs.

OPERATION: BATTERY

Equipment Division

ROGERS MAJESTIC ELECTRONICS

LIMITED

11 BRENTCLIFFE ROAD, LEASIDE, ONTARIO.

For further data on advertised products use page 54.

World Radio History

2 out of 3

Engineers prefer

BURGESS BATTERIES

Independent Research proves that Engineers, the men in the know, prefer BURGESS industrial dry batteries to any other brand. Actual survey shows that BURGESS long-life dependability and superb performance are the reasons 2 out of 3 engineers choose BURGESS BATTERIES every time.

CONSULT YOUR JOBBER FOR PRICES AND SPECIFICATIONS OR WRITE DIRECT



No. 230NX

No. 4FH

Write for Engineering Manual and Check Sheet—No obligation. By return mail you will receive the Free Engineering Manual listing the complete line of Burgess Batteries together with detailed specifications; also the Burgess "Check Sheet" on which you may outline your battery requirements in the event that the battery you need has not already been developed.



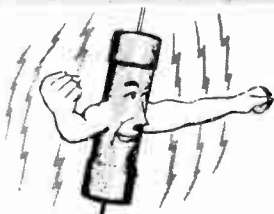
IA-22

BURGESS BATTERY COMPANY

NIAGARA FALLS

CANADA

A QUALITY DRY BATTERY FOR EVERY PURPOSE



I'm **DALOHM...**
miniature but mighty!



You can depend on
**TYPE DC DEPOSITED
CARBON RESISTORS**

Manufactured under rigid quality controls to deliver matchless performance and economy. Pure carbon in crystalline form is bonded to a selected ceramic core and then sealed against moisture with a special silicone coating having high di-electric strength, excellent thermal conductivity, and high resistance to abrasion.

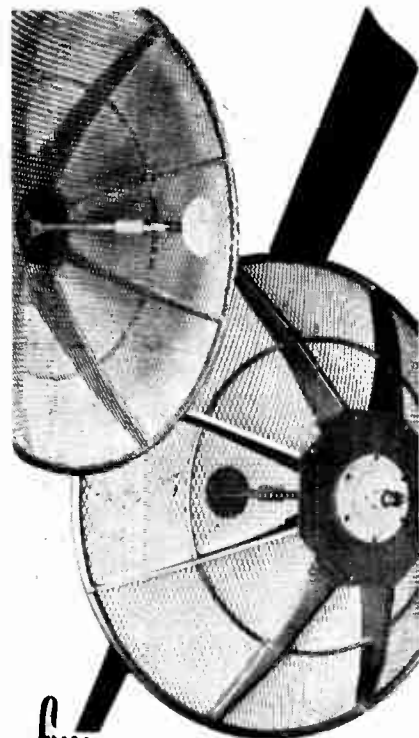
Five wattage ranges and seven basic sizes: DC-1/8, 1/8 watt; DC-1/4, 1/4 watt; DCS-1/2, 1/2 watt; DCM-1/2, 1/2 watt; DC-1/2, 1/2 watt; DC-1, 1 watt; DC-2, 2 watts.

- From 1 ohm to 200 megohms, depending on type
 - Temperature coefficient varies slightly from 140 PPM to 500 PPM per degree C
 - 1% accuracy. (Other tolerances available)
- Meet MIL-R-10509-A Specifications

WRITE FOR
BULLETIN
No. R-24

DALE PRODUCTS, Inc.

1322 28th AVE., PHONE 2139 COLUMBUS, NEBRASKA, U.S.A.
Export Dept., Pan-Mar Corp., 1270 Broadway, New York 1, N.Y.



from
ANY ANGLE...

Prodelin
**PARABOLIC ANTENNAS
OFFER MORE!**

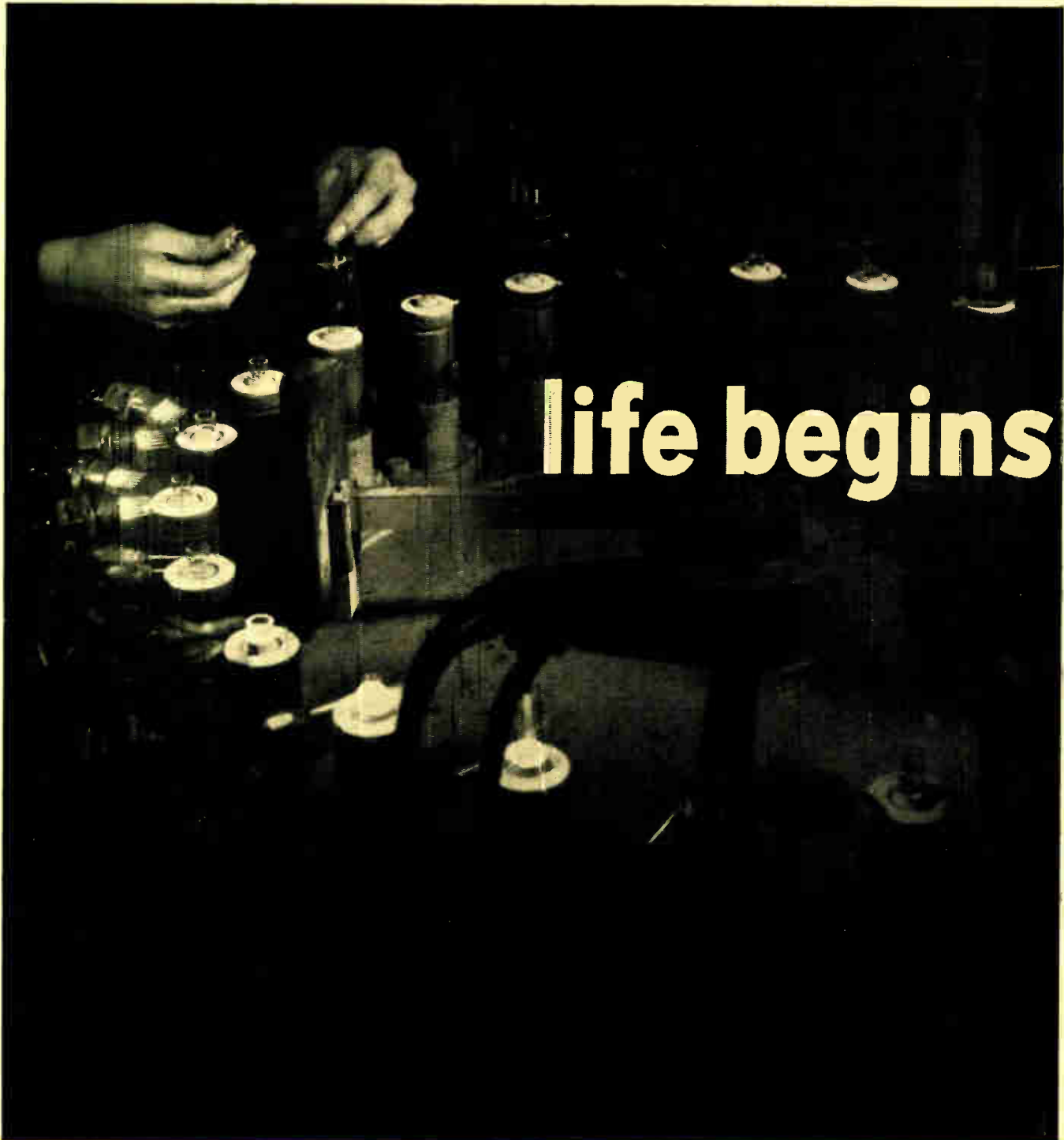
No matter how you look at it, you'll get *more* when you specify Prodelin expanded aluminium mesh parabolic antennas. Prodelin's long list of *plus* features and its dependable, service-proven performance in thousands of installations throughout the world have made it the world's largest supplier of parabolics for microwave relay service from 400 to 2110 mcs.

- High Gains
- Broadband Operation
- Less Wind Loading
- Greater Rigidity
- High Efficiency
- Variable Polarization
- Rear Mounted Feeds
- Pressurized Dipole
- Adjustable Mount

Get the complete story on Prodelin antennas, towers, transmission line, waveguides and associated system components. Ask about "Job-packaging" — the remarkable Prodelin service that delivers a complete antenna system, *systemized* to your particular job, with *matched components* and *installation-ready* at your site, when you need it. Write:

Prodelin Inc

307 BERGEN AVE., KEARNY, N. J.



life begins f

Replace with guaranteed

ROGERS
ELECTRONIC TUBES



RECEIVING TUBES • PICTURE TUBES • TRANSMITTING TUBES • FERROXCUBE •

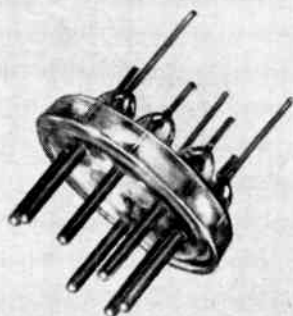
For all miniature tubes, life begins with a finely moulded glass base. The machine shown here makes glass bases for ROGERS miniature tubes.

or a 6CB6

As the machine revolves, seven pins are automatically fed into each of its twenty-four heads. The operator then drops a glass sleeve over the pins. Successive flames then play on the glass, softening it to workability before two presses, in turn, mould it around the pins to give a vacuum tight bond. The hood covering the head on the extreme right supplies hydrogen. This removes all oxides from the pins leaving them clean and bright.

High standards of engineering, rigid inspection and the thorough testing of every completed tube ensure the high quality and long-life performance of ROGERS electronic tubes.

These are finished bases as they come off the machine, at a rate of 1200 per hour. On each base various components such as cathodes, grids, and screens are later assembled to form the tube mount.



GERMANIUM DIODES • SPECIAL PURPOSE TUBES

U.H.F. and V.H.F. twin tetrodes for communication equipment

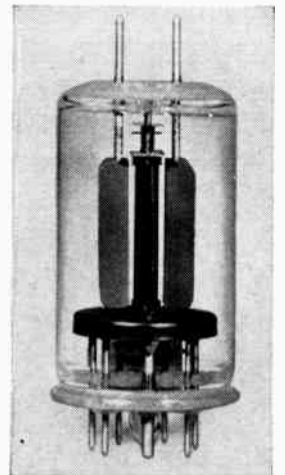
**LONG LIFE • HIGH EFFICIENCY
STURDY CONSTRUCTION
SMALLER • STRONGER**

The type 5894 tube is a U.H.F. and V.H.F. twin tetrode for wide band operation, RF amplifier, modulator, frequency multiplier service and wide-band oscilloscopes. The 5894 is notable for its low battery drain and high power gain.

Other points of interest are: no external neutralization is necessary • zirconium coated molybdenum anodes ensure high overload capacity and lifetime gettering action • single cathode and screen grid construction results in low RF degeneration, therefore low drive is required • self neutralized over the entire band • measures only 4" x 1-13/16". *Improved HF performance.* The symmetry of the system is achieved by the rigid support of the two plates in a manner not requiring insulated support from the rest of the structure. The cathode-grid assembly is equally rigid due to the symmetrical nature of its structure.

Physically stronger. The anode seal strength has been increased by replacing the top section of the tube with a powdered glass seal. This and other construction features enables the tube to withstand greater shock and vibration.

Characteristics: 144 MC—85 watts output; 220 MC—85 watts output; 420 MC—60 watts output; plate voltage—750 volts; anode dissipation—45 watts. Half filament battery drain on "Standby" possible.



The type 6360 tube is a small—3" x 7/8"—twin tetrode that gives high power at low cost. It is highly efficient for operation at up to 200 MC and is an excellent frequency multiplier for the 2 meter and 200 MC bands.

For longer life and better performance specify ROGERS 5894 and 6360 U.H.F. and V.H.F. twin tetrode tubes.

WRITE DEPT. A.A. TUBE & COMPONENT DIVISION

ROGERS

MAJESTIC ELECTRONICS LIMITED

Brentcliffe Road, Leaside, Toronto 17, Ontario
MONTREAL • TORONTO • WINNIPEG • VANCOUVER

NEWS

One Thousand Doctors See Salk Vaccine Presentation By Closed Circuit Television

Doctors in Quebec, Montreal, Ottawa and Toronto were permitted to view the dramatic presentation of the results of the Salk Vaccine tests via a "live" closed circuit telecast from Ann Arbor, Michigan on April 12th, 1955.

1000 doctors attended the showing in Toronto, 250 in Quebec and 200 in Ottawa. CAE, through its Consumer Products division — Dumont Television — had made the technical arrangements for the Canadian end of the continent-wide telecast which allowed Dr. Jonas E. Salk and several of his co-workers to explain and elucidate the test results as well as the basic research which led to the development of the polio vaccine.

In this way important facts and details were transmitted with a minimum of delay to allow immediate action by physicians before the onset of the poli season. Full facilities were also made available for extensive coverage of this history-making event by the press, radio and television.

The success of the Salk Vaccine Closed Circuit Telecast again points up television as an important instru-

ment for the immediate communication of ideas which in this particular case may well help to save lives by conquering the obstacles of time and distance.

Radio Valve Company To Enlarge Facilities

Radio Valve Company, Limited, plans construction of a single-storey, 120,000 square foot plant for the manufacture of television picture tubes and related products on a 35-acre site at Islington Avenue and the Highway 401 cloverleaf in Etobicoke, W. E. Davison, President, has announced.

The new plant will manufacture TV picture tubes, Cathode ray tubes, oscilloscope tubes, radar indicator tubes and like products. It will represent an expansion of the company's present manufacturing facilities on Dufferin Street in Toronto. Architects on the project are Wilson and Newton. Consulting engineers are Nicholas Fodor and Associates Ltd.

M. I. Rosenthal Appoints New Salesmen At CESCO

Mr. M. I. Rosenthal, President of Canadian Electrical Supply Co. Ltd., has announced the appointment of J.

P. Lemay and G. MacDonald as salesmen to the company's Montreal branch.

Mr. Lemay has had 25 years' experience in the radio and appliance business as a salesman and Manager for Ottawa Light, Heat and Power. He also had his own business in Hull, where he was active in many organizations being a founder of the Hull Junior Board of Trade and an active member of the Hull Rotary Club.

Mr. George MacDonald has had 10 years' experience with leading Montreal department stores in the electrical appliance field and as a Department Manager. From his past experience he has an intimate knowledge of the dealers' problems of buying, selling and merchandising, and will be able to offer much direct assistance. Mr. MacDonald will be covering dealers in the west-end of Montreal selling traffic and major appliances.

Mr. Harold Sharkey has been appointed as Sales Manager for Montreal district. Mr. Sharkey has had considerable experience in the radio industry for the past 10 years. He has been with the company as a salesman for two years and is well known to the Montreal dealer trade. In his new position Mr. Sharkey will be occupied mainly with increasing personal service to customers and to assist in sales training.

(Turn to page 78)

INTERCOM TELEPHONES

by *Etelco*

Instantaneous direct communication at the touch of a button with ETELCO push-button telephone.

SOLD, INSTALLED AND SERVICED BY
ENGINEERED SOUNDS SYSTEMS
LIMITED

169 Kipling Ave. S., Toronto 18

GENERAL ELECTRONICS COMPANY
353 Prince Albert Ave., Montreal

Dealer inquiries invited from the exclusive distributor in Ontario, Quebec and British Columbia.



60 Front Street West, Toronto, Ont.



- 5, 10 or 15 line.
- Modern clean design of molded plastic in ivory or black.
- Robust, reliable, easy to maintain.
- Economical operation.
- Loudspeaking master systems available.

For further data on advertised products use page 54.

COMMUNICATIONS

(Continued from page 27)

letters of the exchange name and the next number—will select the exchange, and the last four will take the call to the telephone and ring it. To reach EMpire 8-3911 in Toronto from Van-couver, for instance, a caller would dial 4-1-6-E-M-8-3-9-1-1.

The construction and installation of the crossbar equipment and the intro-duction of new numbering systems are not the only phases of the project, for there's also a great deal of wire and cable work to be done. The Toronto machine, for instance, will be connec-

ted directly to 90 long distance centers via 1,500 circuits which have yet to be built or re-arranged.

Choice of 50,000,000 Numbers

But when the overall job is com-pleted, some 50,000,000 telephones will all be within dialing range of one another.

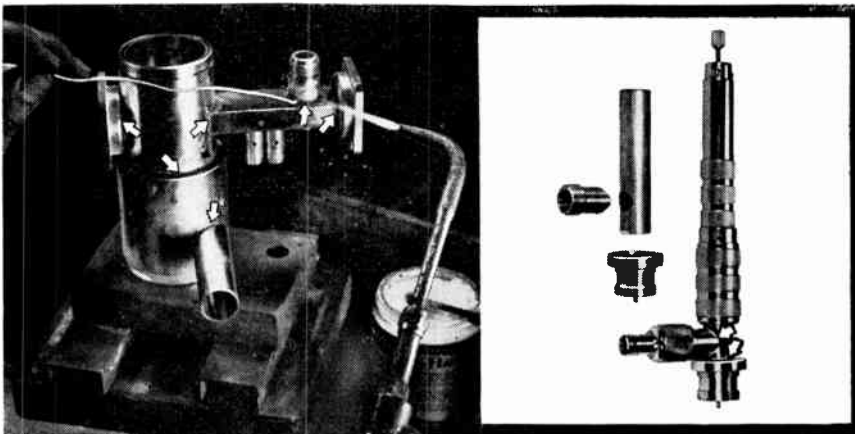
What will all this mean to the average telephone user? It will prac-tically eliminate delays caused by busy circuits, and will create big time-savings in obtaining long distance con-nections because the telephone at the other end will start ringing as soon as the dialing is completed.

EASY-FLO & SIL-FOS SILVER ALLOY BRAZING

A "must" for every designer of electronic equipment

Profitable, low-cost production starts on the drafting board. That's why electronics designers should know about EASY-FLO and SIL-FOS brazing. In addition to amazing strength, speed and economy in metal assembly, these low-tempera-ture silver brazing alloys offer the important advantages of high elec-trical conductivity, strong resistance to corrosion and minimum danger of overheating when joining thin metal.

HERE ARE THREE TYPICAL EASY-FLO SILVER BRAZED JOBS



1. Klystron Tube Mount assembly for Micro-wave Spectrum Analyzer — 6 EASY-FLO joints.
2. Broadband Probe—the main body is EASY-FLO brazed to base and detector tee.
3. Wave Guide assembly for Direct Reading Frequency Meter — 4 EASY-FLO joints.

For the Facts in Print — Get Bulletin C20 It gives all the advantages of EASY-FLO and SIL-FOS Brazing, plus useful informa-tion about joint design and fast production brazing methods. Write for a copy. today.



PRECIOUS METALS SINCE 1867

HANDY & HARMAN OF CANADA LIMITED

141 JOHN STREET, TORONTO 2B, ONTARIO
MONTREAL SALES OFFICE—620 CATHCART STREET

SILVER BRAZING ALLOY DEALERS IN ALL PRINCIPAL CITIES

— MADE IN CANADA —

VARIABLE RESISTORS

**2 WATT
COMPOSITION TYPE**

**Sturdy!
Low Drift! Dust-Proof!**

**APPROVED FOR
JAN-R-94 type RV-4**

+

**PRECISION ELECTRONIC
COMPONENTS LTD.**

50 WINGOLD., TORONTO, ONT.
RU. 1-6174

STARK

**ELECTRICAL AND
ELECTRONIC INSTRUMENTS**

METERS SWITCHBOARD TYPES

Flush and Surface Mounting.
Available in all commercial ranges.

PANEL TYPES

Round and Rectangular from 2" to 9". AC and DC.
Ammeters-Milliammeters-Microammeters-Voltmeters,
etc.

TEST INSTRUMENTS
For Electrical, Radio and Television applications.
Analyzers-Signal Generators-Tube Testers
Vacuum Tube Voltmeters, etc.

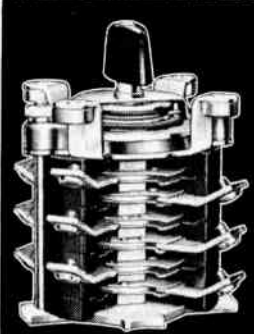
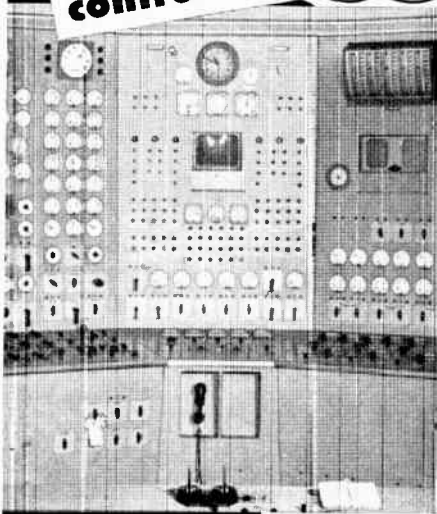
STARK ELECTRONIC INSTRUMENTS LIMITED

General Offices and Factory: AJAX, Ontario
Export Division: 276 West 43rd St., New York 36, N.Y., U.S.A.
Cables: STARKEX, New York

ESCO



**instrument and
control switches**

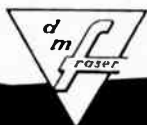


TYPE JR

For Every Control and Transfer Application. The Type JR rotary switch is rated at 10 amperes, 125 volts AC, or 5 amperes, 125 volts DC.

TYPE P

Standard or Special Applications. The Type P rotary switch, a high speed snap action switch is rated at 10 amperes, 125 volts AC or 5 amperes, 125 volts DC. Also available in heavier designs for 30, 60, 100 or 200 amperes at 600 volts AC or 250 volts DC.



D. M. FRASER LIMITED

1070 Birchmount Road, Box 70,

O'Connor Postal Station

TORONTO 16, ONTARIO

Branch Office: 1570 St. Matthew St.,

Montreal, Que.



Book Review



Magnetic Amplifiers by Dr. Herbert F. Storm. Magnetic amplifiers are found in almost every branch of industry today. This new book by Dr. H. F. Storm and other top specialists at the General Electric Company offers a useful presentation of the theory of magnetic amplifiers, along with theoretical and practical data on core materials, core-making techniques, and metallic rectifiers. Many practical applications are described.

Although the theory of the magnetic amplifier is the focal point of the book, related fields vitally affecting the performance of magnetic amplifiers are also fully discussed. This coverage includes: a modern theory of magnetism; characteristics of magnetic materials; magnetic testing; manufacture of saturable reactors; and properties of metallic rectifiers. Because of the close relation between magnetic amplifiers and ac saturating reactors, a complete chapter is given to peaking transformers, voltage stabilizers, nonlinear resonance circuits, and reactors for large mechanical rectifiers.

Magnetic Amplifiers by Dr. Herbert F. Storm is published by John Wiley and Sons Inc., 440 Fourth Ave., New York; contains 545 pages, hard cover bound, cost \$13.50.

Basic Electricity by Van Valkenburgh, Nooger and Neville Inc. The texts of the entire Basic Electricity and Basic Electronics courses, as currently taught at Navy specialty schools, have now been released by the Navy for civilian use. This educational program has been an unqualified success. Since April, 1953, when it was first installed, over 25,000 Navy trainees have benefited by this instruction and the results have been outstanding.

The unique simplification of an ordinary complex subject, the exceptional clarity of illustrations and text, and the plan of presenting one basic concept at a time, without involving complicated mathematics, all combine in making this course a better and quicker way to teach and learn basic electricity and electronics. The Basic Electronics portion of this course will be available as a separate series of volumes.

Basic Electricity is published by John F. Rider, 480 Canal Street, New York, contains 124 pages, soft cover bound, cost \$2.00.

Transistor Audio Amplifiers by Richard F. Shea. The primary purpose of this book is to provide the practical fundamentals of transistor applications and to show how these fundamentals may be used in the construction of audio amplifiers. Clearly, and employing only a minimum of mathematics, the author explains how the reader may:

- (1) intelligently apply these principles in his designs;
- (2) avoid pitfalls; and
- (3) achieve the ultimate in performance from transistor devices.

A large amount of practical material is included in these pages. For example, data is presented on the variation of transistor parameters with operating point, with temperature and between units. Also, the various methods of coupling transistor stages together are analyzed. A number of examples are given of the design of amplifiers intended for a variety of applications, ranging from pre-amplifiers to relatively high-powered output amplifiers.

The volume will provide the user with the necessary tools whereby he can design an audio amplifier to meet the prerequisites of frequency, response, signal-to-noise ratio, input power, and output power in such a manner as to insure maximum reproducibility, longest life, maximum freedom from the effects of temperature and humidity, and last, but not least, lowest cost.

Transistor Audio Amplifiers is published by John Wiley and Sons, Inc., 440 Fourth Ave., New York, contains 219 pages, hard cover bound, cost \$6.50.

Storage Batteries Fourth Edition by George Wood Vinal. Reflecting the many technological advances in battery design and construction that have taken place during the past fourteen years, the new fourth edition of Storage Batteries has been largely rewritten to bring the reader up to date in this rapidly developing industry.

The book emphasizes the scientific principles of storage batteries without allowing the treatment to become too highly technical. Physical and chemical properties of the materials employed in making batteries are discussed, and the reader is given a general description of manufacturing processes. The clear, practical presentation of the principles of operating storage batteries covers charging and discharging, and all their variations: constant current charge, modified constant potential charge, boosting, equalizing and trickle charge, floating, and system-governed charge, gas evolution, and the effects of high and low temperatures. Important industrial applications are described, including telephone service, railway signaling, car lighting, and air conditioning, automotive starting on passenger cars, Diesel starting, trucks and tractors for transporting goods, batteries on shipboard, airplane batteries, and use in mining operations.

Storage Batteries is published by John Wiley and Sons Inc., 440 Fourth Avenue, New York, contains 446 pages, hard cover bound, cost \$10.00.

TV Manufacturers' Receiver Trouble Cures Volume 6 Edited by Milton Snitzer. The material contained in this latest volume comprises cures dealing with later model receivers than were covered previously. In addition, some new cures which have been evolved for earlier receivers are included.

After a certain model or chassis has been in the field for a while, certain troubles may occur which are peculiar to that receiver. In an effort to maintain his own good reputation, the manufacturer is interested in keeping his receiver in tip-top working order. Therefore, his service or engineering department evolves a cure for the particular trouble.

The question may be asked, "Why doesn't the manufacturer incorporate the cure into future production runs of his own receiver?" The answer is that he frequently does. However, it is certainly not possible, with such a complex device as a TV receiver, to hold off on production until every single "bug" has been removed. The fact remains that many receivers are in the field and do develop certain peculiarities of operation for which the manufacturer has a definite tried-and-tested cure. Many of these cures will be found in this volume.

TV Manufacturers' Receiver Trouble Cures is published by John F. Rider, 480 Canal Street, New York, contains 120 pages, soft cover bound, cost \$1.80.

Electroanalytical Chemistry by J. J. Lingane was planned by the author to deal with the newer methods based on coulometric titrations. However, experience with both graduate students and practicing analytical chemists convinced the author that the newer developments can be neither appreciated nor rationally applied without a sound understanding of those aspects of electrochemistry which constitute the common well-spring of all electroanalytical practice. Therefore it was decided to broaden the treatment to include nearly the whole field — "nearly the whole field" because polarographic analysis, although one of the strongest and most fruitful branches, has been omitted.

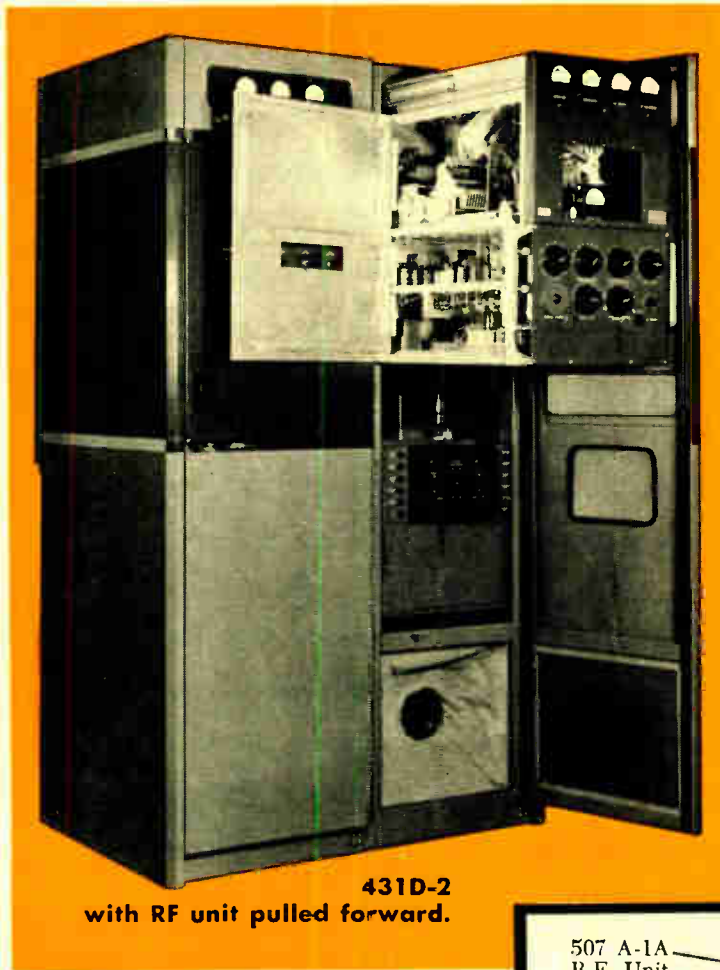
Electroanalytical Chemistry is published by Interscience Publishers Inc. 250 Fifth Avenue, New York 1, N.Y., contains 448 pages, hard covered, cost \$8.50.

Custom installations

with production-line economy

Collins 430

SERIES TRANSMITTERS



431D-2
with RF unit pulled forward.

Building-block assembly permits low-cost custom built HF communications transmitters

A Collins 430 Series transmitter can be tailored to your specific communications requirements — and at low cost. Various combinations of well-designed mass produced Collins basic units are assembled and mounted in one or more cabinets. The Collins method of assembly line production of sub-assemblies results in low manufacturing costs. And, because a great variety of sub-assemblies are produced, many different combinations are possible for *custom installations*.

Developed to fulfill requirements of ground-to-plane, shore-to-ship, and point-to-point transmissions, the 430 Series transmitters are available with modulator and FSK units if desired. Provisions are also made for use of a master oscillator.

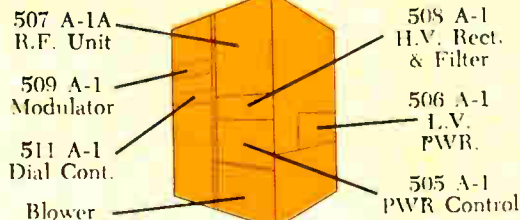
Collins' exclusive Autotune makes complete remote control practical. For example, the 431D-2 shown above can be completely controlled at distances up to 25 miles by a telephone dial system.

All 430 Series transmitters use efficient tetrode tubes in modern circuits to give an ideal power-to-size ratio for maximum economy of space.

Here is outstanding equipment, with wide frequency range and high performance, at low cost. Equipment designed to meet your changing requirements economically, too.

Write today for complete description and technical information.

430 Series transmitters Condensed Specifications
Power Output: 431 Series — 1000 watts CW, FSK or phone. 432 Series — 2500 watts CW or FSK. 2000 watts phone.
Frequency Range: 2.0 to 30.0 mc.
Power Source: 208 to 230 volts, single phase, 50/60 cps.
Cabinet Size: Single cabinet, 26" wide x 33" deep x 84" high. Dual cabinet, 48" wide x 33" deep x 84" high.



Line drawing of transmitter frame showing building-block assembly.

COLLINS RADIO COMPANY OF CANADA, LTD.

74 Sparks Street
OTTAWA, ONT.



NEW PRODUCTS

New Product specifications published in Electronics and Communications have been briefed for your convenience. If you require further information on any of the items published you may readily obtain such by using our Readers' Service, Page 54. Just mark the products you are interested in on the coupon on Page 54 and the information will be in your hands within a few days.

● Ceramic Buyers' Guide Item 643

A new Engineered Ceramics Buyers' Guide, complete in every detail, is now available. This two color, 16-page Guide is designed for the use of purchasers and designers of ceramic parts. Advantages of engineered



ceramics over other materials and the types of ceramic for specific uses are given in this Engineered Ceramics Guide.

The Ceramic Buyers' Guide is included in Sweets 1955 Product Design File. This file

may be found in your company's Technical Library for handy reference.

● Miniature Transformer Catalog Item 644

Available from stock as cataloged items for immediate delivery, this new 1955 miniature transformer catalog gives detailed specifications on hundreds of miniature transformers designed for applications in guided missiles, transistor circuitry, radio paging, airborne applications. These units are available in hermetically sealed, molded, encapsulated, or impregnated construction.

● New Amphenol Cable Catalog Item 645

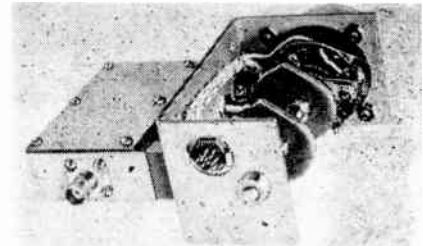
The release of an entirely new catalog devoted exclusively to Amphenol wire and cable products has been announced. Called W1, the new catalog contains 34 pages of cable illustrations and descriptions and includes the following information: jackets, conductors and dielectric data, attenuation and power ratings, a complete listing of Military RG/U Nomenclature, and a cable connector selector chart. W1 is unique in its RG type coaxial cable section. For the first time in any catalog each of these cables are individually illustrated and described. W1 also catalogs Noise-Free, ALJAK, Miniature and Triaxial cables as well as transmitting

and receiving twin-leads. Cables and connectors for Community TV Systems are described. The entire catalog is cross-indexed by Amphenol and Military numbers.

● Remote Control RF Attenuator Item 646

A new remote control adaptation of a standard R.F. Attenuator has just been developed and made available. The new unit, Series 544, is cam operated and solenoid driven. Its salient feature is a special arm which permits remote selection of any of the following cam operated positions on the R.F. Attenuator.

1. First position and second position, entirely out of circuit.
2. First attenuation position in the circuit, and second attenuation position out of the circuit.
3. Both attenuation positions in the circuit, both.



This cycle can be repeated indefinitely.

This new type features all of the characteristics of the standard Daven R.F. unit . . . it is flat from dc to 225 megacycles and maintains a resistance accuracy to ± 2 per cent. Power rating is 0.25 watt. The unit operates on 115 v dc and measures $5\frac{1}{2}$ " high x $5\frac{1}{2}$ " long x $2\frac{3}{8}$ " wide. Although the unit shown has three steps, variations zero attenuation. A maximum of 20 db per step can be supplied.

We Can Do It For You

We here at Osborne Electric Co. Ltd. wholly a Canadian organization have nearly a decade of successful experience, meeting most production problems in engineering and design on both sides of the border. Our plant, tool and die shops are efficiently equipped for exacting manufacturing, testing and design procedure. Above all, the flexibility of our organization proves "service in a hurry" is always available on demand.

1. Special or custom transformers up to 1.5 K.V.A. and 50 K.V.
2. Magnet Coils up to 600 lbs. Special purpose Solenoids.
3. Epoxy Plastic moulded transformer coils and components. Service for the trade in plastic moulding and coating.
4. Switchboards and control panels.
5. Special rotating machines such as generators and motors.
6. Short runs of compression and injection moulded components.
7. Special purpose machines electrically and electronically controlled.
8. Dies and moulds for plastics and die castings. Tool dies, jigs and fixtures for the electrical and electronic trade.

Prompt attention paid to inquiries.

OSBORNE ELECTRIC COMPANY LTD.

95 WESLEY STREET

TORONTO 14, ONT.

For further data on advertised products use page 54.

● Precision Metal Film Type Resistor

Item 647

The recently announced Davohm Series 850 Resistor is the subject of a new six-page brochure now available free. The Davohm metal film type is an entirely new type of resistor. The Series 850 combines, for the first time, qualities of precision and predictable accuracy with lower cost and production availability. Hermetically sealed, with temperature coefficient independent of resistance value, the new resistor is ideal for aircraft and radar use. The covering brochure gives full details of performance in the $\frac{1}{2}$, 1, and 2 watt sizes.

● Capacitor Guide For Servicemen

Item 648

A leading manufacturer of capacitors and RF noise suppression filters has just issued a new sixteen page capacitor estimating and pricing guide in handy pocket size for the convenience of servicemen. It contains all essential data on all ASTRON capacitor types for replacement in home radio, phonograph and television equipment. List prices are given to enable the service technician to make on-the-spot estimates and to show customers actual costs.

● Silicone Controlled Time Delay Relay

Item 649

A compact new silicone-controlled time delay relay embodying many design improvements has been announced.

Designated as the Type A Silic-O-Netic Relay, it is available with standard timings from $\frac{1}{4}$ to 120 seconds. Variable flux operation, caused by the changing relationship of a solenoid coil and its core, produces highly definitive contact action. In the new design, magneto-motive force has been considerably increased as compared with earlier relays of this type. This factor combined with special spring loading of the armature has achieved high speed contact action with substantial pressure for reducing contact resistance.



The Type A Silic-O-Netic Relay utilizes the Heinemann hydraulic-magnetic principle, in which a silicone fluid is the basis of time delay. A movable iron core, hermetically sealed in a non-magnetic metal tube extending through a solenoid coil, is drawn into the magnetic field resulting when the coil is energized. The silicone fluid slows the rate of core travel, thus controlling the response time. Contacts are actuated as the core touches the pole piece and check valve construction within the core allows faster re-setting of the relay.

Silic-O-Netic Time Delay Relays are furnished with coil ratings from 24 to 240 volts, ac; 6 to 125 volts, dc.

Ferranti Electric Ltd., Mount Dennis, Toronto 15, Ont., is sales representative for Heinemann Elec. Co.

● Precision Potentiometers

Item 650

Helipot series AJ are miniaturized ten-turn precision potentiometers for servo or bushing mounting . . . combining high resolution and close linearity characteristics with minimal size and weight. Only 2 inches long by $\frac{1}{8}$ " in diameter . . . weighing only 1 ounce . . . the AJ contains a mandrel-wound resistance element 18 inches long . . . providing resolution as fine as 0.01 per cent . . . with linearity tolerance as close as 0.1 per cent.

A wide range of total resistance is provided. As many as 32 taps can be added during manufacture . . . each spot-welded to a selected single turn of resistance wire . . . without shorting out adjacent turns.

AJSP models have servo lid and precision miniature ball bearings . . . AJS models, servo lid and sleeve bearings . . . AJ models, threaded bushing and sleeve bearings.

● Radar At A Price All Can Afford

Item 651

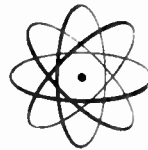
Marine radar equipment — the Decca 212, the world's lowest priced full performance radar — designed to offer all classes of shipping a sound and reliable set with remarkable picture quality, robust compact design, at a price all can afford, is now available.

For the coaster, tug or fishing boat, the Decca 212 offers true big ship performance at low price; low in both capital and operating cost.

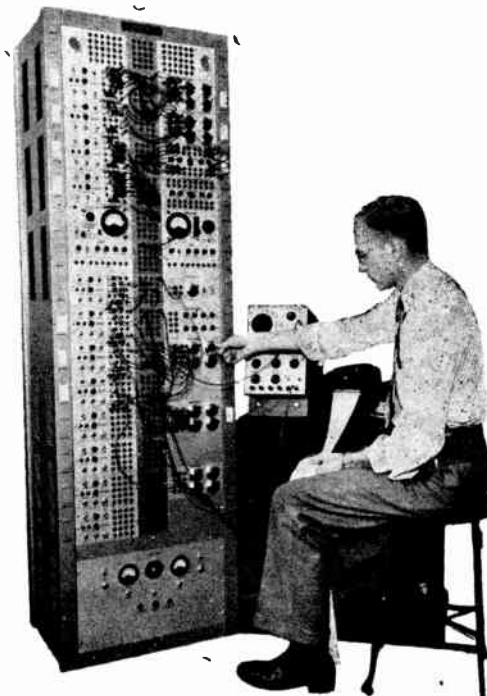
This compact, lightweight radar provides a 9" radar screen giving six ranges from $\frac{1}{2}$ mile to 30 miles with a minimum range of 30 yards or less. Standard equipments are designed to operate from 24v, 32v, 48v 110v and 220v dc and power consumption is low — factors which, coupled with low cost, make the Decca 212 available for the smallest of vessels. (Turn to page 58)

The "BOEING" Electronic Analogue Computer

. . . a powerful device in scientific research and engineering. It can



solve different types of equations, simulate physical and economical systems, or can be tied in as a controller of complicated processes, among numerous other applications.



LOW COST
PRECISION
VERSATILITY
AVAILABILITY
SIMPLICITY
COMPACTNESS



Produced by — Boeing Airplane Company, Seattle, Washington, U.S.A.

We invite your enquiries

COMPUTING DEVICES of CANADA Ltd.

Exclusive Canadian Distributors

311 Richmond Road

Ottawa, Canada



READERS' SERVICE PAGE

We realize that our readers are busy people and may not always have time to write letters of enquiry to manufacturers regarding advertised products that are of interest to them. Therefore, to save you the time of writing a letter, we offer you the use of this Readers' Service Page. It is designed for your convenience in obtaining free and without obligation detailed information on any advertiser's product or New

Product appearing in this issue of *Electronics and Communications*.

Check as many New Products or Advertisements as you like on the attached coupons and send to *Electronics and Communications*, 31 Willcocks Street, Toronto 5, Ontario. We will see that detailed information concerning your enquiries is in your hands within a few days.

Check Advertiser's Name For Information

| Advertiser | Page | Advertiser | Page |
|--|------|---|-------|
| <input type="checkbox"/> Aeromotive Engineering electrical equipment | 42 | <input type="checkbox"/> Federal variable test voltage megohmmeter | 43 |
| <input type="checkbox"/> Aeroxox interference filters | 63 | <input type="checkbox"/> Hammond transformers | 67 |
| <input type="checkbox"/> American Research environmental test equipment | 61 | <input type="checkbox"/> Handy & Harman silver alloy brazing | 17 |
| <input type="checkbox"/> Amperite thermostatic delay relays | 6 | <input type="checkbox"/> Heath electronic equipment kits | 49 |
| <input type="checkbox"/> Andrew parabolic antenna | 84 | <input type="checkbox"/> Helipot electronic equipment | 85-89 |
| <input type="checkbox"/> Automatic Electric distribution cable | 58 | <input type="checkbox"/> Hewlett-Packard amplifiers | 70 |
| <input type="checkbox"/> Automatic Electric power equipment | 82 | <input type="checkbox"/> Hooker electronic components | 83 |
| <input type="checkbox"/> Bach Simpson meters | 14 | <input type="checkbox"/> Industrial Development Bank services | 37 |
| <input type="checkbox"/> Baby test equipment | 67 | <input type="checkbox"/> Industrial Electronics electronic rectifiers | 78 |
| <input type="checkbox"/> Bell Telephone communications services | 73 | <input type="checkbox"/> Jackson color Bar Dot Generator | 18 |
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| <input type="checkbox"/> Bendix vibration-resistant electrical connector | 83 | <input type="checkbox"/> Lenkurt carrier | 91 |
| <input type="checkbox"/> Berco rotary regavoil | 8 | <input type="checkbox"/> Measurements Corp. V.H.F. megacycle meter | 66 |
| <input type="checkbox"/> Bohne springs | 8 | <input type="checkbox"/> Measurements Engineering electronic equipment | 74 |
| <input type="checkbox"/> Bomac microwave tubes and components | 2 | <input type="checkbox"/> Microlab transcription turntables | 57 |
| <input type="checkbox"/> Budelman electronic equipment | 10 | <input type="checkbox"/> Microlab pick-up arm | 62 |
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| <input type="checkbox"/> Canada wire and cable | 75 | <input type="checkbox"/> Motorola two-way radio equipment | 77 |
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| <input type="checkbox"/> Canadian Electrical Supply Co. catalog | 60 | <input type="checkbox"/> Northern Electric microphones | 20 |
| <input type="checkbox"/> Canadian International Trade Fair | 81 | <input type="checkbox"/> Northern Electric wire, cable and communications equipment | 20 |
| <input type="checkbox"/> Canadian Marconi radiotrons | 3 | <input type="checkbox"/> Osborne electronic equipment | 71 |
| <input type="checkbox"/> Canadian Marconi photocell | 80 | <input type="checkbox"/> Phillips rural distribution cable | 52 |
| <input type="checkbox"/> Canadian Marconi universal bridge | 55 | <input type="checkbox"/> Phillips telephone cables | 59 |
| <input type="checkbox"/> Canadian Stackpole resistors | 92 | <input type="checkbox"/> Phillips V.H.F. millivoltmeter | 23 |
| <input type="checkbox"/> Canadian Westinghouse tubes | 9 | <input type="checkbox"/> Precision Electronic Components variable resistors | 49 |
| <input type="checkbox"/> Cannon plugs | 22 | <input type="checkbox"/> Prince & Roberts private automatic telephone exchanges | 59 |
| <input type="checkbox"/> Centralab electronic components | 5 | <input type="checkbox"/> Prodelin parabolic antenna | 45 |
| <input type="checkbox"/> Clarostat controls and resistors | 39 | <input type="checkbox"/> Pye intercommunications telephones | 48 |
| <input type="checkbox"/> Collins transmitters | 51 | <input type="checkbox"/> Radio College of Canada technicians available | 57 |
| <input type="checkbox"/> Computing Devices electronic analogue computer | 53 | <input type="checkbox"/> Radio Engineering 24 channel V.H.F. F.M. radio system | 41 |
| <input type="checkbox"/> Consolidated Electronic solder gun | 68 | <input type="checkbox"/> Rogers Electronic tubes | 46-47 |
| <input type="checkbox"/> Cossor square wave generator | 62 | <input type="checkbox"/> S. & T. Sales electronic equipment | 16 |
| <input type="checkbox"/> Cossor variable electronic filter | 62 | <input type="checkbox"/> Sanborn recording equipment | 29 |
| <input type="checkbox"/> Cossor high speed oscilloscope | 12 | <input type="checkbox"/> Servo magnetic amplifiers | 69 |
| <input type="checkbox"/> Crane teflon sheet, rods and tubing | 90 | <input type="checkbox"/> Snelgrove quartz crystals | 38 |
| <input type="checkbox"/> Dalohm type D.C. deposited carbon resistors | 45 | <input type="checkbox"/> Sperry sound powered electric telephones | 62 |
| <input type="checkbox"/> Daven resistors | 68 | <input type="checkbox"/> Stark meters | 49 |
| <input type="checkbox"/> Dawe wide range oscillators | 16 | <input type="checkbox"/> T.C.C. "Cathodray" visconol condenser | 60 |
| <input type="checkbox"/> Eclipse-Pioneer autodyn synchros | 64 | <input type="checkbox"/> Telephone Mfg. telephone and telegraph equipment | 56 |
| <input type="checkbox"/> Eimac amplifier klystrons | 13 | <input type="checkbox"/> Teletronics regulated D.C. telephones | 41 |
| <input type="checkbox"/> Electrodesign electronic instruments | 57 | <input type="checkbox"/> U.S. Engineering etched and printed circuits | 65 |
| <input type="checkbox"/> Electro Sonic voltage control equipment | 67 | <input type="checkbox"/> Wiley books | 60 |
| <input type="checkbox"/> Esco instrument and control switches | 50 | | |

Check New Product Item For Further Information

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|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| <input type="checkbox"/> 643 | <input type="checkbox"/> 649 | <input type="checkbox"/> 655 | <input type="checkbox"/> 661 | <input type="checkbox"/> 666 | <input type="checkbox"/> 671 | <input type="checkbox"/> 676 | <input type="checkbox"/> 681 |
| <input type="checkbox"/> 644 | <input type="checkbox"/> 650 | <input type="checkbox"/> 656 | <input type="checkbox"/> 662 | <input type="checkbox"/> 667 | <input type="checkbox"/> 672 | <input type="checkbox"/> 677 | <input type="checkbox"/> 682 |
| <input type="checkbox"/> 645 | <input type="checkbox"/> 651 | <input type="checkbox"/> 657 | <input type="checkbox"/> 663 | <input type="checkbox"/> 668 | <input type="checkbox"/> 673 | <input type="checkbox"/> 678 | <input type="checkbox"/> 683 |
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| <input type="checkbox"/> 647 | <input type="checkbox"/> 653 | <input type="checkbox"/> 659 | <input type="checkbox"/> 665 | <input type="checkbox"/> 670 | <input type="checkbox"/> 675 | <input type="checkbox"/> 680 | <input type="checkbox"/> 685 |
| <input type="checkbox"/> 648 | <input type="checkbox"/> 654 | <input type="checkbox"/> 660 | | | | | |

Company Name
Your Name
Your Position
Address

Check Advertiser's Name For Information

| Advertiser | Page | Advertiser | Page |
|--|------|---|-------|
| <input type="checkbox"/> Aeromotive Engineering electrical equipment | 42 | <input type="checkbox"/> Federal variable test voltage megohmmeter | 43 |
| <input type="checkbox"/> Aeroxox interference filters | 63 | <input type="checkbox"/> Hammond transformers | 67 |
| <input type="checkbox"/> American Research environmental test equipment | 61 | <input type="checkbox"/> Handy & Harman silver alloy brazing | 17 |
| <input type="checkbox"/> Amperite thermostatic delay relays | 6 | <input type="checkbox"/> Heath electronic equipment kits | 49 |
| <input type="checkbox"/> Andrew parabolic antenna | 84 | <input type="checkbox"/> Helipot electronic equipment | 85-89 |
| <input type="checkbox"/> Automatic Electric distribution cable | 58 | <input type="checkbox"/> Hewlett-Packard amplifiers | 70 |
| <input type="checkbox"/> Automatic Electric power equipment | 82 | <input type="checkbox"/> Hooker electronic components | 83 |
| <input type="checkbox"/> Bach Simpson meters | 14 | <input type="checkbox"/> Industrial Development Bank services | 37 |
| <input type="checkbox"/> Baby test equipment | 67 | <input type="checkbox"/> Industrial Electronics electronic rectifiers | 78 |
| <input type="checkbox"/> Bell Telephone communications services | 73 | <input type="checkbox"/> Jackson color Bar Dot Generator | 18 |
| <input type="checkbox"/> Bendix-Pacific complete telemeter package | 19 | <input type="checkbox"/> Jennings vacuum relays | 65 |
| <input type="checkbox"/> Bendix electron tubes | 72 | <input type="checkbox"/> Kester solder | 66 |
| <input type="checkbox"/> Bendix vibration-resistant electrical connector | 83 | <input type="checkbox"/> Lenkurt carrier | 91 |
| <input type="checkbox"/> Berco rotary regavoil | 8 | <input type="checkbox"/> Measurements Corp. V.H.F. megacycle meter | 66 |
| <input type="checkbox"/> Bohne springs | 8 | <input type="checkbox"/> Measurements Engineering electronic equipment | 74 |
| <input type="checkbox"/> Bomac microwave tubes and components | 2 | <input type="checkbox"/> Microlab transcription turntables | 57 |
| <input type="checkbox"/> Budelman electronic equipment | 10 | <input type="checkbox"/> Microlab pick-up arm | 62 |
| <input type="checkbox"/> Burgess batteries | 45 | <input type="checkbox"/> Motorola permakay filters | 76 |
| <input type="checkbox"/> Canada wire and cable | 75 | <input type="checkbox"/> Motorola two-way radio equipment | 77 |
| <input type="checkbox"/> Canadian Aviation electronic equipment | 7 | <input type="checkbox"/> National Fibre vulcanized fibre | 4 |
| <input type="checkbox"/> Canadian Electrical Supply Co. catalog | 60 | <input type="checkbox"/> Northern Electric microphones | 20 |
| <input type="checkbox"/> Canadian International Trade Fair | 81 | <input type="checkbox"/> Northern Electric wire, cable and communications equipment | 20 |
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| <input type="checkbox"/> Cossor high speed oscilloscope | 12 | <input type="checkbox"/> Servo magnetic amplifiers | 69 |
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| <input type="checkbox"/> Daven resistors | 68 | <input type="checkbox"/> Stark meters | 49 |
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| <input type="checkbox"/> Electrodesign electronic instruments | 57 | <input type="checkbox"/> U.S. Engineering etched and printed circuits | 65 |
| <input type="checkbox"/> Electro Sonic voltage control equipment | 67 | <input type="checkbox"/> Wiley books | 60 |
| <input type="checkbox"/> Esco instrument and control switches | 50 | | |

Check New Product Item For Further Information

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|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| <input type="checkbox"/> 643 | <input type="checkbox"/> 649 | <input type="checkbox"/> 655 | <input type="checkbox"/> 661 | <input type="checkbox"/> 666 | <input type="checkbox"/> 671 | <input type="checkbox"/> 676 | <input type="checkbox"/> 681 |
| <input type="checkbox"/> 644 | <input type="checkbox"/> 650 | <input type="checkbox"/> 656 | <input type="checkbox"/> 662 | <input type="checkbox"/> 667 | <input type="checkbox"/> 672 | <input type="checkbox"/> 677 | <input type="checkbox"/> 682 |
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| <input type="checkbox"/> 647 | <input type="checkbox"/> 653 | <input type="checkbox"/> 659 | <input type="checkbox"/> 665 | <input type="checkbox"/> 670 | <input type="checkbox"/> 675 | <input type="checkbox"/> 680 | <input type="checkbox"/> 685 |
| <input type="checkbox"/> 648 | <input type="checkbox"/> 654 | <input type="checkbox"/> 660 | | | | | |

Company Name
Your Name
Your Position
Address

Electronic Safety Controls

(Continued from page 26)

Solution

With the new electronic controls it is now possible to fit bulk station loading racks with a completely automatic interlocking system that prevents any fuel loading operation from being commenced or continued if resistance of the ground connections is in excess of the allowable maximum.

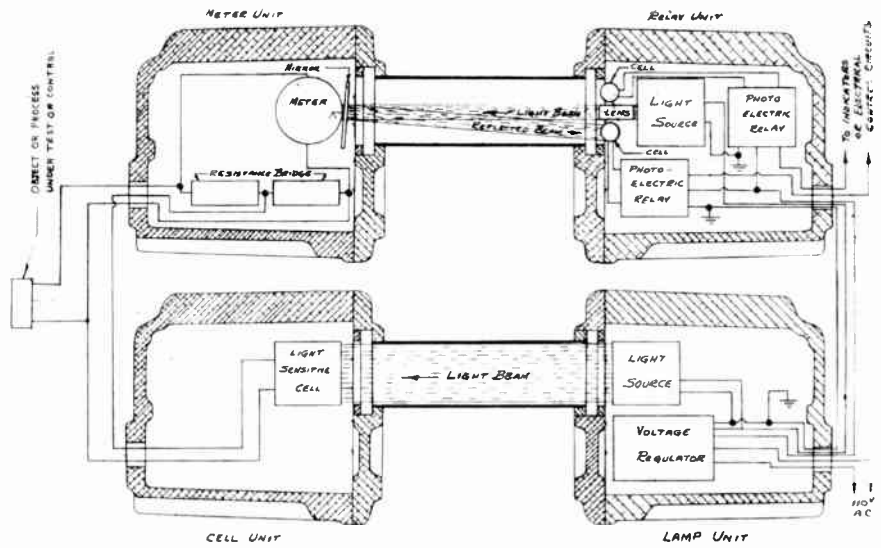
The new interlocking control device which is called a Safe-T Ohm (R) removes from the operator's control the ability to load fuel transports unless ground connections are adequate. Equipment uses explosion proof enclosures and fittings. Through ingenious use of light refraction there is no direct connection between the power circuit and the test circuit nor between the test circuit and the relay operating the interlocking system.

This is an important feature of this safety control equipment as it is impossible for the truck to become electrically charged through any failure of the power source.

At installations where this equipment has been fitted, no loading operations can take place unless all ground and bond connections are properly made. There have been no fires since installation. Tests of equipment during loading operations have shown no remaining accumulation of static or stray electric charges. Exposure of bulk loading stations to fire or explosion from this cause have been reduced to a minimum. No time is lost on actual loading operations due to eliminating the necessity to manually check adequacy of ground connections. Faster loading speed is made possible by positive assurance that the necessary safeguards surrounding loading and transfer operations are operating properly.

Additional Applications

The new equipment provides safe automatic process control on almost any type of hazardous loading or transfer operations. It may be used to provide automatic control over the loading or transfer of jet fuels or high octane gasoline from loading trucks into airplanes, gasoline service stations, fuel dumps, tanker or tank car and other similar applications. It may also be used to provide automatic process controls to safeguard hazardous operations in petrochemical plants, refineries, chemical plants, munitions plants, rubber and plastic-coating operations, photographic film processing, operations where the presence of explosive dust presents a hazard, and in most other industrial operations where static or stray electrical currents represent a fire or explosion hazard.



● Installation arrangements Of Safe-T Ohm Static Eliminator.

The latest UNIVERSAL BRIDGE

with dual-frequency internal oscillator/detector



BY **Marconi**

Provides instant, directly-read, more accurate L, C and R measurement

Through this completely self-contained unit, measurement of inductance, capacitance and resistance values of practically all electronic equipment components may be instantly ascertained.

Through the use of a single L, C and R dial, a system of rotatable discs is viewed through windows automatically showing the actual value of the component under test . . . eliminates human error . . . no multiplying factors involved . . . no confusion.

You can get all the information on the new Marconi Universal Bridge by writing to us today.

Inductance: μH to 100 henrys
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 Resistance: 0.1 ohm to $10\text{M}\Omega$
 Dimensions: $11\frac{1}{2}'' \times 19'' \times 10''$
 Weight: 33 lbs.

Marconi Instruments Department

Marconi



CANADIAN MARCONI COMPANY

CANADA'S LARGEST ELECTRONIC SPECIALISTS
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Second Annual Canadian Room Host To Over Three Hundred Guests

The Canadian Room established for the first time during the 1954 I.R.E. Convention and Show wound up its second year's activity at the close of the recent I.R.E. Convention and Show which concluded in New York last March 24th. Attendance at the Canadian Room which was held in the Commodore Hotel topped last year's attendance by a comfortable margin with close to three hundred Canadians and many American business officials making use of the Canadian headquarters.

Management and engineering personnel representing the Canadian electronics and communications industries from coast to coast were guests in the Canadian Room together with a wide representation of government officials from the National Research Council, Defense Research Board, Department of Transport, Post Office Department, Department of National Defense and Defense Production and technical officers of the Canadian armed services.

The Canadian Room is maintained to provide a meeting place for the many Canadians who attend the Institute of Radio Engineers National Convention

and the I.R.E. Show held annually in New York and thereby establish a focal point for contacting and entertaining their business associates from both Canada and the United States.

Members of the operating committee of the Canadian Room for 1955 were as follows:

Ray Peirce, Sperry Gyroscope of Canada Limited; Dave Dalzell, P.S.C. Applied Research Limited; Bill Deacon, Adams Engineering Limited; John Root, R.O.R. Associates Limited; Ed. Lomas, E. G. Lomas Company; Pete Heenan, P. J. Heenan Limited; Gerry Pointon, Chas. W. Pointon Ltd.; Doug Peacock, Computing Devices of Canada Limited; T. W. Lazenby, ELECTRONICS AND COMMUNICATIONS Magazine; Ken Davis, J. R. Longstaffe Limited; H. E. Dallyn, ELECTRONICS AND COMMUNICATIONS Magazine and Dave Lloyd, J. R. Longstaffe Company Limited.

The third annual Canadian Room is planned to be held in the Hotel Commodore, New York, during the 1956 I.R.E. National Convention and Show.



● "Operations Research" referred to as the "tool of engineering management" was the subject of a panel discussion on the March 22nd program of the I.R.E. Convention in the Waldorf Astoria Hotel, New York. Sir Robert Watson-Watt distinguished engineer and inventor of World War II radar which featured largely in winning the Battle of Britain was invited from Toronto where he is now resident to take part in the discussion of the subject. Chairman of the panel discussion on "Operations Research" was C. M. Jansky, Jr., of the firm of Jansky and Bailey, Washington, D.C. Others on the panel were: Sherman Kinsbury, of the Arthur D. Little Company, Cambridge, Mass., Dr. Ellis Johnson, Office of Operational Research, United States Army at John Hopkins University, Leroy Brothers, of the Operations Analysis Group, U.S.A.F. Headquarters and Martin Ernst, of the United States Navy's Operations Evaluation Group at the Massachusetts Institute of Technology. Sir Robert Watson-Watt who is President of Airtron Limited, Toronto, is shown pictured in the above photograph with Norton W. Kingsland, President and Publisher of Age Publications Limited, Toronto, publishers of *Electronics and Communications* magazine. The photograph shows Sir Robert and Mr. Kingsland in the Canadian Room where Sir Robert was a guest following his participation in the I.R.E. Convention activities.

● Members of the Canadian Room Committee for 1955 are shown in the accompanying photograph. *Top row*, left to right: Ed Lomas, Ottawa; Doug Peacock, Ottawa; Pete Heenan, Toronto; Ray Peirce, Montreal. *Bottom row*, left to right: John Root, Toronto; Bill Deacon, Toronto; Jerry Pointon, Toronto and Dave Dalzell, Toronto. Other members of the committee not shown in the photograph are: Ken Davis, Toronto; H. E. Dallyn, Toronto and T. W. Lazenby Toronto.



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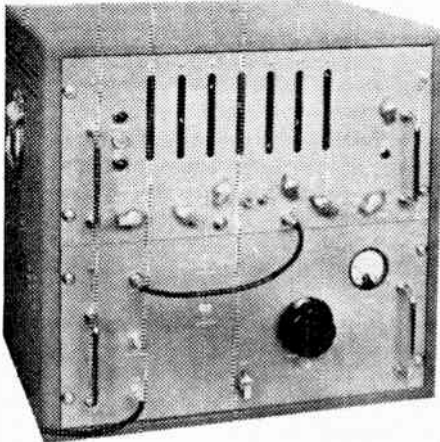
6 INSTRUMENTS IN 1

BERKELEY Model 5571

Direct Reading Digital Frequency Meter

Features . . .

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| 1. 0-42 mc frequency meter | 4. Time interval meter |
| 2. Frequency ratio meter | 5. 0-2 mc event-per-unit meter |
| 3. 0-1 mc period meter | 6. 1 mc counter |



PROVISIONS FOR

1. Extension to 515 mc
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3. Coupling to WWV receiver

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For: Broadcasting stations, private Radio Communication, Telephone, Marine Communication, etc.

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LABORATORY TRAINED
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A limited group of keen reliable men from most provinces of Canada will be available upon completion of this modern training program at Radio College of Canada.

They have had almost 500 hours of extensive practical laboratory experience, plus a strong general training in the theory of Radio, Television and Electronics.

You are cordially invited to send your requirements to the personal attention of F. B. Hobbs. Our recommendations are FREE and unbiased.

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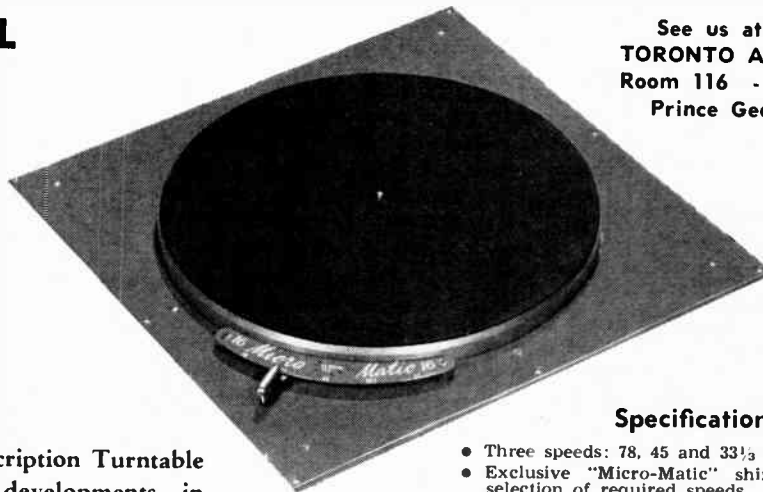
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THE NEW ALL CANADIAN

MICRO TR-16

TRANSCRIPTION TURNTABLE

The "Micro-Matic" Transcription Turntable incorporates the latest developments in Broadcasting, Television, Recording Studios and high fidelity engineering. Designed around an entirely new type of three speed change mechanism. The "Micro-Matic" embodies a drive system, which is completely decoupled acoustically and mechanically from the Turntable Disc. The motors are built to rigid Micro specifications by the foremost motor specialists. The "Micro-Matic" easily meets the requirements of the most particular Broadcaster and Music Connoisseur.



See us at the First
TORONTO AUDIO SHOW
Room 116 - April 27-30
Prince George Hotel

Specifications

- Three speeds: 78, 45 and 33 $\frac{1}{3}$ R.P.M.
- Exclusive "Micro-Matic" shift enables instant selection of required speeds.
- Two "off" positions, disengages drive and switches off motor.
- Cast aluminum, precision machined turntable, with hardened and ground shaft insures wow free operation.
- Neoprene rubber idler wheels of proper shore hardness, provides positive drive, without rumble or wow.
- Wow and flutter content well within NARTB broadcast standards.
- Ribbed rubber mat insures good record drive with ease of removing recordings.
- "Micro-Matic" available in two models, TR-16 with 16" diameter turntable. TR-12H with 12" diameter turntable.
- Equipped with hysteresis synchronous motor.
- Write for bulletins.

MICROLAB DEVICES LTD. 1195 Lawrence Ave. West, Toronto, Canada

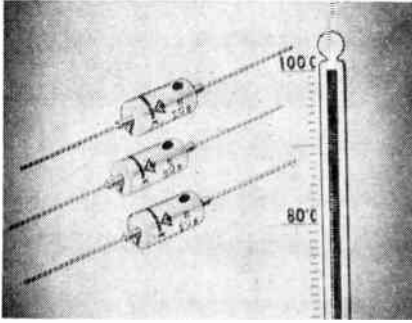
NEW PRODUCTS

(Continued from page 53)

● High Temperature Germanium Diode

Item 652

A new high temperature germanium diode for operation over an ambient temperature range from $-60^{\circ}\text{C}.$ to $+100^{\circ}\text{C}.$ has been announced. All three types are rated and tested to $25^{\circ}\text{C}.$ and at temperatures above $75^{\circ}\text{C}.$ The new diodes are an addition to a series of high temperature germanium diodes and are RETMA registered as Types 1N265, 1N266 and 1N267.



Typifying their high temperature characteristics are the ratings of the 1N267 diode at $85^{\circ}\text{C}.$: 4.0 ma (min.) at plus 1 volt, .040 ma (max.) at minus 10 volts, 20 volts dc maximum allowable inverse voltage.

Designed for clip-in or solder-in application, these diodes measure .230" in diameter and .470" in length. All are supplied with No. 22 tinned copper 1" (min.) pigtail leads.

● Miniature Variable Resistor Item 653

A low-cost variable resistor only $\frac{5}{8}$ " in diameter — yet rated for a wide variety of commercial and military applications — is now available in production quantities.

The new Stackpole Type F Control is especially suited for installation in chassis where space is limited, as in midjet portable radios, television receivers, audio equipment, instruments, and compact printed circuits of all kinds. Miniature line switches complementing the small size of the control itself, will soon be available.

Using the standard Stackpole deposited carbon resistance element and gold plated ring spring contactor, the Type F control gives unusually quiet and stable operation even under wide humidity variations. The control has a $\frac{1}{8}$ " diameter shaft which can be equipped with screwdriver slot, flat, knurl or plain finish to suit individual requirements. The control has a $\frac{1}{4}$ -32 threaded bushing for easy panel mounting.

● "Fastatch" Control Kits

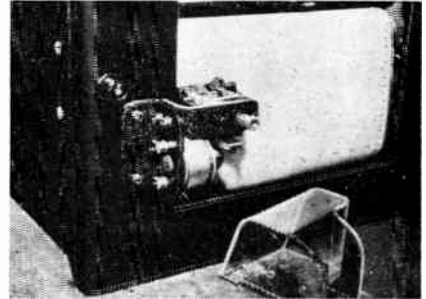
This new kit contains the 11 most popular front (F) and 11 most popular rear (R) units in the "Fastatch" line determined by number of sets using and actual sales volume.

The "Fastatch" system makes it possible to cut off the shafts of a dual concentric control the same as a standard single control. This feature eliminates the need for hundreds of special custom replacement controls and "build your own" kits. The "Fastatch" kit, catalog number FR-22A, covers replacements for practically every TV manufacturer. The sturdy metal kit is furnished at no additional charge for the price of the controls and switches included. This kit puts those "most needed" controls at the service engineer's fingertips. An empty cabinet for any special assortment desired of "Fastatch" controls is also available. Complete details and television usage charts are available.

Item 654

● Device Automatically Identifies Recording Charts Item 655

A new, compact device that automatically prints a number, date or time on Brown strip chart and similar recorder charts at any instant when a voltage is applied to the device during process, test and control work has recently been developed. The unit, called the "IDENTICHART", makes it easy for users to identify individual sections of recording charts in relation to particular conditions taking place at a remote point. The unit mounts on the outside of the door of the recorder regardless of type of instrument and it does not interfere with or



obscure the recording procedure. It is made for 28 volts dc operation but can be adapted to other electrical requirements. The "IDENTICHART" is supplied in kit form so that the user can easily install the unit. The kit consists of a strip of rubber for the chart platen, mounting screws, plexiglass window to replace the original one in the door, plastic transparent cover for the device itself and instructions for installing. Wires on the unit go to the power supply and switch which is connected to the process.

(Turn to page 61)

AUTOMATIC ELECTRIC

has everything you need to install
Rural Distribution Cable

SLATER WIRE BRACKETS

fit hand-in-glove with rural distribution cable to save on installation costs. The insulated steel core of the cable fits into the upper groove of the bracket clamp, which is all that is needed to hold the cable secure from pole to pole. The type "B" bracket is for direct pole mounting, by means of two $\frac{3}{8}$ " lag screws, or one $\frac{3}{8}$ " lag screw and one $\frac{3}{8}$ " carriage bolt. The Type "C" bracket is for crossarm mounting, by means of a $\frac{1}{2}$ " diameter U-bolt which is included with the bracket. A hole is provided for a $\frac{5}{16}$ " x $2\frac{1}{2}$ " lag screw for greater security.

RELIABLE "WIRELINKS" AND "WIREVISES"

are made specially for splicing and deadending the steel core of rural distribution cable. Tough jaws of steel press on the wire, never to let go, making a joint much stronger than the wire itself.

5517

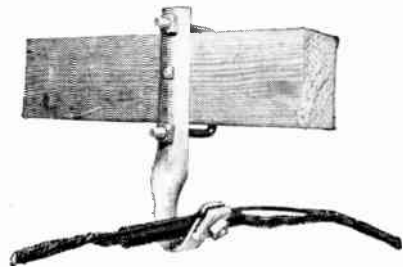
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For further data on advertised products use page 54.

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INTERCOM
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TO YOUR SPECIFIC
REQUIREMENTS

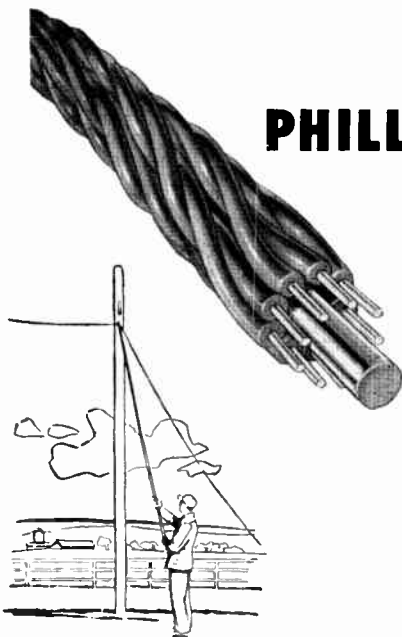
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- Press button equipment — all capacities — with or without loudspeaking master stations.
- Private automatic exchanges (PAX). Capacity 10 to 400 lines.
- Telephone apparatus for all purposes.
- Engineering — Installation — Service.

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Here's how to save real money on cable or open wire line extensions

PHILLIPS RURAL DISTRIBUTION CABLE



makes it possible to save tremendously on time, materials and labour. All it needs is a single bracket at each pole for proper attachment.

Six twisted pairs of No. 19 gauge copper conductors are wound around a polyethylene insulated steel wire, which makes the cable self-supporting for spans up to 200 feet. The conductors themselves have their own polyethylene insulation plus a thermoplastic jacket.

Take advantage of the complete service of AUTOMATIC ELECTRIC by ordering this cable and all necessary fittings from one source of supply.

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The first comprehensive survey of the field. Shows how dielectric analysis has gone far enough to permit the beginnings of dielectric synthesis, in which the properties of the materials are tailored to order for any specific insulation job. 1954. 284 pages. Illus. \$16.00.

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T.C.C. "CATHODRAY" VISCONOL HIGH VOLTAGE PAPER CAPACITORS

T.C.C. "Cathodray" Condensers feature a unique space saving construction in that the Capacitor element is housed in what would normally be the Terminal Insulator of a high voltage condenser. VISCONOL impregnation assures absolute reliability. Working voltages from 1 KV to 75 KV are available.

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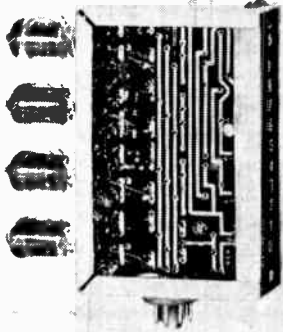
Capacitance = .001 MFD \pm 20%.
V W = 12 K V D. C.
Body Length = 2 3/8".
Diameter = 1 1/8".

NEW PRODUCTS

● 120 KC Decade Counters Item 656

New decade counter units that provide a 120 kilocycle counting rate and have an output voltage suitable for recorder operation are now being manufactured.

The new Model AC-4A Decade Counters feature etched circuits wherein every circuit segment is fully visible, clearly labeled and arranged diagrammatically for simple servicing. A clean mechanical layout improves ventilation, making possible lower operating temperatures and longer service life. Illuminated numerals have reflectors for maximum brilliance and easy readability under all light conditions.



The counters are engineered to fit all standard electronic counters, regardless of make, and also may be used separately in experimental or special setups.

The new etched circuits give good balance and uniform incidental capacities for the high 120 kilocycle counting rate. Resistors are premium quality 5 per cent tolerance units, coupling condensers are silver mica, and the four electronic tubes employed in each counter are of the computer type.

● New Irish Brand Long Playing Tape Item 657

A completely new Long Playing tape featuring frequency response limited only by the recording and playback equipment, with 50 per cent increase in playing time over standard tapes on the same reel, has been announced. This new tape will be known as IRISH LP No. 600 because it provides up to six hours playing time at 1 7/8" per second speed, dual track.



Advantages resulting from the new IRISH "Ferro Sheen" process, claimed to be the most important recording tape development in six years are: 40 per cent to 100 per cent reduction in head wear, since the mirror smooth surface produces a minimum of abrasion and friction; plus the strongest bond between oxide coating and plastic film base ever obtained in any magnetic tape.

● Free Booklet On Instruments In Industry Item 658

The use of instrumentation in its application to various fields of industry is the subject of a highly interesting and informative booklet recently released by one of England's foremost manufacturers of scientific instruments. Interest in the contents of the booklet will be greatly enhanced among Canadian readers due to the fact that the manufacturer has now established a sales outlet in Canada.

Contents of the booklet covers such subjects as:

Noise and its measurement.

Vibration analysis.

The ultrasonic measurement of wall thicknesses.

Dynamic balancing and.

The industrial application of modern stroboscopes.

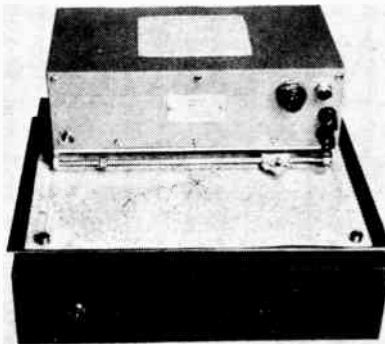
A comprehensive alphabetical index of the many instruments handled by the company is also included in the booklet.

● Model 120 Polar Recorder Item 659

The Model 120 Polar Recorder is designed for use in plotting directivity patterns of antennas, microphones, etc.

The pen is positioned by a servo of the self-balancing potentiometer type. The complete servo including amplifier, motor chopper, slide wire and controls is housed in a 3 x 6 x 10 inch cabinet which comprises the upper portion of the instrument.

The chart turntable is a rectangular platform adapted for 8 1/2 x 11 inch polar co-ordinate paper; and the polar chart drive can be furnished either with a mechanical table rotation shaft for direct coupling to associate equipment, with a synchronous motor and



instantaneous start-stop solenoid clutch for synchronizing with equipment rotating at a constant speed, or with a selsyn drive.

Signal input characteristics are as follows:

1. Sensitivity: 100 millivolts full scale.
2. Input resistance: 1 1/2 megohm.
3. Pen speed: 2 inches per second.

If DB plots are desired it is necessary to use a logarithmic converter ahead of the servo input.

● Polypenco Strip Item 660

If you're looking for new ways to apply nylon . . . and to use it with utmost economy . . . you may find just what you want in POLYPENCO strip.

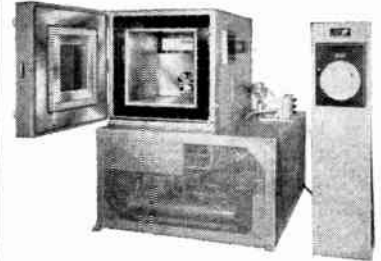
Here's a material with untapped potential that comes to you in coils — anywhere from 1/4" to 4" wide and .010" to .125" thick.

Now look what you can do with it simply by cutting off appropriate lengths! You can make bearing liners for gears, sprockets, sleeve bearings, etc. Or you can use it to line tracks, channels, or almost any surface where wear resistance is needed. You can even cut off lengths, splice them, and use them as conveyor belts.

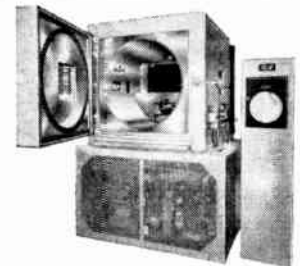
(Turn to page 64)

AR★

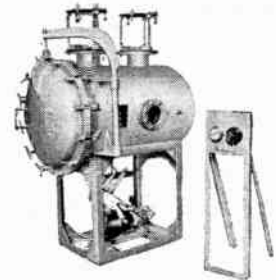
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TEMPERATURE-HUMIDITY test chamber with automatic control of temperature from +500° F to -100° F and lower.



ALTITUDE-TEMPERATURE-HUMIDITY cylindrical test chamber with completely automatic operation and recording; +500° F to -100° F, to 80,000 ft. and higher.



EXPLOSION chamber with double safety features for testing under explosive atmosphere conditions up to 50,000 ft.

American Research offers a complete line of Environmental Test Equipment for simulating conditions of high and low temperature, altitude, relative humidity, sand and dust, rain and sunshine, fungus, explosion, gas and air chilling, etc. • Designed and built in a variety of sizes and ranges to meet all government specifications and individual requirements.

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CORPORATION
838 BROOK ST. BRISTOL, CONN.

MICRO 507 PICKUP ARM

This pickup arm meets the stringent requirements of present day record reproduction. Due to its double counter-balanced design and low vertical inertia, the stability of this arm is excellent. It is ideally suited to the broadcaster and serious audio enthusiast who requires the ultimate in performance combined with compact design.

- Low vertical inertia due to light cartridge holder and knife edge pivot.
- Arm completely balanced laterally improved stability.
- Antifriction needle bearings in pivot post.
- Adjustable to suit different turntable heights.
- Adjustable stylus pressure by means of sliding weight.
- Accepts all standard cartridges.
- Handles 16" transcriptions.
- Overall length of arm — 14".
- Centre of turntable to centre of pivot post — 10 $\frac{3}{8}$ ".
- Overhang of counterweight beyond pivot post — 2 $\frac{1}{2}$ ".
- Height overall — 3 $\frac{3}{8}$ ".

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IS OUR **WHEELER**
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- ▶ CLEAR SPEECH. CLEAR SIGNAL.
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- ▶ SIMPLE standard WIRING.
- ▶ Corrosion-resistant construction.

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ASK ABOUT NEW EXECUTIVE-TYPE CRADLE PHONE.

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COSSOR

SKL



The Model 302
Variable Electronic Filter

SPECIFICATIONS:

- CUT-OFF FREQUENCY RANGE:** 20 cps to 200 kc/s high or low pass in 4 decade ranges.
- RATE OF ATTENUATION IN REJECTION BAND:** 18 db per octave per section. Greater than 90 decibels — limited only by noise and hum level.
- MAXIMUM ATTENUATION:** Negligible
- INSERTION LOSS:** 1 megohm shunted by 30 uuf.
- INPUT IMPEDANCE:** 6 volts peak, with signal in either pass band or rejection band.
- MAXIMUM INPUT SIGNAL:** 300 ohms.
- OUTPUT IMPEDANCE:** at least 80 db below volt.
- LEVEL OF NOISE PLUS HUM:** Not greater than 0.5% overall harmonic distortion.
- DISTORTION:**



The Model 504
Square Wave
Generator

Suitable for testing overshoot, ringing characteristics of amplifiers, passive networks, radar, communications and other pulse transmissions.

FEATURES:

- Rise Time Less Than 50 Milli-microseconds
- Square Waveform
- Frequency Range: 0.5 cps — 1 megacycle
- Variable Output Voltage: 0-10 volts
- Synchronizing Pulse Output
- External Sync Input

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For further data on advertised products use page 54.

Plant Operation

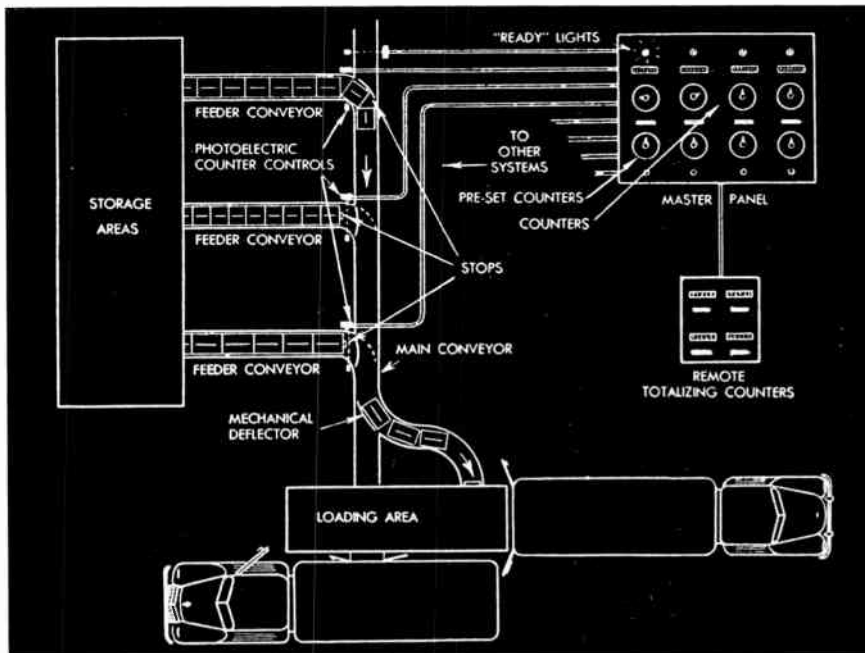
Modern Controls Increase Speed—Accuracy—Efficiency

A LARGE modern brewery handling thousands of cases of beer and ale daily had the problem of filling orders accurately and moving them swiftly from storage areas to waiting trucks and trailers. Loading docks were limited and serious traffic congestion resulted unless trucks were loaded quickly. Eight different sizes and types of containers (cans, quarts, steinies, etc.) had to be carried and routed correctly. The nature of the operation from storage to the shipping dock called for centralized control.

What the brewery needed was a reliable automatic device to count and

number of feeder conveyors — each of which carries cases of a specific type of beer or ale. Each feeder conveyor is equipped with photoelectric control at the junction with the main conveyor. When a case passes through the beam the photoelectric relay operates two electromagnetic counters. One is a simple totalizing counter and the other, a predetermined counter. The counters for all lines are grouped at a master control panel, so one operator can supervise the count for any line.

Upon receiving an order, the operator sets the dial of one predetermined



● Diagrammatic arrangement of the automatic distribution system.

sort the cases making up a single order. Counters actuated by mechanical limit switches are not accurate enough. Variations in the size of cases and their position on the conveyor, as well as dents, holes and torn spots in the cartons, all interfere with mechanical limit switch operation and contribute to inaccurate counting. In addition, the high impact of fast-moving cases makes mechanical switches bounce. This results in false counts and rapid switch failure due to excessive wear.

Photoelectrically controlled predetermined counters solved the counting problem. Only photoelectric controls can accurately count cases of all descriptions, shapes and weights.

Here's how the new system works. Main conveyors run from the storage to the shipping area. At the storage end, the main conveyors are fed by a

ing counter for the number of cases of a given type. By remote control, he opens a deflector to route the cases from the feeder to the main conveyor. He then pushes a "start" button to operate the selected feeder conveyor. When the required number of cases pass the light beam on the feeder conveyor, the predetermining counter stops the conveyor and lights a control panel lamp, indicating that this part of the order has been completed. This process is repeated for each type of case ordered by selecting proper feeder conveyors and counters.

This efficient control system has not only increased the speed, efficiency and accuracy of filling orders but has also resulted in considerable reduction of labor costs. Appreciable saving also is realized from reduction of maintenance costs and lost time due to mechanical limit switch failures.

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RADIO and TV noise
and improves reception

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Each Aerovox Filter is individually tested and is guaranteed to end radio and TV annoyance caused by H.P. motors, oil burners, refrigerators, electric shavers and other appliances.



TYPE IN-310
Bracket mounted unit with high inductance.

TYPE IN-240
For use in the most serious cases of radio interference.



TYPE IN-270
Inexpensive type for slight interference.



TYPE ANL-37
Indicates the correct type of IN filter to use.



TYPE IN-290
Designed for local interference of variable character but strong intensity.

AEROVOX
Capacitors

Standardize with **AEROVOX**

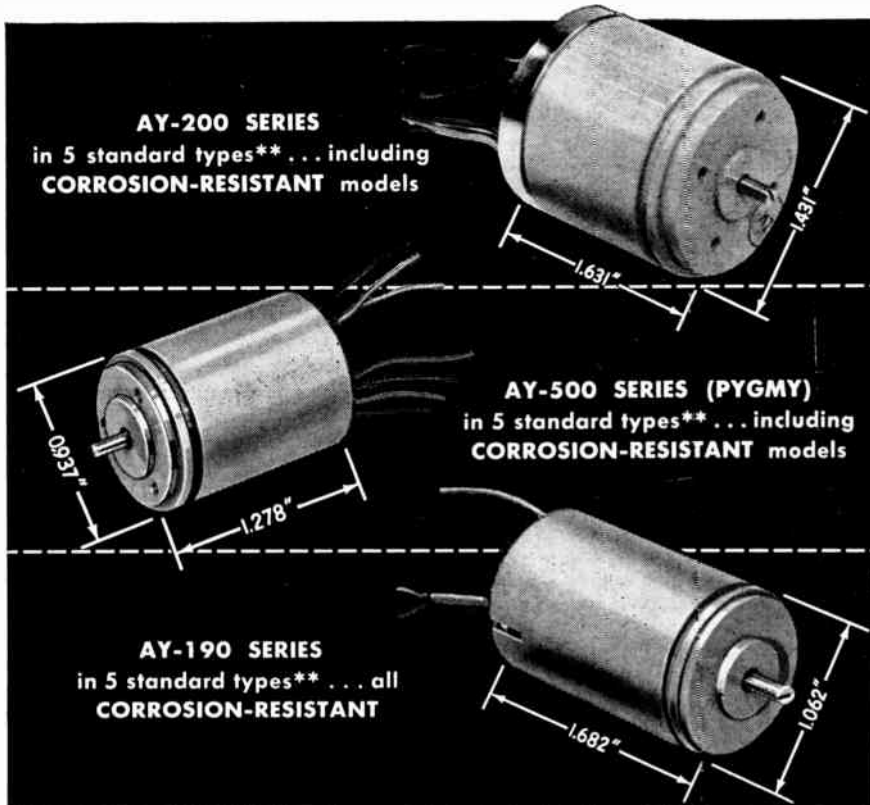
AEROVOX CANADA LIMITED
HAMILTON, CANADA

Manufacturers of fixed capacitors for all radio, TV and electronic equipment. 5507

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**TRANSMITTERS, RECEIVERS, CONTROL TRANSFORMERS, DIFFERENTIALS AND RESOLVERS

And there's a Bendix autosyn to meet every need!

Eclipse-Pioneer's experience, facilities, and production techniques make possible the following important advantages:—

- Significant *price* reductions
- *Delivery* of standard types from stock
- A complete *range* of standard and special types

Whatever your synchro requirements, it

will benefit you to request further information from AVIATION ELECTRIC, 200 Laurentian Boulevard, Montreal.

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OTHER STANDARD AND SPECIAL ECLIPSE-PIONEER AUTOSYN SYNCHROS INCLUDE models 1, 11, 15, 18, 23 and 2R as well as high temperature, high frequency, linear, and other types for special needs.

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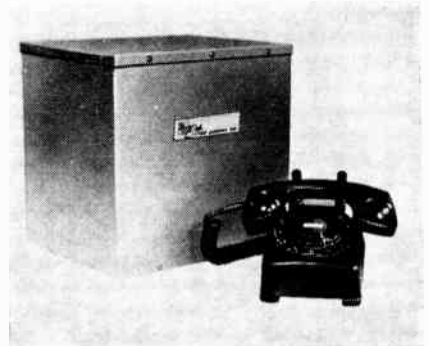
SALES • SERVICE • OVERHAUL • MANUFACTURE OF AIRCRAFT INSTRUMENTS & ACCESSORIES

NEW PRODUCTS

Another thing about POLYPENCO strip — you can blank parts from it at speeds up to 600 cycles per minute . . . and on standard metalworking punch presses at that. This means you can save money while getting the advantages of nylon for gaskets, thrust washers, thin gears, bushings, coil forms, etc.

• Automatic Dial Exchange Item 661

An entirely new and revolutionary Automatic Dial Telephone Exchange, has now been put on the market. By virtue of its advanced design, this exchange, requiring no costly line or cut-off relays, no-push-button operation, no separate power supplies, is available for as little as \$300. The exchange, about the size of a small hat box, handles all the operation normally requiring a bulky switchboard and its operator. This system requires but two wires from each phone station to the exchange, thus making installation time and costs negligible. Due to the simplicity of installation requirements, the unit can be replaced in less than three minutes should expansion be desired or repair necessary. Power is supplied by plugging the exchange into any convenient 110 volt AC outlet.



Primarily designed for intercommunication, this exchange can be tied in with trunk lines wherever the telephone company permits. In conjunction with the trunk tie-in, a system of hold and transfer service for incoming calls can be incorporated as an optional feature for the Bliss PA25 Quick-

optional feature. Other optional features include remote con-Heat Amplifier, (an instantaneous "warm-up" 25 watt paging system) busy signal with "gentle hint" to talking parties, and expansion facilities from the standard ten up to forty or more lines. A light weight portable model is available and exactly suited to the needs of construction jobs, industrial fairs, exhibits, etc.

• Crystal Ovens Item 662

Two new compact temperature controlled ovens for use with JAN type HC-6/U and HC-13/U crystals are now being produced. The Type VCO-2 oven comprises a heavy anodized aluminum housing arranged to accept two, two-prong mounted crystal units. The base of the housing fits a standard octal socket. The housing cover is threaded onto the base for simplified removal when changing crystals. The connections to both crystals are brought out independently to allow the greatest flexibility of oscillator circuit adaptation, and are kept isolated from heater and thermostat leads. A connection is brought out for operation of an external pilot lamp to indicate heater operation.

Heater power is four watts, available for use with 6.3, 12.5 or 28 volt operation, either ac or dc. Temperature of the crystals is maintained at 75°C. ± 1°C.

Oven cases are optionally available with height of 1 1/8" or 2 1/8", to fit specific crystal sizes. Case diameter is 1 7/8"; weight, 57.5 grams, exclusive of crystals.

(Turn to page 66)

For further data on advertised products use page 54.



R5-E VACUUM RELAYS

for pulse forming networks, antenna transfer switching, and guided missiles applications

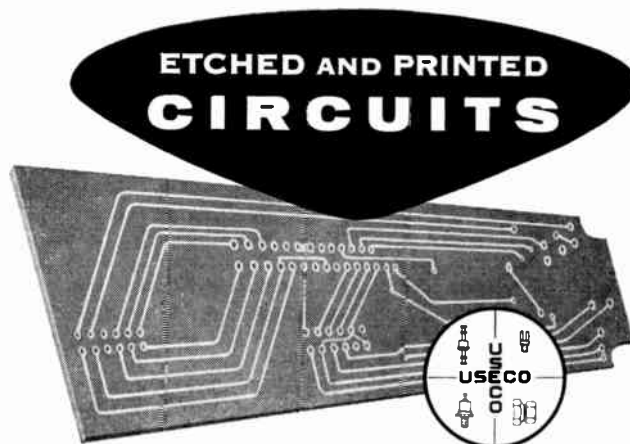
are high voltage relays with a 12 or 24 DC volt actuating coil located in the base of the unit. These small relays are only 3 inches long and 2 inches in diameter with flanges for easy mounting. No flexible leads are used to carry current.

Their vacuum dielectric and tungsten contacts make possible a fast acting 10 KV relay of compact design with a current rating of 10 amperes RMS. Series-break contacts include normally open, normally closed, and single pole double throw types.

A Type R5-F transmit-receive relay is also available with SPDT contacts and an additional NO contact which grounds the receiver when the relay is in the transmit position. It is enclosed in a copper housing with three coaxial fittings.

Send for catalog literature describing these larger relays manufactured by Jennings for DC, 60 cycle, and RF applications up to 85 KV and several hundred amperes.

JENNINGS RADIO MANUFACTURING CORP. - 970 McLAUGHLIN AVE. P.O. BOX 1278 - SAN JOSE 8, CALIF.



Long a recognized leader in standardized electronic hardware and terminal board fabrication, U. S. Engineering Co. now offers expanded facilities for the mass production of quality etched circuits to your prints. Prototype inquiries as well as production runs are invited. Cost estimates and quotations are given immediate attention. Send for new illustrated 8-page Brochure.

U.S. ENGINEERING CO.

(A Division of Litton Industries, Inc.)

521 COMMERCIAL ST., GLENDALE 3, CALIF.

In Canada:

R.O.R. ASSOCIATES LTD., 290 Lawrence Ave. W., Toronto 12, Ont.

There's much to be said for . . .

CONSTRUCTION: Toroidally wound auto-transformers, with tracks formed on one face of the windings.

CORE: Wound from a continuous strip of low loss electrical steel in a similar manner to the well-known C core construction.

INSULATION: Specially processed plastic mouldings ensure minimum shrinkage due to heat and continuous use, and prevent any possibility of the turns slackening.

WINDING: Of high conductivity copper, insulated with a synthetic enamel of the polyvinyl acetal-phenal formaldehyde resin type, giving good space factor, exceptionally high abrasion resistance and prolonged heating resistance.

FRAME: Of die cast aluminium, incorporating long spindle bearings and mounting feet to ensure accuracy and rigidity of the mechanism in relation to the fixing holes.

BRUSHES: The brushes are of a special carbon chosen for its contact resistance characteristics, shaped to give minimum loss, maximum strength and longest life.

There are 4 models of the Berco Rotary Regavolt available:—

| Model | Max. Input Volts at 50/60 cycles | Max. Output Voltage Range at no load | Rated Current | Weight |
|-------|----------------------------------|--------------------------------------|---------------|---------|
| 41A | 250 | 0-250 | 0.8 | 4½ lbs. |
| 41B | 115 | 0-135 | 2.25 | |
| 42A | 250 | 0-270 | 2.0 | 6½ lbs. |
| 42B | 115 | 0-135 | 5.0 | |

The Berco Rotary Regavolt provides a highly economical, compact and reliable means of obtaining a continuously variable output voltage, without the heat losses associated with resistances. Its outstanding advantage over resistance control is that any alternating current load within normal rating can be controlled from zero to full voltage without the necessity of special designing for individual applications. Thus, one rotary Regavolt can be used in place of a number of adjustable resistances. In addition, an increase in voltage, above the main supply, can be obtained with three of the four Regavolt models. This is an especially valuable feature when the supply voltage is low.



...BERCO ROTARY REGAVOLT



★ For full details and prices write to:—

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SOLDER

NEW UHF MEGACYCLE METER

With the Widest
Frequency Coverage
in a Single Band

FEATURES

- Excellent coupling sensitivity.
- Fixed coupling point.
- Small grid current variation over band.
- Calibration point every 10 Mc.
- Uses split-stator tuning condenser with no sliding metal contacts.
- Standard camera socket for tripod fixtures.
- Octagonal case for convenient positioning.
- Useful in television transmitting and receiving equipment.

\$198.00
F.O.B. FACTORY



MODEL 59 UHF

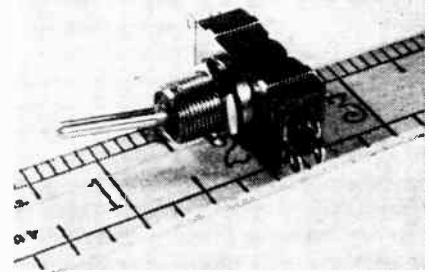
SPECIFICATIONS

FREQUENCY RANGE: 430-940 Mc in a single band
FREQUENCY ACCURACY: $\pm 2\%$ (individually calibrated)
OUTPUT: CW or 120-cycle modulation
POWER SUPPLY: 117 volts, 60 cycles, 30 watts
DIMENSIONS: Oscillator Unit 4 $\frac{3}{8}$ " x 2 $\frac{1}{2}$ "
Power Unit 5 $\frac{1}{4}$ " wide x 6 $\frac{1}{8}$ " high x 7 $\frac{1}{2}$ " deep

NEW PRODUCTS

• Small Panel-Sealed Toggle Switch Item 663

A miniaturized, panel-sealed toggle switch, tested to more than 300,000 cycles, reduces behind-panel space by 50 per cent, and can withstand acceleration, impact and vibration to 200 G's. Because of special, patented features, the switch eliminates contact bouncing and is tease-proof. Advantages of the Hermetronic K-W Toggle Switch include corrosion-proof and explosion proof construction. Its construction eliminates the need for a bulky boot to keep out moisture and dust. The miniaturized device has a switch-case 1.15" x 0.625 x 0.415. Silicone rubber bonded to its stainless steel bushing gives the switch its panel-sealed feature.



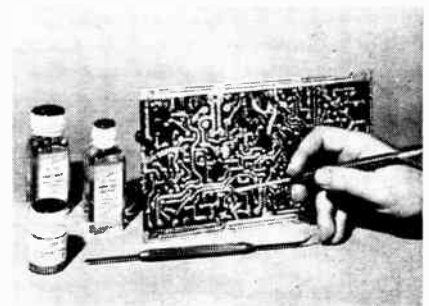
Screw-type terminals emerging from the rear are to be offered also.

The manufacturer states that the switch now makes possible the control of hermetically sealed assemblies by toggle action.

Contact rating is 10 amps, at 125 vac; 10 amps, at 30 vdc; and 1.5 amps, at 125 vdc. Opening force is 95 grams; closing force is 85 grams. Resistance to acceleration, impact and vibration up to 200 G's is obtained because of the 400 grams high contact pressure. Rivetless construction and direct contacts prevent corrosion, provide better heat conduction and heat dissipation. Insulation resistance is better than 1000 megohms at 70 degrees F. Dielectric strength is checked at 1000 volts RMS. The Hermetronic K-W Toggle Switch has military authorization for replacement of Jan S-23, ST 42 and ST 52 types.

• Printed Circuit Repair Kit Item 664

Since tomorrow's radio-television serviceman is going to have to be something of a "printer" as well as a soldering iron expert, a new kit just introduced is sure to find a wide market. Called the "G.C. Printed Circuit Repair Kit", it is claimed to meet all printed circuit servicing needs on virtually all TV sets using that circuitry.



Said to be developed in conjunction with one of the nation's foremost set manufacturers, the "G.C. Printed Circuit Repair Kit" includes the necessary silver print material and silicone resin for protecting the silver coating, plus the special tools that have been designed to expedite this type of work.

(Turn to page 69)

MEASUREMENTS CORPORATION

IN CANADA —

BOONTON · NEW JERSEY



H. Roy Gray, Ltd. 46 Danforth Road, Toronto, Canada.

For further data on advertised products use page 54.

This happy man
has solved his
voltage control
problems . . .



He has just ironed out a production snag at the plant. You'll enjoy peace of mind too, when you know your equipment is operating the way it should. Enough things go wrong without the added headache of widely varying line voltages. Whether your problem is receiver drift, laboratory or test instrument accuracy, lighting control, machinery speeds, or a multitude of other troubles . . . whether the load is 15 watts or 7.5 kilowatts, we have a control that will suit your application. For precise and rigid automatic control, Raytheon Voltage Stabilizers maintain absolutely constant output and require no adjustment. Superior Powerstats offer manual control, and do something rheostats won't . . . raise the voltage. Simpler regulation problems are easily taken care of by Hammond Line Voltage Regulators and Transformers. They're all in our complete catalogue No. 551. Write for a copy today, if you haven't one already.

Electro Sonic Supply Co. Ltd.

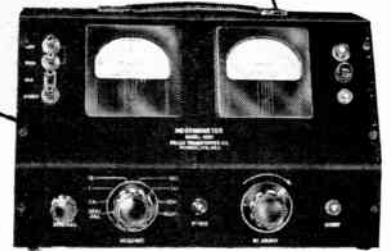
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ELECTRO SONIC



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VARIABLE TEST
VOLTAGE MEGOHMMETER

*A New
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to the Industry Accepted

1020-B MEGOHMMETER

The Freed Type 1620 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.

SEND FOR COMPLETE TRANSFORMER AND INSTRUMENT CATALOGS

FREED TRANSFORMER CO. INC.

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

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**IN TEST EQUIPMENT
IN REPAIR FACILITIES
IN TOROIDS, FILTERS, MAGAMPS**

WE OFFER
Complete Sales and
Service for

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Representative for . . .

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Manufacture of

ALLEN B. DUMONT LABORATORIES - Instrument Division
BOONTON RADIO CORP. - Q meters, test equipment
BOESCH MANUFACTURING CORP. - Toroidal winding equipment
CONTINENTAL CARBON INC. - Nobleloy resistors
M. C. JONES INC. - R. F. Watt meters and couplers

GENERAL RADIO COMPANY
WESTON ELECTRICAL INSTRUMENT CORP.

Toroids, Filters, Magnetic Amplifiers to your specifications.

Consult us FIRST with your instrumentation problems.

BAYLY ENGINEERING LIMITED

FIRST STREET

AJAX, ONTARIO

The "Radarange" It Cooks By Microwave

Raytheon, famed American manufacturer of electronic equipment has come up with a new method of cooking. Following extensive research on the subject, company engineers have now produced a stock model cook stove that cooks food from the heat produced by microwaves. The new stove has been named the "Radarange" and it can cook an 18 pound roast of beef, medium brown and sizzling on the surface in the space of 40 minutes flat. The dollar savings characteristics of such a piece of kitchen equipment are obvious and marketing officials of the company are stressing these features of the stove to hotel and restaurant managers. While these features are all important to hotel and restaurant managers there is yet another feature of this new type of cooking equipment that will be of great interest to another field of business activity.

The new electronic cooker is small and compact and this feature in particular, in addition to its speed and money saving qualities will be of interest to shipping companies who operate small tug type vessels for

their particular needs. Compactness, light weight and cleanliness are the qualities most sought after in marine galley equipment. The new "Radarange" would seem to fill all these requirements.



● The "Radarange" looks like a clinical sterilizer but is the latest type of cooking range.

towing and general harbour work. Operators of this type of craft are continually badgered in their efforts to find suitable galley cooking equipment for their craft that will suit

Two Sizes

Two models of the electronic cooker are being produced commercially by the manufacturers at the present time. A small model measures 23 inches wide, less than 30 inches high and 21 inches deep. The larger model measures 26 inches wide, 64½ inches high and 26 inches deep. Oven sizes of the "Radaranges" are 10 inches high, 14 inches wide and 18 inches deep for the small model and 20 inches wide, 12 inches high and 22 inches deep for the large model.

Another feature of the new electronic cooker that should not be overlooked in its possible application to shipboard use is the fact that the heat generated by it is directed and entirely absorbed by the material that is being cooked. In effect there is no heating of the atmosphere which in the case of most small ships galleys is little less than that required to cook the ship's cook along with the meal. The lack of ambient temperature rise in a ship's galley caused by cooking equipment would also simplify the troublesome problem of ventilating this part of the ship.

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and pre-tinning of:

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Lollypop precision wire-wound Resistor
Davohm Type 1273




Only 1/4" in diameter by 5/16" long, yet is available in values as high as 400,000 ohms

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|---|---|
| <ul style="list-style-type: none"> * Fully encapsulated * Exceeds all humidity, salt water immersion and cycling tests as specified in MIL-R-93A, Amendment 2 | <ul style="list-style-type: none"> * Operates at 125°C continuous power without de-rating * Can be obtained in tolerances as close as ±.02% |
|---|---|

* Standard temperature coefficient is ±20 PPM/°C.
Special coefficients can be supplied on request

Write for complete resistor catalog.



THE DAVEN co.
193 Central Ave., Newark 4, N.J.

WORLD'S LARGEST MANUFACTURER OF ATTENUATORS
IN CANADA: Adams Engineering Ltd., Montreal and Toronto

For further data on advertised products use page 54.

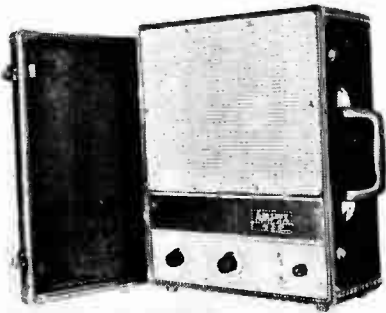
NEW PRODUCTS

● Portable Amplifier Loudspeaker Unit Item 665

A 25-pound portable amplifier-loudspeaker unit that "amounts to a packaged high fidelity music system" has been introduced to the market.

The unit incorporates a specially-designed loudspeaker with a complementary 10-watt audio amplifier in an acoustically correct enclosure. Company officials believe their firm to be the first to offer these three basic elements in a unified design.

Response of the 620, measured in air by accepted acoustical standards, is essentially flat from 60 to 10,000 cycles — an achievement considered remarkable in the largest console speakers and previously considered almost impossible in a portable unit.



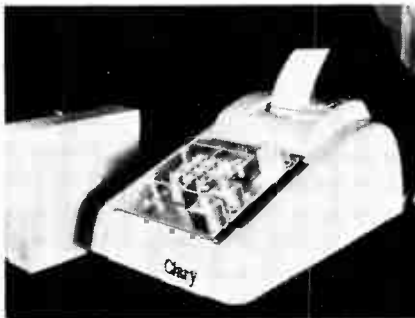
In home applications, the Ampex 620 will improve the quality of sound from phonographs, tape recorders, radios and television receivers. For the sound enthusiast, it is a "walking hi-fi system", combining portability and performance in a previously unattained degree.

Commercially it is expected to be used as a portable public address system, as a monitor unit for broadcasters, as an auditioning unit for advertising agencies, as a sound demonstration unit for music stores and as a teaching device.

● Digital Read-Out Machine Item 666

A new ten-key digital read-out machine has just been announced.

Designed as a practical, inexpensive and flexible device for printing data in electrical pulse form, the unit is available in four basic models: Models 1902 and 1903, 8- and 10-column printers; Models 1972 and 1973, 8- and 10-column printers with credit balance accumulator.



Pulses may be entered into the amount solenoids at speeds up to 40 milliseconds total pulse resolution with 20 milliseconds on time. Solenoids are available for operation on 24 volt dc, 48 volt dc, 110 volt ac-dc. The unit will accept serial information without switching from column to column.

(Turn to page 70)

NEW!

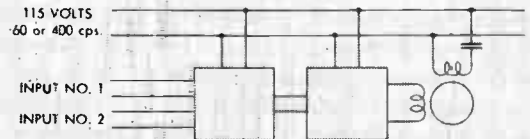
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● MAGNETIC PRE-AMP + SATURABLE TRANSFORMERS

Supply: 115 volt 400 cps.
Power output: 3.5, 6, 10, 18 watts
Sensitivity: 1 volt AC
Response Time: .03 sec.
Lowest Cost — Smallest Size
For further information request Form S493

● MAGNETIC PRE-AMP + HIGH GAIN MAGNETIC AMPLIFIER

Supply: 115 volt 400 cps.
Power output: 5, 10, 15, 20 watts
Sensitivity: .1 volt AC
Response Time: .008 to .1 sec.
Highest performance — All magnetic
For further information request Form S496

● TRANSJ-MAG*: TRANSISTOR + HIGH GAIN MAGNETIC AMPLIFIER

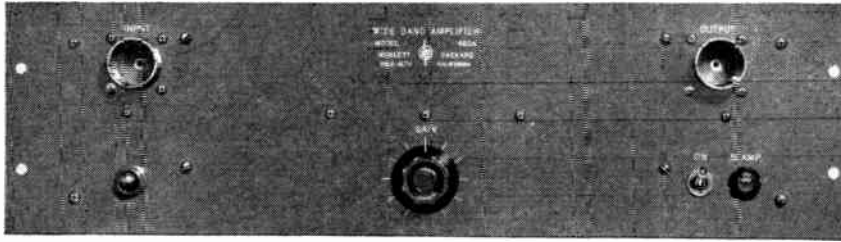
Supply: 115 volt 400 or 60 cps.
Power output: 2, 5, 10, 15, 20 watts
Sensitivity: .08 volt AC into 10,000 ohms
Response Time: .01 sec.
Fast response at high gain
For further information request Form S499
(400 cps.); Form S497 (60 cps.)

*TRADE NAME

MAGNETIC AMPLIFIERS • INC

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632 TINTON AVE., NEW YORK 55, N. Y.

Complete instrumentation for swift, sure, fast circuit measurements



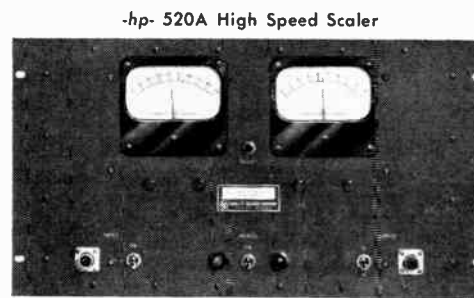
-hp- 460A Wide Band Amplifier



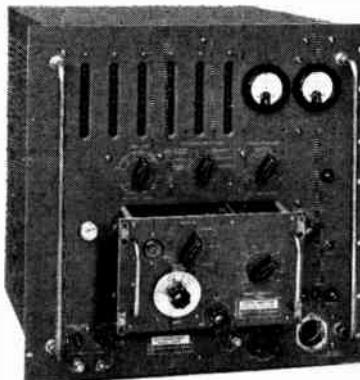
-hp- 46A Connectors



-hp- 410B Vacuum Tube Voltmeter



-hp- 520A High Speed Scaler



-hp- 524B Electronic Counter

-hp- 460 series Amplifiers give you up to 90 db gain in cascade, true amplification of millimicrosecond pulses, 0.0026 microsecond rise time, 125 volt open circuit output and 100 megacycles bandwidth for standard oscilloscopes. -hp- 520A High Speed Scaler is an aperiodic instrument for precision period pulse counting from 0 cps to 10 mc. Its double-pulse resolving time is 0.1 μ sec, triple-pulse resolving time 0.2 μ sec. -hp- also offers a complete line of electronic counters, oscillators, voltmeters, VHF, UHF and SHF signal generators and other equipment for nuclear radiation, television or similar work.



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Company _____

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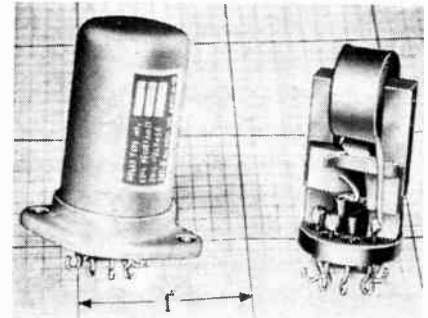
City _____ Zone _____ State _____

NEW PRODUCTS

● Sub-Miniature 2-Pole Relay Item 667

Maximum space conservation in a relay of high-performance characteristics is achieved in a new sub-miniature, 2-pole design announced recently. Less than 1½" high, the new Hi-G relay is enclosed in a cylindrical can equipped with a conventional 2-hole mounting flange of 1½" x ¾" over-all dimension. The new unit retains the balanced rotating armature and efficient magnetic circuit of standard units in the Hi-G line. Weight is one ounce maximum.

Greatly exceeding the provisions of pertinent military specifications such as MIL-R-5757B, the new HG-2SM relay withstands shock accelerations in excess of 20 G's at frequencies up to 2000 cps, with no contact break. In conjunction with other equipment, sub-miniature Hi-G relays have also passed Qualification Test MIL-E-5009A for turbojet



engines. Relay enclosure provides excellent r-f shielding and minimizes radiated noise even with high switching currents. The new sub-miniature unit is capable of operating at temperatures up to 200°C. Insulation resistance is greater than 100 megohms.

Contact current in the new Hi-G relay is rated at 3 amps, 28 volts dc, and 3 amps, 115 volts ac, with contact life in excess of 100,000 operations. Higher contact currents can be handled where shorter contact life is permissible. Contact resistance, held as low as 0.01 ohms, is ideal for signal circuits. Coil resistance for the 2-pole unit is rated at 325 ohms at 28 volts dc. The new unit is also available in a single-pole model with coil resistance of 520 ohms. Relays may be hermetically-sealed and filled with either dry air or nitrogen.

● First Molded Plastic Metallized Paper Tubular Capacitor Item 668

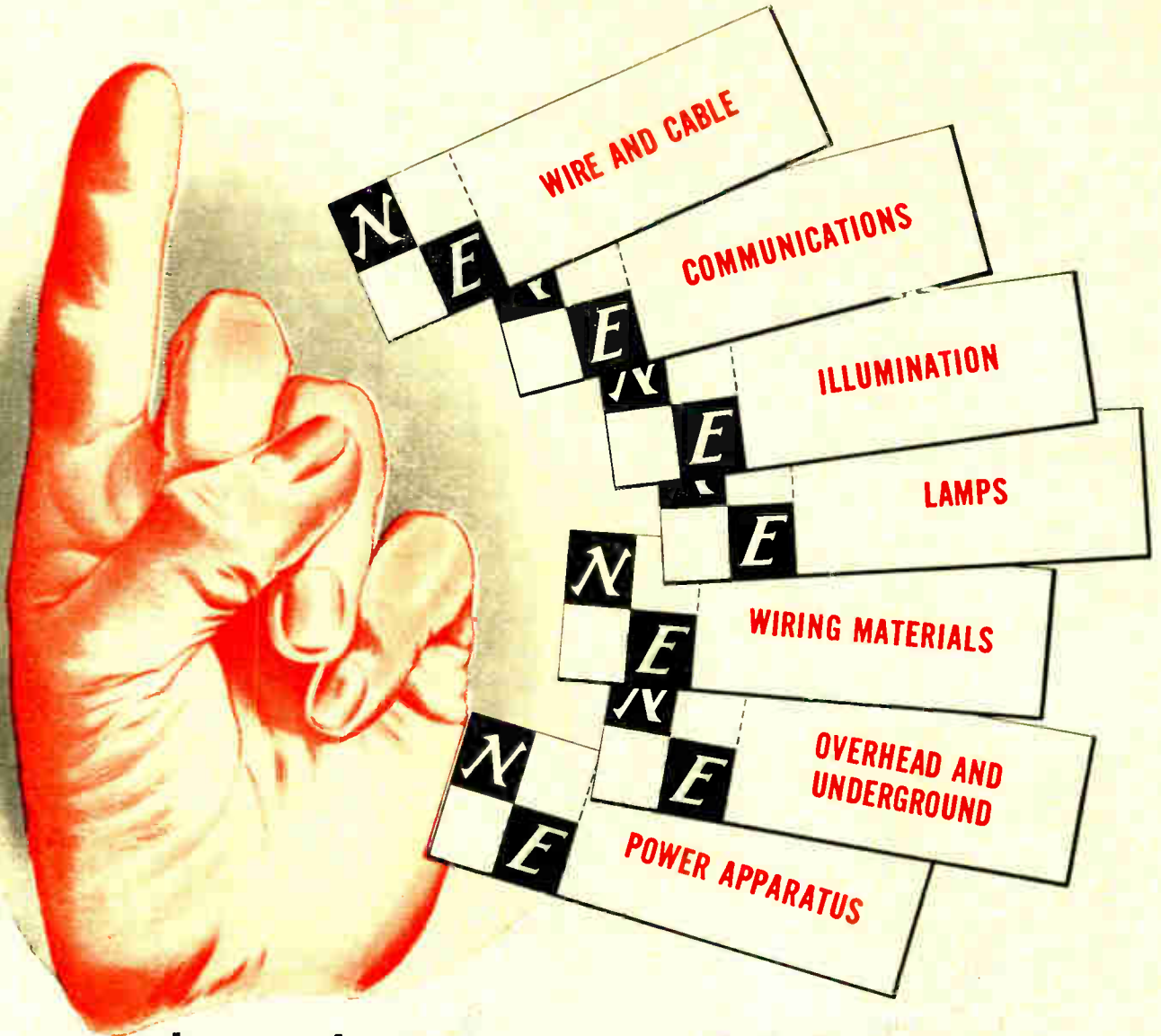
A leading manufacturer of capacitors and RF noise suppression filters has announced a sensational new capacitor — the first metallized paper, molded plastic, miniature tubular capacitor ever developed.

Trade marked "The Comet", it offers features never before available by combining the operating characteristics of a metallized paper capacitor with the complete protection of the maker's exclusive molded plastic shell and bonded seal.

"THE COMET" possesses unique properties that provide extra protection against overloads and momentary surges. Metallized paper construction results in small size and light weight with low RF impedance. A new, solid thermosetting impregnant provides high dielectric strength and improved insulation resistance. "THE COMET" operates dependably up to 125°C. and the bonded shell and protected seal are immersion-proof and impervious to all extremes of heat, cold and moisture.

(Turn to page 72)

For further data on advertised products use page 54.



when 1 get's you 100,000

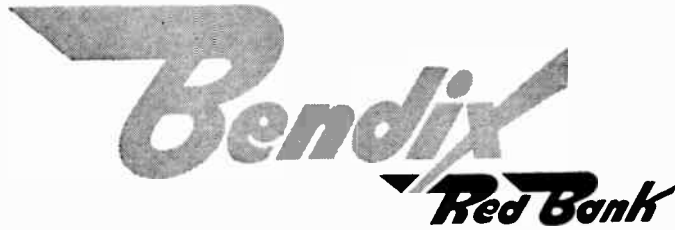
Purchasing from Northern Electric gives you access to approximately 100,000 electrical items which are the dependable products of well over 1,000 manufacturers. With 46 Northern Electric offices throughout Canada, these electrical supplies are made available to you on short notice.

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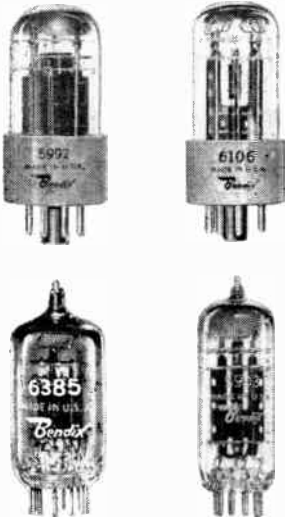
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With electronic controls taking over more and more operational functions in military and industrial applications, it is becoming increasingly important that the electron tubes used be dependable under extremely severe conditions. This applies particularly to installations in aircraft where tubes must operate reliably at high altitudes, while subjected to continuous vibration, varying voltages and frequent shock. Because of their advanced design and construction . . . born of never-ceasing research and special production skills . . . Bendix Red Bank Reliable Electron Tubes have the dependability necessary to meet these severe operating conditions. You can depend on our long, specialized experience to give you the right answer . . . for all types of regular as well as special-purpose tube applications. Tubes can be supplied to both commercial and military specifications. Call on us for full details.

Manufacturers of Special-Purpose Electron Tubes, Inverters, Dynamotors, Voltage Regulators and Fractional D. C. Motors

| DESIGNATION AND TYPE | | | | | TYPICAL OPERATING CONDITIONS | | |
|----------------------|------------|------------|---------------------|-----------------|------------------------------|-------------------------|-----------|
| Type | Proto-type | Bendix No. | Description | Base And Bulb | Heater Voltage | Plate Voltage Per Plate | M.A. Load |
| 5838 | 6X5 | TE-3 | Full Wave Rectifier | Octal T-9 | 12.6 | 350. | 70. |
| 5839 | 6X5 | TE-2 | Full Wave Rectifier | Octal T-9 | 26.5 | 350. | 70. |
| 5852 | 6X5 | TE-5 | Full Wave Rectifier | Octal T-9 | 6.3 | 350. | 70. |
| 5993 | 6X4 | TE-10 | Full Wave Rectifier | 9-Pin Miniature | 6.3 | 350. | 70. |
| 6106 | 5Y3 | TE-22 | Full Wave Rectifier | Octal T-9 | 5.0 | 350. | 100. |

| Type | Proto-type | Bendix No. | Description | Base And Bulb | Heater Voltage | Plate Voltage | Screen Voltage | Grid Voltage | Gm | Plate Current | Power Output |
|-------|------------|------------|----------------------|-----------------|----------------|---------------|----------------|--------------|------|---------------|--------------|
| 5992 | 6V6 | TE-8 | Beam Power Amplifier | Octal T-9 | 6.3 | 250. | 250. | 12.5 | 4000 | 45. MA | 3.5 W |
| *6094 | 6AQ5 6005 | TE-18 | Beam Power Amplifier | 9-Pin Miniature | 6.3 | 250. | 250. | 12.5 | 4500 | 45. MA | 3.5 W |
| 6385 | 2C51 5670 | TE-21 | Double Triode | 9-Pin Miniature | 6.3 | 150. | — | -2.0 | 5000 | 8. MA | — |

*Tube Manufactured with Hard (Nonex) Glass for High Temperature Operation (Max. Bulb Temp. 300°C.)

For additional data write to:

200 LAURENTIEN BLVD., MONTREAL

AE-54-12



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NEW PRODUCTS

● Plastic Tooling Compound Item 669

A viscous, metal-filled plastic material, which can be molded like putty to conform to almost any model or pattern and then hardened to produce a precision replica of the original is now on the market.

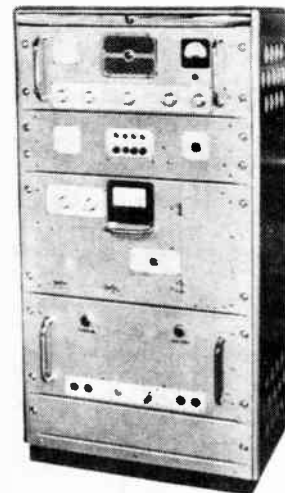
PLASTIK-TUL can be used for rapid and economical production of jigs, fixtures, plugs, gauges, forming dies, holding fixtures, masking fixtures, etc. It is especially applicable for making machining fixtures for odd and irregular shapes which ordinarily may be difficult to hold and or position. In application, PLASTIK-TUL is spread over the pattern or poured into a form containing the pattern and allowed to harden. During the hardening process PLASTIK-TUL requires no pressure and gives off NO volatiles. When completely hardened, in accordance with furnished instructions, it is corrosion-resistant and is not affected by common cutting oils, solvents, greases, etc. It can be drilled, tapped, threaded, milled, broached, sawed, etc. with ordinary metal-working tools and equipment. It may also be painted or plated.

● 60 Watt H.F. Station Item 670

A new compact 4 channel H.F. station with push-button channel selection is available.

The 60 watt H.F. Transmitter (P.T.C. 931) and H.F. Receiver (P.T.C. 941) take advantage of the latest advance in tubes and components.

Any one of four channels may be instantaneously selected either locally or by an operator at up to 15 miles from the station. Frequency selection by pushbutton permits the use of relatively unskilled operators. Instantaneous channel selection practically eliminates the necessity for separate stations on each operational channel.



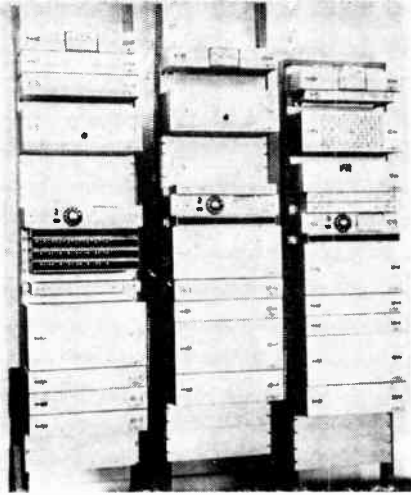
The station consists of four units — the R.F. and modulator unit, transmitter power supply unit, the receiver and the channel selector panel. The units are designed for 19" cubicle mounting housed in a modern steel cabinet with interconnecting cables terminated in plugs and sockets allowing easy removal. Gate switches in the cabinet disconnect all dangerous voltage when the rear door is opened.

Transmitter tuning controls are concealed in normal operation and adjustments are inaccessible to unauthorized personnel.

● Remote Control Supervision Equipment Item 671

A new system for control and supervision of remote equipment locations has been developed.

The new system, designated Type 51B, provides for two essentially independent functions: (1) a means for supervising conditions at remote locations from a control center, and (2) a means for controlling operations of equipment at the remote locations from the control center. Information for both functions consists of d-c pulses translated into tone signals for transmission over any suitable wire or radio circuit.



Standard system assemblies for the 51B equipment are designed on a flexible basis so that individual operating requirements can be met without extensive special engineering.

Designed primarily for use on multi-station radio routes, the new system can also be used wherever information must be gathered from remote stations and transmitted to supervisory personnel at a central attended location.

This system can supervise as many as 80 remote conditions and control up to 90 remote operations. Eight or more remote locations can be associated with each control center.

● Portable Nuclear Activity Tracer

Item 672

A new instrument in the low price field for gamma ray detection has been designed and developed. This new self-contained G.M. type portable activity tracer Model 1003 will be known as the PAT 58 (Portable Activity Tracer).

Housed in a pistol shaped case to facilitate one hand operation, the PAT 58 provides both a visual and audio signal. It is completely waterproof and weighs only 2½ pounds including the batteries and single earphone.

The new instrument is extremely simple to operate. There are only two controls, the off/on toggle switch which is operated like a trigger, and a sensitivity control. The power is provided by one flashlight type battery and six hearing aid type batteries. These batteries will operate the tracer for two to three months if the instrument is used not longer than eight hours a day in periods of three to four hours.

● Thermocouple Transfer Switches

Item 673

Announcement has been made of a new Thermocouple Transfer Switch with extremely low and uniform contact resistance. The contact resistance is less than .004 ohms and will not vary more than ±.0003 ohms over the life of the unit, thus fulfilling the basic requirement of a precision standard transfer switch for laboratory or production testing.

These units are available in all combinations of poles per deck, number of decks and positions per deck. Silver alloy contacts, slip rings and rotor arms are used exclusively and no thermal EMF is present. These durable switches have a life of up to several million operations.

(Turn to page 74)



Symbol of Service in Communications

Bell communications services are geared to your future as well as your present needs. By *leasing* your communications from Bell you tie up no capital, you are relieved of all maintenance problems and your equipment never becomes obsolete.

Whatever your communications requirements you can depend on Bell to recommend and install the type of system best suited to your needs. We will be glad to analyse your communications—there's no obligation, of course—just call our nearest Business Office.

SPECIAL COMMUNICATIONS SERVICES SUPPLIED BY BELL



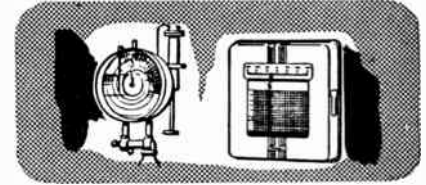
BELL TELETYPE



INTERCOMMUNICATING AND PRIVATE LINE TELEPHONE SYSTEMS



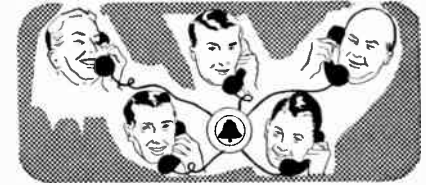
MICROWAVE RADIO RELAY SYSTEMS



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| Canadian Admiral Ltd. | McGill University. |
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| Canadian Aviation Electronics. | National Research Council. |
| Canadian General Electric Co. | Northern Electric. |
| Canadian Marconi Co. | R.C.A. Victor Co. |
| Canadian National Railways | Radio Valve Co. of Canada. |
| Canadian Standards Association. | A. V. Roe Canada Ltd. |
| Canadian Westinghouse Ltd. | Royal Canadian Mounted Police. |
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NEW PRODUCTS

● Miniature AN-Type Precision Connector

Item 674

Compact, lightweight Series 1300 Continental Connectors meet military requirements for precision AN-type connectors of rugged electrical and mechanical construction.

Applications for these connectors are extremely varied, with special emphasis on missile, aircraft electronics and miniature portable electronic gear.

A feature of the 1300 series is one-piece molded inserts to prevent moisture traps and electrical breakdown. Two shell sizes accommodate 3, 4, 5 contacts, or 15, 19, 27, 31 contacts for No. 20 AWG wire.

● A.C. Oscilloscopes

Item 675

Wide bandwidth — high sensitivity — low price: these are major features of two new ac oscilloscopes. Called Model s701 and 701-D (with delay line), the units cover the range of 5 cps to 10 mcs and are useful to 20 mcs.

Both the models 701 and 701-D have a conservatively rated sensitivity of 16 millivolts peak to peak per centimeter and a rise time of 0.35 microseconds. Large signal displays is possible through 4 inches of useful deflection. Easy to operate sweep circuits provide triggered or recurrent sweeps from 0.1 to 10,000 microseconds per centimeter, and a high input impedance of 2 megohms paralleled by 25 mmf permits more accurate measurements through low loading of the tested circuit.

An internal 1 kc square wave is available for calibration and adjustment of attenuators and probes. Cathode follower outputs for external gate and sweep connections provide synchronization for auxiliary equipment. On the Model 701-D, leading edges of pulses can be effectively displayed by delaying vertical signal through a 0.25 microsecond delay line until sweep starts.

Other features of both models are a universal power supply that permits operation at any frequency between 50 and 500 cycles and at voltages of either 115 or 230 volts. A simple, functional front panel arrangement enables operation by untrained personnel, though providing the flexibility for the most elaborate measurements. Only four tube types, with no tube operator at more than 80 per cent of maximum rating permits greatest reliability and easy service, and the low power consumption of 285 watts eliminates the need for a blower. Overall weight of the Models 701 and 701-D, in a grey aluminum housing, is but 43 pounds for easy portability.

● New 12-Page Bulletin Describes Color-Coded Compression Terminals For Shielded Wire And Coaxial Cable

Item 676

A new line of color-coded compression ferrules, called Hyrings, for grounding shielded wire and coaxial cable, terminating rod-type heating element studs, and splicing solid and stranded wire is graphically described in Burndy's Hyring Bulletin 55Y1, just off the press. This bulletin lists all Hyrings available for each conductor, describes the installation methods that eliminate soldering and brazing, covers the range of Burndy installation tooling, illustrates typical uses, in electronics, military, and appliance applications, and contains a dimensional chart that illustrates the Hyrings in seven colors.

● New Catalog

Item 677

Aerovox Canada Limited have recently announced the availability of their fifth catalog covering capacitors and instruments. It has been designed basically to speed up the task of locating and pricing the correct required capacitor.

Included in its 28 illustrated pages are descriptions and general information on Aerovox products.

The main object of the catalog is to eliminate costly delays resulting from incomplete listings.

• **New Goldring Variable Reluctance Cartridge No. 500**
Item 678

A new high fidelity pick-up cartridge of the variable reluctance type with twin styli for standard and L.P. records has been introduced.

The No. 500 turn-over reluctance cartridge will fit all standard pick-up arms having $\frac{1}{2}$ " fixing centers for the cartridge bracket. The cartridge's vibrating systems of very high compliance and low dynamic mass result in extremely low record wear, good tracing without any non-linear distortion over a very wide frequency range even on records of large amplitude. The two styli are mechanically independent of each other.

Specification: Style: (1) .0025" rad. sapphire for L.P. records. Normal tracking pressure: 7 grams. Lateral compliance: Not less than 3×10^{-6} cm. dyne. Effective mass at stylus tip: 3.5 milligrams. Output (average): 3.2 mV per cm sec — up to 35 mV. D.C. resistance: 1,500 Ohms. Impedance: 3,800 Ohms. Recommended load resistance: 50,000 Ohms. Frequency response: Substantially linear from 20-20,000 cps.

• **"Klystron Facts — Case No. 2"** Item 679

"Klystron Facts — Case No. 2", a new booklet offered by the manufacturer of Eimac electron-power tubes, is a discussion of klystron power amplifier applications, as well as new Eimac developments in the klystron field. The pamphlet is a continuation of "Klystron Facts", published in 1954, which covers the theory and principle of klystrons. Both "Klystron Facts" and "Klystron Facts — Case No. 2" are available on request.

• **New Differential Transformer Transmitter** Item 680

A new differential transformer transmitter for transmitting such measurements as pressure, flow, level, and mechanical displacement to a Dynamaster Recorder or Controller, over a wire circuit has been announced.

Delays that would be introduced by transfer of pressure changes through long pipelines or tubing are immediately shown on the chart and scale of the Dynamaster Recorder or Controller located any distance up to 4000 feet away. (Longer distance possible with special engineering.)

Pressure ranges from 0 to 1" of water to 0 to 10000 psi can be furnished, available in standard differential ranges of mercury and bellows type meter bodies.

• **F.S. 185 Frequency Standard** Item 681

The Model FS-185 Frequency Standard is a highly stable source of 100 kc signals. A precision GT-cut quartz crystal housed in an oven within an oven, both temperature-controlled, maintains excellent frequency stability over a wide range of ambient temperature.

The short period stability (5 minutes, any instant) is 2 parts in 100 million. The medium period stability (24 hours, averaged) is 0.5 parts in 100 million. The long period stability (2 months, averaged) is 10 parts in 100 million. A sinusoidal output of 3 volts RMS amplitude across 600 ohms and a trigger (harmonic) output of 20 volts peak amplitude across a 300 ohm load are provided.

Item 682

• **New Edition of Thermocouple And Pyrometer Supplies Bulletin**

A new edition of their 56-page Bulletin P1238 on thermocouples and pyrometer accessories has just been published by a manufacturer. (Turn to page 76)

CW-TELCON
EIMAC
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4

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to
efficient
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CW-TELCON

Canada's Radio and Television industry depends on CW-TELCON radio frequency cables for the latest in design development and the utmost in efficient performance. Canada Wire produces a full range of high frequency balanced and coaxial cables to the most exacting specifications. Write for CW-TELCON pamphlet for complete information.

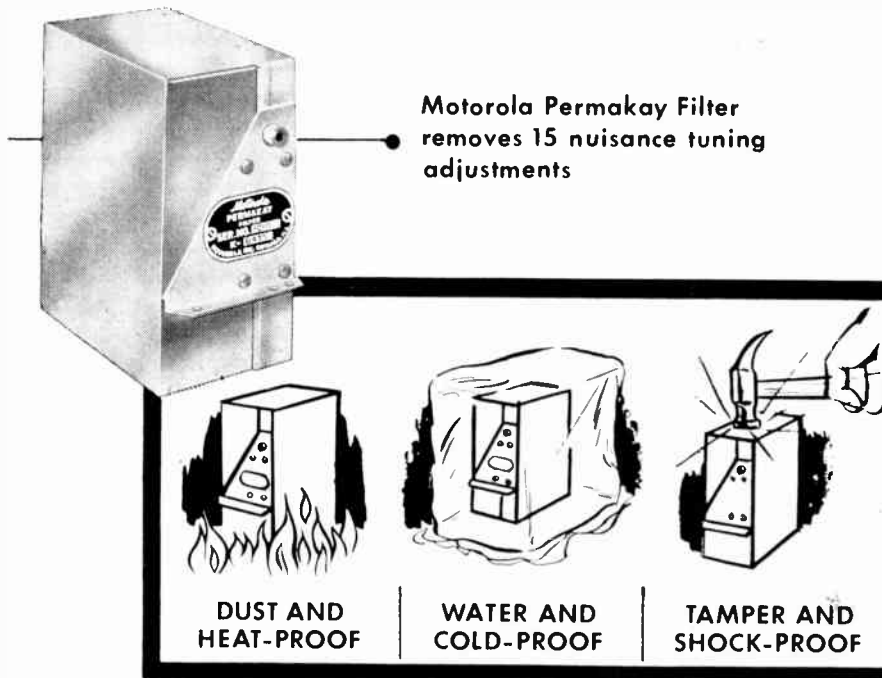
Canada Wire

CANADA WIRE AND CABLE COMPANY LIMITED

FACTORIES:
Toronto, Montreal, Smith Falls, Vancouver
Sales Offices: New York, Los Angeles

Motorola* Selectivity

**GUARANTEED FOR
THE LIFE OF THE SET**



The amazing PERMAKAY filter used in every Motorola 2-way radio receiver results in *maximum selectivity*. The Permakay filter requires no adjustment or maintenance and is *guaranteed for the life of the equipment*. Cast in a solid mass of plastic, the Permakay filter can never be affected by water, dirt, heat, cold or mechanical shock. Temperature compensation ensures constant faultless performance even at extreme temperatures. Year in, year out, Motorola installations number more than *twice* those of all other manufacturers combined. In Canada alone, more than *three out of five* V.H.F. 2-way radio units are Motorola.

Distributed by

*Motorola is a registered trade mark, owned by Motorola Inc., in the United States, and by Motorola Canada, Ltd., in Canada.

Equipment Division

ROGERS MAJESTIC ELECTRONICS

LIMITED

HALIFAX • MONTREAL • TORONTO • WINNIPEG • VANCOUVER

NEW PRODUCTS

(Continued from page 75)

The bulletin, A Buyers Guide and User's Manual, contains extensive engineering data on the selection and installation of the proper types of thermocouples, wells, head assemblies, and other pyrometer accessories, as well as recommended thermocouple for specific installations in the chemical, metal-working, iron and steel, ceramic, petroleum, food, and glass industries, and many others. Numerous examples of specific recommendations for heat-treating and metal processing applications are outlined, along with the design and process considerations involved.

There are 165 photos and line drawings, illustrating products, suggested installation techniques, and accessories, as well as thermocouple calibration tables based on the new NBS Research Paper 2415 and Circular 508. Copies are available upon request.

● *New Miniature Variable Capacitor For "Pocket" Radios* Item 683

A new miniature two-gang variable capacitor, smaller and lighter than any previous commercial model and designed specially for miniaturized portable and "pocket" radios using transistors and printed circuits, has been developed by General Instrument Corporation and is now available to set manufacturers. Only $\frac{1}{8}$ " high, the new component weighs barely an ounce, thanks to the use of an aluminum "cradle", instead of steel as in other models. It is so designed as to fit into printed circuit panels, if desired. The new component (Model 2851) was exhibited at the IRE show in New York, March 21-24, and is the product of an intensive miniaturization research program by General Instrument Corporation.

● *New Electronic Switch With Range of D.C. To 15 MC Converts Cathode-Ray Oscillograph From Single-Beam To Dual-Trace* Item 684

A new electronic switch designed to convert any cathode-ray oscillograph in the range of d.c. to 15 mc. easily and inexpensively into a dual-trace unit, is announced.

The new electronic switch by converting a single oscillographic trace to two traces, permits a multitude of signal comparisons such as timing, phase, input vs. output relationships, circuit interaction, etc., to be explored.

To permit the display of a large variety of signals with a wide variety of repetition rates, the Type 330 offers triggered or recurrent switching. The instrument may be triggered from the oscillograph output at rates from 0 to 100 KC or will switch at recurrent rates of 1, 10, or 100 KC. Triggered switching is particularly valuable for displaying pulses, pulse-rise times and other transient phenomena on alternate sweeps. Recurrent switching finds greatest application in low-frequency mechanical or electro-mechanical work where switching occurs at many times the basic occurrence rate of phenomena.

The input to each channel has two stepped attenuators with nine steps of attenuation from X1 to X400 to allow signals of widely varying amplitudes to be displayed. Including attenuators, the response of either channel extends from D.C. to down not more than 3 db at 15 MC. The rise time is 0.021 μ sec when the electronic switch is connected to an external lead of 60 uuf.

Vertical positioning of the two signals with respect to each other is provided for in the Type 330 to enable superposition of two signals for direct comparison. Either channel may be positioned as the upper trace.

The instrument measures $8\frac{1}{2}$ " x $\frac{1}{2}$ " x 18" and weighs 30 pounds.

For further data on advertised products use page 54.

Letter To The Editor

The Editor,
Electronics and Communications
Dear Sir:

I have read your editorial "A Temporary Tax . . . ?" as I have read many others on the same subject. I quite agree with you; I even believe that our present system (so called) of taxation is nonsensical, arbitrary and unjust. So I take the liberty of sending you a pamphlet which tells you where logically and justly public revenue may be found and where it should be collected so as to cause the least harm to all of us, in the hope that you may join the very small nucleus of electors who are at the present time "watching the activities of their elected representatives", and alas, who, on account of their numerical weakness, cannot do much more but spread around what they think to be the truth.

If the contents of this booklet impress you, and if you feel that it is worth while for others to read and digest, then don't be afraid to call upon the author, Mr. Thompson, for additional copies (the address is written at the bottom on the inside of the back cover). It was printed for no other purpose.

If so, then your attitude will increase my conviction that your editorial has not been written in vain.

Yours truly,
Louis Crepeau, Prof. Eng., E.I.C.

Applications Before CBC

At a public session of the CBC Board of Governors in Ottawa on April 15th, the following requests for new television broadcasting stations were considered:

By Lethbridge Television Limited. To establish a television station at Lethbridge, Alberta, on Channel 7; with erp of 102.8 kw video; erp of 57.5 kw audio, with a directional antenna 668 feet above average terrain.

By the Island Radio Broadcasting Company, Limited. To establish a television station at Charlottetown, P.E.I., on Channel 13; with erp of 21 kw video; erp of 12.5 kw audio, with a directional antenna 401 feet above average terrain.

At the same session four requests for new AM radio broadcasting stations are due to be heard. Their locations are Lindsay, Ont., Smith's Falls, Ont., St. Jerome, Que., and Weyburn, Sask.

RTMA Annual General Meeting

The 26th Annual General Meeting of RTMA is due to take place on Thursday and Friday, June 2nd and 3rd, at the Sheraton-Brock Hotel, Niagara Falls, Ontario.


The first day will be devoted to Division and Committee meetings while the second day has been set aside for the Annual General Meeting and meetings of the Board of Directors and of Special Panels.




why more than three out of five Canadian operators choose Motorola*

2-way radio


Year in, year out Motorola 2-way radio installations number more than twice those of all other manufacturers combined. Here are but three of the many significant reasons Motorola is the leader in the 2-way radio field.



SELECTIVITY: Incorporated in every Motorola radio is the amazing "Permakay" Filter. This filter, encased in plastic and guaranteed for the life of the set, removes 15 nuisance tuning adjustments. The high selectivity of Motorola receivers eliminates any chance of interference from stations in adjacent channels.



RESERVE GAIN: To ensure against possible deterioration of tubes, 90% more gain than necessary is built into Motorola receivers! This is one more reason for the extraordinary long life of Motorola equipment.



TRANSMITTERS: Motorola transmitters provide for clear communications in your own system—with no interference from users on adjacent frequencies. This is ensured by the incorporation in every Motorola transmitter of an automatic *Instantaneous Deviation Control* and also by the excellent design and careful engineering of all transmitter circuits.

More man-hours are built into Motorola!

* Motorola is a registered trade mark, owned by Motorola Inc., in the U.S. and by Motorola Canada, Ltd., in Canada.



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Equipment Division

ROGERS MAJESTIC ELECTRONICS

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● Three of the speakers at the Toronto I.R.E. Section banquet and Ladies' Night held in the King Edward Hotel are left to right: C. A. Pollock, Chairman of the R.T.M.A., Miss Jane Gray, guest speaker and Sir Robert Watson-Watt.

Toronto Section I.R.E. End Year's Activities

A Ladies' Night held in the Sheraton Room of the King Edward Hotel on April 18th, brought to a close the active season of the Toronto Section of the Institute of Radio Engineers. Master of ceremonies for the occasion was J. R. Longstaffe who introduced the many distinguished head table guests which included Fred Heath, Vice-Chairman Elect of the Toronto Section I.R.E.; Lady Watson-Watt; E.

O. Swan; Mrs. E. L. Palin; Mr. Alex Barclay, Chairman Elect of the Toronto Section, I.R.E.; Mrs. H. H. Kerr, Mr. Eric Palin, Past Chairman of the Toronto Section, I.R.E.; Mrs. Carl Pollock; Mr. W. H. Jackson, Secretary-Treasurer Elect, Toronto Section, I.R.E.; Mrs. Fred Heath; Sir Robert Watson-Watt; Mrs. A. Barclay; Mr. H. H. Kerr, Principal, Ryerson Institute of Technology; Mrs. J. R. Longstaffe; Mr. Carl Pollock, President, Radio Television Manufacturers' Association of Canada; Miss Jane Gray and Mr. J.

R. Longstaffe.

Guest speaker of the evening was Miss Jane Gray of radio station CHML, Hamilton, one of Canada's outstanding



● Master of ceremonies for the I.R.E. banquet was J. R. Longstaffe, who chaired the gathering in his inimitable and entertaining manner.



● Retiring Chairman of the Toronto Section, I.R.E. and the newly elected executive are shown above left to right: E. A. Palin; Fred Heath, Vice-Chairman; A. Barclay, Chairman and H. Jackson, Secretary-Treasurer.

radio personalities who spoke to the capacity gathering of her thirty years in the field of radio broadcasting.

Other speakers of the evening were radar specialist Sir Robert Watson-Watt, and Mr. C. A. Pollack, President and Chairman of the Board of the Radio Television Manufacturers' Association of Canada.

The evening was closed with E. L. Palin, retiring Chairman of the Toronto Section I.R.E., turning over the reigns of office and the presentation of a gavel to the recently elected Chairman, A. P. H. Barclay.

INDUSTRIAL ELECTRONICS OF CANADA LIMITED

Selenium and Electronic Rectifiers

and D.C. Power Units

for Industry, Aviation, Communications and Research

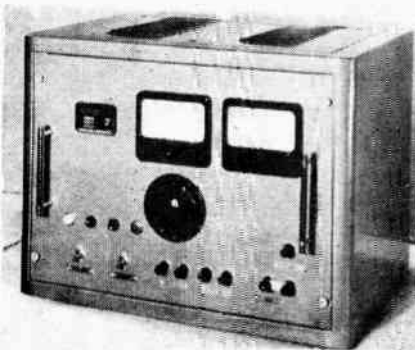
INDUSTRIAL ELECTRONICS

OF CANADA LIMITED

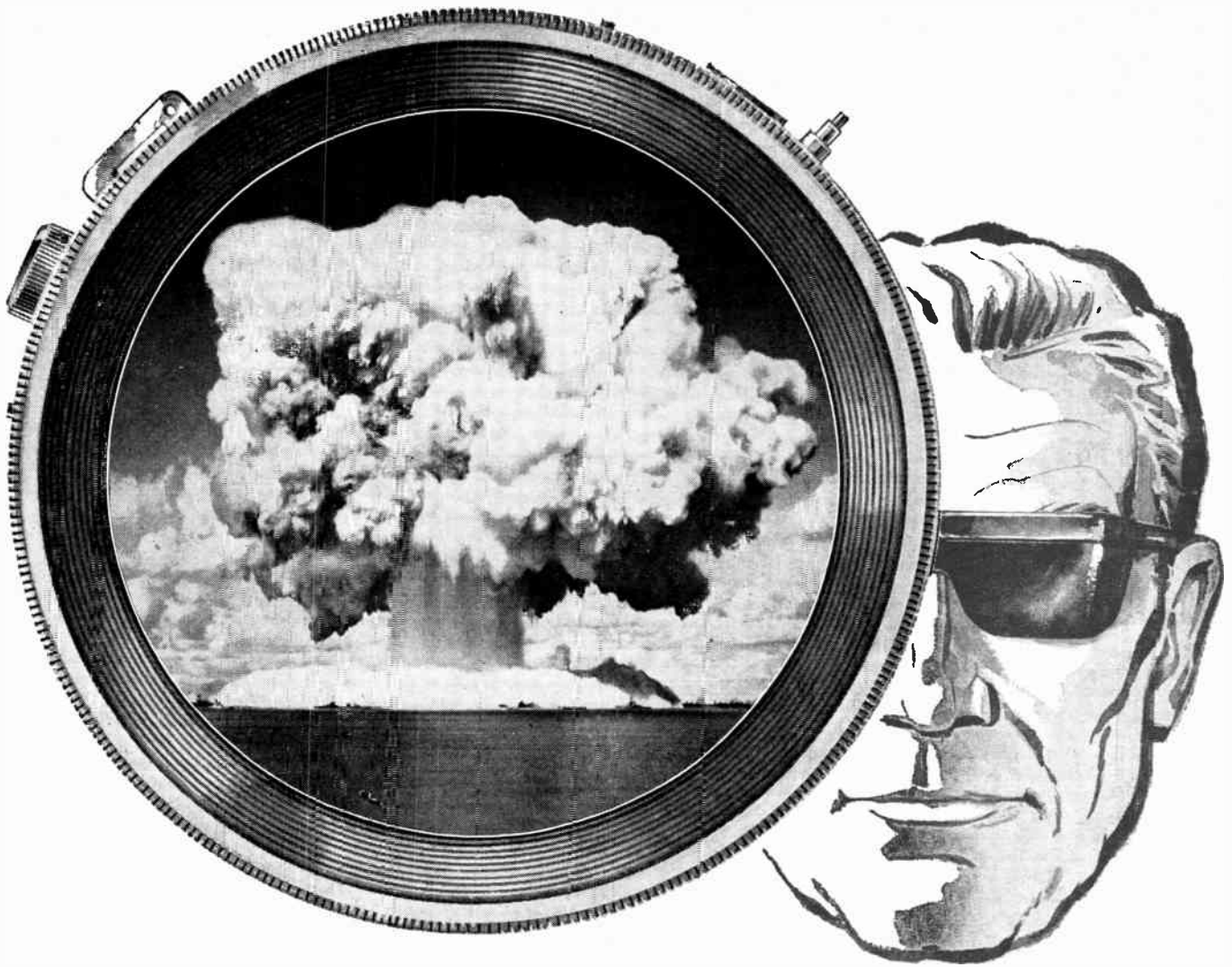
83 TORBARRIE ROAD

TORONTO 15,

ONTARIO



For further data on advertised products use page 54.



how to stop an h-blast

WANTED: a camera to stop the action of a nuclear explosion at a pre-selected microsecond, with high quality image-definition . . . that was the problem handed by the AEC and its Los Alamos Scientific Laboratory to the Boston firm of Edgerton, Germeshausen & Grier, Inc. EG&G solved it by inventing the non-mechanical Rapatronic shutter . . . employing the Faraday Effect of magnetically rotating the plane of polarized light as it traverses an optical element . . . and relying on HELIPOT* precision potentiometers and DUODIAL* turn-counting dials for sensitivity setting and calibration.

A light-pulse from the blast falls on a photocell . . . generates a signal that passes through a variable time-delay to trigger a condenser-discharge circuit . . . releasing energy which surges through a coil wound around a lead-glass lens. The resulting magnetic field rotates polarized light from the blast as it passes through the lens . . . effecting a one-microsecond exposure.

Sensitivity of the photocell circuit is controlled by a standard-linearity Model A 10-turn HELIPOT, calibrated with a Model RB DUODIAL. Time-delay from photocell pick-up to shutter operation . . . continuously variable from 0 to 100 microseconds . . . is controlled by a Model A 10-turn HELIPOT of 0.1% linearity, calibrated with a Model W10 DUODIAL.

The coil of the HELIPOT is wound with more than 10,000 turns of resistance wire . . . the DUODIAL is settable to a

fraction of any of its thousand scale-divisions . . . and the Rapatronic shutter can be tripped at any preselected fraction of a microsecond.

For complete details of this and other HELIPOT applications, write for Data File 404



MODEL A HELIPOT



W10 DUODIAL



first in precision potentiometers

Helipot Corporation/a division of BECKMAN INSTRUMENTS, INC.

Factory: No. 3 Six Points Road, Toronto 18, Ont.

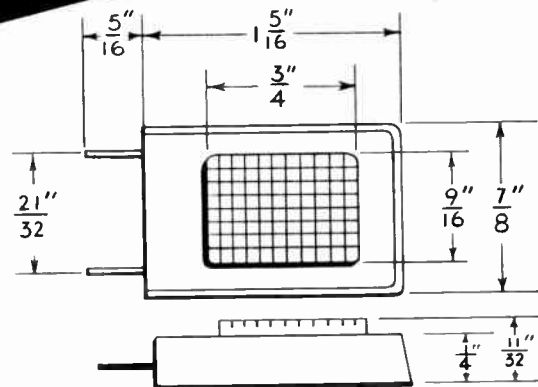
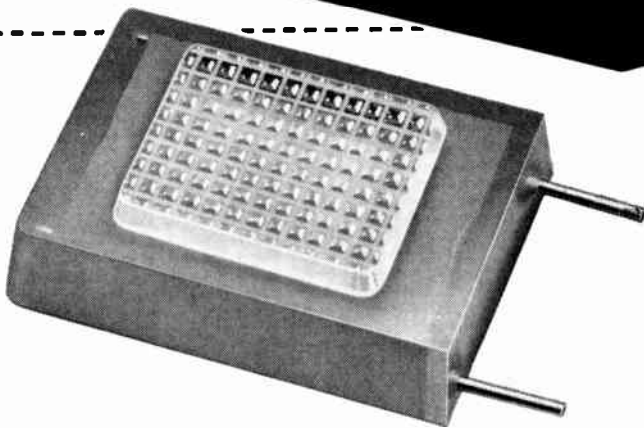
Representative: R-O-R Associates, Ltd.

290 Lawrence Avenue West, Toronto 12, Ont.



* 342
T.M. REG.

NEW PHOTOCELL OPERATES RELAY DIRECT



GENERAL DESCRIPTION

Sensitive area 1.45 cm x 1.85 cm
 Electrodes Interleaving combs
 Cell casing Cast Araldite
 Socket Special

MAXIMUM RATINGS

Dissipation **0.3 max. watt**
Voltage **120 max. volts (a.c. or d.c.)**
Current **20 max. ma**
 Temperature range - 40°C to +75°C ambient

PHOTOELECTRIC CHARACTERISTICS

| | MIN. | AVG. | MAX. |
|---|------|------|----------------|
| Wavelength at maximum response..... | | | 5100°A |
| Dark resistance..... | 100 | 1000 | 10,000 megohms |
| *Resistance at 50 ft candles..... | 1500 | 2000 | 3,000 ohms |
| *Sensitivity at 1 ft candle, 100 volts..... | 0.25 | 0.4 | 0.5 amp./lumen |
| Capacitance..... | 20 | 25 | 30 mmfd |
| Rise-time constant at 50 ft candles..... | | | 5 m.sec |
| Decay-time constant at 50 ft candles..... | | | 10 m.sec |

*Measured with a 2854°K colour temperature tungsten lamp.

For further information, write for the C.M.C. Photocell Handbook to

F. HASELL

CANADIAN Marconi COMPANY

2442 TRENTON AVENUE, MONTREAL, P.Q., CANADA

For further data on advertised products use page 54.



New Products...

FROM OVER 25 COUNTRIES

Will be on display

Each year many Canadian, United States and overseas companies increase the number of their representatives visiting the Canadian International Trade Fair. To get the fullest benefit from these displays and demonstrations of the world's products, be sure that your technical and purchasing personnel attend—as well as other important members of your organization.

Twenty-four exhibitors from six countries have taken space to exhibit a variety of equipment and tools in the electrical field. These will include electronic instruments, high stability resistor components, regulating transformers, motors, control devices, testing instruments, high and low-voltage switchboards, air circuit breakers, switches and timers.

Address your requests for information and accommodation to: The Administrator, Canadian International Trade Fair, Exhibition Park, Toronto.

8th Annual

CANADIAN International TRADE FAIR

TORONTO
CANADA
MAY 30th
TO
JUNE 10th
1955

YOUR GATEWAY TO WORLD TRADE



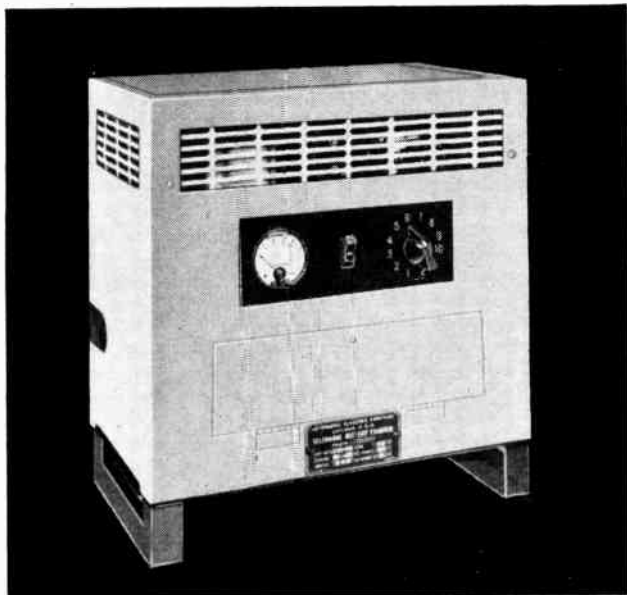
OPERATED BY THE GOVERNMENT OF CANADA TO PROMOTE YOUR BUSINESS

ELECTRONICS & COMMUNICATIONS, MARCH-APRIL, 1955

For further data on advertised products use page 54.

AUTOMATIC ELECTRIC—A GREAT NAME IN COMMUNICATIONS

DEPENDABLE POWER EQUIPMENT Meets Your Every Need—ECONOMICALLY



▲ BATTERY CHARGERS

Type 46 Battery Charger

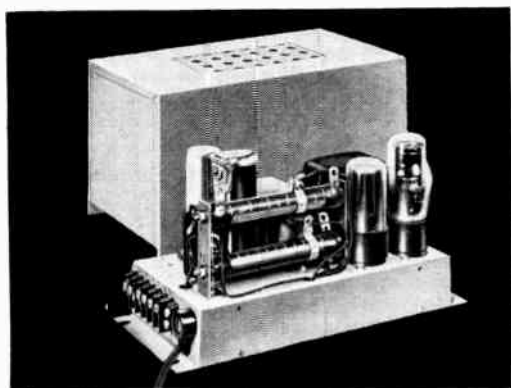
A constant-current 50-volt charger (for 22 to 26 cells). Three sizes: 3, 6, 12 amperes. Operates on 115 or 230 volts, single-phase AC, 50 to 60 cycles. Ask for Circular 1624.

Convotrol Battery Charger

A constant-voltage, fully automatic 50-volt charger (for 22 to 26 cells). Three sizes: 3, 6, 12 amperes. Operates on 115 or 230 volts, single-phase AC, 50 to 60 cycles. Two or more Convotrols can be paralleled or used with Type 46 charger for greater output. Ask for Circular 1623.

Type 44 Battery Charger

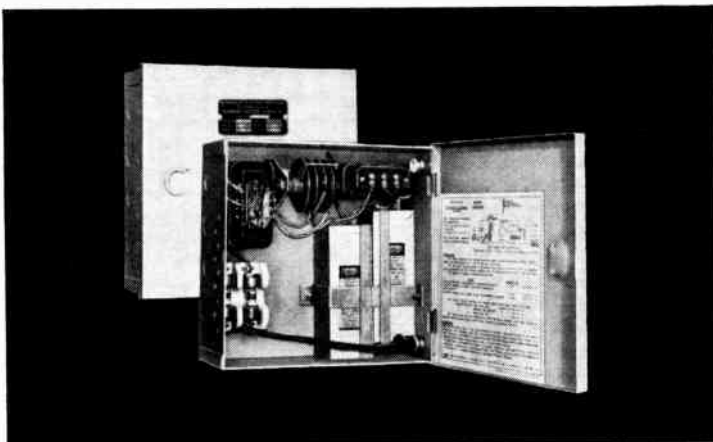
For 1, 2, or 3 cells. Delivers 0.01 to 1.5 amperes. Operates on 115 or 230 volts, single-phase AC, 50 to 60 cycles. Ask for Circular 1659.



▲ Type 85 Battery Eliminator

Provides 150 volts noiseless DC (30 milli-amperes) and 15-volt tap for test desks. Operates on 115 volts, single-phase AC, 50 to 60 cycles. Ask for Circular 1731.

Here's a full line of power equipment especially designed for communication use. Every unit gives you noiseless current. High-grade heavy-duty components withstand overloads, cut maintenance. Write today for full details. You'll see why so many communication men say these units offer the greatest possible economy.



▲ BATTERY ELIMINATORS

Type 45 Battery Eliminator

For automatic, manual, or pushbutton intercommunicating system requiring 12 volts noiseless DC at 1.5 amperes. Operates on 115 volts, single-phase AC, 50 to 60 cycles. Ask for Circular 1689.

Type 48 Battery Eliminator

Fully automatic. Supplies noiseless DC for telephone and signaling equipment. Four sizes: 3 amperes, 25 volts; 6 amperes, 25 volts; 3 amperes, 50 volts; 6 amperes, 50 volts. Operates on 115 volts, single-phase AC, 50 to 60 cycles. Ask for Circular 1708.

AUTOMATIC ELECTRIC

(CANADA) 1953 LIMITED

Distributor in Canada

AUTOMATIC ELECTRIC SALES (CANADA) LIMITED

Head Office: 185 Bartley Drive, Toronto 16

5516

MONTREAL • OTTAWA • BROCKVILLE • HAMILTON • WINNIPEG • REGINA • EDMONTON • VANCOUVER

For further data on advertised products use page 54.

London Report *Continued*

An innovation in intercom equipment is the Mullard amplifier in which germanium transistors are used instead of valves. This results in a great saving of space, weight and power consumption for the transistors work on a very low voltage and consume almost negligible current.

A mobile electronic flight simulator — one of a \$3,500,000 Canadian order, for which delivery commenced early last year, has been exhibited by Redifon.

This simulator which is based on the E. Sabre jet aircraft is housed in a 36 ft. long trailer and has its own mobile power supply. It is fitted with an exact copy of a Sabre cockpit complete with all controls and recording instruments for the instructor. The R.C.A.F. and units in Western Europe are using this instrument for familiarizing trainee pilots with the controls of a Sabre fighter.

Precision electronic measurement of engine speed with accuracies up to .03 per cent, the result given in revolutions per minute, is provided by a new Plessey instrument.

A high power 100 watt 100-channel R/T airborne communication equipment operating in the HF range of 2.8 — 18.1 Mc/s has been developed by Standard Telephones and Cables especially for long distance air transport operators. This is the STR 18C equipment which will be fitted into the entire fleet of B.O.A.C.'s Britannia turbo-prop aircraft, as well as in aircraft of many foreign air-lines.

Following the Standard STR 9X VHF airborne equipments, is the new STR 20 which provides either 560 or 623 channels, according to the channel frequency spacing.

Standard Telephones & Cables STR 30B frequency-modulated radio altimeter is the latest version of the earlier STR 30A. Operating in Band 4,200 — 4,400 Mc/s per second the STR 30B can accurately measure the height of an aircraft down to 2 ft. Height indication is presented on a single indicator with a linear scale reading 0 to 500 feet, calibrated in 100 ft. sub-divided into 20' sections. When the control unit is switched to the 5,000 range an "O" appears beside each major scale figure and the meter then reads 1,000 to 5,000 feet.

G.E.C. have a new FM radio altimeter. The presentation consists of single pointers with one revolution per 1,000 feet. Numbers of thousands are shown on a single figure revolution counter. Pre-set height may be selected manually on a limit height unit and indicator. The limits provide warning when flying above or below any pre-set height.

For QUALITY ELECTRONIC COMPONENTS Consult Us

Representing among other time tested lines:

Sigma Instruments Inc.
Speer Resistor Division,
Speer Carbon Company.
Superior Flux and Manufacturing Co. Inc.
Tyni-Switch Division, The Sessions Clock Co.

SAMUEL C. HOOKER (Canada) LTD.

8025 Decarie Blvd.
MONTREAL 9
REgent 1-2157

21 King St. East
TORONTO 1
EMpire 4-2578



Pioneers in Development of Vibration-Resistant Electrical Connector

The unsatisfied demand for a rugged, dependable connector capable of meeting the exacting requirements of modern aircraft led the Scintilla Division of Bendix* to develop the first vibration-resistant electrical connector. These connectors using the revolutionary new insert material known as Scinflex were first used on Scintilla Division's ignition equipment for piston engines.

So outstanding was the performance of this new and better connector that its acceptance and use have now become world-wide. Today the Scintilla Division is a major contributor to the electrical connector industry.

This pioneering has never stopped. Bendix was first in the field with cadmium plated connectors, which were later made a requirement of military specifications. Our latest contribution is the best engineered closed entry socket contact available anywhere—one which cannot be mechanically overstressed.

*TRADE-MARK



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

FACTORY BRANCH OFFICES:

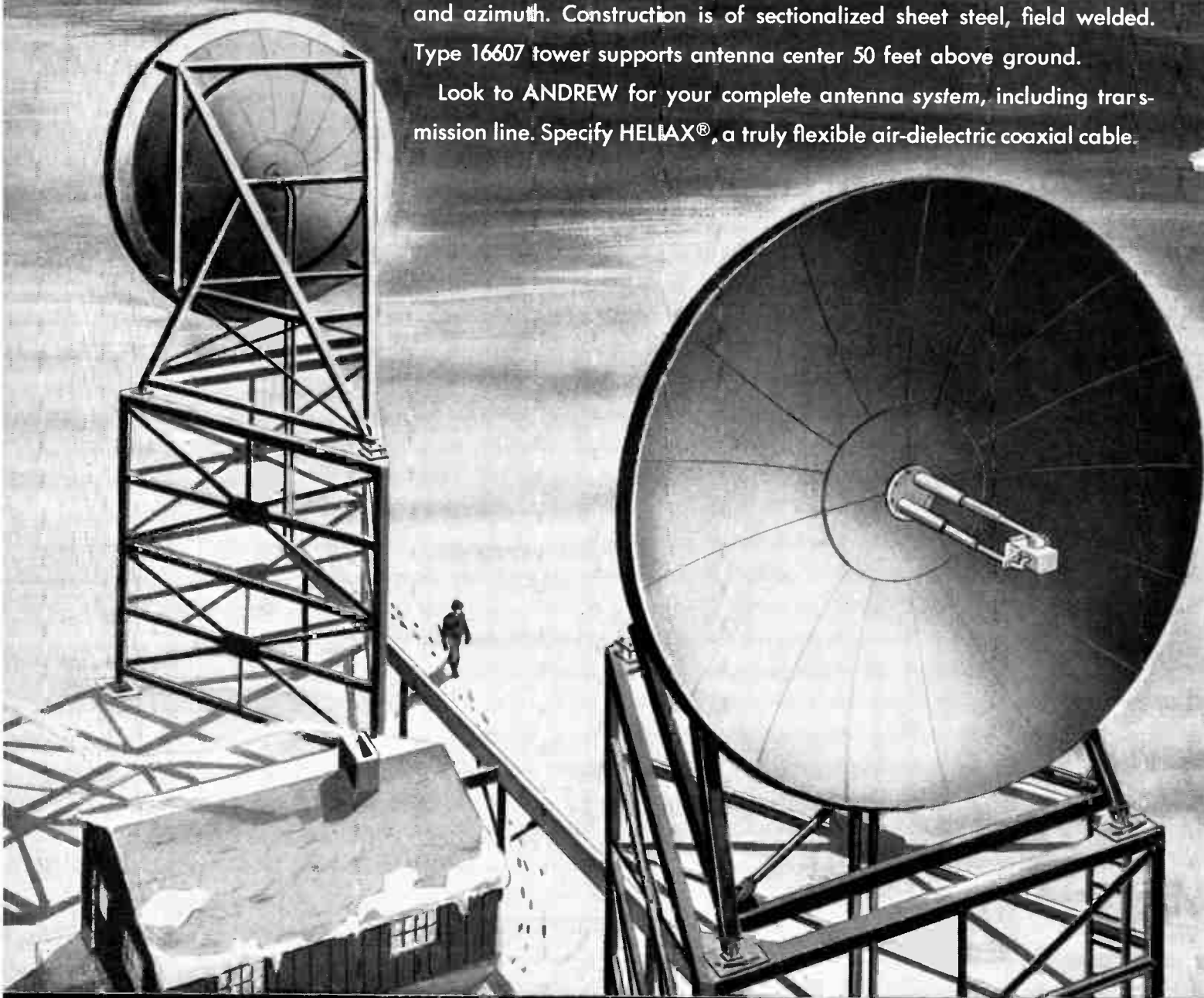
117 E. Providencia Ave., Burbank, Calif. • Stephenson Bldg., 6560 Cass Ave., Detroit 2, Mich. • 512 West Ave., Jenkintown Pa. • Brouwer Bldg., 176 W. Wisconsin Ave., Milwaukee, Wis. • American Bldg., 4 South Main St., Dayton 2, Ohio • 8401 Cedar Springs Rd., Dallas 19, Texas • Boeing Field, Seattle 8, Washington • 1701 "K" Street, N.W., Washington 6, D.C.

SCATTER

ANDREW Parabolic Antennas for this exciting new method of communication are available in standard sizes of 15, 30 and 60 ft. diameter.

The 30 ft. Type P-30-1 illustrated has a gain of 36 db at 800 MC and the Dual feeds have 40 db isolation. Antenna is adjustable in both elevation and azimuth. Construction is of sectionalized sheet steel, field welded. Type 16607 tower supports antenna center 50 feet above ground.

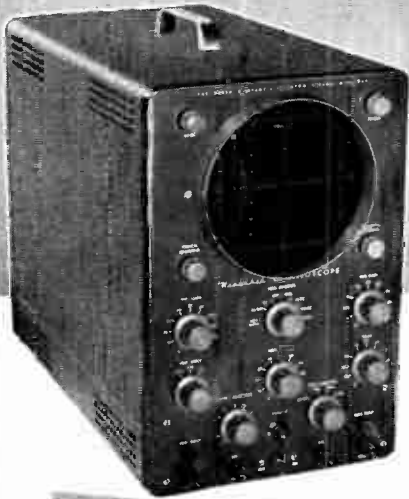
Look to ANDREW for your complete antenna system, including transmission line. Specify HELIAX[®], a truly flexible air-dielectric coaxial cable.



Andrew
ANTENNA
CORPORATION LTD.
606 BEECH STREET • WHITBY, ONTARIO

TRANSMISSION LINES • ANTENNA EQUIPMENT





Heathkit PRINTED CIRCUIT 5" COLOR TV Oscilloscope Kit

MODEL
0-10
\$69⁵⁰
Shpg. Wt. 27 lbs.

The technical specifications for this fine instrument speak for themselves. Vertical channel sensitivity is 0.025 volts RMS/inch at 1 Kc. Vertical frequency response is essentially flat to 5 Mc, and down only 1.5 db at 3.58 Mc. Ideal for Color TV work!

Extended sweep generator range is from 20 cps to 500 Kc in five steps, far beyond the range normally encountered at this price level.

Other features are: plastic-molded capacitors for coupling and by-pass—preformed and cabled wiring harness—Z axis input for intensity modulation—peak-to-peak voltage calibrating source built-in—retrace blanking amplifier—regulated power supply—high insulation printed circuit boards—step attenuated and frequency compensated vertical input circuit—push-pull horizontal and vertical amplifiers—excellent sync. characteristics—sharp, hairline focusing—uses 5U1P CRT—extremely attractive physical appearance.

An essential instrument for professional Laboratory, or for servicing mono-chrome or color TV.

Heathkit PRINTED CIRCUIT 3" OSCILLOSCOPE KIT



This light, portable 3" oscilloscope is just the ticket for the ham, for service calls. Measures only 9 1/2" H x 6 1/2" W x 11 3/4" D, and weighs only 14 lbs.

Employs printed circuit board for improved circuit performance. Vertical amplifiers flat within +3 db from 2 cps to 200 Kc. Vertical sensitivity 0.25 volts RMS/inch peak-to-peak, and sweep generator operates from 20 cps to 100,000 cps. R.F. connection to deflection plates.

MODEL OL-1
\$29⁵⁰
Shpg. Wt. 14 lbs.

Heathkit PRINTED CIRCUIT 5" OSCILLOSCOPE KIT

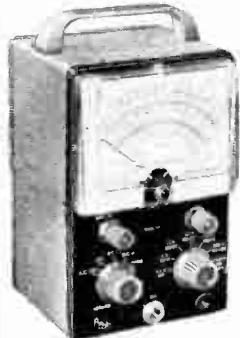


This full-size 5" Oscilloscope incorporates many outstanding features.

Vertical channel flat within +3 db, 2 cps to 200 Kc, with 0.09 volts RMS/inch peak-to-peak sensitivity at 1 Kc. Sweep operation from 20 cps to 100,000 cps. Built-in peak-to-peak voltage calibration—3 step frequency compensated input attenuator—phasing control—push-pull deflection amplifiers. Printed circuits for reliable performance and reduced construction time.

MODEL OM-1
\$49⁵⁰
Shpg. Wt. 26 lbs.

Heathkit PRINTED CIRCUIT VACUUM TUBE VOLTMETER KIT



MODEL V-7
\$24⁵⁰

Shpg. Wt. 7 lbs.

This VTVM has set a new standard for accuracy and reliability in kit-form electronic instruments. Features modern, time-saving printed circuits, and functional arrangement of controls and scales. Includes new peak-to-peak scale for FM and TV work.

Measures AC (RMS) and DC voltage at 0-1.5, 5, 15, 50, 150, 500, and 1500; peak-to-peak AC voltage at 0-4, 11, 40, 140, 400, 1400, and 4000; center-scale resistance readings of 10, 100, 1000, 10,000, 100 K, 1 meg., and 10 meg. 1dB scale provided also. Zero-center operation within range of front panel controls. Polarity reversal switch—200 μ a 4 1/2 meter-transformer power supply—11 megohm input impedance—1% precision resistors—high quality components used throughout.

Heathkit VOLTAGE CALIBRATOR KIT

Once calibrated, this instrument provides a known peak-to-peak voltage standard for comparison with unknown voltage values on an oscilloscope. Panel calibrated directly—no involved calculations required. Operates within a voltage range of .01 to 100 volts peak-to-peak.



MODEL VC-2
\$11⁵⁰
Shpg. Wt. 4 lbs



Heathkit 20,000 ohms/volt MULTIMETER KIT

Features comprehensive range coverage, 20,000 Ω/V D.C. and 5000 Ω/V A.C. Ranges: 0-1.5, 5, 50, 150, 500, 1500, and 5000 V, direct current from 0 to 150 μ a, 15 a, in 5 steps. Center-scale resistance of 15, 1500 and 150,000 ohms, and db from -10 to +65.

Uses 1% precision resistors—50 μ a meter—molded bakelite case.

MODEL MM-1
\$29⁵⁰
Shpg. Wt. 6 lbs.

Heathkit DIRECT-READING CAPACITY METER KIT

Extremely valuable where speed and convenience are essential. Quality control work, production line checking, etc. Reads capacity directly on meter scale, from 0-100 mfd., 1000 mfd., .01 mfd., and 1 mfd. Residual capacity less than 1 mfd. Not susceptible to hand capacity.



MODEL CM-1
\$29⁵⁰
Shpg. Wt. 7 lbs.



Heathkit A.C. VACUUM TUBE VOLTMETER KIT

Measures AC voltage only, from 10 cps to 50 Kc. Covers the range from 1 millivolt to 300 volts in 10 steps at high impedance input. Incorporates full 10 ranges of db scale from -52 db to +52 db. Essential in the audio laboratory or for audio enthusiasts and experimenters. Provides sensitivity essential for low level audio measurements.

MODEL AV-2
\$29⁵⁰
Shpg. Wt. 5 lbs.

Heathkit ELECTRONIC SWITCH KIT

This device will electronically switch between 2 input signals to produce both signals alternately at the output. Used in conjunction with an oscilloscope, it will permit the observation of 2 signals simultaneously. Provides switching rates from 10 cps to 200 cps.



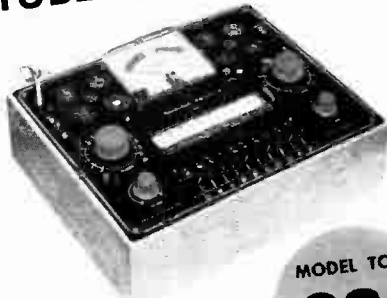
MODEL S-2
\$23⁵⁰
Shpg. Wt. 11 lbs.

HEATH Company

A SUBSIDIARY OF DAYSTROM INC.
BENTON HARBOR 3, MICHIGAN

SELECT YOUR NEXT HEATHKIT FROM

Heathkit TUBE CHECKER KIT



MODEL TC-2
\$29⁵⁰
Shpg. Wt. 12 lbs.

Because of its low price this fine tube tester is available, not only to the service shop and laboratory, but to part-time servicemen, experimenters, and radio amateurs, as well as all tubes commonly encountered in radio and TV service work. Simple "GOOD-BAD" scale on the 4 1/2" meter. Tests for open, short, and quality on the basis of total emission. Includes illuminated roll chart. Fourteen different filament voltage values available. Separate lever switch for each tube element.

Model TC-2P is the same electrically as TC-2, except that it is housed in a beautiful two-toned portable carrying case. Only \$34.50. Shpg. Wt. 15 lbs.

Portable carrying case available separately for Model TC-2, or older model TC-1. Cab. No. 91-3, \$7.50. Shpg. Wt. 7 lbs.
CRT Test Adapter, Model 355 for use with the TC-2, \$4.50. Shpg. Wt. 1 lb.

Heathkit TV ALIGNMENT GENERATOR KIT

Here is the complete R.F. signal source for FM and TV alignment, (both monochrome and color). Provides output on fundamentals from 3.6 Mc to 220 Mc in four bands, with harmonic output usable up through the UHF channels. Electronic sweep circuit eliminates mechanical gadgets and accompanying noise, hum, and vibration. Continuously variable sweep up to 0-42 Mc, depending on base frequency.

Variable marker (9-60 Mc on fundamentals) and crystal marker (4.5 Mc and multiples thereof) generators built-in. Crystal included with kit. Provision for external marker if desired.

Packed with outstanding features. 50 ohm output impedance—exceptionally good linearity—effective AGC action—plenty of R.F. output. An essential instrument for the up-to-date service shop.



\$49⁵⁰

MODEL TS-4
Shpg. Wt. 16 lbs.



MODEL 5G-8
\$19⁵⁰
Shpg. Wt. 8 lbs.

Heathkit SIGNAL GENERATOR KIT

This is one of our most popular kits, and is "serviceman engineered" to fulfill the signal source requirements of the radio serviceman and experimenter.

Covers 160 Kc to 110 Mc on fundamentals (5 bands), with output in excess of 100,000 microvolts. Calibrated harmonics extend usefulness up to 220 Mc. Choice of unmodulated R.F. output, 400 cps modulated R.F. output, or 400 cps audio output. Step-type and continuously variable output attenuation controls.

Coils are prewound, and construction manual is complete. Calibration unnecessary for service applications.

Model RS-1

Heathkit RESISTANCE SUBSTITUTION BOX KIT



Provides switch selection of 36 RTMA 1 watt standard 10% resistors, ranging from 15 ohms to 10 megohms. Numerous applications in radio and TV work.

\$5⁵⁰
Shpg. Wt. 2 lbs.

Heathkit CONDENSER SUBSTITUTION BOX KIT



Very popular companion to Heathkit RS-1. Individual selection of 18 RTMA standard condenser values from .0001 mfd to .22 mfd. Aluminum panel, bakelite case, and includes 18" flexible leads with alligator clips.

Model CS-1
\$5⁵⁰
Shpg. Wt. 2 lbs.

Model DR-1

Heathkit DECADE RESISTANCE KIT



Twenty 1% precision resistors provide resistance from 1-99,999 ohms in 1 ohm steps. Indispensable around service shop, laboratory, ham shack, or home workshop.

\$19⁵⁰
Shpg. Wt. 4 lbs.

Heathkit DECADE CONDENSER KIT



Provides capacity values from 100 mmf to 0.111 mfd in steps of 100 mmfs. +1% precision silver-mica condensers used. High quality ceramic wafer switches for reduced leakage.

Shpg. Wt. 3 lbs.
\$16⁵⁰

Heathkit CONDENSER CHECKER KIT



Measures capacity in four ranges from .00001 to 1000 mfd. Power factor control is provided for indication of electrolytic condenser efficiency. Tests capacitors under actual load conditions. Checks resistance from 100 ohms to 5 megohms. Direct reading scales for all tests. No calculation necessary.

Model C-3
\$19⁵⁰
Shpg. Wt. 7 lbs.

Heathkit LABORATORY GENERATOR KIT



Here is a signal generator for use where high accuracy and metered performance are essential. Covers 150 Kc to 30 Mc on fundamentals in 5 bands. 400 cps modulation variable from 0 to 50%. R.F. output at 50 Ω from 100,000 to 1 μ v. Meter reads R.F. output in μ v. or modulation percentage. Fixed-step and variable output.

\$39⁵⁰
Shpg. Wt. 16 lbs.

Model T-3

Heathkit VISUAL-AURAL SIGNAL TRACER KIT



This signal tracer features a high-gain R.F. channel and probe to permit signal tracing from the receiver antenna input through the R.F. and I.F. stages. Separate low gain channel for audio circuits. Both visual and aural indication by means of speaker and electron beam "eye" tube.

\$23⁵⁰
Shpg. Wt. 9 lbs.

Also noise locator circuit, wattmeter, and terminals for "patching" output transformer or speaker into external circuit.

Model M-1

Heathkit HANDITESTER KIT



The M-1 is literally pocket size to fit in your coat pocket, tool-box, glove compartment, or desk drawer. Measures A.C. or D.C. v. in 5 steps from a full scale minimum of 0-10 v. to a maximum of 0-5000 v. Measures direct current at 0-10 Ma and 0-500 Ma, and provides ohmmeter ranges of 0-3000 and 0-300,000 ohms. Sensitivity of 1,000 ohms/v. 1% precision divider resistors employed.

\$14⁵⁰
Shpg. Wt. 3 lbs.

HEATH Company

A SUBSIDIARY OF DAYSTROM INC.
BENTON HARBOR 3, MICHIGAN

THESE HIGH QUALITY INSTRUMENTS

Heathkit HARMONIC DISTORTION METER KIT



MODEL HD-1
\$49.50
Shpg. Wt. 13 lbs.

Performs the functions of more elaborate and much more expensive audio distortion testing devices and yet is simple to operate and inexpensive to own. Used with a sine wave generator, it will check the harmonic distortion output of audio amplifiers under a variety of conditions. Essential in audio design work.

The HD-1 reads harmonic distortion directly on the meter as a percentage of the original signal input. It operates from 20 to 20,000 cps in 3 ranges, and incorporates a VTVM circuit for initial reference settings and final harmonic distortion readings. VTVM ranges are 0-1, 3, 10, and 30 volts full scale. 1% precision voltage divider resistors used. Distortion meter scales are 0-1, 3, 10, 30 and 100% full scale. Having a high input impedance the HD-1 requires only .3 volt input for distortion tests.

Heathkit AUDIO GENERATOR KIT

This basic audio reference generator deserves a place in your Laboratory. Complete frequency coverage is afforded from 20 cps to 1 Mc in 5 ranges, and output is constant within ± 1 db from 20 cps to 400 Kc, down only 3 db at 600 Kc., and 8 db at 1 Mc. An extremely good sine wave is produced, with a distortion percentage below 0.4% from 100 cps through the audible range.

Plenty of audio output for all applications; up to 10 v. under no load conditions. Output controllable with a continuously variable or step-type attenuator with settings of 1 μ v, 100 μ v, 1 v, and 10 v. Cathode follower output.



MODEL AG-3
\$29.50
Shpg. Wt. 11 lbs.

Heathkit VARIABLE VOLTAGE POWER SUPPLY KIT



Model PS-3
\$35.50
Shpg. Wt. 17 lbs.

Provides regulated DC output for B+, and 6.3 v. AC at 4 amps. for filaments. Output variable from 0 to 500 v. DC at no load, linear from 0-10 ma at 450 vdc and

0-130 ma at 200 vdc! Essential for circuit design and development. Voltage or current read on $4\frac{1}{2}$ " meter.

Heathkit "Q" METER KIT



Model QM-1
\$44.50
Shpg. Wt. 14 lbs.

Will measure Q of condensers, RF resistance and distributed capacity of coils, etc. Uses $4\frac{1}{2}$ " 50 μ a meter for direct indication. Will test at 150 Kc to 18 Mc in 4 ranges. Measures capacity from 40 mmf to 450 mmf within ± 3 mmf. Useful for checking wave traps, chokes, peaking coils. Indispensable for coil winding and determining unknown condenser values.

Heathkit AUDIO ANALYZER KIT



MODEL AA-1
\$59.50
Shpg. Wt. 13 lbs.

The AA-1 consists of an audio wattmeter, an AC VTVM, and a complete IM analyzer, all in one compact unit. It offers a tremendous saving over the price of these

instruments purchased separately.

Use the VTVM to measure noise, frequency response, output gain, power supply ripple, etc. Use the wattmeter for measurement of power output. Internal loads provided for 4, 8, 16, or 600 ohms. VTVM also calibrated for 4, DBM units so db gain or loss can be noted quickly.

High or low impedance IM measurements can be made. High (6 Kc) and low (60 cps) frequency generators built-in. Only 4 meter scales are employed, and one of these is in color so that results are easily read on the scale. Full scale VTVM ranges are 01 to 300 volts in 10 steps, full scale wattmeter ranges are .15 mw to 150 w in 7 steps. IM analyzer scales are 1%, 3%, 10%, 30% and 100%.

Heathkit AUDIO OSCILLATOR KIT



MODEL AO-1
\$24.50
Shpg. Wt. 10 lbs.

(SINE WAVE - SQUARE WAVE)

Features sine or square wave coverage from 20 to 20,000 cps in 3 ranges. An instrument specifically designed to completely fulfill the needs of the serviceman and high fidelity enthusiast. Offers high-level output across the entire frequency range, low distortion and low impedance output. Uses a thermistor in the second amplifier stage to maintain essentially flat output through the entire frequency range. Produces good, clean square waves with a rise time of only 2 microseconds.

Heathkit IMPEDANCE BRIDGE KIT



Model IB-2
\$59.50
Shpg. Wt. 12 lbs.

Measures resistance, capacitance, inductance, dissipation factors of condensers, and the storage factor of inductance. Employs 2-section CRT dial. D, Q and DQ functions are combined in one control. $\frac{1}{2}$ % resistors and capacitors used in critical circuits. 100-0-100 microammeter for null indications. 1000 cycle oscillator, 4 tube detector-amplifier and power supply built-in.

Heathkit 6-12 VOLT BATTERY ELIMINATOR KIT



Model BE-4
\$31.50
Shpg. Wt. 17 lbs.

Furnishes 6 or 12 volt output for the new 12 v. car radios in addition to 6 v. models. Two continuously variable output voltage ranges: 0-8 v. DC at 10 A. continuously or 15 A. intermittent, 0-16 v. DC at 5 A. continuously or 7.5 A. intermittent. Output voltage is clean and well filtered by two 10,000 mfd condensers. Panel meters read voltage and current output.



MODEL BR-2
\$17.50
(Less Cabinet)
Shpg. Wt. 10 lbs.

Heathkit BROADCAST BAND RECEIVER KIT

Build your own receiver with confidence. Complete instruction book anticipates your every question.

Features transformer-type power supply, high-gain miniature tubes, built-in antenna, planetary tuning from 550 Kc to 1600 Kc, $5\frac{1}{2}$ " speaker. Also adaptable for use as AM tuner or phono amplifier.

CABINET: Fabric covered plywood cabinet available, complete with aluminum panel and re-inforced speaker grille. Part No. 91-9, Shpg. Wt. 5 lbs., \$4.50

HEATH Company

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BENTON HARBOR 3, MICHIGAN

New *Heathkit*
DX-100
PHONE AND CW
TRANSMITTER KIT



MODEL DX-100
\$189.50
 Shpg. Wt. 120 lbs.

Shipped motor freight unless otherwise requested. \$50.00 deposit required for C.O.D. orders.

This one compact package contains complete transmitter, with built-in VFO, modulator, and power supplies. Provides phone or CW operation—VFO or crystal excitation—and band-switching from 160 meters through 10 meters. R.F. power output 100—125 watts phone, 120—140 CW. Parallel 6146's modulated by push-pull 1625's. Pi network interstage and output coupling for reduced harmonic output. Will match non-reactive antennas between 50 ohms and 600 ohms. TVI suppressed with extensive shielding and filtering. Rugged metal cabinet has inter-locking seams.

formers—wide spaced tuning capacitors—ceramic insulation—illuminated VFO dial and meter face—remote control socket—preformed wiring harness—concentric control shafts—high quality, well rated components used throughout. Overall dimensions 20 3/4" wide x 13 3/4" high x 16" deep.

Supplied complete with all components, tubes, cabinet and detailed construction Manual. (Less crystals.) Don't be deceived by the low price! This is a top quality transmitter designed to give you years of reliable service and dependable performance.

The high-quality transmitter is packed with desirable features not expected at this price level. Copper plated chassis—potted trans-

Heathkit **AMATEUR**
TRANSMITTER KIT



MODEL AT-1
\$29.50
 Shpg. Wt. 15 lbs.

Enjoy the trouble-free operation of commercially designed equipment while still benefiting from the economies and personal satisfaction of "building it yourself."

This CW Transmitter is complete with its own power supply, and covers 80, 40, 20, 15, 11 and 10 meters. Single knob bandswitching eliminates coil changing. Panel meter indicates grid or plate current for the final. Crystal operation, or can be excited by external VFO. Crystal not included in kit. Incorporates features one would not expect in this price range, such as key-click filter, line-quality components throughout. Instruction Book simplifies assembly. Uses 6AG7 oscillator, 6L6 final and 5Y4G rectifier. Up to 35 watts plate power input.



Model GD-1B
\$19.50
 Shpg. Wt. 4 lbs.

Heathkit
GRID DIP METER KIT

This is an extremely valuable tool for Hams, Engineers or Servicemen. Covering from 2 Mc to 250 Mc, it uses 500 μ a meter for indication. Kit includes prewound coils and rack. Will accomplish literally hundreds of jobs on all types of equipment.

Heathkit **ANTENNA IMPEDANCE METER KIT**

Use in conjunction with a signal source for measuring antenna impedance, line matching purposes, etc. Will double, also, as a phone monitor or relative field strength indicator.



Model AM-1
\$14.50
 Shpg. Wt. 2 lbs.

100 μ a meter employed. Covers the range from 0 to 600 ohms. An instrument of many uses for the amateur.

Heathkit
VFO KIT



MODEL VF-1
\$19.50
 Shpg. Wt. 7 lbs.

Weigh the cost of this kit against the cost of crystals—and consider the convenience and flexibility of VFO operation. This is one of the most outstanding kits we have ever offered for the radio amateur.

Covers 160—80—40—20—15—11 and 10 meters with three basic oscillator frequencies. Illuminated and precalibrated dial scale clearly indicates frequency on all bands and provides more than two feet of dial calibration. Reflects quality design in the use of ceramic coil forms and tuning capacitor insulation, and copper plated chassis. Simply plugs into crystal socket of any modern transmitter to provide coverage of the bands from 160 meters through 10 meters. Uses 6AU6 Clapp oscillator, and OA2 voltage regulator for stability. May be powered from plug on Heathkit Model AT-1 Transmitter, or supplied with power from most transmitters.



Model AC-1
\$14.50
 Shpg. Wt. 4 lbs.

Heathkit
ANTENNA COUPLER KIT

Poor matching allows valuable communications energy to be lost. The Model AC-1 will match your low power transmitter to an end-fed long wire antenna. Also attenuates signals above 36 Mc, reducing TVI. 52 ohm coaxial input—power up to 75 watts—10 through 80 meters.

Heathkit
COMMUNICATIONS RECEIVER KIT

Covers 550 Kc to 35 Mc in 4 bands. Features electrical bandspread separate R.F. and A.F. gain controls—noise limiter—AGC—BFO—phone jack—5 1/2" PM speaker. **CABINET:** Fabric covered plywood cabinet. Part No. 91-10. Shpg. Wt. 5 lbs. \$4.50



Model AR-2
\$25.50
 Shpg. Wt. 12 lbs. (Less Cabinet)

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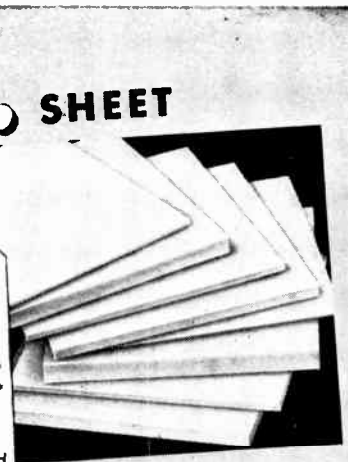
Teflon... SHEET

Your Best Source Is



| Thickness Inches | Nominal Size |
|------------------|--------------|
| 1/16 | 12 x 12 |
| 3/32 | 13 x 18 |
| 1/8 | 24 x 24 |
| 3/16 | 36 x 36* |
| 1/4 | 48 x 48* |
| 3/8 | |
| 1/2 & Up | |

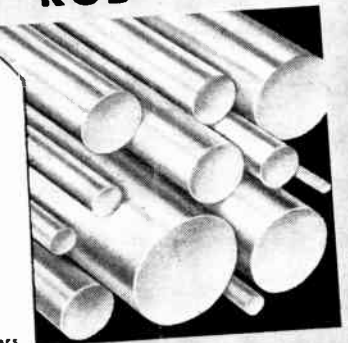
* Can be furnished in 1/2 sheets



ROD

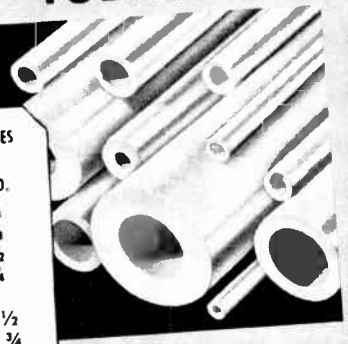
| DIAMETER INCHES | |
|-----------------|-------|
| 1/4 | 1 |
| 3/16 | 1 1/4 |
| 3/8 | 1 1/2 |
| 7/16 | 1 3/4 |
| 1/2 | 2 |
| 5/8 | 2 1/4 |
| 3/4 | 2 1/2 |
| 7/8 | 3 |

Other diameters on specification



TUBING

| TYPICAL SIZES INCHES | |
|----------------------|-------|
| O. D. | I. D. |
| 3/8 | 1/4 |
| 1/2 | 3/8 |
| 3/4 | 1/2 |
| 1 | 3/4 |
| 1 1/2 | 1 |
| 2 1/2 | 1 1/2 |
| 3 | 1 3/4 |



Characteristics of Teflon

- CHEMICAL**
Completely inert.
- ELECTRICAL**
Very high dielectric strength.
Extremely low power factor.
- THERMAL**
Temperature range
-300° to +500° F.
- MECHANICAL**
Strong, flexible, weather resistant.
- LOW COEFFICIENT OF FRICTION**
Absolutely non-stick.

* DuPont Trademark

Request full information and ask for our bulletin, "The Best in Teflon."

Crane Packing Company, Ltd.
627 Parkdale Ave. N., Hamilton, Ont.



CRANE PACKING COMPANY

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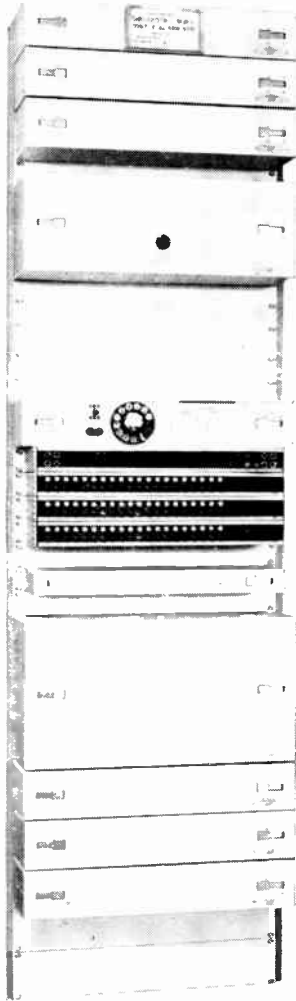
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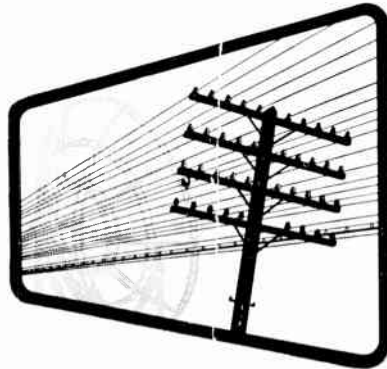
Write Box 3

Electronics and Communications
31 Willcocks St., Toronto 5, Ont.



*Typical Rack Assembly
for a Control Centre*

**Remote
Supervision
and Control by**
Lenkurt
type 51B
CARRIER
superimposed on



OPEN WIRE • CABLE • RADIO



*Typical Rack Assembly
for a Remote Location*

The Lenkurt Type 51B Supervision and Control System provides:

- (1) a means for supervising conditions at remote locations from a control centre and
- (2) a means for controlling operations of equipment at the remote locations from the control centre by carrier frequencies superimposed on existing communication circuits, whether they be open wire, cable or radio.

Supervision is accomplished through a system in which "on-off" or "A-B" conditions at the remote locations are registered on a lamp bank at the control centre. Control is accomplished through a system in which dialing a code number at the Control centre causes the desired operation to be initiated at the remote location.

Various combinations of supervision and control groups are available for various locations from one control centre.

The system is economical in the use of carrier frequencies, provides for both automatic and manual verification of supervised conditions, has automatic synchronization check and positive remote control.

Standard pre-engineered assemblies are available as equipment "package" units and convenient options adapt standard assemblies for various combinations of supervised conditions and controlled operations.

Let us show you how the Lenkurt Type 51B Supervision and Control System can be economically applied to your requirements.

AUTOMATIC ELECTRIC

(CANADA) 1953 LIMITED

Distributor in Canada

AUTOMATIC ELECTRIC SALES (CANADA) LIMITED

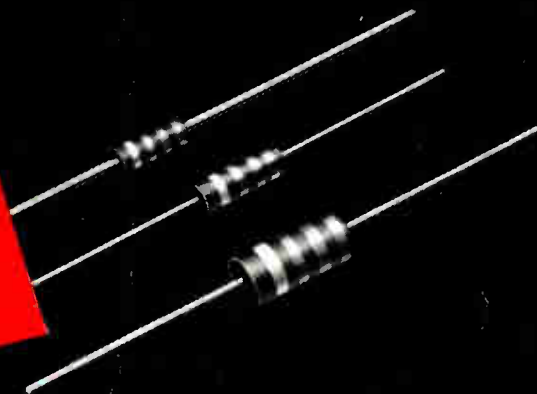
Head Office: 185 Bartley Drive, Toronto 16

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For further data on advertised products use page 54.

Speaking of resistor quality

... it is worthy of note that Stackpole Fixed Resistors are one of the most widely used brands in meeting today's exacting specifications.



Speaking of resistor supplier co-operation

... the Stackpole record of personal attention to detail in matching resistor requirements and of following through with "on time" deliveries of dependable, fully quality-controlled units, speaks for itself.

CANADIAN STACKPOLE LIMITED
550 Evans Ave., Etobicoke, Toronto 14, Ont.

STACKPOLE

FIXED COMPOSITION

R E S I S T O R S

*Backed by the keen personal interest
and full co-operation of the specialists who produce them*