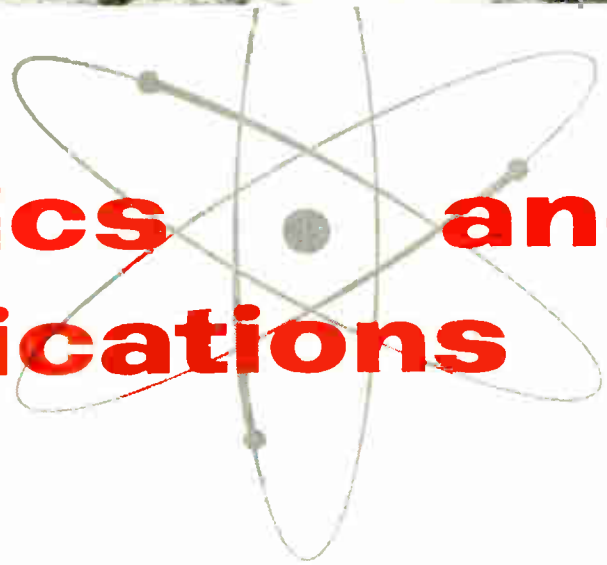


Security by electronics (Story, page 5)

electronics and communications

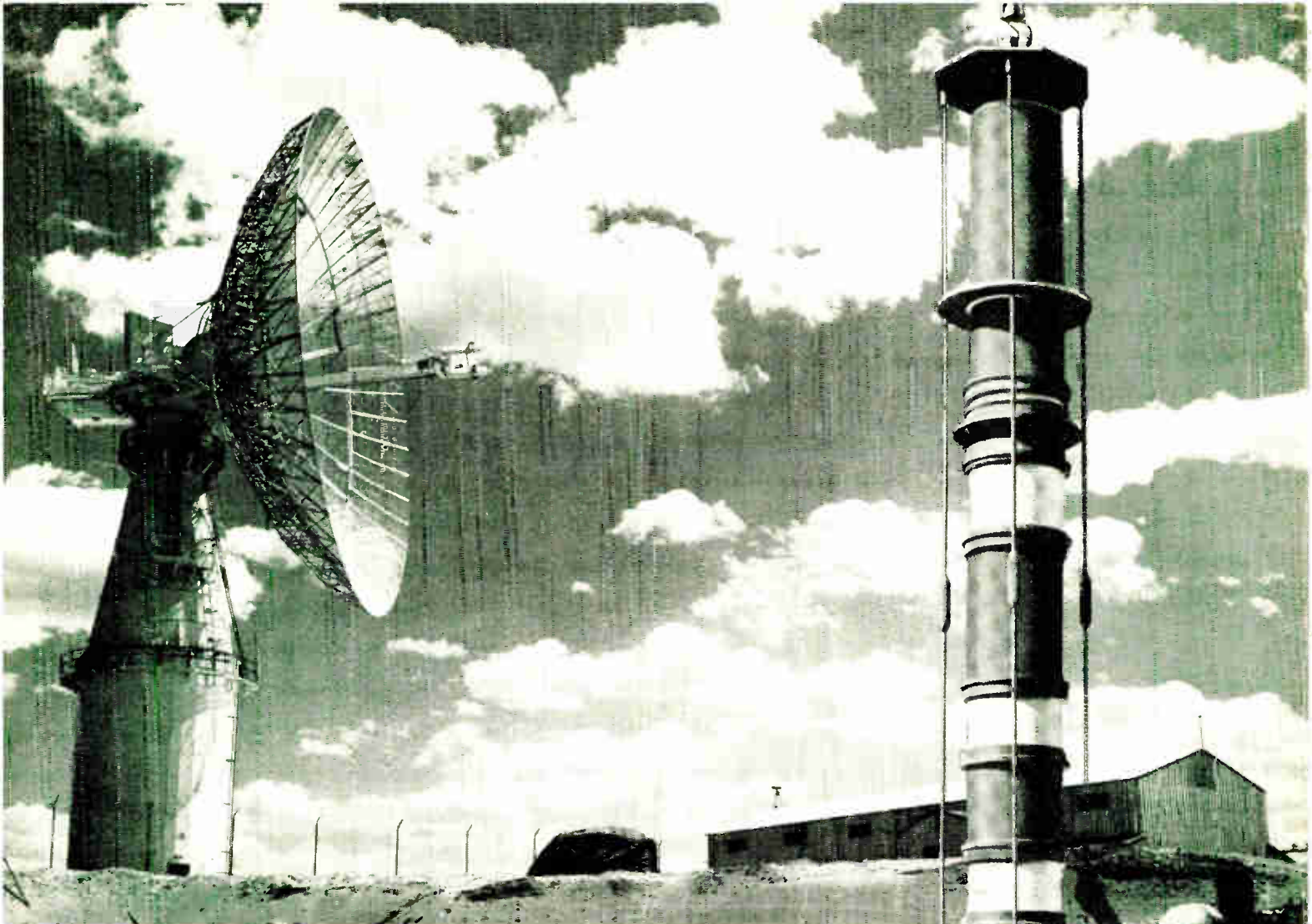


an age publication

JANUARY 1960

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Site of the Canadian Defence Research Board's Prince Albert Radar Laboratory, Prince Albert, Saskatchewan

PROBING THE AURORA BOREALIS

Studying the effects of auroral echoes at UHF on radar detection and tracking of satellites and missiles, the Prince Albert Radar Laboratory is playing an important part in the defense of North America.

The Prince Albert radar antenna and some associated equipment, loaned to the Board by the USAF for studies of mutual interest, is similar to the Millstone Hill Radar at Massachusetts Institute of Technology's Lincoln Laboratory which made radar contact with Venus . . . the longest radio contact on record . . . 56,000,000 miles.

Two Giant Eimac type X626 klystrons, rated at 1.25 megawatts long-pulse power are used in the transmitter. These super power klystrons represent the most reliable, reproducible and economical answer to the problems of pulsed super-power UHF.

Wherever high quality amplifier klystrons are required, investigate the incomparable Eimac line. Call or write for information and literature.



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Eimac type X626 super-power klystron for UHF pulse applications.

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Includes the most extensive line of ceramic electron tubes

World Radio History

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at →
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Before they leave the factory, all Marconi Image Orthicons undergo extremely critical testing.



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Acceptance tests are conducted when the tubes arrive in Canada. Marconi has built a special lab where the Image orthicons are tested under Canadian studio conditions.



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This special testing lab enables Marconi to offer immediate warranty adjustment when required.



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An extensive series of tests check every detail. Once it has passed these tests, the camera tube is shipped to the studio, sealed and protected by the Marconi guarantee.



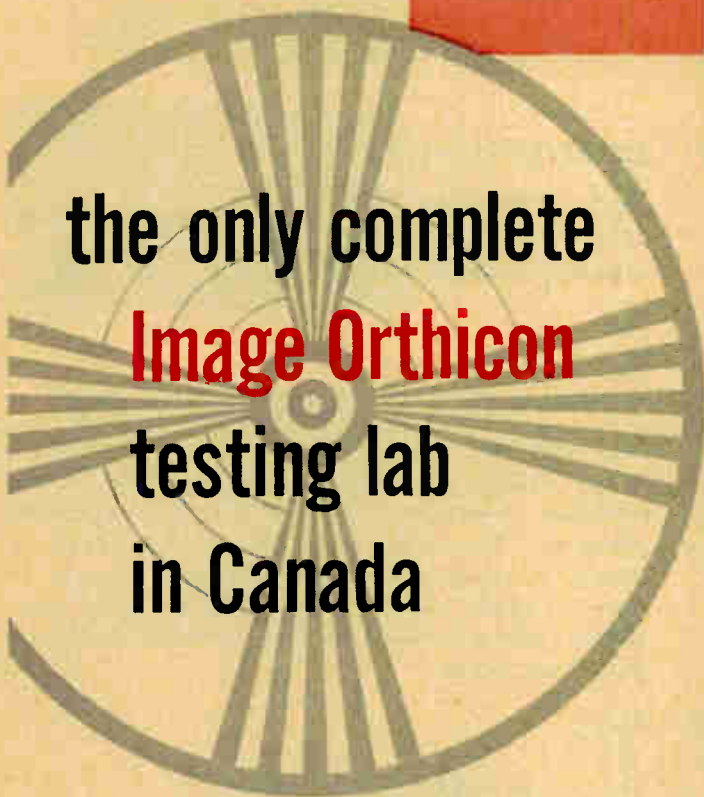
*visiting
studio personnel*

Studio engineers and technicians are invited to inspect and make use of these facilities.



tests vary

Each of the six types of Image orthicons undergoes its own special tests. To test each tube thoroughly takes 30 to 50 minutes.



the only complete
Image Orthicon
testing lab
in Canada

ELECTRONIC TUBE AND COMPONENTS DIVISION

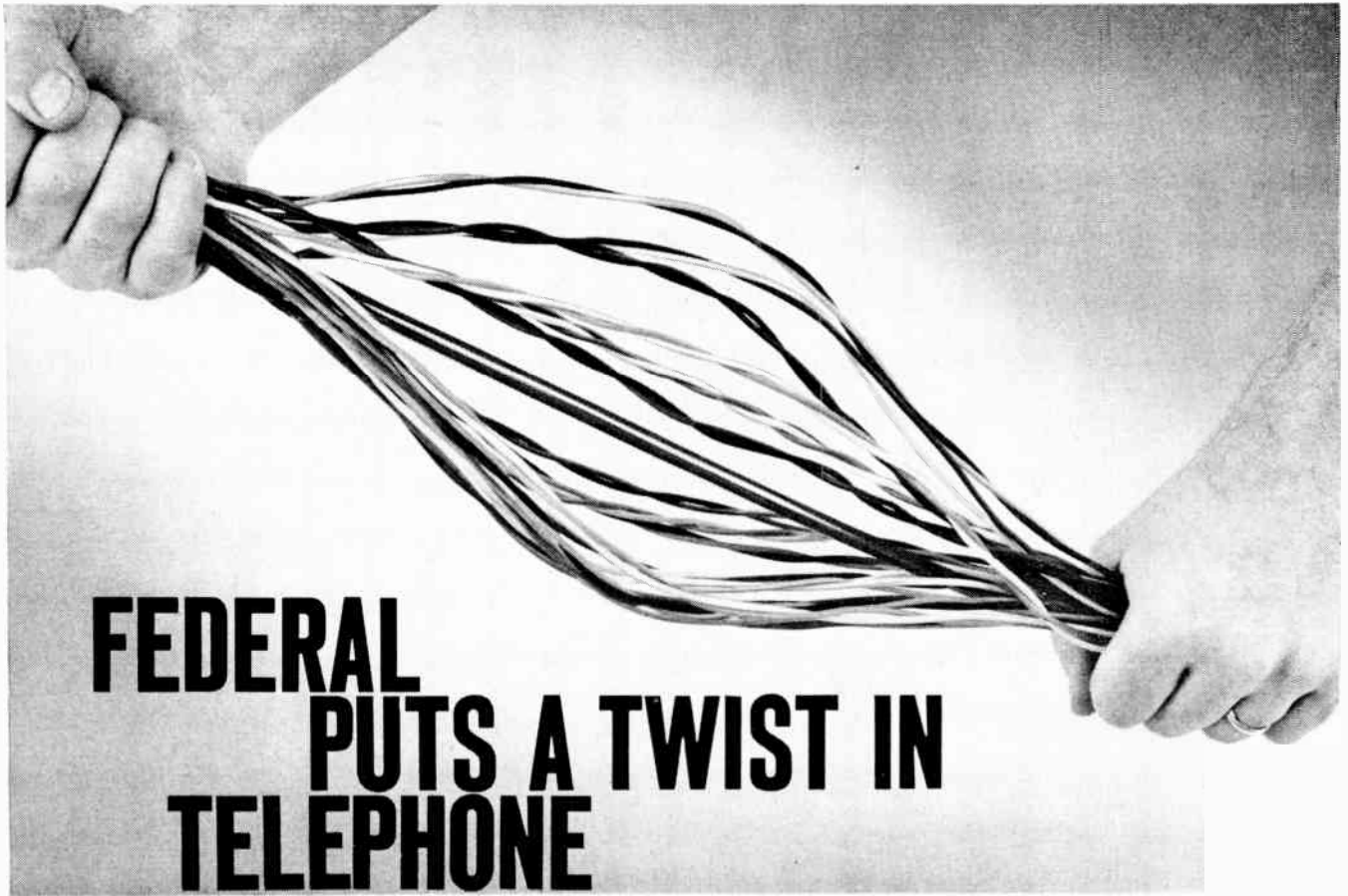
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For complete details check No. 9 on handy card, page 43

ELECTRONICS AND COMMUNICATIONS, January, 1960



FEDERAL PUTS A TWIST IN TELEPHONE CABLE

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



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Another fine product . . .

FEDERAL TYPE NC TELEPHONE DROP WIRE

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FEDERAL WIRE



& CABLE DIVISION

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For complete details check No. 25 on handy card, page 43



an age publication

Electronics and Communications

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

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COVER STORY

Detection devices shown in the front cover illustration are used with the new integrated building protection and security system introduced by Minneapolis-Honeywell Regulator Co. The equipment includes fire and smoke detectors, tamper-proof window switches, noise and motion detectors and electronic fencing. Any of the devices can be tied in with a centralized control console.

you are looking at the best UNIVERSAL COUNTER-TIMER

Presenting the new **CMC 226B**



and here's the proof...

ENGINEERED FOR THE USER

CMC's new universal counter-timer is human engineered to eliminate costly "cockpit trouble." Take a look at the clean, functional lines.

And inside, this tastefully styled instrument uses modular circuitry to simplify maintenance and cut weight. Nine tubes have been eliminated, lowering power drain and operating temperature and increasing reliability. Weight is only 40 lbs.

TECHNICALLY SPEAKING

Direct reading, 0 to 1.2 mc. Time interval, 1 microsecond to 1 million seconds. Period, 0 microsecond to 1 million seconds. Stability of 2 parts in 10^7 , with an option of 5 parts in 10^8 . Sensitivity 0.1 volt rms.

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DO ALL THESE JOBS PRECISELY DO THEM EVERY TIME

Measure frequency, time interval, period, phase shift, frequency ratio, rpm, flow, velocity, and many other basic physical quantities.

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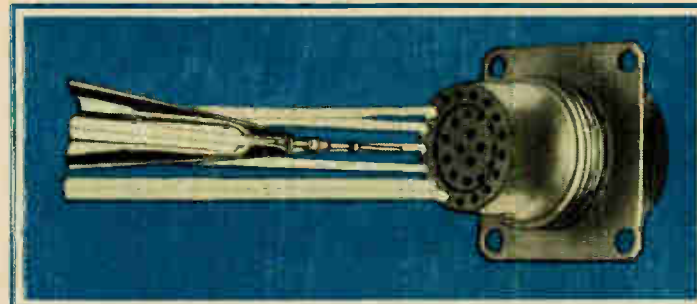
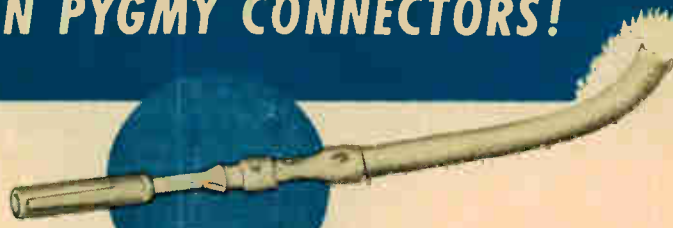
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22

For complete details check No. 11 on handy card, page 43

Bendix PUTS A CRIMP IN PYGMY CONNECTORS!



MULTI-CONDUCTORS NOW WIRED WITHOUT SOLDER

BENDIX has developed a crimp-type contact that is both removable and replaceable, yet securely wedges multi-conductors into electrical connectors much faster and cleaner than solder. This latest achievement of BENDIX electrical research is now available in the Pygmy "PT" and "SP" series. A new integral insert and grommet design provides improved moistureproof performance. Socket contacts have the famous probe-proof, close-entry feature and are heavily gold-plated over silver underlay.

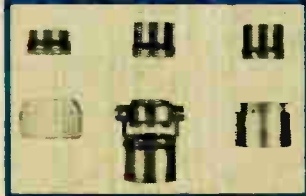
THE NEW "PT" PYGMY CRIMP



AVAILABLE

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CP SERIES CE-SR SERIES CE SERIES



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WALL MOUNT RECEPTACLE



BOX MOUNT RECEPTACLE



JAM NUT RECEPTACLE



STRAIGHT PLUG



90 DEGREE PLUG

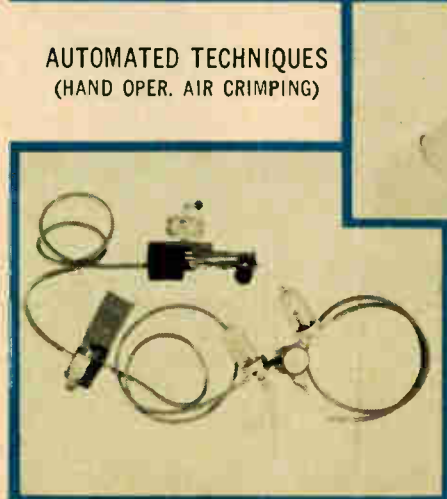


The "SP" series is similar to the above, except the plate finish is aluminite and the receptacle flange is larger with provision for back-panel mounting.

HERE ARE THE TOOLS TO HANDLE THE JOB



CRIMPING PYGMY CONTACTS



AUTOMATED TECHNIQUES (HAND OPER. AIR CRIMPING)



AUTOMATED TECHNIQUES (FOOT OPER. AIR CRIMPING)

For additional information please contact

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business briefs and trends

★ Two British companies, Humphreys and Glasgow Ltd. and Babcock and Wilcox Ltd., each with Canadian affiliations, are collaborating in the design of small capacity nuclear power plants which may be sold in Canada and other Commonwealth countries. The plants will burn enriched uranium fuel and units as small as 10mW capacity are to be designed later on.

* * *

★ Stuart D. Brownlee, president of Canadian Admiral Corporation, Ltd., indicated recently that final industry TV sales for 1959 will probably be down about 5 per cent from 1958, but, he continued, all the market research experts agree that 1959 will be the lowest point in a TV sales curve that has been declining since the 1955 peak. "Starting in 1960," Mr Brownlee observed, "television sales should increase steadily at a rate of about 5 per cent per year because of the growing replacement market coupled with the demand for second sets in the home."

* * *

★ The use of manufacturing representatives in the dissemination of electronic products has been proved as the best tool for sales in the industry," said a western sales executive speaking before the National Electronic Representatives Convention in Chicago. "No maker, regardless of how efficient a sales group he has built," said the speaker, "is able to touch all of the sales bases with the efficiency a well integrated rep system offers."

* * *

★ Telegrams via satellite relay stations, and direct transmission of television from remote corners of the world, are some of the revolutionary advancements that may be expected in the communications field, according to a Canadian National Telegraphs executive. Referring to the future of communications, he said that the announcement of a British Commonwealth Around-the-World cable was a prime example of what may be looked for. The first leg of this cable will go into service between Canada and the United Kingdom in 1961, carrying telegraph and telephone services.

* * *

★ Deliveries on the Doppler Radar Navigation Systems and associated test equipment ordered from Collins Radio Company by Trans-Canada Air Lines are scheduled to begin in January, 1960. The contract calls for six FM-CW Doppler systems to be installed on DC-8's the Canadian airline has on order and five FM-CW Doppler system spares.

* * *

★ The demand for telephone service in Newfoundland has greatly multiplied in the years since the Second World War and the estimated number of telephones in use in that province now approximates 50,000. That the measure of growth of this form of communication is significant is evidenced by a recent move on the part of the Avalon Telephone Company to seek authority to increase its capital stock from \$7½ million to \$20 million.

* * *

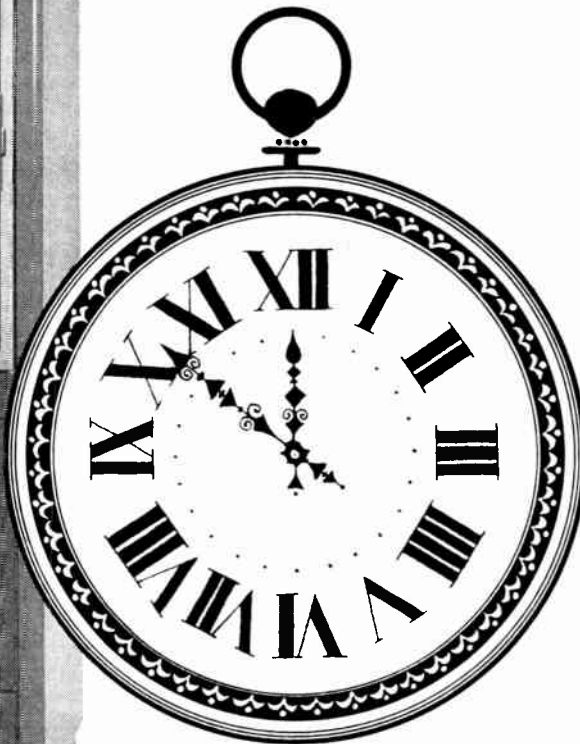
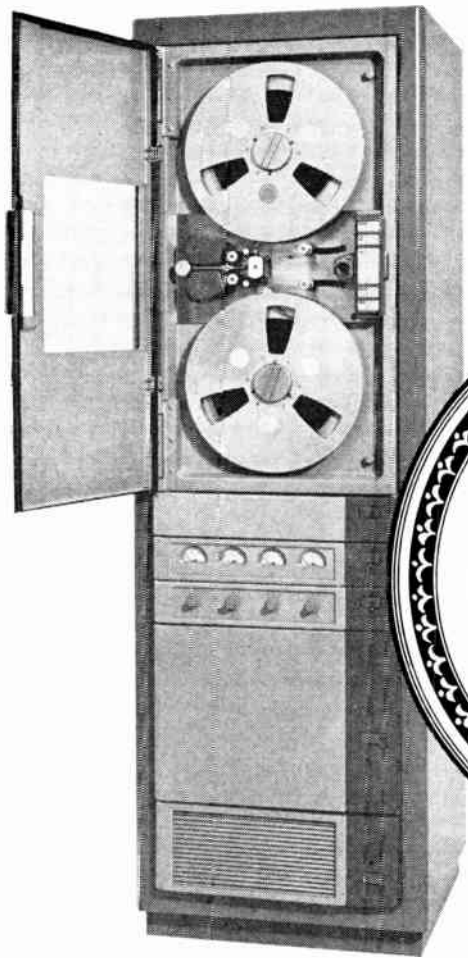
★ Telex, an automatic teletype service providing a new ultra-fast means of communications between any two units on the continent, was recently initiated in the city of Nelson, British Columbia, by the opening of a Telex central office. Other B.C. cities having a Telex central exchange are Vancouver, Victoria, Kamloops and Kelowna.

* * *

★ The annual event heretofore known as The IRE Show will become officially the IRE International Convention in 1960. It will be held March 21-24 at the Waldorf-Astoria Hotel in New York City and at the New York Coliseum.

* * *

★ It is estimated that British electronic exports for 1959 reached around \$170 million out of a total sales volume for the year of \$1.3 billion for the industry.



AMPEX FR100B

magnetic tape recorder gives you a 5-minute hour • or a 300-second minute

The FR100B is the workhorse of the laboratory, with versatile time base expansion and compression which enables you to accommodate any speed for accurate data storage.

It presents your data in "live" electrical form that allows an unlimited variety of techniques for read-out, analysis and control-signal use. For example, it permits you to re-run costly, often unrepeatable test procedures, thousands of times.

The FR100B is a third generation machine, backed by more than 12 years of Ampex experience in manufacturing thousands of individual pieces of magnetic tape recording equipment. It features a plug-in modular design, with interchangeable plug-in amplifiers, which allows accessibility of all electronic components and sub-assemblies.

All tape guiding elements are referenced to a precision plate casting. A single equipment can record up to 14 tracks of direct FM or PDM data, or up to 32 tracks of serial or parallel digital data.

The standard equipment offers six speeds ranging from 60 to 1 $\frac{1}{8}$ ips, electrically switchable in two overlapping ranges using a four position switch and unique speed range dial. Broader speed ranges can be incorporated into the tape transport as required.

Write or phone for an illustrated brochure and specifications on the FR100B, or technical assistance with any data storage problem.

AMPEX

AMPEX AMERICAN CORPORATION / Instrumentation Division
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For complete details check No. 35 on handy card, page 43

A unique Canadian marketing research study tells

How industry buys

'LONDON STUDY' of industrial purchasing traces influences

at work in making industrial sales

THE unique industrial marketing research report, known as the London Study, has now been published in book form under the title *How Industry Buys, with conclusions and recommendations on marketing to industry*. The study probed in depth the industrial purchasing-selling process in Canada and was sponsored by the Business Newspapers Association of Canada and the Canadian chapters of the National Industrial Advertisers Association.

The study was directed by Dr. Donald H. Thain and Dr. D. S. R. Leighton, associate professors of business administration at the University of Western Ontario School of Business Administration and Charles B. Johnston, lecturer in business administration at the school.

Field interviews covered 36 companies representative of the Canadian industrial market—in the London, Ontario area—and examined the history from realization of the need to actual purchase of a large, medium and small purchase in each company. Graduate students from the university carried out the interviewing under the direction of the authors.

The London Study is the first detailed examination of the industrial purchasing-selling process ever made in North America and yields fascinating insights into the buyer-seller relationship.

It examines the impact of mechanized promotion and personal selling on the industrial buyer and traces the complex process of an industrial purchase through teams of buying influences inside and outside the purchasing companies.

Chapters on advertising, direct mail, distribution and other marketing factors discuss the quality of industrial marketing in Canada today. The 36 case-reports on the companies and purchases studied are published in detail in *How Industry Buys*.

In another section, the authors draw important conclusions and recommendations from the study which will be of great importance to everyone concerned with industrial marketing in Canada.

Senior executives, marketing management, advertising management and advertising agency staffs will find *How Industry Buys* an absorbing and penetrating examination of the most critical problems they face today.

Copies of the 270-page *How Industry Buys* report can be obtained from George Mansfield, Manager, Business Newspapers Association of Canada, 100 University Avenue, Toronto, Ontario at \$7.50 a copy post paid.



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OF CANADA**

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business briefs and trends

★ Canadian importers can play an important role in Japanese-Canadian trade by selecting only the best quality Japanese merchandise for Canadian markets, according to the director of the Japan Trade Center, in Toronto. Eijiro Fujise, who came to Canada to officiate at the opening of the Japanese display at the Pacific National Exhibition, said Japanese manufacturers and exporters are greatly influenced by the practices of Canadian importers. The importers, he said, are regarded as experts on marketing in Canada. He called on Canadian importers for co-operation in ordering only quality goods from Japan. Although this might mean higher costs, Mr. Fujise said he felt Canadians are concerned with quality first, before low prices.

* * *

★ The purchase of step by step automatic switching equipment for the Outlook telephone exchange of the Saskatchewan Government Telephones was announced recently by C. W. Sparrow, Saskatchewan Government Telephones' Chief Engineer. The successful tender was made by Standard Telephones & Cables Manufacturing Company (Canada) Limited, the Canadian suppliers of the British manufactured telephone equipment. With the letting of the contract, the estimated price of the total project, including building, equipment, dial telephone and the necessary outside cable work, is nearing the one-quarter of a million dollar mark.

* * *

★ Major planning of new multi-channel multi-purpose undersea telecommunication cables, Canada's position in the development and operation of an intra-Commonwealth 'round-the-world' cable system, and recording another profitable year for the fiscal period of 1958-59 are the main features contained in the Ninth Annual Report of the Canadian Overseas Telecommunication Corporation tabled in the House of Commons recently by Honorable George Hees, Minister of Transport. The Report, submitted by Douglas F. Bowie, the Corporation's President and General Manager, disclosed a net profit of \$625,703.00 after provision for income tax of \$565,426 and of \$446,206.00 for interest charges on Government loans. This marks the ninth successive year of profitable operating since the Corporation came into being in 1950.

* * *

★ Sales of Clairtone Sound Corporation Ltd. are expected to at least triple during the next 12 months. "One order from the United States already ensures that exports will show a minimum tenfold increase," according to Peter Munk, president. During the past marketing year, he said, the company manufactured and sold a total of 1,200 stereophonic high fidelity models, including a sample order of 100 to the United States. An initial order from the U.S. for Clairtone's 1959-1960 line calls for a total of 1,000 in two models to be delivered to Granco Products, Inc. Long Island City, N.Y., by mid-November.

* * *

★ Marsland Engineering Ltd. of Kitchener have announced plans for the construction of a \$1 million electronics plant to be built in Waterloo's new industrial section. The plant will cover 100,000 square feet and is expected to create employment for 450 people when completed in about 18 months' time.

* * *

★ A new Northern Electronic telephone manufacturing plant to be constructed at London, Ontario, will have a capacity for the manufacture of 500,000 telephones a year in addition to other telephone system accessories. Capital investment, including new equipment for new facilities, amounts to \$12 million and, when completed, will require in the neighborhood of one thousand employees.

* * *

★ A contract for the technical maintenance of the USAF Pine Tree Line radar system valued at \$4,100,207 has been awarded to the Canadian Commercial Corporation. Physical execution of the contract has been sub-contracted to Canadian Aviation Electronics, Canadian Marconi and the Canadian National Telegraphs.

Newsletter

C a n a d i a n R a d i o T e c h n i c a l P l a n n i n g B o a r d

Canadian Association of Broadcast Consultants

At an Ottawa meeting held during the first public hearings of the new Board of Broadcast Governors, an association of broadcast consultants was formed, consisting of those consulting engineers accredited by the Department of Transport. Known as the Canadian Association of Broadcast Consultants, the group provides, in behalf of its members, a single voice in Canadian radio and television affairs.

The prime reason for the formation of this new group was that, up to January 1959, the consultants, while bound to proceed under the Department of Transport specifications, were unable as a group to request modernization of the broadcasting technical regulations.

Through the new association the consultants now can serve on and advise the CRTPB when desirable. Other advantages to be gained, through this group, will be the formation of a technical information pool on such things as ground conductivities and standardization of engineering procedures. It also provides for mutual discussion of technical problems. The association hopes to be able to advise the Department of Transport and the Board of Broadcast Governors of new developments and new trends in the Canadian broadcasting industry.

While the consultants, as professional engineers, are bound by the by-laws and codes of ethics of their provincial associations, they have not before had the interpretation of ethical decisions specifically related to broadcasting. They hope now to promulgate a suitable code.

Associate memberships are available to others actively engaged in the business of broadcast consulting, whether professional engineers or not.

The President of the association is George Mather, P.Eng., and the Vice-President is A. G. Day, P.Eng. H. Z. Rogers, P.Eng., 830 Lansdowne Avenue, Toronto 4, Ontario, is the Secretary-Treasurer.

15th Annual Meeting

At the fifteenth annual meeting of the Planning Board on December 3 in Ottawa the Executive Officers were all re-elected for another year.

The meeting was a successful one and during its course the Canadian Broadcasting Corporation camera crew took some footage of film for a documentary film which will illustrate the democratic process where government officials and citizens sit around the same table to work out common problems in the public interest.

An important event of the annual meeting was the formation of the Ad Hoc Committee on Regulatory Factors to meet with officials of the Department of Transport, to resolve a working method of using the regulatory factor and define, as far as possible, which factors should be applicable to different specifications. The terms of reference of the Ad Hoc Committee, as outlined by the president, were — (a) discussion of the problem technically, (b) suggestions from DOT officials on the relief of the situation in particular areas, and (c) suggested compromises.

A meeting of the Ad Hoc Committee on regulatory factors was held on December 8 in Ottawa and the proposals made at the meeting are being sent to the chairmen of all the technical committees of CRTPB for their comments. These comments will then be circulated to the sponsor members of the board for approval. The most important item on the agenda of this meeting was in connection with the land mobile equipment situation.

The Ad Hoc Committee on regulatory factors is constituted as follows: Chairman — R. A. Hackbusch — CRTPB General Coordinator; G. H. Long — Canadian Association of Chiefs of Police; T. S. Dutton — Canadian Electrical Association; S. Bonneville — Telephone Association of Canada; G. P. Adamson — Electronic Industries Assoc. of Canada; W. Ornstein — Chairman of the Fixed Land and Maritime Mobile Committee, CRTPB; J. C. Cline — Hydro-Electric Power Commission of Ontario; G. Bedingham — Acting Chairman of the EIA Mobile Equipment Engineering Committee; N. Redsell — Association of Municipal Electrical Utilities of Ontario.

C a n a d i a n R a d i o T e c h n i c a l P l a n n i n g B o a r d
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R. C. POULTER, Director of Public Relations; F. W. RADCLIFFE, Secretary-Treasurer

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PHILLIPS ELECTRICAL  **COMPANY LIMITED**

Increasing counting system reliability

The use of transistors in glow-tube counters results in a cost reduction of one-half and an increase in reliability. Units can be cascaded to read as high as 10^5 and are used in nuclear instrumentation.

by Henry A. Kampf*

Using a combination of transistors and glow-transfer counting tubes results in an inexpensive approach to reliability for counting systems. The absence of vacuum tubes and the use of transistors that are either cut off or saturated results in a nearly ideal counter which is unaffected by power supply variations as large as 20 per cent and temperatures as high as 60 C. A single low-speed decade complete with decimal readout can be produced at less than one-half the cost of conventional decimal counting units.

Glow-transfer counting tubes perform the function of counting and simultaneously provide visual readout by the position of the glow of the tube. Each glow tube requires two negative pulses to advance the glow from one cathode to the next. One of these pulses is fed to the first guide which advances the glow one-third of the way. The second pulse is fed to the second guide which advances the glow the second one-third of the distance from cathode to cathode. The glow finally advances the last one-third of the distance as the pulse driving the second guide falls to zero.

Pulse timing

The negative pulses driving the guides are timed so that the second-guide pulse is nearly at full amplitude before the pulse at the first guide begins to fall as shown in Figure 1A. Pulse amplitudes of at least 80 v are required to drive the tubes reliably.

Larger pulses produce faster glow transfer, giving faster counting rates. However, 80 v pulses will drive a GC10B glow tube at a rate of 1000 counts per second.

The pulse width also affects the counting rate. It is not possible to start glow transfer before the glow is resting on a cathode, and a finite time is required to transfer the glow from cathode to guide to guide to cathode; therefore a minimum period exists below which input pulses will not be resolved. Driving pulse width T_1 at one-half amplitude must not be wider than about 80 per cent of T to allow for adequate glow-transfer time.

The circuit shown in Figure 2 is a simple reliable circuit capable of 1-KC operation. It provides driving pulses of about 100 v. Since this driving-pulse amplitude is smaller than that usually used with the glow-transfer tube, it is necessary to make the output pulse widths

wider than just described in order to accommodate the slower glow-transfer times. This circuit is essentially two amplifiers in cascade; both are saturated when no signals are present.

Circuit operation

The positive input pulse is differentiated by the coupling capacitor C and R_1 , the input resistor of Transistor Q_1 . The portion of this differentiated pulse that exceeds the cut-off threshold of Q_1 , produces a large negative pulse at the collector of Q_1 as it is cut off. This pulse is fed to the first guide of the glow tube and also fed to transistor Q_2 to develop the second pulse.

* Consulting Engineer, Packard Instrument Co., Inc.

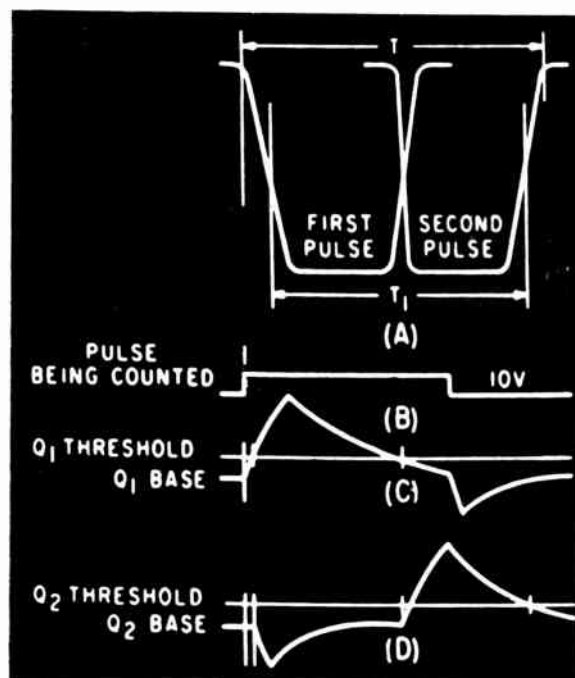


Figure 1 — Waveshape of pulses at the guides (A), input (B), transistor Q_1 (C) and transistor Q_2 (D) are shown.

Figure 2 — Circuit for 1-kc scaler uses 5 per cent tolerance resistors and 10 per cent tolerance capacitors.

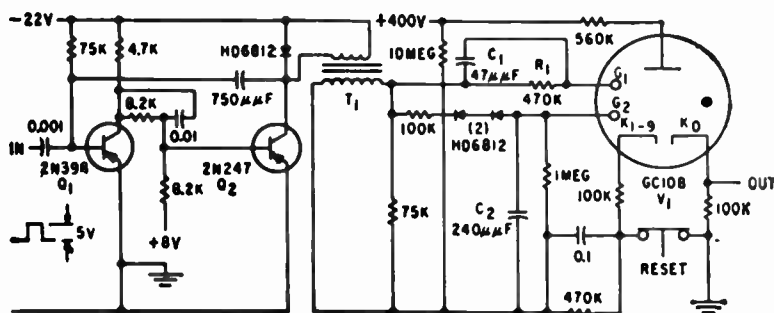
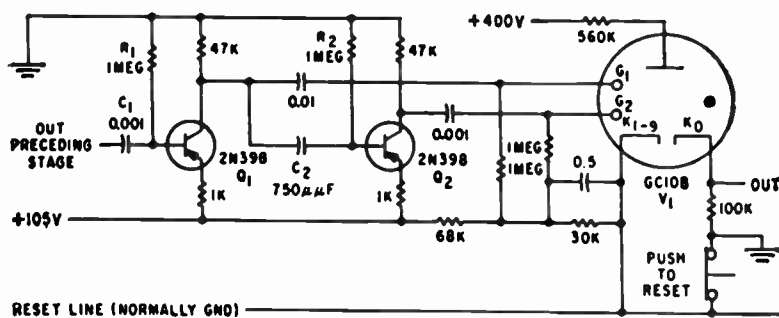


Figure 3 — All capacitors and resistors of 4-kc scaler have tolerance of 5 per cent.

The pulse is differentiated by capacitor C_2 and R_2 , the input resistor of Q_2 .

Negative excursion of the signal at the base of Q_2 has no effect since Q_2 is already saturated. However, the positive part of this signal which exceeds the cut-off threshold of Q_2 causes the pulse output that is used to drive the second guide.

The time constant at the base of Q_1 controls the pulse width of the first pulse and the delay time of the second pulse. The time constant at the base of Q_2 controls the pulse width of the second pulse.

These 1-kc circuits are cascaded by connecting the input of one to the output of another. Registers as high as 10^5 have been obtained by using this method.

4-Kc scaler

The circuit shown in Figure 3 drives the glow tube at its maximum possible rate. It uses a single-shot multivibrator and step-up transformer T_1 to obtain the 300 v pulses necessary to drive the tube at its maximum rate

of 4-kc. In this circuit the single driving pulse is fed to both guides at the same time.

The pulse arrives at the first guide after passing through differentiating network R_1 and C_1 while the pulse arriving at the second guide charges up capacitor C_2 of the pulse-stretching network. Therefore, as the pulse at the first guide is decaying the second guide-pulse voltage is still at a high value, and the glow is transferred as previously described.

The main-driving pulse width is determined by the multivibrator time constant and the pulse amplitude is determined by the loading on the step-up transformer. Pulse amplitudes as large as 300 v are obtained and, with a half-amplitude width of only 60 microseconds, are capable of driving the glow tube at a 4-kc rate. Some of the GC10B tubes have counted as fast as 6 kc with this circuit.

These circuits are quite tolerant of component variations in production and are used in the counting system of liquid scintillation spectrometers and other nuclear instrumentation.

★ Port Alberni in British Columbia is unique in possessing the world's first electronic pushbutton cable station. When tests are completed on the equipment in the new plant, it will be remotely controlled from Vancouver; the station itself will operate without staff and the building will remain locked.

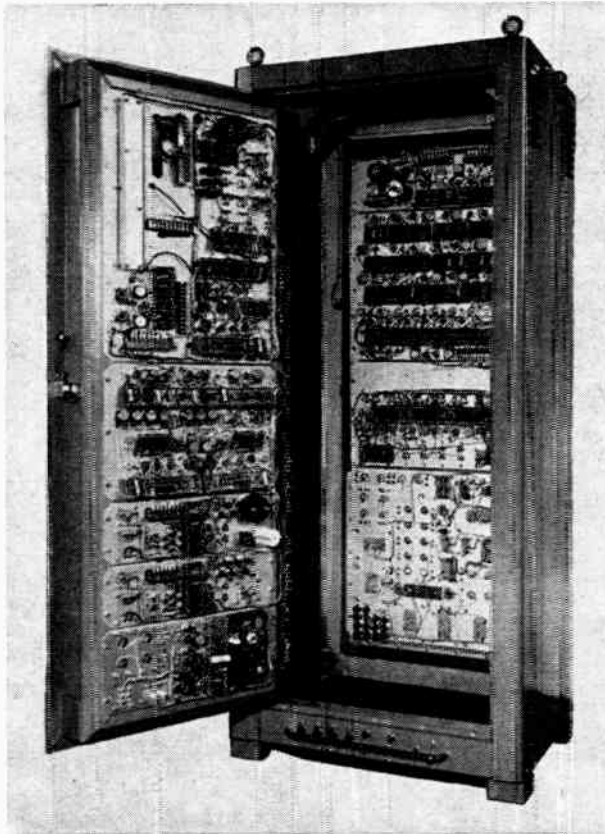


Figure 1 (left) — Scan converter with front door open, showing complete accessibility of all components and wiring. The back door, containing the remainder of the circuitry, opens in the same way.

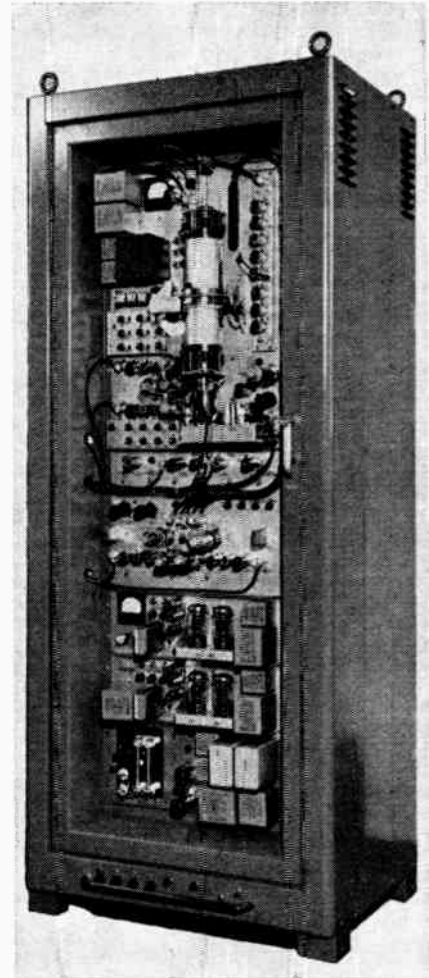


Figure 2 (right) — The scan converter, which was designed and produced in the Waterloo Laboratories of Raytheon Canada Limited, together with suitable monitors form a Bright Display System for use in air traffic control centers. This equipment received the annual award for the best product designed in Canada at the IRE Convention 1959.

The problem of giving a bright steady picture to a radar operator is solved by using a TV display first converting the radar signals into TV waveforms in a scan converter.

A bright radar display system

by Dr. T. W. R. East*

Standard radar displays of the P.P.I. type have always suffered from two main drawbacks. Firstly, viewing of the display has to take place in relative darkness. Even with special lighting techniques the operators must be situated in a special room; the display cannot be used in airport control towers or on the bridge of a ship. Secondly, it is difficult to obtain a complete picture at a glance from the display, mainly due to the great difference in intensity between a target which is being "written" on the screen and its afterglow.

Viewers of TV programs have no difficulty in using their receivers in a normally lighted room. The reason for this is that the picture is being painted on the screen 30 times per second and does not rely on the persistence of the phosphor to produce a steady effect. Thus a white or blueish-white phosphor giving a bright picture can be used. The problem of giving a bright steady picture to the radar operator is solved by using

* Engineering Department, Raytheon Canada Ltd., Waterloo, Ont.

a TV display, first converting the radar signals into TV waveforms in a scan converter.

Figure No. 3 shows a typical bright display system. The scan converter is in the center; radar signals are converted from polar coordinates to TV coordinates in it, and can then be displayed on a conventional TV studio monitor. A TV synchronizer giving horizontal and vertical drive pulses supplies synchronizing signals to both the TV monitor and the scan converter. This system was designed for the Airways and Airoute Surveillance Radar (AASR) and its associated equipment which give a number of different types of radar video such as MTI and map video; the video mixing gating unit combines them in a suitable fashion before they reach the scan converter.

The scan converter

The heart of the scan converter is a dual gun storage tube designed by Raytheon Company in Massachusetts. This tube resembles two small cathode ray tubes mounted face to face. In place of the phosphors there is a single storage screen which can be reached by both electron guns. The write gun places radar signals on the storage screen in the form of electrical charges on the insulator, and they persist there for as long as desired, fading away in the course of say 1 minute. The read gun scans the storage screen and detects these charges again, passing a corresponding signal out to the TV equipment. Figure 5 is a block schematic of the scan converter. A storage tube is in the center; to the left of it are the write circuits; the remainder are read circuits. Radar trigger, passing into the sweep generator, starts a sweep waveform which is resolved into X and Y components. They pass through a write deflection amplifier to the crossed coils of a fixed deflection yoke mounted round the write end of the storage tube. Thus the write electron beam is deflected in a PPI sweep which rotates in synchronism with the radar antenna. Radar trigger also starts a range mark generator and blanking generator. Radar video, processed in the video mixing gating unit, passes through an amplifier to the grid of the write gun of the storage

tube where it modulates the beam, and lays down the PPI picture in the form of electric charges.

The storage screen consists of a very fine mesh of wire, stretched tight across the center of the tube. The side facing the write gun is coated with a thin layer of insulator. The electrode potentials around the storage screen are so arranged that when the beam strikes the insulator, secondary emission takes place and a positive charge is left on the surface. Thus each radar target is represented by a small positively charged area; range marks take the form of positively charged rings.

The read electron beam which explores this storage screen is deflected into a TV raster by a sweep generator and deflection amplifier which get their drive pulses from the synchronizer. Again fixed coil magnetic deflection is used. The synchronizer is normal TV studio equipment so that the raster has 525 lines, interlaced, at 30 frames per second.

The read beam reaches the storage screen at a slow velocity and is only able to penetrate it where there is a positively charged area on the insulator. Areas which did not receive charge in the writing process repel the beam which returns in the direction of the read gun. A second wire mesh, known as the collector, is mounted between the storage screen and the write gun. When the read beam penetrates the storage screen, it lands on the collector and forms the output signal of the tube, passing to a preamplifier.

Unfortunately, part of the write beam also lands on the collector and enters the preamplifier in the form of interference. We chose to solve this problem by modulating the read beam at 30 mc/s; the output signal contains a component at 30 mc/s, amplitude modulated by the pattern through which the beam has passed. The preamplifier is tuned to 30 mc/s, as is the main read amplifier; thus the write beam component is rejected. The overall bandwidth of these amplifiers is 13 mc/s so as to accommodate the full detail of the TV picture. The detector and amplifier give positive video at 1 volt amplitude in a 75 ohm line, suitable for display in a conventional TV studio monitor.

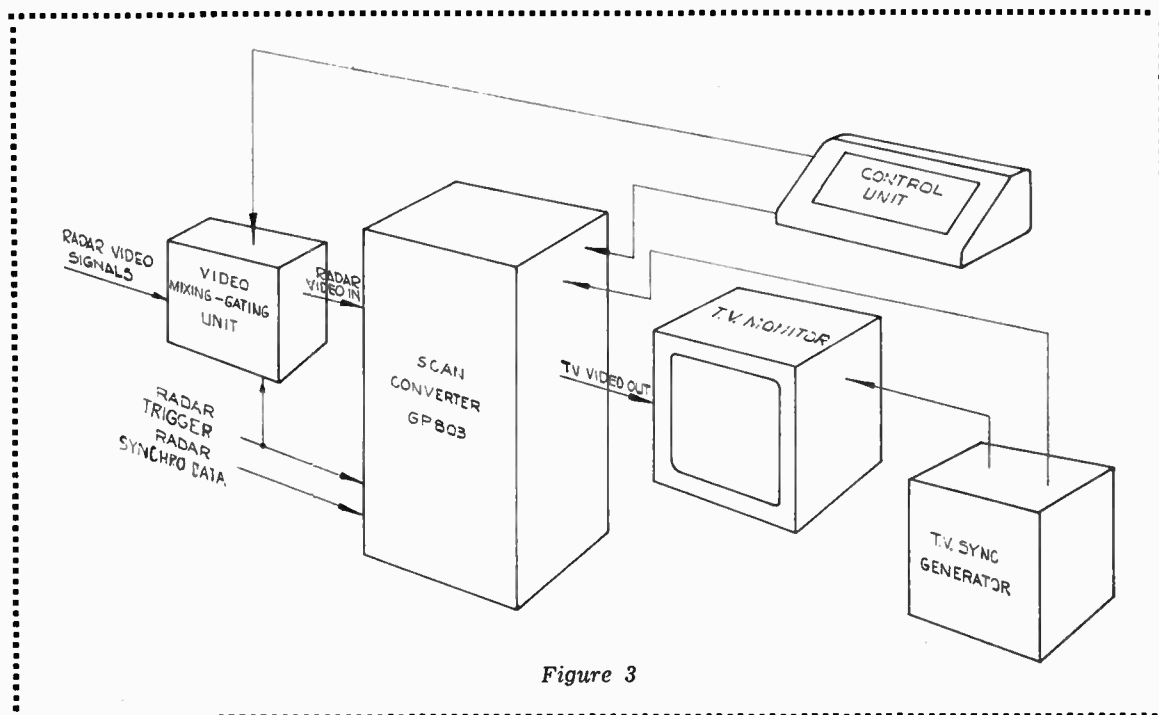


Figure 3

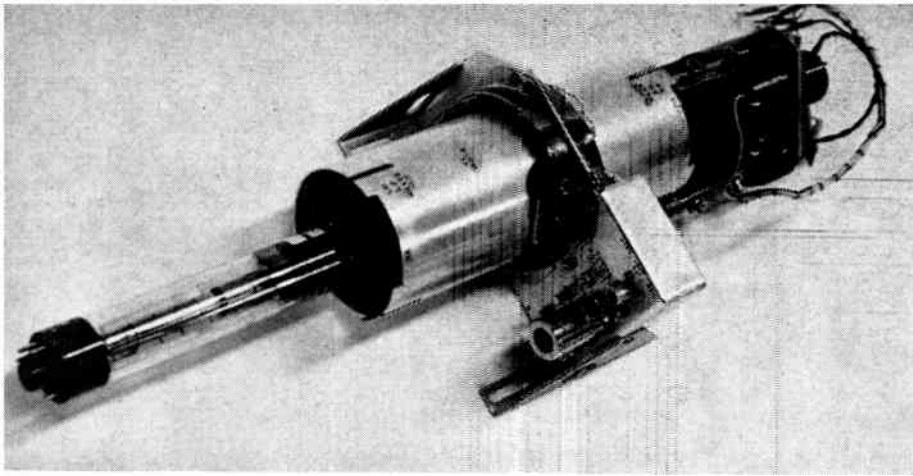


Figure 4 (left) — Raytheon storage tube type QK812 in the storage subassembly of the radar to TV scan converter, showing read focus and deflection coils and read preamplifier.

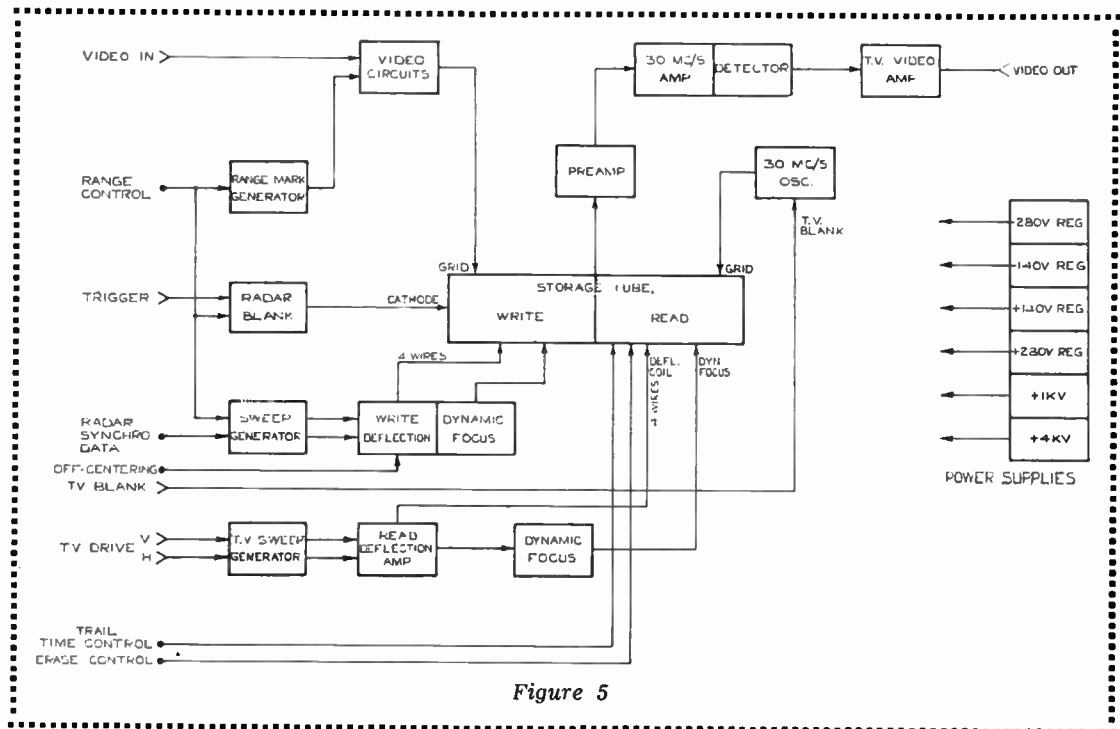


Figure 5

Packaging

In packaging this scan converter, the main requirements for continuous duty under air traffic control conditions are durability; accessibility of the individual chassis and of the cabling between the chassis and to other units of the system, safety of personnel, adequate heat dissipation. All components which dissipate appreciable quantities of heat are mounted on the outside of the chassis where natural ventilation is sufficient. The chassis are mounted inside a large frame which is carried on two hinges on the left hand side and a door handle on the right hand side. When maintenance personnel need to get at the wiring or small components, they open it just as if it were a door. When opened up the back of the chassis is now completely accessible for maintenance. Interconnections are carried across the hinged side and into a duct running up the side of the cabinet, which can be reached from the inside and also opened from the outside of the cabinet. Cables continue across the top of the cabinet to the other duct or leave the cabinet through the center of the roof or through holes in the floor. Another hinge frame on the other side of the unit is similarly arranged. While the doors are closed no wiring is exposed so there is no shock hazard. Opening the door breaks the circuit by means of an interlock system, which can be cheated by the maintenance

personnel who have to work with the equipment running.

Some users have a requirement that all equipment be fitted with doors which cover all working parts; such doors can be fitted as extras; forced draft will then be necessary and can be provided by fans mounted in the doors themselves.

Criterion of performance

The chief criterion of performance of this equipment is the ability to distinguish two targets close together on the TV screen. Resolution can be measured according to the standards used in TV practise; in this case a fine pattern is written into the storage tube and read out again on the read side. The measured resolution is more than 500 lines. The long persistence of the storage tube causes each target to leave a trail; by glancing at each trail, the position, direction and some indication of speed of the target is obtained. The appearance of normal air traffic on the screen is quite striking and the complete situation is easily comprehended at one time.

Two scan converters, designed and built by Raytheon Canada Limited for the Canadian Department of Transport, were delivered to Ottawa and Winnipeg last year.

It is felt that D.O.T. and other users of radar equipment will gradually convert their radar installations to bright display from conventional PPI indicators.

RBB 156,
front view,
Rogers Majestic
Broad Band Terminal.

EQUIPMENT UPGRADING

A Canadian designed V. H. F. broadband equipment

How time tested designs
may be modernized to meet
present-day requirements.

by G. W. Crossan, M.I.R.E.*

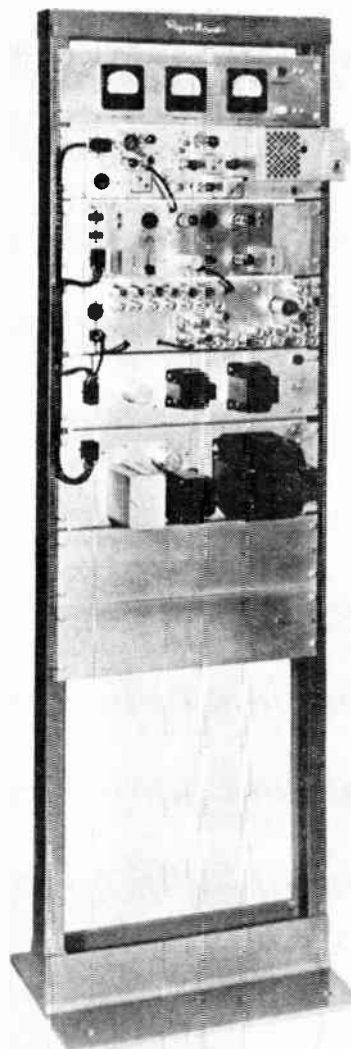
The glamour and novelty of new techniques, components and associated hardware have always made electronic products subject to rapid change and/or modification. This continuous search for new and better units and the resulting high obsolescence of equipments makes our industry very dependent upon the speed at which we can convert new concepts into practical equipments.

It is, therefore, very gratifying to find that some of the equipments designed three to five years ago are still in demand and when they are reviewed in the light of current technological advances they can be brought up to date without the expense of a new development program and associated high product cost.

An example of such a product is the Rogers Majestic Broadband units which were originally modifications of single channel VHF equipments and their evolution into a specific product line was largely the result of customer requirements and the suggestions of their communications engineers. These radio terminals are now an accepted media of transmission and have in the past few years been installed in over 100 locations throughout the world.

The basic design is proven and any attempt to improve or modify such equipment must be limited to areas that offer a definite improvement without degrading the inherent reliability and accepted performance.

The Rogers Majestic Broadband equipment was originally designed to operate in the 152 to 174 Mc/s



frequency band to provide a suitable transmission facility as an alternative to open wire or cable, for shorthaul systems from which voice, signalling, alarm, telemetering and control channels can be derived. It provided economical continuous duty communication links which are essential to power, telephone, oil, gas and lumbering companies. Such organizations have found that increased use of radio-relay systems can pay handsome dividends. Originally designed for single hop circuits up to 40 miles in length, several such links have been operated in tandem for a complete chain. The original models of this equipment were designed to provide a 1+2 channel voice system, which was later extended to 1+3 channels (Figure 1, RBB53-1/2).

The performance specifications of the previous models were tabulated and discussions with the design engineers pointed out certain areas that could be improved within the above terms of reference (Figure 1, RBB156).

Performance specifications for this basic type of equipment have not been issued, as of this date by competent authorities such as the C.R.T.P.B.

Our engineers suggested that the new model should meet the pertinent paragraphs of the recommendations on telephone channel parameters currently being considered by the Telecommunications Industry in Canada.

* Engineering Department, Philips Electronics Industries Ltd., Toronto, Ontario.

PERFORMANCE SPECIFICATIONS

Figure #1

	<u>RBB53B-1</u>	<u>RBB53B-2</u>	<u>RBB156</u>
Frequency Range	152-174 Mc/s	152-174 Mc/s	132-144 Mc/s 152-174 Mc/s
Frequency Stability	± 0025%	± 0025%	± 0005%
Phase Modulation			
Modulation Index	1	1	1
Transmitting Level	40 watts	40 watts	50 watts
Primary Power Source	117V 25/60 ~	117V 25/60 ~	117V 60 ~
Base Bandwidth	12 Kc/s	18 Kc/s	24 Kc/s
Distortion	1%	1%	< 1%
Input Level	- 30 dbm	- 30 dbm	- 30 dbm
Transmitter Spurious	- 60 db	- 60 db	> - 60 db
Receiver Noise Figure	12 db	12 db	8 db
Receiver Spurious	- 100 db	- 100 db	> - 100 db

The power supply

The original set was designed to operate from 117 volt 25 or 60 cycle single phase power. Since the frequency standardization program of the Ontario Hydro has been completed and the requirement for equipments to operate on 25 cycle power no longer exists it was possible however to redesign the power supply and associated filter to reduce its size and weight and increase the R.F. output power to 50 watts.

The substitution of silicon rectifiers in the power supply is justified by their long life and high efficiency. The manufacturers of these semi-conductors have achieved stability of performance and characteristics which materially add to the reliability of the equipment.

The receiver

The current trend to reduce the noise figure of receiving equipments and various improvements in

circuitry justified close examination of the front end of the receiver. The conventional R.F. amplifier was replaced by a cascade circuit improving the tuning range and noise figure and the frequency coverage was extended to include 132 to 144 Mc/s as well as 152 to 174 Mc/s, which provided a broader field of application for the equipment.

The base band of the receiver was extended to 24 Kc/s (Figure 2-RM426) to permit additional channels of commercially available carrier equipments to be used at the option of the system design engineer. In addition the overall reliability of the receiver was improved by standardizing on special quality tubes.

The transmitter

The basic circuit of the transmitter was modified to accommodate the 24 Kc/s base band (Figure 2-RM329). The addition of special quality tubes improved the

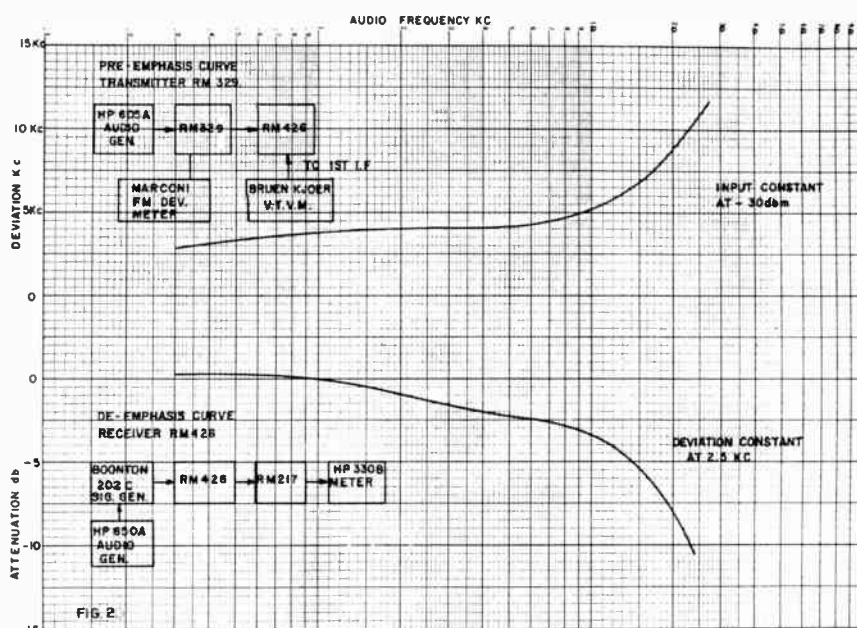


Figure 2

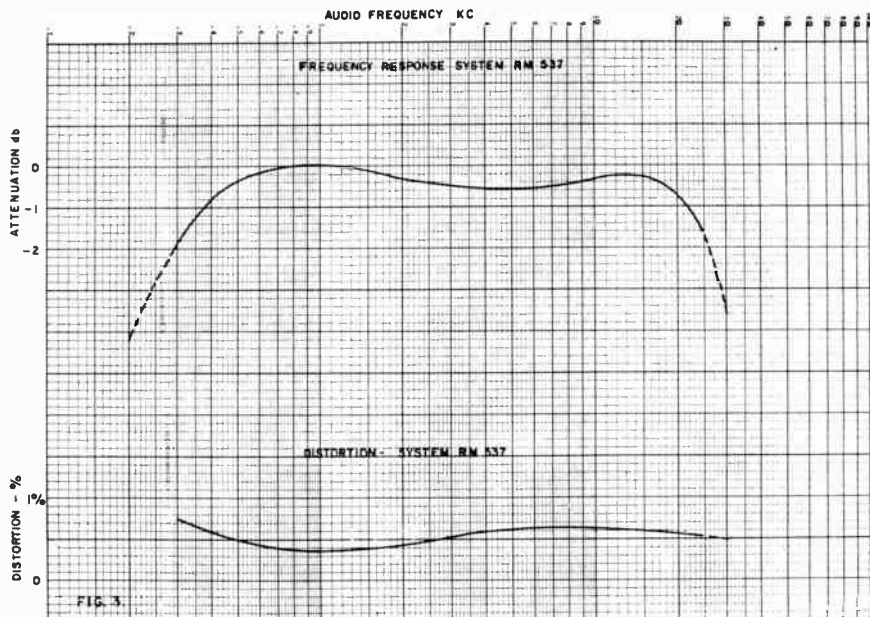


Figure 3

overall reliability and performance. A few mechanical changes were made to facilitate production.

General

The RBB series was normally supplied rack mounted or optionally in an enclosed cabinet. The requirement for greater utilization of floor space in communications systems can be met by mounting two units on a single six foot rack for applications requiring standby equipment or repeater service. Single units can be mounted on five foot racks.

Various features in the original equipment were changed to options to be supplied as requested by the systems design engineer as follows:—

1. Metering Panel — this unit can be supplied in portable form and used to test more than one terminal.
2. Alarm Circuit — this equipment can be used to

provide supervision and standby operation, if required.

Incoming and outgoing base band circuits are terminated on a Combined Line Amplifier Panel. Attenuators provide for level settings in 1 db steps over a range of 30 db.

Conclusion

The advent of more complex systems and ancillary equipments make the modern communications engineer appreciate conventional reliable equipment. He has learned from experience that the service he must provide is best supported by time tested designs — time tested designs which — due to the rapid obsolescence of equipment need not be scrapped in lieu of new designs but which may rather be modified to meet new requirements by careful engineering analysis and modernization.

Electronics future bright

The EIA President, Stuart D. Brownlee, in a New Year message to the members of the association, was optimistic about the electronics industry and its future in the next decade. His message, in part, was as follows:

“We are about to enter a new decade. Judging by the past ten years, the new decade will bring in a period of accelerated development in our fast-moving industry. Just as today we are selling products which ten years ago were experimental objects in the laboratory, work is going on today in research departments which will evolve into the products we will be selling

during the next decade. The rate of development of new products is continually increasing so that the next electronic decade will, I believe, show greater progress in product diversity than has the past ten years.

“If we maintain our progressive attitude we will prosper in spite of temporary set-backs. Our industry has always had its ups and downs, perhaps more than some other industries. But in such a technical field as ours, the progress curve is bound to climb upward as we maintain our research activities and forever explore new ways of doing things.”

Indicating surface flatness with electronics

An electronic straightedge permits fast and accurate measurements of flatness under shop conditions

by P. E. Carbone*

Checking the flatness of machine ways, surface plates and small areas such as micrometer caliper anvils is mandatory for close tolerance production. Many sophisticated devices have been developed to detect variations of a few millionths of an inch on critical workpiece measurements.

Currently, optical flats and parallels, and the autocollimator are used to determine surface flatness. Flats and parallels are most widely used for checking small surfaces, while autocollimators are useful when checking larger surfaces.

There are some conditions, however, when the surface of a workpiece must be checked rapidly and

weight, Fig. 1, was utilized as the basis of the design. Deflection in a bar supported at its ends, d , is maximum at the center and can be determined by the formula:

$$d = \left[\frac{5 w (1)^3}{384 EI} \right]$$

where w = distributed load, lb. per unit length; 1 = length, inch; E = modulus of elasticity, psi; and I = moment of inertia, inch⁴. The stress, S , at this center position is also maximum, because the bending moment, M , is maximum, and is described by:

$$S = \left[\frac{Mc}{I} \right] = \left[\frac{M}{Z} \right]$$

where I/c is the section modulus of the beam.

Deflection of a bar is usually so small when checking a scraped surface that amplification of the measured distance between the center portion and the ends must be made to obtain usable data. For this measurement, the electronic amplifier is used to amplify and compare the signal output from the strain gauges, which are connected in a Wheatstone bridge, mounted on the checking bar with a reference signal by means of a built-in discriminator circuit.

When the electronic straightedge is placed on a surface to be checked for flatness, it will conform to the surface and indicate concavity or convexity. For example, assume the bar deflects 0.001 inch due to its own weight when supported on its ends. When placed on a surface which is concave by 0.001 inch or less, the bar will assume the same over-all curvature as the surface for the length of the bar. The strain gauges bonded to the bottom of the bar will stretch while the upper gauges will compress and will coincide with the stresses of the bar at these points. These gauges, connected to the opposite arms of a Wheatstone bridge, will cause an unbalance in the bridge that is directly proportional to the stress and deflection. The output

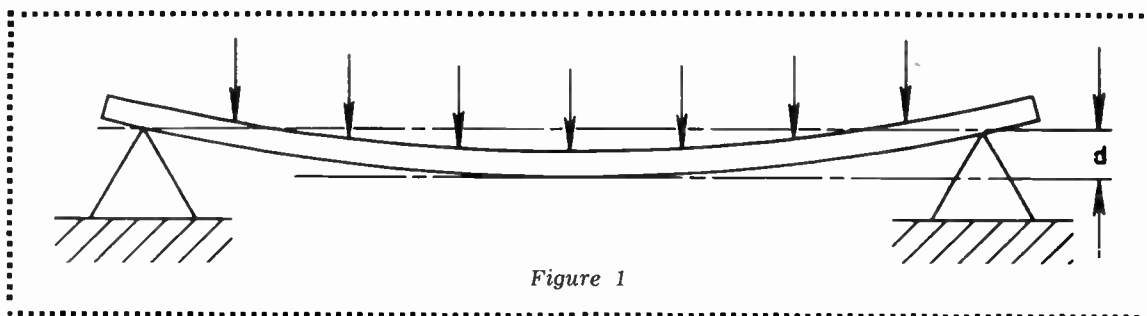


Figure 1

the only requirement is determination of the over-all flatness or curvature for a prescribed length. An example is a scraped surface that has been tested and corrected for bearing points. The only other possible errors are those resulting from any slight curvature extending over the entire surface. Checking this curvature rapidly has always been a problem. Optical flats are not suitable because of their small size; autocollimation and similar methods are usually too time consuming.

To fulfill the need for a fast checking method, an electronic straightedge was developed to measure flatness within 0.000025 inch over 120-inch length. Elements of the straightedge are a cast iron bar, usually 24 or more inches long, and four SR-4 resistance strain gauges. A standard resistance capacitance circuit is used to amplify the minute electrical output from the strain gauges.

The phenomenon of a bar deflecting from its own

is amplified and the condition of the surface is indicated on the meter.

In calibrating an electronic straightedge, it is placed on a nearly perfect flat surface and a null point is determined by alternately testing the lower and upper edge on this surface. The edges of the straightedge are scraped flat and parallel. Having obtained this null condition for a flat surface, the bar is then checked to determine the maximum sag or deflection. Knowing this measurement, the amplifier is adjusted so that each meter division corresponds to a specific increment of the total sag.

Since all the relations of stress, strain, deflection and concavity or convexity are linear, it follows that the electronic straightedge is a linear reading device. It is useful for checking the flatness of surfaces within a prescribed range as determined by the maximum possible deflection of the bar.

* Design Engineer, Brown & Sharpe Mfg. Co.

COMPUTERS

The Decca Twin tape unit, shown at the right, is a fast, automatic filing system for the storage of master files and ledgers of business records.

An efficient method of storing computer information and its supply to computing machines by a

High speed tape unit for digital data processing

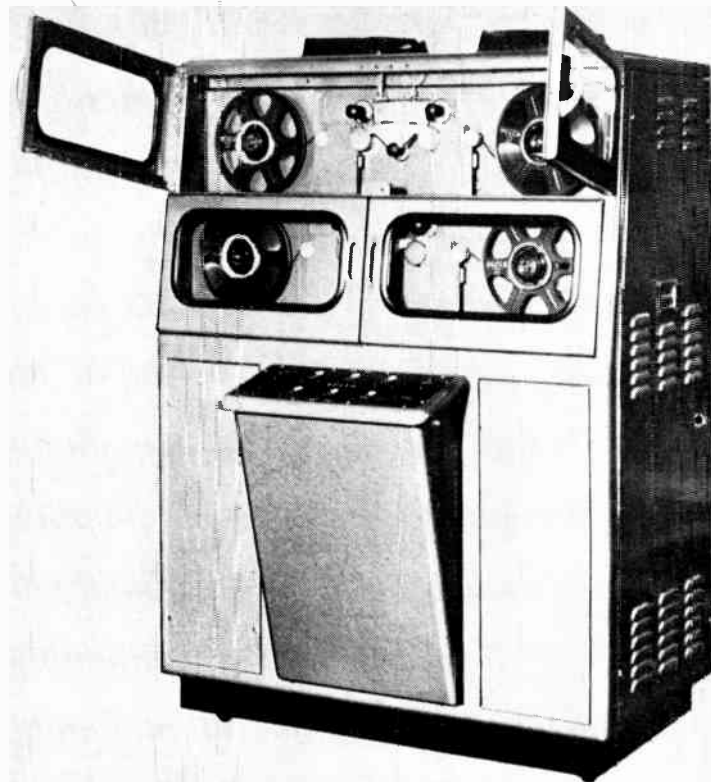
In computer engineering not the least of the many problems encountered concerns the storage of information and the computer's access thereto. The Decca Twin tape unit illustrated is a fast, automatic filing system for the storage of master files and ledgers of business records, for storing intermediate results in large-scale scientific calculations, and for passing information in and out of a computing system. It should be noted that in the first three applications the main bulk of the information is kept within the data processing system, and only the particular information required by the user is presented or handled externally.

The twin tape unit fulfils these requirements admirably. One file, or spool of tape, contains the equivalent of half a million words, which the computer can read at 2,000 words per second. The computer can start the tape, make an entry of twenty words, and stop the tape, all in a thirtieth of a second.

The unit contains two entirely independent decks, each capable of handling up to 3,600 feet of $\frac{1}{2}$ inch magnetic tape. A spool may be quickly changed for another from the system library. As a result, an almost unlimited amount of information may be held in the system, and made available to the computer in a few minutes.

The high performance of the tape drive and a number of other special features of the unit, allow computer time to be used to best advantage. These features include quick easy spool changing and a flexible and fully interlocked control system, giving automatic loading, unloading, and rewinding of the tape. Integration of the twin tape unit into any computer system is thereby greatly assisted.

All control circuits, power supplies and air pumps necessary for the two tape decks are mounted within the cabinet, making the unit completely self-contained.



The tape compartments are lightly pressurized with filtered air to exclude dust.

The Decca magnetic tape spool is based on the 10½ inch NARTB spool, specially adapted to the requirements of data processing. A tape end is easily attached with a simple accessible clip. Each spool has provision for a special recording ring, associated with the label, which indicates to the tape unit that the user is prepared for a new recording to be made on that tape. The absence of a ring thus protects the contents of a file against overwriting due to operator, program or circuit faults.

Two Decca spools on each deck carry the tape, which passes from one spool to the other over a convex bridge-guide, above which are the heads. Non-detachable hublocks secure the spools quickly but effectively. Between the bridge-guide and the spools the tape is drawn into a reservoir box by light suction. These reservoirs remove the need for high spool accelerations when the tape is started or stopped on the bridge. The length of a tape in the loop in each box is controlled by a servo-mechanism which causes the appropriate spool to wind or unwind.

The tape is moved by two vacuum capstans, which rotate continuously in opposite directions at either end of the bridge guide. Normally the friction between the tape and the capstans is insufficient to move the tape. Movement is obtained by applying a partial vacuum through the perforated surface of one or other capstan, according to the direction required. Vacuum is switched by means of solenoid-actuated air-valves to either capstan, or to perforations in the bridge, which act as a brake. This pneumatic clutch system, by operating on the underside, ensures that no damage is caused to the tape. Manual control of the tape movement may be exercised from the desk or remote control from the computer.

News Report

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

Seabreeze officially opens modern manufacturing plant

"There is still room for expanding small business in our economy, for entrepreneurial activity which is based, not on the enormous resources of the large corporation, but rather on the individual resourcefulness," James A. Roberts, associate deputy minister of trade and commerce, said when he officially opened the new plant of Seabreeze Manufacturing Limited, Etobicoke.

He cited Arthur K. Tateishi, company president, as a "truly outstanding example" of individual resourcefulness "in this world of 'group-think' and the large corporation with its competent research division."

The Canadian-born president of Seabreeze came to Toronto practically penniless in 1944 after he had lost his business, car and many other assets in the uprooting of Japanese and Japanese-Canadians from the west coast during World War II.

In a small rented shop on College Street, Tateishi handled radio repair service calls for appliance stores. Within a year he invented a direct drive phonograph motor that proved so successful he formed his first company, Phono Motors Ltd., in 1946. It was an easy step from motors to a "Phono-Tronic" record player and to adapt the same motor to a fan. Sales of the fan, called "Sea Breeze," resulted in dealers, distributors and general public referring to the Sea Breeze company. Phono Motors promptly changed its name.

Today "Seabreeze" sound reproduction equipment is used in more Canadian homes than any other make, according to company figures.

AEI acquires Siemens Edison Swan

H. G. McHaffie, president of Associated Electrical Industries (Canada) Ltd., announces the acquisition by the company of the entire share capital of Siemens Edison Swan (Canada) Limited which now becomes a subsidiary of Associated Electrical Industries (Canada) Ltd., but will continue to operate without change of name.

H. T. Wormell, a director of AEI (Canada), is president of Siemens Edison Swan (Canada) Ltd. Siemens' recently expanded Winnipeg plant manufactures telecommunications equipment.



The new plant of Seabreeze Manufacturing Limited, Jutland Road, Etobicoke, has more than 60,000 square feet of floor space and employs about 250 people. This new manufacturing plant was officially opened by James A. Roberts, Associate Deputy Minister of Trade and Commerce, on November 27.

S. F. Lee chief engineer for S. G. Telephones

Appointment of S. F. Lee, as chief engineer, Saskatchewan Government Telephones, was announced recently by Hon. C. C. Williams, minister in charge of Saskatchewan Government Telephones. Mr. Lee succeeds C. W. Sparrow, who was made manager of operations and engineering for the system. Both appointments were effective October 1, 1959.

CONTRACTS ADMINISTRATOR



M. F. Phillips

J. P. Giacoletto, vice-president and general manager of Collins Radio Company of Canada Ltd. has announced the appointment of Michael F. Phillips to the position of Contracts Administrator. During the past three years he has been employed by the Department of Defense Production, latterly as chief of the Sonar Division, Electronics Branch.

Toronto IRE members tour local plants

The Radio Valve Co. Rexdale Works provided conducted tours for 140 members and friends of the Toronto Section of the IRE on the occasion of their November monthly meeting. Forty-two students from the Radio College of Canada attended this meeting.

The Rexdale television tube manufacturing plant constructed in 1956 is one of the newest and finest of its kind in North America and is designed to produce up to 1600 tubes per day.

The first regular meeting in 1960 of the Toronto Section of the Institute of Radio Engineers will be held on Tuesday, 12th January, 1960. This meeting will consist of a field trip to the Maclean-Hunter Printing Plant at Yonge and Highway 401.

Ottawa firm to rep for Microwave Electronic Tube Company Inc.

The Ahearn and Soper Company Limited have been appointed exclusive Canadian Representatives for Microwave Electronic Tube Company, Inc., of Salem, Massachusetts.

The Microwave Electronic Tube Company manufactures microwave tubes and devices, TR, ATR, pre TR tubes, magnetrons, klystrons, noise tubes, spark gaps, duplexer assemblies and windows.

The full line of products from the Microwave Electronic Tube Co. Inc. are now available in Canada through The Ahearn and Soper Company Limited who will welcome the opportunity to serve you.

Canadian copper sought for British cable manufacture

Interviewed at his Toronto hotel, during his visit to Canada as part of his world-wide tour of Associated

Electrical Industries' companies, Dr. J. N. Aldington confirmed that AEI are taking a leading part in the design of Nuclear Power Stations and research reactors.



Dr. J. N. Aldington

Construction of Britain's Berkeley Power Station, another AEI project, is proceeding on schedule.

While in Toronto, Dr. Aldington discussed the bulk purchase of copper from Canadian sources for AEI's cable manufacturing companies in England.

Submarine Cables Limited, of which company Dr. Aldington is chairman, are starting work on the new 60 channel, 2-way Anglo-Canadian telephone cable.

American Electronics appoints Canadian distributor

Visirecord of Canada, Ltd., has been appointed exclusive Canadian distributor for American Electronics Peripheral Data Processing Machines. Announcement of the new appointment was made by James Zastro, general sales manager of the American Data Division, American Electronics, Inc., Brooklyn, N.Y.

Appointment of Visirecord, with its 34 sales offices throughout Canada, marks the first major move in a program to expand sales outlets beyond the borders of the United States, Mr. Zastro said.

Canadian firm enters U.S. market

National Semiconductors, Ltd., of Bates Road, Montreal, specializing in photoconductors, semi-conductors and research, is now developing, manufacturing and marketing cadmium sulphide cells in the United States, according to Dr. D. A. Anderson, president.

Dr. Anderson, George Pankau, vice-president, and George Redmond, in charge of engineering, were formerly associated with Canadian Marconi Co., Montreal.

Acton Labs appoint Canadian rep

Conway Electronics Enterprises of 1514 Eglinton Avenue West, Toronto,

RCA VICTOR DIRECTORS



D. Doheny



J. G. Godsoe

P. J. Casella, president, RCA Victor Company, Ltd. announces that at a special general meeting of the shareholders held recently at the head office in Montreal, Daniel Doheny, Q.C. and J. Gerald Godsoe, C.B.E., LL.D. were elected as directors of the company. Mr. Doheny, a partner of the Montreal legal firm of Bourgeois, Doheny, Day & Mackenzie, replaces the late Aubrey H. Elder, Q.C. who served for many years as a director of the company. Mr. Godsoe, a well-known Canadian business man, is also director of the Crown Life Insurance Company; Dominion and Angle Investment Corporation; The Great Western Garment Company and other companies.

Ontario has been appointed to represent Acton Laboratories Inc. in Canada. Conway will handle the complete ALI line of electronic laboratory test instruments, which include vacuum tube voltmeters, phase meters, ponogometers, impedance measuring meters, oscillographic recorders, and is equipped to provide factory-trained service to the ever-growing electronics markets throughout Canada.

APPOINTMENT



G. H. Scott

The election of G. H. Scott as president of Engelhard Industries of Canada Limited has been announced by C. W. Engelhard, chairman and president of Engelhard Industries, Incorporated, Newark, N.J. Starting with the parent company in 1935, Mr. Scott came to Canada in 1941 as general manager and director, elected vice-president and managing director in 1953.

Microwave contract to RCA

RCA Victor Company, Ltd. announced recently it had been awarded a contract in excess of \$20,000,000 by Canadian National Railways to construct a 1,200-mile-long microwave communications systems from Grande Prairie, Alberta, to the Yukon-Alaska border.

The system, which will be linked with communications systems in Alaska, will open up greatly improved telephone facilities in western Canada and Alaska. The engineering and construction work, virtually all of which will be done by Canadians, should prove a big spur to the Canadian economy. Scheduled for completion in about two years, the contract is expected to provide well over 1,000,000 man hours of labor to Canadians.

Sales promotion appointment at Northern Electric

R. A. Marvin has been appointed sales promotion manager of the wire and cable division of Northern Electric Company Limited, succeeding the late M. R. MacDonald.



R. A. Marvin

Born in Edrans, Manitoba, Mr. Marvin graduated from the University of Manitoba with the degree of Bachelor of Science in electrical engineering. He joined the Company in 1936, in Winnipeg.

A year later, he was transferred to Regina as a specialist in power apparatus, wire and cable and overhead and underground materials. In 1942, he came to Montreal in the capacity of technical naval engineer on the degaussing program and, two years later, returned to Winnipeg. He was subsequently appointed wire and cable marketing manager in the sales division, Montreal.

Since then, he has successively served as engineered products manager and wire and cable manager.

Canadian Admiral appoints Ottawa manager

Ed. Whittaker, vice-president — sales, Canadian Admiral Corporation, Ltd., has announced the appointment of a new manager for the company's Ottawa sales branch.

The new manager is Alex. McQueen, formerly of the company's Toronto branch sales staff. The Admiral branch in Ottawa distributes company products to dealers in Eastern Ontario and Quebec counties adjacent to Ottawa.

Beatty Bros. Limited gets mast order for Western European defense

Beatty Bros. Limited, Fergus, Ont., have been awarded a contract, through the Canadian Westinghouse Company, to build portable microwave masts for use in the Western Europe defense.

These masts are part of two super high frequency "line of sight" microwave radio systems. The first is a truck-mounted, three-hop system with four completely mobile terminal and repeater stations. The second part is a two-hop system with two terminals and a repeater station, the system materials being housed in transportable shelters. The entire system can be transported with a high degree of mobility. When in operation the system will have capacity for carrying 120 different channels.

The Beatty design for these portable microwave masts is similar to the 150 ft. portable radio transmitting masts supplied to the Department of National Health and Welfare for Civil Defense use. The new microwave masts, however, will have to support heavy, large area antennas and remain fully operable under any wind or weather conditions found in Europe.

Although Beatty masts are used extensively in Canada for all types of communications and radio broadcasting, this will mark the first time Beatty masts have been exported.

Hoodspith named general manager of ITTESCO

R. R. B. Hoodspith has been elected general manager and member of the board of directors of IT&T Electronics Service Company of Canada Ltd., it has been announced by the ITTESCO board of directors. Prior to accepting this position, Mr. Hoodspith was a Wing Commander in the RCAF in



R. D. B. Hoodspith

charge of the No. 1 Radar and Communications School at Clinton, Ont. He replaces John T. Robertson, who is accepting a new post within the company's parent organization.

The company services commercial and government customers in Canada including the Distant Early Warning (DEW) Line, the major part of which is located in northern Canada. ITTESCO's Canadian Board Members include Air Marshal Wilfred A. Curtis, Milton J. Foley, Maurice P. Forget and Henry G. Norman.

DOT ACQUIRES DECCA SYSTEM



Air Vice Marshal A. de Nierville, Director General of Air Services, Department of Transport, signs entry in Log Book at "Taking Over" ceremony at St. Raymond, Que. when the Decca Navigator System in Eastern Canada was turned over to the Department of Transport by Computing Devices of Canada Ltd. With A/V/A de Nierville on the platform are (left to right): C. F. Hembery, President of Computing Devices of Canada Ltd.; Monsignor G. M. Bilodeau of St. Raymond; Ferguson Walsh, Decca chain commander; F. Gordon Nixon, Director of Telecommunications and Electronics Branch of DOT.; Y. R. Tasse, M.P. for Quebec East; Captain G. Gaudreau, Marine Agent at Quebec for DOT.

DOT takes over Decca navigation system

Transport Minister George Hees has announced the purchase by the Department of Transport of the four-chain system of continuous radio positioning for shipping, known as the Decca Navigator, which has been undergoing evaluation in Eastern Canadian waters for the past two years. The four Decca Navigation chains were purchased from Computing Devices of Canada Ltd., licensees for the Decca Navigator Company of England, for the sum of \$2,350,000. The system will now be recognized as an official radio aid to marine navigation in this area. For the present it will be maintained and operated by Computing Devices of Canada Ltd. under contract with the Department of Transport.

Evaluation of the Decca Navigator system was carried out by 400 Canadian and foreign ships operating in Canadian Atlantic waters and up the St. Lawrence river and results of the tests were studied by officials of the Department of Transport. Originally established in Canada by the Decca Navigator Company of England, the government-acquired Decca Navigator system is similar to the several chains established in European waters and other parts of the world.

Canadian Research Institute named agents for two firms

The Canadian Research Institute of 46 St. George Street, Toronto have recently made known that they have been appointed as the Canadian representatives for the Kocour Company of Chicago, Ill., and the Italian firm of Microsprings, s.r.l., of Milan.

W. M. Hummel establishes new firm

Prime Electronic Components Ltd., located at 868 Dundas Highway East, Dixie, Ontario has been formed to replace the sales agency operated by William M. Hummel.

Offices, warehouses and an experimental laboratory to display and test components will be included in the new setup.

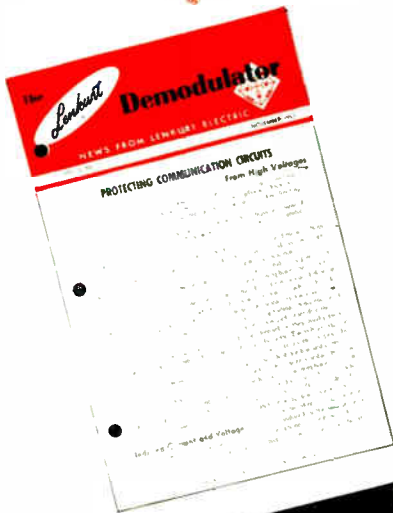
William M. Hummel is president and M. "Paddy" Maher is vice-president and treasurer of the new firm.

Concurrent with the announcement of Prime Electronic Components Ltd. establishment it was also announced that the company has been chosen exclusive Canadian sales representatives for Ecco Electronic Components Corp., of Yonkers, N.Y. and Precision Carbide Company of Patterson, New Jersey.

U.S. firm establishes Canadian plant

United Electric Controls Co., Watertown, Mass., manufacturers of temperature, pressure and vacuum controls, has announced the establishment of a manufacturing facility in Canada. The new firm, whose name is United Electric Controls (Canada) Ltd. is located in Dorval, Quebec. Lorne J. Inglis has been appointed general manager.

This expansion will enable United Electric to serve more efficiently its many Canadian customers and will open to growing Canadian and British Commonwealth of Nations industry a whole new range of top quality products, it was stated by A. W. Reis, president.



**Reprint
Book
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The 32 most-requested articles from the first seven years of The Lenkurt Demodulator have been compiled into book form. The attractive, cloth-bound book is titled **CARRIER AND RADIO ARTICLES SELECTED FROM THE LENKURT DEMODULATOR**, and costs \$2.50, post-paid.

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ON CARRIER COMMUNICATIONS

and developments connected with this field. For example, articles have appeared on: Factors affecting the propagation of Micro-waves; Transmission of Dial and Teletypewriter signals; Cable Transmission characteristics; Amplitude modulation, etc., etc. It is circulated

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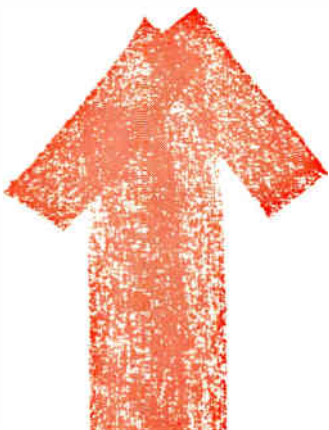
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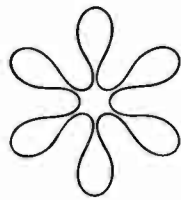
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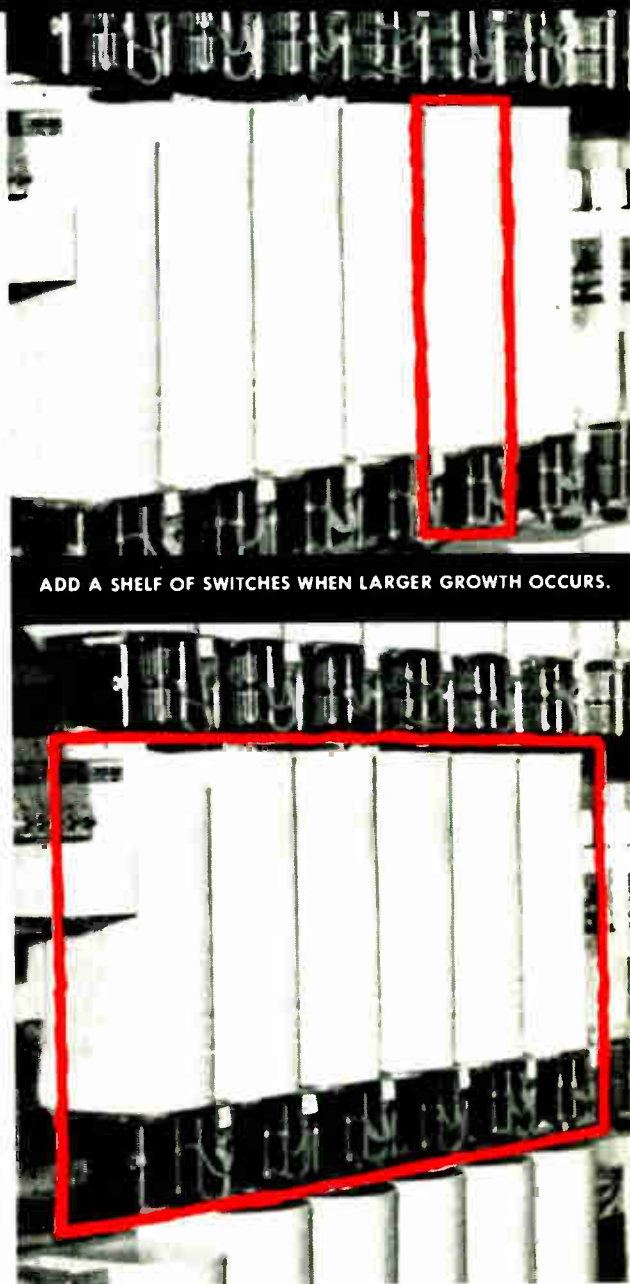
Strowger C.A.X. equipment is custom built to your exact requirements. All you do is ring Automatic Electric—and a highly trained equipment engineer takes over from there. From initial planning and layout of buildings, to selection, supply and installation of every item of equipment, Automatic Electric will handle the entire project.

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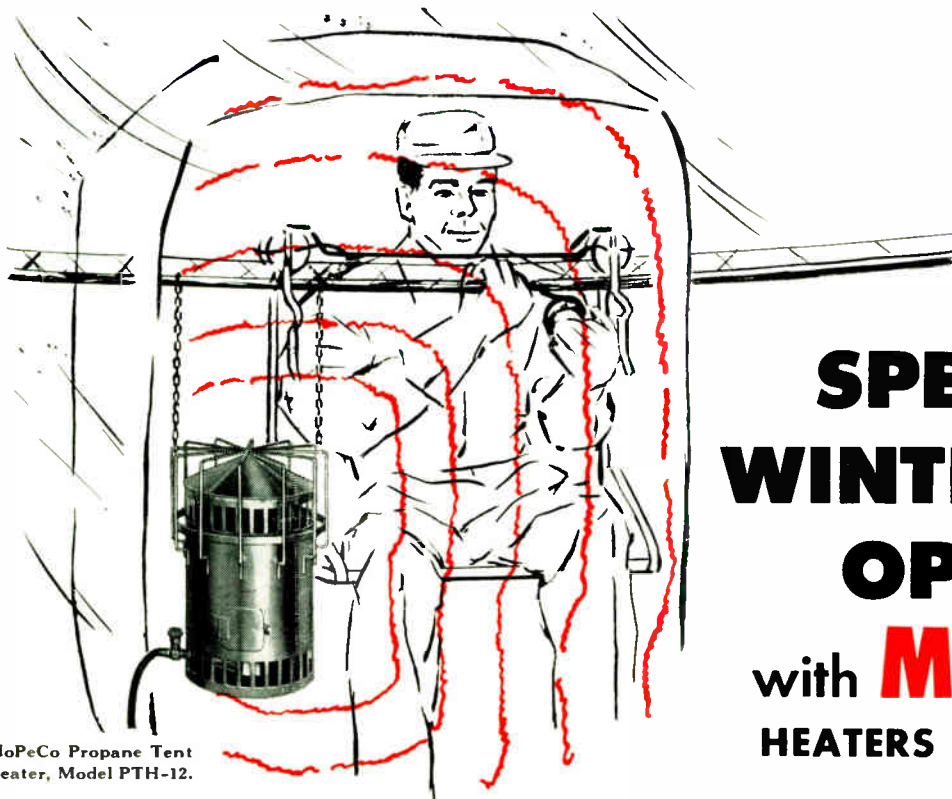
If you would like further information, call or write your nearest Automatic Electric office today.



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AUTOMATIC ELECTRIC



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5904-R

DDP contract for Servomechanisms Ltd.

Servomechanisms (Canada) Limited, Toronto, Ontario, Canadian subsidiary of Servomechanisms, Inc., has just received a contract from the Canadian Department of Defense Production for the manufacture of control systems for AN/ARC-552 UHF communication sets.

The contract was awarded on the basis of competitive bidding and calls for seven different types of UHF communication control panels and associated equipment. A total of nearly 3,900 units in the various types is involved in the contract which has a total value of approximately \$570,000.00.

These control units form part of the AN/ARC-552 UHF communication gear which will be used to convert the entire fleet of the Royal Canadian Air Force to UHF communication. The equipment was designed by Collins Radio Company of Canada Limited, also of Toronto.



The above photograph shows members of the Canadian Radio Technical Planning Board while in session at their 15th annual meeting held in Ottawa on December 3. The present executive of the Board were all re-elected for another year. They are: F. H. R. Pounsett, president; C. J. Bridgland, vice-president; R. A. Hackbusch, general co-ordinator; R. C. Poulter, director of public relations and F. W. Radcliffe, secretary-treasurer.

British telecommunication equipment for Canada

A well-known British firm of telecommunication equipment and instrument manufacturers have recently won an order for the supply of telecommunication equipment to the Canadian Department of Defense

for the benefit of interested communications personnel in Western Canada. Production. The contract is for the supply of 124 Signal Generators which will be used by the Royal Canadian Air Force in the maintenance of ground-to-air Very High Frequency multichannel radio equipment.

Data Transmission Seminar

Over fifty engineers, representing the major communications companies and public utilities in Eastern Canada, gathered at the Queen Elizabeth Hotel in Montreal on November 16 and 17 to participate in a seminar on Data Transmission sponsored by Automatic Electric Sales (Canada) Ltd.

In recognition of the growing importance of both the military and commercial aspects of data transmission, the program included formal presentations on the basic characteristics of data, transmission considerations for data handling, equipment requirements and trends, and a review of the existing and anticipated applications of data transmission. The papers on these subjects were supplemented by discussion periods and exchanges of ideas among the attendees.

Speakers included R. W. Ralston,

Toll Equipment Engineer, American Telephone and Telegraph Co.; R. C. Matlack, Special Systems Engineer, Bell Telephone Laboratories; Dr. B. P. Nicholls, Supervisor of Data Systems Planning, Northern Electric Research and Development Laboratories; J. N. Petrie, Chief Transmission Engineer, Automatic Electric Co.; F. B. Bramhall, Engineering Consultant, Lenkurt Electric Co.; B. C. Borden, Supervisor of Sales Assistance, International Business Machines Co. Ltd. The seminar was opened by S. C. Bird, Vice-President and General Manager, Automatic Electric Sales (Canada) Ltd., and chaired by J. R. Simpson, Radio Systems Specialist in the Carrier and Radio Division of the company.

The event was one of a continuing series of annual engineering seminars sponsored by AE, and will be repeated at Edmonton in April, 1960,

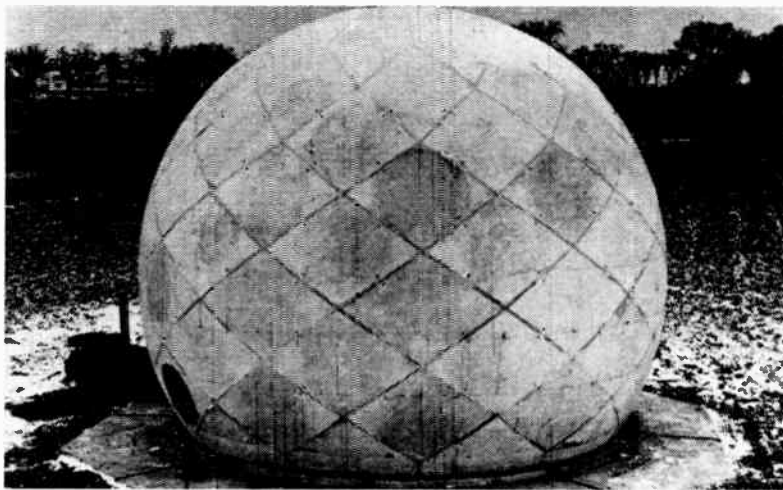


In the accompanying picture Mr. J. Robinson, the British company's representative in Canada (right) is seen inspecting one of the signal generators with Mr. R. Chaffey, export manager of the British company.

Deliveries of the generators to Canada will begin shortly. Earlier in 1959 the British company received a substantial order from the Canadian Department of Defense Production for nearly two hundred instruments, including signal generators, oscilloscopes, and transmission test sets. Together with the latest order, the value of these contracts amounts to more than \$333,000.



Pictured above, while in attendance at the data transmission seminar, are (left to right): R. C. Fawcett, Manager, Lenkurt Division, Automatic Electric Sales (Canada) Ltd.; Dr. B. P. Nicholls, Supervisor of Data Systems Planning, Northern Electric Research and Development Laboratories; J. R. Simpson, Radio Systems Specialist, Automatic Electric Sales (Canada) Ltd. and R. C. Matlack, Special Systems Engineer, Bell Telephone Laboratories.



World's first polyurethane foam radome, erected at Ottawa, Ontario, by the National Research Council, is constructed entirely of polyurethane foam, even to the joints. This radome, the result of a development program sponsored jointly by the Royal Canadian Air Force and the National Research Council, is designed to meet a growing need for ground shelters providing greater dielectric "transparency" to minimize energy loss and boresight error in radar tracking installations.

Tung-Sol forms Canadian division

Formation of the Canadian Division of Tung-Sol Sales Corp., a subsidiary of Tung-Sol Electric Inc., was announced recently by George W. Keown, vice-president in charge of

sales of the parent company. E. Leslie Peter has been named sales manager of the new division which will distribute automotive products throughout Canada.



E. Leslie Peter

The division's headquarters are at 1117 St. Catherine St. West, Montreal 2. Warehouses will be maintained in Montreal and Toronto.

Mr. Peter joined Tung-Sol as advertising and sales promotion manager for automotive products in 1957. Since that time he has served in a succession of management posts, most recently as merchandising manager.

Frank A. Ford elected chairman of IRE chapter

The second regular meeting of the Toronto Section of the Institute of Radio Engineers was held on November 2, 1959. At this meeting sponsored by the Toronto Chapter of the Professional Group on Communications Systems, Frank A. Ford was elected to be the first chairman of this chapter of the PGCS.

The purpose of the chapter is to see that the field of "Communications Systems" is adequately covered by the IRE's activities.

Precision Electronic Components to rep for Atohm Electronics

Atohm Electronics, manufacturers of Trimmer Potentiometers, has appointed Precision Electronic Components (1956) Ltd. of 50 Wingold Avenue, Toronto 19, Ontario as their sole representative in Canada. These precision sub-miniature potentiometers have welded internal connections and the winding is potted in high temperature epoxy. The wiper arm which is completely damped, is made of precious metal.

Bayly Engineering takes over Ballantine Labs line

Ballantine Laboratories Inc., of Boonton, New Jersey have announced that their complete line of electronic vacuum tube voltmeters for AC measurements has been taken over by Bayly Engineering Limited of Ajax, Ontario.

New system to serve New Carlisle, N.B.

Canadian Pacific-Canadian National Communications engineers have started construction work on a new microwave system which will provide a French-language TV signal to New Carlisle, N.B.

The new ultra-modern system, running 142 miles from Rimouski, Que., to New Carlisle, N.B., is being built by Canadian Pacific Communications, and will be maintained by Canadian National Telegraphs.

Construction began this summer for the already-existing terminal at Rimouski. It is expected the network will be completed in June of 1960.

R. W. Naylor chief engineer for C. C. Meredith

The appointment of R. W. Naylor, M.A. Sc., P.Eng., as chief engineer of company operations has been announced by R. P. Scott, vice-president and general manager, C. C. Meredith & Co. Ltd.

Mr. Naylor was formerly with the Electronic Equipment Department, Canadian General Electric Co. Ltd., Toronto, as manager of the Broadcast Engineering unit, and later was technical counsellor in advanced engineering and design engineering.

DOT sponsors multiplex course for engineers

Fourteen Department of Transport radio engineers and technicians from radio regions across Canada have just completed the first formal course on Elmux, the new Siemens and Halske transistorized error correction equipment for radio teletype communications. The course also included engineers from the Department of National Defense. The Elmux training course was sponsored by the Department of Transport and arranged by the Ahearn and Soper Company Limited, the exclusive Canadian representatives of Siemens and Halske, manufacturers of this equipment. The course was held in the new Science Building at Carleton University in Ottawa during the month of September.



The Department of Transport will be the first communications authority in Canada to install Elmux error correction equipment on radio teletype communications circuits.

In the above photograph Z. P. Zurawski is shown explaining transmission of message to J. R. MacKay of the Department of Transport.



A 2-WAY SAVING
ON THE RESISTORS THAT ARE
SETTING TODAY'S QUALITY STANDARDS

1. Now you can get resistors for today's most critical military requirements . . . direct from a Canadian Manufacturer . . . at favourable Canadian prices. They're Coldite 70+ Fixed Composition Resistors designed to exceed MIL-R-11 requirements and made by an exclusive cold moulding process that assures unmatched load life, moisture resistance, and other important performance characteristics.

2. No other resistors can match Coldite 70+ for production line efficiency — because their exclusive solder-coated leads makes them far and away the easiest

resistors to solder by any method. This saves your company money on their use.

Coldite 70+ Resistors are the latest development of a firm which, since the early days of radio, has been one of the largest, most dependable resistor suppliers. Laid end to end, the resistors Stackpole has produced would extend around the world so many times you'd get dizzy counting them!

Coldite 70+ Resistors are now made in Toronto by Canadian Stackpole Limited in the complete range of 5%, 10% and 20% "preferred" values in ½-, 1-, and 2-watt styles.

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550 Evans Avenue - Toronto 14, Ontario
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Servomechanism (Canada) Ltd. staff appointments

Mr. William W. Shannon, president of Servomechanisms Inc., has announced the following staff appointments in the company's Canadian subsidiary, Servomechanisms (Canada) Limited, Toronto, Ontario. The changes follow the promotion of Mr. Croydon H. Hartley, formerly president of the Canadian company and Director of Foreign Activities of SMI. Mr. Hartley is now Customer Liaison Manager for the Los Angeles Division of SMI, responsible for the overall sales and promotional activities of the division.

The new president of Servomechanisms (Canada) Limited is Mr. Donald C. Stewart, who also occupies the position of treasurer.

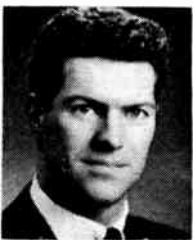
Mr. Irving M. Liss has joined Servomechanisms (Canada) Limited as Director of Engineering and Sales. Mr. Liss is a graduate of the University of Toronto in electrical engineering.

Mr. George Kusunoki has been promoted to the position of Manufacturing Manager of Servomechanisms (Canada) Limited. An employee of the since its inception in 1953, he had previously served as Chief Inspector, Production Control Manager, Purchasing Agent and Material Control Manager.

Mr. John H. Pile has been appointed to the position of Chief of Technical Sales of Servomechanisms (Canada) Limited. Mr. Pile has 20 years' experience in the aircraft industry with Avro Aircraft Limited and its predecessor companies.

CGE appoints broadcast sales reps

The appointment of Peter G. Bowers, P.Eng., as sales representative for Eastern and Northern Ontario was recently announced by C. E. Spencer, manager, broadcast sales, Electronic Equipment and Tube Department, Canadian General Electric Company



H. K. Davis



P. G. Bowers

Limited. A further appointment, coinciding with this change, resulted in Harry K. Davis, former area representative, becoming broadcast sales representative in south-western Ontario, in addition to his present



D. C. Stewart



I. M. Liss



G. Kusunoki



J. H. Pile

representative responsibilities in the province of Manitoba.

Mr. Bowers and Mr. Davis operate from their offices at the CGE broadcast equipment manufacturing facility located at 830 Lansdowne Avenue, Toronto 4, Ontario — LENnox 4-6511.

E. A. McIntyre appointed chief inspector

The appointment of Mr. E. A. McIntyre to the post of Chief Inspector, Electrical Branch, Inspection Services, Department of National



E. A. McIntyre

Defense, has recently been announced. Mr. McIntyre is a graduate of the University of Toronto in Mathematics and Physics, and brings to his new position considerable experience in the field of inspection of electronic and electrical equipment. He has been active in the American Society for Quality Control, founding the Ottawa section and acting as its original chairman. In his new post he will be in charge of government inspection of defense industries supplying electrical materials to Canada's armed forces.

Tellurometer Canada Ltd. takes on additional lines

Tellurometer Canada Limited, 1562 Carling Avenue, Ottawa, has been appointed Canadian and U.S. agents for Mervyn Instruments of England. This company manufactures scientific instruments and electronic equipment. The Tellurometer Company has also been appointed Canadian and U.S. agents for special-purpose Shaw Hygrometers and Moisture Meters.

Electronic experts meet

Electronic scientists and engineers from Canada's electronic industry met December 3 last to discuss means of improving the public's television, radio, and communications services. These men are members of the Canadian Radio Technical Planning Board which was holding its 15th annual

meeting at the Chateau Laurier Hotel.

With the era of earth satellites and space travel just beginning, the problems of allocating the radio frequencies for communicating with man-made heavenly bodies will have to be anticipated and solved. This is in addition to providing wavelengths for use in the already-crowded earth communications field which are among the problems that will have to be solved by the members of the CRTPB.

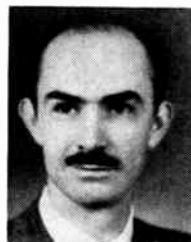
Canadian Admiral multimeters for armed forces

Canadian Admiral Corporation has been awarded a contract to manufacture a quantity of multimeters and accessory equipment for the Canadian armed forces, according to an announcement by Len Irvine, manager of the Electronic Products Division of the company.

The multimeter, known as the ME-77A/U, is a compact service type AC and DC voltohmmeter for use in field, workshop and lab. work. The equipment is rugged and has been designed to function reliably and accurately even when subjected to the roughest handling.

R-O-R engineering sales appointment

R-O-R announces the appointment of Mr. W. W. Hastings to their sales engineering staff. Bill Hastings is a U. of T. graduate, B.A.Sc. in Electrical Engineering. His engineering background includes some time in research



W. W. Hastings

work with the British Iron & Steel Research Association and several years with the Westinghouse organization, including a period with their Air Armament Division at Baltimore, and Atomic Energy Division at Hamilton. He joined R-O-R from the Electronics Division at Hamilton.

Mr. Hastings will be responsible for R-O-R engineering sales in Western Ontario.

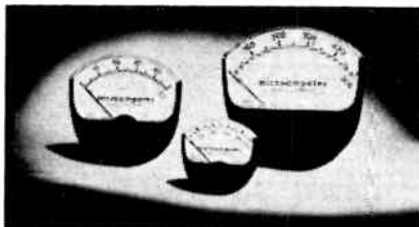
New Products

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 43. Just mark the products you are interested in on the coupon on Page 43 and the information will be in your hands within a few days.

Indicating instruments

Item 2558

Honeywell Controls Limited has introduced its new line of electrical indicating instruments (Marion Meters)



with the Medalist series of readable, modern miniaturizing meters. The meters provide more readability in the same panel space and the same readability in less panel space than conventional meters. The Medalist series also provides a scale length which is up to 50 per cent greater than other meters of the same size. The MM-1 has a maximum weight of 1.6 ounces and comes in all standard ranges and various colors. It has a single hole mounting.

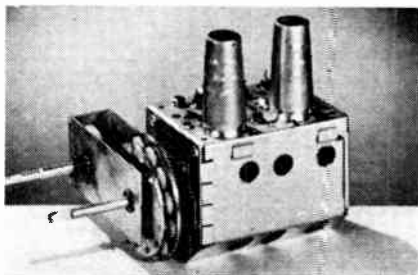
Inquiries for additional information should be addressed to B. Colwell, Honeywell Controls Limited, Vanderhoof Avenue, Toronto 17, Ontario.

Pre-set fine tuning package

Item 2559

General Instrument — F. W. Sickles of Canada Ltd. have developed a pre-set fine tuning "package" which can be added to the General Instrument "500" TV tuner to give automatic fine tuning.

Since this package becomes an integral part of the tuner, no additional tuner mounting brackets are required. Less than 1 1/4" is added to the overall length of the tuner.



The fine tuning shaft may be mounted in any of four quadrant points around the channel selector shaft, and the spacing between shafts is 2 1/4".

Remote control may be added where desired.

For further information write to: General Instrument — F. W. Sickles of Canada Ltd., Waterloo, Ontario.

Two-way voice repeater

Item 2560

The Model 205A2 transistorized repeater, manufactured by Macson, Inc., is a high performance low-cost 2-way repeater for operation from 24 or 48 volts.

Designed for cable and open wire use with a flat response from 200 to 3500 cps, the complete unit takes only 1.3/4 inches of rack space. Used with external repeat coils and can optionally be used as 4-wire termination set with amplifiers. Each repeater is a plug-in self contained unit.

Additional 205A class equipment includes a special miniature AC power supply, program amplifiers, monitor speaker panel with modules, test unit and general purpose amplifier.

Full information from Tele - Radio Systems Ltd., 3534 Dundas Street West, Toronto 9, Ontario.

Sweep generator

Item 2561

Jerrold Electronics Corporation's new Model 707 is a high output, extremely flat, sweep frequency generator. Boasting a $\pm .05$ flatness over



its highest octave of coverage, the new unit is available with plug-in oscillator heads covering any portion of the spectrum from 1/2 to 250 mc.

The 707 features an all-electronic saturable reactor, permitting a maximum deviation of approximately 4 1/2 to 1 with sweep rates adjustable from one sweep every two minutes up to 60 sweeps per second.

Direct coupled circuits in the 707's monitoring detector and deviation drive circuits permit use of the instrument with "X-Y" recorders where permanent records for inspection or reporting purposes are desired. Sawtooth or pyramid sweep shapes may be selected by adjustment of a front panel control. The output power exceeds +20 dbm and is monitored by a front panel meter.

The new Jerrold precision instrument is designed to operate from a 115 volt 50/60 cycle supply built on a 13 by 17-inch chassis for cabinet or 19-inch rack mounting.

For additional information, contact Jerrold Electronics Corporation, Industrial Products Division, Philadelphia, Pa., U.S.A.

Electronic secretary

Item 2562

The Electronic Secretary^R, already widely used in Canada for answering and recording telephone calls during office hours and after staff have gone home, is now available in three new models.

The Model BPR-1 is described as a low-cost, automatic telephone answering unit, designed specifically for home or small business use. It enables the subscriber to record his own outgoing message — up to 13 seconds — or to



be away from his office and find as many as twelve recorded messages waiting for him when he gets back. The unit is simple to operate, requires almost no maintenance, and is said to be extremely reliable.

The MR-1, a monitor recorder with a 1-hour recording capacity, can be used for any application where monitoring of calls is required. The tape recorder is kept running automatically whenever the local line is loaded, and a ceramic microphone is included for manual recording.

The INT-2A is a magnetic intercept recorder. Basic playback power is ample for five trunks and can be augmented to handle more lines as required.

For complete information or for details of the various accessories available, call or write any office of Automatic Electric Sales (Canada) Ltd.

Garlock components

Item 2563

The Garlock Packing Company; Electronic Products Sale, of Camden, New Jersey, has appointed Lake Engineering Co. Limited to be their sole Canadian representative in the field of teflon, Kel-F, nylon, and allied components and raw materials, for electronic applications. These include feed-through and stand-off insulators, tube and transistor sockets, connectors, test points, crystal sockets, grommets, spaghetti, copper-clad teflon for printed-circuit boards, teflon rod, tube, sheet, tape, machined parts, nylon rod, tube, machined, parts, silicone sheet, etc.

For further information write to: Lake Engineering Co. Limited, 123 Manville Road, Scarborough, Ontario.

send for this

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Test Instruments
Hi-Fi • Ham Gear

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For complete details check No. 18

**PRECISION FREQUENCY
MEASUREMENTS...**

0.1 to 175 mc. At low cost!



LAMPKIN 105-B

MICROMETER FREQUENCY METER

- Heterodyne type, A.C. operated.
- Measures nearby transmitters. 100 KC to 175 MC (to 3000 MC by measuring multiplier stages of crystal-controlled transmitters).
- Accuracy better than 0.0025%. Reset-ability 0.0005%.
- Automatic correction for temperature of crystal calibrator.
- Pinpoint CW signal generator 20 MC to 200 MC.
- Size only 13" x 8 1/2" x 5". Weight 9 1/2 lbs.
- Price \$220.00 net (does not include duty).

Satisfaction guaranteed or money re-
funded.

For indication of FM deviation, up to 25
KC swing, at carrier frequencies from 25
to 500 MC, use the companion unit: the
LAMPKIN 205-A FM MODULATION METER.

Write today for technical data
on both instruments.

LAMPKIN LABORATORIES, INC.

Dept. 707, Bradenton, Florida, U.S.A.

For complete details check No. 21

New Products

Model 524D counter

Item 2564

A new electronic counter featuring a uniform 8-decade numerical readout is now available from the Hewlett-Packard Company.

The instrument, Model 524D, has a crystal oscillator stability of 3 parts in 10⁸ short-term; 5 parts in 10⁸ per week. It provides for full frequency measurements from 10 cps to 10 MC and period measurements from 0 cps to 10 KC.

Inexpensive plug-in units extend the frequency measurement range to 220 MC, permit period measurements over 10,000 periods, and increase sensitivity for precise measurement of weak signals. Another plug-in provides for time measurements from 1 micro-second to 100 days. Time is measured in 0.1 ms, 10 ms, 1 ms, or 10 sec increments, with total registration of 99,999,999 counts.



Model 524D features direct, instantaneous and automatic readings without calculation or interpolation. Display time is variable and an automatic illuminated decimal point is included.

For further information, write or call Peter N. Sherrill, Hewlett-Packard Company, Palo Alto, California, U.S.A.

Millie Amp says,
"Get the Best
and pay less!"

"Gold Brand"

METERS

STARK ELECTRONIC SALES COMPANY
AJAX, ONTARIO

For complete details check No. 30

**Manually operated
voltage adjuster**

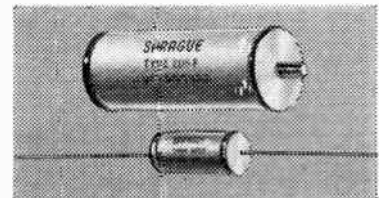
Item 2565

This new model, line voltage adjuster for use with equipment sensitive to abnormal line voltages, features compact construction and a modern appearance. Plastic front 0-150 volt-meter. Ten point heavy duty tap switch



with silver contacts. Double outlet receptacle. On-off switch on input. Accommodates line voltages of 85 to 125 volts. 60 cycle for a steady 110 or 115 volts output. The adjuster can be used to accelerate the breakdown of defective components, or for imposing under-voltages to detect faulty oscillators. The maker points out the versatility in application by the use of the adjuster for control of lamp temperature values in color photography.

Hammond Manufacturing Company,
Guelph, Ontario.



**High Voltage,
Glass-Encased Difilm®
Vitamin Q® Capacitors**

High-altitude and high-voltage capacitor applications in airborne electronic equipment are simplified with Sprague's new Type 205P Difilm Vitamin Q capacitors! These glass-encased, dual-dielectric capacitors are specifically designed to minimize corona problems.

SPRAGUE®

**CANADIAN
MANUFACTURING
REPRESENTATIVE**

Micarta Fabricators
Limited

18 Toronto Street
Toronto, Ontario
Phone EMpire 8-4251

For complete details check No. 29

Up to 5 megohms in a ½-watt resistor . . .
and better operating
characteristics, too!



Only the **WESTON VAMISTOR®**

offers performance like this!

Here, at last, is a precision metal film resistor which offers substantial advantages over all other types—wire wound, deposited film, etc. Look at this list of VAMISTOR capabilities and characteristics:

- VAMISTOR HANDLES HIGHER WATTAGES. Up to 8 full watts at 40 C for Model 9849-2.
- VAMISTOR OFFERS HIGHEST RESISTANCE RANGES. For example, 1.5 megohms in ¼-watt size . . . 5 megohms, ½-watt.
- VAMISTOR HAS OUTSTANDING THERMAL CHARACTERISTICS. Runs cooler . . . resists thermal shock. Standard temperature coefficient doesn't exceed 50 ppm/°C.—lower than Nichrome wire. Also available with maximum of 25 ppm/°C. Temperature coefficients don't vary over the resistance range.
- VAMISTOR OFFERS UNUSUALLY LONG SHELF LIFE, STABILITY. Exclusive process of fusing element to inside of steatite tube assures long life, improved resistance to all environmental conditions.
- VAMISTOR IS MORE RELIABLE; HAS GREATER MEAN-TIME-TO-FAILURE.
- VAMISTOR PRODUCES NO CORONA; IS AS NOISE-FREE AS BEST WIRE-WOUND RESISTORS.
- VAMISTOR OFFERS EXCEPTIONAL PERFORMANCE UNDER RADIATION.
- VAMISTOR ACCOMMODATES HIGHER MAXIMUM CONTINUOUS WORKING VOLTAGES.
- VAMISTOR IS VIRTUALLY NON-INDUCTIVE. Capacitance characteristics are superior to all other existing resistors.
- VAMISTOR IS SUBJECT TO STRICTER QUALITY CONTROL THAN ANY OTHER RESISTORS
- THE VAMISTOR LINE CONFORMS TO MIL-R 10509C CHAR. C. Styles RN-65, RN-70, RN-75 and RN-80.

For full information, call or write: Daystrom Limited, 840 Caledonia Road, Toronto 19, Ontario, or 5430 Ferrier Street, Montreal, Que., a subsidiary of Daystrom Incorporated, or any office of Northern Electric Co. Ltd.



MIL STYLE	WESTON MODEL	WESTON DIMENSIONS	
		LENGTH	DIAMETER
RN-65, RI-92	9855-2	0.650	0.235
RN-70, RI-94	9852	0.866	0.312
RN-75, RI-96	9850-2	1.120	0.411
RN-80	9849-2	2.156	0.411

WESTON

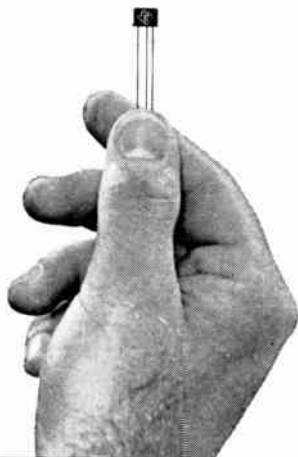
Instruments



WORLD LEADER IN MEASUREMENT AND CONTROL

For complete details check No. 14 on handy card, page 43

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SEMICONDUCTORS**



**DELIVERED
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Anywhere in Canada

Off-the-shelf
Factory prices
Complete Line
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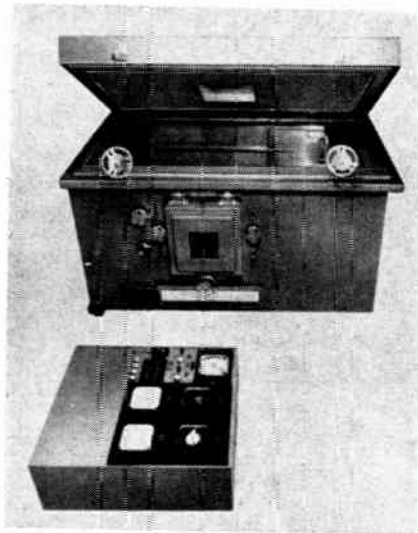
For complete details check No. 34

New Products

Temperature test chamber

Item 2566

Claimed to be a unique feature of a new altitude-temperature test chamber announced by the American Research Corporation is the true vertical air flow which accurately simulates the actual conditions to be encountered by the test piece.



Conditioned air is forced down on the test space and is returned to the top of the chamber via a plenum in the rear, so that air flow on the test piece is in one direction only.

The chamber, which has a free test space of 4' x 4' x 7½' high, provides temperatures from -100°F and altitude simulation from sea-level to 100,000' and higher.

It is equipped with a small reach-in door which gives access to the test piece without the necessity for opening the large door, thus making it possible to check the test piece quickly between cycles.

American Research Corporation is represented in Canada by **Computing Devices of Canada Limited, Box 508, Ottawa 4, Ontario.**

Beatty mast catalog

Item 2567

A new Beatty Mast Catalog is now available to Communication Engineers, Erectors and Dealers.

The line has been broadly expanded to handle greater heights, heavier loads and to mount the increased variety of antennae equipment in all fields.

Both steel masts, hot dip galvanized and engineered to CSA specifications and aluminum masts are produced at the Beatty plant in Fergus. The company's output has been increased to handle all types — single, H. Masts, Triple, Quadruple and Vertical radiators. A full range of torsion resistors, antennae pull-offs, obstruction lights, anchors and expanded services such as painting for DOT complete

the company's mast program.

Interested engineers or dealers are invited to avail themselves of Beatty engineering facilities to assist in planning installations for various loads and conditions.

Write for the new catalog to **Mast Division, Engineering Dept., Beatty Bros. Limited, Fergus, Ontario.**

Oscillomink

Item 2568

The Oscillomink, a direct-reading jet oscillograph ensures clear recording and immediate evaluation. The Oscillomink records oscillations within the range from 0 to approximately 1,000 cps. The instrument is easy to operate and directly gives reliable results, even if difficult problems are to be solved.

Write for literature to the **Ahearn and Soper Company Limited, 384 Bank Street, Ottawa, Ontario.**

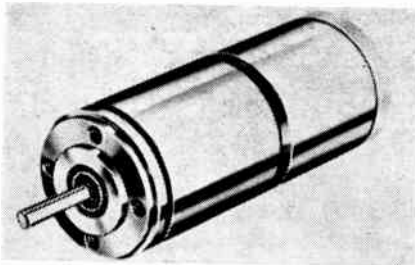
Servomotor-rate generator

Item 2569

Helipot Division of Beckman Instruments, Inc., Toronto, Ontario, announces a new size 11 servomotor-rate generator specifically designed for systems using 60-cycle power.

This latest addition to the Beckman line of servomotors is the Beckman 11 MG 630/600. Featuring a stainless steel housing and encapsulated windings, it weighs a scant 7.5 ounces, yet will operate continuously at stall at a unit temperature of 200°C.

Designed to be driven by a 6.3 volt filament supply, the generator takes a



power input of 3.8 watts with a power factor of 0.99. Excitation input up to 26 volts is available.

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

Millie Amp says,
"What are you
waiting for,
buy 'Gold Brand'"



"Gold Brand"

METERS

STARK

STARK ELECTRONIC SALES COMPANY
AJAX, ONTARIO

For complete details check No. 33

Communications Technician
 required for
**MAINTENANCE OF CARRIER
 MULTIPLEX EQUIPMENT**
 operating over
WIRE AND RADIO FACILITIES
 and
SUPERVISORY CONTROL EQUIPMENT

Must have a minimum of five years' experience in the above field in a responsible technical capacity, and must be personally capable of handling most outage and routine maintenance arisings without requiring engineering assistance.

Technical Education — H.N.C., C. & G., Ryerson Institute or equivalent.

Must be able to prepare concise accurate reports in English, and carry out on the job training of other personnel.

The position is a permanent one with a large Quebec utility, offers good prospects, excellent employee benefits, congenial working conditions, and involves travelling approximately 30% of time in urban areas driving Company vehicle.

Reply in writing must clearly indicate the work performed by applicant himself, and degree of personal technical responsibility discharged.

Reply to: **H. Bordeleau,**
Personnel Dept.,
P.O. Box 6072,
Montreal, Quebec.

NEW
MINIATURE
LIGHTED
Push Button Switch

With independent lamp circuit.
 Normally open, momentary contact. NE2B neon lamp circuit independent of switch for maximum flexibility. Rated 1 amp. 115 V. AC.

Life expectancy 500,000 operations.
 $\frac{3}{16}$ " dia. — $1\frac{1}{4}$ " behind panel. $\frac{9}{32}$ threaded bushing. Nut and housing anodized aluminum — contacts, fine silver.

**Grayhill
 Series
 40-1**



Actual Size

Write For Complete Details



Phone: Fleetwood 4-1040
 57. Hillgrove Ave., LaGrange, Illinois

“ PIONEERS IN MINIATURIZATION ”
 For complete details check No. 20 on handy card, page 43

**BENDIX SR RACK
 AND PANEL CONNECTOR**

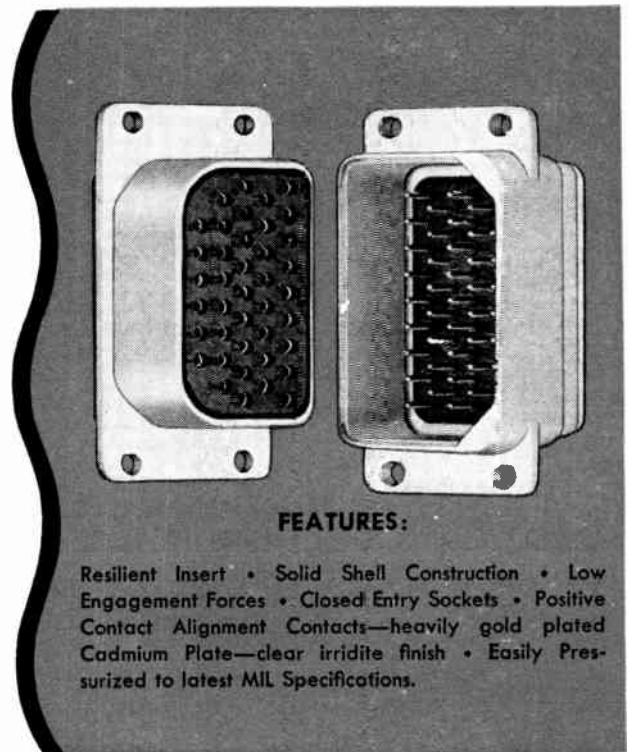
*with outstanding resistance
 to vibration*

The Bendix type SR rack and panel electrical connector provides exceptional resistance to vibration. The low engagement force gives it a decided advantage over existing connectors of this type.

Adding to the efficiency of this rack and panel connector is the performance-proven Bendix “clip-type” closed entry socket. Insert patterns are available to mate with existing equipment in the field.

Available in general duty, pressurized or potted types, each with temperature range of -67°F to $+257^{\circ}\text{F}$.

Here, indeed, is another outstanding Bendix product that should be your first choice in rack and panel connectors.



FEATURES:

Resilient Insert • Solid Shell Construction • Low Engagement Forces • Closed Entry Sockets • Positive Contact Alignment Contacts—heavily gold plated Cadmium Plate—clear irridite finish • Easily Pressurized to latest MIL Specifications.

SCINTILLA DIVISION
 SIDNEY, NEW YORK



Canadian Affiliates: Aviation Electric Ltd., 200 Laurentien Blvd., Montreal 9, Quebec

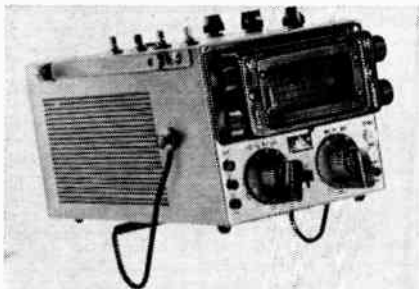
For complete details check No. 8 on handy card, page 43

New Products

Pocketscope

Item 2570

The Waterman Direct Reading Pocketscope Hi-Gain Model S-17-A is a novel concept with radically new innovations in portable oscilloscopes. New techniques combine extreme compactness with "large scope" features. This dynamic instrument is comparable to a shoebox in size and a large laboratory oscilloscope in performance.



This Pocketscope weighs less than 8 lbs., is 4¾" high, 5½" wide and is 10" deep. The universal handle and mounting make it indeed a "skyhook" model. The operations are extremely simplified and are reduced to two "he-man" controls with automatic sync.

The direct reading feature allows direct calibration of scales in volts (from 10 millivolts per division) and milliseconds (from 10 microseconds

per division). Sync signal in excess of 1 volt peak automatically triggers the oscilloscope. Sync light indicates presence or absence of proper level. Single switch flips trace 90 degrees to increase accuracy for voltage measurements giving effective 2½ inch vertical.

For further information, write to **Aviation Electric Ltd., 200 Laurentien Blvd., Montreal 9, P.Q.**

Pipe wall gauge

Item 2571

XactRay Non-Contact Pipe Wall Gauge, new illustrated folder from Daystrom Limited, describes latest product modifications for non-contact, x-ray device for both metals and non-metals which supplies precise measurements of pipe wall thickness within one per cent accuracy of the wall thickness being measured.

The new booklet — designated No. 13-200 — reports major savings in mills where the XactRay pipe wall gauge has eliminated wasteful blind cropping of seamless tubing. Actual installations are illustrated and the booklet includes line drawings that show how the gauge can be set up to measure either one or two walls. The one-wall pipe gauge will detect above-and-below tolerance walls and eccentricity while two-wall units can be used to indicate precise cut-off point, weight per foot and inside diameter.

The non-contact units are available with auxiliary equipment, including

automatic off-gauge markers, alarm circuits, remote indicator stations and a standard strip chart recorder. Designed for metals and non-metals, the pipe wall thickness gauge can be used to measure asbestos-cement pipe, propeller blanks, high pressure storage cylinders, plastic cylinders and rubber tubing as well as seamless tubing in the metals industry.

For copies of booklet No. 13-200, write to **Daystrom Ltd., 840 Caledonia Road, Toronto.**

Hi-fidelity stereo system

Item 2572

GALAXY II, a new compact Stereo Hi-Fidelity System is available from Jensen.

Occupying less than a square foot of floor space the Galaxy II consists of two electrically separated Stereophonic channels with two satellite units and one base center unit.

Supplied complete with mounting hardware and 24 foot connecting cords, this unit is available as a complete unit in a variety of finishes or in kit form.

Specifications: Input Impedance 16 ohms per channel. Frequency Range 36 to 14,000 cycles. Power Rating 25 watts — 50 watts peak. Finishes — choice of walnut, tawny ash, or mahogany.

For further information write to: **Jensen Speakers, Division of Renfrew Electric Co. Limited, 349 Carlaw Ave., Toronto 8, Ontario.**

ADCOLA
ESTABLISHED 1914
(Regd. Trade Mark)

QUALITY SOLDERING EQUIPMENT

DESIGNED FOR
BENCH LINE
PRODUCTION AND
CONTINUAL USE



Adcola Instruments operate at correct soldering temperatures which ensures permanent and quality joints.

Canadian, British
& Foreign Pats.,
Reg. Designs

ALL VOLTAGES
SUPPLIED

Instrument
List No. 64
3/16" Bit.
Also available in
1/8" and 1/4" tip.

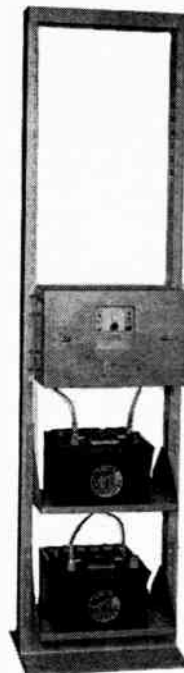
SALES AND SERVICE
L. J. LAMB
Box 103
Weston, Ont.
CH. 1-5830

STANDBY A.C.

The PYLON inverter Model 1-48-A provides a complete standby A.C. power source of 300-watt rating.

This unit is equipped with charger/regulator, battery voltmeter, battery shelves and automatic transfer equipment.

Fully transistorized, the 1-48-A features high efficiency, sine-wave output and freedom from maintenance. The transfer to standby is so rapid there is no detectable effect on communications equipment.



PYLON

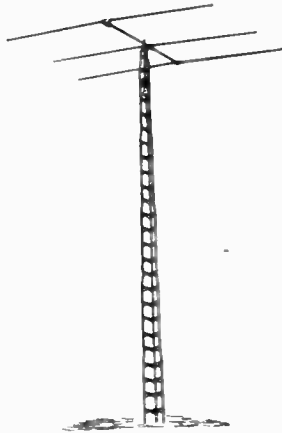


PYLON ELECTRONIC DEVELOPMENT company, Ltd.

Communications Systems and Equipment

161 CLEMENT ST., VILLE LA SALLE, MONTREAL 32, QUE.

NEW THE DELHI SPAULDING STRATO-TOWER



SELF-SUPPORTING TOWERS UP TO 67 FT!

- Heavily galvanized, all-steel construction
- Riveted joints — no rust-prone welds
- Smart, modern styling
- "X" brace design for greater strength
- Beaded channel leg eliminates twisting
- Quickly, easily erected
- A Product of Canada's leading TV Antenna manufacturer

Your Choice of 4 Bases

The Strato-Tower comes with four different types of base: One for anchoring in concrete; one using a screw anchor; another using a cylinder base; and one to be anchored to the side of a building with ground rods driven through holes in the base.

See the Spaulding Strato-Tower today at any Delhi dealer

ALSO AVAILABLE:

Guyed towers up to 150 ft. in height and an "Erect-Tower" using a crank-up principle to 100 ft.

DELHI METAL PRODUCTS LIMITED DELHI, ONTARIO

For domestic TV and all types of commercial requirements

For complete details check No. 16 on handy card, page 43

SPECIALISTS IN COMPONENTS



FLEXIBLE TERMINAL BLOCKS

Regd.

We make components of many kinds. Our terminal blocks provide great flexibility in two planes, and can be screwed to curved or irregular surfaces without danger of shattering. The P.V.C. moulding is easily cut with a knife. Insulates and grips terminal screws firmly even if the blocks are mounted upside down.



BELLING & LEE LTD
GREAT CAMBRIDGE ROAD, ENFIELD, MIDDX., ENGLAND

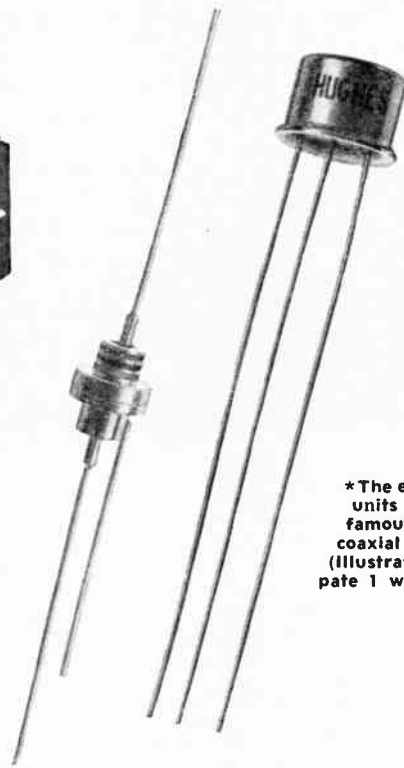
Canadian Agents: **ASTRAL ELECTRIC CO. LTD.**
44 Danforth Road, Toronto, Ont.

For complete details check No. 2 on handy card, page 43
ELECTRONICS AND COMMUNICATIONS, January, 1960

PNP SILICON 400 MILLIWATTS* HIGH VOLTAGE

These Hughes fused junction transistors offer the following advantages:

- BV_{CBO} , BV_{EBO} and BV_{CEO} are symmetrical — 7 styles from 15 to 110 volts.
- Low leakage current . . . — 0.1 microamps max.
- Low saturation resistance.
- Higher operating frequency.
- All electrodes insulated from can.
- Standard TO-5 outline.



* The equivalent units in the famous Hughes coaxial package (illustrated) dissipate 1 watt.

HUGHES INTERNATIONAL
A DIVISION OF HUGHES AIRCRAFT COMPANY, U. S. A.



Write or phone for complete data sheets and pricing — immediate delivery of sample orders.

R-O-R ASSOCIATES LIMITED
1470 DON MILLS RD., DON MILLS, ONT.

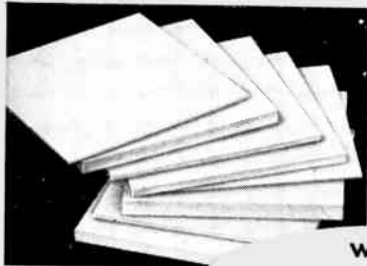
TORONTO
Hickory 4-4429

TELEPHONE

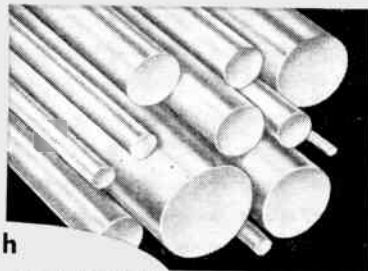
MONTREAL
Hunter 1-0700

For complete details check No. 27 on handy card, page 43

When You Do It Yourself



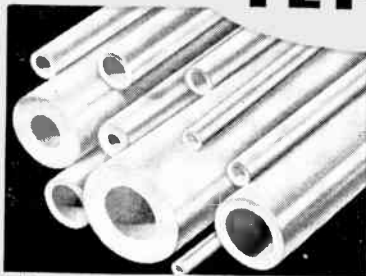
sheet



rod

with

TEFLON*



tubing



tape

start with

CHEMLON®

The Best In Teflon

It's a matter of good precaution—Getting the full advantages of this material depends largely on the processing ability of your supplier. He must meet *all* of these qualifications:

- 1 Fabricating experience, facilities and rigid quality control to supply a uniform, non-porous Teflon, free from any flaws, thus eliminating costly rejects or malfunction of your end product.
- 2 Dimensional accuracy—no matter what form you order, it should be carefully sized to industry specifications. Any waste of Teflon adds substantially to its cost, and corrective finishing in your own shop unnecessarily adds production time and expense.

Under the name, Chemlon, "John Crane" gives you full satisfaction on each of these points, plus engineering assistance on any problem you might have.

Contact "John Crane" about your specific needs. Also ask for Bulletins T-110 and T-122.

Crane Packing Company, Ltd.
Box 134 - Station C, Dept. DCP
Hamilton, Ontario



*DuPont Trademark



MECHANICAL PACKINGS



SHAFT SEALS



TEFLON PRODUCTS



LAPPING MACHINES



THREAD COMPOUNDS

CRANE PACKING COMPANY, LTD.

OFFICES IN PRINCIPAL CANADIAN CITIES

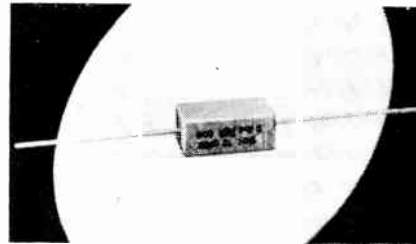
For complete details check No. 12 on handy card, page 43

New Products

New 2 watt resistor Item 2573

A new 2 watt resistor has been added to the PW series of I.R.C. wire wound resistors.

Low in cost, these PW2 type resistors are ideally suited for any power application up to 2 watts. Resistance



values are available from 0.24 ohms to 6200 ohms in a variety of tolerance values. Small in size, they are supplied with axial leads.

For further information, write I.R.C. Resistors, Division of Renfrew Electric Co. Ltd., 349 Carlaw Avenue, Toronto 8, Ontario.

Precision products handling bulletin

Item 2574

A new 6-page bulletin entitled "Kennett Containers Handle Precision Products Better" is announced by National Vulcanized Fibre Co.

This 2-color folder includes six actual case studies, describing how Kennett receptacles improve material handling efficiency and reduce product damage in leading industries. Photographs illustrate the properties of Kennett receptacles, such as durability, strength, light weight, resiliency, quietness and corrosion resistance.

The complete line of Kennett containers are pictured, including: utility trays, nesting-stacking trays, bin-front trays, mill boxes, tote boxes, fibre trucks, drop-sided trucks, reusable shipping containers and barrels.

Copies of this bulletin are available without cost from National Fibre Company of Canada, Ltd., 107 Atlantic Avenue, Toronto, Ontario.

Millie Amp says,
"I've seen 'em all
and Gold Brand
gives you more
for less!"

"Gold Brand"

METERS

STARK

STARK ELECTRONIC SALES COMPANY
AJAX, ONTARIO

For complete details check No. 31

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(Continued overleaf)

APPLICATION FOR FREE SUBSCRIPTION

Please ADD my name to receive ELECTRONICS & COMMUNICATIONS.

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

Street

City Zone Prov.

If you have recently CHANGED your address please note former address here:

Company Nature of Business
(State, when applicable, whether electronic equipment or components are manufactured, sold, or used in manufacturing, etc.)

Signature Position
 IF YOU ARE AN ENGINEER, PLEASE SO STATE — when it is not included in your job title.
 1-60

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

- 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567
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- 1 2 3 4 5 6 7 8 9 10 11 12
 13 14 15 16 17 18 19 20 21 22 23 24
 25 26 27 28 29 30 31 32 33 34 35 36
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Name Position

Company Nature of Business

Street City Prov.
 1-60

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

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5c POSTAGE WILL BE PAID BY

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ACTIVE CIRCULATION

It costs us a lot of active dollars annually to keep our circulation lists up-to-date and it's important enough to us that we have them audited every year by CCAB (Canadian Circulations Audit Board Inc.).

Advertisers trust CCAB audited figures so we get more advertisers and YOU get the high standard of editorial you have always wanted to read.

ELECTRONICS and COMMUNICATIONS

is a



audited publication

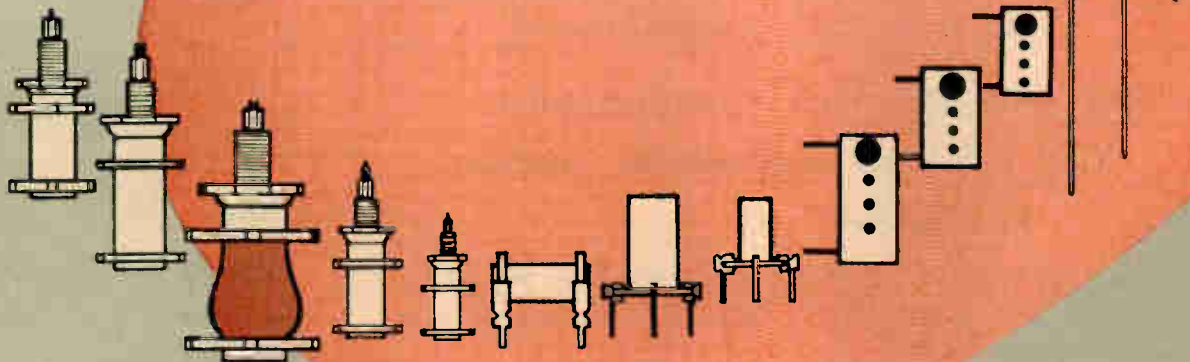
Industries' most complete range
MOLDED CHOKE and
VARIABLE INDUCTOR

Coils



Featuring the **NEW MINIATURE**
"RING-DING" SERIES

Reliable, rugged coils that exhibit high Q, very low distributed capacity, and all concentrated into an amazingly small package.



Electronically the Finest by

DELEVAN

POSITIVE THINKING... is not merely a chapter from a book on psychology! It is a state of mind and an art of thought that has been responsible for new ideas and unlimited advancements in a modern and highly competitive world. Here at Delevan the scope of positive thinking has broadened to the point where startling changes have been made in the field of electronics. Dedicated engineers have met the challenge of industry and have created the quality and uniformity which is demanded in every electronic coil.

Through the use of new materials, new applications, and new methods of manufacture, Delevan has introduced into its standard line of coils numerous values of molded and variable coils that once required the complications of custom manufacturing.

Nowhere in electronics history will you find highly skilled electronics engineers more devoted to the task of putting absolute perfection into their product than at Delevan. Delevan is the name that represents the industries' widest range of high quality standard coils developed to meet the most rigid requirements.

DELEVAN ELECTRONICS CORPORATION

77 OLEAN ROAD

EAST AURORA, NEW YORK



A COMPLETE LINE OF CONNECTORS

MANUFACTURED AND STOCKED IN CANADA



MINI-E

67 SERIES

MINIATURE WITH BAYNOT HITCH.
TOP QUALITY. 67 SERIES (MINI-E)

SUBMERSION PROOF AND HEAVY DUTY
OF THE MS CONFIGURATIONS (89 SERIES)

STANDARD AN AND MS SPECIFICATIONS

STUB - E MS TYPE TO E AND R REQUIREMENTS

MINIATURE INSTRUMENT CONNECTORS (165 SERIES)

WRITE FOR CATALOG IEC-3



CANADA LIMITED

349 CARLAW AVENUE, TORONTO 8, ONTARIO

SALES OFFICES: OTTAWA • MONTREAL • CALGARY

For complete details check No. 36 on handy card, page 43

"PRE-SHRUNK" for miniaturization IRC Molded Deposited Carbon Resistors —

IRC has reduced the size of Molded Deposited Carbon Resistors in the 3 most popular wattage ratings at the same ambient, an improvement made possible through the use of a unique IRC alloy film and a new high-temperature coating.

This means that you can now choose a smaller unit with wattage equivalent to the one you formerly specified. Weight and space savings, as it happens, are especially significant in the most-used sizes.

COMPARE THESE SIZE REDUCTIONS!

MIL Type	IRC Type	Length Nominal	Diam. Nominal	Min. Ohms	Max. Ohms	Max. Volts Continuous	WATTAGE		
							MIL 70°C	IRC 70°C	IRC 125°C
RN60	MDA	.406	.130	10	5M	300	1/8	1/4	1/8
RN65	MDB	.594	.203	10	5M	350	1/4	1/2	1/4
RN70	MDC	.719	.261	5	25M	500	1/2	1	1/2

IRC EXCEEDS MIL SPECIFICATIONS

IRC Resistors are designed for MIL-R-10509C Characteristic B requirements.

WRITE FOR BULLETIN B-9C



RESISTORS

division of
Renfrew Electric Co. Limited

349 CARLAW AVENUE • TORONTO 8, ONTARIO

SALES OFFICES: OTTAWA • MONTREAL • CALGARY

For complete details check No. 37 on handy card, page 43

New Products

Infra red spectrometer

Item 2575

The Mervyn-NPL Infra Red Spectrometer is the first of a series of such instruments designed to cover a specific range of the Infra Red Spectrum.

Manufactured by Mervyn Instruments of Woking, England, it is intended to fill the need for a high resolution spectrometer at a price which would enable it to be used widely for routine analysis and process control.

The instrument covers the 3 micron region (1-4 microns) and is said to possess an overall stability which makes it eminently suitable for use as a process controller when it is locked at one wavelength setting. (It may also be used as a scanning spectrometer.)



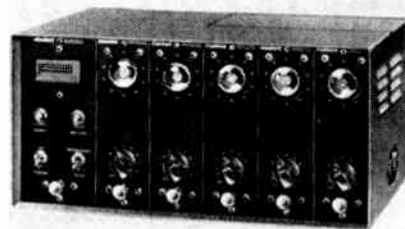
The spectrometer may be used for analysis or control of many compounds found in petroleum refining, production of lubricating oils, plastics, paints, detergents and pharmaceuticals; also in the analysis of heavy water, and many organic compounds.

For further details contact: Tellurometer Canada Ltd., 1562 Carling Ave., Ottawa, Canada.

Predetermining counter

Item 2576

The Tally-Count predetermining electronic counter is designed for counting and controlling production at speeds up to 100 events per second.



Selector knobs can be set to furnish closure of contacts at any desired count from 1 to 100,000, permitting accurate batching, machine cycling, package filling, quality control, etc. Individual decades (plug-in type) enable Tally-Count to be expanded from a 1-decade to a 3- or 4-decade unit without wiring change.

For further information write to: Modenco of Canada Limited, 4975 De Sorel Street, Montreal, Canada.



"OJ"

*brings
telephone
communications
up-to-date*

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

RESEARCH and DEVELOPMENT LABORATORIES

Northern Electric

COMPANY LIMITED

SERVES YOU BEST

4482-11

For complete details check No. 23 on handy card, page 43

ELECTRONICS AND COMMUNICATIONS, January, 1960

47

OPPORTUNITIES

These classified advertisements are published to assist those in the trade who have articles for sale, positions available, positions desired, sales agency openings or business opportunities. Charges are 25c per word or figure, not including heading or box number. Minimum charge is \$5.00 payable on submission. No agency commission paid.

There is absolutely no charge for "positions desired" advts. Send all material to the attention of the advertising manager of ELECTRONICS AND COMMUNICATIONS, 450 Alliance Avenue, Toronto 9, Ontario.

GRADUATE ELECTRICAL ENGINEER

desires position with Canadian firm. Experience includes flying time of 500 hours as a navigation officer and two years as a telecommunications officer with the RCAF. Opportunity to gain technical experience considered of greater importance than remuneration involved. Complete resume will be forwarded on request.

Box 5022

Electronics and Communications
450 Alliance Avenue, Toronto 9, Ontario

BRITISH FIRM SEEKS U.K. AGENCY RIGHTS FOR CANADIAN ELECTRONICS MANUFACTURER

A large and reputable firm of British electronic equipment and component manufacturers situated in the North of England is desirous of obtaining U.K. representation rights for Canadian manufactured electronic equipment and components. The firm seeking this arrangement is a supplier of electronic equipment to H.M. Admiralty, Ministry of Supply and the United Kingdom Atomic Energy Authority. In reply interested parties should state the types of equipment or components they are prepared to place on the British market through such an arrangement. Address replies to:

Box 5022

Electronics and Communications
450 Alliance Avenue - Toronto 9, Ontario

TECHNICAL SALES REPRESENTATIVE

of imported electronic equipment seeks change to position dealing with equipment or parts of Canadian or American origin. Extensive technical background. Connections with jobbers and industry.

Box 5029

Electronics and Communications
450 Alliance Avenue, Toronto 9, Ontario

NOTE — Applications are sought for the following key position in the new Vancouver Television station only on the understanding that my clients have no reason to believe or suspect that their application for license is being given favourable consideration. This search for qualified and experienced personnel is strictly a precautionary and preparatory measure begot of sound business judgment and practice on the part of my clients.

● Chief Engineer

— essentially he must be experienced in TELEVISION TRANSMISSION OPERATION with preference given experienced applicants holding an Engineering degree.

Written applications **ONLY** will be considered for this key position and will be dealt with in strict confidence by John W. A. Fleury of

JOHN W. A. FLEURY & ASSOCIATES LTD.

Personnel and Executive Placement Consultants

708-475 Howe Street, Vancouver 1, B.C.

Formulas accompanying the article entitled "The Manufacture of Ferrites" . . . which appeared in the November 1959 issue of Electronics and Communications should read as follows:


page 13, para 7: $F_{e_2}^{3+} O_3 M^{2+} O$

page 14, para 3: $Z_n^{2+} F_e^{3+} \left[F_e^{3+} M_{n_4}^{2+} \right] O_{32}$

page 16, para 1: $M_n F_{e_2} O_4$

Completely
CANADIAN MADE

 **PANEL MEASURING INSTRUMENTS**

 **PORTABLE AND LABORATORY INSTRUMENTS**

 **ELECTRONIC INSTRUMENTATION**

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

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

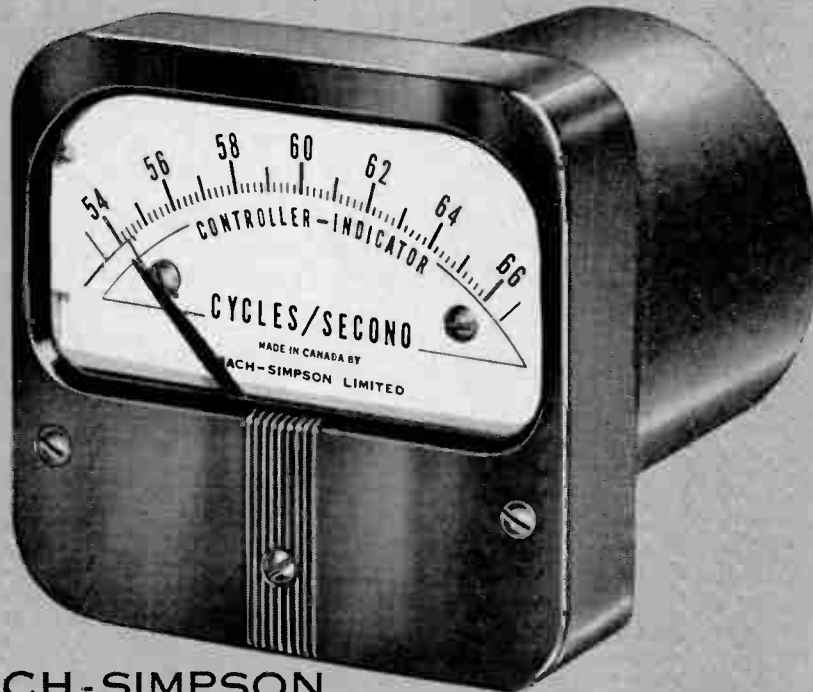
Others have, and have been completely satisfied!


Bach-Simpson
LIMITED

JA 5187

INTERVAY

THE COMPACT CONTROLLER



BACH-SIMPSON

Controller-Indicators

offer sampling of pointer position at regular intervals, with positive contacting in the case of a shift of the measured quantity outside of preset limits. Contact pressure is produced by a solenoid, and is therefore independent of meter torque. Circuits of the integral primary relays are actually closed by heavy motor-driven contacts, rather than by the pointer contact itself.

Frequency, voltage, current, temperature — in fact, any quantity which can be indicated on a switchboard instrument — can be accurately and reliably limited or programmed, with simultaneous indication. A variety of sampling intervals and a wide range of contact arrangements are available, and slave units, as well as self-contained types for independent operation, are standard.

In addition, a full line of switchboard meters, compatibly styled and featuring the anti-parallax pointer and scale combination employed in the Controller-Indicators, makes possible a completely integrated panel design.



The Bach-Simpson Frequency Controller-Indicator received the I.R.E. Award for the most outstanding new Canadian component exhibited at the 1959 I.R.E. Canadian Convention.



1255 BRYDGES STREET - LONDON, ONTARIO

JA5260



Install

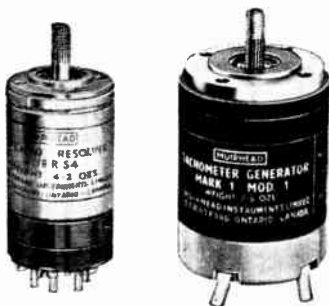
MUIRHEAD Servo Components



Types include Control Transmitters, Control Differential Transmitters, Control Transformers, Torque Transmitters and Receivers, Torque Differential Transmitters, Resolvers, Linvars, Servomotors, Motor Tachometers and Tachometer Generators. Where military specifications exist, Muirhead Servo components can be supplied satisfying Ministry of Supply, Bureau of Ordnance and N.A.T.O. requirements.



**And obtain the Ultimate in Performance from your
Electromechanical Design**



A concise index to all the types manufactured is available in the Muirhead Synchro Broad Sheet, which will be forwarded on request. Detailed information on individual types is also available in handy data sheet form.

MUIRHEAD INSTRUMENTS LTD · STRATFORD · ONTARIO · CANADA
Phone 3717-8

For complete details check No. 22 on handy card, page 43

Miniature precision tubing catalog

Item 2581

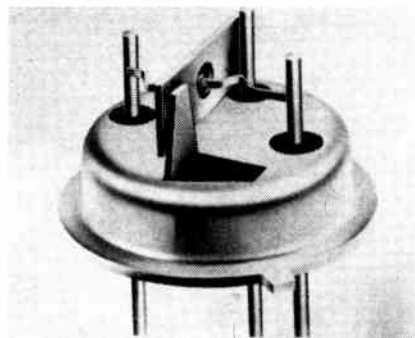
Canadian Research Institute, 46 St. George Street, Toronto 5, Ontario, are making available a twelve-page illustrated catalog on the line of precision tubing manufactured by Precision Tube Company, Incorporated. Data are given on tubing of various metals and alloys as small as 0.010" outside diameter and including Bourden tubes and metal shielded wire.

For further information write to:
Canadian Research Institute, 46 St. George Street, Toronto, Ontario.

Thermal bonded transistor

Item 2582

Tung-Sol Electric Inc. announced recently its registration with EIA of the 2N1313, a PNP germanium alloy junction transistor employing the manufacturer's exclusive "Thermal Bond" construction.



Designed for use in high current, high speed, computer switching applications, Tung-Sol's 2N1313 provides a novel design approach to greater mechanical reliability.

The 2N1313 is designed and constructed to withstand 20,000 G centrifuge, exceeds all MIL environmental specifications for shock, vibration, centrifuge, and resistance to salt spray and moisture, and shows excellent current gain linearity (low beta fall-off). Its thermal resistance derating is the lowest for electrically insulated devices (.350 degrees C/mW, typical).

For further information write to:
Tung Sol Electric Inc., Newark 4, New Jersey, U.S.A.

Millie Amp says,
"Get Gold-Branded.
it costs so little!"

"Gold Brand"

METERS

STARK

STARK ELECTRO-IL SALES COMPANY
AJAX, ONTARIO

For complete details check No. 32

ROGERS

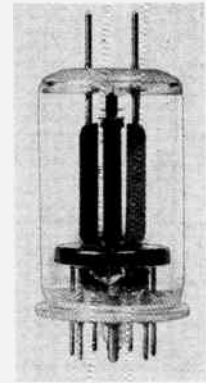
REFERENCE BULLETIN NO. 1

Rogers tube type 5894 for 150 M/c mobile transmitters

The Rogers 5894 is a transmitting double tetrode capable of giving 30 watts output, CCS, in a conservative manner under the field conditions met in mobile communications. It is further capable of giving extreme reliability as a base station output tube producing 60 watts.

Great uniformity is achieved from tube to tube and also in the current division within each tube, with the Rogers 5894.

- Each anode is capable of dissipating 20 watts.
- The cathode is indirectly heated and oxide-coated.
- Maximum ratings apply up to 250 megacycles.
- At reduced ratings the 5894 may be operated at up to 500 megacycles.
- To ensure neutralization over the entire operating band, the tube has built-in cross neutralizing capacitors, the value of which is adjusted to the direct grid-plate capacities.



TECHNICAL DATA

ELECTRICAL

CATHODE: indirectly heated, oxide coated
Heater sections in

	parallel	series	
Heater voltage 1)	6.3	12.6	V
Heater current	1.8	0.9	A
pins	5-(1+7)	1-7	

DIRECT INTERELECTRODE CAPACITANCES

	each unit	both units in push-pull	
Output capacitance	3.2	2.1	pF
Input capacitance	10.5	6.7	pF
Anode to grid No. 1 (internally neutralized) max.	0.08		pF

AMPLIFICATION FACTOR (each unit)

grid No. 2 to grid No. 1 8.2

MUTUAL CONDUCTANCE (each unit)

at anode current = 30 mA 4.5 mA/V

LIMITING VALUES AND OPERATING CONDITIONS

H.F. CLASS C TELEGRAPHY

C.C.S. limiting values (absolute limits)

Frequency	max.	250 Mc/s	500 Mc/s
Anode voltage	max.	750 V	600 V
Anode input power	max.	2x60 W	2x50 W
Anode dissipation	max.	2x20 W	
Anode current	max.	2x110 mA	
Screen-grid Voltage	max.	300 V	
Screen-grid dissipation	max.	2x3.5 W	
Control grid voltage	max.	-175 V	
Control grid current	max.	2x5 mA	
Resistance between control grid and cathode	max.	50 k Ohms	
Voltage between cathode and heater	max.	100 V	

OPERATING CONDITIONS (two sections in push-pull)

C.C.S.

	200	250	430	500 Mc/s
Frequency	200	250	430	500 Mc/s
Anode voltage	600	750	520	500 V
Control grid bias	-80	-80	-80	V
Common control grid bias resistor				20 k Ohms
Screen-grid voltage	250	250	250	250 V
Anode current	2x100	2x80	2x100	2x100 mA
Control grid current	2x2.5	2x1.5	2x2.8	2x3 mA
Screen-grid current	16	17	18	20 mA
Peak grid-to-grid driving voltage	200	250		V
Screen-grid dissipation	4	4.25	4.5	5 W
Anode input power	2x60	2x60	2x52	2x50 W
Anode dissipation	2x15	2x17.5	2x19	2x20 W
Tube output	90	85	66	60 W
Tube efficiency	75	71	64	60 %

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

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

ROGERS

electronic tubes & components

A DIVISION OF PHILIPS ELECTRONICS INDUSTRIES LTD.
116 VANDERHOOF AVE., TORONTO 17, ONTARIO

Defense Sharing Procedure

It has been brought to the attention of ELECTRONICS AND COMMUNICATIONS magazine that Canadian electronics firms have been increasingly active in seeking contracts under the U.S.-Canadian production sharing agreements by having their names placed on Bidders' Mailing Lists of the various U.S. military agencies.

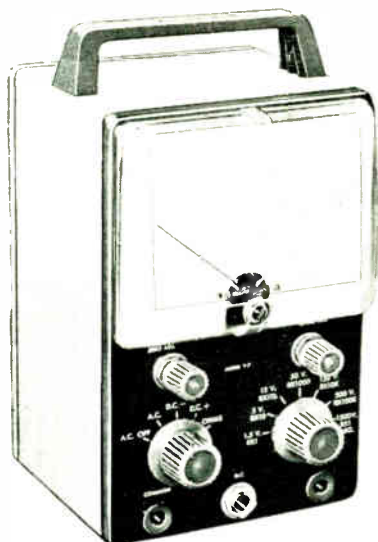
In many cases application has been made direct to the agency concerned and not through the Canadian Commercial Corporation. It is unfortunate that this practice leads to confusion and delay as the forms are invariably returned to the Department of Defense Production in Ottawa for correction.

The United States Armed Services Procurement Regulations specify that all applications for placement on U.S. Procurement Agencies Bidders' Mailing Lists be routed through the Canadian Commercial Corporation in Ottawa. The Canadian Commercial Corporation relies on the Department of Defense Production to ensure that applications are completed correctly and that the company completing the application has facilities capable of manufacturing in Canada the commodities concerned.

Canadian firms anxious to have their names entered on Defense Production Sharing Bidders' Mailing Lists should, before filling out their applications, read carefully pages 18 to 21 of "Notes on Canada-United States Defense Production Sharing". It should be further noted by applicants that only those items "excepted" from the Buy American Act are available to Canadian industry as production sharing items.

For the convenience of Canadian firms anxious to bid on Defense Production Sharing work, a list of the equipments which are currently "excepted" by each of the United States Armed Services is available from the Electronics Branch of the Department of Defense Production in Ottawa. While the Department of Defense Production has stated that it welcomes the visits of Canadian business men to United States procurement agencies to obtain information on how they operate, it has been suggested that before completing forms for inclusion on Bidders' Mailing Lists it would be in the interests of all parties concerned to contact the Production Sharing Staff of the Department of Defense Production in Ottawa at Room 1215, No. 2 Temporary Building, 70 Lyon Street, Ottawa, who are in a position to ensure that forms are filled out in an acceptable manner.

PROFESSIONAL QUALITY TEST EQUIPMENT . . . AT A LOW **HEATHKIT** PRICE!



HEATHKIT VACUUM TUBE VOLTMETER

This multi-function VTVM will measure AC volts (RMS), AC volts (peak to peak), DC volts, resistance, and db. A zero center scale db range is provided and a convenient polarity reversing switch is employed for DC operation, making it unnecessary to reverse test leads when alternately checking plus and minus voltages. A large 4½" meter is used for indication, with clear, sharp calibrations for all ranges. Front panel controls consist of a rotary function switch, a rotary range selector switch, zero-adjust and ohms-adjust controls. Precision 1% resistors are used for high accuracy and a printed circuit board is used for most of the circuitry. Use of printed circuits permits high circuit stability, speeds assembly time and cuts down the possibility of wiring errors. The 11-megohm input resistance of the V-7A reduces "loading" of the circuit under test resulting in greater accuracy than would be obtained with other types of voltmeters.

HEATHKIT V-7A **\$36.95**
Wired Model No. WV-7A \$56.95

No. 336



\$6.95

30,000 volt DC high voltage probe kit provides a multiplication factor of 100 on DC ranges of Heathkit V-7A or any 11-megohm VTVM to measure high voltages. Multiplier mounted inside plastic probe body. Wired model No. W-336 \$7.95.

No. 339-C



\$5.95

Etched circuit RF probe kit extends frequency response of the Heathkit V-7A or any 11-megohm VTVM to measure RF voltage up to 250 mc. Wired model No. W 309-C \$6.95.

HEATHKIT PROFESSIONAL "5" DC OSCILLOSCOPE

Amazingly versatile, the OP-1 features DC coupled amplifiers and DC coupled CR tube unblanking. The triggered sweep circuit will operate on either internal or external signals and may be either AC or DC coupled. Sweep frequencies are provided by switch-selected base rates of 2 and .2 milliseconds-per-CM, and 20, 2 and 1 microseconds-per-CM in conjunc-

tion with the continuously variable 10-to-1 multiplier. Sweep frequencies are calibrated to within 10% at all control settings. The 12-position vertical attenuator is calibrated in volts-per-CM and the horizontal sweep is calibrated in time-per-CM.

HEATHKIT OP-1 **\$219.95**



**SAVE 50%
OR MORE
WITH HEATHKIT
TEST EQUIPMENT**

For a free Heathkit catalogue of over 100 easy-to-build Heathkits write:

DAYSTROM LIMITED

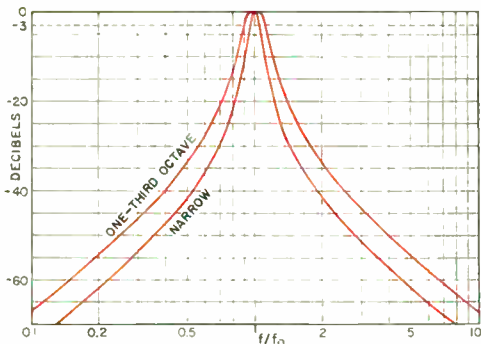
2 RATHERM ROAD, TORONTO 19, ONT.

Distributors of Heathkits in Canada

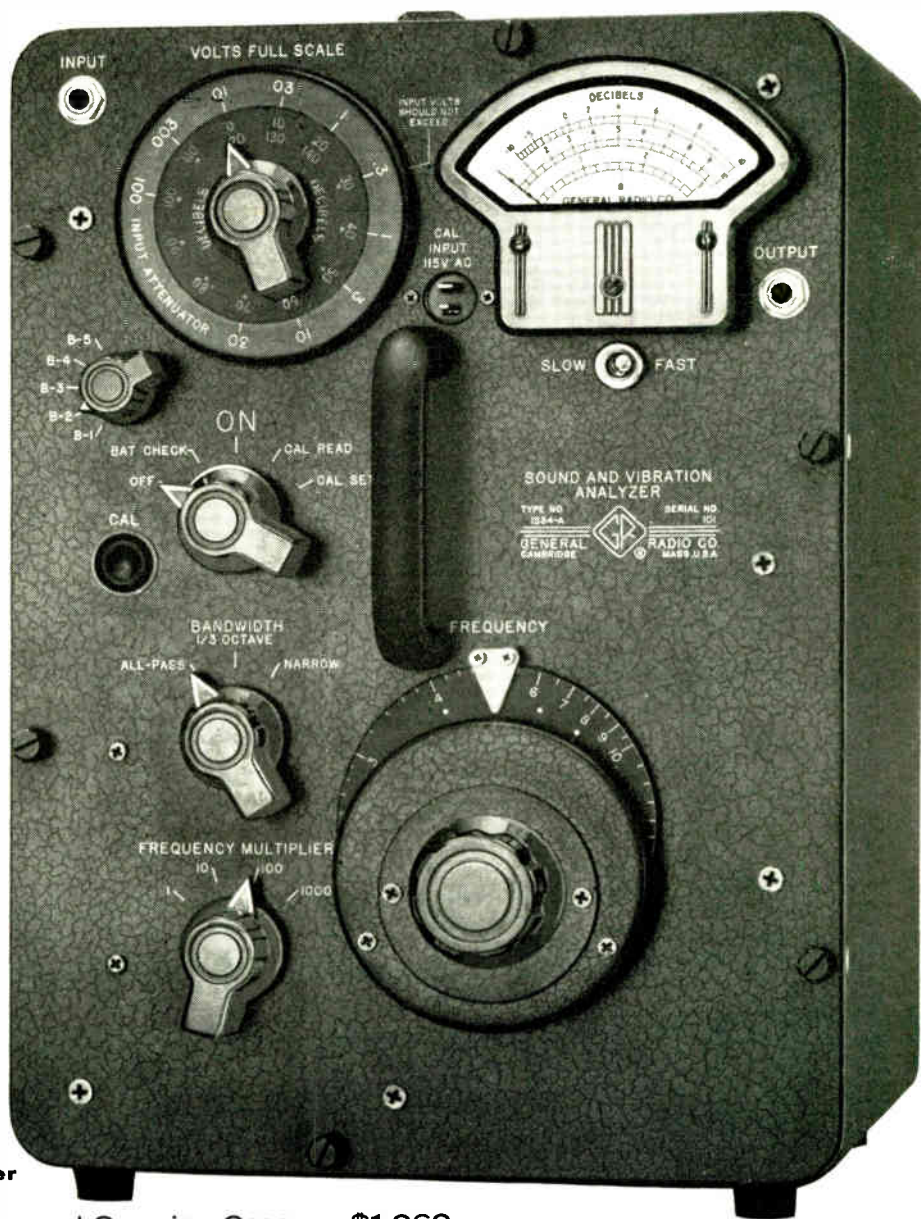
6007

NEW - ONE ANALYZER . . .

FOR SOUND, NOISE, AND VIBRATION



- ★ **THREE BANDWIDTHS:**
"Narrow" for measurement of single-frequency components of spectrum — bandwidth is 8% of center frequency at 3-db points.
"One-Third Octave" for analysis of noise — bandwidth is 1.26 times center frequency.
"All-Pass" for convenient adjustment of overall level — flat from 2.5c to 25 kc \pm 2 db.
- ★ **Wide Range:** Continuously tunable from 2.5 to 25,000 cps.
- ★ Both Analyzer characteristics fall off at 12-db per octave far from center frequency.
- ★ Adjustable decibel dial may be set so Analyzer is direct reading in sound-pressure level, one-third octave-band level, or any other desired level — may be calibrated using 115v line to make Analyzer direct reading in input volts.
- ★ Portable and battery-operated for field use.
- ★ New G-R Type 1521-A Recorder can be linked to the Analyzer to provide a graphic record of the frequency spectrum under study.



Type 1554-A
Sound and Vibration Analyzer

Complete with Accessory Cables and Carrying Case . . . \$1,060

This Analyzer is a tunable voltmeter whose bandwidth is a constant percentage of the frequency to which the instrument is tuned. It will measure amplitudes and frequencies of the individual components of sounds and vibrations. Frequency-selective amplifiers employing RC feedback networks can be either synchronously or stagger tuned to give "Narrow" or "One-Third Octave" bandwidth respectively. The ampli-

fiers can also be switched to "All-Pass" operation to measure the entire input signal. Transistors have been used extensively throughout this instrument.

The instrument is designed for use with a Sound-Level or Vibration Meter. When component levels exceed 50 db, measurements may be made directly with accessory microphones.

GENERAL RADIO COMPANY

WEST CONCORD, MASSACHUSETTS

Canadian Engineering Office in TORONTO
 99 Floral Parkway, Toronto 15, Ontario
 Arthur Kingsnorth • Richard J. Provan
 Tel: CHerry 6-2171

Repair Service: Bayly Engineering Ltd., Ajax, Ontario

For complete details check No. 19 on handy card, page 43