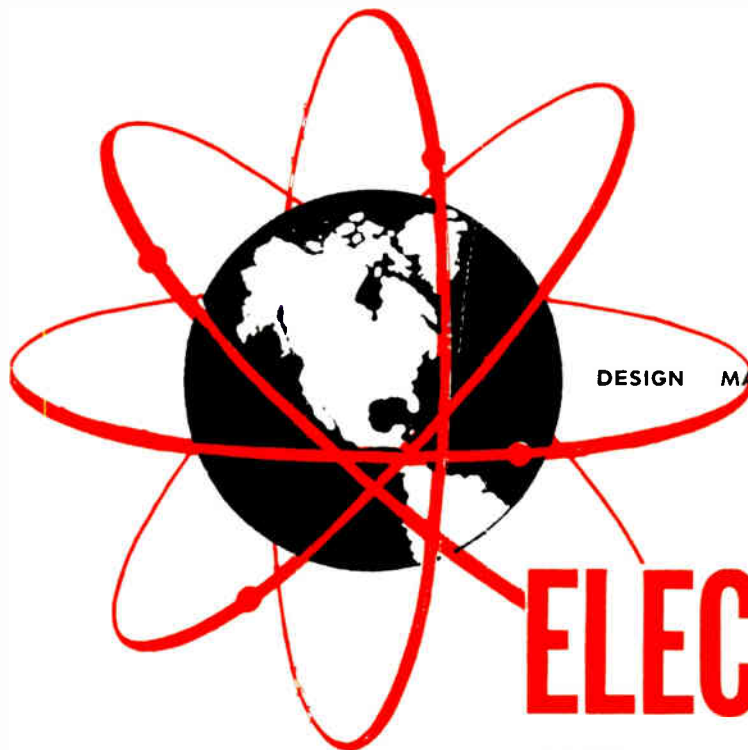


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DESIGN MANUFACTURE ENGINEERING APPLICATION

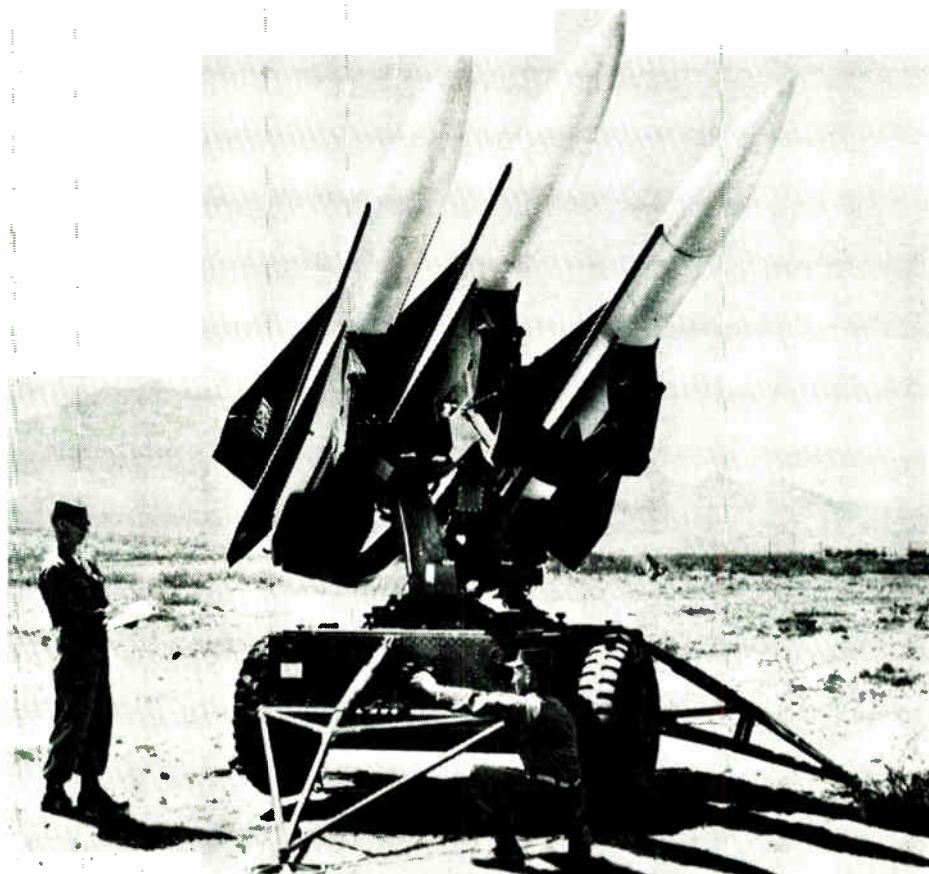
ELECTRONICS AND COMMUNICATIONS

October, 1957

An AGE Publication
Toronto, Canada



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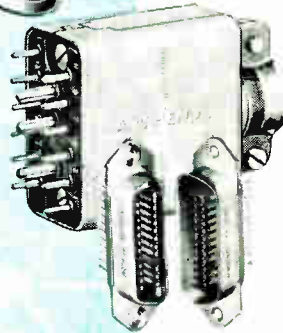
Developed and to be produced by Raytheon Manufacturing Company, prime contractor for the entire HAWK missile weapon system, the HAWK shown above can destroy attackers flying at even the lowest altitudes at distances far enough away to effectively protect the defended areas. The HAWK's radars detect and track the low flyers in blind zone of conventional radars.

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AN and MINIATURE
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STANDARD and MINIATURE
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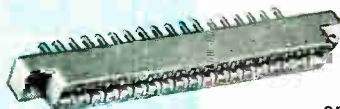
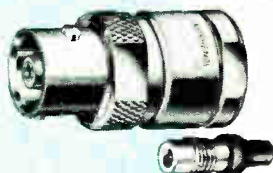
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| TYPE NO. | DESCRIPTION |
|----------|----------------------------|
| P807 | 3" Image Orthicon |
| 5820 | 3" Image Orthicon |
| P811 | 4½" Image Orthicon |
| 6198 | Vidicon for Industrial use |
| 6326 | Vidicon for film pick-up |

ELECTRONIC TUBE AND COMPONENTS DIVISION

CANADIAN **Marconi** COMPANY

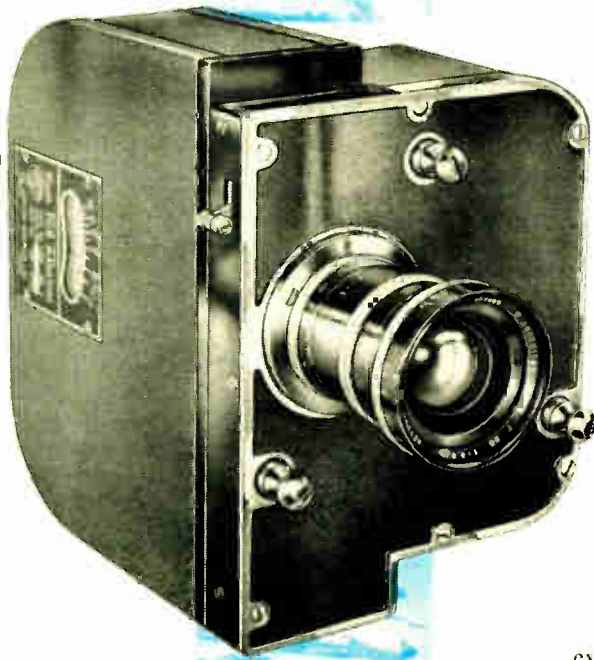
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The Perfect Answer

to Film Recording



SPECIFICATIONS

INSTRUMENTATION CAMERA TYPE T232 Mk7

Size: 7½" x 5¾" x 6½"
 Weight: 13½ lbs.
 Power: 28 volts DC; constant demand, 4 amperes, intermittent up to 1.8 amperes. The Type T232 DC power supply, which operates from 110v 60 cps, is available to power the camera
 Lens: 28mm Augenieux F3.5, or to customer specification
 Magazine: 100 ft. 35mm standard sprocketed film, No. 10 daylight loading spool, 400 ft. magazine available on special order
 Picture Formats: 18x25, 25x25 or 25x36 mm.
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HERE is the perfect answer to the problems of film recording. The Mark 7 Instrumentation Camera is completely flexible through the entire field of instrumentation and aerial survey positioning photography. The shutter is a focal plane type, the basic exposure speed of which is 1/100 second.

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 PLYMOUTH 5-3371

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



For further data on advertised products use page 105.

Electronics And Communications

VOLUME 5

OCTOBER, 1957

NUMBER 10

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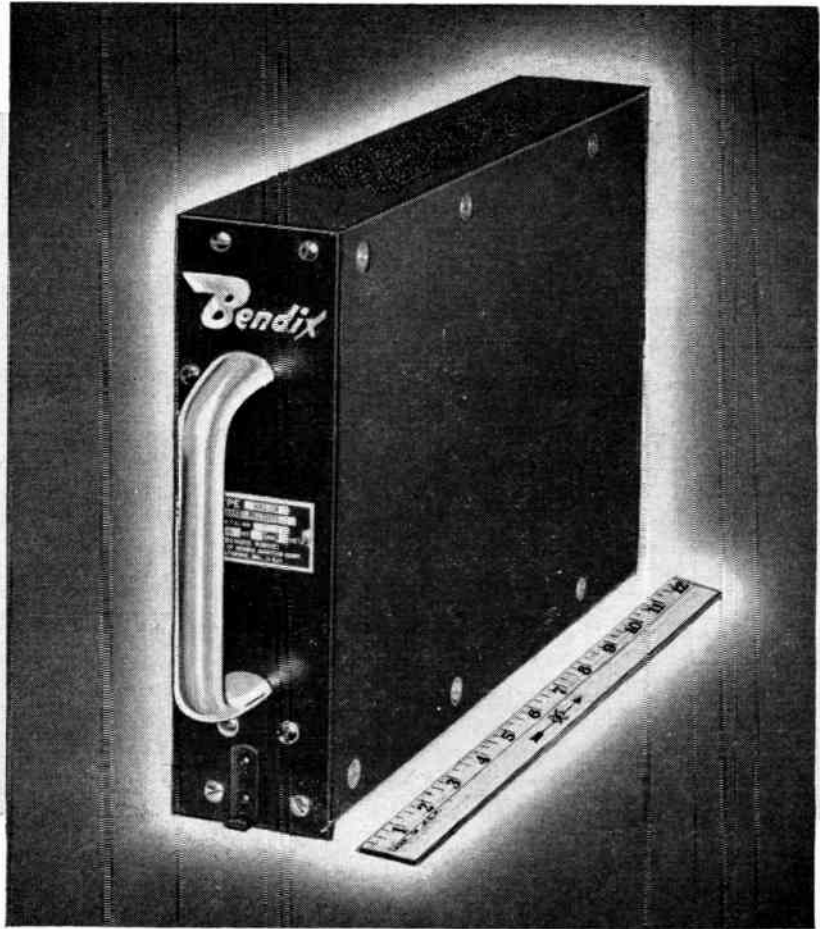
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PRINTED AND MANUFACTURED BY THE UNIVERSITY OF TORONTO PRESS 60

NEW
Bendix
MARKER
RECEIVER
 (1/4 ATR)



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

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

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

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

- (1) Greatly reduces the chance of television or FM interference.
- (2) Stabilizes gain under wide ranges of environmental conditions and line voltage fluctuations.

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

*Reg. U. S. Pat. Off.

SPECIFICATIONS

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

Specifications subject to change without notice.



COMPUTING DEVICES OF CANADA LIMITED
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5716

For further data on advertised products use page 105.

men who make a "science of service"

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Eastern District
Engineer
Montreal, Que.



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



Canada Wire and Cable Company Limited

Factories:

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A Canadian Company Manufacturing and Selling Coast to Coast

Electronics And Communications

Volume 5

October, 1957

Number 10

A Trend To Specialization

Recent news from the United States indicates the strengthening of a trend that has been developing for some time. It is the trend to specialization on the part of electronics manufacturers' representatives. That such a trend is taking place is due largely to two reasons; first the snowballing number and diversity of electronic components that could be carried on a rep's inventory, and second: the increasing rate of competition facing representatives in moving their merchandise.

Like the medical profession therefore, manufacturers' agents are turning to specialization and the increasing use of prefixes such as military, industrial, instrumentation, communications and production are being employed to denote the particular type of clientele that a manufacturers' rep is prepared to cater to.

Another reason for the growing trend toward specialization in the United States is the increasing technological knowledge that is required of representatives in order to adequately serve customer enquiries.

It is, we believe, reasonable to assume that, if conditions are such as to bring about this trend in the United States, then similar conditions may well develop proportionately in Canada.

Excepting the large Canadian companies who are manufacturing concerns in their own right but who act as outlets for equipment manufactured elsewhere, a considerable proportion of the Canadian electronics industry is made up of smaller companies either concentrating on the manufacture and sale of components under license agreements with non-Canadian firms or who are purely sales reps with no manufacturing facilities whatsoever.

If, therefore, there should be any economic necessity for specialization on the Canadian scene, it would appear that those companies who have established manufacturing facilities for the production of specific components will feel the squeeze to a greater extent than those who have only established sales outlets and who depend on the production and delivery of merchandise from American or other manufacturing sources. This by reason of the fact that it costs more to operate a manufacturing plant than it does to maintain a sales outlet.

Companies tooled and equipped for the production of specialized components, therefore, may be faced with the possibility of remaining in their particular field of specialization in competition with others who are free from the expense of carrying added manufacturing costs and who are dependent only on the importation of goods from the United States or other sources.

While the proprietor of the purely agency type of business may have an economic advantage over the owner of a manufacturing enterprise in any likely competition in component specialization and marketing, barring of course the imposition of tariff protection, the owner of the manufacturing facility is, on the other hand, in an enviable position to break into one of the most promising fields in the Canadian electronics industry, namely the development, production and marketing of specially engineered custom equipment for industry.

Surprisingly enough, up to the present time, there are few concerns in Canada that have entered this field but those who have report back-log business capable of maintaining their plants on a high productive level for some time to come.

Excepting the field of communications, and to a lesser extent research, the application of electronics to industry has lagged sadly in Canada compared to other countries. This of course does not mean that the larger Canadian companies have not taken advantage of electronics to further their manufacturing processes, but there are literally hundreds of smaller enterprises to which the application of electronic techniques has never been considered nor investigated.

Management of this class of industry have, no doubt, heard of the possibilities inherent in electronic control, measurement etcetera, but the everyday logistics of running their business has prevented them from directing any concerted effort to determining where electronic apparatus may facilitate their operations. It is in this area of industry where some initiative on the part of the electronic manufacturing industry in Canada could uncover a wealth of business in the matter of specially engineered and produced equipment and the component manufacturer already equipped with a manufacturing facility and presumably some engineering personnel would appear to be the most suitable type to pursue this field of endeavor.

If, therefore, there is any trend toward specialization among electronic manufacturers' representatives in Canada, and we have heard reports from several sources that increasing competition is, indeed, lending support to this very plan of action by some Canadian firms, then it is considered that those in possession of reasonable manufacturing facilities may well consider the possibilities of specializing in custom engineered packages for industry as an alternative to specialized component sales agencies with whom they would otherwise have to compete.

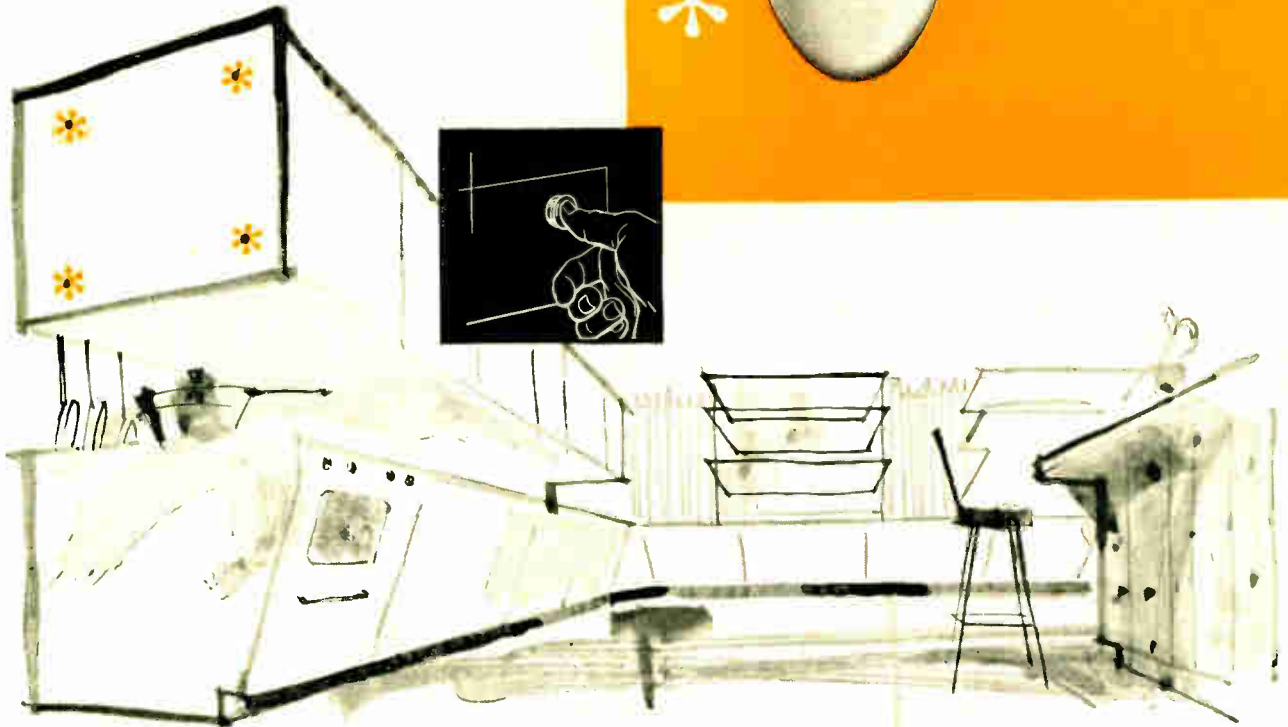
We believe that it can more or less be taken for granted that the 'bonanza' days of supplying the television market with components and sub-assemblies have reached their peak. It may be, of course, that the establishment of color television in Canada, whenever it may come about, will lend temporary support to this segment of the electronic industry but it cannot be expected that such a market will provide indefinite support for the highly competitive and crowded nature of this particular part of the business.

It may be argued also, that defense spending for electronics, which despite recent cutbacks is sure to be restored in the near future, will provide a lively market for the dealer in components, but this market, like the television market, is crowded and highly competitive also and is coming within the sphere of specialization. The industrial market, therefore, remains as a market the surface of which to date has only been scratched and it is this market to which the component dealer with a manufacturing facility may look with assurance as an escape from the trap of specialization in which he may find himself.

Good looks count

... and you can count on improved product appearance with

Plasti-Plugs®



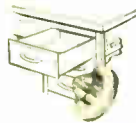
Plug production holes



Ventilation plugs



Cover access holes



Silent drawer glides

Metal kitchen cabinets with unsightly production holes showing? Not if Fastex Plasti-Plugs (one piece, self-retaining hole plugs) are used! Snapping-in with a light touch of the finger, Plasti-Plugs are available in 45 standard sizes, in colors to match every product. Low in cost to buy and apply, Plasti-Plugs do double duty too—can be used for dust protection, friction glides and as replaceable plugs. Special moisture-sealing plugs may also be had. Made of polystyrene, nylon or vinyl, they're non-corrosive, always good-looking.

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45 standard sizes listed . . . tells how easily you can "snap in" Plasti-Plugs by Fastex.

For further data on advertised products use page 105.

World Radio History

RETMA Report



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

FCC Receiver Staff Report

The United States Federal Communications Commission has received the Roscoe L. Barrow study group's staff report on "Network Broadcasting" a 1400 page mimeographed document dealing with station ownership and licensing policies and related subjects. The study was initiated by the FCC to see if the present operation of television and radio networks tends to foster or impede the development of a nation-wide, competitive television system, analogous to the Fowler Royal Commission On Broadcasting which delivered its completed report this year in Canada.

Although the report was intended to cover both radio and television, as the Study progressed it soon became apparent that the problems most urgently requiring attention by the FCC referred to television. It was decided, therefore, to concentrate on television in this report with a recommendation that radio broadcasting be the subject of a further, separate, study.

Roscoe L. Barrow is Dean of Law College, University of Cincinnati, and the two-year study was ordered by the United States Congress in June 1955.

Electronics Division Meets

The Electronics Division of the Radio-Electronics-Television Manufacturers Association of Canada held a meeting in Toronto in September. Among other items of business, it was noted that expanded statistical services will take effect at the beginning of 1958. A more detailed breakdown of electronic equipment than the present reporting will be inaugurated and will provide members with a set of statistics having a greatly improved usefulness.

The Commercial Representative reported on the status of the Instrumentation and Data Handling Committee and members were to be asked to comment on possibly broadening the terms of reference of this committee.

New Members of RETMA

Recently admitted members of RETMA are as follows:

New Members In Electronics Division -

Canadair Limited, Cartierville, Que.

Manufacturers of aircraft, electronic test equipment, telemetry equipment, aircraft antennae, radio frequency transmission harnesses, cable forms, junction boxes and accessories.

Beaconing Optical and Precision Materials Co. Ltd., 455 Craig St. W., Montreal, Que.

Manufacturers of custom-made electronic defense equipment systems and microwave stations.

New Members In Components Division -

Telegraph Condenser Company (Canada) Ltd., 50 Bertal Road, Toronto, Ontario. Manufacturers of electrolytic capacitors.

Bach-Simpson Ltd., 1255 Brydges Street, London, Ont. Manufacturers of precision meters and carbon resistors.

Radio Fall Meeting Program

November 11 - 12 - 13

King Edward Hotel

Toronto, Canada

Sponsored By

EIA Engineering Department

RETMA of Canada

IRE Professional Group

MONDAY, NOVEMBER 11th

9:30 a.m. — EIA Engineering Department

M. A. ACHESON, *Presiding*
Television in Ten Languages
C. J. HIRSCH
Hazeltine Corporation
International Component Standardization
LEON PODOLSKY
Sprague Electric Company
EIA Activities in Automation
J. J. HARRINGTON
Arthur D. Little, Inc.

2:00 p.m. — Quality Improvement and Reliability Session

(Arranged by the IRE Professional Group on Reliability and Quality Control)
J. R. STEEN, *Presiding*
Progress in TV Receiver Reliability
E. H. BODEN
Sylvania Electric Products, Inc.
Reliability Control Based on Multiple Sequential Feedback
C. M. RYERSON
Radio Corporation of America
Purchasing Reliability
E. J. BREIDING
International Business Machines Corporation
Establishing a Practical Routine for Measuring TV and Radio Tube Quality in the Customer's Plant.
D. M. PALAMOUNTAIN
Raytheon Manufacturing Company

TUESDAY, NOVEMBER 12th

9:00 a.m. — Radio and Television Session

(Arranged by the IRE Professional Group on Broadcast and Television Receivers)
J. F. MCALLISTER, *Presiding*
Development of the 12-Volt Plate-Voltage Hybrid Automobile Radio Receivers—AM, Signal-Seeker and FM
C. C. Hsu
Bendix Radio Division
Local Oscillator Radiation from Television and FM Sets
WESLEY G. PETERSON
Warwick Manufacturing Corporation
Techniques Involved in Meeting FCC Radiation Requirements at UHF
JOHN BELL
Zenith Radio Corporation
Design Consideration of a Development UHF Tuner Using an RF Amplifier
J. B. QUIRK
General Electric Company
All Transistor FM Radio Receiver
H. V. STEWART
Texas Instrument Company

2:00 p.m. — Radio and Television Session (continued)

PREBEN GOMARD, *Presiding*
Minimizing the Effect of Cut-off in TV Vertical Oscillators
S. F. LOVE
Radio Valve Company, Ltd.
Automatic Fine Tuning Circuitry in TV Receivers
K. W. FARR AND L. J. SIENKIEWICZ
Westinghouse Electric Corporation

Vacuum Tube Requirements in Vertical-Deflection Circuits

K. W. ANGEL
Radio Corporation of America
The Property of TV Sync Separator Without and With Interference Pulses in the Composite Signal
DR. EDUARD LUEDICKE
RCA Victor Company, Ltd.
Analysis and Synthesis of Magnetic Field — in Yokes Using Rotating Probes
HENRY S. VASILEVSKIS
Philco Corporation

6:45 p.m. — Radio Fall Meeting Dinner

Toastmaster: DON FINK
Incoming President, Institute of Radio Engineers
Speaker: I. J. KAAR

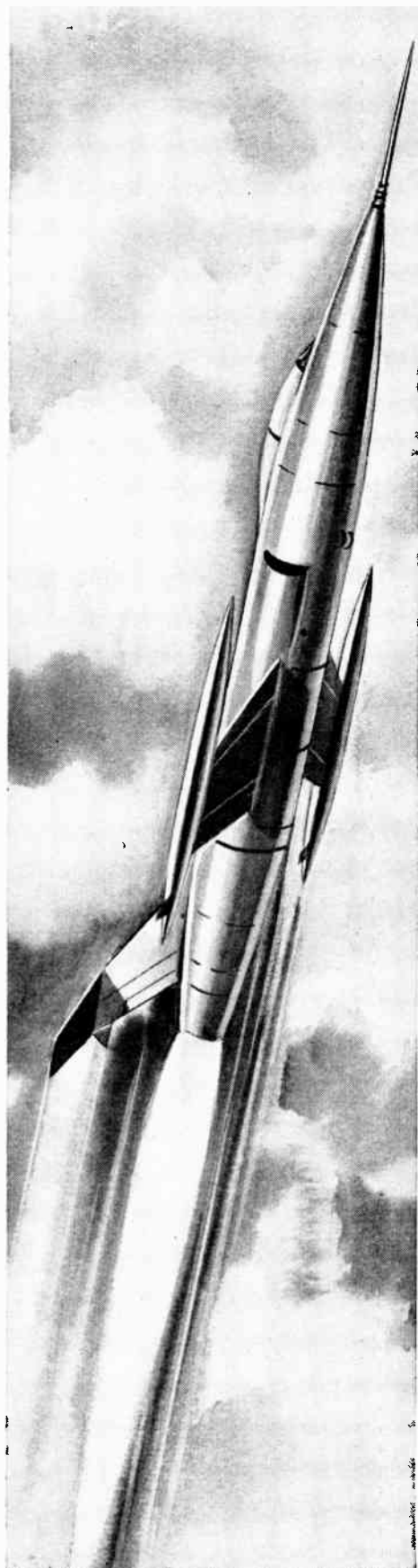
WEDNESDAY, NOVEMBER 13th

9:00 a.m. — Electron Devices Session I

(Arranged by the IRE Professional Group on Electron Devices)
J. T. CIMORELLI, *Presiding*
Design and Development of the RCA-21CYP22 21" Glass Color Picture Tube
C. P. SMITH, A. M. MORRELL, R. C. DEMMY
Radio Corporation of America
Application of the RCA 21CYP22 Round Glass Color Picture Tube
H. N. HILLEGAS, R. W. HAGMANN, D. J. RANSOM
Radio Corporation of America
Earth's Field Effects in Shadowmask Color Tubes
GLEN A. BURDICK, SR.
Sylvania Electric Products, Inc.
Tetrode Driver Tube for Hybrid Auto Sets
JOSEPH GAZIANO
Raytheon Manufacturing Company
Typical Germanium Power Transistor Data and Typical Circuit Applications
WALLACE C. CALDWELL AND LEO L. LEHNER
Bendix Aviation Corporation

2:00 p.m. — Electron Devices Session (continued)

H. L. OWENS, *Presiding*
Present Status of Transistor Receiver Design Procedures
W. H. RYER AND W. E. SHEEHAN
Raytheon Manufacturing Company
Design Considerations for Transistor Portable Reflex Receivers
R. V. FOURNIER
Radio Corporation of America
A Broadcast Receiver Using Diffused Meltback Transistors
ERICH GOTTLIEB
General Electric Company
Silicon TV Rectifiers
HERBERT W. HENKELS AND VICTOR SILS
Westinghouse Electric Corporation
Effect of Transient Voltage on Junction Transistors
H. C. LIN AND W. F. JORDAN, JR.
CBS-Hytron
Parameter Variation Results Affecting Multistable Circuits
WM. J. MALONEY
General Electric Company



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- Single-side band
- Antennas

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Director of Personnel
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1001 Lenoir Street
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in the air—on land—under the sea

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work magic for Canada's Defence

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unit of vital importance to Canada's defence air craft. The same engineering skill and modern up-to-the-minute equipment that produced this tube are available to Canada's Electronics Industry. Westinghouse Electronic Tubes are completely reliable . . . for the first line of defence or for your line of work.

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

**CANADIAN WESTINGHOUSE COMPANY LTD.
ELECTRONIC TUBE DIVISION—HAMILTON, ONT.**

WATCH WESTINGHOUSE AT THE CANADIAN I.R.E. SHOW—OCT. 16, 17, 18

For further data on advertised products use page 105.

the editor's page

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

Whose Blue Heaven?

Since the beginning of time abstract problems have occupied the mind of man. Many of them have led to the development of theories which contributed greatly to progress. But it is difficult to see the value of one problem which is now puzzling a number of eminent British lawyers. It concerns the ownership of outer space and the territorial rights of the countries located underneath any particular spot.

The question, for instance, is: if Russia sends an intercontinental ballistic missile on a 5,000 mile course, the missile rises 600 miles into the atmosphere. In doing so does Russia violate the neutrality of any country situated along the course followed by the missile?

It would seem that the answer to this problem would depend on how high a nation's sovereignty reaches up beyond outer space into the limitless miles of nothing. An international convention to study the matter and to make recommendations has now been proposed by a group of eminent British legal experts.

The mind of man, capable of tackling and solving the world's most worrisome problems would also seem to be capable of conjuring up programs of investigation based on the acme of absurdity.

If and when this group of eminent British legal experts have solved the problem of territorial rights in outer space they may turn their erudition to the solution of the equally important problem of sharing the sunlight among nations on a basis of area or population.

Technology Eliminates Turkey Farm !

A Labor Department study shows that for every 100 clerical and sales workers in 1955, 165 will be required in 1965. According to U.S. Labor Department officials it has been shown that advancing technology, rather than replacing human labor is creating a "snowballing" demand for more and better workers, better educated and better trained. The Labor Department has given some indication of how this trend will work in the next few years. For instance, for every 100 employed in 1955 as managers, officials and proprietors, 122 will be needed by 1965; professional and technical workers, 137 will be needed; skilled craftsmen, 124 will be required; and semi-skilled workers, 122 will be needed in 1965.

On the other hand, however, the report shows that for every 100 farmers and farm workers in 1955, only 85 will be required in 1965 and for every 100 unskilled workers only 97 will have jobs waiting for them.

Insofar as we are concerned this whole situation adds up to the fact that we were born thirty years too late for we were just about getting around to thinking about retiring onto a secluded turkey farm. Now however, since technology seems destined to reduce the number of farmers that will be required about the time of our retirement we'll have to adjust our plans accordingly. As an alternative to turkey farming one may be well advised to consider the correspondence school business. An advanced kindergarten course in astronomy or nuclear physics may be just the thing observing that the pace of technological progress is such that in about ten years' time there'll be no jobs suited for anyone with an IQ of less than about 97 per cent.

Can the Computer Figure This One?

Visitors to the Business Equipment Building at the recent Canadian National Exhibition were amazed to see a small sized computer working away by itself. On closer examination the visitors found that the computer was an

ElectroData 101 and was producing a month by month calculation on someone's mortgage. In one case the computer worked out a thirty year mortgage for a little old lady who was given a completely tabulated breakdown to take with her.

Now there is really nothing startling about this information because computers have been known to perform some incredible feats of arithmetic in no time flat. However, representatives of ElectroData who were on duty at the exhibit were justly proud of the fine equipment manufactured by their company and in commenting on the mortgage calculations that were being performed by their computer claimed that the machine unfortunately could not make the payments on the mortgage. Well we can understand this, but there is one thing about the whole affair that bothers us and that is — where did that little old lady lay her cotton pickin' fingers on a thirty year mortgage? If the ElectroData computer will warm its inanimate little brain up some time when it has nothing more to do and let us know where we can pick up a thirty year mortgage we'll be eternally obliged.

"The Next Stage"

If we search our subconscious minds carefully enough many of us will admit that recent reports of the testing of a Russian inter-continental ballistic missile capable of being aimed and fired upon any target on earth are anything but comforting. It is not likely that the public will lose too much sleep over this announcement but it is conceivable that there may be some midnight oil burnt among the high-ranking members of the western world's general staffs who may be in a better position, through intelligence sources, to ascertain whether there is, in fact, any basis of truth in the Russian report. For those of us, however, who may be inclined to view such announcements with a greater degree of brooding, there is comfort to be found in the equally startling announcements made recently by Duncan Sandys, Minister of Defense for the United Kingdom, to the effect that Britain is working on a long range strategic ballistic rocket of more advanced type than anything the United States possesses. Mr. Sandys has admitted that American rocketry is several years ahead of missile work in Britain, but he has qualified this remark with the enjoiner: "that has been the tendency with all our atomic weapons. We do not try to duplicate what Americans are doing. We try to get along with the next stage."

It is this "trying to get along with the next stage" that impresses us most. If we are not mistaken, what Mr. Sandys means by this is that United Kingdom authorities are not content to base their production designs on second hand engineering and development borrowed or exchanged from the technical braintrusts of other countries. Although it may take more time, and more dollars to initiate and carry through original engineering, the end result of creating a system or technique that is not obsolete or nearly obsolete before it goes into production is surely well worth the time and money. This is especially true when it is considered that the initiation and carrying through of original engineering projects is productive of engineering personnel of a calibre capable of original thinking, a commodity that will not likely be available to borrow or exchange under certain foreseeable conditions.

In our opinion there have been recent instances in Canada when Mr. Sandys's principle of "trying to get along with the next stage" could have been applied with advantage.



If you're after extra quality at no extra cost . . .

TRY BENDIX HIGH GAIN POWER TRANSISTORS

More impressive than anything we can say about Bendix High Gain Power Transistors is the enthusiastic endorsement they are receiving from engineers who have tried them. These design, project, and research and development people report they like Bendix transistors because of their HIGH POWER AND CURRENT GAIN • LOW LEAKAGE • LIFE STABILITY • HIGH BREAKDOWN VOLTAGE • LOW THERMAL RESISTANCE • LINEAR TEMPERATURE VARIATION.

Why this universal acceptance? Because our transistor program is based on the following:

- 1 *Simplified design* that keeps initial cost down and operating dependability up.
- 2 *Extra performance capability* through use of component parts and mate-

rials that exceed specification requirements by a sizeable margin.

- 3 *Improved manufacturing techniques* that help contribute to *better transistors at low cost.*

- 4 *Uniformly dependable quality . . .* through close quality control that includes comprehensive inspection procedure utilizing Bendix-developed test methods and instruments.

We believe that our many years' experience in designing and producing precision, special-purpose electron tubes has a great deal to do with this extra-high quality and dependability.

We make a wide variety of power transistors. And, because we are in volume production, we can offer immediate delivery on most models. We'll be glad to help you in working

out troublesome circuitry problems, too, if you wish.

It will pay you to get complete details about Bendix transistors. Write

AVIATION ELECTRIC LIMITED,
200 LAURENTIEN BLVD., MONTREAL.

BENDIX TRANSISTORS EXCEL AS—

- Power Amplifiers
- High-Current Switches
- Inverters
- Power Oscillators
- Power Supplies
- Motor Controls
- Audio Amplifiers
- Hi Fi Amplifiers
- Voltage Regulators

AVIATION ELECTRIC
LIMITED



HALIFAX • MONTREAL • OTTAWA • TORONTO • CALGARY • VANCOUVER

For further data on advertised products use page 105.

Concerned with microwave test equipment?

Only NARDA offers you these

exclusive features!

TURRET ATTENUATORS

Only Narda offers you a UHF-only attenuator. This represents a considerable savings in cost for applications in this frequency range. Each of three models offers the Designer or Development Engineer 12 steps of attenuation from d.c. to 1,500 mc with a VSWR of 1.25. Designed for bench use or mounting into test equipment packages.



One unit can give a maximum of 30 db attenuation; two units can be used in series to provide a wide range of control in small steps.

- Model 705—0, 3, 6, 9, 12, 15, 20, 25, 30 db
- Model 706—0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20 db
- Model 707—0, 3, 6, 9, 12, 15, 18, 21 INF db

ALL MODELS... \$275 each

COAXIAL DIRECTIONAL COUPLERS



10, 20 and 30 DB ... 225 to 4,000 mc.

Only Narda offers coaxial directional couplers in 10 and 30 db values, as well as 20 db. In addition, all models offer such advantages as these:

1. Flat Coupling—values with 1 db of nominal over a full octave frequency range, with calibration provided to ± 0.2 db accuracy.
2. Machined from solid blocks of aluminum—hence, more rugged.
3. Directivity exceeding 20 db.
4. Frequency Ranges: 225-460, 460-950, 950-2000, 2000-4000 mc.

Write for complete specifications.

\$100 to \$225



S to X BAND FREQUENCY METER

Narda offers the only single instrument covering this complete band of frequencies—2,350 to 10,500 mc. In addition, no combination of other meters can cover these frequencies at a comparable price!

An easy to read nomograph type calibration chart, mounted in the lid, converts digital counter readings to frequency in megacycles—to the rated accuracy of 0.2%. No calculations or interpolations are needed.

The unit is completely self contained, with built-in detector and indicating meter. A sensitivity control allows use with strong signals; for signals below 5 mw., the external meter jack may be connected to an amplifier or oscilloscope.

Model 802B... \$785

UHF FREQUENCY METER DETECTORS... Direct Reading

The only direct reading frequency meter detectors available for the UHF range—and they're from Narda, of course! Absorption type meters, with 0.2 db insertion loss, each includes a resonant cavity, coaxial switch, crystal detector, current meter, sensitivity control and type N terminals.

SPECIFICATIONS

| Frequency (mc) | Accuracy | Loaded Q | VSWR | Sensitivity for full scale deflection | NARDA Model | Price |
|----------------|----------|----------|------|---------------------------------------|-------------|-------|
| 200-500 | 0.5 mc | 500 | 1.15 | 0.2 mw | 804 | \$375 |
| 500-1500 | 1 mc | 700 | 1.15 | 0.2 mw | 805 | 375 |
| 1500-2400 | 2 mc | 500 | 1.25 | 0.5 mw | 806 | 375 |



Complete Coaxial and Waveguide Instrumentation for Microwaves and UHF — including:

- | | | |
|----------------------|---------------|----------------------|
| DIRECTIONAL COUPLERS | TUNERS | ATTENUATORS |
| TERMINATIONS | ECHO BOXES | STANDARD REFLECTIONS |
| FREQUENCY METERS | SLOTTED LINES | BOLOMETERS |
| HORNS | BENDS | THERMISTORS |

MAIL COUPON TODAY FOR FREE CATALOG AND NAME OF NEAREST REPRESENTATIVE

The Narda Microwave Corporation
160 Herricks Road
Mineola, N. Y.
Dept. EC-2.



NAME

COMPANY

ADDRESS

CITY..... ZONE..... PROV.

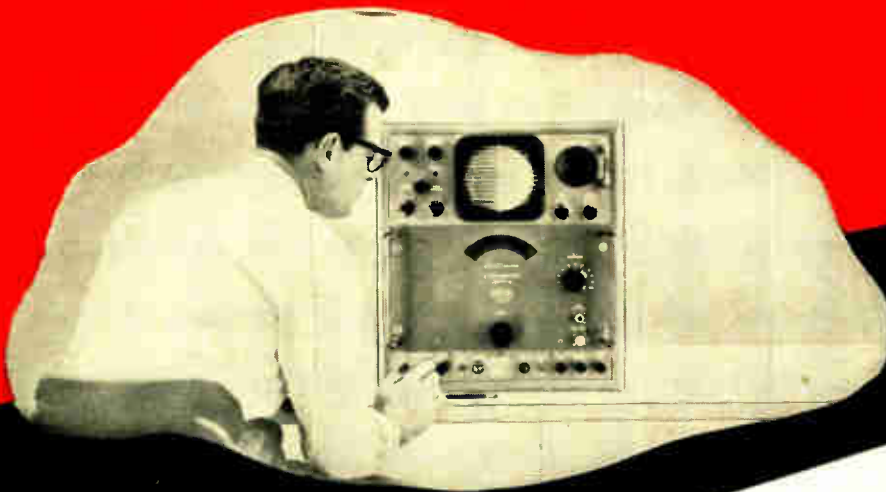


160 HERRICKS ROAD, MINEOLA, N. Y. • PIONEER 6-4650

Direct Reading Spectrum Analyzer

- for
- Visual frequency calibration — high resolution
 - Leakage and interference measurements
 - Standing wave measurements
 - Pulse modulation analysis
 - Sensitive receiver

The BASIC SCOPE for VISUAL MICROWAVE



SPECIFICATIONS

| Model No. | Equipment |
|---|----------------------------------|
| Model Du..... | Spectrum Display and Power Unit |
| Model STU-1... | RF Tuning Unit 10-1,000 mc. |
| Model STU-2A... | RF Tuning Unit 910-4, 560 mc. |
| Model STU-3A... | RF Tuning Unit 4,370-22,000 mc. |
| Model STU-4... | RF Tuning Unit 21,000-33,000 mc. |
| Model STU-5... | RF Tuning Unit 33,000-44,000 mc. |
| Frequency Range: 10 mc to 44,000 mc. | |
| Frequency Accuracy: $\pm 1\%$ | |
| Resolution: 25 kc. | |
| Frequency Dispersion: Electronically controlled, continually adjustable from 400 kc to 25 mc per one screen diameter (horizontal expansion to 20 kc per inch) | |

Frequency differences as small as 40 kc measurable by means of variable frequency marker with adjustable amplitude. Portable and completely self-contained.

Input Impedance: 50 ohms—nominal
Overall Gain: 120 db
Input Power: 400 Watts
Sensitivity: (minimum discernible signal)

| | |
|--|----------------|
| STU-1: 10-400 mcs | —85 to —95 dbm |
| 350-1,000 mcs | —80 to —90 dbm |
| STU-2A: 910-2,200 mcs | —85 to —95 dbm |
| 1,980-4,560 mcs | —75 to —87 dbm |
| STU-3A: 4,370-11,000 mcs | —77 to —90 dbm |
| 8,900-22,000 mcs | —65 to —85 dbm |
| STU-4: 21,000-33,000 mcs | —57 to —75 dbm |
| STU-5: 33,000-44,000 mcs | —50 to —65 dbm |
| RF internal 100 db continuously variable (STU-1, STU-2A, STU-3A) | |
| IF 60 db continuously variable | |

World Radio History

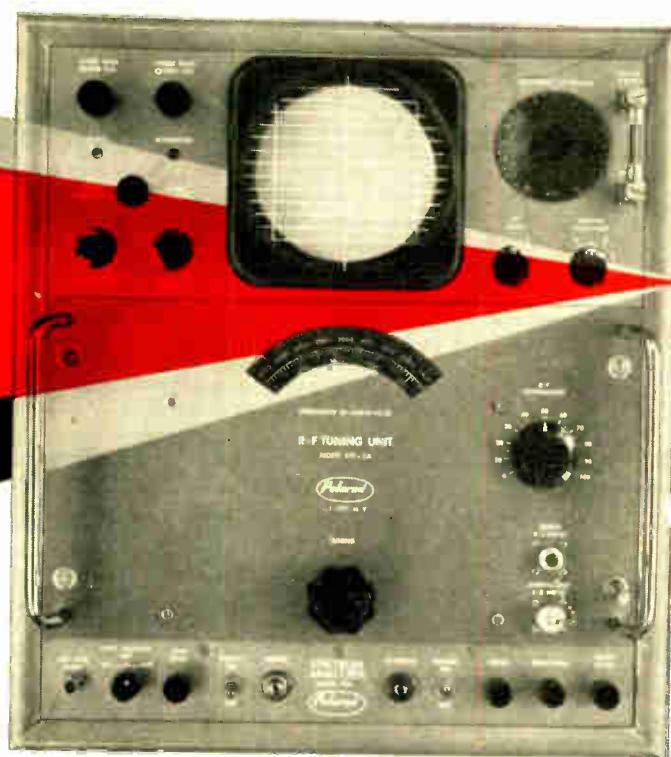
For further data on advertised products use page 105.

Broadband 10-44,000 mc

Now, the Polarad Model TSA Spectrum Analyzer provides the same visual advantages for microwave testing as the standard oscilloscope accomplishes for low frequency signals. This is a "must" instrument for microwave work! It displays with high sensitivity on a bright easily defined CRT, pulse modulation components, frequency differences, attenuation and band width characteristics, leakage detection, radiation and interference signals, and VSWR information.

This is visual instrumentation—it provides immediate and complete information because of the high resolution obtainable.

Frequencies are read directly on the linear dial with 1% accuracy as the set is tuned. Maximum reliability and long life are assured through use of non-contacting oscillator plungers. A variable frequency marker with both frequency and amplitude adjustable is provided.



ANALYSIS

Write today—directly to Polarad, or your nearest Polarad representative—to find out how the Model TSA Spectrum Analyzer can speed your research and solve your microwave measurement and testing problems.

Write for your copy of the Polarad "Handbook of Spectrum Analyzer Techniques". 50c per copy. Includes discussion of Spectrum Analyzer operation, applications and formulae for analysis techniques.

AVAILABLE ON EQUIPMENT LEASE PLAN

FIELD MAINTENANCE SERVICE AVAILABLE THROUGHOUT THE COUNTRY

*For private demonstration
without obligation
ask for the*



*to stop
at your plant*



ELECTRONICS CORPORATION
43-20 34th Street, Long Island City 1, N. Y.

REPRESENTATIVES: Albany, Albuquerque, Atlanta, Baltimore, Boston, Chicago, Cleveland, Dayton, Denver, Englewood, Fort Worth, Kansas City, Los Angeles, New York, Philadelphia, Portland, Rochester, St. Louis, San Francisco, Schenectady, Stamford, Syracuse, Washington, D. C., Winston-Salem, Canada: Arnprior, Ontario.
Resident Representatives in Principal Foreign Cities

ELECTRONICS & COMMUNICATIONS, OCTOBER, 1957

For further data on advertised products use page 105.

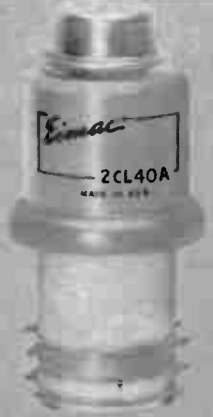


4CX300A General purpose tetrode with 300 watts plate dissipation up to 500 MC

EIMAC FIRST
with ceramic tubes
that can take it...

New stacked ceramic receiving tubes that can withstand heavy shock and vibration

2CL40A A new, small ceramic high vacuum rectifier or clipper diode that can be air or liquid cooled



In recent years equipment manufacturers and users have been introduced by Eimac to a series of ceramic tube firsts unequalled in the industry: klystrons, negative grid tubes, rectifiers and receiving tubes.

Clean, and rugged . . . these tubes can stand up to shocks and temperatures no glass tube can. Design and production advantages are a boon to equipment manufacturers and users alike.

As first in the field, Eimac has developed ceramic tube manufacturing techniques that have evolved into well established processes.



4K50,000LQ Four cavity klystron that delivers 10,000 watts of power at frequencies of 700 to 1000 MC

3CX100A5 A premium quality ceramic and metal 100 watt triode



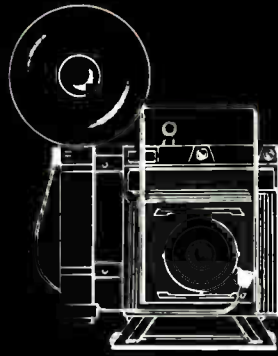
4CX5000A High power radial-beam tetrode especially suitable for single sideband operation

EITEL-McCULLOUGH, INC.
SAN BRUNO
CALIFORNIA



The World's
Largest
Manufacturer
of
Transmitting
Tubes

*We
Were
There...*

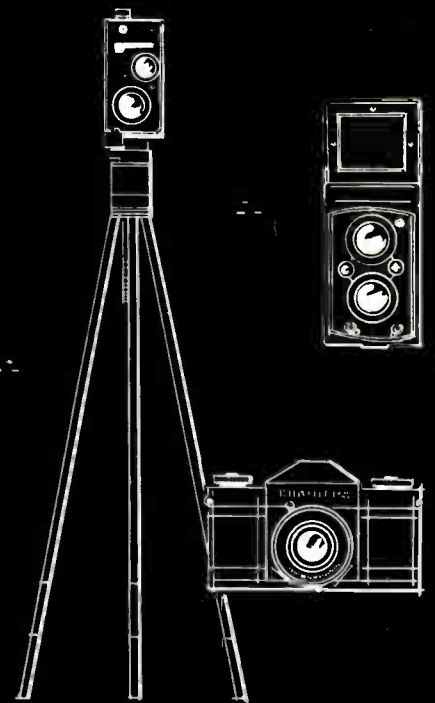


**The Second Canadian
IRE
Engineering Symposium
and Exposition**

OCTOBER 16-17-18, 1957

AUTOMOTIVE BUILDING, C.N.E.

Toronto - Ontario - Canada





We Were There

The second annual Canadian IRE Convention and Exposition held at Exhibition Park from October 16 to 18 last was indicative in many ways of the continuing growth of the Canadian electronics and communications industries.

The presence at the Exposition of 165 exhibitors, 76 per cent of whom were Canadian, is ample evidence of the stature of this young and still growing Canadian industry. That so many Canadian firms were anxious to exhibit their products is further evidence of their achievements in this field of endeavor. That nearly forty exhibitors from abroad should have elected to show at the Exposition is proof of the faith that others have in the Canadian electronics market.

The success of the second annual Canadian IRE Convention and Exposition was due initially to those who exhibited and the following pages presents a pictorial review of many who took part in this event.





A complete display of electrical instruments and panel meters by HICKOK ELECTRICAL INSTRUMENT CO. — High voltage power supplies by PESCHEL ELECTRONICS — Erec-tronic experimental circuitry systems by SCIENCE ELECTRONICS — Shielded rooms by SHIELDING INCORPORATED — Electrical instruments and panel meters by STARK ELECTRONIC INSTRUMENTS LTD. — All represented by

Stark Electronic Sales Co.

Stark Building, Ajax, Ontario



Canada's leading Manufacturers of Electronic Equipment for industry and defense. Products featured in the exhibit, Microwave Scatter Systems, the only equipment of its kind designed and built in Canada. Also displayed were several industrial electronic products including Nultrax positioning and measuring systems, Lite-Gard, punch press guard, closed circuit T.V. and resistance welding controls.

Canadian Westinghouse Company Limited

Electronics Division

Hamilton, Ontario



A full range of Radio Relay systems and of land, sea and air communications and navigational equipment designed and manufactured in Canada is featured by this major Electronics Company, which is noted also for its extensive lines of instruments and its special installation and maintenance services.

Canadian Marconi Company

2442 Trenton Avenue, Montreal 16, Quebec

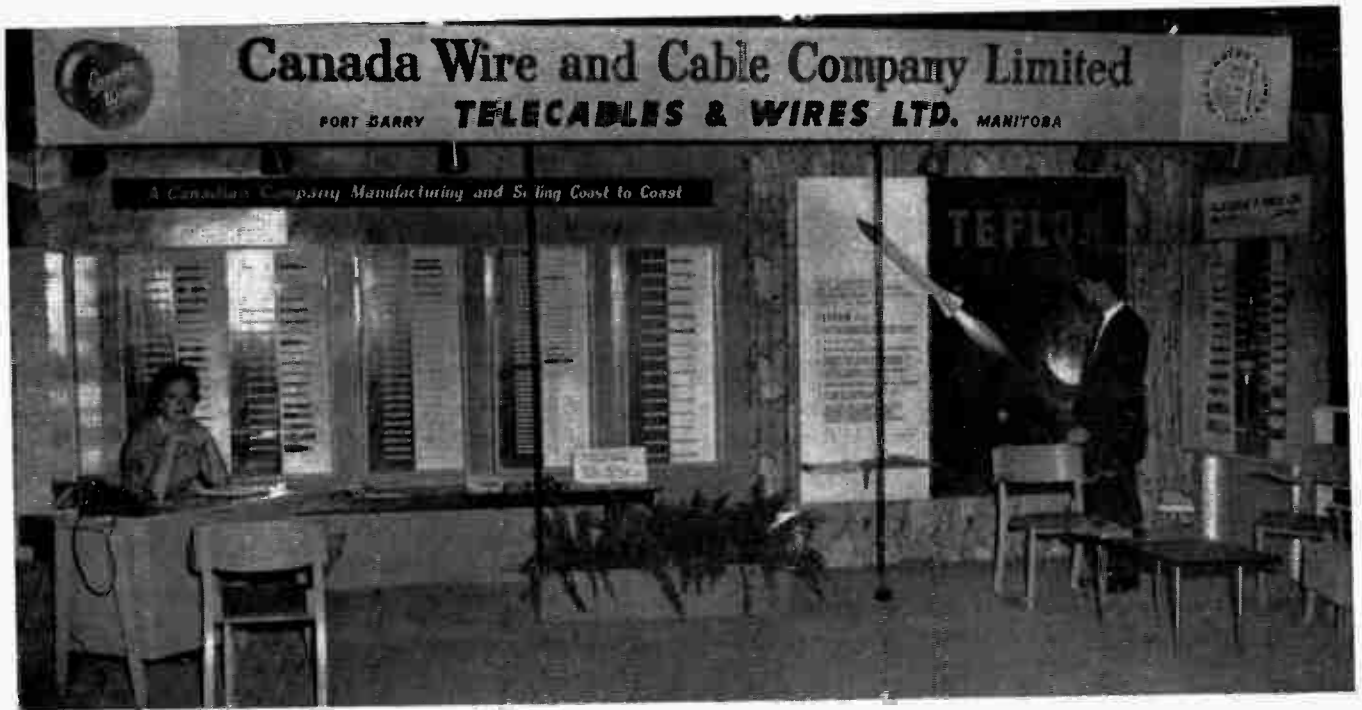


With emphasis on complete range and coverage, an extensive selection of Marconi standard and specialized tubes were shown, along with Clarostat and National industrial components.

Canadian Marconi Company

Electronic Tube and Component Division

830 Bayview Avenue, Toronto, Ontario



Canada Wire and Cable Company Limited and its subsidiary Telecables & Wires Ltd., exhibited CW Telcon radio frequency cables and a full range of lead-in wires, polyester type magnet wires and all types of communication cables including a complete line of paper lead and polyethylene insulated telephone cables. Headlining the exhibit was the newly developed Teflon insulation on magnet wires, lead-in and hook up wires for extreme high temperature applications.

Canada Wire & Cable Co. Ltd.

147 Laird Drive, Postal Station 'R', Toronto 17 (Leaside), Ontario. - Telephone: MAyfair 8681



We specialize in a complete line of relays covering high speed, resonant, polarized, latching, hermetically sealed, sub-miniature, high shock (1,000 G's) high temperature.

Miniature versions of standard electronic components our specialty. Miniature bearings, transformers, capacitors, relays, tubing and resistors.

Shaded pole motors unidirectional, reversible, synchronous and geared head.

John Herring and Company Limited

3468 Dundas St. West, Toronto, Ontario



A Canadian company with a background of over fifty years in the Communications Field — Now specializing in the applications of Electronics to Communications and Product Development.

Hackbusch Electronics Ltd.

23 Primrose Ave., Toronto, Ont. - Telephone: LE. 1-2453



Featuring oscilloscopes, pulse amplifiers, high fidelity audio equipment, microphones, steel flaw detectors and salinometers. In the nucleonics field: Beta-Gamma Ionization Chamber.

Cossor (Canada) Limited

301 Windsor Street, Halifax, Nova Scotia



Module Units, Printed Wiring, Complete Range of Capacitors, Precision Resistors, the Acme line of Filters and Inductors and Electronic Assemblies. Crowley famous for Magnetic Components for High Frequency Applications.

Aerovox Canada Limited

Hamilton, Canada



A familiar sight were these four attractive displays containing many new components. Adams Engineering is now serving the industry from its offices in Toronto, Montreal and Ottawa.

Adams Engineering Ltd.

1500 St. Catherine St. W., Montreal, P.Q.



Latest world advances in receiving, broadcast and special purpose tubes, and components were displayed and demonstrated in ROGERS attractive booth.

Rogers Electronic Tube and Component Division

11-19 Brentcliffe Road, Leaside, Ontario



This Canadian Company engineers and manufactures communications equipment to rigid specifications. Featured were the 300 Watt Pep Linear Power Amplifier and the single sideband Exciter with double sideband Carrier level control, along with a complete one Kilowatt transmitting and receiving station as used by the Civil Defense. Those in attendance were Messrs. D. V. Carr, A. G. Sheffield and M. Yurko of the Canadian office, Messrs. W. J. Galione and W. Deans of Technical Material Corporation, New York.

T. M. C. Canada Ltd.

P.O. Box 1006, Billings Bridge, Ottawa, Ontario



A Canadian Company supplying a wide variety of electronic and nucleonic equipment throughout North America. Developmental effort available. Also suppliers of no-break and automatically controlled diesel generating plants.

Mechron Engineering Products Ltd.

Ottawa, Canada



Philco — famous name in the field of electronic training materials. Producers of semi-Conductor devices, closed circuit television, T.V. transmitters and studio equipment and microwave systems.

Philco Corporation of Canada Ltd.

Don Mills, Ontario



Among the outstanding products developed and produced by this company are the R-Theta Navigation Computer System, Dual Probe Ice Detector, Automatic Tri-Film Processor, Mark 7 Instrumentation Camera, Mark 8 Aerial Camera, Gamble Stereo Plotter, High Speed Impulse Recorder, Rocket-Firing Intervalometer.

*Canada's First Approved R.C.A.F. Environmental Test Laboratory is available for Industry and Defense.

*Special instrumentation equipment produced for the I.G.Y. program, include the type T609 Auroral Recorder, the type T613 station magnetometer and the "all-sky" camera.

Canadian Applied Research Limited

1500 O'Connor Drive, Toronto 16, Ontario



Established for over 35 years as a sales organization operating throughout Canada, representing leading Manufacturers of Quality Electronic Components and Equipment.

A. C. Simmonds & Sons Ltd.,

100 Merton Street, Toronto 7, Canada



Manufacturer of a complete line of variable composition resistors for industrial and military electronic equipment. Styles RV-4 and RV-5 Controls exceed military specifications and have been approved. Style RV-6 Controls are now undergoing tests.

Precision Electronic Components (1956) Ltd.

50 Wingold Avenue, Toronto, Ontario • Telephone: RU. 1-6174



UHF and Microwave Instruments and Components
Coaxial Waveguide: Couplers, frequency meters, impedance meters, terminations, detectors, attenuators, test sets.

Bolometers (Barretters & Thermistors)

The Narda Microwave Corporation

160 Herricks Road, Mineola, N.Y.



Known from coast to coast for Television Tuners, Loudspeakers, Wirewound Resistors, Variable Tuning Capacitors, Trimmer Capacitors, Precision Gears and Gear Train Assemblies, Servo-loop Systems, Microwave Components.

Marsland Engineering Limited

Kitchener, Ontario



With orders now on their books for over seven thousand marine radar equipments, Decca Radar is now used by half the world's radar equipped vessels.

Decca Radar (Canada) Limited

23 Six Points Road, Toronto 18, Ont.



Shown above is the booth of the Instrumentation Division of Atlas Radio Corporation Ltd., exclusive Canadian representatives of leading U.S. manufacturers in the Instrumentation field. Prominently displayed are the following distinguished instrumentation lines: Kin-Tel, Sierra, Gertsch, Tel-Instrument, Edin, Borg, Electro, Vec-Trol, Industrial, Lindgren.

Instrument Division

Atlas Radio Corporation Limited

50 Wingold Avenue, Toronto 10, Ontario



Creative Leaders in Communications, Specialists in Airborne Communications and Navigation Equipment, Microwave, Scatter, and other Point-to-Point Communications. Of special interest on exhibit were a Mobile Scatter Radio Terminal, the ARC 38 HF Transceiver and ARC 552 U.H.F. Transceiver — all produced in our Toronto plant.

Collins Radio Company Of Canada Ltd.

11 Bermondsey Road, Toronto 16, Ontario



Varian Associates of Canada Limited offer complete services for micro wave tube and system component development and manufacture to the Canadian Electronic industry. The Company also manufactures graphic recorders and markets precision DC instrumentation.

Varian Associates of Canada Ltd.

Georgetown, Ontario



Members of the editorial and advertising staffs of *Electronics and Communications Magazine* the Pioneer Publication serving the Canadian electronics and communications industries pose for the "We Were There" cameraman at the second annual Canadian IRE Convention and Exposition. Shown in the photograph are left to right: Miss D. K. Trowell, Editorial Assistant; Mrs. Andree Hamblet and Arthur Dixon, Assistant Advertising Manager.

Electronics and Communications

31-35 Willecks Street

Toronto 5, Ontario



Sorry we didn't have time to talk with everyone that visited our Booth. If you have requirements for Sarkes Tarzian Silicon Rectifiers; Fluorocarbon Products Teflon components and light weight copper clad teflon for printed circuits; Hollingsworth Solderless terminals; or Kulka blocks and toggle switches; we suggest you contact us immediately.

Please call if you have any suggestions.

A. T. R. Armstrong Limited

Manufacturers' Representatives

700 Weston Road, Toronto 9, Ontario



Canadian Manufacturers of Hermetic Seal Terminals for the Electronics Industry. Manufacturers of Glass-to-Metal Seals including: Crystal Bases, Transistor Enclosures, Multi-terminal Headers, Feed-Thrus, Stand-Offs, Hermetically Sealed AN Connectors and Special Headers.

Quality Hermetics Ltd.

45 Hollinger Road, Toronto 16, Ontario



An Associate Company of The International Telephone and Telegraph Corporation engaged in the Engineering and Manufacture of Communications Equipment are prepared to supply comprehensive Telecommunication Engineering engineered systems.

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

9600 St. Lawrence Blvd., Montreal



Manufacturers of Vitreous Enamel and Cement Coated Power Resistors. Power Type Rheostats. "Regavolt" Regulating Transformers. Molded Knobs (including Collet fitting type). Manufacturers and Sole LICENSEES for BERCO Products in Canada.

Canadian Electric Resistors Limited

16 Curity Avenue, Toronto 16, Ontario



A Canadian Company now having served the Canadian Electronic industry for over twenty-five years. Manufacturing ceramic dielectric capacitors, button mica and trimming capacitors, Electro-Mechanical Assemblies, Pac module units, suppressors.

Erie Resistor of Canada Limited

Trenton, Ontario



Canada's leading distributor of electronic components for every industrial requirement. Prompt processing of orders and vast stock assure immediate delivery of your orders. Write for FREE Industrial Components Catalogue.

Electro Sonic Supply Co. Ltd.

Industrial Sales Division

543 Yonge St., Toronto 5, Ont. - WAInut 4-9301



A comprehensive display of Heath's Test Equipment — plus a preview of new developments concerning Weston's Inductronic line of measurement and control. Weston's new ceramic resistor — the Vamistor, was also prominently displayed.

Daystrom Limited

840 Caledonia Road

Toronto, Ont.



ELECTRONICS ENGINEERS

A complete range of test equipment and precision components.
Data handling and control systems.

R-O-R Associates Ltd.

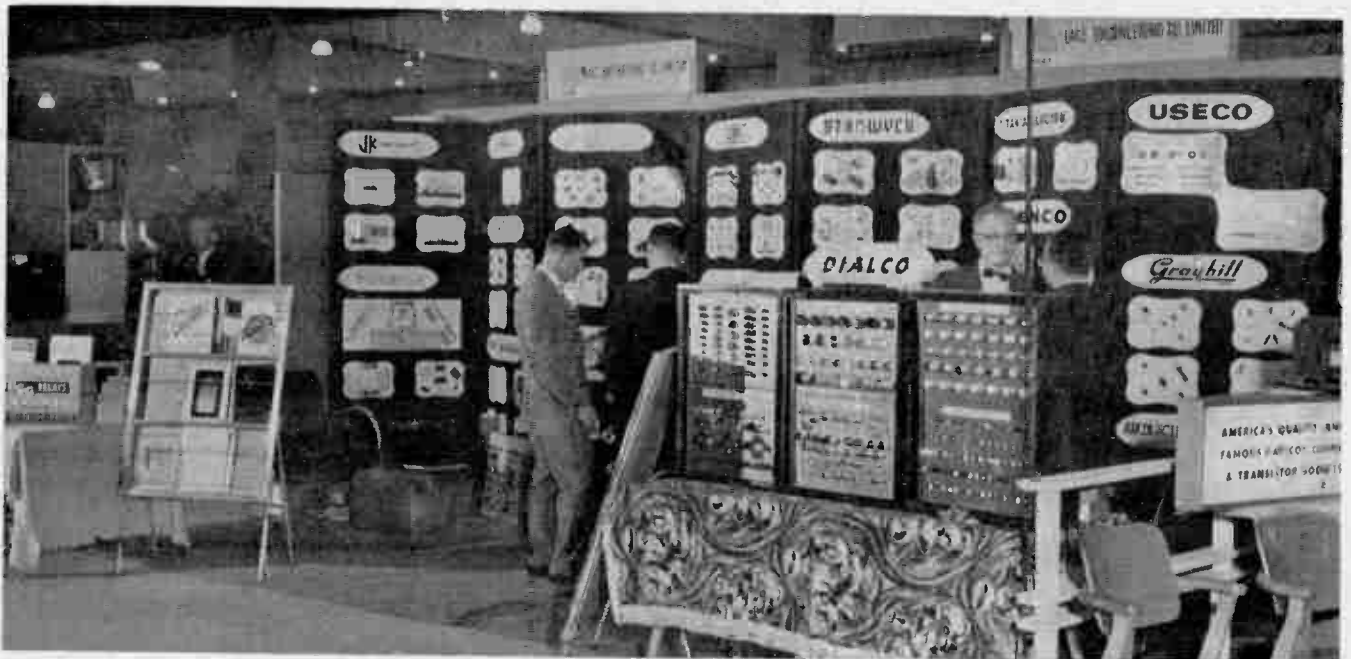
1470 Don Mills Road - Don Mills, Ontario



Exhibit featured Data Gathering, a high speed method for gathering source information, job and cost data. Industrial Paging with automatic reply and other intercom systems were included in the display.

Executone Communication Systems Limited

331 Bartlett Ave., Toronto 4, Ont.



REPRESENTING

- Aladdin Electronics
- Arcoelectric
- Continental Carbon Co. Inc.
- Custom Components Inc.
- Dialight Corp.
- Dialtron Corp.
- Fuze-On Products
- Glence Corp.
- Grayhill Inc.
- Greibach Instruments Corp.
- Grigsby-Allison Co. Inc.
- Gulton Industries Inc.
- Hawkesbury Wire Co. Limited.
- Kemtron Electron Products Inc.
- James Knights Co.
- Leecraft Mfg. Co. Inc.
- Litton Industries
- Patterson Moos Division
- Plastic Capacitors Inc.
- Signal Indicator Corp.
- Standard Telephones & Cables Mfg. Co. (Canada) Ltd.
- Starwyck Coll Products Limited
- Stegg Electric Limited
- Titan Electric Corp. of Canada Ltd.
- U.S. Engineering Co. Inc.
- Wirt Company

Lake Engineering Co. Ltd.

777 Warden Ave., Toronto, Ont.



Active in the field of laboratory, military and industrial instrumentation and control. Analog and digital computing devices and quality radio communications equipment.

Instronics Limited

P.O. Box 51, Stittsville, Ontario



Specialists in Custom Sheet Metal parts for the Electronics Industry. Close tolerance work by modern methods at lowest cost. All types of welding, plating, painting, etc. Send for illustrated brochure.

Bishop Sons & Co. Ltd.

588 Eastern Avenue, Toronto 8, Ontario - Telephone: HO. 3-1213

SWEEP MARKER GENERATOR

MJS MODEL SMG-57

SPECIFICATIONS

SWEEP GENERATOR frequency ranges in 2 bands 2Mc to 260Mc.

MARKER GENERATOR frequency ranges in 2 bands 3Mc to 225Mc.

MARKER GENERATOR ACCURACY better than 1%.

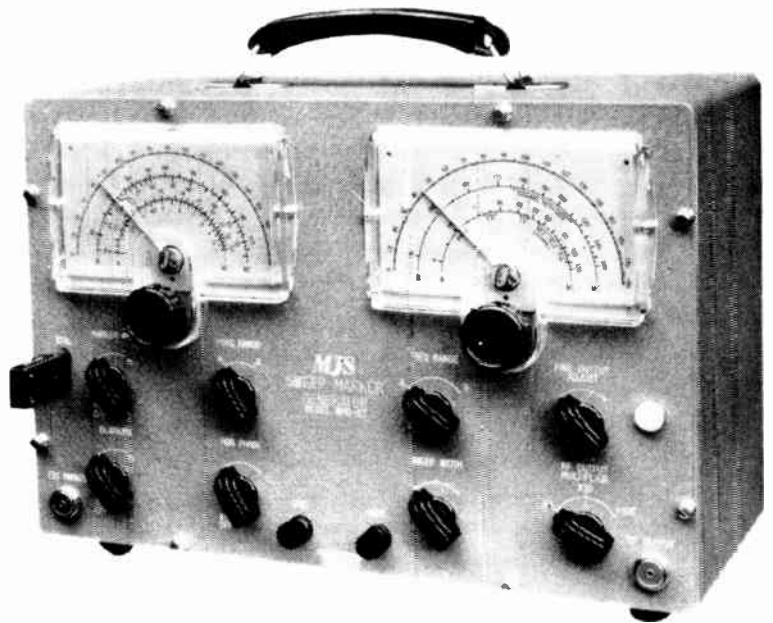
SWEEP DEVIATION variable to 12Mc.

OUTPUT IMPEDANCE 75 ohms.

OUTPUT VOLTAGE over 100,000 microvolts in 3 steps.

CRYSTAL OSCILLATOR ACCURACY 0.002%.

POWER SUPPLY AC 115V 50/60 cps.



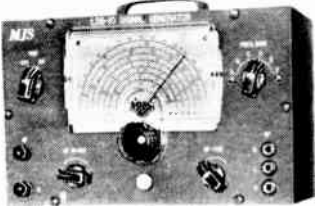



ONLY \$139.95

The MJS Generator, Model SMG-57, is specifically designed for Television Service and alignment work. Professional appearance, unusual accuracy, and versatility have been combined in this fine instrument, to provide the Radio and Television Technician with the kind of equipment he can use to speed up difficult trouble shooting and alignment.

The SMG-57 is a combination Sweep and Marker generator, with frequency ranges of exceptional width, permitting front-end as well as I.F. alignment. Each instrument is *individually* calibrated on Marker frequencies, clearly showing exact setting for all key I.F. markers. The experienced Technician will quickly realize the advantages of this time-saving feature.

An internal, crystal controlled 4.5Mc oscillator is provided for accurate alignment of Sound I.F. and demodulator circuits. Please note that the Marker Frequency Range of the SMG-57 extends down to 3Mc, thus allowing the instrument to be used to align F.M. receiver I.F. at 10.7Mc as well as providing an option of Marker or Crystal oscillator at 4.5Mc.

"you can't get more for less NOR AS MUCH for so little"

| | | | |
|---|--|--|---|
|  <p>\$39.95 LSG-10 Signal Generator (Wired Ready For Use)</p> |  <p>\$13.95 PD3 Multimeter (Wired Ready For Use)</p> |  <p>\$24.95 MT6D Multimeter (Wired Ready For Use)</p> |  <p>\$34.95 BJ-1 Condenser Analyzer (Wired Ready For Use)</p> |
|---|--|--|---|

STARK ELECTRONIC SALES CO.

AJAX — SOLD THROUGH ALL LEADING JOBBERS — ONTARIO

CANADA'S MOST COMPLETE LINE

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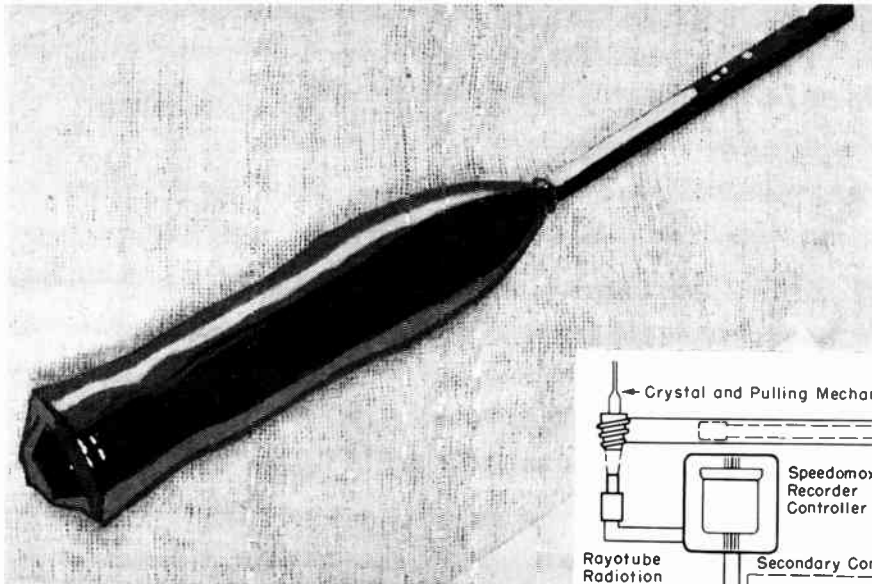
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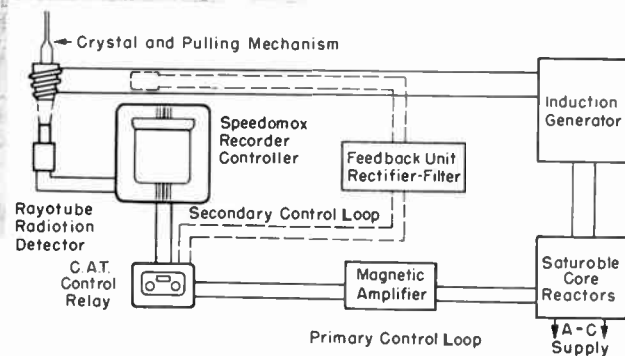
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● This typical crystal, some 8 inches long, is super-pure and is cut to form Philco transistors used extensively in electronic equipment, such as computers, radios, data processing machines, industrial controls, military communication equipment, power converters and test equipment.

● Schematic diagram shows crystal growing equipment, with elements of the L&N package control system which permits temperature control within 0.25 C.



Controls Permit Routine Production Of Transistor Crystals

THE difficult problem of accurate temperature control in growing transistor crystals has been reduced to a routine production technique. Now the operator continuously draws a large single crystal of silicon or germanium from a crucible, induction heated to the range of 1400C for silicon; 950C for germanium and manually sets the optimum crystallization temperature, and the control system maintains this set point within 0.25C for about an hour.

This super-accurate control, seldom called for in industrial process applications, is obtained with a package system, specifically designed for growing crystals. Its importance is emphasized by the consequences of temperature drifts from the set point. If the temperature rises more than some 0.6C above the optimum growing point, the end of the crystal melts; if the temperature drops 0.6C below the proper value, the melt freezes.

Control Employs Radiation Detector

As diagrammed in Fig. 2, the Leeds and Northrup control system is designed to regulate the induction heater through a magnetic amplifier and saturable core reactors. It comprises three basic elements:

- (1) a radiant heat detector (Rayotube), sighting on the bottom of the crucible
- (2) a Speedomax recorder-controller with adjustable range and adjustable zero (AZAR)
- (3) a control relay (L&N's "C.A.T." or current adjusting type) which delivers a 0 to 5 ma d-c signal to the magnetic amplifier in accordance with the controller's error signal.

However, even minor fluctuations in line voltage or other spurious effects in the circuit could upset the delicate temperature balance. Design engineers, therefore, added a secondary control loop to compensate for these effects (also shown in Fig. 2). In this circuit, a pick-up loop mounted near the induction coils, keeps a continuous check on the energy level delivered to the melt. Extraneous changes in this energy level promptly cause a feedback signal to the C.A.T. unit and cause immediate corrective control action before they seriously affect the melt temperature.

Other refinements in the package system assure sustained high accuracy and reliability in drawing uniform crystals. These include:

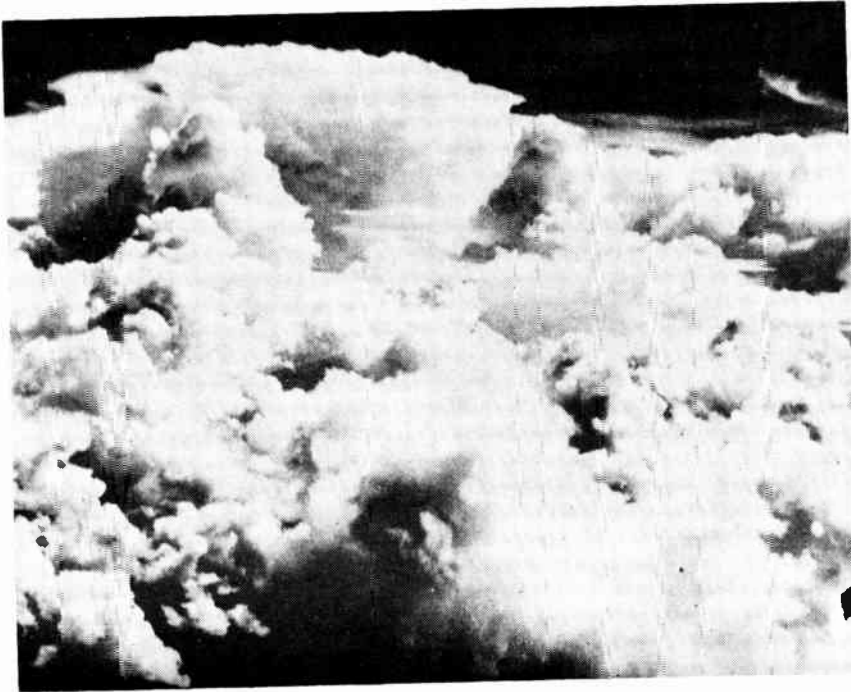
- (1) A small flow of inert gas along the sighting path of the radiation detector clears away any dust or fumes and maintains the accuracy of the detector's optical system.
- (2) The recorder employs a type of dry cell which produces a highly stable current output for the time required to grow a crystal.
- (3) The recorder controller's normal full scale range of 100C can be reduced to only 60C at the crystal growing temperature, so that each scale division represents smaller increments and permits closer control.

Crystal Growing Process

In one crystal growing machine a gas-filled chamber holds the crucible with the silicon or germanium to be melted. Above the crucible a rod with a seed crystal connects to a motor-driven pulling apparatus. The principle here is to start the large single crystal growth from the small seed, drawing continuously from the melting silicon or germanium in the crucible.

With the seed in place, the operator heats the charge until it is thoroughly melted. This requires some 15 to 20 minutes. Then the operator reduces the power and watches the surface of the melt for the first trace of cloudiness. By means of the set point on the Speedomax recorder-controller, the operator balances heat input to maintain this surface cloudiness.

The operator then lowers the seed until it touches the surface and starts the puller. The shape of the meniscus of the surface is the operator's guide, who adjusts both speed of pulling and temperature as experience indicates. The operator can then turn the temperature control over to an automatic program control unit if that is desired. The crystal grows on itself as the molten material crystallizes on the solid surface. Pulling takes from 60 to 90 minutes, with the automatic control system operating to maintain temperature within 0.25C of the set point.



● Growing cumulo-nimbus storm clouds; cloud top 28,000 ft., base 1,500 ft. Photographed from 20 miles at 10,000 ft.

Weather Avoidance With Airborne Radar

By P. L. STRIDE, Assoc. I.E.E.*

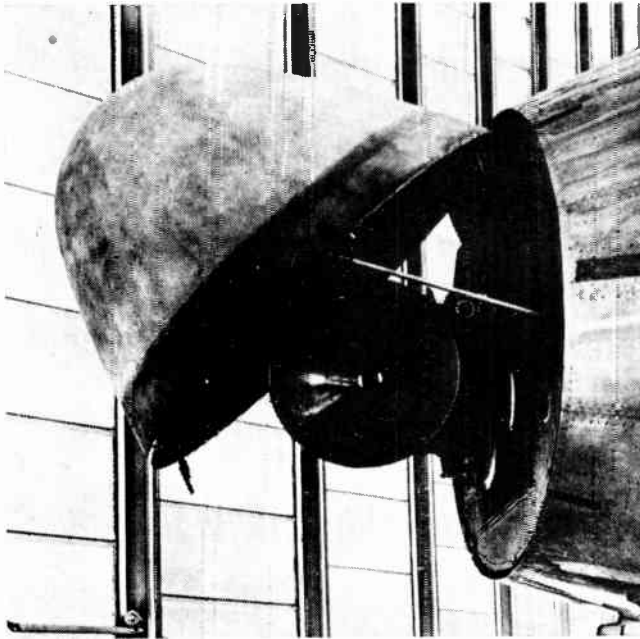
FOR several years the world's major airlines have been interested in the use of airborne radar for detecting, and giving warning of, the bad weather and turbulent flying conditions associated with cumulo-nimbus cloud formations. As long ago as 1948 extensive trials, notably by B.O.A.C.¹ and American Airlines,² showed that airborne radar could give adequate warning of such regions and enable the pilot to select the safest route through them. In addition, techniques for avoidance of high ground, navigation by "map painting" and navigation by means of ground responder beacons were thoroughly investigated and found to be useful subsidiary facilities. At that time the equipments available had been developed with military needs in view and were not entirely suitable for installation in civil aircraft. Development of equipment designed specifically for airline use has been delayed because airline managements have been somewhat reluctant to commit themselves to the initial capital expenditure, a weight penalty approximating to one passenger and the maintenance problems, until they were thoroughly convinced that airborne radar would enable flight operations to be facilitated. The advent of high speed aircraft has, however, forced a decision and several major airlines have now stated their intention to fit. This has naturally provided

the necessary incentive to the equipment designers and at least four radars are now available for commercial aircraft. While these radars offer a similar overall performance, there are some notable differences in detailed design, particularly in choice of frequency and method of scanner stabilization.

Operational Requirements

The main operational uses for an airborne radar are the avoidance of turbulence associated with cumulo-nimbus clouds and thunderstorms, navigation by ground "map painting," navigation with the aid of ground-based beacons, high ground avoidance, and the measurement of ground speed and drift. A radar designed to perform all these tasks in the best possible manner would be a somewhat complex affair and it is necessary to determine which is the prime requirement. In general, all the requirements except that concerned with the avoidance of turbulence can be met by existing instrumentation in conjunction with ground-based navigational aids. Clearly, therefore, the basic radar should be designed with weather avoidance as the primary consideration. Nevertheless, any additional information the radar can provide, such as ground "map painting," may usefully supplement existing navigational aids.

* Ekco Electronics Ltd., E. K. Cole Ltd.



● Fig. 2. Scanner of Ekco search radar in nose of Bristol Britannia aircraft; radome raised to provide access.

Considering cloud and thunderstorm detection in more detail the main requirements are: (a) adequate range of initial detection so that avoidance action can be initiated at an early stage; (b) good penetration of storm areas so that a storm of considerable depth can be plotted completely; (c) good penetration through intervening precipitation between radar and target; (d) adequate resolution to permit gaps between turbulent cores to be defined and negotiated; (e) means of assessing turbulence; (f) preservation of the foregoing information during aircraft manoeuvres, i.e., good scanner stabilization. For a radar of given power output and receiver sensitivity, maximum detection range and penetration capability are governed by the choice of operating wavelength. Also, angular resolution is affected by the wavelength and the size of antenna it is possible to install in the aircraft nose.

Importance of Operating Wavelength

The theoretical aspects of radar echoes from meteorological phenomena were first dealt with by Ryde³ and the results subsequently confirmed experimentally by several workers. It is well known that radar echoes from clouds are dependent on reflections from the water droplets or ice crystals making up the cloud structure. The magnitude of the radar signal has been shown to be approximately

$$\text{proportional to } \frac{D^6}{\lambda^4}$$

where D is the droplet diameter and λ the wavelength. It will be seen that the system sensitivity will increase rapidly as the wavelength is decreased and, in fact, on wavelengths much below 3 cm. significant returns will be obtained from the harmless small-droplet type of cloud as well as from large-droplet cumulo-nimbus clouds. Thus detection range and cloud structure considerations demand that for a given transmitter power, receiver

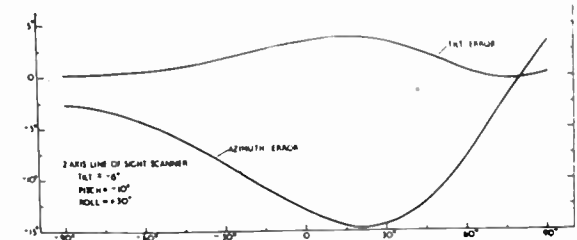
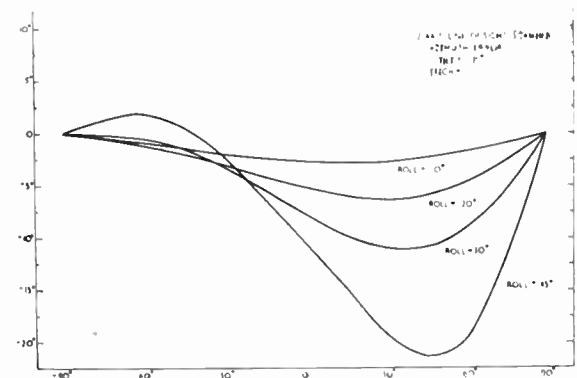
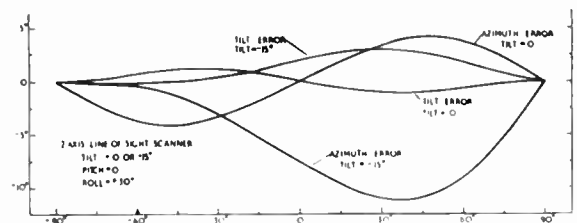
sensitivity, etc., the wavelength shall be short but with a bottom limit of about 3 cm. Further problems arise when the questions of detection of a cloud target through intervening rain and plotting of the far edge of a storm are considered. Table I shows the attenuation figures for various rainfall rates at wavelengths of 3, 6 and 10 cm. These figures are derived from Ryde's calculations.⁴ It will be seen that attenuation increases very rapidly with decrease of wavelength. Thus the choice of operating wavelength must be made with the possible path attenuation, as well as the maximum reflection from the desired target, borne in mind. It has been shown⁵, "that the maximum range on a particular target with heavy precipitation between target and radar, is given by an operating wavelength in the 5-6 cm. region.

Further, antenna gain and beam width are dependent on the relation between wavelength and paraboloid diameter, and any increase in wavelength must be accompanied by a proportional increase in antenna diameter for a given gain and beam width. The beam width directly affects the angular resolution of the system. British trials have used an X-band equipment fitted with an 18 in. paraboloid giving a beam width of approximately 5 deg. In practice, this means that a point target well within maximum range appears on a display as an arc of 5 deg. and that two such targets separated by 5 or 6 deg. may be virtually indistinguishable. Trials experience has

TABLE I. — APPROXIMATE ONE-WAY ATTENUATION IN dB/MILE AT 18° C. PRECIPITATION RATE

| WAVE-LENGTH | 25 mm. hr. | 50 mm. hr. | 100 mm. hr. |
|-------------|------------|------------|-------------|
| 3 cm. | 1.3 | 2.6 | 5.2 |
| 6 cm. | 0.14 | 0.27 | 0.54 |
| 10 cm. | 0.012 | 0.024 | 0.048 |

indicated that an angular discrimination inferior to this



● Figs. 3, 4 and 5. Line-of-sight scanner stabilization errors described in text.

Acknowledgment is made to British Communications and Electronics magazine in which this article first appeared and to the United Kingdom Information Office for their cooperation in making available to Electronics and Communications the first North American publishing rights for this article.

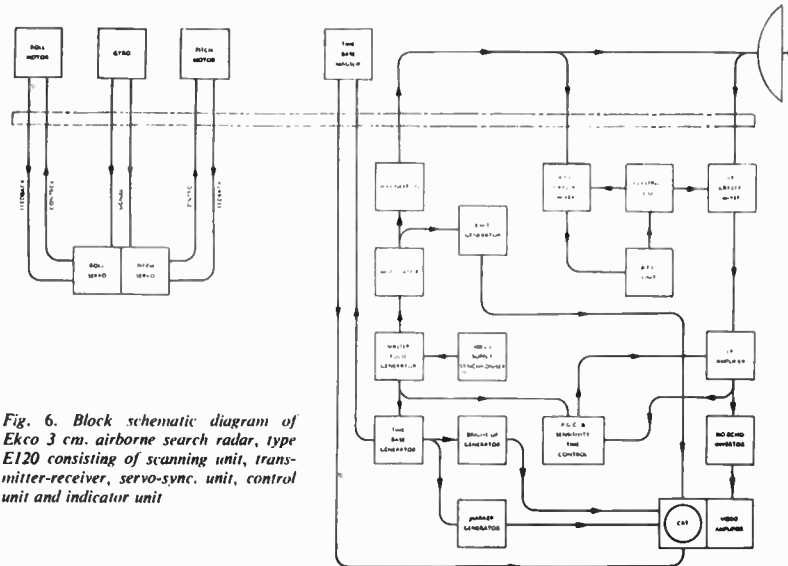


Fig. 6. Block schematic diagram of Ekco 3 cm. airborne search radar, type E120 consisting of scanning unit, transmitter-receiver, servo-sync. unit, control unit and indicator unit

might well be unacceptable as the negotiation of narrow gaps through turbulent cores would become increasingly difficult. Since the antenna has to be mounted in the nose of the aircraft the smaller its diameter the better, and in practice anything much larger than 18 in. is likely to be extremely difficult to install, particularly in modern high-speed machines. Thus, there are sound reasons for keeping the operating wavelength as high as possible from both a discrimination and ease of installation point of view. Clearly the final choice of wavelength must be a compromise between initial detection range, angular resolution and penetration through precipitation.

All British trials experience to date with 3 cm. equipment has indicated that attenuation between radar and target, or through the storm area being examined, has not significantly degraded the information obtained on the display, and for this reason British preference is still for 3 cm. equipment. The Aeronautical Radio Inc. specification for American Civil Airborne Radar has demanded a wavelength in the 5-6 cm. region. The initial demand was based largely on the theoretical report of Marshall and Hirschfeld but was supported by the United Airlines trials report on the prototype R.C.A. system designed to meet the ARINC specification. During the course of these trials an attempt was made to compare the results obtained with 5 and 3 cm. radars against the same target. Unfortunately the radars were in different aeroplanes and the display photographs obtained are difficult to compare directly.

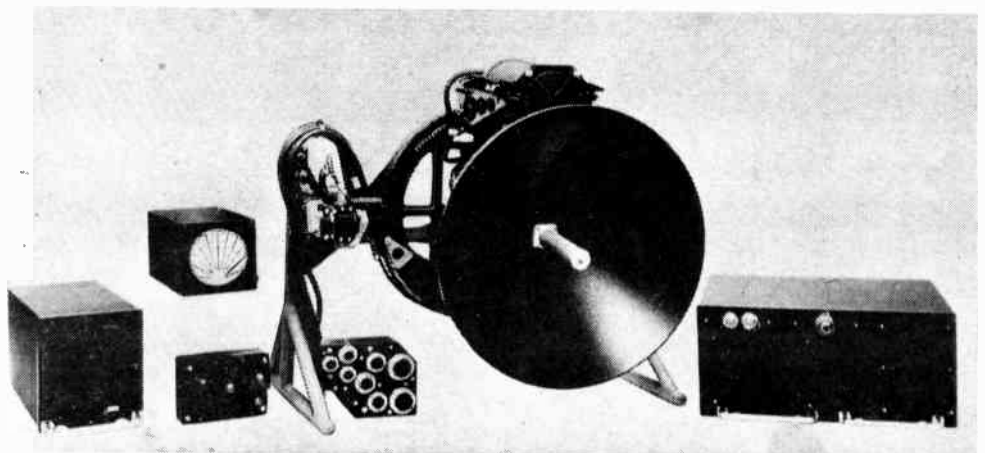
Nevertheless, the consensus of opinion of the trials team was that the 5 cm. system gave a significant improvement in turbulent area delineation when the target was in the presence of heavy rainfall. It is worth noting, however, that the Bendix Co. used figures taken during a similar trial to illustrate the advantages of a 3 cm. system.

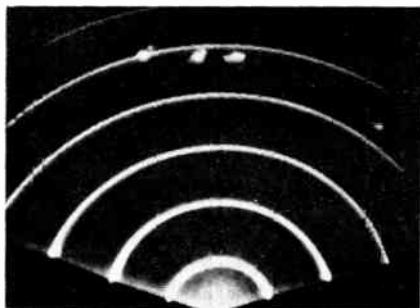
Summarizing, the 3 cm. system has the advantage of good angular discrimination and considerably longer range in the absence of path attenuation, while a 5 cm. equipment will suffer less range reduction in the presence of heavy precipitation. The final decision cannot be made on purely theoretical grounds and must be resolved on the bases of operational experience with the two wavelengths. The final result will depend on whether the heavy rainfall rates postulated by the protagonists of a 5 cm. system occur on a significant number of occasions.

Scanner Stabilization

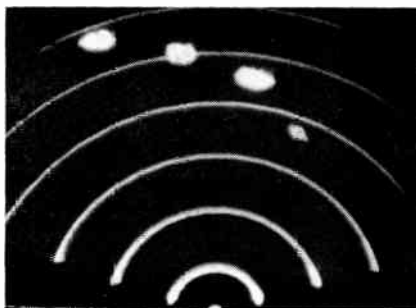
In order to prevent distortion of the display, and consequent loss of accurate information, during aircraft manoeuvres it is necessary to ensure that the plane of the scan remains horizontal or maintains a fixed relationship to the horizontal plane. Various systems can be employed ranging from full platform stabilization to the simpler line-of-sight system. In "platform" stabilization the main azimuth scanning axis and the tilt axis — if any — are carried on a gimbal system having independent roll and pitch axes. Any movement of the aircraft from the

● Fig. 7. The complete Ekco airborne search radar, type E120.

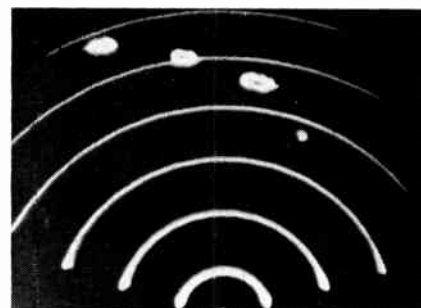




● Fig. 8. Typical clouds near maximum range on 120 mile scale.



● Fig. 9. The same group at 60 miles.



● Fig. 10. Iso-echo contours of the same target at 60 miles.

horizontal causes the reference gyro to produce error signals which are fed to stabilization motors on these two axes. The platform carrying the azimuth axis is always maintained horizontal within the accuracy of the gyro reference and the servo system.

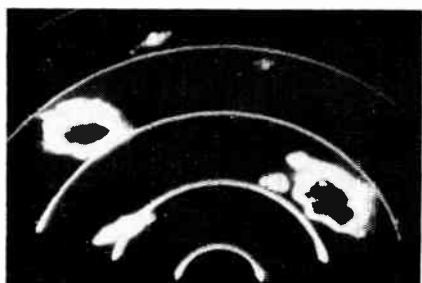
Line-of-sight stabilization is achieved by moving the aerial system about an axis at right angles to, and rotating with, the unstabilized azimuth scanning axis. If the aircraft rolls and the azimuth axis is no longer vertical, a continuous motion is introduced about the subsidiary tilt axis and is related to azimuth angle so that the plane of the scan is kept approximately horizontal. Pitch errors can be dealt with and fixed amounts of upward or downward tilt introduced in a similar manner. While this method of stabilization leads to a comparatively simple mechanical design, the fundamental geometry of the system produces errors in azimuth and tilt in the presence of a large rolling movement, unless the signals from the gyro reference are processed through an elaborate computer. These errors mainly result from the measurement of azimuth angles about a non-vertical axis. In addition, the servo system and tilt correction motor are working during the whole period that the aircraft is not horizontal and must produce high accelerations near the limits of azimuth scan. The geometry of the system has been considered by Swain⁴ and Figs. 3 to 5 summarize the errors to be expected under various conditions. For example, with -15 deg. tilt, -10 deg. pitch and 30 deg. of roll the azimuth error near the dead ahead position is approximately 15 deg. This means that a target directly ahead would appear to be 15 deg. to port or starboard while the aircraft was in a bank and would apparently move back to dead ahead when the aircraft resumed level flight. Although these errors are reduced in the absence of pitch and tilt, it is clear that confusion of this sort is undesirable when negotiating narrow gaps in cloud formations or when attempting to identify ground features during map painting. It can be shown that the line-of-sight system is acceptable only if the total addition of roll, pitch and tilt demands is kept within about 20 deg. While this restriction may be reasonable over a large portion of a flight, there may well be occasions, particularly when traversing cumulo-nimbus areas, during which the system will be inadequate.

Iso-Echo Contour Presentation

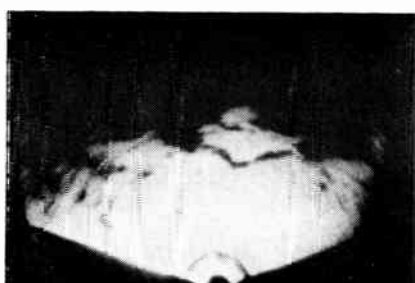
Early operational trials on both sides of the Atlantic showed that avoidance of the response areas defined on the radar display, resulted in the elimination of serious turbulence even when narrow gaps were negotiated. However, the converse was not necessarily true and in some instances flights through radar response areas did not result in excessive buffeting while in others the effects were severe. It is believed that these anomalous results are due to the high rate at which certain clouds develop and also to the lack of knowledge of the stage of development and decay at which the turbulence is greatest. In practice, the course changes found necessary to avoid all response areas were comparatively small and far preferable to the large diversions considered desirable from a purely visual assessment of the large cloud masses found in frontal or monsoon conditions. Consequently, on routes involving long stage lengths, the uncertainty of the turbulence associated with the particular cloud echo was not considered to be of great importance. On short stages, particularly when flying on airways as in the U.S.A., the problem is not so simple, as diversions of even two to three miles might seriously affect the traffic-control problems.

During trials by American Airlines, evidence was produced to show that the degree of turbulence within a cloud is related to the rainfall gradient at the cloud edges, i.e., a sharp rainfall gradient is associated with severe turbulence. A means of assessing this gradient, known as an iso-echo contour display, was investigated and has since been adopted by all the equipment designers. This type of display shows two contours, one corresponding to the minimum detectable signal level, and the other to a predetermined signal amplitude above this level. The first contour is defined by the outline of the "paint" on a cathode-ray tube, while the second corresponds to the edge of the "hole" left when signals above the predetermined amplitude are inverted. The separation between the contours — i.e., the width of the "paint" left on the tube — indicates the rainfall gradient.

In its present state of development the device does not provide an absolute measurement of rainfall gradient and hence turbulence. However, it does provide a means of comparing the turbulence likely to be encountered in



● Fig. 11. Iso-echo contours of the same target at 20 miles.



● Figs. 12 and 13. "Map painting" over the south coast of England. Note Wight and (Fig. 13) the tip of Cherbourg at approximately 100 miles range.



various parts of a cloud echo or between different clouds of a large formation, i.e., if it is necessary to fly through a cloud echo, the cloud or section of a cloud giving the broadest iso-echo contour point should be selected. Much trials work remains to be done in order to determine the optimum level above the threshold signal at which the display should invert. When this optimum inversion level has been settled, it may be possible to say that clouds not giving an iso-echo "hole" may safely be flown through.

If the iso-echo contour presentation is to give consistent results, it is necessary to ensure that the signal fed to the inversion circuits is independent of range for a given target and also that the maximum overall performance of the system remains constant. The first requirement may be fulfilled by arranging for the gain of the radar receiver to be related to target range in accordance with some predetermined law derived from the radar equation. This facility is usually known as sensitivity time control—S.T.C. For point targets at long range where a very small fraction of the beam is intercepted, the received signal is proportional to the fourth power of the range. At short ranges, however, the same target might fill the beam and then the received signal is proportional to the square of the range. Thus, before the automatic gain control law for the receiver can be determined, some assumptions must be made regarding the relation of target size to beam-width at various ranges. However, at shorter ranges on the type of targets being considered the relationship will always be a square law.

Stabilization of the maximum receiver performance can be obtained either by setting the manual gain control to a predetermined point when iso-echo presentation is required, or by arranging for some form of automatic gain control system referenced to noise. Neither of these methods takes into account possible variations in transmitter performance, but as these are usually of a long-term nature, the complications involved in overcoming this difficulty are probably not worth while.

The Ekco 3 cm. Airborne Search Radar

There is a very marked similarity between the designs of the various manufacturers with the exception of the acknowledged question of operating wavelength and the method of scanner stabilization. In the case of the American equipments, complete interchangeability of systems has, in fact, been achieved as a result of the ARINC specification. All equipments contain a scanner, a transmitter-receiver unit, an auxiliary unit — time bases, servo amplifiers, etc., an indicator unit and a control unit, but the circuit functions contained in individual units differ considerably between manufacturers. Table II enables a comparison to be made of the various electrical characteristics. This table is based on the latest information available but may be subject to minor corrections as

equipment designs are not in all cases completely finalized.

The Ekco Electronics type E.120 equipment represents latest British practice and is believed to have certain features which are an improvement on current American designs. It has been designed in collaboration with B.O.A.C. with the requirements of Britannia and Comet 4 aircraft in mind. Previous experience with the earlier low power type E.38 systems,⁹ both on trials aircraft and in the Comet 1, has been of great value in formulating the specification for the new system and has enabled operational performance to be predicted with certainty. A block diagram of the equipment is shown at Fig. 6 and a photograph of the complete system in Fig. 7.

Platform-stabilized Scanning System

The aerial system proper consists of an 18 inch paraboloid illuminated by a pressurized dipole and reflector plate. This assembly sweeps over an arc of 150 deg. in azimuth in 1½ seconds, thus providing a cone of r.f. energy subtending an angle of 5 deg. and scanning 75 deg. on each side of the aircraft fore-and-aft line. Provision is made for tilting the paraboloid relative to the dipole assembly so that the plane of scan can be set within the limits of 7 deg. above or 17 deg. below the horizontal. The stabilization system employs a gyroscope as a reference. Should the platform tend to depart from the horizontal, misalignment signals produced by the gyroscope are fed to a sync-servo unit which controls the stabilization motors. The direction of rotation of the motors is such that the platform is returned to the zero error signal position, i.e., the horizontal. The stabilization limits are ±45 deg. in roll and +18 deg. and -22 deg. in pitch; the rates of follow are 30 deg./sec. in roll and 10 deg./sec. in pitch, with a lag not greater than 2 deg. in both planes. This performance is, of course, accompanied by some weight penalty, but the advantages are considered worth while. Under steady conditions the scanning axis is vertical within 1 deg. If desired the stabilization system can be disconnected. The scanner is then electrically locked to the aircraft axes by limit switches.

The Transmitter-Receiver

The transmitter-receiver unit contains all the r.f. circuits for the installation, together with the master pulse generator and necessary power supplies. The unit also provides all the h.t. and e.h.t. voltages required by the rest of the installation. The transmitter uses a 60 kW 3 cm. magnetron feeding into a milled block hybrid and duplexer. The magnetron is modulated by a thyatron-controlled delay-network modulator. The thyatron is triggered by a pulse produced by a blocking oscillator, the p.r.f. of which is synchronized with the 400 c/s +5 per cent supply. The blocking oscillator also provides the master timing pulse for the rest of the equipment.

TABLE II.

| CHARACTERISTIC | BENDIX RDRI | RCA AVQ10 | COLLINS WP101 | EKCO E120 |
|---|-------------------------------------|---|---|---|
| WAVELENGTH | 3.2 cm. | 5.55 cm. | 5.55 cm. | 3.2 cm. |
| POWER OUTPUT | 40 kW | 75 kW | 75 kW | 60 kW. |
| PULSE WIDTH | 2.0 micro-sec. | 2.0 micro-sec. | 2.1 micro-sec. | 2 micro-sec. |
| REPETITION RATE | 400 pps. | 400 pps. | 400 pps. | 400 pps. |
| RECEIVER NOISE FACTOR | | | | 12 dB. |
| RECEIVER BANDWIDTH | 1 Mc/s. (30 Mc/s. IF) | 1 Mc/s. (60 Mc/s. IF) | 2 Mc/s. (60 Mc/s. IF) | 1.5 Mc/s. (30 Mc/s. IF) |
| CONTOUR SEPARATION | Pre-set approx. 16dB | Adjustable 5dB-15dB | — | Pre-set adjustment 2-18dB above noise |
| APPROXIMATE AUTOMATIC GAIN CONTROL (S.T.C.) RANGE | 0-30 miles | 0-20 miles | 0-25 miles | 0-60 nautical miles (n.m.) |
| DISPLAY | 240° ppi. 5 in. tube | 360° ppi. 5 in. tube | 360° ppi. 5 in. tube | 150° offset ppi. 5 in. tube |
| RANGE SCALES | 0-20, 0-50, 0-150 n.m. | 0-20, 0-50, 0-150 n.m. | 0-20, 0-50, 0-150 n.m. | 0-20, 0-60, 0-120 n.m. |
| RANGE MARKERS | 5, 10, 25 n.m. | 5, 10, 25 n.m. | 5, 10, 25 n.m. | 5, 10, 20 n.m. intervals |
| ANTENNA DIAM. | 22 in. parabola | 22 in. parabola or 22 in. 30 in. ellipse | 22 in. parabola | 18 in. parabola |
| APPROX. BEAM WIDTH | 3.8° | 7° with 22 in. reflection 5.4° horiz. with ellipse | 7° | 5° |
| STABILIZATION LIMITS | ±20° total (including tilt ±15°) | ±20° total (including tilt + 10° -15°) | ±35° total (including tilt + 10° -15°) | Roll ±45° Pitch + 18° -22° Tilt up 7° down 17°. Static — ±1° Dynamic — ±2° for 30°/sec. roll + 10°/sec. pitch |
| STABILIZATION ACCURACY | | ±2° with zero tilt and roll rate up to 20°/sec. | | |

Note: All systems are capable of operation with two indicators; the Ekco E120 may be provided with an alternative control position. 360 deg. p.p.l. presentation may be limited by the free view of the scanner, depending on the installation.

The receiver section of the duplexer contains three mixer crystals coupled to a common klystron local oscillator. In one crystal the local oscillator signal is mixed with a small portion of the magnetron output and the difference frequency is fed to the a.f.c. amplifier and discriminator unit. The output from this unit controls the frequency of the local oscillator, so that the i.f. of 30 Mc/s is always maintained in spite of drift in magnetron and local oscillator frequencies. The second and third crystals are part of a balanced mixer assembly, the output of which is fed to the i.f. amplifier. The latter has a bandwidth of 1.5 Mc/s and a noise factor of approximately 3dB. The overall noise factor of the complete receiver chain is approximately 12dB. Circuits in the sync-servo unit work in conjunction with the i.f. amplifier unit and provide automatic gain stabilization referenced to noise and sensitivity/time control.

Scanner Stabilization Control

The servo section of the sync-servo unit contains two servo chains which control the roll- and pitch-correction motors on the scanner from misalignment voltages supplied by the gyro. The correction motors are three-phase machines arranged to run off a single-phase supply by a capacitor across the phases. A feed-back generator is integral with each machine. Direction of rotation is determined by selection of the pair of phases to which the supply is directly connected. This control is accomplished by a pair of variable reactors, either of which can be saturated by windings in the anode circuits of the control valves. The grids of these valves are supplied with the a.c. misalignment voltage, from the gyro pick-off system in suitable phase, mixed with the feed-back voltage.

Time Bases and Associated Circuits

The synchronizer section contains the time base, range markers, iso-echo contour, a.g.c. and s.t.c. circuits. The time base follows conventional lines, and consists of a linear-rundown generator, feeding into amplifying and phasesplitting circuits, followed by a push-pull output stage. The scan waveform is fed to the indicator scanning coils, via a magstrip located on the azimuth-drive shaft of the scanner. Three time bases are provided corresponding to 20, 60 and 120 nautical miles. Markers produced by ringing circuits can be superimposed on the display at intervals of 5 miles on the 20 mile range, 10 miles on the 60 mile range, and 20 miles on the 120 mile range.

In order that the signal amplitude from a given target shall be independent of range, a sensitivity time control waveform is applied to the receiver, when using the iso-echo contour circuit. An automatic gain control signal, referred back to output noise level, is generated in this unit and is applied to the i.f. amplifier in the transmitter/receiver in order to stabilize performance.

Ease of Control

The control unit enables all normal adjustments to be carried out during flight with the exception of display contrast and marker amplitude, which are fitted to the indicator unit. The main operational controls are separated from those requiring infrequent adjustment only. The first group includes beam tilt, iso-echo contour switch, manual gain control, and a range switch with stand-by position. The second group of controls consists of power on/off, stabilization on/off, a.f.c. on/off, and manual tuning. The iso-echo contour switch has three positions, "contour on" — inversion circuit in operation, automatic gain stabilization and sensitivity time control on receiver, "contour off" — automatic gain stabilization and sensitivity time control on receiver; and "manual gain" — manual gain control on receiver. This switching sequence ensures that the iso-echo contour display is only available when the maximum receiver gain is stabilized and the sensitivity time control is in operation.

The indicator contains the 5 in. cathode-ray tube and a signal video amplifier. The scan waveform is taken from the magstrip on the scanner and fed to the deflector coils on the tube. Consequently, the scan moves in synchronism with the ± 75 deg. sweep of the aerial system. The time base is arranged to swing about a point near the

bottom of the tube, which corresponds to the position of the aircraft; a line drawn from this point through the center of the tube represents the heading of the aircraft. The display can therefore be regarded as a true scale plan of the sector of space at a given elevation directly ahead. To avoid congestion of targets at short ranges, zero range on the 20 mile time base corresponds to an arc about the point of rotation.

Since a high-brightness cathode-ray tube, with 20 kV final anode voltage, is used, it is anticipated that a visor will be unnecessary in most cockpit ambient lighting conditions.

The system is capable of operating two indicators and can be fitted with an alternative control position. The main operational controls only are transferred to the alternate position. This facility is of value when the equipment is being used for "map painting" by the navigator.

Results of Operational Trials

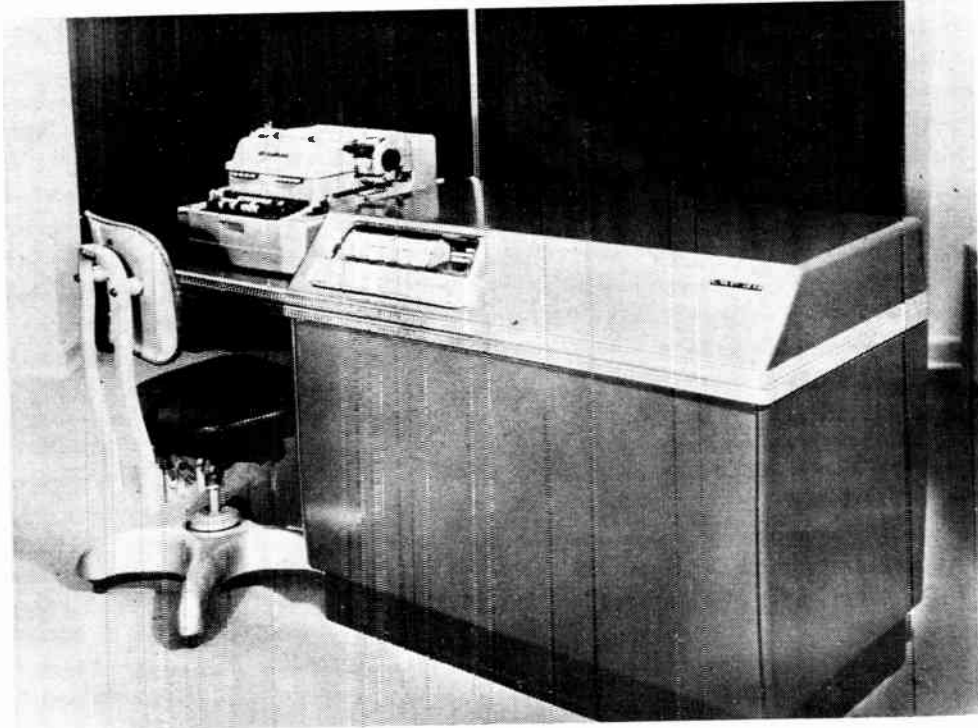
The calculated range performance of the Ekco type E.120 equipment, based on known results with the same concern's 10 kW type E.38 system, showed that the clear air range on the largest clouds would be of the order of 170 miles and some 120 miles against land masses. Thus, with a maximum calibrated indicator range of 120 miles, some margin is available to take care of intervening precipitation. Preliminary trials results have confirmed these predictions. The retention of the "platform" stabilization system of the earlier model has enabled the good performance on "map painting" and high ground avoidance to be repeated. Fig. 8 shows a typical group of clouds near maximum range on the 120 mile scale. The same group is shown in Fig. 9 on the 60 mile range without the iso-echo contour circuitry in operation. Figs. 10 and 11 show these targets, with the iso-echo contour in, on the 60 mile and 20 mile ranges respectively. The differences in contour separation of the right- and left-hand targets are clearly visible on the 20 mile range. In the latter case, if it was necessary to fly through either target the left-hand would be selected. "Map painting" is demonstrated by Figs. 12 and 13. These pictures were taken over the south coast of England and the Isle of Wight is clearly visible. The three targets towards the top left-hand corner of Fig. 12 are ships. These targets demonstrate the effects of beam width in relation to angular resolutions, as it can be seen that they are subtending approximately 5 deg. The maximum range performance on ground returns is illustrated on Fig. 13 where the tip of the Cherbourg peninsular is visible at approximately 100 miles.

Conclusions

Radar designers are actively considering further improvements to their systems, such as aerial beams that can be switched from "pencil" to equal-energy distribution to give better performance on "map painting," the use of Doppler techniques for drift and ground speed measurement and storage tubes for improved display performance. However, until existing equipments have proved themselves in airline use, it is unlikely that any major changes will be made.

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● Typical of the type of computer used for decentralized computing facilities is the Royal Precision L.G.P. 30 computer shown here.

The Small Computer And Decentralized Computing Facilities

By C. F. FLANNELL *

DIGITAL computers of contemporary vintage have made two major contributions in scientific and engineering applications which were hardly possible for computers of pre-electronic vintage. First, they have solved many problems too large for even a lifetime of horse and buggy methods of calculation. Second, by assuming the burden of repetitious computations, they have provided engineers with more time for creative thought.

So valuable are these contributions to industrial technology that they have stimulated a remarkable development in the size and speed of computers. The giant brains are providing engineers with answers of precise accuracy in cases where educated guesses were the rule. The wide margin of safety provided with the educated guess resulted in the design of inefficient equipment creating continuously high costs of operation. In other cases cut and try methods involving the building and testing of prototypes of trial design were used. Now the testing of many trial designs can be simulated at electronic speeds to eliminate the expense of building and testing actual prototypes. Recognizing the importance of such developments, the engineer is quickly accepting the giant brains available to him.

However, the use of giant brains is not without its price. While computers have grown to be very large and very fast, they have also grown to be very expensive and very complex. The expense requires critical scheduling for efficient use and the complexity makes scheduling difficult. In addition, efficient computer operation requires highly trained personnel who are difficult to find. Furthermore, the large computing installation is not flexible enough to keep up with the fast-changing demands of the engineering group. Hence, after the engineer learns to rely upon the giant brain and use it regularly, it becomes the source of several major obstacles.

The first obstacle an engineer faces in getting a problem solved on a giant computer is having the problem programmed; that is, put into machine language. In one aircraft factory where the writer was employed in the computing center problems have waited in line to be programmed for over six months. The engineers finally had to make a decision on the metal to be used in an air frame before they received the results of the computer's heat calculations which showed that the temperatures involved would stay slightly below the melting point of the metal selected by the engineers. If they had guessed wrong, thousands of dollars and a great deal of time would have been lost. This was a very important problem

* Royal McBee Corporation.

The speed and capacity of modern digital computers have greatly broadened the effectiveness of scientific and engineering efforts. The recognition of computer usefulness has been the impetus for the development of the giant brain. However, useful though it is, the giant brain is attended with difficulties. These difficulties can be overcome in many cases by the use of several small computers either to augment the large computer or, in some applications, to replace it. In addition, the small computer can be used in cases where computing volume and cost factors make the use of no other computer possible. We can expect that the recognition of its great potential will generate in the coming years a remarkable expansion in the use of the small computer.

and the engineers were very unhappy with this computing service. Many groups waited even longer for their answers.

The second obstacle an engineer encounters in having a problem solved on a giant computer is the dual problem of communication and scheduling after the programming is completed. The data must be sent to the central installation each time a run is made. The large companies which have the large computers frequently are widely dispersed so that inter-office mail may require a half day for delivery. After the data arrives, it must be logged in, assigned a priority, punched in cards or tape for entry into the computer, and wait until the machine becomes available. Only then are the answers returned to the engineer.

In some situations, the obstacle to communication created by the large computer installation is even more critical. For many engineering groups, one day or even one week's service from the computing group is quite adequate; nevertheless, many engineers want their answers within a few minutes. One good example of this demand for quick results is in aerodynamic wind tunnel applications. In many cases when a wind tunnel test is completed, the engineers want to see the results of that test before they set up the next test; this requires that the pressures, temperatures, and other measurements which were taken during the test be reduced to physical quantities which are meaningful to the engineer. Such a situation provides an ideal application for a computer. However, if the engineer must wait a day for these results, not only is his work less effective but also expensive wind tunnel equipment is inefficiently used. Therefore such a delay represents a considerable financial loss to the company.

There are many other cases where immediate results are desirable. For instance, in research problems the engineer may first try a given set of values and then when he sees the results he may want to change one number slightly to observe the effect on the answers. If he must wait a day or two for his answers, he is less inclined to try a new value. When he gets an answer which is close enough, he is inclined to draw his conclusions without trying for a more accurate answer. Hence, it appears that the barrier to communication with giant brains stultifies the experimental spirit.

In spite of this discouraging picture, a great deal of progress has been made toward improving the system of communication with the central computing installation. One method of improving communications is to feed data directly to the computer and receive answers immediately.

Such a system in its ultimate form would be very complex indeed, and with current techniques is still impractical. The alternative method is to locate a computer at each source of data. The introduction of the small computer has made such decentralization possible. Hence many large organizations have become interested in a decentralized operation as a method of increasing the efficient use of their personnel and of breaking up the bottleneck created by giant brains.

Some electronic engineering companies have responded to this interest by developing very versatile small computers. Many of the building blocks for these computers were developed for use by military aircraft and ships where limitation of component size is important. The General Precision Equipment Corporation is using such building blocks in developing small electronic computers. The Royal McBee Corporation is also marketing these computers. These two organizations have combined their facilities to produce and market the Royal Precision line of data processing equipment. One of these products is the LGP-30 computer, a small electronic computer designed primarily for scientific applications.

Small Computer Comparisons

What comparisons can be made of the small computer with the large computer? First of all, recent developments with magnetic drum and disc memory systems have made it possible to produce a large memory in small computers at a relatively modest cost. Furthermore, a small ratio of physical size to effective circuitry can be maintained by the use of time-sharing of components. As a result it has been possible to develop a truly general purpose computer of small size. Hence, the modern small computer can solve any problem which can be solved on the large computer; the only real difference lies in the time required for problem solution and the amount of human supervision required. Modern design techniques, then, have made it possible to put a very powerful computer in a very little space.

A second point in favor of the small computer is the ease of installation. Computers have been developed with remarkable capacity which occupy less space than a normal office desk, which operate from a standard wall outlet, and which require no more power than an ordinary home iron. For such computers no air conditioning is required and hence no major overhaul of buildings to house them as required for large computer installations. The cost of installation of such a computer is practically zero.

There are three principal ways in which small computers are being used today. One way is to use several small computers as satellites to a large computer in order to reduce the difficulties attending the use of the large computer. Another is to use a group of small computers to replace a large computer. A third way is to use the small computer by itself as the principal computing device for a company, division, or department. The expense of the large computer makes its use in this third case prohibitive. There are several interesting examples of such uses of small computers. Here is one.

The head of the computing department of a large aircraft company, after a six month feasibility study, recommended to management that they open the bottleneck of the central computing installation by purchasing a group of small computers to be located in various engineering departments. Their central computing installation operates on an "open shop" basis where the engineer does most of his own programming. This programming is simplified by an algebraic interpretive routine which translates algebraic expressions into computer language.

The programming procedure was to remain unchanged with the installation of the small computers. The engineers would continue to program their problems in algebraic form using the interpretive routine to translate this algebra into machine instructions. The engineer who

had a small computer in his own department would use an interpretive routine which would produce a program for the small computer rather than the large computer. The engineer then would return to his small computer where his problems could be solved without the delay of sending the data to the central installation and waiting for it to be returned a day or perhaps a week later. With this system the engineer would make only one trip to the central installation or send information to the central installation only one time. Then he could continue to use his program independent of the central computing installation until he chose to solve another problem on the computer or make a major modification of the existing program.

Economics

The LGP-30 computer was recommended for this application because its order structure is compatible both with the large IBM computer and the Univac computer which this aircraft company is using. They planned to punch the program on IBM cards and use a card-to-tape converter or if the Univac computer was used, they would punch the program tape directly from the computer. The engineer would return to his department with a program tape ready for entry into the small computer.

The same computer has been chosen to augment a large computer installation in another way. The compatibility of LGP-30 code with the codes of large computers has led to its use in program check-out. Anyone who has worked in a central computing installation realizes that an engineer rarely states his problem in the first writing exactly as he wants it; invariably he wishes to make additions to the program or changes in the program almost immediately upon its completion. Debugging of new programs and revision of programs consume a great deal of machine time and when the machine involved is a giant computer, time can be very expensive. In working through parts of a problem to find the source of difficulty, the greater speed of a large computer is of no advantage. An inexpensive man tends to become the slave of an expensive machine.

Hence, some people have chosen to eliminate this expenditure of valuable machine time by placing new problems on a small computer for solution until the details are formalized and a satisfactory program is developed. Then if the volume warrants, the program is translated to the language of the large computer. In this type of operation the small problems and the "one-shot"

problems never reach the large computer. This approach has another advantage besides the saving of money. It reduces the pressures which are exerted toward standardization of procedures. The engineer can feel free to try new approaches to his problem on the small computer while his old approach is being employed on the large computer.

Some large companies are taking still another approach to the application of small computers. Management has chosen to let each large department or division select a computer which will satisfy its own needs. The computing facility is on a completely decentralized basis. By having the computer close at hand, the engineer is encouraged to really make use of it rather than waste his time on a desk calculator or content himself with educated guesses or "ball park" answers. For this type of installation, care should be taken in selecting a computer which is relatively simple to program and operate so that the engineer can spend more time concentrating on finding methods leading to more accurate answers than on programming and operating the computer.

Another interesting application of a small-sized computer on a decentralized basis is its use as a special purpose computer. A major oil company is using a small computer in one of its refineries. The computer has been set to assist in the one difficult task of finding a combination of operations that will produce the desired motor fuels on any particular day from the crude that is presently available. In this application, the use of a central computing service is inadequate because immediate answers are important. Accurate solution of this problem can mean as much as \$.01 per barrel difference in profit. Since over 100,000 barrels per day are involved in this operation, computation can make as much as \$1,000 difference in profit per day.

The small company which cannot afford the price of a large computer or does not have enough work volume to warrant the use of a large computer, may find use for an installation similar to that in a department of a large company. Similar considerations should govern their choice of a computer. However, in addition to such things as ease of operation, they must also consider the capacity of the machine. In the small company when a problem is encountered which is difficult to squeeze into the small computer, there is no large computer standing by which may be used. Hence, it becomes even more important for the small company to select a computer which has a capacity adequate for the broadest range of problems they expect to encounter.

Wire Stripping Technique Eliminates Hand Operations

A WIRE stripping technique that reduces wire preparation costs by over 50 per cent and which completely eliminates all wire retwisting and retinning has attracted the attention of wire manufacturers in the United States and Canada.

The operation is accomplished by a tin reflow method using an induction heating generator and special measuring devices that can be adapted for use with any wire stripping machines in use today.

This equipment, which is placed between the roll of wire and the stripper, automatically senses the points along the wire where cutting and stripping will occur. It applies a short pulse of R. F. heating energy to these points as the wire travels into the wire stripping machine. The R. F. heat energy melts the tin on the individual strands, effectively soldering them into a solid bundle that will not fray under the strain of cutting and stripping. The wires can then be fitted into tight terminal lugs or

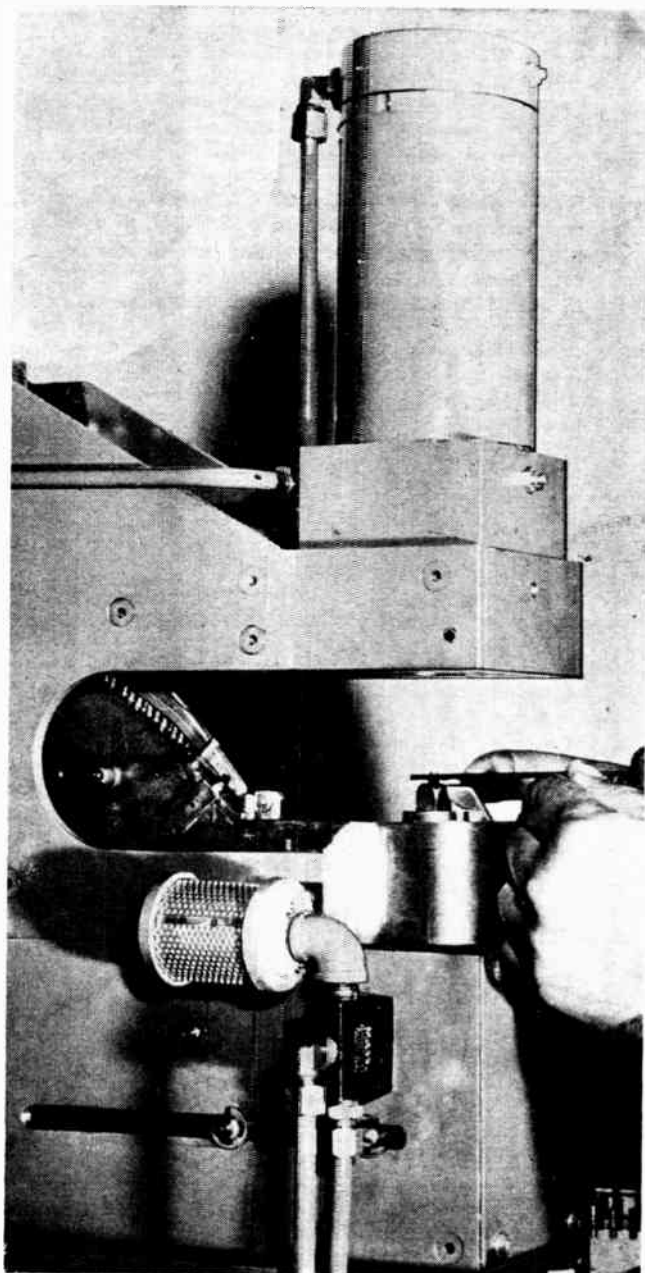
other small orifices without retwisting or resoldering.

Any length or size of wire can be handled. The process is limited only by the capacity of the stripping machine being used. The equipment is compact and can be set up on the same work table as the wire stripper.

A precision electronic timer, triggered by the wire stripper, controls the heat cycle with great accuracy, so that no overheating discoloration of wire or deformation of even low temperature plastic jackets occurs.

One West Coast user reports that this equipment has eliminated the duties of four girl operators retwisting and solder tin dipping of cut and stripped wires.

The equipment is being used successfully with various MIL spec wires, Teflon jacketed wire and with Teflon jacketed silver plated wire. This latter wire has not, up until now, been successfully bonded by any similar means, wire manufacturers report.



● New Model LSD Edward Segal Setting Machine for turret terminals and tube pins. Photo shows operator locating pre-punched board on top of component, which he does in a flash. Then he presses the foot pedal and the machine does the rest.

Terminal And Tube-Pin Setting Machines

Capable of 40 to 50 settings per minute new machines prove boon to the electronic component industry.

A HYDRAULICALLY or air operated machine that compensates for variations in board thickness, thus preventing costly part breakage is an ingenious new production tool that sets turret terminals and tube pins with great speed and economy for the electronics industry.

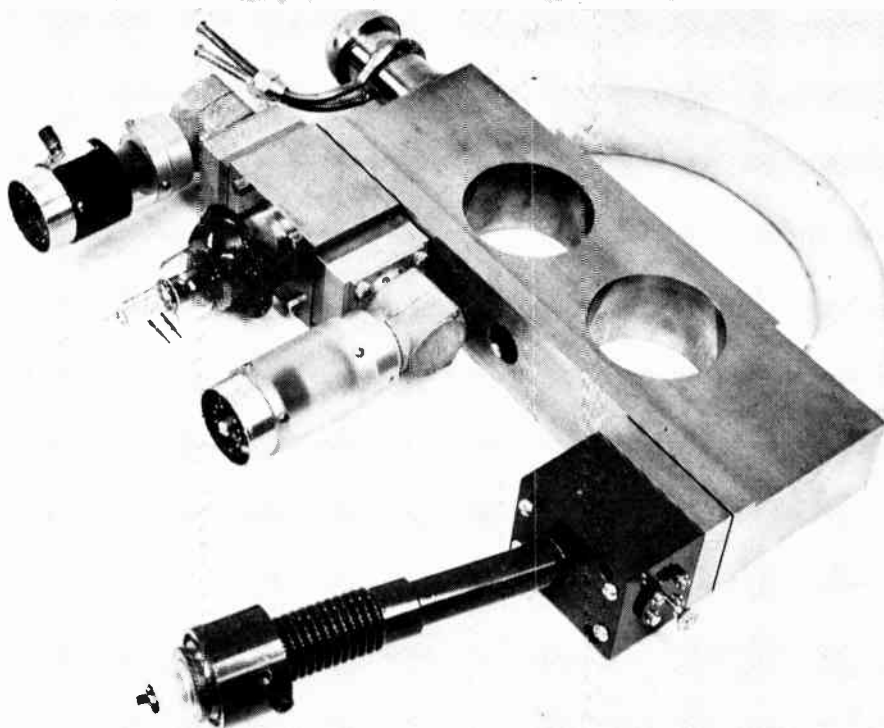
Originally designed, developed and built by Segal at the request of an electronic parts manufacturer grown weary of the plodding production rate obtained by the usual hand loading method, the setting machine achieves between 40 to 50 settings per minute without a single miss, depending upon type of assembly. Hand loading would rate about 10 to 15 settings per minute with the aid of an experienced operator.

Actually, use of the new machine is not limited to setting turret terminals and tube pins. Other similar components including double end rivets can also be set on

it. The machine has been designed for use with various raceways as required and tooling can be interchanged for different applications.

According to Segal engineers, manufacturers of the equipment, this is the first machine for this type of operation successfully designed with bottom feed, which permits work to be loaded directly on the component before the machine is tripped. An unskilled operator merely locates the pre-punched board on top of the part which is automatically fed from the bottom into a pair of jaws, presses the foot pedal and the machine does the rest. Result is complete elimination of spoilage to expensive board assemblies.

These machines have been designed with pressure regulated up to 1400 p.s.i. — with greater pressures possible if necessary. All tooling and working parts are either hardened or chrome-plated for long life.



● Closeup of analyzer assembly of the CEC Analytical Mass Spectrometer.

Mass Spectrometry In Science And Industry

The application of mass spectrometry to the fields of industrial process control, laboratory analysis, and problems in research, has been a major scientific contribution of our time. Fifteen years ago the mass spectrometer was a scientific curiosity. Today it is a dependable and extremely sensitive analytical tool used in research and industry.

THE outstanding advantage of mass spectrometry is its ability to analyze gases and liquids more rapidly than other methods. Analyses which formerly took days can now be completed in minutes by the use of automatic mass spectrometry and computation.

Included among the mass spectrometer's many uses are refinery stream analyses, chemical reaction process monitoring, university chemical and physical research, medical isotope studies, metallurgy reduction, absorption techniques, and engine combustion analyses.

A commercial mass spectrometer suitable for analytical applications was developed by Consolidated Electrodynamics Corporation, when this firm became interested in a mass spectrometer capable of analyzing the complex hydrocarbon mixtures encountered in the petroleum industry.

A mass spectrometer developed at California Institute

of Technology was loaned to this firm to facilitate preliminary work and after about four years of research by Dr. Harold W. Washburn and his coworkers, a commercial instrument was placed on the market by the company. The first one was delivered to Atlantic Refining Company in late 1942.

The mass spectrometer's operation is based on the fact that every molecule has a unique construction pattern, its individual atoms having a definite geometric arrangement with bonds of definite strength between them.

The manner in which each type of molecule will break when it is bombarded by electrons and the quantity of each type of fragment depends on the strength of these atomic bonds, so that pattern of breakage and the number of fragments produced is an unmistakable "fingerprint" of each specific chemical compound. The characteristic is so unique and accurate for each compound as to



● The new Consolidated Type 21-611 Mass Spectrometer (center) the Process-Monitor Type (left) and large Analytical Type (right).



● A CEC Process-Monitor Mass Spectrometer in use as anaesthesia control instrument during surgery at the City of Hope Medical Center.

constitute one of today's most widely used methods of analysis of complex mixtures.

Instrument Designed To Split Molecules

When a sample in a vapor state is allowed to "leak" into an ionization chamber through a minute opening, its molecules are met by a stream of electrons from a white-hot filament. The molecules immediately take on electrostatic charges, and some are split into two or more charged pieces. Then both the charged molecules and their fragments are passed through a slit to form a beam, which is suddenly accelerated to high velocity.

The beam enters a curved analyzer tube, which is located in a strong magnetic field. Each of the swiftly moving particles making up the beam is deflected according to its molecular weight and its speed. The original beam therefore becomes a series of beams, each containing ions of one specific mass and traveling in one definite trajectory. It is necessary only to measure the intensity of each individual beam to obtain an analysis of the whole.

This is accomplished by means of a slit at the opposite end of the analyzer tube through which only ions having the correct combination of mass and velocity can pass.

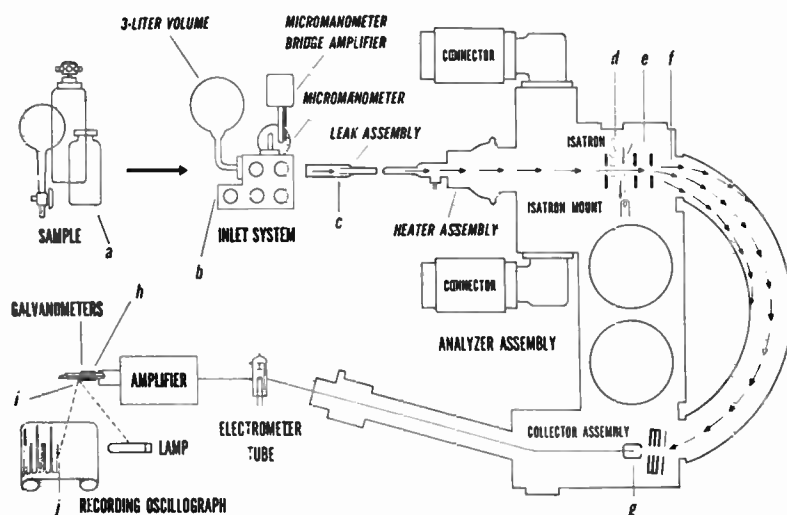
All other ions at each instrument setting will either fall short or overshoot the slit and thus be harmlessly grounded on the tube walls. Ions passing through the slit strike a collector, which converts their charge into electric current proportional to the abundance of the particles and hence to the concentration of the constituent. Each type of ion is successively focussed on the slit by varying the accelerating voltage. Amplifiers increase the resulting signals so that they can be recorded. The permanent record obtained of the relative quantities is called the chemical compound's "mass spectrum".

Completeness of the analysis is a characteristic of mass spectrometer operation that is vital in the face of increasingly rigid product specifications. Every volatile material present in a substance or mixture in a concentration detectable by the instrument being used is registered on the mass spectrum. Such measuring and recording of substances even when they are unexpected makes the method of great value in both quantitative purity determinations and exploratory qualitative work.

Several models of this versatile instrument are now available. One is the large analytical type intended for laboratory use. Another is the smaller and portable "process-monitor" type intended primarily to monitor and

HOW THE MASS SPECTROMETER WORKS

- A sample of the unknown substance is stored in a small container at relatively low pressures, usually in the vapor phase.
- The molecules are introduced through a series of special valves called the inlet system.
- The conglomerate mixture of molecules passes through a restrictor called a gold leak. The tiny openings allow only a limited number of molecules to pass.
- In the ionization chamber, called the Isatron, a much higher vacuum is maintained. Here the molecules are bombarded with a stream of electrons from a heated filament. Some become positively charged ions, others are fragmented and positively charged.
- Ions thus formed leave the Isatron chamber through a narrow slit. They are next accelerated to a high velocity by a strong electrostatic field, and pass through a second slit.
- A magnetic field, parallel to the slits, diverts the fast-moving ions into circular paths, the radius of which is proportional to the mass and velocity of the ion. Thus, the single beam is split into individual beams.
- Sorted in this manner, ions of a given mass pass through resolving slits and strike a collector 180° away from their starting point. The charges given up to the collector are amplified by an electrometer tube.
- Having now been translated into an electric signal, the results are amplified and fed to a bank of five galvanometers, each set for a different sensitivity.
- A tiny beam of light reflected from each galvanometer mirror is photographed on a moving roll of sensitive paper in the oscillograph.
- Thus, the complete mass spectrum is obtained, focussing the separated ion beams successively on the collector by varying the ion-accelerating voltage. As each beam sweeps across the collector, its intensity is recorded on the moving paper.



control continuous processes in chemical plants and oil refineries. It can make precise, almost immediate measurement of any process-gas constituent within its range. Either the major constituents of a process-gas or trace impurities can be monitored with equal ease and accuracy.

Recently this same firm introduced an inexpensive, portable mass spectrometer intended for both laboratory and industrial uses. Known as the Type 21-611, it permits industrial engineers and research scientists to perform precise batch or process analysis in the field or in the plant.

The 21-611 possesses a unique and improved scanning feature. Mass numbers appear linearly with time on a large, motor-driven dial, making mass marking unnecessary. In a conventional mass spectrometer, peaks are recorded far apart in the low mass range and close together at the high end. In the 21-611, mass numbers appear equally spaced on a fixed time base. Its high sensitivity makes possible the detection of gas impurities in the low ppm range.

Major Use Is In Petroleum Refining

Refinery research and production men are enthusiastic about the accomplishments possible with the mass spectrometer. For example, two mass spectrometers are playing a prominent role in both process control and research work at Shell Oil Company's Houston, Tex., process-development laboratory. This laboratory is the central clearing house for 40 pilot plants in the firm's research department.

These plants are all concerned with the improvement of refining techniques through the separation or conversion of crude oil. The mass spectrometer is used to analyze gas samples from the plant streams up to the pentane hydrocarbon range, liquid analyses of hydrocarbons and gasoline fractions up to 400°F., and hydrocarbon "type" analyses.

A mass spectrometer is a basic research tool in the development of petroleum refinery processes by the Universal Oil Products Co., Riverside, Ill. About 600 samples are analyzed each month. Eighty per cent of these are mixtures of petroleum gases containing as many as 19 compounds.

Another mass spectrometer is used at Sinclair Research and Development Laboratories, Harvey, Ill. for rapid examination of gases and highly volatile petroleum products, quickly analyzing mixture samples which would require hours to run by classical distillation methods.

An interesting application of mass spectrometry is in catalytic reforming at the Esso Laboratories pilot plant at Baton Rouge, Louisiana.

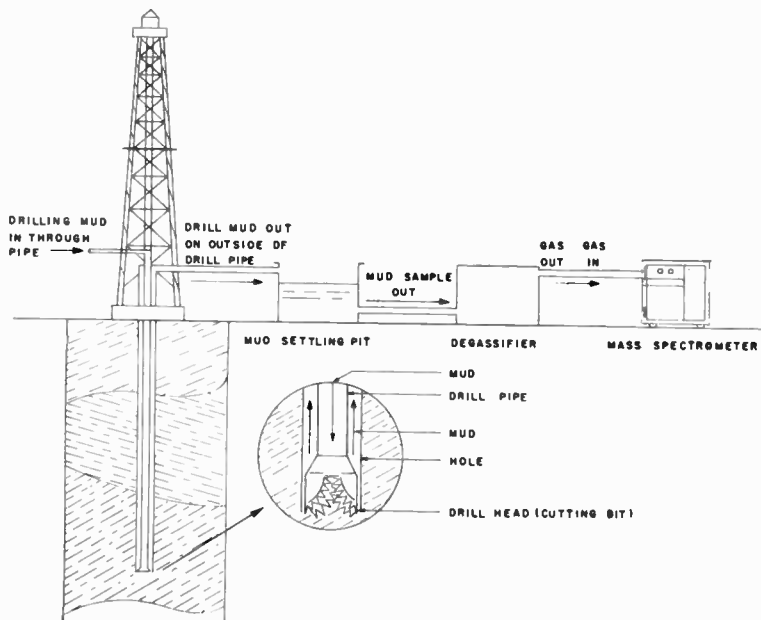


● Operating a CEC Process-Monitor Mass Spectrometer at the Commercial Solvents Corporation, Sterlington, La.

Esso researchers say that continuous analysis of product streams by the Consolidated Process-Monitor Mass Spectrometer in connection with other continuous analyzers and data reduction systems, has proved of immeasurable assistance in obtaining continuous, almost instantaneous analytical data.

Preliminary material balance calculations are obtained from the gas and liquid gravitometers, gas flow meters, and volume measurements of liquid product. These data are supplemented in the final material balance calculations by hydrocarbon gas analyses from a process monitor mass spectrometer. Composition (mass spectrometer), gravity, and hydrogen content (thermal conductivity) of the recycle gas stream are used by the operator in monitoring plant operation.

The two gas streams (recycle and stabilizer overhead) are alternately and automatically admitted to the mass spectrometer every 15 minutes. Data for calculating the complete analysis of either 12-component stream are thus available every 30 minutes. A given period (eight to 12 hours) is usually selected for material balance workup, appropriate spectra are selected for workup, and an average or composite analysis of both gas streams is made for that period. An electronic computer is used to solve analytical equations to give percentage composition.



● Diagram showing how Hycalog, Inc. uses the CEC Process-Monitor Mass Spectrometer in well logging.

Sulfur Dioxide Control

In one recent test at an oil refinery's sulfur recovery plant, the Process Monitor Mass Spectrometer not only showed how much sulfur dioxide was being vented into the atmosphere, but also showed how the plant efficiency could be increased to get higher yield of recovered sulfur.

During refining, hydrogen sulfide, a corrosive, toxic, and odorous gas is usually removed in treating plants. It was formerly burned to sulfur dioxide and then vented to the air. While not quite as objectionable as hydrogen sulfide, sulfur dioxide is also a major cause of air pollution. Refineries now use recovery units to convert the hydrogen sulfide to elemental sulfur.

To keep these sulfur-recovery plants at peak operating efficiency, ratio flow controllers are used to increase or decrease the combustion air as the feed rate increases or decreases.

Concentrations of hydrogen sulfide and sulfur dioxide were monitored in the tail gas for a period of nine weeks. The average increased sulfur production resulting from the instrument's use was 1.2 long tons per day in this plant of about 40 tons per day production.

Industrial Versatility

The unique ability of the mass spectrometer to pinpoint specific chemical compounds makes it the perfect "sleuth" for ferreting the sources and composition of air pollutants. The County of Los Angeles, for example, used the instrument in smog research.

About 60 chemical compounds or families of compounds were identified, or tentatively identified, in samples of air with the mass spectrometer, and the amounts of some of these were determined. It was shown that the gaseous phase of the smog was primarily in a mixture of hydrocarbons and other substituted compounds.

The mass spectrometer has been successfully used for the analysis of exhaust-gas samples, but a major problem has always been the obtaining of a representative, discrete sample. Tedious and time-consuming special techniques were required to avoid the possibility of sample condensation, absorption, adsorption, and even reaction.

Process-monitor mass spectrometers are proving of particular importance in this study because they were designed to provide continuous on-the-line monitoring from a small, compact, mobile instrument. The continuous sample-inlet system eliminates the discrepancies which may result from use of sample containers.

In actual tests, the sample was taken from a point on the exhaust manifold approximately one foot downstream from the nearest exhaust port. A short, ¼-inch metal line delivered the sample directly to the instrument. The investigations have been enlightening because the results showed not only how the automobile is a source of smog, but also because they provided a means of studying engine efficiency.

One of the most intriguing uses for the "process monitor" type has been found in oil wildcatting. It is being used in finding if a well being drilled would become a producer. The pioneering use of the method has been made by Hycalog, Inc., of Shreveport, Louisiana, a custom well-logging firm.

Oil is always accompanied by some gas. As a gas/oil formation is approached, some of the hydrocarbons will be dissolved or entrapped in the drilling mud and carried to the surface. This makes it possible to learn when a hydrocarbon-bearing formation is being drilled. A hot-wire gas analyzer is used to measure thermal conductivity which is proportional to the hydrocarbon content. A continuous sample of the drilling mud is degassed and the gas introduced into the analyzer.

When Hycalog engineers learned that under ideal conditions the Process Monitor Mass Spectrometer is 20 times as sensitive as the hot-wire apparatus in measuring the dissolved hydrocarbons in the mud and cuttings, they mounted one in a trailer laboratory and tested it in the oil fields. It has since become a standard instrument with

the firm and news of this new aid to wildcatters' "luck" is spreading.

The process monitor type is being used in the "in situ" secondary recovery of petroleum.

The in situ process is an underground combustion process for the secondary recovery of crude oil from spent wells. The combustion is maintained by injecting air at various points in the field between wells. This resultant increased temperature and pressure reduces the viscosity of the oil, permitting recovery.

At one installation the mass spectrometer is used to monitor continuously nine wells for the gases produced in the combustion zone so that proper air injection may be maintained. The instrument has a nine stream sampling manifold and a gas programmer. It is controlled automatically to cycle through any of the nine streams and record up to six gases present in the mixtures.

Monitors Coal-To-Oil Conversion

On the banks of the Vaal River in South Africa, a Consolidated analytical mass spectrometer monitors the making of gasoline and oil from coal in the world's first large-scale coal-to-oil plant. The \$112-million plant, owned by South African Coal, Oil, & Gas Corporation (SASOL), is located 50 miles north of Johannesburg.

It produces gasoline from coal at a rate of 55 million gallons a year by gasification and conversion, using both American and German versions of the Fischer-Tropsch reaction technique.

The analytical mass spectrometer, operating round the clock, plays an important role in process control and product testing. In the course of one typical month over 950 analyses are made on the mass spectrometer. It analyzes samples of gas and liquid mixtures, detects and solves special plant problems, and generally serves as the most important tool for quality control in the production of petroleum products.

A mass spectrometer has been utilized in perfecting the Wulff Process for the production of acetylene. This method uses natural gas, ethane, propane, butane, or any LPG mixture as feed stock to yield a relatively low-cost, but high-purity product.

An analytical type mass spectrometer has played an important role in carrying out fundamental investigations of the Fischer-Tropsch and coal-hydrogenation processes for getting synthetic liquid fuels at the U.S. Bureau of Mines Laboratory at Bruceton, Pa. Application of the instrument to the coal hydrogenation process involves routine analysis of the off gases which consist of high concentrations of hydrogen plus small amounts of hydrocarbon gases, saturates, naphthenes, and aromatics.

The versatile instrument has been found useful at the Institute of Gas Technology in Chicago for making accurate, rapid gas analyses of complex gas mixtures. It is being used for more than merely routine gas analysis. Determination of the individual constituents of gas formerly reported as "illuminants", measurement of nitrogen directly rather than by difference, the detection and measurement of isotopic tracers, and the identification of reaction intermediates which exist only momentarily, are some of the research applications.

Instrument Now In Atomic Energy

Two types of continuous-monitoring mass spectrometers, a uranium isotope recording instrument and a helium-deuterium resolving mass spectrometer, are in use in atomic energy plants. The first instrument is designed to resolve the isotopes of uranium in the form of uranium hexafluoride gas with extremely high precision. The sampling system is designed to cycle continuously through multiple streams, introducing first one gas and then another to compare their isotopic abundances.

The second instrument is of the cycloidal-focussing type. It samples continuously a gas stream consisting of eighteen gases from hydrogen through carbon dioxide. Resolution of one part in 190 was required and radiation

was a problem. The eighteen component gases are programmed to record the specific peaks of interest and identify them on the chart with a marginal printer.

An analytical mass spectrometer, in addition to being the major analysis instrument, has also solved a major butadiene problem at the Polymer Corporation at Sarnia, Canada. This Canadian plant is the world's only completely integrated synthetic rubber plant, making both monomers and polymers.

At this plant butylenes are dehydrogenated to butadiene. The butadiene produced is extracted continuously from the product in a unit using cuprous ammonium acetate as the solvent.

Coincident with the use of a new calcium-nickel-phosphate catalyst in the dehydrogenation unit, abnormal operation of the butadiene extraction section was observed. To study the cause of this bottleneck in butadiene extraction, samples of the various plant streams were taken and rapidly scanned by the mass spectrometer for extraneous materials.

Analyses revealed that the new catalyst was producing small quantities of water-soluble carbonyls as side reactions in the dehydrogenation unit. The carbonyls were contaminating the butadiene-extraction-unit solvent and seriously limiting its efficiency to absorb the butadiene. The dispatch with which the mass-spectrometer method defined the problem made it possible to place a water scrubber on the dehydrogenation-unit product within 24 hours. As a result the plant operating problem was rectified without serious losses in production.

Medical Research Tool

The most dramatic use of the mass spectrometer is in biological and medical research. Both the process monitor type and a special "isotope-ratio" type of mass spectrometer are being used by medical schools, hospitals and research institutions.

Development of the isotope-ratio instrument and the

availability of both radioactive or enriched stable isotopic materials put new methods at the disposal of researchers in biochemical and physiological fields. Cell growth and metabolic processes could not be followed prior to the availability of isotopes.

Researchers at the University of Wisconsin, for example, have been using an isotope — ratio instrument since 1950 in the study of the mechanism of biological nitrogen fixation. At the Veterans Administration Medical Center in Los Angeles, a mass spectrometer has been used to assist in water-balance studies and research on human water-metabolism.

An interesting application of the mass spectrometer to the study of blood gas equilibria during anaesthesia has been made by two researchers at the Mayo Foundation, Rochester, Minnesota.

Because of the great specificity of mass spectrometry in gas analysis, Mayo medical scientists found it possible to develop simple techniques for the analysis of anaesthetic and other gases in blood, notably carbon dioxide and oxygen.

Much research remains to be done to exploit the full potential of the instrument. It has tremendous possibilities in medical and biological research. Similarly, petroleum and chemical engineers feel that there are many things yet to be accomplished with it, particularly in its growing use as a process and monitoring control instrument. Direct process monitoring with the mass spectrometer is a reality today.

The mass spectrometer is one of the new tools of science and industry which is drastically cutting the time-lag between the scientists' concepts and popular utilization. Every new discovery made with it opens new areas for further exploration.

Thus, both as an instrument for revealing new information on the world around us and as a tool for every-day industrial production and control, the mass spectrometer is a major implement in our scientific age.

Low Cost Leak Detector Has Many Advantages



● Photo shows compactness and portability of the leak detector.

A leak detector, which detects and locates a leak so small that it will admit less than two cubic inches of gas per year, is the first halogen sensitive instrument to offer the sensitivity, stability and quick recovery time needed to assure convenient and reliable leak detection. Besides locating leaks in high vacuum, pressure and other process equipment, this unit is valuable as a quality control instrument in leak testing a wide variety of manufactured items ranging from water buckets and automobile radiators to hydraulic systems and hermetically sealed components and assemblies.

The new instrument is operated by connecting to the system or part under test which is then evacuated with a mechanical vacuum pump. When a pressure of 80 to 200 microns is attained, the outside of the part is blanketed with a tracer gas. Easily available, low cost Freon-12 is used. If a leak is indicated, further probing with a fine stream of gas locates the leak with pinpoint accuracy.

The instrument approaches the mass spectrometer leak detector in sensitivity, and is said to cost less than one-third as much and offers significant operating advantages. Among these are (1) simplicity, (2) compactness and portability, (3) elimination of pumps and liquid nitrogen cold traps, (4) immunity to burn-out caused by exposure to atmospheric pressure, and (5) rapid warm-up.

The device incorporates two design innovations to overcome the disadvantages of earlier halogen-sensitive leak detectors. The annoyance of the unpredictable slow shift in the "no-leak" signal has been eliminated by measuring the rate of change of the signal rather than its absolute value, so that the unit responds only to the quick change in current caused by the location of a leak. Recovery time from exposure to tracer gas has been sharply decreased by continuously flushing the sensing element with halogen-free air introduced into the element through a controlled leak.

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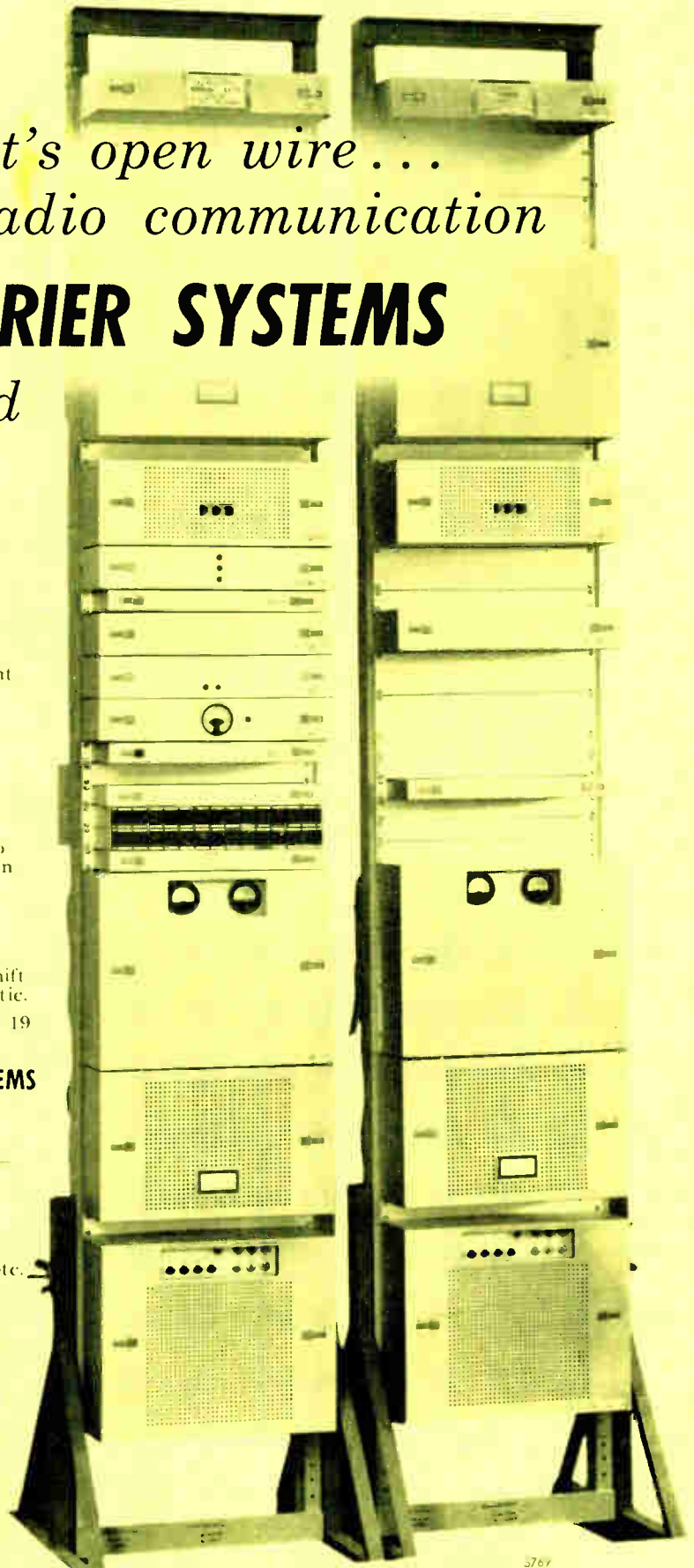
Type 5090B—Boosts signal-to-noise ratio. Saves circuits unsuitable due to cross-talk, etc.

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* All Lenkurt's famous 45-Class carrier systems are designed for direct interconnection at carrier frequencies. This eliminates expensive back-to-back arrangements, reduces distortion and simplifies maintenance. Lenkurt Carrier Systems can help solve your communications problems—economically.

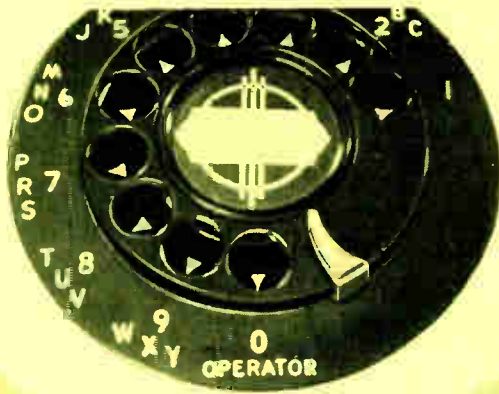
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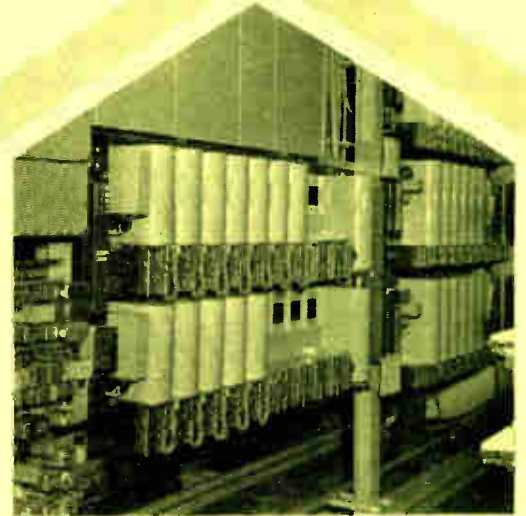
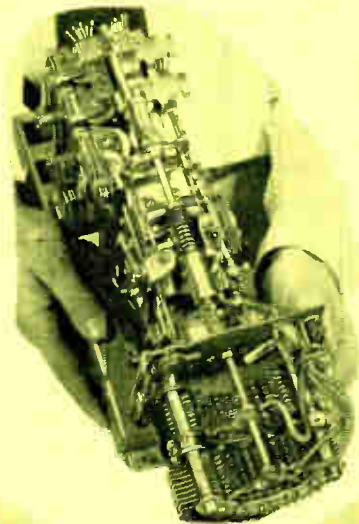
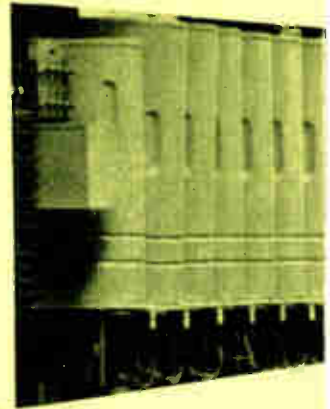
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Expansion is easy with Strowger. For moderate growth, just jack in an extra switch or two on the extra banks provided with your equipment. For larger growth, add a shelf, complete with pre-wired banks. And for heavy growth, add a frame with as many shelves of switches as you need. There's no capacity limit to Strowger expansion.

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Telephone requirements in the coming years may differ considerably from to-days. If your telephone equipment can't adapt it must be replaced. Strowger equipment *will* adapt easily and economically, as it has with rotary trunk selection, intertoll dialing, "2-5" numbering, automatic toll ticketing, expansion to director operation and many other developments.

Strowger equipment is built by the company with the longest experience in manufacturing dial switching equipment. Contact an Automatic Electric Engineer soon and discover what Strowger can mean if you're considering Dial.

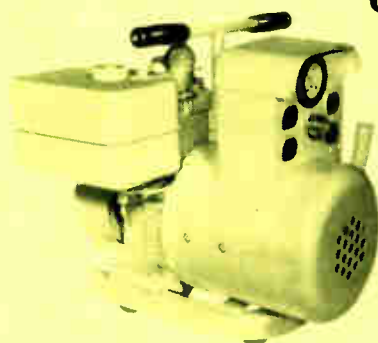
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Light and rugged--ideal for field, construction and maintenance use.



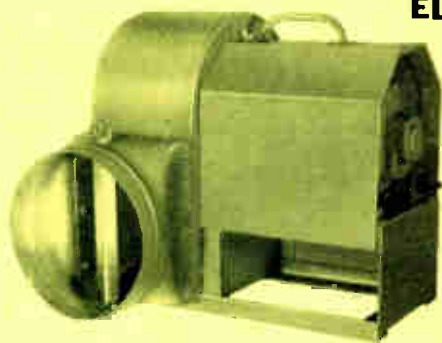
GENERATOR SETS. Lightweight, compact, portable sets for supplying prompt, on-the-job electric power. 115 volt AC or DC units as required. Ball bearing generator, powered by single cylinder, air cooled Briggs and Stratton engine complete with rope starter, radio shielding ignition and muffler exhaust. Control box contains twist-lock outlets, voltmeter, circuit breaker and pilot lamp. Special type silencer for use in residential and hospital areas available on request. 800 and 1200 watt models mounted on angle iron frames with rubber grip carrying handles (illustrated), 2300 watt model mounted on pipe frame with rubber feet, and 3000 watt model mounted on two wheel dolly with rubber tires. Special enclosures and dollies for all models are available on request. Weights range from 87 lbs. (for the 800 watt model) to 214 lbs. (3000 watts).



GASOLINE DRIVEN VENTILATING BLOWER

Circulates 800 cubic feet of fresh air per minute, clears manholes of foul air and gas—and keeps them clear. Engine is single cylinder, four cycle, air cooled type with rope starter and one-gallon fuel tank. Blower housing is made of 16 gauge aluminum with air intake protected by wire screen. Discharge tube is designed for use with eight inch diameter hose. Weighs 45 lbs.

Very useful attachment is the Spiratube flexible 8-inch diameter hose for delivering fresh air from the blower down to the manhole. Stretches to 15 feet, flattens tight for easy storage. Weight 15 lbs.



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Derives its power from an outside source, such as the 1200 watt DC or AC Generator Set. Driven by 1/4 H.P. weather-proof electric motor, either 115 volts DC or 115 volts, 60 cycles, A.C. Equipped with on-off switch and 18 foot rubber covered cord with twist-lock plug. Weighs 43 lbs.

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business briefs and trends

★ R. M. Robinson, vice-president and general manager, Electronic Equipment and Tube Department, Canadian General Electric Company Limited, speaking before a technical conference on electrical maintenance said that automation in our Canadian plants will certainly make us more competitive in world markets. By the same token, he said, if we are reluctant to automate our plants, we will be placed in a disadvantageous position competitively with other countries with whom we cannot hope to compete.

* * *

★ The American Atomic Energy Commission has recently issued a ruling stipulating that all nuclear power operators in the U.S.A. must take out \$150,000 insurance against reactor accidents for each 1,000 kw of thermal energy. The ruling also stipulates that minimum insurance per reactor will be \$250,000 and rates will be \$30.00 a year per thousand thermal kw with a minimum of \$100.00 per year.

* * *

★ Canada's first venture into transAtlantic telecommunication by an all-purpose cable was the main factor contributing to a much improved net profit of over \$400,000.00 which is revealed in the latest report of the Canadian Overseas Telecommunication Corporation. The Corporation's 7th Annual Report released recently by Hon. George H. Hees, Minister of Transport, discloses that the transAtlantic telephone cable has given such satisfactory service that, although the new facilities were in use for only six months during the year reported, the telephone volume for the full year increased by 300 per cent. The cable was placed into service in September, 1956, a joint Canada-U.K.-U.S.A. project.

* * *

★ Reports from Europe indicate that rocket research engineers have reached the thermal barrier but are having considerable difficulty in obtaining high-temperature components, all of which has led American manufacturers of these components to search for European outlets for their products.

* * *

★ Britain's world-wide lead in the development of atomic power for peaceful purposes has resulted in the sale of five nuclear power plants with a total value of \$151 million. Electronic instrumentation for these installations will reach about \$15.4 million. United Kingdom manufacturers of atomic power plants look forward to orders totalling between \$475 million and \$540 million by the end of 1958. Such installations would require between \$47 and \$54 million worth of electronic equipment.

* * *

★ Indications show that nearly \$800 million out of an estimated \$2,300 million will be cut from American Government defense contracts this year. These contracts were for U.S.A.F. communications equipment.

* * *

★ The cost of electronic trade shows in the United States is getting more expensive every year. Not only are manufacturers paying more for trade show space, but are being asked to exhibit their products more frequently. A recent survey on this issue shows that most manufacturers want only two trade shows a year. The survey also revealed that trade shows are becoming far too large.

* * *

★ According to a recent survey Sweden is looming large as a potential market for television sets. At the present time Sweden has 45,000 TV sets and this is expected to rise to 500,000 TV sets. With only six set manufacturers in Sweden to cope with this expected demand, German, Dutch and British interests are fighting for this potential market.

* * *

★ According to Hoffman Electronics Corporation officials, transistors will be employed in the 1959-1960 automobile ignition systems. At the present time the Hoffman Corporation is working in conjunction with one automobile firm who proposes to use a silicon rectifier in their premium-priced cars.

business briefs and trends

★ Connectors and hermetic seals, which in the past have been dependent almost 100 per cent on military business, will soon break into the television field. Mr. Allan A. Segal, vice-president of Hermetic Seal Corporation, predicts that within the space of a year TV tuner controls will turn to the use of quartz crystals for fine selection. According to Mr. Segal, this development in tuners may well permit split channels for the television industry.

* * *

★ Inventory of television receivers in the hands of manufacturers and distributors at July 31, 1957, was 27.5 per cent below levels at the same date last year, says a statement from Radio-Electronics-Television Manufacturers Association of Canada. Inventories of the popular 21" models are down by 36 per cent. In addition dealer inventories, according to a recent survey, are relatively low. Recent reports of high stocks of television sets are therefore incorrect. Distributor sales to dealers for the period January 1, 1957 to July 31, 1957 were 194,155 units. This compares with 252,227 unit sales for the corresponding period in 1956 — a reduction of 23 per cent.

* * *

★ Dr. John T. Henderson of Ottawa, president of the Institute of Radio Engineers, has forecast a bright future for the Canadian electronics industry. According to Dr. Henderson the problem confronting the Canadian electronics industry is keeping up to other nations with greater capacities in the electronics field and at the same time developing new electronic equipment.

* * *

★ R. M. Robinson, vice-president and general manager of the electronic equipment & tube department, Canadian General Electric Co. Ltd., states that automation in the future will create more — not fewer — jobs. Looking ahead ten years Mr. Robinson sees the problem of planning for an economy based on a Canadian population of almost 21 million people and, despite this population growth, our work force will increase only about 25 per cent.

* * *

★ Hon. C. C. Williams, Minister of Labor for Saskatchewan, has officially designated Radio and Television Electronics as a four-year trade course in that province.

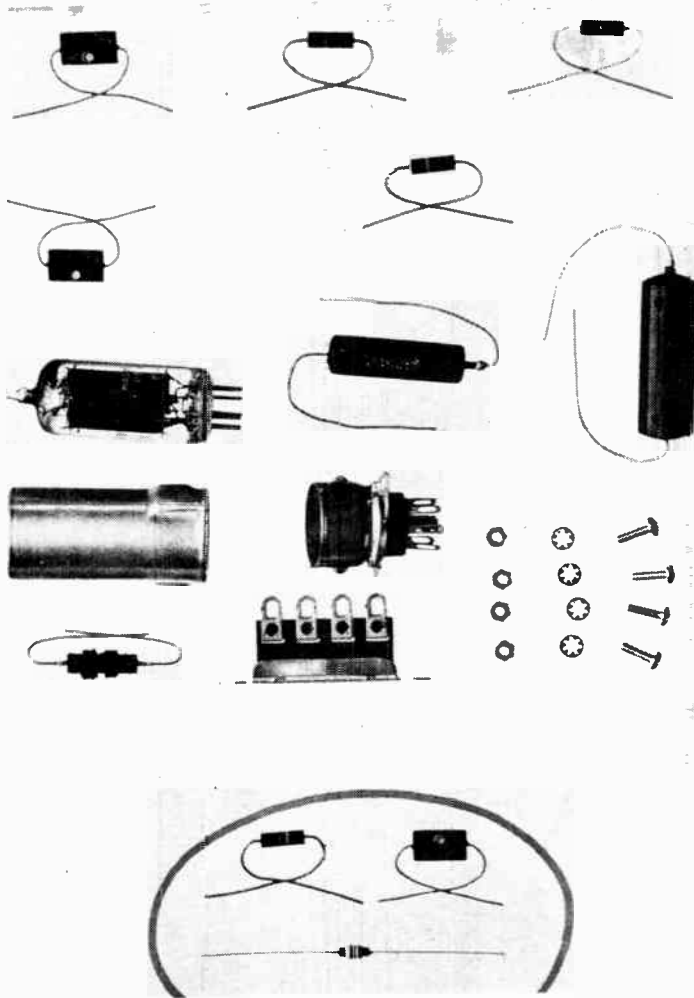
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★ Domestic production by companies in Canada's electrical manufacturing industry was \$1,215,800,000 for 1956, an increase of 11 per cent over 1955, Thomas J. Bell, newly-elected president of the Canadian Electrical Manufacturers Association, stated at the group's 13th annual meeting held recently. "This is the second consecutive year that the electrical manufacturing industry has passed the billion dollar mark in production," Mr. Bell said, "and barring some unforeseen problem, the industry should maintain its strong economic position in the years to come . . ."

* * *

★ Companies in Canada's billion dollar electrical manufacturing industry realized an average profit on their sales dollar of 3.3 per cent for 1956 according to B. Napier Simpson, general manager, Canadian Electrical Manufacturers Association. In a statement to industry leaders who attended CEMA's annual meeting, Mr. Simpson stated that "while the 3.3 per cent was a gratifying increase in relation to the industry's profit margin over the past two years, it is still rated among the lowest profit margins in the history of the industry. "This compares with an overall average profit of 5.8 per cent for all manufacturing industry in Canada during 1956, according to the survey made by the Canadian Manufacturers Association," he emphasized.

* * *



A New Dimension For Design Engineers

Varicap Capacitor, No Bigger Than Teardrop, Called Boon To FM, TV, Missiles And Miniaturized Systems

● Tiny new Varicap unit, circled in accompanying photograph, with two companion parts does the work of 24 components and which scientists say is major step in never-ending quest for miniaturization of electrical equipment.

A TINY new electronic component, no bigger than a teardrop, which can automatically observe and maintain color fidelity in a color television picture and perform scores of other vital civilian and military functions, has been developed by the American firm, Pacific Semiconductors, Inc.

Physicists believe the component, including descendants under development, eventually will widely displace the mechanical tuning capacitor and the reactance tube — a vacuum tube which acts as a variable capacitor.

The new variable capacitor is expected to have wide application in tuning and modulation of frequencies in FM transmitters and receivers, telemetering, teletype, missile control systems and miniaturized communications systems.

The new component, called the Varicap, is another member of the solid-state device family, which includes transistors, semiconductor diodes and rectifiers. Its capacitance can be varied by changing an applied bias voltage.

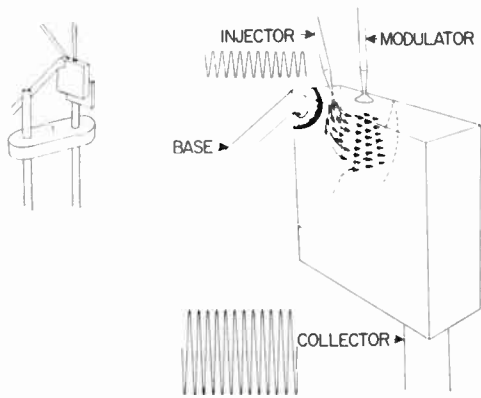
The component will provide the circuit engineer with a new design dimension. A simplified approach to varying frequency by changing bias voltages within a circuit system has many obvious applications. But the ultimate usefulness of this new component will be determined by the ingenuity and imagination of the circuit designers who seek to exploit its capability, according to the designers. Company officials point out that the semiconductor variable capacitor is not a new invention. The phenomenon of changing capacitance across a semiconductor junction with changing voltage has long been known to solid state physicists. Nor does the company

claim it recognized first the circuit usefulness of a semiconductor capacitor; development work in this field has been done by other groups, including RCA and Bell Telephone Laboratories. The specific accomplishment of PSI has been the development and production of devices meeting the special characteristics necessary for effective operation as a voltage variable capacitor.

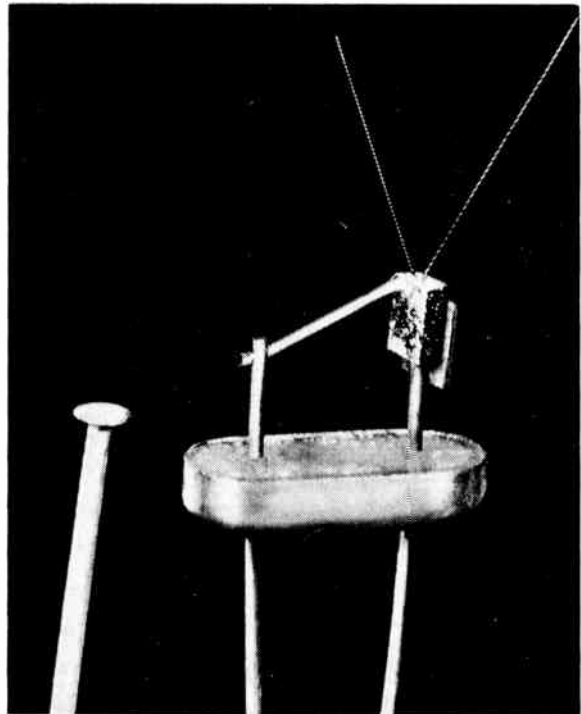
These advantages include great size and weight reduction and significant improvement in service reliability. Component and installation costs can be substantially reduced. In one application, the Varicap, a resistor, and a mica capacitor perform the same function as twenty-four displaced parts.

The new component has no filament to heat and wear out as does the reactance tube. It requires less maintenance and operates faster and more reliably than the mechanical tuning capacitor. And it is uniquely advantageous in that its capacitances do not change with temperature, whereas other variable capacitors are quite sensitive.

Usefulness of the new component has been demonstrated by operation of a transistorized FM transmitter, in which the jobs of tuning and voice modulation of transmitter frequency are performed by the Varicap. An FM receiver, in which the automatic frequency control function is performed by a Varicap, instead of the usual vacuum tube circuit, has also been successfully operated. A major radio manufacturer has operated a standard broadcast receiver in which the tuning capacitor was replaced with Varicaps.



● How it works—A voltage is applied between base and collector in such a direction as to produce a high electric field and virtually no current. A voltage, applied to the injector, causes electrons to enter the region of high field. The electrons flow extremely rapidly to the collector contact. This current (flow of electrons) is modulated by the application of a signal to the modulator as shown. Since the modulator draws only a negligible current while causing the current between injector and collector to fluctuate, amplification results.



● Experimental assembly of the "spacistor," Raytheon's new startling scientific breakthrough with vast potential in the electronics field, is shown alongside an ordinary pin. It is considered a major step forward in the art of amplifying or boosting electrical energy — vital to all electronic transmission.

The Spacistor You've Been Hearing About

INVENTION of the "spacistor," a startling scientific breakthrough with vast potential in the electronics field, was disclosed recently by a team of Raytheon physicists.

Considered a major step forward in the art of amplifying or boosting electrical energy — vital to all electronic transmission — the spacistor promises to combine many of the best properties of the vacuum tube and the transistor.

The spacistor, which uses a wholly new principle, is a semiconductor device as tiny as a transistor and operates electrically like a vacuum tube.

Still in the research stage, the new device promises two major advantages over today's best transistors. Research scientists predict the spacistor will amplify at frequencies up to 10,000 megacycles, as much as 50 times higher than transistors. Also, because spacistors can be made from materials unsuited for transistors, they are expected to operate at temperatures as high as 500 degrees Centigrade, or more than double today's germanium or silicon transistors.

Disclosure of the spacistor was made by Dr. Hermann Statz of the Raytheon research team in a paper presented at the semiconductor session of the Institute of Radio Engineers and the American Institute of Electrical Engineers.

The new concept will allow engineers to design new electronic equipment and greatly improve present ones. It will also free applications engineers from some natural limitations of the transistor.

Higher Operating Temperature

Reliability at higher temperatures is a major problem in rocket and guided missile applications. Today's transistors, made of germanium and silicon, will not operate satisfactorily above 200°C.

High temperature spacistors, on the other hand, can be made from materials unsuited for transistors and are expected to operate reliably at 500°C.

Invented after two years' intensive research, the spacistor, Dr. Statz cautioned, may take three to five years more research and development before it becomes commercially available.

Among present electronic equipment expected to benefit materially from the spacistor are guided missiles and rockets, radars and communications equipment and TV sets.

The spacistor retains many transistor advantages. It operates on a fraction of vacuum tube power, having no filament to heat or burn out. Also, it can be tightly packaged in minute assemblies.

The spacistor's predicted higher frequency operation may lead to devices better suited for airborne or portable applications. Many communications systems operate at frequencies between 1000 and 10,000 mcs. If spacistors can replace vacuum tubes in these equipments, overall size and power requirements should shrink.

A comparison of how the charged particles in spacistors and transistors work can be made by dropping a single ink drop into two glasses — one empty, the other filled with water.

The drop rapidly reaches the bottom of the empty glass — similar to the rapid action of the spacistor. In the filled glass, the drop slowly diffuses until it finally reaches the bottom — similar to the relatively slow response of a transistor.

Raytheon's pioneering work in semiconductors enabled it to market the first commercial junction transistors in 1952. More than 20,000,000 of this company's transistors and other semiconductor devices are now in use.

Newsletter

Canadian Radio Technical Planning Board

The CRTPB Newsletter is a monthly news department about the Canadian Radio Technical Planning Board, a non-profit organization established over twelve years ago to act as an advisory body, in the public interest, between the Department of Transport and the users of the radio spectrum in Canada.

Membership of the CRTPB consists of eighteen sponsors and, in accordance with the constitution, these are all non-profit organizations who represent the major users of radio and television communications such as the broadcasters, railways, trucking and marine transportation interests, public utilities, telephone communications and professional engineering groups.

Over a hundred scientists and engineers serve on various panels and committees comprising the CRTPB, and this Newsletter will bring to readers news about the CRTPB work and technical activities on which they are engaged.

Restricted Common Carrier Mobile Radio Services

The Department of Transport has informed licensees and others interested in Restricted Common Carrier Mobile Radio Services that licenses have been granted for this service in metropolitan areas and that applications had been received to establish RCCRS facilities in areas in addition to those already covered. The DOT is ready to accept further applications to establish Restricted Common Carrier Radio Services in areas not already served.

Specification DOT 105 In Draft Form

The draft of DOT Radio Standards Specification 105 as prepared by the CRTPB Committee has been sent to all contributing sponsors of the CRTPB for approval. DOT 105 is a specification for FM or PM transmitters and receivers in the land mobile service in the range 450 to 470 MC/S. It is emphasized that the specification is still only in draft form.

Specification DOT 124 (Provisional) For Comments

The provisional issue of Specification DOT 124 for airborne radio receiving and direction finding equipment operating in the 200-415 KC/S band has been circulated, at the request of the DOT, to all contributing sponsors of CRTPB for comments. The intent of the specification is to establish minimum standards for the performance and approval of airborne radio receiving and direction finding equipment for aircraft of Canadian registry. The Canadian Radio Technical Planning Board has an Aeronautical Committee which deals with relevant specifications and other aviation/radio matters.

Spectrum Management

A comprehensive paper entitled "A Canadian Point of View On Radio Frequency Spectrum Management" was presented by C. M. Brant, Controller, Radio Regulations Division, D.O.T., before the convention of the American Institute of Electrical Engineers in Montreal in June.

The CRTPB considers that this is an important and enlightening document dealing with the whole philosophy of the spectrum and that, therefore, all CRTPB sponsors will be interested. As a service to the sponsors the Board has arranged to send copies of this paper to all representatives, alternates and all committee chairmen.

Executive Committee Meets

The CRTPB Executive Committee met at the Board Offices in Toronto on October 3 to consider applications for memberships in the CRTPB, and to discuss committee reports, budget, plans for the Annual Meeting, the preparation of an organizational, procedure and membership book, and other relevant matters.

13th Annual Meeting

The 13th Annual Meeting of the CRTPB will be held in Salon "D", Chateau Laurier Hotel, Ottawa, on Tuesday, December 10th, 1957 commencing at 9:30 a.m.

United States to Study Radio Spectrum

The Board of Directors of the U.S. Electronic Industries Association (formerly RETMA of U.S.) has proposed that a co-operative long range study of the radio spectrum be made, the study to cover both military and civilian uses of the spectrum.

The proposed Government-industry review of the crowded radio spectrum was initiated by the Broadcast and Closed-Circuit Television Equipment Section of the EIA Technical Products Division and endorsed by the executive committees of the Military Products Division, the Consumer Products Division, and the Technical Products Division. The Board of Directors have decided to refer the matter to a special committee for implementation.

During discussions, it was emphasized that the radio spectrum was one of the most valuable national resources and that its full value could be realized only by means of frequency allocations based on comprehensive technical information. It was pointed out that the study, to have maximum value, must include a review of government in addition to non-Government frequency allocations.

The last time a comprehensive study of the frequency allocations was conducted in the United States was toward the end of World War II.

Two Programs On One TV Channel?

It is reported that a company in the United States has developed a new television broadcasting technique which might provide an additional program on each of the VHF television channels now in use. The FCC has been approached about the system, it is stated.

It is claimed that this doubling of channel facilities would be accomplished by what is described as a contra-phase multiplexing method which involves the transmission of two different pictures in the same bandwidth.

Special circuits would be necessary for television receivers to allow them to receive the two programs on one channel and to eliminate the unwanted program. By a system of coding and de-coding, the method could be adopted for pay-TV programming. Special attachment for this purpose could be put on existing receivers.

The use of this new system for the military and for fire and police department is envisaged.

Canadian Radio Technical Planning Board
200 St. Clair Avenue West, Toronto 7, Ontario

R. A. HACKBUSCH, President; F. H. R. POUNSETT, Vice-President; R. C. POULTER, General Co-ordinator and Director of Public Relations; F. W. RADCLIFFE, Secretary-Treasurer

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 105. Just mark the products you are interested in on the coupon on Page 105 and the information will be in your hands within a few days.

● Vibration Indicator

Item 1698

Type 1414 Vibration Indicator is a very compact instrument for vibration investigations in machines and structures. The instrument is designed for direct measurement of the three important characteristics of vibration, namely displacement, velocity and acceleration. The small dimensions and low weight make this unit an ideal tool for vibration checks by maintenance and installation engineers. Unwanted or excessive vibration is quickly located so that the necessary corrective action can be taken before serious damage occurs.



Six full scale ranges are provided for each function as follows: displacement 0-0.001 to 0-0.03 in. zero to peak; velocity 0-0.03 to 0-10 in/sec peak; acceleration 0-10 to 0-3000 in/sec² peak. Probe type inertia operated crystal pickup is supplied with the instrument. The maximum acceleration to which the pickup can be subjected is 10 g peak. Dimensions of the instrument are 8 $\frac{3}{4}$ " x 3 $\frac{3}{8}$ " x 2 $\frac{7}{8}$ "; weight is 2 $\frac{1}{2}$ lbs.; weight of the pickup 16 oz.

Dawe Instruments Ltd., 1654 Bank Street, Ottawa 1, Ontario.

● Digital Converter

Item 1699

High speed conversion of shaft rotations into discrete decimal digits for punch or printer systems is accomplished by a digital converter engineered by Taller & Cooper, Inc., Brooklyn, New York.

The digital converter effects significant economies in telemetering, data reduction and logging, and inventory control operations. Equipped with printed circuit commutators, the Taller & Cooper digital converter operates from any shafted mechanism, such as a self-balancing potentiometer or servosystem used to convert electrical data into shaft positions.

The converter accepts strain gage, thermocouple, photometer or bolometer outputs; voltage, power, speed or any other data that can be directly or indirectly reduced to shaft positions.

Operating torque is less than $\frac{1}{2}$ inch ounce, with shaft speeds up to 100 digits per revolution available. Commutator wipers with bifurcated contacts guarantee virtual 100 per cent positive contact.

A new data sheet is available from Taller & Cooper, Inc., 75 Front Street, Brooklyn 1, New York, U.S.A.

● Toroidal Winding And Taping Machines

Item 1700

A new series of automatic dual-purpose toroidal winding and taping machines has been introduced by Universal Manufacturing Co., of Hillside, New Jersey. These Universal "TOROYD" Series UT machines feature simultaneous, separate or sequential 360° continuous winding of wire and/or tape in one operation, and can be operated by one unskilled operator.

The result of several years of painstaking development by Universal engineers and industrial designers, these machines are designed for quantity and quality production. Series UT machines are ideal for medium, large and super-size toroidal coils, where precision winding and taping are required.

They are equipped with core-turning table, automatic forward and reverse feed, stepless variable pitch control, calibrated adjustable twin tension brakes, quick-locking shuttle-gear and magazine, automatic predetermining counter, tape footage indicator and automatic cut-off. An adjustable coil clamp fixture, for sector winding up to 270°, is available as optional equipment.

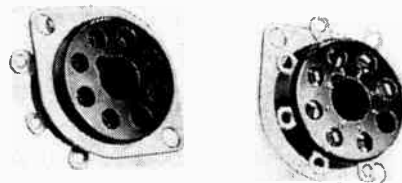
The new "Toroyd" Series consists of two models: UT-14, with a wire diameter range of No. 20 - No. 7, and UT-20, having a range of No. 14 - No. 5, both accommodating most commercial $\frac{3}{4}$ " or 1" tapes. Now in production, "Toroyd" Series UT combination winding and taping machines are especially suited for faster and more economical production of toroidal coils.

Complete specifications may be obtained from Universal Mfg. Co., Inc., 410 Hillside Avenue, Hillside, New Jersey, U.S.A.

● Klystron Tube Socket

Item 1701

Assembly time can be reduced and rework eliminated by the use of a new molded chassis mounted octal socket for the JAN-CRP-2K45 thermally tuned klystron tube. Self-aligning gold plated contacts are flexibly mounted in slightly oversize orifices of a glass-filled diallyl phthalate socket body. The new socket provides accurate alignment and probe penetration in the wave guide mount which avoids any possibility of mismatch.



Design of the new Globe klystron tube socket also eliminates both the need for insulated bushings and any contact shorting to the wave guide tube mount. Contact tabs are easily accessible for fast accurate circuit assembly.

For additional information write Globe Electrical Manufacturing Co., 1729 West 134th Street, Gardena, California, U.S.A.

World Radio History

● Creep Testing Equipment

Item 1702

Instron Engineering Corp. of Quincy, Mass., has announced the development of new high temperature creep testing equipment for the metallurgical field.

The new equipment makes possible highly accurate creep measurements at temperatures up to 2200°F, in either a vacuum or in artificial atmosphere. Load capacity is at least 2000 pounds at 2200°F. Specimens up to 0.357 inch diameter can be accommodated, and modifications can be made to accept subminiature specimens and sheet materials.

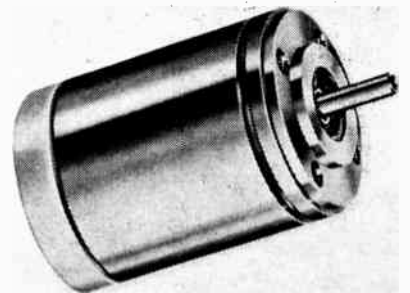
The complete testing unit includes a vacuum-tight capsule with pull-rods and gaging apparatus, a precision dead weight lever loading system, furnace and recorder-controller panel. Vacuum pumping and gaging apparatus can be supplied if desired.

Instron Engineering Corporation, 440 Hancock St., Quincy, Mass., U.S.A.

● Beckman Servomotor

Item 1703

Helipot Corporation, of Newport Beach, California, a division of Beckman Instruments, Inc., announces the addition of the Model 11 SM 460 to its growing line of Beckman rotating components. The size 11, 115-volt, 400-cycle, high torque-to-inertia servomotor is rated for 200°C unit temperature, continuous duty operation at stall.



Rotor inertia of 1.07 gm. cm.² and the high acceleration at stall of 41,500 radians/sec.² insure fast, precise response to error signals.

Power requirements at stall are 4.0 watts per phase. Custom windings permitting the use of transistorized amplifiers, and various impedances, are available on request. Fixed-windings can be wound for operation from any standard carrier voltage supply. All windings are completely encapsulated.

Precision manufacturing techniques insure the environmental integrity of the servo-mounting unit, which is 1.632" long by 1" in diameter and weighs 4 oz. The stainless steel housing and shaft are both passivated. Stainless steel ball bearings are custom fitted to the shaft and housing . . . shaft run-out is held to .001" T.I.R. Stator and rotor are high-temperature assemblies using corrosion resistant laminations . . . rotor is precision aligned for minimum slot effect.

For further information contact Canadian representative: R-O-R Associates, Ltd., 1470 Don Mills Rd., Don Mills, Ontario.

New Products

● "Megger" Bond Tester

Item 1704

There are two types of "Megger" Bond Tester, one for aircraft use, and the other for industrial use. The former is designed primarily to test the bonding of the airframe and the surface "skin", and has a finely divided scale covering 0-0.1 ohm. However, the .0025 point is very near the zero mark, and for this specific application, the industrial instrument is recommended. This unit, designed to test cable joints, ground and lightning conductors, etc., is scaled 0-100 milliohms, but the low end of the scale is wide-spaced, so that the .0025 point is easily read. Either instrument can be supplied with a nickel-iron battery, or modified to accept dry cells.

The equipment consists of a direct-reading ohmmeter and the battery contained in a hardwood box which may be strapped to the body for firm support. The moving system of the ohmmeter is the highly efficient and rugged cross-coil "true" ohmmeter customarily built onto other Ever-shed "Megger" Testers. One coil is the control which is in series with the resistance under test. The other is the deflecting coil, which is in parallel with that resistance. The deflection depends on the ratio of the current in the two coils, which is proportional to the resistance being tested. This type of movement is independent of any variation in the battery voltage.

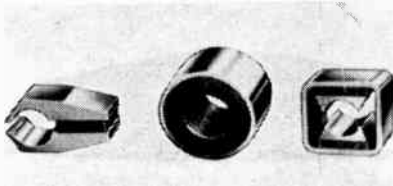
The Megger Bond Tester is an easy-to-use ohmmeter for those hard-to-measure low resistances.

For further information contact R. H. Nichols Limited, 2781 Dufferin St., Toronto, Ontario, Canada.

● Ceramic Permanent Magnets

Item 1705

Ceramic permanent magnets can now be used in place of electromagnets for DC motor fields through the recent introduction of Index V ceramic permanent magnets by The Indiana Steel Products Co. of Valparaiso, Indiana.



James R. Ireland, director of engineering and research at Indiana Steel, points out that because the powerful new Index magnets will not become demagnetized when opposed by powerful armature fields, it is now practical to use them for DC motors of all sizes — from tiny fractional horsepower motors to large multiple horsepower machines of 10 horsepower and more. "From a manufacturing viewpoint," Mr. Ireland said, "this is good news. It means that ceramic magnets can save cost. The larger the motor, the more cost is saved, because the percentage of total cost represented by these magnetic materials decreases with size of the magnets."

Other advantages accruing from the use of permanent magnets in place of the copper wound electromagnets for DC motor fields are: higher efficiency, cooler operation, simplified motor design and lower fabricating cost.

For further particulars write to the Canadian representative: The Indiana Steel Products Co. of Canada Ltd., Kitchener, Ontario.

● Ruggedized Plug-Ins

Item 1706

A complete series of Ruggedized Plug-Ins for designing and building automation

systems is available from Engineered Electronics Company, of Santa Ana, California.

This complete line of "rugged systems building blocks" speeds the design of timing systems, automatic control systems, data handling, computing and automation systems.

Representative units from the Ruggedized Series have been tested by a qualified independent testing laboratory and found to readily meet the shock, vibration and temperature requirements of MIL-E-5272A.



With the IERC Tube Shield, they offer the following advantages:

1. Protection for tube from vibration and shock.
2. More effective dissipation of heat.
3. Longer tube life, with cooler and more efficient operation.
4. Greater electrical shielding.
5. New mechanical construction and design assures full protection to critical components against stress or tension.

All Ruggedized units are compatible with EECO Standard-Series hardware and EECO Systems Development Racks. Custom circuits are readily built in this Ruggedized Plug-In. The only packaging information needed is the circuit schematic with parts description.

Engineered Electronics Company, Santa Ana, California, U.S.A.

● Thickness-Density Gage

Item 1707

The Gammascan, developed by Nuclear Systems Division of The Budd Company, measures the thickness or density of such continuously produced materials as plate, and sheet metal, glass, thick sections of plastics, etc.

This new instrument utilizes a modified scintillation detection method which senses the radiation from a sealed self-contained gamma radiation source. The Gammascan continuously analyzes the thickness of the materials under inspection. An output signal is provided which can be used for control of servo-mechanisms to compensate for indicated variations. The Gammascan also provides a continuous written record of the thickness of the material as well as a meter indication.

A modified version of the Gammascan can be used as a quality control tool for the detection of small flaws in thick sections of heavy materials. For example, a flaw $\frac{1}{8}$ " in diameter has been easily detected in a 5" thick section of lead.

The unit has a time response in the millisecond range, is extremely sensitive and stable, and has been carefully engineered to operate under typical industrial conditions.

The Budd Company, 2450 Hunting Park Avenue, Philadelphia 32, Pa., U.S.A.

● "Little Joe" Sleeving Cutter

Item 1708

A 7,000 per hour production rate for cutting all types of insulation tubing is a standard with the new Motorized "Little Joe" Sleeving Cutter. This compact, bench-type tool also cuts fibre glass and silicon coated nylon as well as solder and No. 16 and smaller wire with equal speed and sharpness — in $\frac{1}{8}$ " to 2" lengths and diameters up to $\frac{1}{4}$ " O.D.

This Model 201 "Little Joe" does a razor-like cutting job. The tubing is fed automatically right from the reel through the machine where the cut pieces are ejected into any small receptacle or box. This efficient tool maintains an even, guaranteed high production speed without crushing or spoilage to the cut stock. It eliminates operator fatigue and also other expensive methods of sleeve cutting with an overall cost-saving that easily becomes an appreciated factor.

"Little Joe" is built for long life. All vital parts are made of case-hardened steel. The high speed steel knife can be removed easily for resharpening or replacement. Any desired cut length — $\frac{1}{8}$ " to 2" — can be maintained through a quick-set adjustment screw (at side of the machine) . . . Powered by a reliable 110 Volt, 1/50th h.p. Bodine motor operating at 115 r.p.m., and protected by 4 ag — 2 amp. slow blow fuse. Furnished complete with metal base and plug-in cord. Designed for bench mounting through two screws. Compact — occupies only 8" x 11" x 7" height. 17 lb. wt. packed for shipment.

New catalog page and full information can be obtained by addressing: Macdonald & Co., 1324 Ethel Street, Glendale 7, California, U.S.A.

● Scherr Micro Projector

Item 1709

A new concept of micro projector design has been introduced by the George Scherr Company in their new model Scherr Micro Projector which features a vertical principle of design offering these important advantages: (a) A horizontal stage onto which work of a flat nature is simply laid without aid of fixtures or holding devices. (b) A comfortably inclined screen on which the enlarged image is reproduced directly in front of the observer. (c) A choice of fixed standard magnifications that are changed simply by slipping different projection lenses into a vertical socket in which they rest by gravity. (d) When using the micrometer cross slide, both measuring motions are performed on the same plane, namely the horizontal and most natural one.

A rigid floor base makes this model a self-contained unit. The column slide is adjustable for wear by means of gibbs and will hold square indefinitely. A graduated adjustment will tilt the stage to a desired helix angle of a thread or rake angle of a form tool, etc. The 4" diameter stage opening and a 14" diameter round screen result into extra large capacity.

Custom-made precision coated lenses and achromatic condenser lenses are employed for different objectives 10 to 100X magnification. All lenses are set to the correct magnification at the factory. No readjustment or experimenting by the user is required.



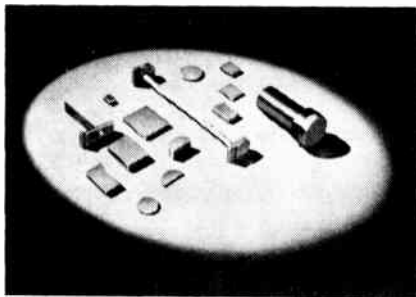
Fully illustrated folder with complete price information may be obtained from the George Scherr Company, 200 Lafayette Street, New York 12, New York, U.S.A.

New Products

● Additions To Graphite Gilsiloy Group

Item 1710

An expanded line of silver-graphite powdered-metal electrical contacts has been developed by Gibson Electric Company, Delmont, Pa., now celebrating 25 years of manufacture. Nine new materials have been added to the graphite Gilsiloy group, which now totals 15. Included are silver-graphite, silver-nickel-graphite, silver-tungsten-graphite, and copper-graphite powdered-metal compositions.



According to Gibson engineers, the newly-expanded graphite line will allow greater flexibility in selecting and adapting the correct contact material to each electrical product. Typical uses for graphite Gilsiloy include disconnect switches, light-duty air circuit breakers, rheostats, contact brushes, contactors.

Being non-metallic, graphite reduces the welding tendency of electrical contacts, improves the "surety of making contact" because it cannot tarnish or form surface oxides, and imparts self-lubricating properties. Graphite Gilsiloy is made from mixtures of metal powders and graphite powder. Because graphite tends to retard brazing, graphite Gilsiloy contacts are specially treated to provide a surface satisfactory for brazing with silver solder.

New materials in the graphite Gilsiloy line are these silver-graphites: C-6 for disconnect switches; C-2 for contactors and rheostats; C-1, C-500, C-250, C-125 for rheostats and contact brushes. Also new are NC-205 (silver-nickel-graphite) ideal for current-carrying hinged connections on circuit breakers and disconnect switches; CW-52 (silver-tungsten-graphite) for light-duty air circuit breakers and for rheostats; UC-7 (copper-graphite) for rheostats and contactors.

All graphite Gilsiloy are available solder-backed for brazing. Gibson supplies contacts alone, or assemblies. For further information, inquiries should be sent to Gibson Electric Company, Box 602, Delmont, Pa., U.S.A.

● Low-Cost Infrared Instruments

Item 1711

Until recently, use of infrared spectrophotometers for chemical analysis was generally restricted to large research groups or major company laboratories. Primary reason for this was the high cost and complexity of available infrared instruments. Now Beckman's Scientific Instruments Division has introduced low-cost infrared instruments designed for routine laboratory analyses by chemists and to help spectroscopists free their larger instruments for more complex work.

The IR-5 and the IR-6 are low-cost instruments for thousands of routine research and quality control applications where product purity, identification of unknowns and product development is involved. The IR-5 is a double-beam instrument; the IR-6 is a single-beam unit. Both are easily operated, fully automatic recording spectrophotometers, ideally suited for qualitative and quantitative analyses.

Already widely used by science and industry is the Beckman IR-4, an automatic recording instrument of the double-beam, double-monochromator type. This advanced analytical tool offers the exceptional resolution and measurement versatility required for complex molecular structure analyses and many other chemical assays.

These infrared spectrophotometers trace "fingerprints" of chemical compounds, enabling analysts to identify unknowns and to make quantitative measurements with extreme accuracy. Because the amount of infrared energy that each compound absorbs is as characteristic of that one compound as the human fingerprint is characteristic of an individual, infrared provides a degree of specificity not found in any other analytical technique.

For further information write Scientific Instruments Division, Beckman Instruments Inc., 2500 Fullerton Rd., Fullerton, Calif., U.S.A.

● Transistorized Sub-Carrier Oscillators

Item 1712

Pacific Division, Bendix Aviation Corporation, is now offering a new line of transistorized sub-carrier oscillators for application in FM/FM telemetering systems.

Two of the oscillator types (Models TOE-100 and TOE-101) are voltage controlled, with the Model TOE-100 employing silicon transistors for high temperature ranges, and Model TOE-101 utilizing germanium transistors for very low temperature applications. Both are available for operation at any of the standard sub-carrier frequencies, and in a choice of input ranges.



Proven advantages are vastly improved stability, linearity and resistance to severe environmental conditions.

The third type, Model TOR-100, is a silicon transistor resistance bridge sub-carrier oscillator with a configuration identical to that of the silicon transistor voltage controlled unit (Model TOE-100). It is used for the measurement of stresses where strain gage bridges are employed. TOR-100 is also used with strain gage transducers and for temperature measurements with resistance bridges as the temperature sensing device. Bridge excitation is supplied by the sub-carrier oscillator.

The silicon oscillator units provide performance within specifications at temperatures to 85°C., while the germanium units operate over the range -40° to +60°C. All units will withstand 25g vibration to 2000 cycles per second. Total power requirements for any of the three basic types is less than 0.35 watt.

Bendix-Pacific reports that characteristics of these transistorized sub-carrier oscillators provide a significant advancement in the state of the art of telemetry from the standpoint of operational environment, accuracy and efficiency.

For further information write Pacific Division, Bendix Aviation Corp., 11600 Sherman Way, North Hollywood, California, U.S.A.

● Neutron Detector Tubes

Item 1713

Two new types of neutron detector tubes for use in neutron shielding studies are announced by The Victoreen Instrument Company.

The manufacturer states that the new neutron detectors are used extensively at the Oak Ridge National Laboratory Tower Shielding Facility and Bulk Shielding Facility for the determination of both fast and slow neutron flux.

The new neutron detector tubes are designated as the Victoreen Model VXN-1 for detecting thermal neutrons and built to ORNL Specification Q-1503, and Victoreen Model VXN-2 for detecting fast neutrons and built to ORNL Specification Q-1381.

Model VXN-1 is an enriched boron trifluoride proportional counter with nominal operating voltage between 1650-1750 volts. This detector has a long flat plateau of over 250 volts with an average slope of 2 per cent per 100 volts. Available in diameters of 1, 2, and 2½" and lengths up to 12", the gas filling is 96 per cent enriched B¹⁰F. The anode is 1 mil tungsten wire and the cathode is of polished brass. The tube has a life of 10⁶ counts and upon depletion can be returned to the factory for refilling at a small nominal charge.

Model VXN-2 is a proton recoil type counter. The internal design consists of three polyethylene chambers with an ethylene gas filling. The anode is 1 mil tungsten wire and the cathode is of polished brass. Operating voltage is between 1450-1550 volts. Under normal operating conditions, the life of the tube is better than one year. The unit is sealed but can be refilled upon depletion of the gas.

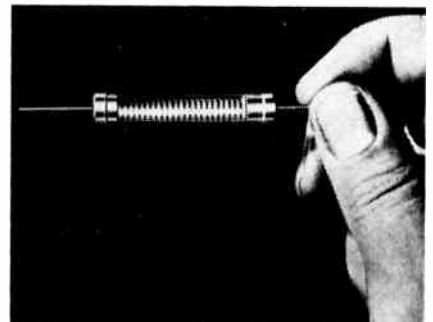
Full details on new Victoreen Model VXN-1 and Model VXN-2 neutron counter tubes are available on request to The Victoreen Instrument Company, 5806 Hough Avenue, Cleveland 3, Ohio, U.S.A.

● Metal Film Resistors

Item 1714

The Daven Co., Livingston, N.J., announces the availability of the new Davohm Series 850 hermetically sealed metal film resistors, specifically designed to negate the possibilities of shorting out or burning up.

While Davohm Series 850 can momentarily withstand large overloads, extreme overloading will open circuit them; but they cannot short out or burn because there are no organic compounds in the resistor which might carbonize. Therefore, these Series 850 resistors are extensively used in critical applications where severe line overloads might burn up conventional resistors or cause them to short out and overload other components. Typical present applications include fuel gages in jet planes and line terminations in telemetering circuits.



In addition, the Series 850 metal film resistors offer the lowest noise level available, low ohmic values, excellent high frequency characteristics, a wide temperature range and complete hermetic sealing in smallest size.

For further information on the non-shortening or burning behavior of Davohm Series 850 hermetically sealed metal film resistors, contact The Daven Company, Livingston, N.J., U.S.A.

New Products

● Ku Band Ferrite Isolators

Item 1715

High-power Ku-band ferrite isolators are now available from Raytheon Manufacturing Company in standard models.

Model IKuH1 covers a frequency range of 16.0 to 17.0 kmc; it provides a minimum of 20 db isolation and a 0.5 db maximum insertion loss over the full band. The unit weighs less than 2½ lbs. and is 3¼ inches long.

Model IKuH3 is a miniaturized unit which weighs less than 1½ lbs. and is less than 2 inches long; it nevertheless provides a minimum isolation of 14 db and a maximum insertion loss of 0.3 db over the 16.0 to 17.0 kmc band.

Both of these units have a power handling capability of 135 watts average, 135 kw peak.

Modified standard units are available on special order to meet particular performance or packaging requirements.

Raytheon Manufacturing Company, Special Microwave Device Group, Seyon Building, Waltham 54, Massachusetts, U.S.A.

● Klystron Amplifier Tube

Item 1716

Varian Associates announce a revolutionary, new wide-tuning-range klystron amplifier tube with internal resonant cavity circuits capable of tuning from 1700 to 2400 megacycles. The VA-800 klystron is one of a line of high-power, high-gain, low-noise CW power tubes delivering 10kW and 1kW of power for tropospheric communication service in the frequency range from 375 Mc to 8500 Mc.

Uniquely, the only rf connections to the Varian VA-800 are an input line with less than one watt of drive power and an output line to carry 10,000 watts of rf power to the antenna. All resonant circuits are an internal part of the tube and can be tuned readily to any spot in the 1700 to 2400 Mc band. No other physical adjustments are required for the tube to operate at optimum performance at all times. The only electrical requirements are supplies for the cathode, beam voltage, and the beam focusing magnet. Because these are not critical, no warm-up adjustment periods are necessary.



The resulting freedom from physical, electrical, and vital maintenance adjustments removes the possibilities for mis-adjustment, eases systems maintenance, and helps provide the simplicity required for reliability and low cost operation.

These high power amplifier klystrons provide bandwidths sufficient for hundreds of telephone and teletype channels, or one or two television channels and are used in over-the-horizon forward scatter communication circuits, many of which provide vital communications in remote and inaccessible areas.

Detailed information available from Varian Associates of Canada, Limited, Georgetown, Ontario.

● Battery Eliminator Kit

Item 1717

The Heathkit "Low-Ripple" Battery Eliminator Kit, Model BE-5, is modern in the fullest sense of the word! It incorporates an extra low-ripple filter circuit so it can be used to power all the newest transistor type circuits requiring 0 to 12 volts DC, and the new "hybrid" automobile radios using both transistors and vacuum tubes. Its DC output, at either 6 or 12 volts, contains less than .3 per cent AC ripple!

The special filter circuit is built right in, and the highly filtered 6 or 12 volt DC output is available at up to 5 amperes at a separate pair of output terminals. Additionally, the model BE-5 has another pair of terminals for output with a normal amount of filtering, for use as a battery eliminator on a conventional-type auto radio, etc. Here the unit will supply up to 15 amperes on the 6-volt range or up to 7 amperes on the 12-volt range. The output voltage is variable on both ranges, from 0 to 8 volts, or from 0 to 16 volts.

The BE-5 is ideal for servicing 6 or 12 volt car radios of the vibrator type, transistor type of "hybrid" types. It will double as a battery charger, is often used as a marine converter for small pleasure boats, or will supply voltage for small DC motors (such as electric trains, etc.) It is housed in a modern case with rounded



corners, and two meters on the front panel constantly monitor output voltage and output current. Shipping weight 23 lbs.

Heath Company, A Subsidiary of Daystrom, Inc., 305 Territorial Rd., Benton Harbor, Mich., U.S.A. or 840 Caledonia Rd., Toronto, Ontario, Canada.

● Ground Detector And Alarm

Item 1718

In three phase systems a voltage fluctuation in any phase will change voltages and ground potentials on the other two phases. This is never immediately evident but does create serious hazard to men and equipment. Even small amounts of excess grounding, due to motor, transformer or wire faults will shorten motor life and raise power bills. The PRD-C5700 Ground Detector is an electrical device with visual and audible alarms that indicate ground faults before they can do any damage. It can be set to discover a line voltage drop as little as one volt in systems of any voltage rating.

The unit is useful for industrial plants, pumping systems, chemical plants, grain elevators, ships, power generating stations, large buildings and any place using 3 phase motors and equipment.

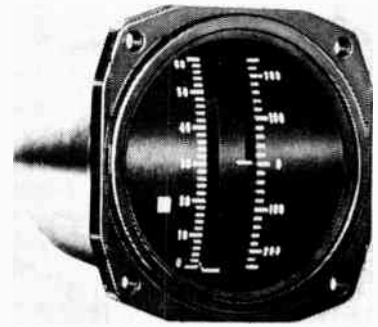
The PRD ground detector operates at 110 volts and can be installed at any control point. Transformers are included to operate it off the power line and one unit will take care of all equipment on one system. An extra contact is included for an optional Transmitter Signal Device for quickly locating specific faults.

For full details write for Bulletin C57, Principle Research and Development Corp., Box 93, Franklin Park, Ill., U.S.A.

● Multimeter For Data Link Or Analog Application

Item 1719

DeJur-Amsco Corporation announces the availability of a multimeter with a maximum of four simultaneous readouts. This unit is a 3½" AN type meter, hermetically



sealed and gas filled. It is completely ruggedized in a shielded, steel case. Maximum sensitivity is 200 microamps for each display.

For complete specifications, write to Canadian representative: Atlas Radio Corp. Ltd., 50 Wingold Ave., Toronto 10, Ontario.

● A New Method Of Counting Small Components

Item 1720

The progress of miniaturization has produced many small and even minute parts and components, valuable enough to require counting, yet of too little mass for the positive mechanical operation of a contact and too small for photo-electric counting, unless complicated and costly special arrangements are employed.

Since every object, no matter what shape or weight dropped on a diaphragm produces noise, it is proposed to count such small objects acoustically.

The Sodeco Acoustic Impulse Transmitter Type 1Tka consists essentially of an aluminum tube of 54 mm diameter and 66 mm length topped by a stainless steel diaphragm and containing a microphone. The transmitter is installed at an angle of 45° with the horizontal, and the parts conveyed in single file by a suitable conveyor such as an inclined trough are made to drop from a low altitude on the center of the membrane. The kinetic energy "A" being the product of weight (g) and altitude (cm), tests carried out with steel pellets have shown that the transmitter operates dependably for values of "A" above 0.2 gcm (= 0.02779 oz. in.). At the center of the diaphragm the sensitivity is actually 0.150 gcm, within a radius of 5 mm: 0.180 gcm, of 10 mm: 0.350 gcm, of 15 mm 0.680 gcm, etc.

The impulse from the transmitter is fed into the Sodeco Impulse Adaptor Type 1Tulal, which is a compact, mains operated instrument in wall mounting case consisting essentially of two tubes (1 x E99CC and 1 x ECC83) for the electronic amplification and adaptation of the primary impulse. It contains a switch for the optional selection of impulse frequencies of up to 15, 30 or 60 impulses per second, also a sensitivity regulating screw to adapt the sensitivity of the adaptor to the weight of the component which is to be counted.

The amplified and adapted impulse of constant amplitude and duration is fed into an appropriate Sodeco counter which, according to the requirements, may be a simple counter with manual or electrical zero reset, with or without auxiliary contacts, a summation or differential counter, a batch counter, a predetermined counter, all of them either with standard ratio impulse/unit or with non-standard ratio impulse/unit.

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

New Products

● Smallest Commercial Rocket

Item 1721

Atlantic Research Corporation, Alexandria, Va., has announced the addition of a new solid propellant rocket motor to the company's line of technological instruments and devices. Believed to be the smallest solid propellant rocket motor commercially available, the 0.6-pound PET (Propulsion, Experimental Test) motor is only 1.5 inches in diameter and 4.75 inches long.

The PET rocket motor furnishes 40 pounds of thrust for one second when fired in an environment approximating room temperature and sea-level pressure. Potential applications include use in experimental rocket engineering, acceleration of small masses, packaged fast-response short-time thrust services, short-time exposure of materials to rocket blast, and retro and spin functions on larger missiles and rockets.

The new PET rocket motor employs Atlantic Research's "Arcite" solid propellant. The rocket motor is ignited electrically by means of an integral igniter. The motors are supplied as sealed, weather-proof units, ready for firing.

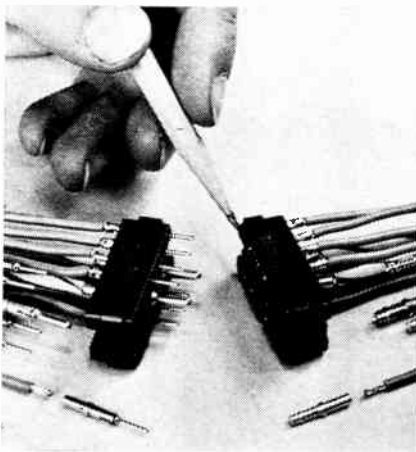
For further information, write Atlantic Research Corporation, Alexandria, Va., U.S.A.

● Solderless Connector Speeds Electronic Wiring

Item 1722

A solderless multi-lead plug-and-receptacle connector designed to speed the wiring of electronic harnesses and achieve greater dependability and versatility has been introduced by Burndy Canada Ltd., according to the sales manager of the company's Omaton division.

Called the "Hyfen", the connector has two mating units, a plug and a receptacle. Instead of being soldered, pins and sockets are crimped to wire ends by single-stroke manual or high-speed automatic tools.



This method is said to be not only faster than soldering but also to make more reliable, more easily checked connections. Elimination of solder fluxes and dissimilar metals improves resistance to corrosion. A minimum number of contact points also reduces reliability problems.

Crimping may be done before or after the harness is in place. Once wires are tipped with pins or sockets, they are snap-locked in the plug and receptacle, which may be mated as a gang connect or disconnect. Pins and sockets may also be pulled out separately to remove individual circuits.

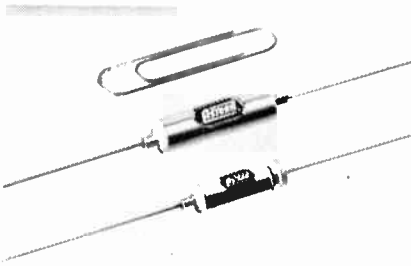
Burndy Canada Ltd., 1530 Birchmount Road, Toronto, Ontario, Canada.

● Subminiaturized Electrolytic Capacitors

Item 1723

Type EE and EM subminiaturized electrolytic capacitors are announced by Astron Corporation, East Newark, N.J., manufacturer of capacitors and R. F. noise suppression filters.

The two subminiaturized units are especially designed for transistorized circuits and miniaturized low voltage D.C. equipment. Featuring very low leakage characteristics for minimum battery drain, Types EE (epoxy end fill) and EM (spun end with rubber bushing) are extremely small hermetically sealed electrolytics (from $\frac{3}{16}$ " x $\frac{1}{2}$ " to $\frac{1}{4}$ " x $\frac{3}{4}$ "). They have applications in hearing aids, transistorized pocket radios, miniaturized recorders and many other miniature units.



Available in voltages of 1, 3, 6, 8, 16, 26, and 50, the new Astron units also feature long shelf and operating life.

Complete technical information is available by writing to Astron Corporation, 255 Grant Avenue, East Newark, N.J., U.S.A.

● Miniaturized AC Network Analyzer

Item 1724

A means of putting on a desk-top the power lines and generating stations of an electric utility power transmission system — that is the new Miniaturized AC Network Analyzer now in production by the Computer Department of General Electric Co., Phoenix, Arizona.

For purposes of load flow studies and the simulation of proposed additional facilities, this new AC Network Analyzer miniaturizes by simple jack-plug selection the transmission systems of a large electrical utility company. It operates on 115 volts, 300 watts, and comes ready to plug into any ordinary office outlet.

This desk-top special purpose analog computer is intended to relieve the manual calculation of the engineering staff by solving the day-to-day network circuitry problems that are too large to do by hand calculation but too small to justify taking them to a large network analyzer installation. It eliminates the expense often incurred because "safe" or half-guessed solutions must be accepted in lieu of an actual detailed solution of the problem. It can, for instance, make short work of: (1) Load flow studies (watt and var flow and voltage); (2) Analysis of transmission requirements to supply new loads; (3) Analysis of transmission capabilities of existing systems or proposed additions; (4) Short circuit and relay studies; (5) Calculation of specifications and optimum location for additions to portions of existing networks; and/or the circuits involved in the analyzer are easily understood by anyone familiar with communications equipment, such as carrier current or mobile radio. It can, therefore be easily serviced by utility communications maintenance personnel.

Any office will do for its location and no external cooling equipment is required inasmuch as it operates through all normal ranges of temperature and humidity.

The unit is composed of a 10-EC stabilized oscillator driving four amplifiers which simulate the generating stations. Line, load and slant capacity units are connected by patch cords to represent the network configurations under study. A single panel

type indicating instrument isolated by electronic amplifiers measures powers, voltages, currents and vars. Standards of resistance, capacitance and inductance are provided for calibrating the network constants.

Base values involved in the equipment are 10 volt, 1000 ohms impedance, 10 milliamps current — being selected for use in order to standardize on one set of values which are numerically converted to desired values by the user.

Further information may be obtained by writing the manufacturer, General Electric Co., Computer Department, Phoenix, Arizona, and requesting technical bulletin CPB-4.

● Subminiature Static Flasher

Item 1725

Jordan Electronics Company of Alhambra, California announces a new flashing warning light for aircraft systems. Three functions are incorporated: (1) flashing light, (2) steady light, (3) "press to test"; thus, two signals can be indicated with a single unit. The flashing rate is 100 counts per minute \pm 10 per cent over the voltage and temperature range. The operational range is from 14 volts to 32 volts DC and from -55°C to $+71^{\circ}\text{C}$. Meets MIL-K-8144.

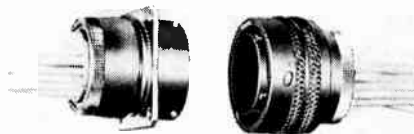
The unit weighs only $1\frac{3}{4}$ ounces, is $\frac{5}{8}$ inch diameter and requires 3 inches depth behind panel. A standard lamp housing is used, permitting a variety of caps and easy replacement of lamps. Supplied with pig-tail leads, solder lugs or a connector for hook-up. Part No. AU-0024.

For additional information, contact Jordan Electronics Company, 3025 West Mission Road, Alhambra, California, U.S.A.

● "PT" Pygmy Connector

Item 1726

A new Bendix "PT" Connector which, it is claimed, represents the greatest advance yet achieved in miniature connector design is now being offered by Aviation Electric Limited.



The "PT" Connector accommodates about three times as many circuits, size for size, as comparable to "AN" Connectors, and incorporates a 5-key polarization and a three point lock. The positive locking action has been designed to completely eliminate safety wiring.

Incorporating such outstanding features as: Safety wiring completely eliminated; mechanically assisted coupling and uncoupling through cam action; visual and audible inspection of coupling — perfect for "blind" locations; three point bayonet lock; perfect axial alignment of mating parts at all times; constant spring tension behind mated insert faces; five key polarization — positive protection against mismatching or cross-plugging; resilient inserts, performance proved in millions of Bendix Connectors over the past ten years; heavy gold plating over silver on all contacts; closed entry, probe-proof socket contacts; both pin and socket contacts machined from high grade copper alloy; machined bar stock or impact extruded shell components cadmium plated to QQT-416; olive drab iridite after treatment.

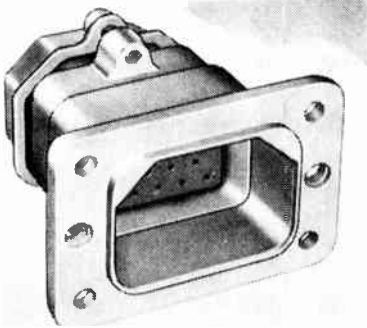
The Bendix "PT" Connector was designed and developed in anticipation of the needs of the aviation industry, in this case the trend toward higher voltages and smaller Connectors. For complete information and illustrated literature write to Aviation Electric Limited, 200 Laurentien Boulevard, Montreal 9, Que., Canada.

New Products

● High Speed-High Altitude Connectors

Item 1727

A new rack panel pressurized connector that is designed for high altitude and vibration applications is featured in the DPS series. When the DPS connector is mated, it is sealed about the insert faces by means of a specially designed rubber seal. This seal is encased in the -34 shell so that the step down design of the mating -33 shell seats into and against it when mated. In addition to this feature the -34 or pin insert shell encloses a monobloc silicone insert which is designed in such a way that the tightening of the junction shell over the back of the insert effects a compression seal around the wires that have been inserted. The -33 or socket insert shell incorporates a plastic front insulator,



to insure alignment of contacts, and is backed up by a silicone rear insulator that is also tapered to permit the corresponding taper of the junction shell to compress it around the wires as the junction shell is tightened.

The contacts for DPS connectors must be ordered separately since they are installed at time of wiring. There are coaxial contacts, and thermocouple contacts available. Also air lines which may be used in place of co-axial contacts.

These connectors are available in four different sizes with several insert arrangements for each size. Complete information and ordering numbers are available by writing for Bulletin DP 101 to Cannon Electric Canada Limited, 160 Bartley Drive, Toronto 16, Ontario.

● "X-Y" Oscilloscope With Plug-In Unit

Item 1728

The Tektronix Type 536 is an oscilloscope that has identical horizontal and vertical deflection characteristics with the same type of preamplifier plugged into both channels. It converts to a general-purpose instrument when the Type 53/54T Time-Base Generator is plugged into the horizontal amplifier.

Horizontal and vertical characteristics with Type 53/54G Units plugged in are: — differential inputs, dc-to-10 mc passbands, 0.035- μ sec risetimes, nine calibrated deflection factors from 0.05 v/div to 20 v/div with vernier controls for adjusting sensitivity between steps, less than one degree relative phase shift to well beyond 10 mc, control on front panel to adjust phase balance up to 20 mc, five divisions of deflection at 20 mc without overdriving input amplifiers.

Horizontal characteristics with the Type 53/54T Time-Base Unit are: — 22 calibrated sweep rates from 0.2 μ sec/div to 2 sec/div with vernier control to adjust sweep rate between steps, 5 x magnifier increases calibrated sweep rate to 0.04 μ sec/div, fully-automatic triggering or amplitude-level selection with manual or preset stability control.

Other Type 536 features are: — amplitude calibrator with 18 steps from 0.2 mv to 100 v, 4-kv accelerating potential, electronically-regulated power supplies, beam-position indicators. Tektronix, Inc., P.O. Box 831, Portland 7, Oregon, U.S.A.

● Components Oven

Item 1729

Bulova Watch Company, Electronics Division, Woodside 77, New York, have introduced their new AM-200 Oven. The new oven is specifically designed for components such as capacitors, resistors, transistors, etc.

The AM-200 Oven cavity measures 1 inch in diameter by 2 inches in length. Temperature regulation is $\pm 3^\circ\text{C}$. over an ambient range of -55°C . to $+100^\circ\text{C}$. Available with either plug-in or stud mountings.

For further information write Sales Engineering Department, Bulova Watch Company, Electronics Division P-846, Woodside 77, New York, U.S.A.

● Precision Device Edits Magnetic Recording Tape

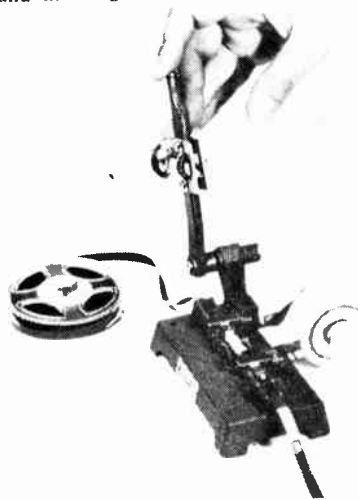
Item 1730

The first moderately-priced precision device for cutting and splicing magnetic recording tape is announced by Alonge Products, Inc., 165 West 23rd Street, New York 11, N.Y.

The company anticipates broad application for the new unit in such fields as commercial and home recording, office appliances, computers, automation and electronics, where, despite the wide use of magnetic tape, editing has been largely performed by hand without the benefit of specialized equipment.

Completely non-magnetic in construction, the Alonge splicer provides two separate operations — cutting and splicing for $\frac{1}{4}$ -inch tape.

Cutting is accomplished by a center blade, which pivots and can be set for precision cuts at 90° , $67\frac{1}{2}^\circ$ or 45° degree angles. The recording tape is laid into a track on the unit and held in place by two spring bronze pressure pads. To cut the tape, the arm is lowered and the top knob firmly pressed. An engraved center line marks the point of the cut and an index marker on the unit indicates a point $1\frac{1}{2}$ inches from the center as a reference in editing and marking.



In the splicing operation, the splicing tape is laid over the recording tape and the splice is achieved in a single downward stroke of the cutting arm. Two side knives cut the splicing tape to the exact width of the recording tape, while the two tapes are pressed together for a firm bond.

The compact unit measures only $4\frac{1}{2}$ x $3\frac{1}{8}$ x $3\frac{3}{4}$ inches, overall, and weighs less than one pound.

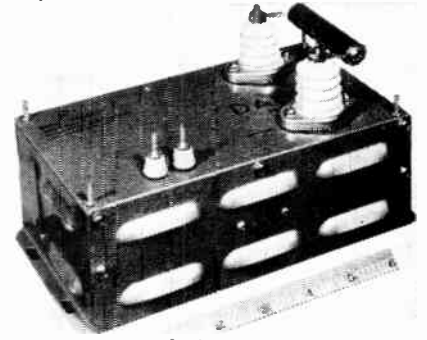
Orders or inquiries should be addressed to Alonge Products, Inc., 165 West 23rd Street, New York 11, N.Y., U.S.A.

● "Hi-Sel" DC Power Supplies

Item 1731

The new Beta Series 9000 "Hi-Sel" DC Power Supplies, featuring air insulation for minimum weight and selenium rectifiers for small size, are announced by Beta Electric Division, Sorensen & Company, Inc.

Ideal for industrial or laboratory application, these power packs are a major



advance in high voltage techniques. Units of the 900 Series operate from a 115 V, 50-400 cps source and are available with maximum output ranging from 5-15 KV, 2.5 and 5 milliamperes. Sizes vary from $7\frac{1}{4}$ " h x $4\frac{1}{4}$ " w x 3" d (weighing 6 pounds) to 9 " h x $8\frac{1}{2}$ " w x 6" d (weighing only 13 pounds).

The power packs feature low ripple in all current ratings (0.5 per cent to 2.0 per cent) and good dynamic load regulation. These inexpensive high voltage sources are especially useful where low weight and small size are critical and where controls and meters are not required.

By employing a continuously variable autotransformer in the AC input circuit, the DC output voltage may be varied from 0 to full rated voltage. An external bleeder, supplied with each unit, can be used as a multiplier for a KV meter. Use of selenium rectifiers makes hermetic sealing unnecessary; components can be easily reached for servicing.

For further information write Beta Electric Division, Sorensen & Company, Inc., 333 East 103rd Street, New York 29, N.Y., U.S.A.

● Dry Ice Chest Chamber

Item 1732

A new test chamber to cover a range of temperatures from -100°F to $+300^\circ\text{F}$ is being offered by the Environmental Equipment Co. of Brooklyn, N.Y. It features low mass microhm heating unit and dry ice cooling with by-pass damper for economical operation, exterior of sturdy steel, interior of heavy gage stainless steel and a readily accessible separate compartment for controls and instruments.

Accessories available are multipane windows, added penetrations, temperatures to $+425^\circ\text{F}$ or higher and casters for portability. Standard test space dimensions are 18 " x 18 " x 12 " (Model DI-3).

Environmental Equipment Co., 369 Linden St., Brooklyn 27, N.Y., U.S.A.

● Screw-Holding Screw Driver

Item 1733

A new type of screw-holding screw driver has been developed by The H. J. J. Company of Oakland, California, which provides a quick, sure way to hold a screw in position. As the assembler pushes forward, tiny twin bits expand inside the slot of the screw. The screw will not be released until it is firmly seated in the thread.

The new screw-holding drivers are also used extensively for removing screws.

Hi-Fonic Music Systems, Inc. of Palo Alto, California, has found that the use of the H. J. J. screw-holding drivers has resulted in savings of more than 50 per cent in production time for assembly involving hard-to-reach places at Hi-Fonic.

The H. J. J. screw-holding drivers are manufactured in a wide variety of sizes and lengths by The H. J. J. Company, 268 Marlow Drive, Oakland, California, U.S.A.

News Report

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

Deplores Tendency To Turn Television Into An Intellectual Anaesthetic

Speaking at the banquet of the Institute of Radio Engineers' Canadian convention in the King Edward hotel, Toronto, on October 17th, Dr. Marcus Long of the University of Toronto told the 500 guests that every invention in electronic and allied fields created corresponding responsibilities. His subject was "Engineers are People".

The emphasis on atoms for war instead of for peace, he said, indicates that the death-wish transcends the life-wish. Men misuse their genius, diverting the skill of engineers to wrong ends.

The speaker warned of the ever present danger that communications might be controlled by single groups and distorted for personal or evil ends, and went on to deplore our tendency to turn television into an intellectual anaesthetic, instead of making it a pillar in our educational systems. The simple, the superficial, the safe — that is the accepted recipe for television programs, he said. This is because producers and sponsors realize that the use of this formula is the best route to avoid the curbing action of the pressure groups.

In Professor Long's opinion radio and television should be able to give an adult picture of our daily and wordly life; also wit, wisdom, music and science and mental pabulum suited to an adult society. If television is going to replace books it should at least concern itself with some of the topics that are vital to good literature, and it should also find a place for giving us penetrating analyses of life.

The speaker emphasized the responsibility of the engineer in seeing that the devices he showered upon society be used for the benefit of man and not for destruction. The engineer could not disassociate himself from this responsibility.

Government Pledge

Coming to one of the main points of his speech, Professor Long said —



● Professor Marcus Long, Professor of Philosophy, Toronto University, guest speaker at the 1957 Canadian IRE Convention Banquet, tells assembled guests that . . . "TV has become man's intellectual anaesthetic" . . .

"The present federal government is pledged to a double system of television. It will maintain the CBC but take away some of its regulatory powers and give more opportunity to private stations. That, I believe, is a good thing. It also guarantees to



● Top left, Clare A. Norris, Chairman of the IRE Convention Committee, introducing head table guests at the 1957 Canadian IRE Convention Banquet. Top center, Allan B. Oxley, Regional Director of the IRE, welcomes guests on behalf of Region 8 IRE. Top right, Colonel W. L. Sagar, Dominion Council of Professional Engineers, introduces the guest speaker, Professor Marcus Long, Professor of Philosophy of the Toronto University. Bottom left, Dr. John T. Henderson, President of the IRE, addresses banquet guests on behalf of the Institute of Radio Engineers. Bottom center, W. H. Jeffrey, President of the Radio-Electronics-Television Manufacturers Association of Canada, extends greetings to IRE members and guests on behalf of RETMA. Bottom right, Dr. John T. Henderson presents IRE Microwave Prize to Dr. R. I. Primich of the Defense Research Telecommunication Establishment.

those who have no taste beyond the cheap, and the interests of nine-year olds, that their tastes will be satisfied. So I am all in favor of the policy with but one important caveat. The government is likely to feel that the CBC ought to pay its own way by competing with private stations in the quality of its programs and its care not to offend any pressure groups; it may feel that CBC ought to offer the same fare as the private stations. This must not be done".

The Fowler Commission showed that a reasonably adequate program for the CBC will cost about five hundred million dollars over the next six years. Marcus Long said that if engineers organized as a pressure group to help CBC, their influence would far exceed their numbers. This influence should help ensure that television would become a medium for good.

Passing to the international field, Long said that we must transfer decisions on war to the United Nations, and also accept more gracefully the conditions of co-existence. The ICBM and the satellite made obsolete all the old military techniques, and we must accept this fact. Engineers, who have made all this new world possible, must shoulder part of the responsibility.



● Head table guests at the Canadian IRE Convention Banquet picture above are: Back row left to right, T. J. Bell, President, Canadian Electrical Manufacturers Association; V. A. MacKillop, Engineering Institute of Canada; Dr. B. G. Ballard, American Institute of Electrical Engineers; Dr. R. I. Primich, Defense Research Telecommunications Establishment; W. H. Jeffery, President, Radio-Electronics-Television Manufacturers Association of Canada; Colonel W. L. Sagar; Ralph A. Hackbusch, Canadian Radio Technical Planning Board; and S. L. Britton, Canadian Aeronautical Institute. Front row left to right, A. B. Oxley, Regional Director, IRE; R. M. Brophy, Member of Defense Research Board; General Charles Foulkes, Chairman, Canadian Chiefs of Staff, Department of National Defense; Professor Marcus Long, Professor of Philosophy, Toronto University, guest speaker; Clare A. Norris, General Chairman of the Institute of Radio Engineers' Canadian Convention and Exposition; Dr. J. T. Henderson, President, Institute of Radio Engineers; and J. H. Fox, Association of Professional Engineers of Ontario. Head table guests not included in the photograph are Paul Davoud, Air Industry Transport Association; and His Worship, Nathan R. Phillips, Q.C., Mayor of Toronto, Ont.

He concluded — "You cannot sit idly by while men misuse the opportunities you have opened to them.

You cannot hide behind the false shield that you are only engineers. Engineers are people".

Clare Norris Announces Canadian IRE Awards

Six awards for work done in electronic fields were announced by Clare A. Norris, general chairman of the Institute of Radio Engineers' Canadian second annual convention-exposition which concluded on October 18th last.

"These awards are given from funds of the IRE in Canada," says Mr. Norris, "to encourage and reward individual effort in any of the electronic activities, such as radio, radar, television, and similar fields. Five went to IRE students across Canada to cover their travel and accommodation and thus enable them to visit our convention in Toronto. They are — Edward Joseph Frazer, Vancouver, broadcast operator at a paper mill and for the N.W. Telephone on Trans-Canada network; is also a ham operator.

J. A. Doherty, Edmonton, a fourth year engineering student, chairman of IRE student branch.

Dan Bereskin, third year engineering physics student, University of Saskatchewan, also a ham operator.

Jack B. Ellis, University of Toronto, chairman of IRE student branch. This student entered university by winning an Association of Professional Engineers' scholarship.

John St. Onge, Laval University, chosen as a graduate student of high

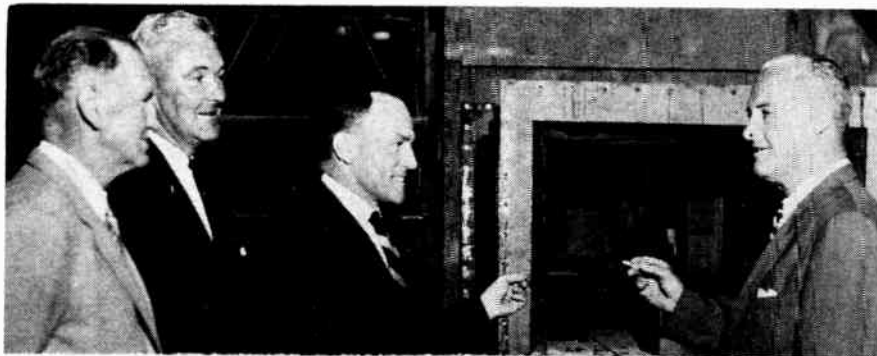
academic standing and personality, is also secretary of IRE student branch.

The sixth award says Norris, is the "Microwave Prize" given to Dr. R. I. Primich, Defense Research Telecommunications Establishment, Ottawa, who receives a money gift and certificate.

The convention-exposition, which terminated its three-day run on October 18th, had an attendance of 7,647 technical personnel. In view of the current serious flu epidemic this figure compares well with last year, being within 3 per cent. Additional public day attendance was 1,002.



● Describing the features of an improved 2-way radio equipment at the recent IRE Exposition is Rogers Majestic Electronics President, S. G. Paterson. To Mr. Paterson's right are: R. M. Brophy, Member of the Defense Research Board; Gen. Charles Foulkes, C.B., C.B.E., D.S.O., C.D., Chairman, Canadian Chiefs of Staff, Department of National Defense; and Dr. John T. Henderson, President of the Institute of Radio Engineers.



● Workmen are nearing completion on the automatic annealer — largest of its type in Canada — at the new Simcoe magnet wire division plant of Canada Wire and Cable Company Limited, Toronto (Leaside). Outlining the details of the annealer on a recent tour by Town of Simcoe officials is magnet wire division manager, A. V. Armstrong (extreme right).

Chase & Sons Appoint Canadian Sales Manager

The appointment of Bruce W. Bier as Canadian sales manager has been announced by Francis M. Chase, president and general manager of Chase & Sons, Inc., North Quincy, Mass.

A resident of Peterborough, Ontario, Mr. Bier has been associated with



B. W. BIER

Canadian General Electric Company, Ltd., for the past seven years. During this time, he has served as a buyer and works priorities representative at the Davenport Works in Toronto and as supervisor of purchasing at the Canadian Department of Defense Production Plant at Downsview, Ontario. For the past three years, Mr. Bier has served as senior buyer and purchasing agent for Canadian General Electric's Wire and Cable Section in Peterborough, Ontario.

As Canadian sales manager for Chase electrical insulating tapes and materials, Mr. Bier will have his headquarters in Peterborough.

D. O. T. Order To Stark Electronics

Stark Electronic Instruments Ltd. announces that the Department of Transport has placed an order for 100 All-Band Microvolt Signal Generator Model 295X as manufactured by Hickok Electrical Instruments Co. (Cleveland, Ohio). This unit designed for mobile applications such as police, taxicabs, airlines or wherever critical alignment and low microvolt signal is essential, covers the range of 125 Kcs to 175 Mcs continuous on fundamentals.

The Department of Transport will be supplying these units to stations throughout Canada where they will be used for checking and calibrating receivers for air, marine and ground purposes.

Philco Appoints Two Sales Engineers

The appointment of Mr. Wm. F. Potts and Mr. Rod Weese as Sales Engineers has been announced by Mr. J. A. Price, Manager, Government & Industrial Department, Philco Corporation of Canada Limited.

Mr. Potts, a graduate of Queens University, comes to the company from the R.C.A.F. He will be responsible for the sale of electronic training aid material, transistors, microwave and closed circuit TV.

Mr. Weese is well known in the electronic industry, having been engaged in various phases, both here and abroad. He will be responsible for the development of the TV broadcasting market.

IT&T Establish Canadian Service Company

A new Canadian subsidiary of International Telephone and Telegraph Corporation, called IT&T Electronics Service Company of Canada, Ltd., has been organized in Montreal. The company will provide services ranging from the installation, operation and maintenance of telecommunication and electronic equipment, such as microwave links and radar network, to the engineering of such installa-

tions and the evaluation of alternative systems for a given job.

Head of the new company is J. T. Robertson who has been with IT&T for many years. Starting with IT&T's London associate, Standard Telephone & Cables Ltd., he later served with the Royal Air Force and Royal Canadian Air Force. Most recently, he was assigned to the telephone and radio operating department of IT&T at New York headquarters.

IRE Toronto Section Opens 1957-58 Season

The opening meeting of the 1957-58 season of the Toronto Section—Institute of Radio Engineers on Sept. 23, 1957 consisted of a tour of the David Dunlap Observatory at Richmond Hill. Dr. D. A. MacRae of the Dept. of Astronomy, University of Toronto, briefly addressed the meeting and outlined the general nature of the work at the Observatory. He later introduced Dr. Yen of the electrical engineering staff who detailed some of the problems of radio astronomy.

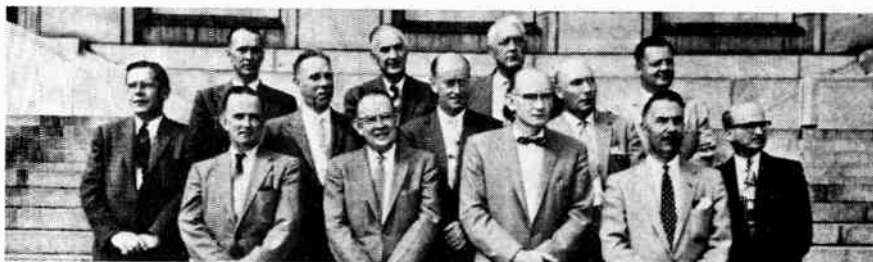
The group then toured the dome to see the 74-inch telescope and also visited the radio telescope site. The latter project is quite new and consists of a large horn antenna and a steerable array of zigzag antennas feeding low noise amplifiers and recording equipment. Detailed studies of the signals emanating from the sun and various radio stars are now under way.

Canadian Westinghouse Markets GPL TV Camera

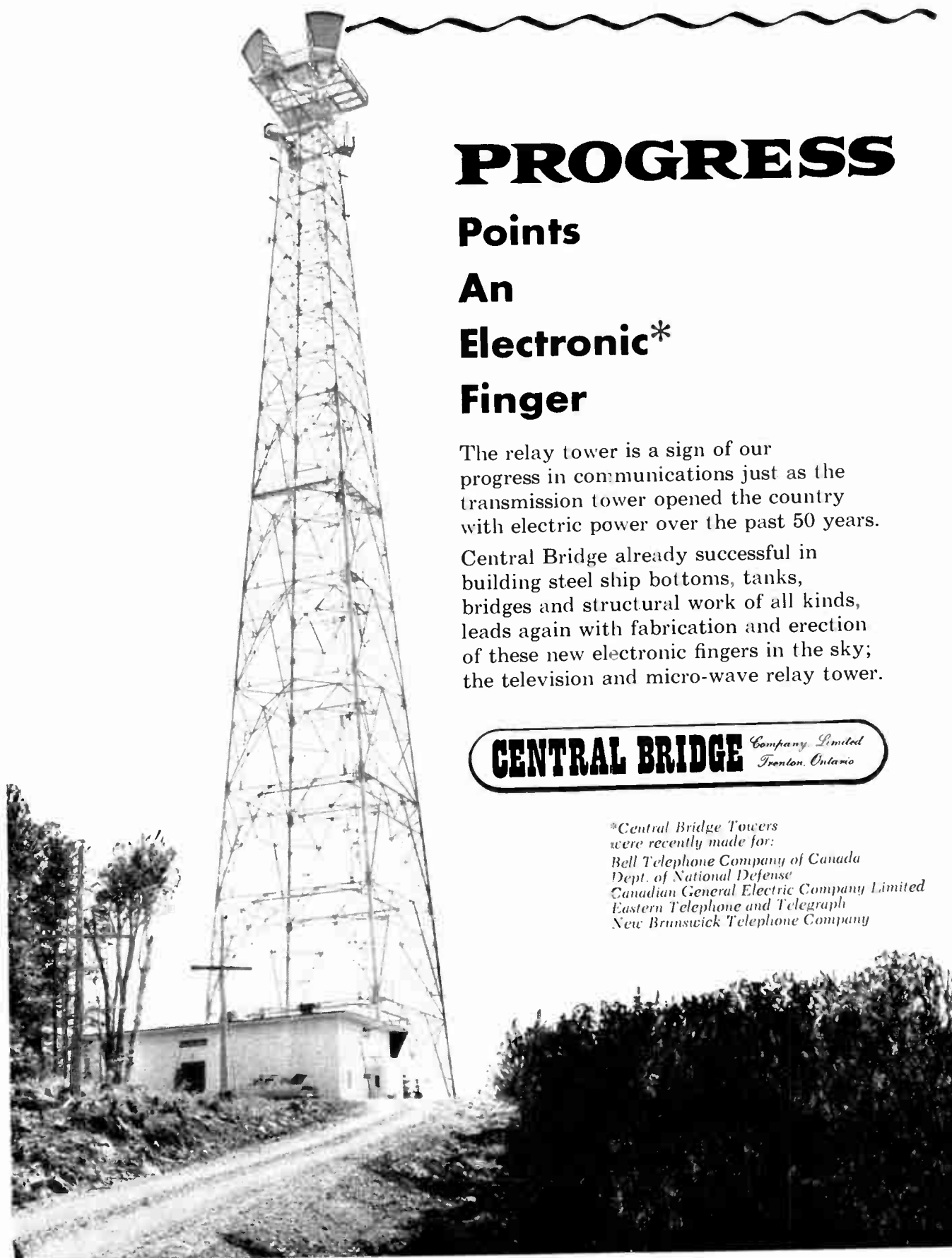
A new "single-unit" closed circuit television camera with associated remote control accessories introduced recently by General Precision Laboratory Incorporated will be marketed in Canada by the Electronics Division of the Canadian Westinghouse Co. Limited.

Designated the PD-500, the unit contains the camera, camera circuitry and controls within a housing 5" wide, by 7½" high, by 12" long, eliminating the need for separate control unit or external power supply.

RADIO REGULATIONS INSPECTORS



● Transport Department's Radio Regulations Inspectors from across Canada have been attending special courses at Ottawa in connection with Civil Defense matters. Left to right are: (Front Row) A. P. Stark, Chief Radio Examiner, Ottawa; W. A. Caton, Head, Inspections and Examinations Section, Ottawa; Frank Grant, Regina, Sask.; C. M. Brant, Controller, Radio Regulations, Ottawa. (Second Row) Ted Ginn, Saint John, N.B.; Tom Slinn, Toronto; Maurice Martin, Vancouver; Charlie Williams, Moncton, N.B.; B. Monday, Montreal. (Back Row) Eric Shea, Winnipeg; R. C. Peddle, St. John's, Nfld.; H. Lane, Halifax; R. Goldsalve, Edmonton.



PROGRESS

Points An Electronic* Finger

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

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

CENTRAL BRIDGE *Company Limited*
Fronlon, Ontario

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

Consumers' Gas Company matches its expansion program with this "package" of Bell Telephone Communications Services

Conversion to natural gas, construction of new pipe lines, rapid growth of consumer demand — all are part of this Toronto utility's big and busy program. And Bell Telephone's specialized communications are helping it along in three strategic ways:



Bell 2-way Radiophone speeds laying of pipe lines, conversion of equipment by providing instant contact between despatcher and the 81 vehicles at work on these jobs.



Bell Telemetering channels transmit information to and from this control centre shown above, operating the regulators and valves that handle the flow of gas into and through most parts of metropolitan Toronto.



A new dial PBX system facilitates the handling of a greatly increased volume of calls. Shown here is part of the special customer contact service which required 24 positions of special answering equipment.

Bell Telephone offers you the newest developments, the most advanced techniques in all aspects of modern business communication. *You pay only for service:* no capital outlay, no problems of maintenance, depreciation or obsolescence. Have Bell's specialists go into *all* your communication needs, without cost or obligation.



THE BELL TELEPHONE COMPANY OF CANADA
Specialized Communications Services

For further data on advertised products use page 105.

World Radio History

News Report

Lloyd M. Price Retires From Radio Valve Co.

After thirty-three and a half years of service, Lloyd M. Price, manager-engineering, of Radio Valve Co.



L. M. PRICE

retired recently. Mr. Price has been active in both the Institute of Radio Engineers and the Radio Electronics Television Manufacturers Association. He is a Fellow of the IRE, has been active in committee work and has served as chairman of the Toronto section of IRE. In RETMA as well as his committee activity he served as chairman of the Component Section for two years and as a vice-president of the association.

CGE Expands Carboly Plant

Increased demand for the "hardest metal made by man" has resulted in a move into a new and expanded manufacturing plant by the Carboly section of Canadian General Electric Company Limited.

The new Carboly plant is at Lansdowne Avenue and Davenport Road in Toronto's west end.

T. J. Bell Elected President Of CEMA

Thomas J. Bell of Toronto was elected president of the Canadian Electrical Manufacturers Association, at the group's annual meeting at Niagara Falls, Ont., on October 11th.

President of Fiberglas Canada Ltd., he will be responsible for guiding the

destiny of an Association which represents Canada's \$1,215,800,000 electrical manufacturing industry.

Born at Southampton, Ont., in 1914, "Tommy" Bell received his preliminary education at Ridley



T. J. BELL

College. In 1936, he graduated from the University of Toronto, with a B.Comm.

His first job took him to Federal Wire & Cable Co. Ltd., where he became cost accountant and the Guelph firm's 32nd employee. A facility for the financial end of business plus a natural ability for management led him to assistant secretary-treasurer in 1938, and assistant to the president in 1940.

- ▶ for the finest mercury...
- ▶ for close-up vision...
- ▶ for ideal brazing...

MERCURY

Produced under the finest and most modern conditions... quality controlled throughout the complete refining and processing cycle... available in Technical, Distilled and Triple Distilled grades. Supplied in: 1 pound, 5 pound, 10 pound plastic bottles; prime virgin in 76 pound flasks.

BORESCOPE

For bright, illuminated close-up vision within any bore, threaded hole, recess or interior surface to a depth of many feet. Borescopes provide unmatched brightness, clarity and accuracy in a unit durable enough to stand up to the toughest inspection routines.

SILVALOY

Silvaloy's relatively low melting point with excellent fluidity and penetration make it an ideal group of brazing alloys for fast production. The strength and neat appearance of Silvaloy joints provide additional sales appeal for the fabricated product.

Write for complete catalog material and details.

BAKER

**PRECIOUS
METALS**

BAKER PLATINUM OF CANADA, LTD.

512 King Street East, Toronto, Ontario, Canada

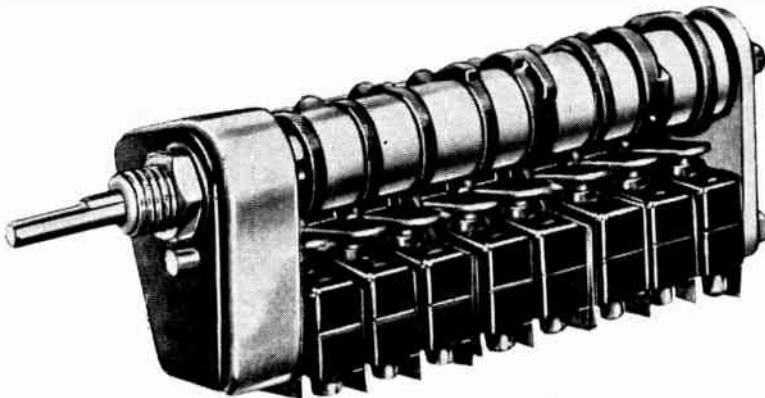
SALES OFFICE: BAKER PLATINUM QUEBEC, LTD., MONTREAL

ENGELHARD INDUSTRIES

RESEARCH MAINTAINS BAKER'S LEADERSHIP IN PRECIOUS METALS

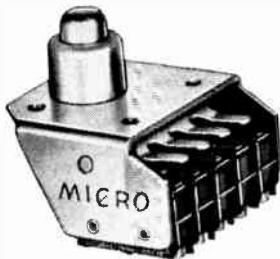
ELECTRONICS & COMMUNICATIONS, OCTOBER, 1957 **World Radio History** For further data on advertised products use page 105.

FOR MULTIPLE CIRCUIT CONTROL...



SUBMINIATURE ROTARY SELECTOR SWITCH

MICRO SWITCH rotary selector switches provide a means of switching two to eight different circuits with one small compact assembly. The switch consists of two to eight single-pole, double-throw subminiature basic switching units operated by cams on a common shaft. The cams are pre-set to operate the basic switches at 45° detents. Cams can be set to your specifications at the factory, permitting any combination of the switching units to be actuated in any position.

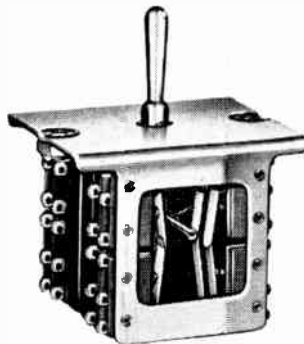


MULTIPLE CIRCUIT PANEL MOUNTING PUSH BUTTON SWITCH

Small, panel mounting manually operated push button switch containing two to fourteen basic switching units. Each unit may be wired either normally open or normally closed providing numerous combinations of "off" or "on" circuits in either depressed or released plunger positions.

SUBMINIATURE TOGGLE ASSEMBLY

An assembly of up to sixteen subminiature basic switches operated by a single bat handle. Eight switches can be operated with each direction of the toggle motion. This assembly makes an unusually efficient, compact, lightweight component... each of the subminiature switches is less than 3/4" long and weighs less than 1/15 ounce.



ALTERNATE ACTION PUSH BUTTON SWITCH 82PB1-T-2

This maintained-contact push button switch offers one-button on-off control of two single-pole double-throw circuits. It requires only 1 3/8" below its mounting panel. Alternate action is achieved by long-life nylon index cam. Switch provides double-pole, double-action and completes a cycle of operation every two-pushes of the button.

THERE'S A MICRO SWITCH PRECISION SWITCH FOR EVERY INDUSTRIAL REQUIREMENT

For name of nearest distributor and/or MICRO SWITCH catalogue No. 75 and Data Sheet 124 write Honeywell, Toronto 17, Ontario.



Honeywell

MICRO SWITCH PRECISION SWITCHES

For further data on advertised products use page 105.

News Report

Heath Hi-Fi Show Held in Toronto

Operating models of all Heath high fidelity equipment were displayed at a Heath Hi-Fi Show held at the Regency Towers Hotel, 89 Avenue Road, Toronto, from October 30 to November 2 inclusive.

Visitors were given an opportunity to listen to either tuner described in Heathkit advertising literature, with any amplifier, with any speaker, and with a special switching system permitting instant selection of any particular unit.

The Heath "Legato" Speaker System was demonstrated, also the Heath 70-watt high fidelity amplifier.

Representatives from the company's engineering department were on hand to answer questions and demonstrate equipment. A Hi-Fi Speaker and several other Heathkits were given away as door prizes.

Heathkit high fidelity equipment is handled in Canada by Daystrom, Limited, 840 Caledonia Road, Toronto 10, Ontario.

J. H. Smith Elected President Of Canadian General Electric

The election of J. Herbert Smith as President and Chief Executive Officer of Canadian General Electric Company Limited was announced following a recent meeting of the company's Board of Directors. Simultaneously, the

board announced the election of Mr. Smith as a Director of the company.



J. H. SMITH

A native of Fredericton, N.B., Mr. Smith succeeds James H. Goss, who has resigned to accept a position with the General Electric Company in the United States. Mr. Goss, who has been President and Chief Executive Officer of Canadian General Electric since 1955, will remain a Director of the company.

The Board also announced the election of Ian F. McRae of Peterborough as a Director of the company. Mr. McRae is Vice-President and General Manager of the company's Civilian Atomic Power Department.

As newly elected directors, Mr. Smith and Mr. McRae replace Robert Paxton, Executive Vice-President of the General Electric Company, and A. F. Vinson, Vice-President — Manufacturing, of General Electric, who have resigned from the Board. The Board now consists of 13 directors, nine of whom are distinguished Canadians.

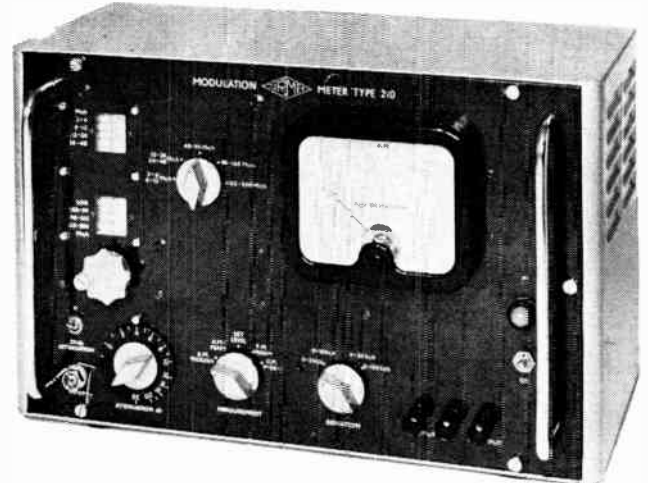


ELECTRONIC INSTRUMENTS

AM/FM MODULATION METER



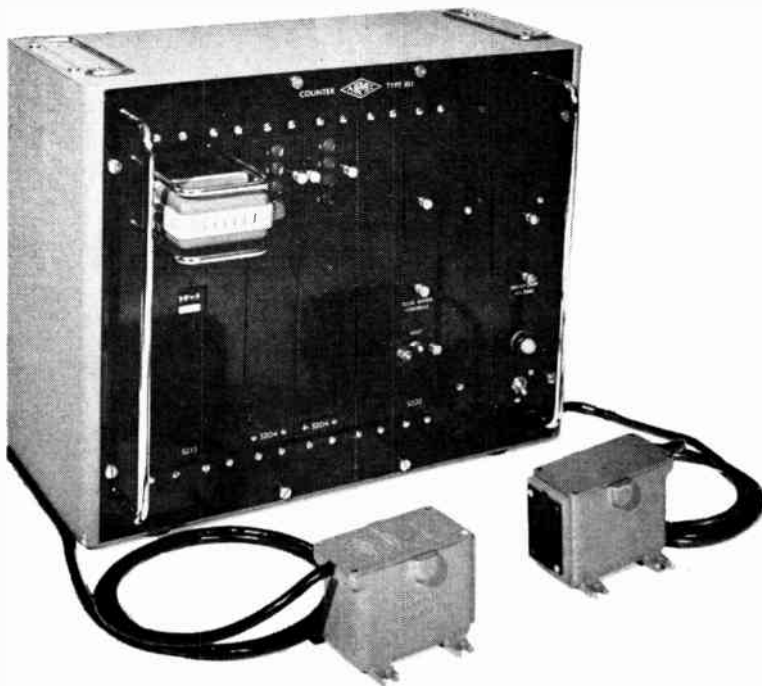
- Carrier Frequency Range: 2.25 to 600 Mc/s.
- MEASURES to 100% modulation depth and frequency deviations to 100 Kc/s in range 30 c/s to 15 Kc/s.
- Simplicity of operation.
- High accuracy.



ELECTRONIC COUNTER



- Compact and extremely versatile.
- Counting rate up to 3000/s.
- Counting capacity: 4 billion.
- Applications:
 - Counting**
 - Measuring**
 - Timing**
 - Remote Control**



Airmec Electronic Equipment Includes:

Time and Frequency Meters
Frequency Standards
Ionisation Testers
Oscillators
Signal Generators

Electronic Batch Counters
Electronic Tachometers
Photocell Controls
Temperature and Level Control Equipment
Radio and TV Servicing Equipment

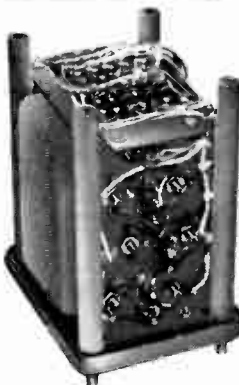
SEND FOR YOUR
COPY OF CATALOG



**RADIO COMMUNICATIONS
EQUIPMENT & ENGINEERING LTD.**
475 METROPOLITAN BLVD., MONTREAL 32



UAC tubeless DC to AC Converters replace bulky dynamotors and inefficient vibrator power supplies



- **COMPLETELY TRANSISTORIZED**
- **COMPACT**—as little as $\frac{2}{3}$ cu. in. per VA.
- **LIGHTWEIGHT**—as little as $\frac{1}{2}$ ounce per VA.
- **RUGGED**—withstand in excess of 100 G's

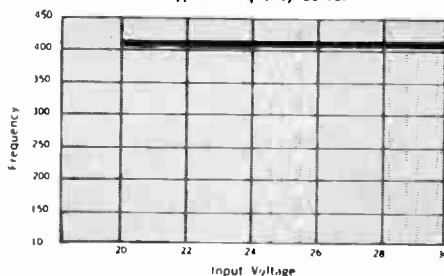
CAN BE MADE TO MEET MIL SPECS

UAC high efficiency power supplies solve size, weight, vibration and shock problems in hundreds of mobile and aircraft applications. Efficiency over 90%; temperature stability from -55°C to 100°C can be achieved. 400 cps. and 1000 cps. both available. Standard DC to AC units to 250 VA; custom units to 2 KVA.

TYPICAL STANDARDS From 24 to 28 VDC Input

| Model No. | Power | Output Voltage | Current Amps. | Case Size (inches) | Weight |
|----------------|-------|----------------|---------------|--|------------|
| 10VA/50-400 | 10VA | 50-400 | CPS .2 | $3\frac{1}{2} \times 2\frac{1}{2} \times 4\frac{1}{2}$ | 2 lbs. |
| 10VA/115-400 | 10VA | 115-400 | CPS .1 | $3\frac{1}{2} \times 2\frac{1}{2} \times 4\frac{1}{2}$ | 2 lbs. |
| 100VA/50-1000 | 100VA | 50-1000 | CPS 2 | $3\frac{3}{4} \times 3\frac{1}{2} \times 5\frac{1}{2}$ | 3 1/2 lbs. |
| 100VA/115-1000 | 100VA | 115-1000 | CPS 1 | $3\frac{3}{4} \times 3\frac{1}{2} \times 5\frac{1}{2}$ | 3 1/2 lbs. |

Typical Frequency Curve.



Also ask about DC-DC units including standards to 500 Watts from 28 VDC input; and AC-DC supplies including standard 400 cps three phase units.



UAC Electronics

A DIVISION OF

Universal Transistor Products Corp.

Dept. EC 97 • 36 Sylvester St. • Westbury, L. I., N. Y. • Edgewood 3-3304

IN CANADA: ELECTRONIC ENTERPRISES REGD.
551 OAKWOOD AVE., TORONTO 10, ONT.



Model EFB \$99.50 Net

New! Super-Filtered DC for transistor design work

Less than 15 millivolts AC ripple up to max. load

DC Power... for precision laboratory and design work.

- Dual range—0-32 volts up to 4 amperes
0-16 volts up to 8 amperes
- Internal Impedance: 4 ohms at 32 volts
2 ohms at 16 volts
- Smooth voltage control with continuously variable carbon brush-type auto transformer
- Long-life selenium rectifiers—patented heat sink cooling

Model EB dual range DC Power Supply, same as above except 5% ripple.

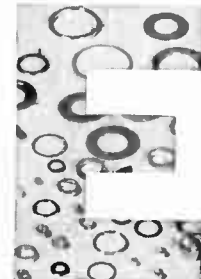
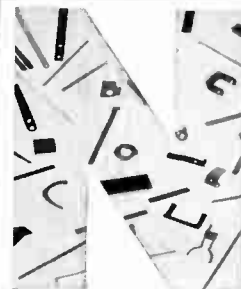
Send for new Bulletin EFB



MORE DC POWER
PER DOLLAR

ATLAS RADIO CORP. LTD.
50 Wingold Avenue
Toronto 10, Ontario

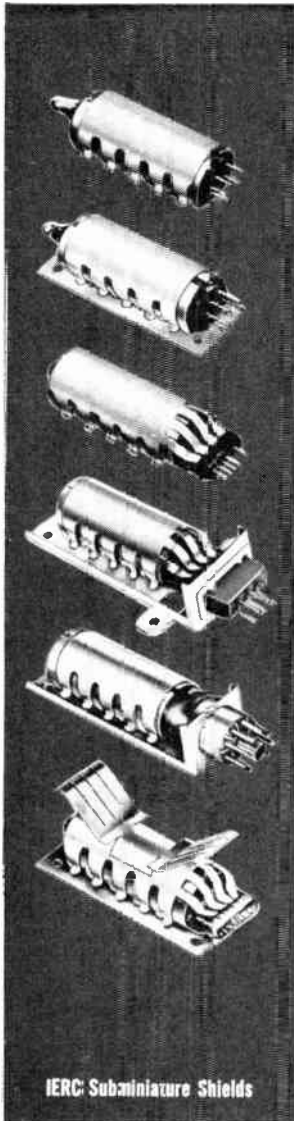
NEY'S SMALL PARTS PLAY A BIG PART IN PRECISION



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Consult Ney's Engineering Dept. on any problem involving precious metals to improve your products.

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Specialists in Precious Metal Metallurgy since 1812



IERC Subminiature Shields



IERC Military "B" Type Miniature Shields
Meets MIL-S-9372B (USAF) Meets MIL-S-242A (SHIPS)

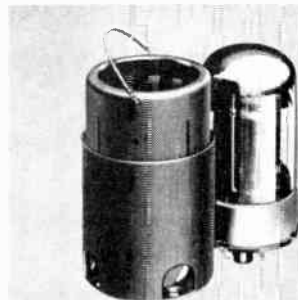


IERC Miniature Hardmount Shields

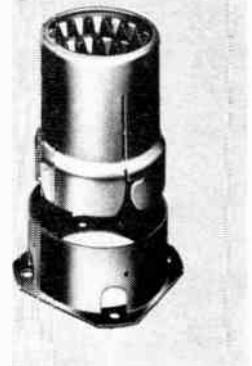
At the Canadian IRE show
booth 262 has it!



IERC "TR" Shields Meets MIL-S-19786A (NAVY)



IERC Octal / Power Shields



See the only complete line --- IERC's Heat-dissipating Electron Tube Shields for maximum cooling, retention, shock protection and longest tube life!



If you can't be at the show, be sure to write our company letterhead for the IERC Heat-dissipating Tube Shield Guide and other IERC Technical Bulletins.



IMPORTANT PRODUCT PREVIEWS of miniature and subminiature right angle heat-dissipating tube shields for printed circuit applications will be shown for the first time. Other special heat-dissipating tube shields including new IERC types for the 6094 size tube will also be on display.

New IERC HEAT-DISSIPATING TUBE SHIELD GUIDE—the first informative guide of this type ever to be compiled and offered to the electronic industry will be available free to visitors at our booth (262) during the Canadian IRE. The IERC Guide provides practical, accurate information which helps electronic engineers get increased electron tube life and reliability through proper matching of tube and tube shield for maximum cooling, retention and protection against shock and vibration. More than 1,400 helpful combinations are included in the 20-page Guide.

PATENTED OR PATS. PEND. CROSS-LICENSED WITH NORTH AMERICAN AVIATION, INC.

FOR FAST CONVENIENT SERVICE in your area, contact our Canadian representative: R-O-R Associates Limited, John S. Root, 147C Don Mills Road, Ontario. Hickory 4-4429.

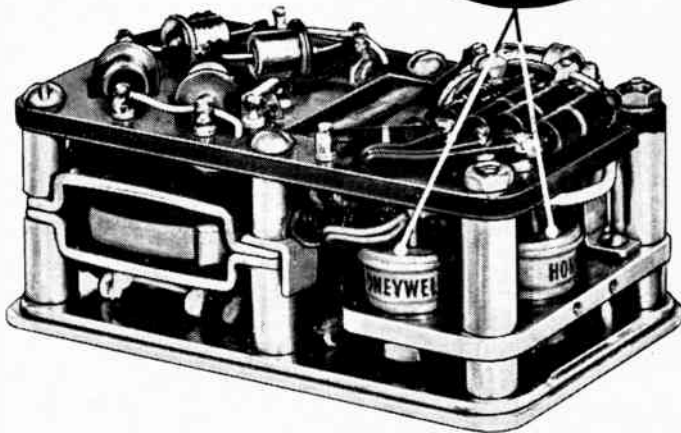


electronic research corporation
145 West Magnolia Boulevard, Burbank, California

Mightiest Little Transistor



Actual size



Honeywell Weld-Seal H6 Transistors make this 48-watt, 12 oz., D.C. power converter more compact than any other.

STRONGER, MORE COMPACT, MORE FLEXIBLE AND MORE POWERFUL FOR ITS SIZE THAN ANY OTHER TRANSISTOR

Honeywell Weld-Seal Transistors are designed specifically for

- D.C. Power Converters (shown above)
- Amplifier for Servo Motors
- Voltage Regulation

When compactness and high power are both vital, Honeywell's Weld-Seal Transistors are your best answer; they combine smaller size per power output with greatest flexibility and interchangeability.

Honeywell Weld-Seal Transistors offer a narrow span of characteristics — plus superior electrical performance and high uniform power gain over a wide range of collector current values; and have a maximum emitter current, R.M.S. of 3.5 amps.

They are hermetically sealed by welding — ensuring ruggedness, long life and outstanding performance. For complete details, contact your local Honeywell Office, or write to Honeywell, Toronto 17, Ontario.

Honeywell

15 Offices
across Canada



First in Controls

True Hermetic Sealing
assures Maximum Stability in

AMPERITE RELAYS and REGULATORS

Simplest • Most Compact • Most Economical

Thermostatic DELAY RELAYS

2 to 180 Seconds



STANDARD

PROBLEM? Send for
Bulletin No. TR-81



MINIATURE

• 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

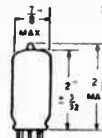
consume approximately 2 W. and may be operated continuously. The units are most compact, rugged, explosion-proof, long-lived, and — very inexpensive!

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

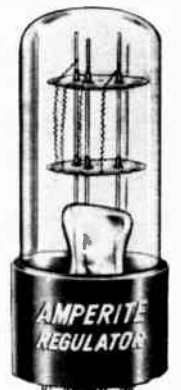
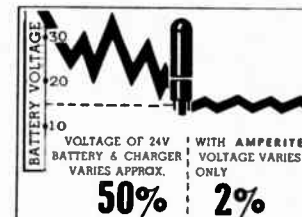
Also — Amperite Differential Relays: Used for automatic overload, under-voltage or under-current protection.

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. Operate on A.C. D.C., Pulsating Current.



Hermetically sealed, they are not affected by changes in altitude, ambient temperature (-55° to $+90^{\circ}$ C.), or humidity. Rugged, light, compact, most inexpensive.



Write for 4-page Bulletin No. AB-51

AMPERITE CO., Inc.
561 Broadway, New York 12, N. Y.
Telephone: CAnal 6-1446

In Canada: AHas Radio Corp. Ltd.
50 Wingold Ave., Toronto 10.



Individual inspection
and double-checking
assures top quality
of Amperite products



a comprehensive
**Telecommunication
 Engineering Enterprise**

The largest telecommunication manufacturing organisation in the British Commonwealth **Standard Telephones and Cables Limited** covers the whole waterfront of telecommunication engineering and is engaged in the research, development, manufacture and installa-

tion of all types of communication and control systems.

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

'Standard' productions include:—

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



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

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

News Report

Record Attendance For RETMA-IRE Golf Tournament

Representatives of the Radio-Electronics-Television Manufacturers Association of Canada and of the Institute of Radio Engineers attended the Annual RETMA-IRE Golf Tournament at the Cedar Brae Golf and Country Club at Scarborough, near Toronto, on September 24th. Nearly two hundred people attended the dinner and over one hundred golfers took part in the

tournament.

Head table guests included: N. Chapman, Chairman of the Hamilton Section of IRE; S. D. Brownlee, RETMA Vice-President and Chairman of the RETMA Receiver Division; R. A. Hackbusch, RETMA Director of Engineering and President of the Canadian Radio Technical Planning Board; H. Jackson, Chairman of the Toronto Section of the IRE; D. Knapp, Chairman of the 1957 RETMA-IRE Golf Tournament Committee; W. H. Jeffery, President of RETMA; L. A. Stopps, RETMA Vice-President and Chairman of the RETMA Components Division; and F. W. Radcliffe, RETMA General Manager.

Canadian Line Materials Appoints John Bell

L. E. Messinger, president and managing director of Canadian Line Materials Ltd. has announced the appointment of John Bell to handle all CLM products in Manitoba from the newly established sales office in Winnipeg.



J. BELL

Mr. Bell will continue to serve customers in Manitoba, as in the past with the E. M. Brydon Co. under the direction of the late Earl Brydon.

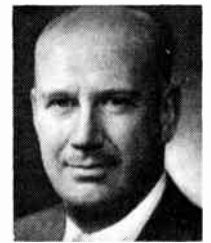
Mr. Bell has been handling sales of CLM products on an exclusive basis since 1948. Prior to that he was associated with Canada Wire and Cable Co.

C. P. Clare Canada Ltd. Reorganizes

G. Douglas Zimmerman of Toronto recently announced formation of C. P. Clare Canada Ltd. The new company, to manufacture and sell Clare electronic components, is financed and entirely managed by Canadian industrialists, headed by Mr. Zimmerman, managing director of Fischer & Porter (Canada) Ltd. Mr. Zimmerman observed that Canadian financing and management of an American founded concern marks a realistic U.S. approach to the job of obtaining more business in Canadian markets.



G. D. ZIMMERMAN




C. P. CLARE

Officers of the new industry are: Mr. Zimmerman, president; M. E. Prichard, Chicago, vice-president; Kenneth F. Waldron, Toronto, secretary-treasurer, and G. F. Crossman, Toronto, assistant secretary.

Carl P. Clare, Chicago electronics manufacturer, will be chairman of the board of directors. He is president of C. P. Clare & Co. of Chicago and Fairview, N.C. Other directors are: Maxwell Goldhar, Toronto chartered accountant and director of several prominent Canadian companies, and Messrs. Prichard, Waldron and Zimmerman.

Headquarters of C. P. Clare Canada Ltd. will be at 2700 Jane Street, Toronto,



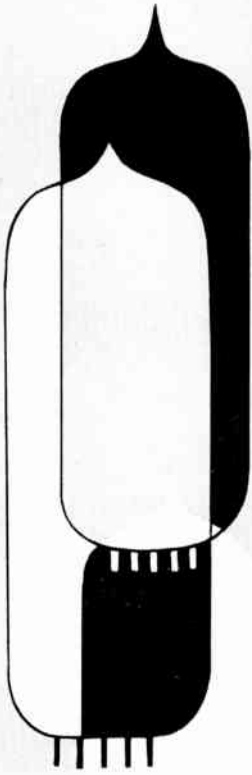
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LM ERICSSON

MINIATURE, LONG-LIFE TUBES

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| 5842/417A | 5847/404A | 6028/408A |
| 6927/6J6L | | 6928/6AQ5L |



- 10,000 hour lifetime for most types
- Quality and performance tested
- Ruggedized—mechanical robustness far exceeds international standards
- Specially selected high quality materials throughout
- Available from stock

Ericsson Telephone Sales of Canada Limited
130 Bates Road, Montreal, 8, P.Q.

Please send me full information on your long life electronic tubes.

Name:

Company:

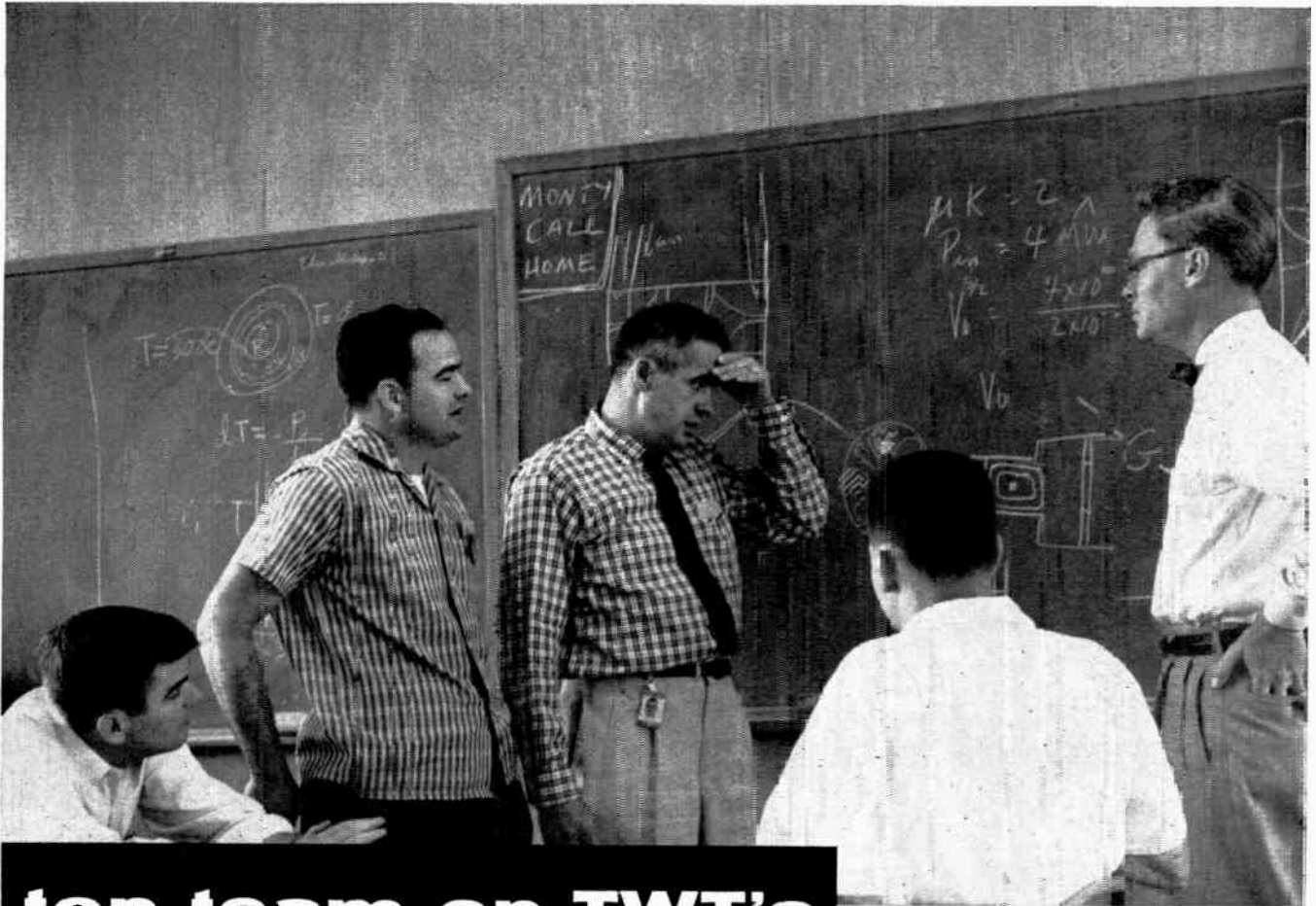
Address:

City: Prov.:

ERICSSON

TELEPHONE SALES
OF
CANADA LIMITED

For further data on advertised products use page 105.



top team on TWT's

Advanced wave tube design being discussed at Varian by Jack Ruetz, Monty Rogers, Willis Yacom, John Sullivan and Wells Dodds.

Traveling-wave tubes, as any of the men above will tell you, are slated for an important place in the world of electronics. And these men, backed by Varian know-how, are out to assure the fullest possible realization of the wave tube's promising future.

With one of the industry's most competent wave tube development groups, Varian is geared to meet a wide range of difficult challenges in its field . . . applying to newer systems problems the same know-how and teamwork that just a few years ago established Varian's leadership in klystrons.

Many new ideas and applications are on the way, to back up the success of tubes like the VA-121 and VA-161 shown here. The entire Varian wave tube team is ready to go to work for you, to shape up a wave tube application or come up with the answers you've been looking for. Write or call your Varian representative or Varian's Application Engineering Department.



VA-121 traveling-wave amplifier-synchrodyne or serrodyne driver for high power S-band pulse applications. Performs to detailed specifications of phase and amplitude stability to meet the stringent requirements of phase-coherent MTI radar systems.

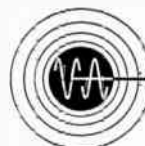
| | |
|--------------------|-------------|
| Power Output | 25-40 watts |
| Saturation Gain | 30 db min. |
| Duty Cycle | .01 max. |
| Beam Voltage | 2250 volts |
| Grid Pulse Voltage | + 27 volts |

VA-161 backward wave oscillator for use in tunable radar local oscillator, countermeasure and bench and test applications. In the frequency range from 8.2 to 12.4 kMc.



| | |
|------------------|--------------------------|
| Power Output | 30 to 120 mW |
| Anode Voltage | 150 to 600 volts |
| Permanent Magnet | |
| Size: | 4 1/8 x 5 x 6 1/2 inches |
| Weight: | Approx. 6 lbs. |

THE
MARK OF
LEADERSHIP



VARIAN associates
OF CANADA, LTD. • GEORGETOWN, ONTARIO

KLYSTRONS, TRAVELING WAVE TUBES, BACKWARD WAVE OSCILLATORS, LINEAR ACCELERATORS, MICROWAVE SYSTEM COMPONENTS, R. F. SPECTROMETERS, MAGNETS, MAGNETOMETERS, STALOS, POWER AMPLIFIERS, GRAPHIC RECORDERS, RESEARCH AND DEVELOPMENT SERVICES

ELECTRONICS & COMMUNICATIONS, OCTOBER, 1957

For further data on advertised products use page 105.

News Report

New Location For Servomechanisms Canada Ltd.

Servomechanisms (Canada) Limited has in the last twelve months assumed a major position in the world-wide field of aircraft instrumentation and automatic control equipment. Not only has it assumed the business in Canada formerly carried on under the name of Industrial Electronics of Canada Limited, but it has also been made the exclusive channel for world-wide distribution of the products and

services of Servomechanisms Incorporated of New York and Los Angeles, of which the Canadian organization is an integral part.

The company is now located in new quarters at Rexdale Boulevard and Kipling Avenue, Toronto 15, Ontario.

The Canadian company is currently operating at approximately double the level of last year's activity and present contracts call for a further doubling of business in 1958.

The senior personnel of the company are: Mr. C. H. Hartley, president, Mr. D. C. Stewart, treasurer and general manager, Mr. J. H. Legere, chief engineer, and Mr. S. A. Rutland, government contracts administrator.

Spaulding Fibre Co. Appoints Sales Manager

Thomas C. Drees, has been appointed Sales Manager of the Spaulding Fibre Company, Inc., manufacturers and fabricators of phenol fibre, vulcanized fibre, pressboard and rag paper insulation.



T. C. DREES

Under his direction, Mr. Gordon Fordham and Frank Avann, P.Eng., sales engineers are covering the Toronto area, Mr. Bill Christensen, Hamilton, London and Guelph area, and Mr. M. P. Komar, Montreal and Quebec area.

The office, which is located at 106 Lakeshore Road East, Port Credit, Ontario, is under the management of Mr. G. M. Whitley.

Fred Lesser Joins Transitron Inc.

Fred R. Lesser, formerly with Electrodesign of Montreal and well known to the Canadian electronics industry, has recently left Canada to take up the appointment of sales and marketing manager of Transitron Inc., Division of Van Norman Industries, 186 Granite Street, Manchester, New Hampshire.

Walter G. Ward Named General Manager

The appointment of Walter G. Ward as general manager of the apparatus department of Canadian General Electric Company Limited was announced recently by J. Herbert Smith, president.

In his new capacity, Mr. Ward succeeds Mr. Smith, who earlier was elected president of the company.



W. G. WARD

Following war-time service as a lieutenant - commander (radar and communication) in the Royal Canadian Navy, Mr. Ward rejoined the company in 1945 as manager of the electronic equipment section.

He was appointed manager of the major appliance operation in Montreal in 1952 and general manager of the appliance department in 1954. Following an assignment on organizational work with the General Electric Company he was appointed manager of induction motors in Peterborough in 1956. Earlier this year he was named general manager of the wholesale department.



CLM RECTIFIERS nurse your batteries

You'll protect your investment in station-type batteries when you install CLM Electronic Regulated Selenium Rectifiers.

CONSTANT OUTPUT VOLTAGE. In a CLM rectifier the output voltage is kept constant from no load to full load which increases battery life.

SELF-PROTECTING. CLM rectifiers are self-protecting on overload as the voltage curve drops off rapidly after 115 percent load is reached. CLM electronic regulated rectifiers are convection cooled, noiseless and require a minimum of maintenance.

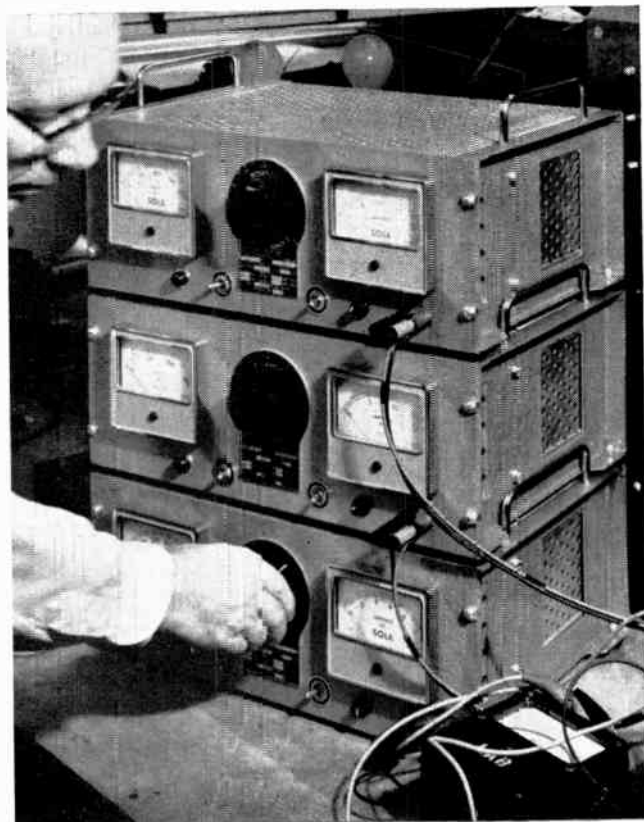
FREE BULLETIN. For your free copy of Bulletin SR-14 which describes in detail, the performance characteristics of CLM rectifiers for station-type batteries write: Jack West, Sales Manager, Rectronic Division, Canadian Line Materials Limited, Toronto 13, Canada.



SELENIUM RECTIFIERS



COMPACT, CONVENIENT three-high stacking of the new adjustable Sola Constant Voltage DC Power Supply is shown in the typical laboratory bench setup above. Below, engineer "dials" specific test voltage desired from each of the three standard models of "DC Solavolts" shown.



A versatile DC supply for men who design or test electrical and electronic equipment prototypes

Do you design or test "prototypes?" If so, and you're seeking a laboratory source of high-current DC voltage, it will pay you to use the "DC Solavolt." It's a moderately-priced, adjustable, regulated dc power supply that provides unusual stability with intermittent, variable, or pulse loads. Output voltage is regulated to within $\pm 1\%$ though supply voltage may vary as much as $\pm 10\%$. Ripple is held to 0.1% or less.

Electrical specifications of the six stock "DC Solavolts" available appear in the table below:

All Inputs 100-130 volts, 60 cps

| Catalog Number of Stock Units | Regulated Adjustable Output Voltage Range | Rated Loadings in Amperes | | Ripple* Voltage—% of Total Output |
|-------------------------------|---|---------------------------|-------------------------|-----------------------------------|
| | | At max. Voltage Setting | At min. Voltage Setting | |
| 28510 | 5-35 | 7.0 | 7.0 | 0.10 |
| 28520 | 25-60 | 4.0 | 6.0 | 0.05 |
| 28530 | 30-90 | 2.8 | 4.0 | 0.04 |
| 28540 | 60-180 | 1.4 | 2.0 | 0.03 |
| 28550 | 150-250 | 1.0 | 1.5 | 0.02 |
| 28560 | 250-400 | 0.6 | 0.75 | 0.02 |

*Figures in this column cover ripple voltages measured at full rated load and input of 115 volts.

Along with these laboratory standards of performance, the DC Solavolt offers compactness, low weight, high efficiency, and high short-time overload capacity. All stock models occupy only 7" of height and 12 $\frac{1}{4}$ " of depth on a standard 19" relay rack frame. There are no tubes to replace, no compensating adjustments are needed, and no maintenance is required. Carrying handles, available as accessory equipment, provide "one-man" portability and self-stacking. Your local electronic distributor, who stocks the DC Solavolt, will be happy to give you further information.



Write for Bulletin 32J-DC-245
SOLA ELECTRIC (Canada) Ltd.
102 Laird Drive, Toronto 17, Ont.

SOLA *Constant Voltage*
DC POWER SUPPLIES

Giant Step For Canadian Closed-Circuit TV

Last month — September 18th — 5,500 B-A Oil dealers across Canada watched an hour-long closed-circuit telecast. The show was designed by B-A to introduce the firm's entire sales force, *simultaneously*, to Velvet 98 — a new, high-octane gasoline.

It was the first time Canada's growing microwave had been used in its entirety: the show was sent from Toronto to Montreal, Ottawa, London, North Bay, Port Arthur, Winnipeg, Regina and Saskatoon.

Produced at Toronto's new Queen Elizabeth Theatre, the show was

received in each of the connected cities and projected onto giant screens by the new GPL 611A large-screen television projectors — latest product of General Precision Laboratories. Technical operation and staging was handled by Canada's closed-circuit TV pioneers — TelePrompTer of Canada Limited.

The show was shot with two Pye Image Orthicon studio cameras and a Pye Video Mixer. Three Pye monitors were used in the control room.

Since this was a stage show at the Queen Elizabeth Theatre, as well as a

telecast, 80 foot-candles of light was required. TelePrompTer's lighting director used 20 scoops, 20 - 750 spots and 2 extra dimmer boards, besides the theatre's permanent lighting equipment.

Audio equipment used was a 10-channel McCurdy audio mixer, a 4-channel RCA mixer and 14 mikes (including lapel and boom mikes). Local looping was provided by the various telephone companies, who used both microwave links and coaxial cables. Microwave links were used in Montreal (BTC), Ottawa (BTC), Toronto (BTC), London (CNT), Fort William (BTC) and Regina (SGT).

Coaxial cables formed the loops in North Bay (BTC), Winnipeg (MTS) and Saskatoon (SGT).



● Photograph shows one of the Pye Image Orthicon studio cameras with TelePrompTer equipment attached which was used to shoot Canada's biggest closed-circuit TV hookup.

Aside from the obvious production necessities the success of the telecast depended entirely on the projection equipment set up in the various viewing cities. TelePrompTer chose the new GPL 611A large-screen TV projector. Ten of these GPL's were brought in from the United States and shipped to the locations across Canada.

TelePrompTer — who already have ten 611A television projectors and two Fleetwood TV projectors across the country, announced plans last week to station another three of the GPL's in other cities soon. TelePrompTer's president, Spence Caldwell, adds: "We expect to keep pace with the completion of the trans-Canada microwave . . . by the time the coast-to-coast network is ready we intend to have large-screen projection equipment in every major city on the line."

When you buy
SPRINGS
QUALITY
COUNTS

You can count on quality when you buy from Bohne because they are specialists in the field of precision spring making. Industry is constantly calling on Bohne "know-how" for economical spring production. Send your sample, blueprint or specifications for quotation.

BOHNE INDUSTRIES LIMITED
1153 QUEEN ST. W. • TORONTO 3



for
analog computer
readout:

modern, compact, mobile

SANBORN CONSOLE RECORDING SYSTEMS

Up to eight problem variables can be recorded in inkless, permanent, rectangular-coordinate tracings — with Sanborn's improved six- and eight-channel 156-, 158-5490 Console Systems. Less than four feet high and about two feet in width and depth, these Systems are completely mobile and designed for maximum operating convenience. Controls and indicators on the sloping top panel include individual-channel attenuation, position, balance, sensitivity and stylus heat adjustments; switch for turning off B+ of output amplifiers; chart drive motor switch (can also be remotely controlled); code marker and/or one-second interval timer stylus switch. The Recorder unit, either six or eight channels, features paper loading from the top, and nine precisely controlled speeds from 0.25 to 100 mm/sec. Four dual-channel DC Driver Amplifiers of current feedback design are housed below the Recorder, and are mounted on a chassis which may be withdrawn for inspection.

Electrical specifications of the Console Recording Systems include a basic sensitivity of either .01 volt/chart division (5490 types) or 0.1 volt chart division (5495 types); linearity of 1%; drift less than 1/2 chart division/hour (5490), less than 1/20 chart division hour (5495); flat frequency response to 20 cps, down 3 db at 60 cps for all amplitudes to 5 cm peak; either single-ended or push-pull input signals of 5 meg. impedance (each input lead to ground).

A useful companion instrument is the new Sanborn Model 183 Programmer, designed to provide a connecting link between an analog computer and the Console Recording System. Shown mounted at the top rear of the Console, the Programmer operates the Console in the following automatic sequence: turns recorder drive on — feeds calibration signals to all channels — reads initial DC levels of computer — closes contacts to start computer problem — records computer output for a preset chart length — turns off recorder drive and resets itself for another cycle.

Further technical data, prices and delivery information — on the 5490-5495 Console Recording Systems and two- to eight-channel 5475-5480 Systems are available on request from your Sanborn Sales-Engineering Representative or the Industrial Division in Waltham.



SANBORN COMPANY

INDUSTRIAL DIVISION

175 Wyman Street, Waltham 54, Massachusetts

Canadian Representative:

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

Westinghouse 2-Way Radio

*puts scattered plant vehicles
as close to you as this mike!*



WHEREVER they're working, you reach all your vehicle operators *instantly*. You co-ordinate action . . . deliver instructions without delay . . . keep your equipment *on the job*, carrying more payloads per day! Westinghouse Link 2-Way Radio eliminates *all* the costly factors that slow up materials handling—idle time, dead mileage, confusion and paperwork!

Obtain the facts! A Westinghouse communications specialist will show you actual case histories—he'll point out the cost savings of others. Let him analyze *your* operations and explain how a Westinghouse Link 2-Way Radio system can make similar savings for *you*.

Take advantage of this service. Just call your nearest Westinghouse office or write Electronics Division, Canadian Westinghouse Company Limited, Hamilton, Canada.

WESTINGHOUSE ELECTRONICS

57C745

News Report

Syntron (Canada) Limited Names General Manager

Syntron (Canada) Limited, Stoney Creek, Ontario, manufacturers of electromagnetic vibratory equipment, announces the appointment of William



W. B. ARMSTRONG

B. Armstrong to the position of general manager. His previous position was that of Western District manager and general sales co-ordinator, a post he filled since January 1st, 1956. Mr. Armstrong began with Syntron in October, 1954, as district salesman, Toronto, Canada.

Radium Dial Corp. Buys Radelin-Kirk Montreal

Radium Dial Corporation of 920 McEachran Avenue, Montreal, has announced the purchase of the Montreal plant of Radelin-Kirk Limited, formerly a wholly-owned Canadian subsidiary of United States Radium Corporation.

The company, an affiliate of both Airborne Equipment and United Aviation is headed by Vince Cochrane, and specializes in the manufacture and refinishing of all aircraft instrument dials and panels, serving the aircraft industry from coast to coast. Under the terms of the sale agreement, the research and manufacturing facilities of U.S. Radium remain available to the Canadian company and an expansion program is now in progress.

The application of radium finishing in the electronics field is being considered and it is expected that a service to electronic equipment manufacturers and users will become available once this program is completed.

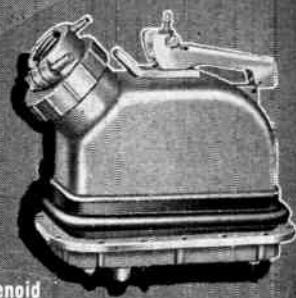
New Carbide Chemicals Plant in Montreal

The polyethylene and petrochemicals plant of Carbide Chemicals Company, Division of Union Carbide Canada Limited, was officially opened on October 2nd by the Hon Paul Dozois, Minister of Municipal Affairs, Province of Quebec. More than 200 representatives of business, education and government attended the ceremony at a luncheon in the Sheraton Mount Royal Hotel. A. A. Cumming, President, Union Carbide Canada Limited, commented on the diversified activities of Union Carbide in Canada.

An unusual feature was the use of closed circuit television to link the luncheon guests with the plant in Montreal East, 15 miles away.

1915-1967

Cannon quality
in missile
launching connectors
means safety



GMA-Solenoid
or Manual Release.
41 to 140 Contacts.
Coaxials Available.



GMJ-Skid Away
Release. 18 Size
14 Contacts.

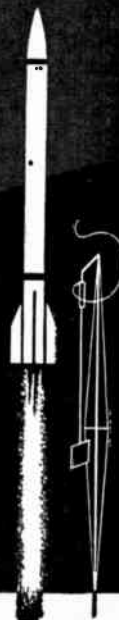
GMD-Skid Away
Release. 22 or 50
Size 14 Contacts.

Performance of missile launching connectors cannot be "hit or miss." It must be right! That's where Cannon's reputation for quality and design experience can help you with the most complete and most reliable line available.

Write TODAY for
GM1 Bulletin.

CANNON PLUGS

CANNON ELECTRIC CANADA LTD.
160 Bartley Drive,
Toronto 16, Ontario. 5636



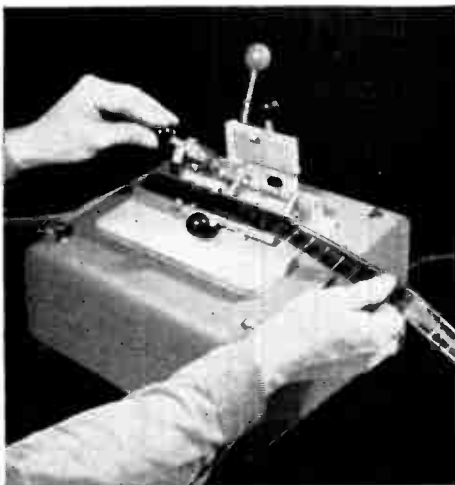
For further data on advertised products use page 105.

THE NATIONAL SCENE

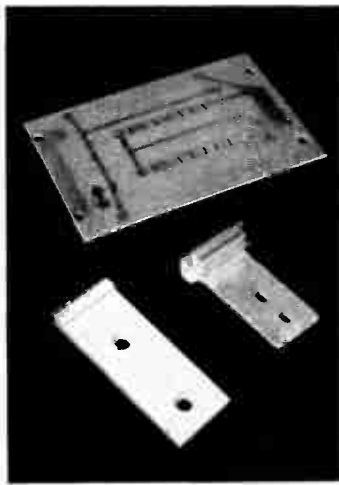


"YOU FRAMED ME, NICK. AND I TOLD YOU I'D GET SQUARE. NOW . . ." And then the film broke! Film breakage—cause of movie audience irritation in the "old days"—is a minor problem today. Tomorrow

it will be a rarity. *Reasons:* Newly developed, polyester base motion picture film of unusual strength and durability (duPont "Cronar," for example) and better film splicers like that shown here.



NATIONAL HELPS NEW SPLICER BOND FILM INSTANTLY—without disturbing original molecular orientation. Non-acetate film cannot be spliced satisfactorily by conventional methods. So the new device, developed by Shepard Laboratories, Inc., uses intense high-frequency heat to fuse the film instantly—without "burning" or affecting grain, high strength or durability. Side result: a superior splicer for all types of film.



IMPROVES PERFORMANCE—KEEPS COSTS DOWN. PHENOLITE[®], used in electrode supporting blocks, offers complete resistance to carbonizing. Copper-clad PHENOLITE for printed circuits cuts costs and improves circuitry. Shepard tells us: "PHENOLITE passed our tests . . . Reasonable price holds our costs down."

NATIONAL CAN HELP YOU

reduce unit product cost or improve product performance at no added cost. Here's why: You can select the "one best material" from over 100 grades of PHENOLITE[®], Vulcanized Fibre and National Nylon—without compromise in properties or cost. You can simplify production and purchasing with the timed delivery of 100%, usable parts—from a single, reliable source. You gain competitively with National's new materials and grades—the direct results of programmed materials research. You benefit by calling National first. Check the Telephone directory Yellow Pages, or write Toronto direct, address Dept. O-10.

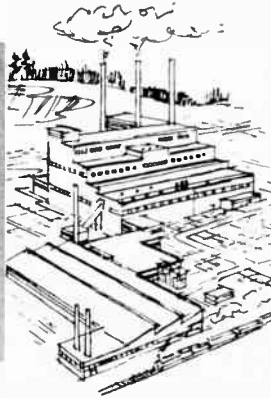
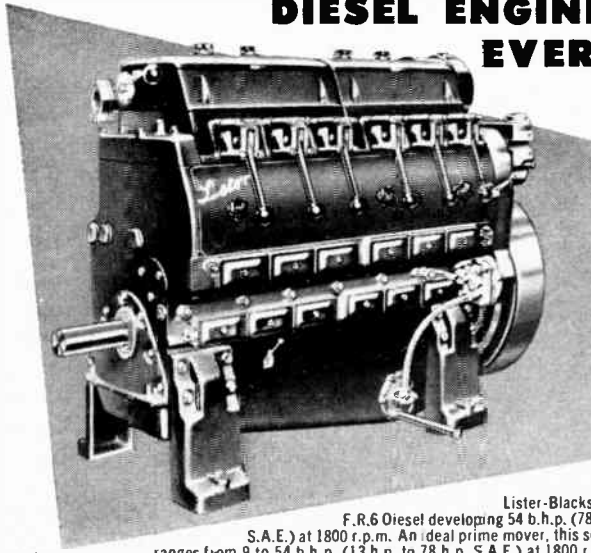


NATIONAL

FIBRE COMPANY OF CANADA, LTD.

ATLANTIC & HANNA AVENUES, TORONTO
1411 CRESCENT STREET, MONTREAL

DIESEL ENGINES FOR EVERY PURPOSE



Lister-Blackstone
F.R.6 Diesel developing 54 b.h.p. (78 h.p. S.A.E.) at 1800 r.p.m. An ideal prime mover, this series ranges from 9 to 54 b.h.p. (13 h.p. to 78 h.p. S.A.E.) at 1800 r.p.m.

Built in a tradition of reliability, Lister-Blackstone engines incorporate the very latest improvements in Diesel design. The full line includes engines from 3½ to 600 h.p. and there are models for every purpose. Ease of maintenance and economical operation are assured when you specify Lister-Blackstone. Service and spare parts are available from coast to coast. *Write for Bulletin F.R.1-6.*

CANADIAN LISTER-BLACKSTONE LIMITED

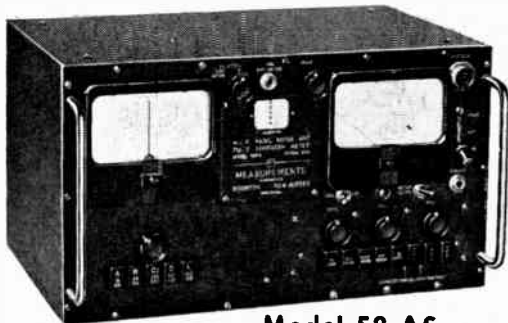
1921 EGLINTON AVE. E., TORONTO 13 • 3135 WEST BROADWAY, VANCOUVER
25 ST. JAMES ST., VILLE ST. PIERRE, MONTREAL

Distributors: B.C. Equipment Co. Ltd., 551 Howe Street, Vancouver • Bruce Robinson Electric (Edm.) Ltd., 10056-109th Street, Edmonton • Medland Machinery Limited, 576 Wall Street, Winnipeg • Russel-Hipwell Engines Ltd., Owen Sound • Consolidated Engines & Machinery Co. Ltd., 5645 Pare Street, Town of Mount Royal, P.Q. • Russel-Hipwell Engines Ltd., 1298 Barrington Street, Halifax • Clayton Construction Co., Ltd., P.O. Box 118, Muir Bldg., St. John's, Nfld.

MEASUREMENTS' *improved*

VHF Radio Noise and Field

Strength Meter



Model 58-AS

USES

- ▶ For measuring electrical noise
- ▶ As a tuned r-f voltmeter
- ▶ As a null indicator for r-f bridges and slotted lines
- ▶ For directional-antenna pattern measurements
- ▶ For signal-to-noise ratio measurements
- ▶ For measurement of harmonics
- ▶ As a carrier-voltage meter
- ▶ As a field-strength meter

The new Model 58-AS meets all requirements for a modern portable instrument for the measurement of radio noise originating from electrical devices — for field-strength surveys, and wherever the use of a tuned radio-frequency voltmeter is required. It is designed to measure radio interference as required by military specifications.

SPECIFICATIONS

- Frequency Range:** 15 to 150 Mc in five bands directly calibrated to ±2% accuracy.
- Voltage Range:** Linear — 10 microvolts to 0.1 volt full-scale.
Logarithmic — 100 microvolts to 1 volt full-scale.
- Attenuators:** R-F Input Attenuator — 60 db in 3 steps.
I-F Attenuator — 20 db in 1 step.
- Circuit:** Superheterodyne with tuned r-f amplifier having 72-ohm balanced input.
- Detector Response:** Average, quasi-peak and peak "slide-back" response.
- Gain Standardization:** Calibrated internal "shot noise" diode.
- Bandwidth:** Impulse bandwidth of 150 Kc.
- Power Supply:** 117 volts, 50-60 cycles, 55 watts

Send for bulletin

In Canada: **H. Roy Gray, Ltd.**
46 Danforth Road, Toronto, Ont.

News Report

Lee Bern & Company Moves

Lee Bern & Company Limited, one of Western Canada's leading electronics and electrical wholesaling houses, has moved from its former location at 72-74 Princess Street to 341 William Street in downtown Winnipeg. The new premises consist of approximately 14,000 square feet of floor space from which central location the operations of Lee Bern & Company Limited, and its subsidiary, Radio Supply Company Limited, and their branches at Edmonton, Saskatoon and Fort William, are now directed.

Lee Bern & Company Limited are exclusive distributors for Dominion Electrohome Industries Limited in Manitoba and the Lakehead District.

RCA Electronics Division Appointments Announced

R. J. Good, who has been appointed manager, Defense Electronic Systems Engineering, RCA Victor Company, Ltd., is a B.Sc., University of Toronto. Mr. Good has been with RCA Victor seven years. His experience ranges from installation and maintenance of electrical and radio equipment to development work on the CF-105 all-weather jet interceptor.

E. W. J. Morris was recently appointed manager, Contracts Administration, Defense Electronic Systems Engineering, RCA Victor Co. Ltd. Mr. Morris has been with RCA Victor since January, 1954, his responsibility prior to this new appointment being the administration of all RCAF and microwave projects.

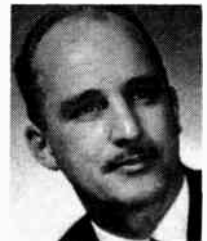
D. R. Sherwin is the newly appointed manager, Operations and Engineering, RCA Victor Defense Electronic Systems Engineering. A B.Sc., London University, and a graduate of the



E. W. J. MORRIS



D. R. SHERWIN



R. J. GOOD

College of Aeronautical Engineering, London. Mr. Sherwin has had technical experience ranging from aircraft structural design to process development on gas turbines.

Laboratory Standards

MEASUREMENTS CORPORATION

BOONTON, NEW JERSEY

CKSL *proved it!*



STATION TECHNICIANS PLAYED A REEL OF "SCOTCH" MAGNETIC TAPE

twice each day for nine months!



"It was the first time we had checked the life of a tape. Frankly, we were surprised at the punishment that "SCOTCH" Brand Magnetic Tape III-A can take. Each day the spool was played twice and rewound twice on high speed equipment. Yet no distortion could be detected and a low noise level was maintained. Another thing, it erased clearly and did not curl throughout this nine-month period."

Ron Turnpenny, Director of Engineering, CKSL, London, Ontario.

On battery-operated portable tape recorders, the technicians of this same station have also found that "SCOTCH" Brand Magnetic Tape 120A provides higher output and reduces noise and overload problems.



TRADE MARK
SCOTCH
 BRAND
Magnetic Tapes



MINNESOTA MINING & MANUFACTURING OF CANADA LIMITED, LONDON • CANADA

Sales Offices: Halifax • Montreal • Toronto • Winnipeg • Calgary • Vancouver

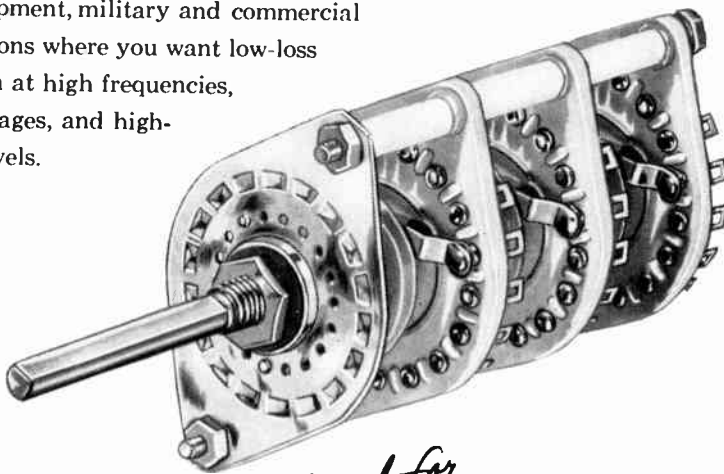
Resident Salesmen: Moncton • Quebec City • Ottawa • Hamilton • North Bay • Regina • Saskatoon • Edmonton

**Handles a Kilowatt
with ease**

Centralab Series PA-230 Rotary Power Switch

*The most versatile multiple-circuit
rotary power switch available*

Switching configurations up to 24 positions, shorting or non-shorting. Meets all your requirements for transmitters, industrial test equipment, military and commercial applications where you want low-loss operation at high frequencies, high voltages, and high-power levels.



Designed for **ruggedness,
accuracy, long life**

- Sections are Grade L-5 Steatite. Voltage breakdown, 3000 volts R.M.S. between critical parts.
- Ball-bearing index insures positive positioning.
- Square rotor shaft, combined with mating Monel driver, provides rotational accuracy throughout length of switch.
- Coin-silver contacts, for excellent current-carrying characteristics.

Customer's problem: Needed 540 contact combination.

◀ Solution: This 30-section Centralab Series PA-230 switch.

Centralab can solve *your* switch problems.

Centralab Canada Ltd.

804 Mt. Pleasant Rd, Toronto 12, Ontario

A DIVISION OF GLOBE-UNION INC.
964J E. Keefe Ave., Milwaukee 1, Wis.

In Canada:
804 Mt. Pleasant Rd., Toronto, Ontario

**New 36-page
Switch Catalog.**

*Write for
free copy today.*



News Report

Dominion Fasteners Increase Plant Facilities

Necessitated by the rapid development and acceptance of their fastener service to industry, Dominion Fasteners Limited announce the completion of additional manufacturing space at their plant in Hamilton.

This new extension will increase present facilities by more than 25 per cent . . . for the warehousing and production of the famous Tinnerman Speed Nut brand fasteners as well as other spring steel fastening devices.

Eimac Appoints New Canadian Representative

Eitel-McCullough, Inc., San Bruno, California manufacturer of Eimac electron-power tubes, has announced the appointment of R. D. B. (Ben) Sheppard, P.Eng., as its new Canadian Field Representative. His offices are at 2036 Prince Charles Road, Ottawa 3, Ontario.

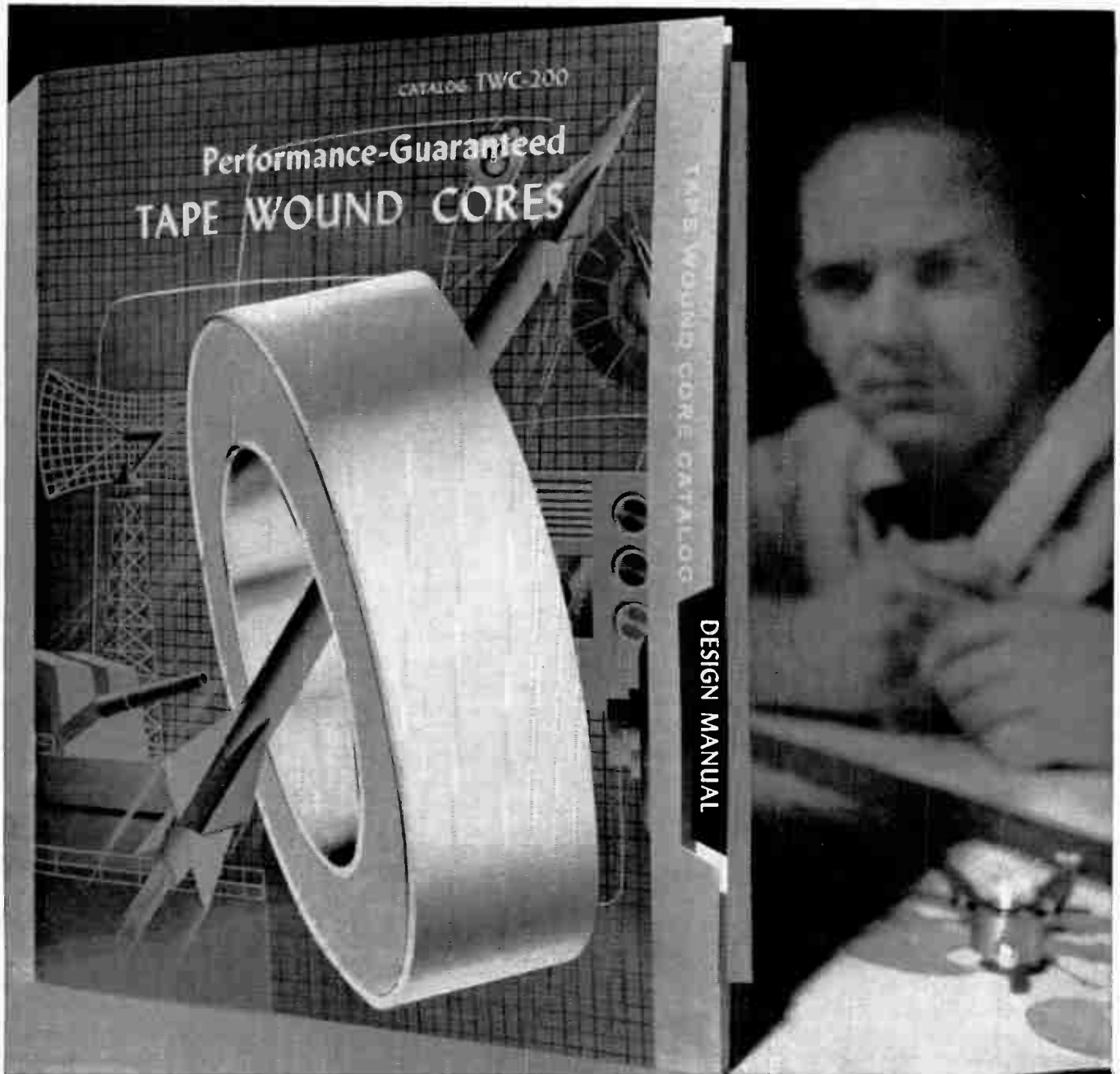


R. D. B. SHEPPARD

Mr. Sheppard has handled the Eimac product line for one-and-a-half years during previous associations and has had broad experience in field engineering. He served with the Engineering Department of the Canadian National Telegraphs as field engineer (radio group) in connection with point-to-point radio circuits throughout Canada. For two years he was Assistant General Radio Engineer, handling field work and supervision of microwave installations including television transmission circuits for Canadian National Telegraphs from Toronto to Windsor and from Montreal to Quebec. He is a graduate of the University of Toronto and a member of the Institute of Radio Engineers.

For further data on advertised products use page 105.

KEEP UP-TO-DATE ON MAGNETICS



Here's the first design manual for your work with tape wound cores

Because engineers have expanded high permeability magnetics into a host of new uses, Magnetics, Inc. has combined its new tape wound core catalog with the industry's first design manual. If you and your staff need a working familiarity with magnetic equations, characteristics and terminology, this 28-page book will be of unusual value.

This design manual has been compiled under the direction of our laboratories. It contains basic units and conversion factors, methods of testing (dynamic, EI loop and d-c), properties and magnetic values of nickel-iron alloys, and many pages of curves showing the variation of magnetic properties with temperature and of core loss with frequency.

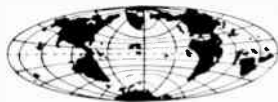
This fact-packed catalog and design manual also describes in detail the tape wound cores and bobbin cores which we manufacture. It will enable you to design around and specify the industry's only Performance-Guaranteed Tape Wound Cores. Should your engineering departments feel that more than one copy would be of value, please write for TWC-200 on company letterhead, giving full names and titles. *Magnetics, Inc., Dept. E-40, Butler, Pa.*

MAGNETICS inc.

ELECTRONICS & COMMUNICATIONS, OCTOBER, 1957

For further data on advertised products use page 105.

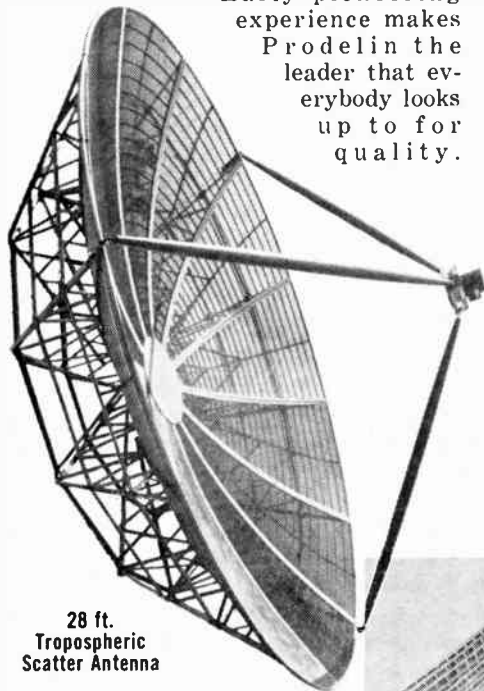
EVERYBODY looks up to Prodelin



Leading Worldwide Supplier of Parabolic Antenna Systems for Communication Services

There's much to be gained by using a Prodelin Parabolic Antenna . . . whether your application is for line-of-sight, point-to-point microwave communication, or for over-the-horizon tropospheric scatter service for long distance communications.

Early pioneering experience makes Prodelin the leader that everybody looks up to for quality.



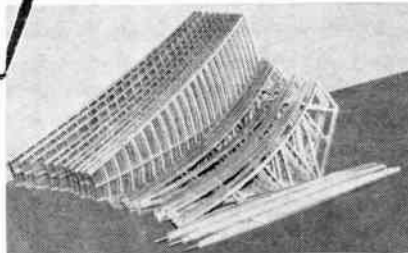
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air freight shipment

Prodelin manufactures field proved parabolic reflectors with associated feeds providing the most complete antenna line in 2, 4, 6, 8, 10, 14, 18, and 28 foot diameters for every type of communication requirement.

If there is not a stock Prodelin antenna to suit your specific needs, Prodelin will design one for you. In active service throughout the world are rugged Prodelin aluminum mesh antennas that withstand 150 mph windloads fully iced . . . economical spun aluminum reflectors for similar services . . . and the new sectionalized plastic reflectors . . . all designed for low cost, long distance transportation by land, sea, or air. Remember, a Prodelin antenna costs *less* than any other part of your system . . . and with *larger* antennas, you can achieve greater gains at lower maintenance costs!

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307 Bergen Avenue, Kearny, N.J. Dept. EC.

News Report

Leland Electric Appoints Manager Defense Division

The appointment of Donald W. Richardson as manager of the Defense and Special Products Division of Leland Electric Canada Limited, is announced by Mr. G. Ernest Robertson, president of the company. This



D. W. Richardson

new division is responsible for all aspects of engineering, production, sales and service of Leland inverters, converters, generators, alternators, airborne and ground power supply equipment other than commercial motors.

Mr. Richardson has had wide experience in the electrical industry, both in Canada and the United States, and prior to his appointment was manager for Reliance Electric and Engineering Company at their Dayton, Ohio Branch.

Mr. Richardson was born in Canada, and obtained his B.Sc. degree in Mechanical Engineering at the University of Toronto. He is a member of the Professional Engineers of Ontario, The Engineers Institute of Canada and the American Iron and Steel Association.

P.S.C. Commercial Manager Dies

J. H. (Bert) Cornell, Commercial Manager and a Director of The Photographic Survey Corporation, of Toronto, died suddenly October 1st in Caracas, Venezuela on a business trip. He was widely known throughout South and North America, being responsible for much of the organization's growth.

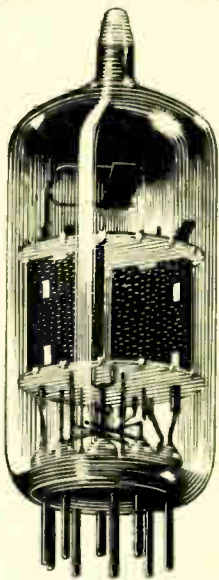
Mr. Cornell joined PSC's aircraft operating company, Kenting Aviation, as a navigator in 1946. In that year he flew on PSC's first South American operation, an oil concession survey in Venezuela. In 1950 he transferred to PSC's Sales Division as Western Representative with headquarters in Calgary. He returned to Toronto in 1951 to become PSC's sales manager, a post later designated as commercial manager when Mr. Cornell took over supervision of all the company's client relations. He was also in charge of the sales activities of Aeromagnetic Surveys Limited and Hunting Technical and Exploration Services, two companies associated with P.S.C.

Mr. Cornell leaves his wife and daughter and a brother, G. M. Cornell of Lorne Park, Ontario.

The Mullard M8137 Miniature Double Triode, one of a line of Rogers Special Quality* tubes, is a long life, ruggedized replacement for the 12AX7.

The M8137 has greater freedom from microphony, extremely consistent electrical characteristics, and a specially engineered bifilar heater construction with self-cancelling magnetic fields. It is a low hum, low microphony tube of outstanding reliability and uniformity.

**Rogers Special Quality tubes are finding more and more applications in all types of professional equipment. The greater reliability and lower maintenance cost of the apparatus in which they are used more than compensates for the higher initial cost.*



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

BUYERS' GUIDE TO **MUIRHEAD** SYNCHROS

News Report

*For Synchros and Servomotors
Consult Muirhead the Specialists with the widest range
and largest stock of Grade 1 Synchros in Canada*

The following are in current production:

SYNCHROS

| Designation | Size | Volts | Frequency | Function |
|-------------|------|-------|-----------------|----------------------------------|
| 26V08CX4(B) | 08 | 26V | 400c/s | Control Transmitter |
| 26V08CT4(B) | 08 | 26V | 400c/s | Control Transformer |
| 11CX4b | 11 | 115V | 400c/s | Control Transmitter |
| 11CT4b | 11 | 115V | 400c/s | Control Transformer |
| 11CDX4a | 11 | 115V | 400c/s | Control Differential Transmitter |
| 11TR4a | 11 | 115V | 400c/s | Torque Receiver |
| 11TX4a | 11 | 115V | 400c/s | Torque Transmitter |
| 11R54 | 11 | 26V | 400c/s | Resolver |
| 26V11CX4a | 11 | 26V | 400c/s | Control Transmitter |
| 26V11CT4b | 11 | 26V | 400c/s | Control Transformer |
| 26V11CDX4a | 11 | 26V | 400c/s | Control Differential Transmitter |
| 26V11TR4a | 11 | 26V | 400c/s | Torque Receiver |
| 26V11TX4a | 11 | 26V | 400c/s | Torque Transmitter |
| 11 LINVAR | 11 | | | Linear Variometer |
| 15CX4a | 15 | 115V | 400c/s | Control Transmitter |
| 15CT4a | 15 | 115V | 400c/s | Control Transformer |
| 15CDX4a | 15 | 115V | 400c/s | Control Differential Transmitter |
| 15TR4a | 15 | 115V | 400c/s | Torque Receiver |
| 15TX4b | 15 | 115V | 400c/s | Torque Receiver |
| 15TX4a | 15 | 115V | 400c/s | Torque Transmitter |
| 15TX4b | 15 | 115V | 400c/s | Torque Transmitter |
| 15TDX4a | 15 | 115V | 400c/s | Torque Differential Transmitter |
| 15TDR4a | 15 | 115V | 400c/s | Torque Differential Receiver |
| 15R54 | 15 | 40V | 400c/s | Resolver |
| 15CT6a | 15 | 115V | 60c/s | Control Transformer |
| 18CX4a | 18 | 115V | 400c/s | Control Transmitter |
| 18CT4a | 18 | 115V | 400c/s | Control Transformer |
| 18CDX4a | 18 | 115V | 400c/s | Control Differential Transmitter |
| 18TR4a | 18 | 115V | 400c/s | Torque Receiver |
| 18TX4a | 18 | 115V | 400c/s | Torque Transmitter |
| 18TDX4a | 18 | 115V | 400c/s | Torque Differential Transmitter |
| 18TDR4a | 18 | 115V | 400c/s | Torque Differential Receiver |
| 18CX6a | 18 | 115V | 60c/s | Control Transmitter |
| 18CT6a | 18 | 115V | 60c/s | Control Transformer |
| 18CDX6a | 18 | 115V | 60c/s | Control Differential Transmitter |
| 18TR6a | 18 | 115V | 60c/s | Torque Receiver |
| 18TX6a | 18 | 115V | 60c/s | Torque Transmitter |
| F18M-6-A/1 | 18 | 25V | 1000c/s nominal | Resolver Transmitter |

307/3ca

J. W. Paddon Joins Decca Radar

The directors of Decca Radar (Canada) Limited announce the appointment of Mr. J. W. Paddon as manager of their Radar Systems Division.

A native of Canada, Mr. Paddon's radar experience began at the Royal Aircraft establishment in 1939. In World War II he was stationed in Washington by the Department of Munitions and Supply and returned there during the Korean crisis as Chief of the Electronics Division of the



J. W. PADDON

Department of Defense Production.

Prior to his present appointment, Mr. Paddon was supervisor of administration in Canadair's Special Weapons Division.

Mr. Paddon is a senior member of the Institute of Radio Engineers.

1958 Electronic Parts Distributors' Show

The Electronic Industry Show Corporation announces that the 1958 Show will be held May 19-21, 1958 at the Conrad Hilton Hotel, Chicago, Ill.

SERVOMOTORS

| Designation | Size | Reference Phase | | Control Phase | |
|----------------|------|-----------------|-----------|--------------------|-----------|
| | | Volts | Frequency | Volts | Frequency |
| Mk. 14 Mod. 2 | 11 | 115V | 400c/s | 115V (57.5 ± 57.5) | 400c/s |
| Mk. 14 Mod. 3 | 11 | 115V | 400c/s | 180V (90 ± 90) | 400c/s |
| *Mk. 14 | 11 | 115V | 400c/s | | |
| Mk. 7 Mod. 1 | 15 | 115V | 400c/s | 115V (57.5 ± 57.5) | 400c/s |
| Mk. 7 | 15 | 115V | 400c/s | 20V (10 ± 10) | 400c/s |
| *Mk. 7 | 15 | 115V | 400c/s | | |
| †Mk. 12 Mod. 0 | 15 | 115V | 400c/s | 115V (57.5 ± 57.5) | 400c/s |
| *Mk. 12 | 15 | 115V | 400c/s | | |
| Mk. 8 Mod. 0 | 18 | 115V | 400c/s | 115V (57.5 ± 57.5) | 400c/s |
| Mk. 8 Mod. 1 | 18 | 115V | 400c/s | 115V (57.5 ± 57.5) | 400c/s |
| ‡Mk. 8 | 18 | 115V | 400c/s | 20V (10 ± 10) | 400c/s |
| *Mk. 8 | 18 | 115V | 400c/s | | |
| †Mk. 16 Mod. 0 | 18 | 115V | 400c/s | 115V (57.5 ± 57.5) | 400c/s |
| *Mk. 16 | 18 | 115V | 400c/s | | |

TACHOGENERATOR Mk. 1 Mod. 1 Size 15 Energisation 115V 400c/s Output 3·2V/1000 r.p.m.

*Low impedance control windings †With Tachogenerator ‡Mod. 0 or Mod. 1 shafts

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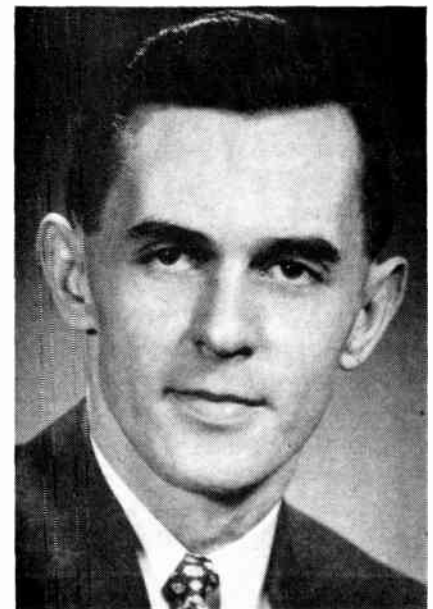
Many types are available for immediate delivery

If you require types not listed above, do not hesitate to send us your enquiry — they may be in hand — or, if not, we may be able to produce them for you quite quickly.

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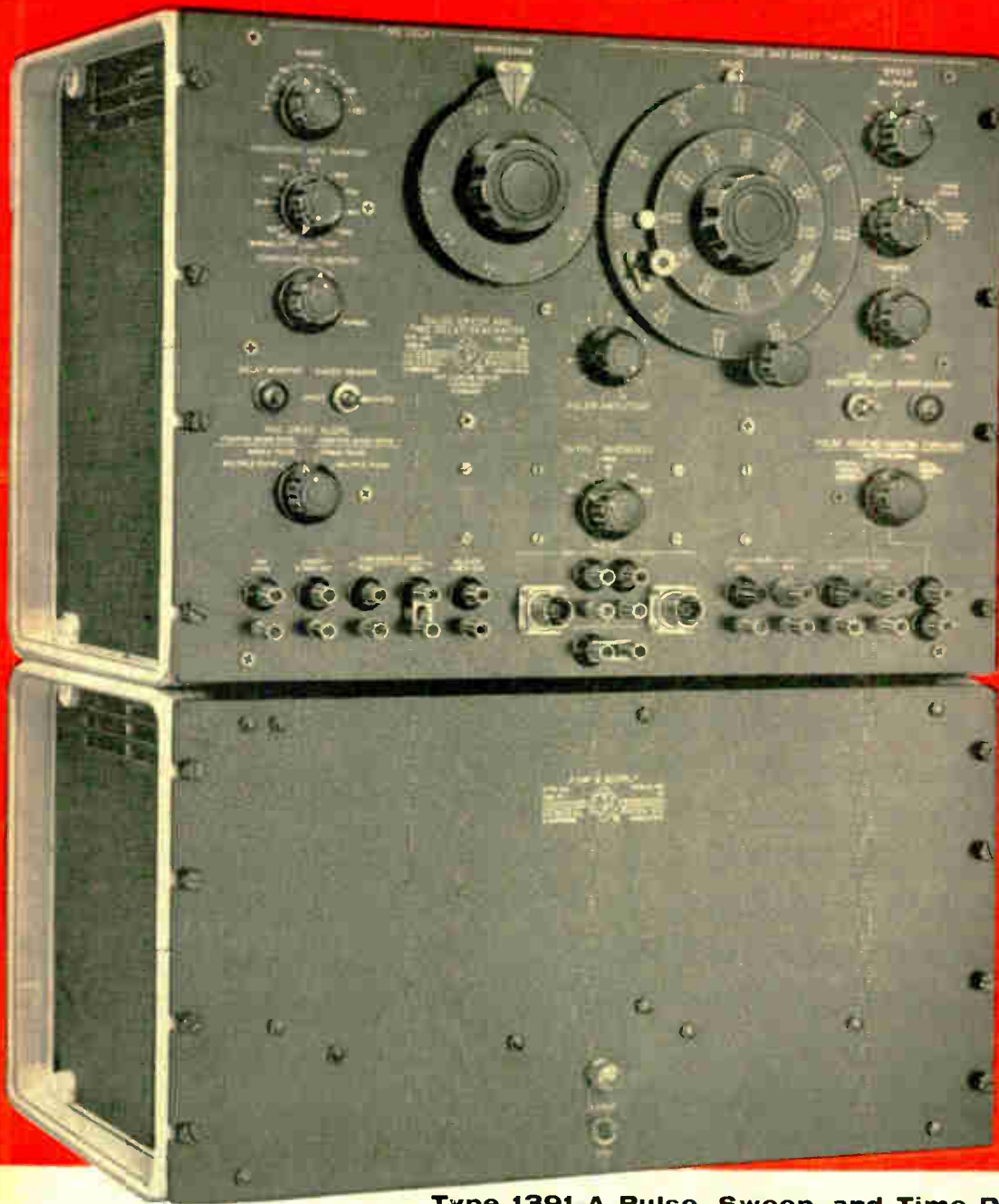
SALES REPRESENTATIVE



M. J. HOWARD

● Cannon Electric Canada Limited has announced the appointment of "Marty" Howard, 132 Crocus Avenue, Ottawa, Ontario, as Sales Representative in the Ottawa area and in Eastern Ontario. The appointment of Mr. Howard will insure closer liaison and better service for Cannon customers in these areas.

For further data on advertised products use page 105.



Basic Instrument for the Pulse Engineer

Type 1391-A Pulse, Sweep, and Time Delay Generator, \$1745

The Type 1391-A Pulse, Sweep, and Time-Delay Generator is the most versatile pulse package commercially available today. Pulse, sweep, and gate outputs (both positive and negative), triggers, delayed signals, and timing signals are all available at the front panel. Double pulsing (in three different ways) and the generation of pulse bursts are readily accomplished.

Performance specifications are excellent — they include extremely wide ranges of pulse duration ($0.05 \mu\text{s}$ to $10^5 \mu\text{s}$), pulse-repetition frequency (dc to 250kc), time delay ($1 \mu\text{s}$ to 1.1 sec), output impedance (50-600 Ω), and pulse amplitude (up to 90 volts).

Yet the basic pulse characteristics are outstanding: rise and decay times as low as 25 millimicroseconds, negligible overshoot, no ramp-off, no duty-ratio restrictions, and pulse jitter as low as one part in 50,000.

Write for our Pulse Bulletin which describes this instrument completely (it also describes our Unit Pulse Equipment).

The Type 1391-A Pulse, Sweep, and Time-Delay Generator takes external sine wave, square wave, pulse, or other cyclic voltage — uses this signal to synchronize its delay, sweep, and pulse circuits — and makes available at its various binding posts:

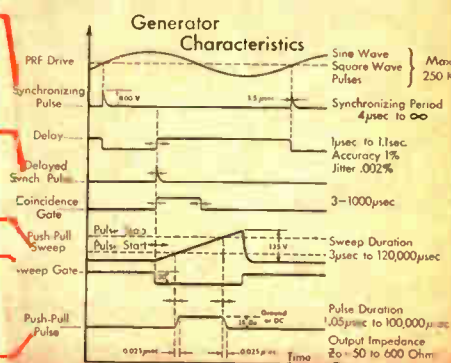
Direct-trigger pulse (or synchronizing pulse) timed by the input signal.

Delayed synchronizing pulse accurately adjustable in time by delay generator — to perform time selection, built-in coincidence circuitry permits timing of the delayed synchronizing pulse to be controlled by externally generated pulses fed into the instrument.

Push-pull sawtooth voltage of sufficient amplitude to be applied to the deflection plates of any oscilloscope for examining the generator's output pulses, or for use in driving auxiliary equipment.

Push-pull gating pulse having the same duration as the sweep.

Positive or negative pulses with excellent shape characteristics, continuously adjustable in duration, amplitude, and delay with respect to (a) the input trigger and (b) the sweep, at a variety of output impedances.



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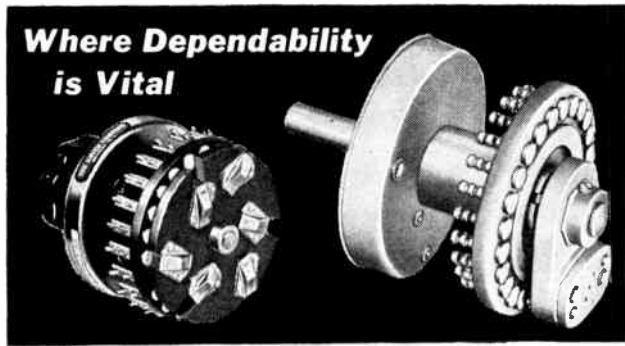
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- Roller-type detent—gives positive indexing action.
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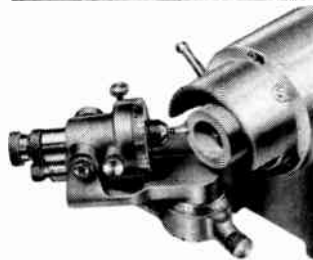
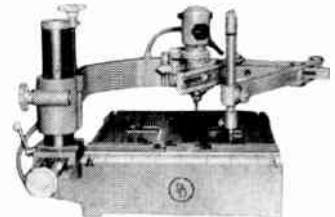
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- TRANSISTOR POWER SUPPLY
- BATTERY OPERATED

The Freed Type 2030 Megohmmeter is a battery operated instrument especially suited for measuring leakage of transformers, motors, cables, condensers and insulating materials wherever the power line is inaccessible or where battery operation is more desirable.

Resistance values are indicated on a 3" expanded scale meter protected against overload. Low resistance in series with component under test provides very short charging time for even the largest condensers. Calibration positioned provided to check accuracy of 500 volt test potential. The 500 volt test supply is regulated.

- Resistance — 5 Megohms to 10 million Megohms.
- Accuracy — ±3% to 100,000 Megohms ±5% to 10 million Megohms.
- Voltage on unknown — 500 volts DC.
- Self contained — Battery operated.

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Type 1620 Megohmmeter — 50-1000 Volt Variable test Potential — 0.1 Megohms to 4 million Megohms.

Type 1620-C Megohmmeter — Designed for capacitor testing 50-1000 volt variable test potential.

Type 1020-B Megohmmeter — A 500 volt fixed test potential, Range — 1 Megohm to 2 million Megohms.

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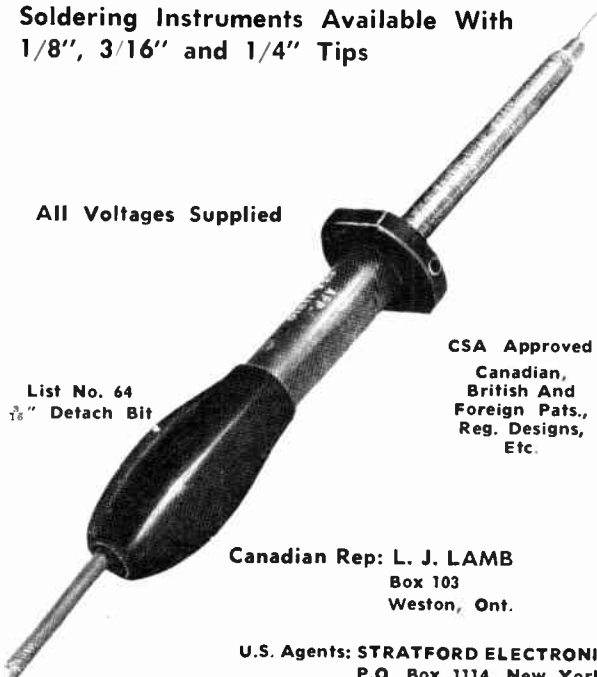
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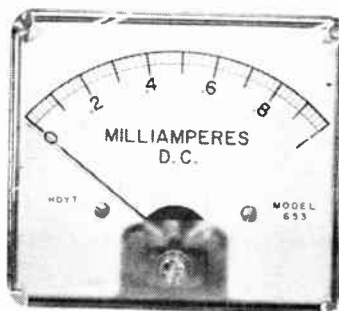
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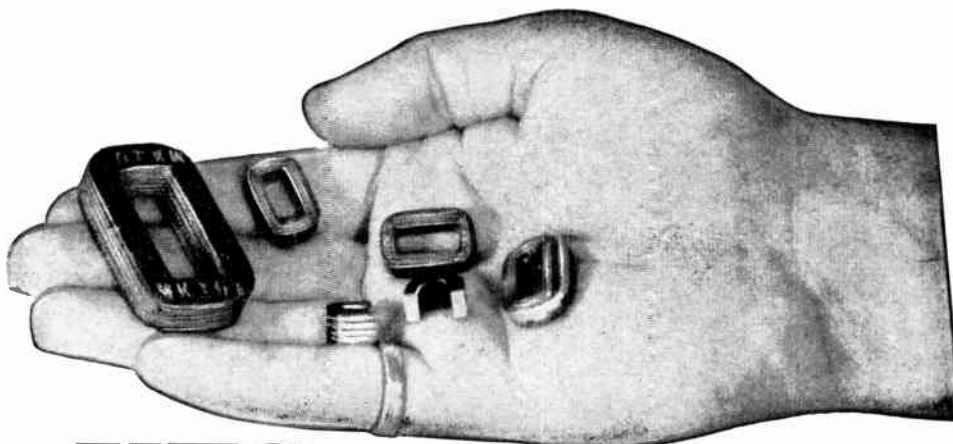
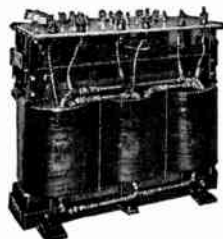
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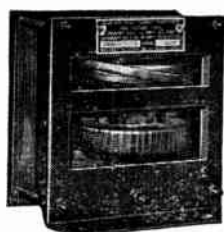
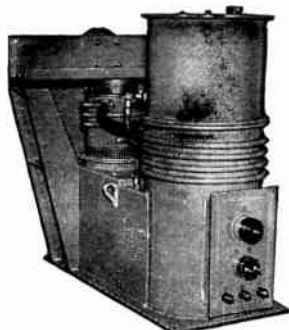
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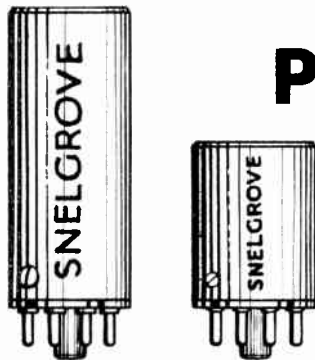
Illustrated above and reading counter-clockwise: HyperCores, Chokes, Power, Pulse, Filament, and Plate Transformers.

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CRYSTAL OVENS

NOW IN PRODUCTION



Available in various models to accommodate 1 or 2 HC-6/U or HC-13/U Crystal Holders.

Operating Voltages 6, 12, 24V.

Temperature ranges and differentials to suit most exacting requirements.

Write for more technical data.

We now offer a line of Crystal Ovens with emphasis on **RELIABILITY.**

Much research has been devoted to eliminating the causes of failure. Prolonged tests under severe field operating conditions indicate exceptional reliability in these ovens.

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Canada's Foremost Frequency Control Specialists
LICENSED UNDER BELL SYSTEM PATENTS

C. R. **SNELGROVE** CO. LIMITED
DON MILLS, ONT.

News Report

Canadian Chosen For Important U.S. Position

Appointment of C. Graydon Lloyd of Syracuse, as general manager of the General Electric Specialty Electronic Components Dept. at Auburn, N.Y., was announced recently by L. Berkley Davis, Owensboro, Ky., general manager of the company's Electronic Components Division.

Mr. Lloyd for the past five years has been manager of engineering for the company's Technical Products Dept., Syracuse. His new appointment was effective October 1st.

In his new position Mr. Lloyd will be responsible for the overall operations of one of the company's 118 product departments.

Mr. Lloyd was born in Toronto, Canada, and was graduated from the University of Toronto with a bachelor of science degree in electrical engineering. He joined the Canadian General Electric Company that year, and later held marketing, sales, and engineering management positions in the CGE electronics operations.

He transferred to the company's former Electronics Division at Syracuse in 1952, as assistant to the general manager of the former Commercial Products Department, and later that year was appointed department manager of engineering.

APPOINTMENT



W. H. NEWPORT

● White Radio Limited of 41 West Ave. North, Hamilton, Ontario, recently announced the election of W. H. Newport as a Director of the company. Mr. Newport was also appointed Vice-President and R. G. Stevenson, Secretary-Treasurer. W. H. (Bill) Newport continues as Sales Manager and R. G. (Ron) Stevenson continues as Office Manager.

First in 1901

Signor Marconi received the first wireless signal ever transmitted across the Atlantic Ocean, from Cornwall, England, to St. John's, Newfoundland. The Company, incorporated under a Dominion charter, became the pioneer electronics firm in North America.

First in 1919

Radio broadcasting first came to Canada via Marconi's Montreal Station XWA, now CFCE.

First in 1921

Canadian Marconi developed the first radio receivers to be made in Canada.

First in 1937

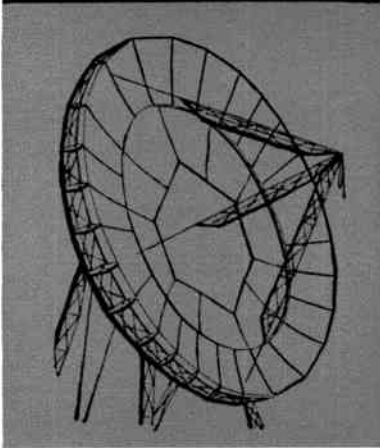
Canadian Marconi produced the first mobile radiophone equipment designed and developed in Canada — for public utilities, police cars, and later for taxis.

First in 1948

Canada's first commercial marine radar was developed by Marconi in co-operation with the National Research Council.



CANADIAN MARCONI — First with the Finest in Communications

**First with the widest range of Radio Relay**

The only Canadian electronics firm engaged in the research design and development of microwave, radio relay and "scatter" equipments, Canadian Marconi has become one of the leading suppliers with several hundreds of units delivered and installed. With a range of communications equipment amongst the widest in the world, the Company is rapidly becoming the leading Canadian exporter of communications equipment.

Whatever *your* communication needs — mobile radio or radar, conventional microwave or "over-the-horizon" forward scatter systems, marine or aviation electronic equipment — it *pays* to look *first* to Canadian Marconi. In solid experience, in creative research, in engineering skill, Marconi *continues* to be first with the finest in Canadian communications.

CANADIAN MARCONI COMPANY



MONTREAL 16, QUEBEC

CANADA'S LARGEST ELECTRONIC SPECIALISTS

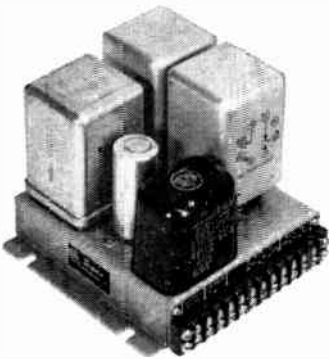


KONRAD R. M. S. ANSBACHER (STANDING) LEADS DISCUSSION OF SIGMA DEVELOPMENT WITH A VARIETY OF SECTION HEADS.

Sigma Advanced Scientific Team ... constant challenge to the pinnaticerebric

Original exploration by Sigma's staff scientists: at the top level often yields not only marvelous new concepts, but occasional answers to lower order problems as well. In the unposed scene above (our last meeting), world-renowned theoretical application engineer Ansbacher (plain

"Square" to his colleagues) has made an electrifying suggestion concerning the Series 8000 Magnetic Amplifier Relay: plug it in to see if it works! Here is the kind of unfettered, creative thinking that has made all industry react swiftly at the mention of our name.



Carrying on from their leader's initial discovery, the group rapidly uncovered more and more secrets of the "Mag-Amp" — some by intensive thought, others by unsoldering certain enclosures. It was soon agreed by all members that Magnetic Amplifier Relays were excellent devices for detecting unbalance (a sizable number are in use at Sigma's own plant), and comparing the outputs of low impedance D.C. signal sources. On went the discussion, out came the applications, higher and higher rose the enthusiasm as each new specification was added to the list. Predictions flew of uses in temperature control devices with thermistor bridges, thermo-

couples and such, light-sensitive equipment, and wherever 0.1 microwatt is the most you can get to switch 1 to 5 ampere loads at 120 VAC. A caution was voiced over the Magnetic Amplifier Relay's slow speed (30-300 milliseconds), but was cast aside as usually not a consideration. Final moments were devoted to eulogizing such virtues as ruggedness, long life (in the millions) and availability in practically any state of completeness and with whatever Sigma relays necessary to suit the customer's whims. In the warm camaraderie that comes from the knowledge that one of their products is both useful and in production, the distinguished little group rose and in unison repeated their oath: "Exitus, ab eloquentia confusio."*

*Literally, "Success, from eloquent confusion", but generally interpreted "Go, before you get things any more confused."

SIGMA INSTRUMENTS, INC.

85 Pearl St., South Braintree 85, Mass.

Canadian Representatives:

SAMUEL C. HOOKER (CAN.) LTD., Montreal and Toronto

ARVA, Vancouver, B.C.

World Radio History

News Report

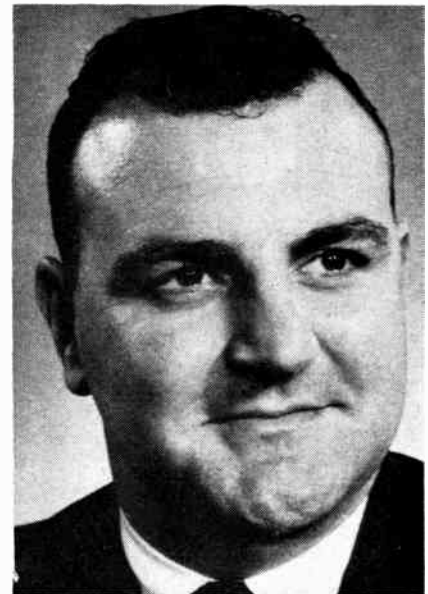
A.P.E.O. Outlines Functions In Booklet

The Association of Professional Engineers of Ontario has produced a booklet describing the Association and how it serves its more than 16,000 members.

Entitled "Serving The Engineering Profession in Ontario", the booklet, which is illustrated by line drawings, outlines the various functions of the Association.

It reveals the growth of its membership since formation in 1922 when the Professional Engineers' Act was passed; briefly outlines the responsibilities of the profession; how the various branches of the profession are served and administered by the Association; explanation of the Act; the code of ethics; the Association's public relations program; its liaison with government bodies; salary studies and fees; engineering technicians; and the income protection and life insurance plans available to members through the Association. The booklet also refers to scholarships offered engineering students at Queen's University and the University of Toronto by the Association; and describes the organization and function of the Canadian Council of Professional Engineers.

CALDWELL APPOINTMENT



R. S. WILSON

● Robert S. Wilson has joined S. W. Caldwell Ltd., of 447 Jarvis St., Toronto, Ontario, as special assistant to the president, Spence Caldwell. Prior to this appointment Mr. Wilson worked in the United States as a sales representative for the Armstrong Cork Company.

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ELECTRONIC ENGINEERS AND TECHNICIANS with broad experience in one of the following areas: Communications equipment, test equipment, instrumentation and digital techniques. Excellent opportunities are available for men of UK or Canadian birth. Interviews in Canada are envisaged in the next few weeks. Write for detailed brochure to acquaint yourself with our organization. Address correspondence to:

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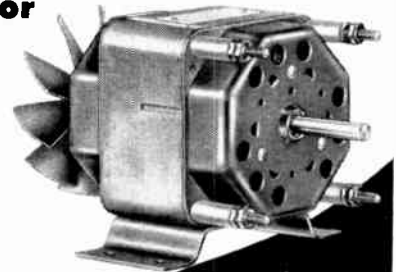


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News Report

Future Speakers For IRE Toronto Section

N. F. B. Bounsall, Chief Transmission Engineer, Sound Division, National Film Board will address the Toronto Section of the Institute of Radio Engineers on Monday, November 11th. He will describe the complex sound mixing and recording systems now in use in the recently completed National Film Board headquarters in Montreal.

On December 2nd, Inspector Long of the Communication Branch of the Toronto Police Department will address the Toronto Section of the Institute of Radio Engineers. His subject will be the new Metropolitan Police Dispatch System. This new facility enables the central radio room to efficiently monitor and direct cruisers, squad cars and motorcycle officers throughout the entire Metropolitan Toronto area. Both meetings will be in Room E21, Electrical Building, University of Toronto at 8:15 p.m.

Sperry Gyroscope Promotes Ottawa Executives

Mr. B. W. King, managing director of Sperry Gyroscope Company of Canada, Ltd. announces the appointment of Mr. J. G. Musgrave, former purchasing agent, to the position of works manager, Sperry Gyroscope



J. G. MUSGRAVE



R. A. MOORE

Ottawa Limited. Mr. Musgrave joined the sales organization of Sperry in 1951, having had broad experience in general industrial sales and purchasing.

Mr. R. A. Moore, who has been chief buyer with the company since its inception as a Canadian organization, is appointed to the position of purchasing agent.

Clinic Considers Industrial Engineering Department Problems

Dr. Marvin Mundel, vice-director of the management center at Marquette University, Milwaukee, Wisconsin, will conduct the fifth annual fall management clinic sponsored by the Montreal chapter of the Society for the Advancement of Management.

To be held in the Queen's Hotel, Montreal, on Friday, November 22nd, at 9 a.m., the clinic will have as its theme "Improving Organization and Performance of an Industrial Engineering Department". Bruce Winter of the engineering department of Canadian Industries Limited, will be clinic chairman.

A program and advance registrations for the clinic may be obtained from Bruce Winter, Canadian Industries Limited, Box 10, Montreal.

To obtain further information on New Product items in this issue, use postcards page 105.

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AVAILABILITY**

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RECEIVING AND PICTURE TUBES

POWER AND TRANSMITTING TUBES

TRANSISTOR, DIODES AND RECTIFIERS



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Designed for continuous coverage from 2 to 220 mc with sweep width to 30 mc plus, and with high output automatically held constant over both frequency sweep and tuning range.

* These apply to instruments properly terminated in nominal 70 or 50 ohms.

KAY Vari-Sweep

All-Electronic High Level Sweeping Oscillator or, (with sweep off) Continuously Tuned CW Signal Source

SPECIFICATIONS*

Range: Fundamental frequency 2 to 220 mc, continuously variable in ten switched overlapping bands. Direct reading frequency dial calibrated to $\pm 4\%$. RF Output: 1.0 V rms into 70 ohms, metered. Flat within ± 0.5 db over widest sweep and over frequency band. Sweep Width: Continuously variable $\pm 2\%$ to $\pm 30\%$ of center frequency to maximum of at least 30 mc. Sweep Rate: Continuously variable 10 to 40 cps. Locks at line frequency. Attenuator: Switched 20, 20, 10, 6 and 3 db plus continuously variable 6 db. Price: \$695.00, f.o.b. plant.

For New Kay Catalog, Write:

KAY ELECTRIC COMPANY

Dept. EC-10, Maple Ave., Pine Brook, N.J.

CAldwell 6-4000

For further data on advertised products use page 105.

Why is ELECTRONICS & COMMUNICATIONS a member of CCAB?

To have a circulation statement that is *believed* by Advertisers and their Advertising Agencies.

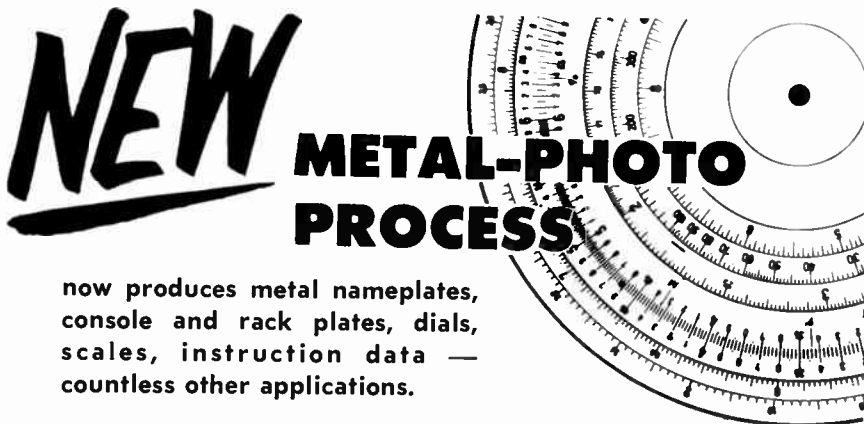
Advertisers, by nature, are doubting Thomases, and may not believe that you have received this copy of ELECTRONICS & COMMUNICATIONS. We know you have, of course, but that is not good enough.

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Once every year, the CCAB auditor visits our Circulation Department. He checks our records thoroughly, demanding proof that you are in the electronics and communications or allied industry, that you are where we say you are, and that you are being sent ELECTRONICS & COMMUNICATIONS regularly.

It is this auditor's report that is believed. We are proud of it, and shall be glad to send you a copy if you wish.

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ENGINEERS READ

TECHNIQUE

A JOURNAL OF INSTRUMENT ENGINEERING

This quarterly journal is available to all who are concerned and interested in precision electrical instruments.

The October issue includes two main items:—

1. 'The D-729 Phasemeter and Some Applications' by A. Cooper, B.Sc., A.M.I.E.E.
2. 'The Analysis of Muscle Potentials by Means of a Muirhead-Pametrada Wave Analyser' by A. Nightingale, M.A., F.Inst.P., Physics Department, Guy's Hospital Medical School, London.

News of the latest additions to the range of Muirhead Synchros and Servomotors is now a regular feature

The cover design shows the latest Mufax fully automatic weather chart recorder.



Write and have your name included on our 'Technique' mailing list.

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Precision Electrical Instrument Makers

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TECHNICAL PERSONNEL AVAILABLE

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

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

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

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

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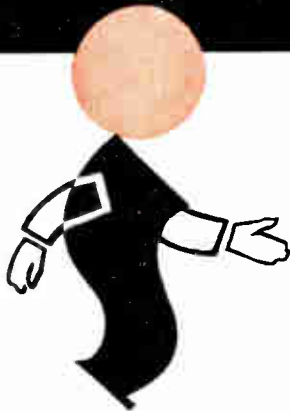
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