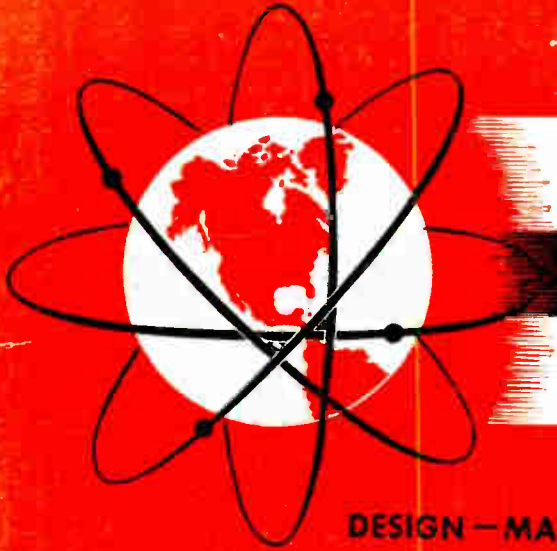


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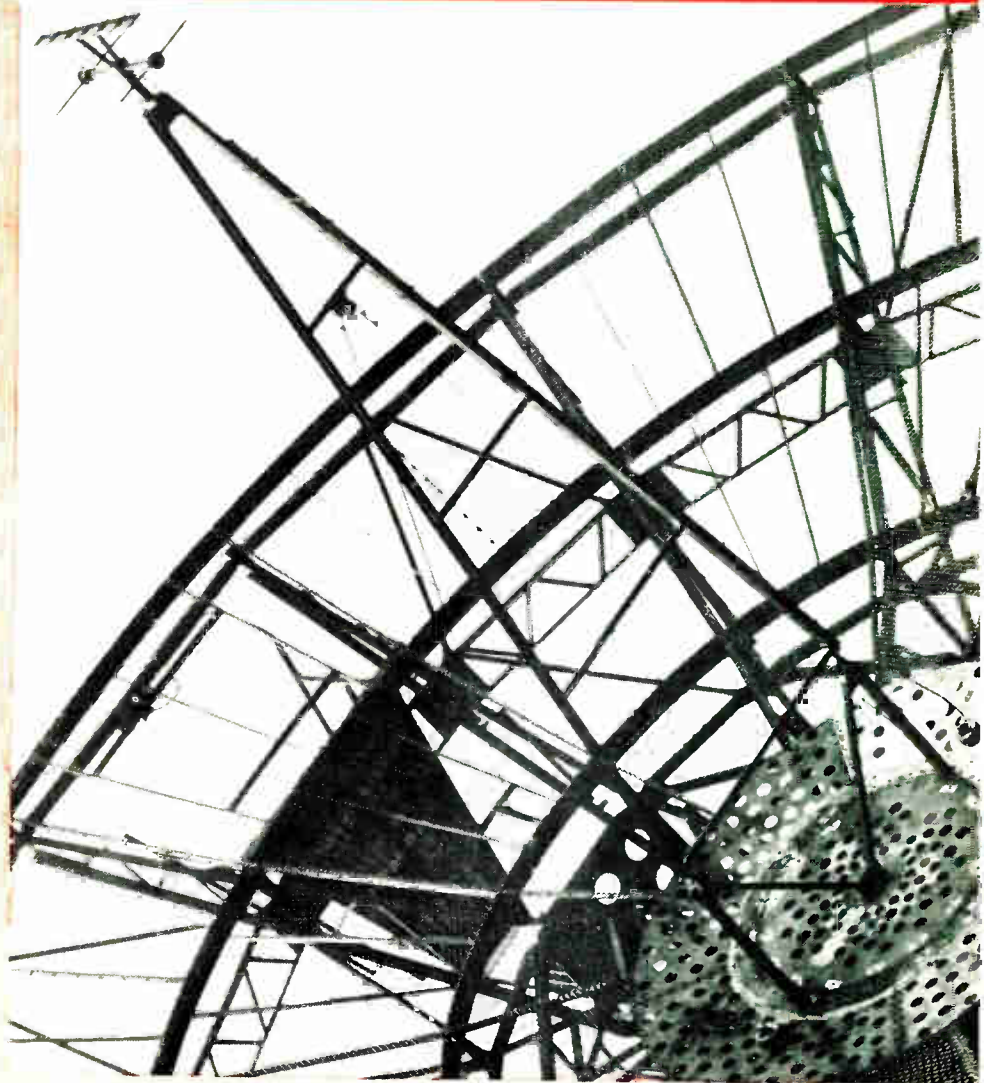
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For Flue Dust
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Steel Pails Solve Problems
For Magnet
Wire Industry 22

Small Towns Can
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Transmitter 24

Electronic Control To
Millionths Of
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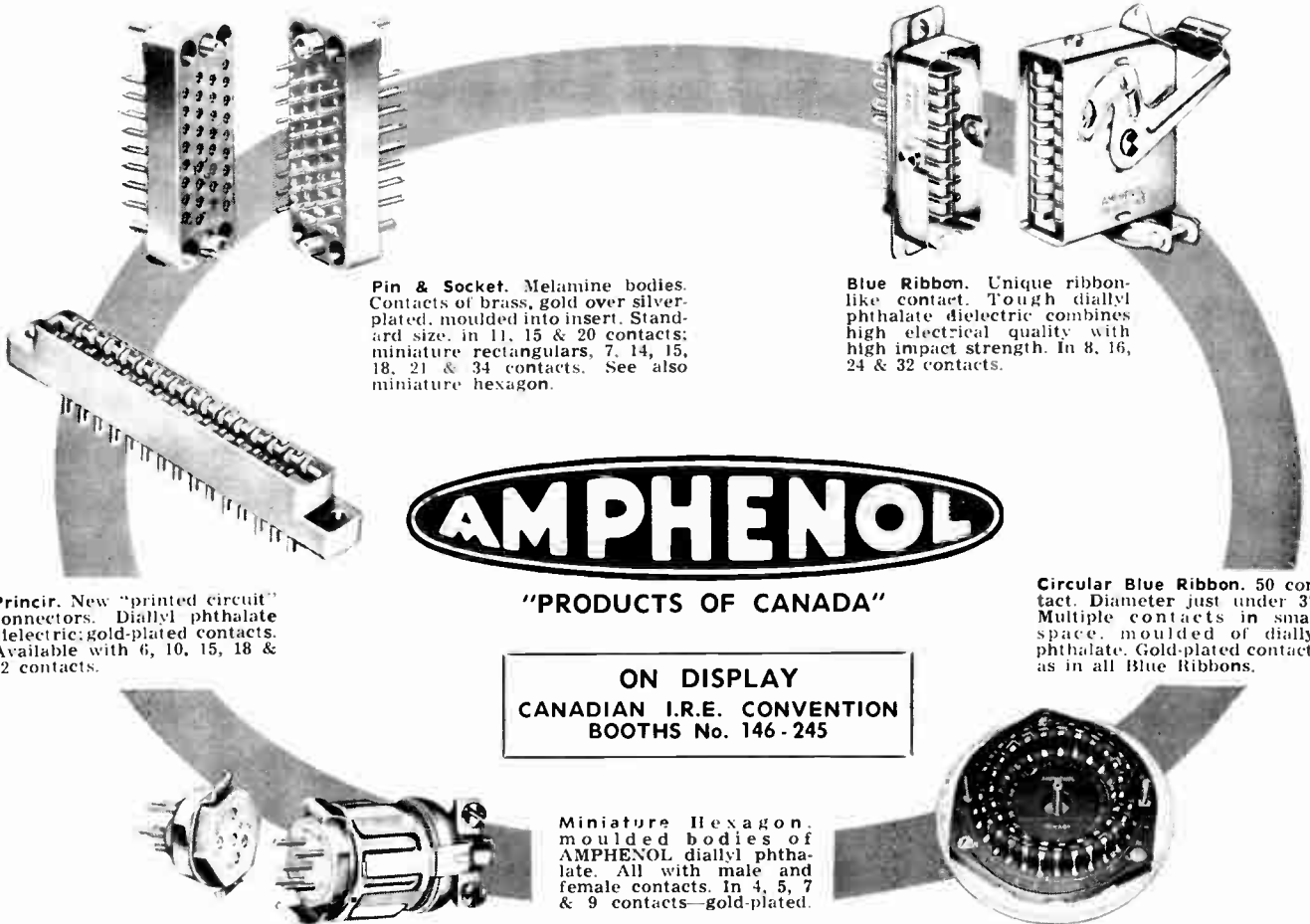
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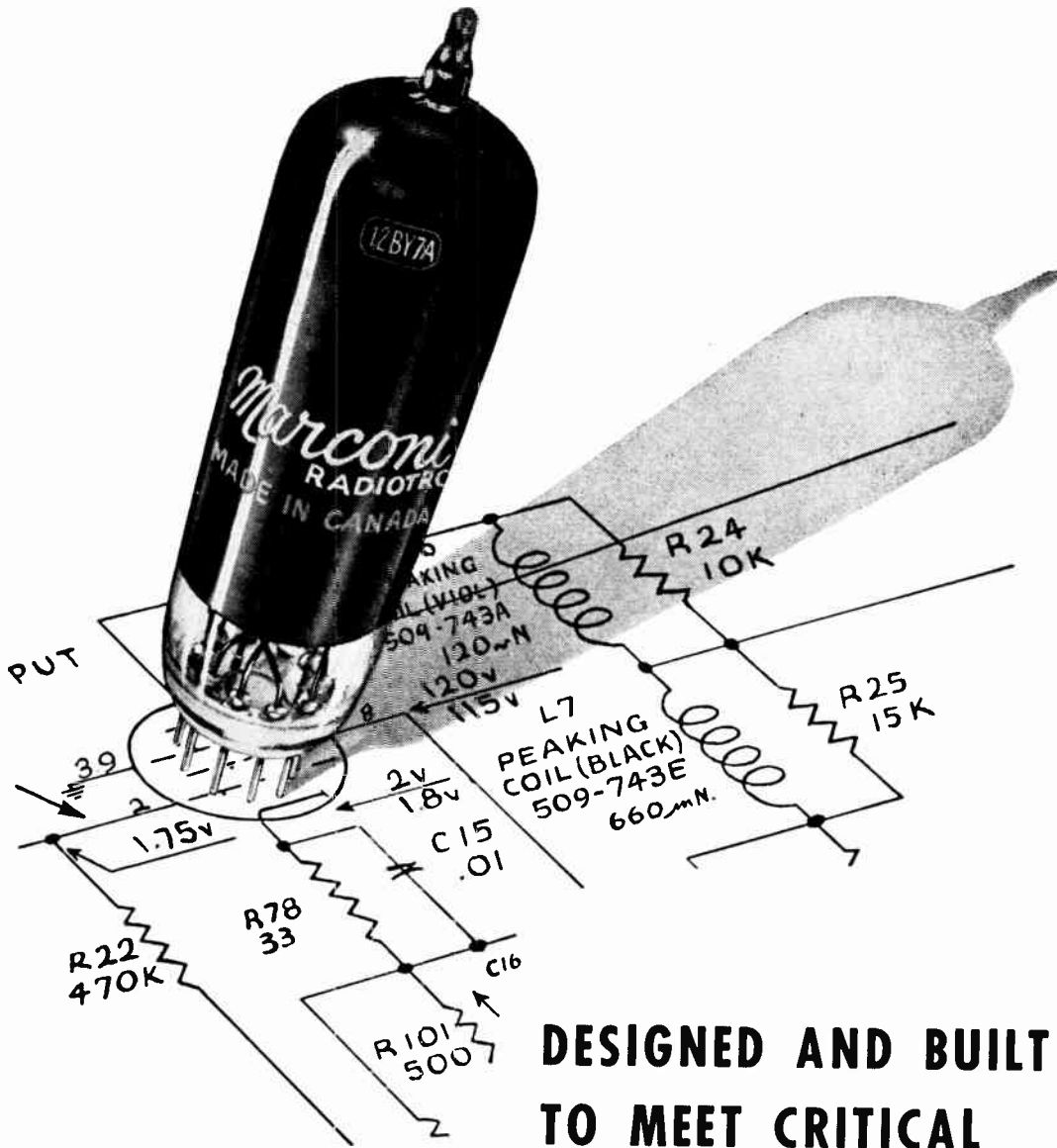
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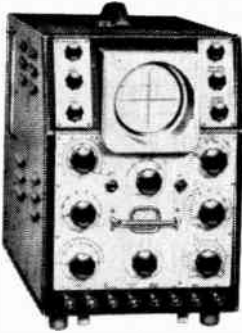
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EVOLUTION IN PRECISION INSTRUMENTS

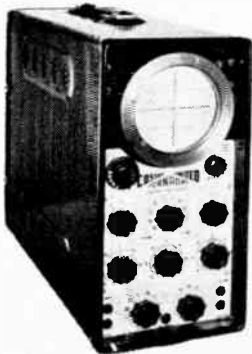


MODEL 1049 Double Beam meets industrial and laboratory requirements, recording frequencies from zero to 400 Kc/s (A1) and 800 Kcs. (A2).

4-inch flat-screen double beam tube operates at 2KV and provides for operation at 4KV when recording of fast transients is undertaken. 2 independent channels with gains 900 and 25.

The complete range of Cossor oscilloscopes provide instruments that are designed to meet plant and laboratory requirements and are an evolution in precision.

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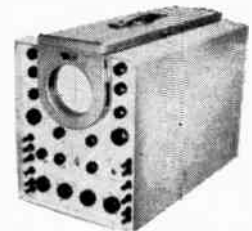
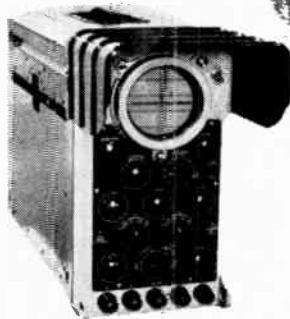


MODEL 1035 incorporates a 4" flat screen Double Beam Tube and independent amplifiers providing high and low gain channels with a frequency range of 20 c/s to 7 Mc/s and 20 c/s to 100 Kc/s respectively. Voltages of applied signals can be measured directly on calibrated front panel dials.



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MODEL 7514C Oscilloscope is a versatile high gain wide band instrument for general laboratory and industrial applications. The Amplifier handles signals from 5 cycles to 10 Mc.

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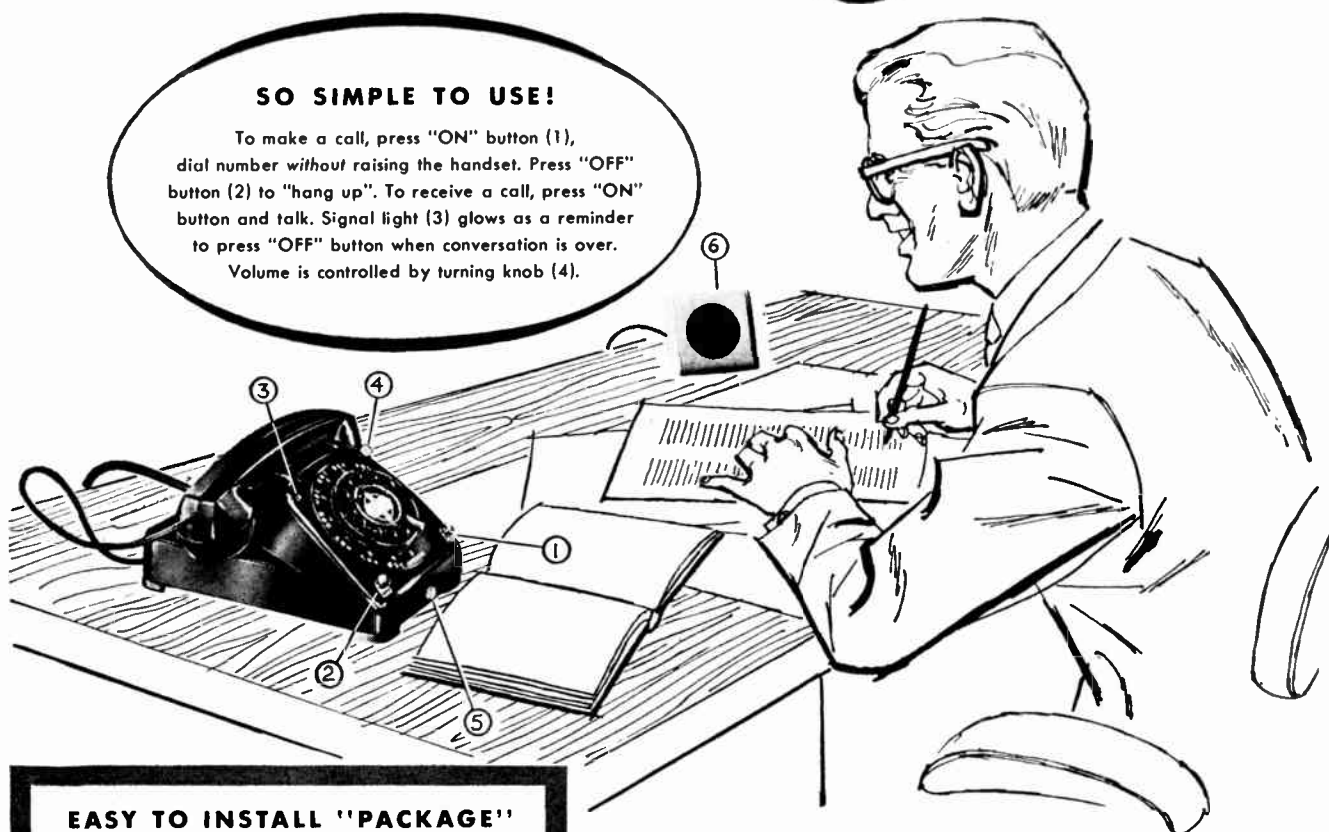
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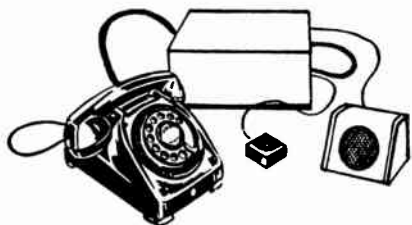
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SO SIMPLE TO USE!

To make a call, press "ON" button (1), dial number without raising the handset. Press "OFF" button (2) to "hang up". To receive a call, press "ON" button and talk. Signal light (3) glows as a reminder to press "OFF" button when conversation is over. Volume is controlled by turning knob (4).



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All components including the type 88 Loud-Speaking Telephone (with built-in microphone, "ON" and "OFF" buttons, volume control knob and signal light) and desk top speaker, control unit with plug in amplifier, terminal block and necessary connecting cords are supplied as a complete "package".

Installation is simply a matter of mounting the amplifier unit, connecting to 115 volts, 60 cycles power supply, connecting the telephone line to the terminal block, and connecting the cords.

The Automatic Electric Type 88 Loud Speaking Telephone opens a new era in telephone convenience! The built-in microphone (5) picks up the normal voice, while the other party is heard, clearly and naturally, through the separate speaker (6). Others may join in the conversation by gathering around the desk! For privacy, raise the handset and talk in the usual way; to use the loud speaker again merely replace the handset.

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5560

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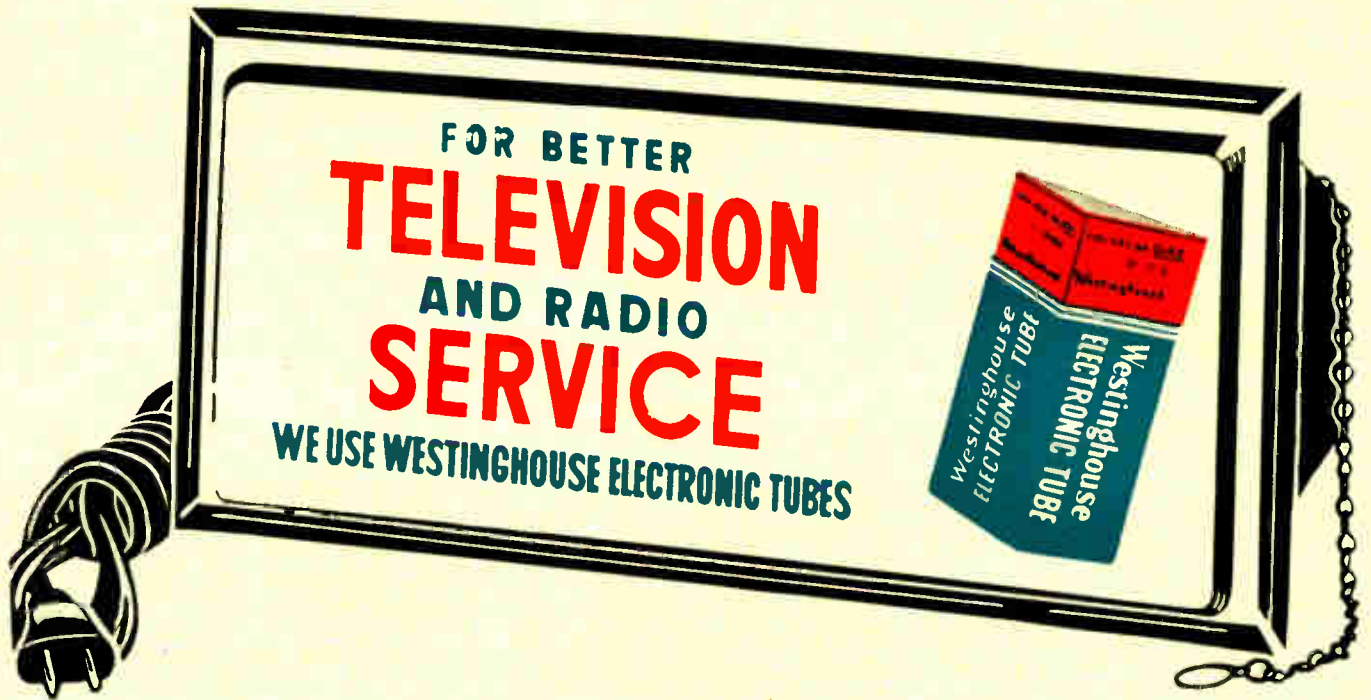
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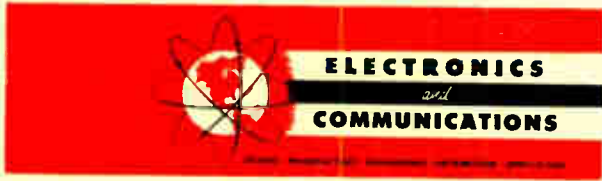
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THE ONLY CANADIAN JOURNAL DEVOTED SPECIFICALLY TO THE APPLICATIONS OF COMMUNICATIONS AND ELECTRONICS

AUGUST • 1956
Vol. 4 No. 7

Printed, Engraved and Pro-
duced in its Entirety by
AGE PRESS
a Division of
AGE PUBLICATIONS LIMITED

President and Publisher NORTON W. KINGSLAND
Vice-President and Director of Advertising NORMAN McHARDY
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Member Canadian Circulation Audit Board, Inc.



PRINTED IN CANADA
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Subscription Rates: Canada, U.S.A. and British Possessions \$ 5.00 per year
 Foreign \$10.00 per year

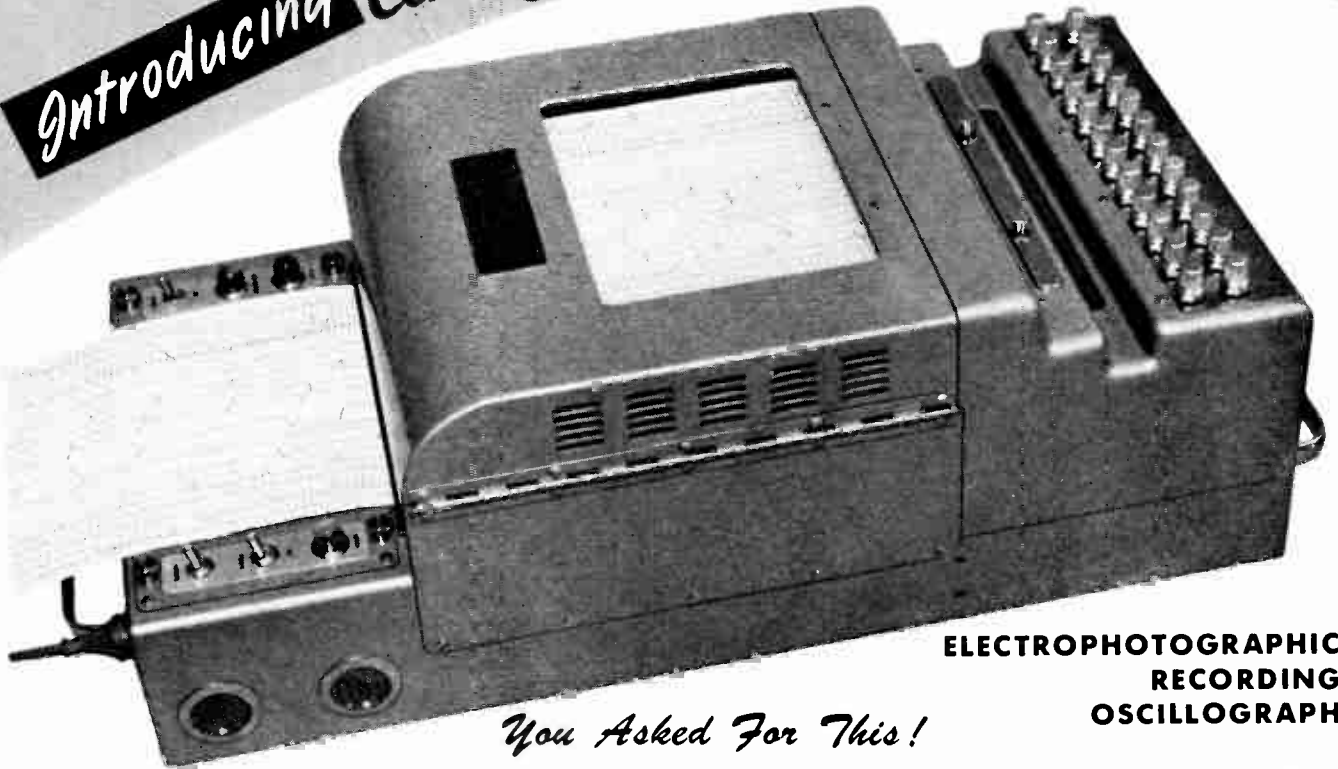
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The greatest advancement in the technique of multi-channel oscillograph recording in over 20 years, the CENTURY ELECTROGRAPH is essentially a direct-writing recording oscillograph utilizing the

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RETMA REPORT

*A Monthly Bulletin Of Association Activities
Prepared For Electronic And Communications.*

By
BASIL JACKSON



Electronics Division Forms Sound Equipment Committee

The Electronics Division of the Radio-Electronics-Television Manufacturers Association of Canada recently formed a Sound Equipment Section Committee. The aims of this new committee are to broaden the scope of operation and to evaluate the economic problems of the sound equipment business in addition to the discussion of technical problems in audio engineering. The committee will consider sound equipment relating to industrial audio, public address systems, intercommunication and custom-built home music equipment.

The formal objectives of the Sound Equipment Committee are as follows:

To investigate the stimulation of sales of Canadian-made audio equipment in competition with imported equipment.

To investigate carefully the possible development of the United States market for Canadian-made sound equipment.

To investigate ways of assisting architects and consulting engineers in acoustical problems by the preparation of RETMA of Canada engineering specifications.

To work toward the ultimate goal of having sound equipment tendered to general contractors on a separate contract and not as part of the electrical contract as is now the commonly accepted practice. If this were done, RETMA would be able to issue standards for the sound equipment segment of the electronics industry similar in scope to the standards set by the building industry. Also, it would greatly simplify the problems met by the consulting engineer and by the architect in specifying equipment and its installation.

RETMA's Engineering Activity

Perhaps the range and scope of the engineering committees of RETMA are not fully realized, even by those in the electronics industry. The Components Division has an Engineering Committee having twenty-four engineering sub-committees each of which deals with a specific component or groups of components. For example, there is a sub-committee dealing with the engineering problems relating to variable air capacitors, another on fixed paper capacitors, a separate sub-committee on mica capacitors, while others deal separately with resistors, transformers, vacuum tubes, wire, vibrators, sockets and printed wiring plates, dry batteries, switches, printed circuit units, knobs and shafts, plastics, connectors, television tuners, acoustic devices, solderability of components, metallic rectifiers and antennas.

The chairman of each sub-committee is a member of the Components Engineering Committee, and makes his report of the activities of his particular sub-committee at meetings of the main committee.

(Continued overpage)

RETMA REPORT

The Receiver Engineering Committee of RETMA is also very active. It too has sub-committees, one dealing with spurious radiation from television receivers and another on service voltage standardization. Various liaison representatives attend meetings of the Receiver and Components Engineering Committees to ensure that each group is kept informed of the activities of the other.

The Electronics Division is composed mainly of engineering groups. These are divided into sections which are sub-divided into committees. The main sections consist of the General Communications Section, having a Mobile Equipment Engineering Committee and a Microwave, Radio Relay, and Multiplexing Engineering Committee, a Broadcast Equipment Section, having a Radio and a Television Broadcast Committee, the Sound Equipment Section, possessing a Sound Equipment Committee, a Government Relations Section and the recently formed Instrumentation and Data Handling Section.

Annual RETMA-IRE Golf Tournament

The annual RETMA-IRE Golf Tournament is scheduled to take place on Tuesday, September 18, at the Cutten Fields Golf Club, Guelph, Ontario. This is a departure from the traditionally-scheduled Friday for this very popular event.

Transformer Engineering Sub-Committee

At a recent meeting of the Transformer Engineering Sub-Committee the subject of standardization of lamination test methods was discussed. Generally, members were in favor of the establishment of a test method, but while such a method might be acceptable to Canadian lamination suppliers, it might not be acceptable by United States lamination suppliers.

It was thought that a grade designation for laminations on a permeability basis was necessary in the industry, and it was acknowledged that the variation of characteristics of steel between different mills presented a problem to transformer designers and engineers.

It was arranged that members of the committee would make independent coded tests on the suitability of various specified gages of laminations for production purposes.

High Fidelity Sales Increase

More and more Canadians are becoming interested in high fidelity sound reproducing equipment for home use. Sales of this equipment have been steadily increasing over the past year with a consequent increase in the sales of recordings. A great variety of types of units is available, from small self-contained chambers, reproducers to installations with separate speaker chambers, amplifying and turntable units.

UHF Television

Television receivers with separate tuners and tuning controls for reception of UHF channels are now being supplied in Canada in readiness for the Buffalo, N.Y., transmission of UHF programs in the autumn. Such transmissions will be seen in the Southern Ontario regions of the Buffalo station.

AMPEX TAPE RECORDERS FOR EVERY DATA RECORDING NEED

A complete line that works together with compatible characteristics and a consistent standard of excellence

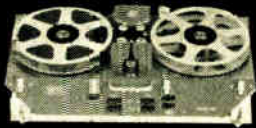
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FR-100—Overall performance specifications are the best of any magnetic tape recorder now in production. Modular design of the FR-100 provides broad scope that gives engineers and scientists a freedom to experiment and develop advanced data gathering techniques.

6 tape speeds 1 7/8 to 60 in/sec; D-C to 100,000 cycle/sec. frequency response; choice of 3 recording methods on any track by plug-in interchangeable amplifiers.

MOBILE



800—For airborne, shipboard or vehicular use, this recorder combines excellent performance specifications with ruggedness, compactness and light weight. It is also resistant to shock, vibration and environmental extremes. The 800's versatility is second only to the FR-100.

4 tape speeds; D-C to 30,000 cycle/sec. frequency response; choice of 3 recording methods on any track by plug-in interchangeable amplifiers.

DIGITAL



FR-200—This magnetic tape transport fulfills the fast start-stop requirements of digital handling. It also provides a unique single loop threading feature which greatly simplifies tape change and minimizes chance for faulty threading by inexperienced personnel.

Tape attains full speed or full stop within less than 5 milliseconds; standard machine has 30 in/sec. tape speed and 7 tracks on 1/2-inch tape; other combinations on order.

REPEATABLE



S-359—The endless tape loop handled by this transport serves a number of special needs: time delay, repeating signal for analysis, monitoring with "infinite" time limit, and various programming functions. Loop length is continuously variable from 3 1/2 foot minimum to 25, 50 or 75 foot maximum.

Available for 1/4, 1/2 or 1-inch tape; same tape speeds, heads and other characteristics as Ampex reel-to-reel recorders.

DEPENDABLE



300 SERIES—These are Ampex's long established line. For many applications where the great versatility and extremely high performance specifications of the newer FR-100 are not needed, a 300 series machine provides high quality performance and great reliability at less cost.

Available for various types of recording: 303 for pulse-width modulation; 306 for FM-carrier recording; 307 for direct recording; also combinations.



A mark of the Ampex leadership in magnetic tape recorders is the fact that every machine produced equals or exceeds all published performance specifications. A general tape instrumentation brochure and descriptive literature on various models are available on request. Write Dept. SS-2788

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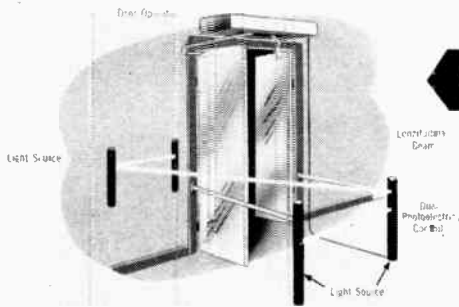
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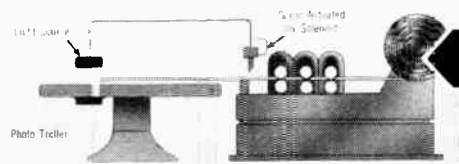


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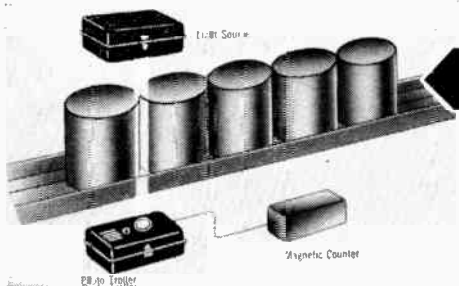
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Let's Legalize SARAH!

In view of the ever present danger of flying accidents and the possibility of an aircraft becoming lost, it is a little surprising that it has taken science so long to devise a means whereby the position of a crashed aircraft is automatically indicated by means of radio apparatus. Now, however, it is reported that such an apparatus has been designed and produced for this specific purpose and reports indicate that the Royal Canadian Air Force have adopted it for use in service aircraft.

The device, known by the name SARAH which stands for Search And Rescue And Homing, is a subminiaturized instrument that weighs three and one-half pounds and can be carried in a pilot's jacket pocket or attached to the flotation gear of an aircraft. According to descriptions of the equipment, it is designed to survive when everything else is lost and actual search operations with the equipment in Great Britain have proved its efficiency.

With the new instrument it is claimed that one aircraft can cover an area of thirty thousand square miles in four hours with the assurance of pinpointing the location of a crashed plane if it is within the area.

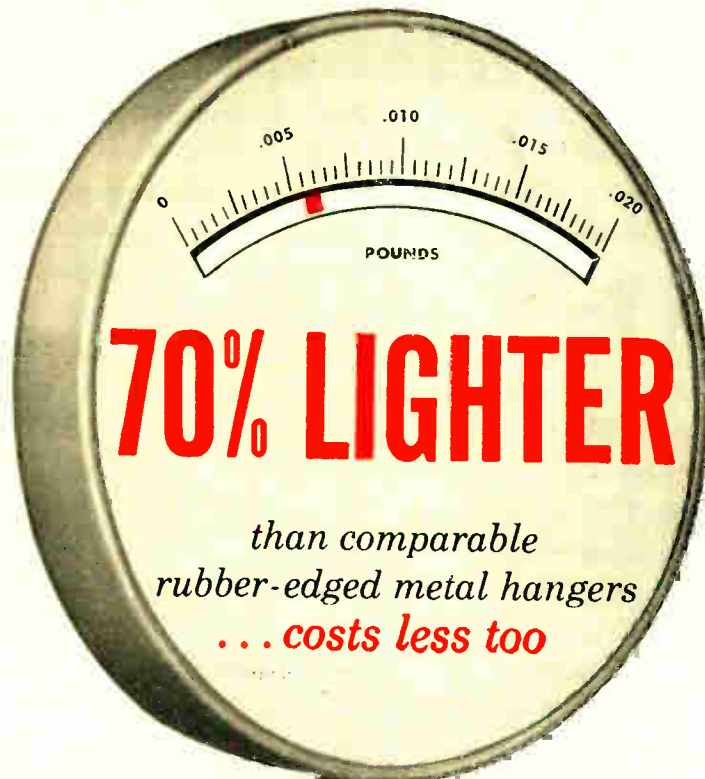
★ *Here then is a device which promises to reduce the tremendous cost of carrying out search and rescue operations — search and rescue operations which, despite their cost and the efficiency of the organizations charged with this duty, have too often in past years failed to locate plane or survivors.*

★ *The instrument is claimed capable of working equally well during the darkness of the night, through smoke, snow, fog or haze. Insofar as survivors are concerned then, the development of such an instrument may be lauded as being equal in importance to the development of the sextant, because it is of little comfort for the survivors of a crashed plane or a disabled surface craft to be able to reckon their own position in the grim knowledge that searchers are totally ignorant of their whereabouts. This, especially so in the vast wilderness of Canada's northland into which aircraft are venturing farther and more frequently every year in the performance of air freight-lift operations and the need for transporting personnel into locations inaccessible by any other means than aircraft.*

★ *This new instrument then is an instrument through the use of which hundreds of thousands of taxpayers' dollars may be saved in reducing the cost of search and rescue operations. For this reason it is considered that federal authorities in the Department of Transport, under which civilian flying regulations in Canada are administered, may well consider the value of legislation requiring all aircraft to be fitted with this instrument.*

Though no figures on the cost of the apparatus are available, it is reasonable to assume that it would not be beyond the ability of commercial aircraft operators to afford. Insofar as private flying is concerned it is considered that flying clubs could easily afford the cost of one or two of the instruments which could be issued to flyers planning cross-country flights taking them over uninhabited, wooded or mountainous sections of the country in which they may be forced down to become as completely lost and as difficult to find as those unfortunate enough to be forced down in the vastness of Canada's northland.

The compulsory use of an instrument such as SARAH, through the required legislation, would surely not impose a financial hardship on anyone and may quite conceivably save hundreds of thousands of dollars of government funds in the years ahead and, what is more important, the lives of many who travel by air.



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business briefs & trends

★ The Trans-Canada Telephone System have estimated that over \$3 billion dollars will be spent on expansion in the next 25 years by Canadian telephone systems. Citing the telephone industry as one of the best barometers of development, Thomas W. Eadie, chairman of the Trans-Canada Telephone System, recently commented that the national total of telephones and the daily average of calls have all more than doubled in the last 10 years.

* * *

★ A technical school in Quebec City has become one of the first educational institutions in Canada to use closed circuit television. Ecole Technique de Quebec has installed a system which consists of a camera and monitor tied to several TV sets in the various laboratories.

* * *

★ According to RETMA, there were 1,920,683 radios and 2,059,129 TV sets shipped to dealers during the first four months of 1956, compared with 1,577,483 radios and 2,329,449 TV sets in 1955.

* * *

★ One of the largest electronic computers to be installed in Canada to date is that now in use in the engineering department of the Canadian Westinghouse Company in Hamilton. The computer is valued in the neighborhood of one hundred thousand dollars. A further computer is now on order for the University of Alberta's electrical engineering department, delivery of which is expected early in 1957.

* * *

★ Sales of radio sets dropped off in the period from 1952 to 1954, as the result of television's growing influence, but in 1955 radio staged a comeback. This is borne out by the fact that radio set sales increased in 1955 by 8.5 per cent and are reported up again this year. Furthermore two new broadcasting stations have recently been launched in Western Ontario. Manufacturers have devised new ways and places for using sets and the public has demonstrated that it still likes to listen to radio. One radio company official expresses it this way: radio "has shaken off the effects of a deep sleep".

* * *

★ P. J. Casella, vice-president, consumer products, R.C.A. Victor, says that after a four year reign, TV has been nudged aside as the most wanted piece of home entertainment equipment. TV, Mr. Casella said, has been the undisputed number one choice until quite recently and is still a strong second but latest surveys in Canada show that more Canadians now have their sights trained on a newcomer: the high-fidelity record player. Despite this trend, however, Mr. Casella predicts that Canadians will probably buy three million TV sets during the next five years.

* * *

★ A company chief engineer, addressing a management club conference recently, said that the "Electronic Age" has uncovered the need for a new type of salesman, a man who knows both engineering and salesmanship and can put the two together. "In the past," he said, "engineers have not been required to be vocal persons. They did the research and the development. Now there are wonderful job opportunities for those who possess the two qualifications — knowledge of engineering and the professional know-how of salesmanship."

* * *

★ Beginning in September, an experiment will be tried out in Maryland whereby 6,000 pupils in two high schools and six elementary schools will get a large part of their daily lessons by closed-circuit TV. The project has been worked out between local school authorities, representations of RETMA, and other educational groups. The idea originated with the TV manufacturers, who hope to develop more flexible, easy-to-operate TV equipment for school use and overcome the increasing dearth of teachers.

* * *

★ Reports emanate from Washington that the DEW-line radar chain across the Canadian Arctic is ineffective as at present planned. Efforts to improve the system will sky-rocket costs when SAGE is worked into it. SAGE (semi-automatic ground environment) is an electronic computer deluxe which assembles radar data, works out course and speed of attackers and directs defending planes or missiles towards them. Consideration is being given to a second DEW-line along the southern border of the United States.

* * *

★ It has been suggested that the creative brains of electronic inventors might well work towards providing additional anti-accident devices in an effort to reduce the tragic toll of human life taken annually and hourly by automobile accidents. Electronic industries have produced many attachments and devices which have greatly assisted in the maintenance of road safety, but the ever-increasing amount of traffic on the highways calls for a continuous and vigorous campaign to devise ways and means of keeping casualties to a minimum.

* * *

★ Indicative of the growing importance of the Canadian electronics industry in foreign markets is the report from Canadian Aviation Electronics of Montreal to the effect that negotiations are now being conducted with firms in Switzerland, Sweden, the United States and the United Kingdom for the use of patents developed by Canadian Aviation Electronics.

* * *

★ The forecast of Dr. B. G. Ballard, director of radio and electrical engineering at the National Research Council, is that professional musicians will be wiped out by electronic imitators. "It is possible," he said, "that the composer of the future will write his symphonies by punching holes in a tape." Electronics would imitate every instrument, and the orchestra would be conducted by an engineer pressing selector buttons.

* * *

★ Automation has made its debut in the accounting department of the Canadian National Railway with the installation of electronic equipment in the revenue accounting and expense accounting departments of the company's Atlantic region. In Moncton the automatic equipment is processing the 30,000 pay cheques of the company's employees in this region.

* * *

★ In order to meet the ever growing demand for aluminum in the electrical field, Aluminum Company of Canada Limited have announced they will install equipment for producing insulated aluminum wires in their cable mill at Shawinigan Falls.

* * *

(Continued on page 36)

*if
you
buy*
**magnet
wire . . .**

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REWINDING



FOR
ARMATURES

. . . no matter what your application, the quality of your winding can be a most important asset in your production.

For this reason, Phillips Magnet Wire is designed to be the finest wire procurable. Backed by generations of craftsmanship, it is subjected to a constant series of tests and inspections to maintain its quality.

First it is precision drawn to exacting tolerances from 99.96% pure copper and the copper is tested and the wire gauge checked. In a special process it receives the high finish, so essential to magnet wire, and is annealed to the precise softness needed. . . . finish and softness are checked and tested. Then an electrically sound insulation is applied in a uniform thickness and density . . . and dimensions, density and dielectric are rigidly tested.

As a result, Quality Craftsmanship and Testing combine to give you the finest Magnet Wire that can be made.

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WIRES AND CABLES



Norton W. Kingsland

With the passing of our President, each of us at Age Publications has lost a personal friend. For "King" was that kind of man. His very presence created an atmosphere of friendliness and goodwill. It was impossible to be in his company without being continuously aware of the deep sense of humanity which lay behind every word he spoke, every idea he expounded and every plan he proposed.

As a publisher, he was a man of practical vision. Ideas flowed from him in effortless abundance, for his mind was essentially creative. He brought a sense of excitement to the daily task, of something being done that was well worth doing. He was eager to praise, fiercely loyal to all those whom he regarded as his fellow workers.

Above all, it is for his manliness and integrity that we remember him. He led without appearing to lead, making himself one with us. It was, indeed, this selflessness, coupled with a never-failing sense of humor, which revealed his natural humility. For "King" was unchanged by success, adamant in his refusal to regard himself as of more consequence than the humblest member of his staff. He would have abhorred such words as these being written or spoken about him.

We shall not see his like again. We shall not again listen as his vigorous imagination ranged over diverse fields of activity in the contemporary world. His mind was always more concerned with the eternal promise of the future than with present actualities. And from each such journey of imaginative exploration he would return with a deepened sense of the goodness of living in Canada, the country he loved above all others and the land he served so selflessly in war and peace.

We had for "King" a feeling far deeper than that of mere respect. We mourn his passing.

A good piece of materials engineering may often help to bring a major development project into a practical reality and a good example of this is provided by the creation of a graphite-impregnated laminated plastic material by the Synthane Corporation of Oaks, Pa. This piece of materials engineering helped to turn Research-Cottrell, Inc.'s development of improved electrostatic precipitation rapping equipment into a practical reality by the design and production of an

Electronically Controlled System For Flue Dust Elimination

FOR many years Research-Cottrell has helped large power plants to remove the dust from their flue gases (Fig. 1) with its electrostatic precipitators that literally pull the dust particles out of the gas stream by use of electrical forces. But occasion-

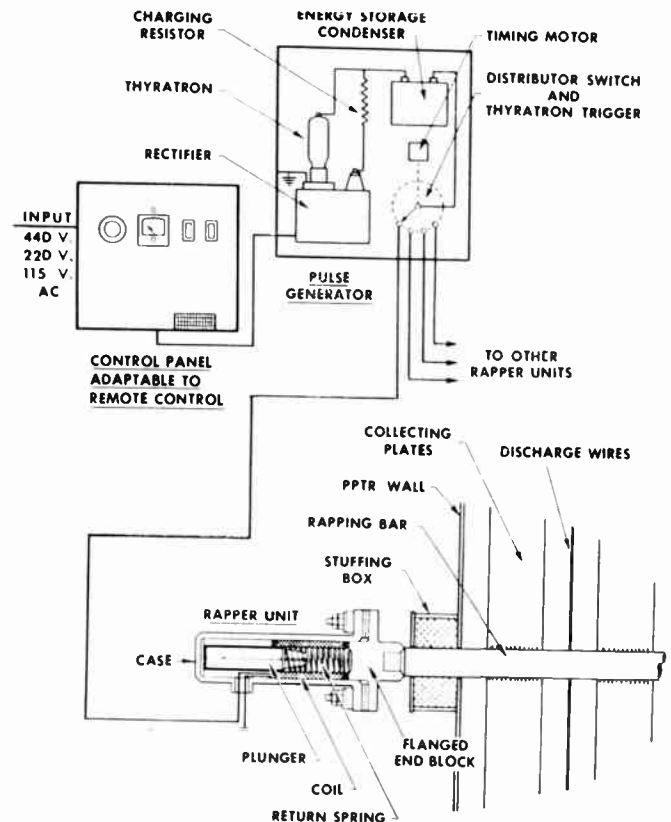
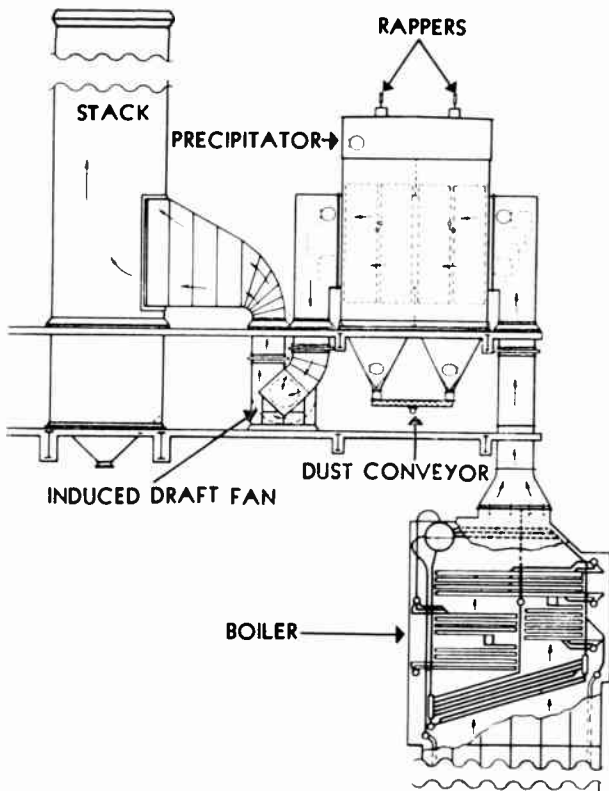
ally the plates on which this dust collected had to be shaken to dump the collected dust into a hopper. This was generally done by giving the collecting plate a periodic, powerful blow with a "rapper". Often this would stir up a local dust cloud which

resulted in a "puff" of fine dust going out of the power plant stacks, which was highly objectionable to the power plant's neighbors. So Research-Cottrell developed a new electronically controlled rapper system (Fig. 2) which provides small, frequent electromagnetically-applied rapping impulses. These impulses continuously remove the collected dust from the collecting plates into a hopper and thus prevent the formation of a thick, collected-dust layer on the plates, which stirs up dust clouds when broken off. The new system thus completely eliminates puffs of dust from the stack.

A considerable problem in the development of the new rapping equipment was the need of producing a hermetically sealed electromagnetic hammer (Fig. 3) that would apply rapping pulses at controlled intervals to the collecting plates and thus produce continuous removal of the accumulated dust from them.

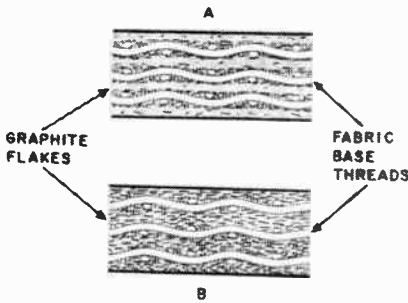
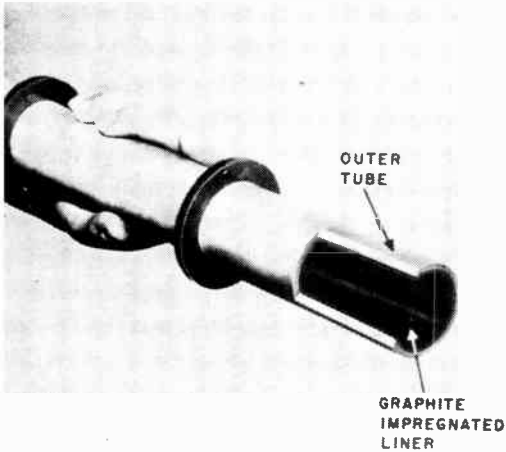
The frequent blows of this sealed-in hammer required that it be lubricated permanently at the time it was built. Also, the housing had to remain air tight despite the frequent, powerful blows of the hammer, to avoid failure of the hammer from accumulations of the everpresent dust, or from corrosion produced by the corrosive flue gases.

Research-Cottrell engineers referred the problem to Synthane Corp.,



● Left: Fig. 1. Electrostatic precipitator system for dust removal. Dust-laden flue gas flows into electrostatic precipitator where electrical forces attract dust particles to vertical charged metal plates, leaving dust-free gas flow out through stack. Right: Fig. 2. Research-Cottrell's newly developed system for

removing dust accumulation from electrostatic dust collector plates into a hopper without stirring up a local dust cloud that goes out through the smoke stack. Secret of the new system is applying small, high frequency "rapping" pulses to shake collected dust from plates before it forms a thick layer.



● (Top) Fig. 3. Sealed rapper unit. Exploded view of rapper shows its functional parts. Left to right: 1) the outside housing, (2) the coil form and coil winding, (3) the plunger, (4) plunger return spring, and (5) end cap. (Center) Fig. 4. Cutaway view of coil form in Research-Cottrell's sealed rapper unit for new electronic rapping system for electrostatic precipitators. (Bottom) Fig. 5. Secret of lifetime lubrication service provided by Synthane Corporation's special process graphite-impregnated plastic laminate. Conventional graphite-impregnated laminate (A), has graphite flakes only near fabric filler, provides spotty location of graphite and permits rapid flake-off of graphite layer with wear.

of Oaks, Pa., a leading producer and fabricator of laminated plastic materials for industry. Synthane devised the following solution. The sealed

hammer housing (Fig. 3) encloses a tubular structure of Synthane, a laminated phenolic thermosetting plastic. This laminated tubing provides the strength to resist the powerful, repeated impacts of a magnetic core (steel plunger) which is pulled powerfully forward every time a current impulse flows in a magnetic coil wound on the outside of the tube. The sudden movement of the steel plunger delivers a hammer blow to the housing's end piece and this blow is transmitted by a connecting rod to the collecting plates, knocking the collected dust from the plates into the hopper below.

To permit the plunger inside the housing to move without friction, engineers lined the tube with a layer of laminated plastic (Fig. 4) which is impregnated with graphite. The lubricating effect of the graphite permits the hammer plunger to slide back and forth with very little friction, thus provides built-in lubrication from the beginning to the end of the life of the sealed hammer or "rapper" unit.

Plastic Production

Ordinarily laminated phenolic plastics are produced by a standard process which consists of dissolving the plastic resin in a solvent, then impregnating a cloth with the dissolved resin. The solvent is then driven off by heating, leaving a cloth impregnated with resin. Sheets of this impregnated cloth are then put together in a stack or book which is cured under heat and pressure. In this process the resin polymerizes, producing a solid, hard sheet of plastic laminate with a cloth core to give it tensile and impact strength.

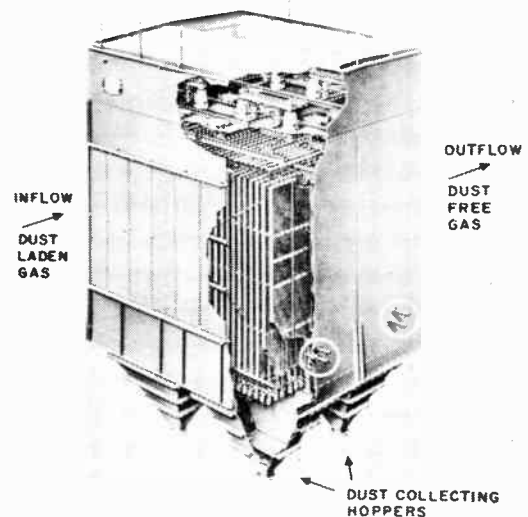
Producing a plastic laminate impregnated with graphite to reduce friction can be done by coating the resin-impregnated cloth with graphite flakes, then laying these flake-covered sheets together and subjecting them to heat and pressure to cure the resin. However, this results in a plastic laminate in which the graphite particles are concentrated in a thin coating on each side of the cloth (A, Fig. 5), thus providing a "spotty" lubrication effect. Furthermore, the graphite particles readily flake off so that their lubricating effect is quickly lost from the laminated plastic material. However, by a special process, researchers achieved a laminated plastic (B, Fig. 5) in which the graphite flakes are dispersed homogeneously through the entire thickness of the laminated plastic sheet. Moreover, the graphite flakes are securely bonded into the plastic material, and so do not flake off after a little wear. Instead, the graphite particles remain built into the laminate, and so provide continuing lubrication even as the laminate wears down. Therefore the lining of graphite-impregnated laminated plastic provides dependable lubrication for the life of the

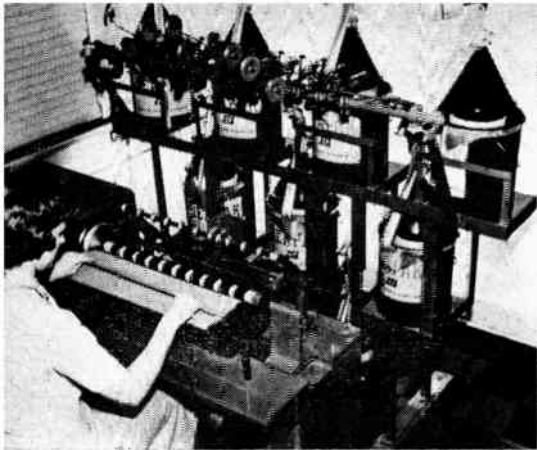
rapper, and the rapper can be built as a sealed unit.

Engineers have found that the sealed rapper units using the graphite-impregnated plastic have given such troublefree service that none of the units produced has ever had to be unsealed, despite the fact that in each one the magnetic core "hammer" may move back and forth as often as 1 to 6 times a minute, or 1440 to 8640 times a day for years at a time. And these units have given the same trouble-free service not only in power plants, but also in gypsum, iron cupola, open hearth iron ore sintering, and many other applications.

In fact, so successful have these sealed units been that engineers believe graphite-impregnated plastic material may be the key to many similar problems where an electro-mechanical actuating mechanism must be provided with built-in lifetime lubrication so that it can have long operating life in dust laden atmospheres. To put it in their own words. "Since the rapper units may operate in dirty, corrosive, or moist atmospheres and must perform with an absolute minimum of maintenance, it was necessary to provide hermetic sealing with a permanent, dry-type lubrication. An eminently satisfactory solution to the lubrication problem was obtained with a bonded coil-form inner liner of graphite-impregnated phenolic material. This method has advantages of simplified assembly, few rejections, and low unit cost, combined with excellent performance."

● Fig. 6. Cutaway view showing arrangement of dust collecting plates in Research-Cottrell's electrostatic precipitators, and magnetic impulse rappers (circles) which provide small, frequent pulses that produce continuous removal of dust from plates into hoppers. Improved system eliminates dust clouds formed by earlier systems.





● A coil winding machine taking wire out of steel pails is shown here in operation. Each pail replaces approximately 10 small spools, resulting in a great reduction in down-time due to changing spools, rethreading the machines and joining the wire.

ACCORDING to C. K. Hubbard, a general manager of Jones & Laughlin Steel Corporation's Container Division, the use of the steel pail as a wire container results in manufacturing economies, simplifies material handling, eliminates a complete bookkeeping phase, and makes a package that provides superior protection against transit and storage damage for the wire itself.

The steel pail is being used with outstanding success by Rea in its packaging of magnet wire.

Magnet wire is the fine-drawn, film-insulated copper wire used in devices such as transformers, motors, generators, solenoids and coils which use an induced magnetic field.

Past practice has been to put the finished wire on spools of various sizes. These spools were shipped to the customer in cases. However, this has many shortcomings.

The size and capacity of the spools are limited by the tensile strength of the wire itself, since the wire is used to rotate the spool when it is taken off the spool in the customer's operation.

The small capacity of the spools means that the winding machines at the wire-user's plant are shut down frequently in order to load them with full spools of wire.

The wire pail reduces machine down-time tremendously. A six-inch

● The capacity of a steel pail is evident in this photograph. The steel pail on the left holds 100 pounds of magnet wire, as much as is held by 10 of the six-inch spools on the right; one and a quarter as much as the 12-inch spool holds, and 20 times as much as the 4½-inch spool.



A steel pail has solved three of the most troublesome problems in the magnet wire industry — packaging — shipping and de-reeling. The enthusiastic reception of this new wire container by manufacturers is an indication of its further application as a package for wires of all types.

Magnet Wire Industry Problems Solved By Use Of Steel Pails

spool holds 9 to 10 pounds of magnet wire. The steel pail holds 90 to 100 pounds. The use of the wire pail results in a 90 per cent reduction in down-time for each 100 pounds of wire used. Since many winding machines use several hundred pounds of wire in an eight-hour shift, the time-saving and economy are considerable.

The wire pail also eliminates the need for expensive, highly-polished cast spools and some complicated bookkeeping associated with the handling of these spools. These spools require a deposit by the customer which is refunded when they are returned. After being returned they must be inspected and reworked if damaged.

In contrast, the new steel pail, manufactured of 26 gage steel, is in itself an extremely rugged shipping container while its cost is such that it may be used as a no deposit, non-returnable item. The manufacturer has perfected a way to make the welded seams of the pail perfectly smooth, providing an inner surface which cannot injure the delicate insulation.

In addition to eliminating the book-keeping expense, the steel pail also releases capital previously tied up in spool deposits by the customer for more productive uses, and the wire manufacturer eliminates the cost of spool investment, inspection, and maintenance.

Since the wire pail uses an entirely different principle than the conventional spool, wire can be de-reeled from — that is, taken out of — the pails at amazing speeds.

The heavier sizes of magnet wire have been de-reeled from the pails at speeds up to 5,000 feet a minute. To facilitate de-reeling at speeds in excess of 2,000 feet a minute, Rea has developed a device which they make available to their customers at cost. It consists of a metal or plastic cone with a nylon guide. This can be attached easily to a pail, making it readily usable with any type of

winding machine with little or no modification.

The new steel pail, which bears the trade name of JAL-PAK, has a deep-drawn bottom which accommodates a fiber core around which the wire is coiled. It is offered currently in sizes of from 2½ through 7 gallon capacity.

The pails are equipped with metal bails and wooden grips to facilitate handling. The design also permits safe stacking which is an advantage wherever storage space is limited. This feature, for example, makes it possible for the Rea Magnet Wire Company to palletize its shipments. Pallets of 18 pails, totalling 1800 pounds, are strapped together and efficiently loaded by fork truck into trailers. The pallets are unloaded in the same manner at the customers' plants.

● This is the steel container, which has met with such wide approval among the company's customers. The top and bottom of the pail have a deep draw which accommodates a seven-inch-diameter fiber core. The wire can be de-reeled from the containers at tremendous speeds, as high as 5,000 feet per minute.



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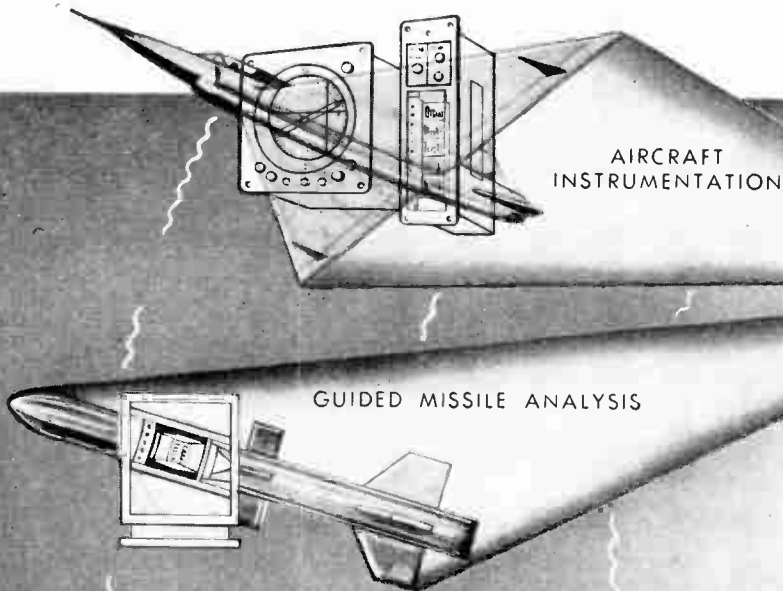
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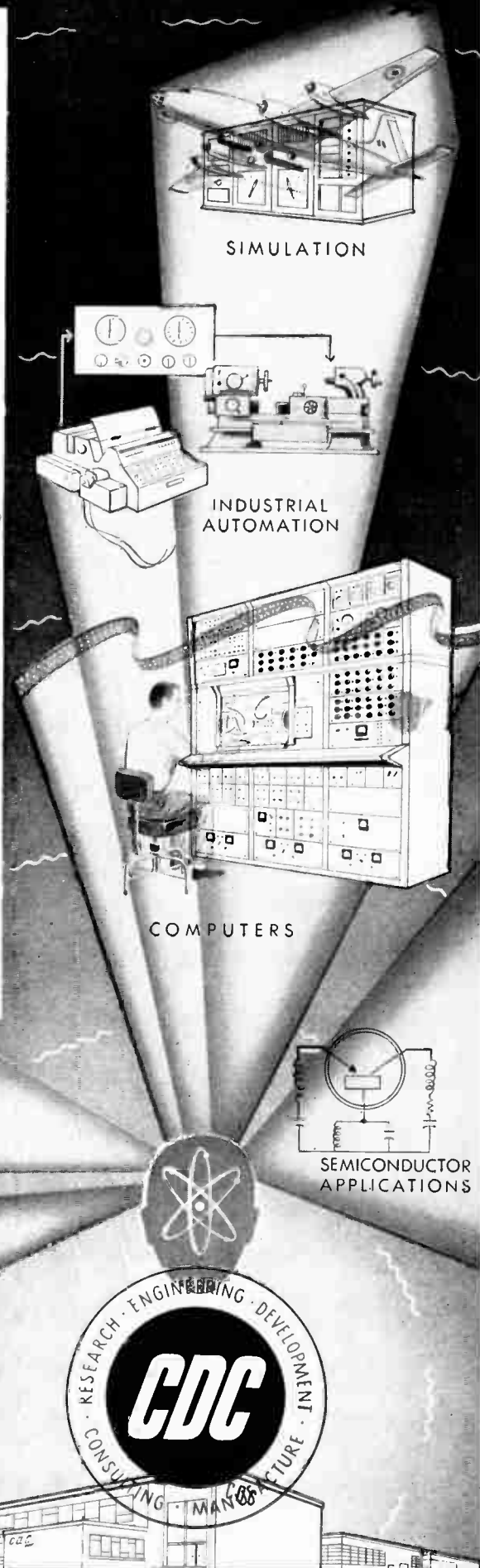
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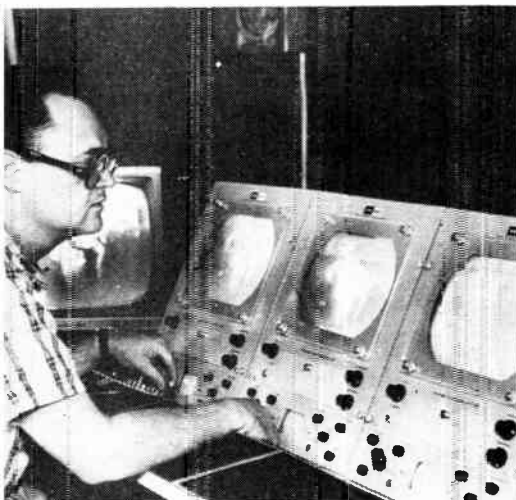
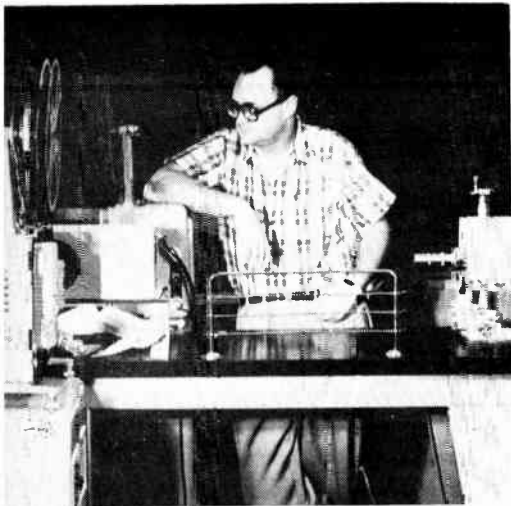
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A low cost (\$70,000) low power (150 watts) completely remote controlled television station which is operated with a staff of only one technician per shift may hold the answer to the economic problem of . . .

Small Town TV

THE first "one technician per shift TV" installation in the nation has been in operation at KSHO-TV for the past ten weeks on a 24-hour per day schedule. First in the nation to operate on an around-the-clock schedule seven days a week, KSHO-TV is transmitting both live shows and film programs to residents of Las Vegas and Henderson, Nevada. The station has a crew of only four technicians — one for each shift plus a chief engineer.

All equipment, including cameras, are remote-controlled from a small master console. The operator can change focus and lenses on the cameras, start and stop the film chain, adjust the lights, monitor and switch audio circuits, adjust picture quality and perform the other technical work that, in high power stations, requires crews of a dozen or more men.

KSHO-TV is equipped with three Kay Lab model 1985 B camera chains: one live studio chain, one remote-controlled live chain, and one film chain. A master console containing all of the remote controls is the heart of the operation.

Operating with 150 watts power, the station has an effective radiated power of 436 watts, transmitted through a 4-gain antenna 240 feet above ground, from atop the new 15-storey Hotel Fremont in Las Vegas. The signal is fed into the antenna system through a 400-foot line.

Primary coverage area is a radius of 15 miles. Programming is both live and film, with emphasis on the latter in six-hour blocks.

KSHO-TV has solved the problem of maintenance by installing two transmitter units, which are used alternately. In practice, the shift

technician's time is taken up in large part with threading film projectors, and loading slide projectors.

The transmitter is said to be the answer to those who have wondered how small towns can have their own live television transmitters.

The investment required for such a station is estimated at only a fraction of the amount required to construct and place a high-power station on the air. This lower initial cost, plus the reduced costs for manpower, can be reflected in rates well within the economic means of businessmen and merchants in the smaller communities.

KSHO-TV's rate card goes as low as \$6 per spot, as against the \$50 or more for the higher-power stations and public reception has been good. As the only station operating around the clock in a city that has a large number of night workers, the audience — even in the wee, small hours — is big enough to pay-off economically.

According to the manufacturer this low-cost, low-power package also holds exciting possibilities for educational television. Cost of installation and operation is claimed to be well within the realm of possibility for many city school systems that have been frustrated by the high cost of installing high-power stations.

"The complete remote-controlled studio and transmitter of KSHO-TV is a logical development from the earlier pioneering work of the manufacturers in commercial and industrial TV, and one which they believe holds the exciting possibility of bringing live television to areas of the nation which, heretofore, have been by-passed or neglected because of the cost.

- (Top) About twenty-two of the 24 hours of KSHO-TV's daily programming are turned over to films, projected through film chains.
- (Second from top) This television camera in studios of KSHO-TV, Las Vegas, is completely remote operated by a technician in the master control room who can change lenses, focus and angle by turning a dial.
- (Third from top) KSHO-TV's operations manager studies the station's picture quality on a video line monitor in the master control room of the Las Vegas station.
- (Bottom) Operations manager of KSHO-TV, Las Vegas the nation's first completely remote controlled commercial television station, at the remote audio-video controls.



All over Canada progressive telephone companies have found a new, effective way of building revenue.

They rent additional P-A-B-X equipment to their subscribers . . . to local institutions and business organizations. Telephone men find P-A-B-X rentals bring in the most profit, and build goodwill too!

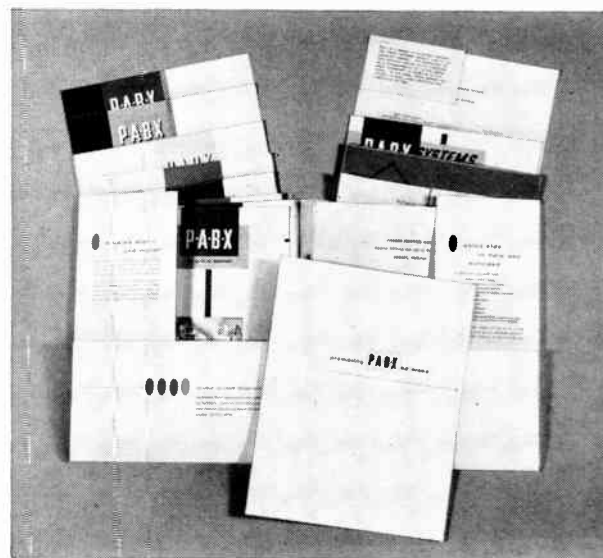
P-A-B-X . . . LARGER PROFITS

P-A-B-X provides all the telephone facilities necessary in modern business. And they are engineered for large (unlimited capacity) and small (10 lines or less) installations. Through one switchboard and any desired number of telephones P-A-B-X gives the following automatic services:

- (a) *Automatic "inside" service.* Provided without an operator, simply by dialling direct the number of any desired inside station.
- (b) *Public exchange service.* Outgoing calls may also be made direct. This may be modified so that toll calls (for example) are made by or under the control of the operator.
- (c) *Special services.* P-A-B-X offers your subscribers a wide choice of special services not possible with a manual system. Among these are Night Transfer Service, Code Call Service, Public Address Cut-In, Paging Telephone, and many others.

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FOR TELEPHONE COMPANIES



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AUTOMATIC  ELECTRIC

ORIGINATORS OF THE DIAL TELEPHONE



A New Method For Obtaining Critical Flatness And Parallelism For Production Lapping Of Thin Crystalline Semiconductor And Piezo Electric Materials

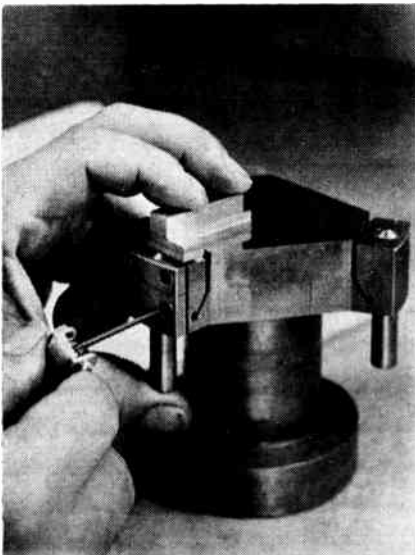
CONSTANT demand for new electronic devices to cope with a broadening horizon of applications continues to push present manufacturing techniques to the limit. This has led to the grinding, lapping and polishing of Germanium, Silicon, Quartz, Barium Titanate and Lead Zirconate to wafer thickness of only a few thousandths of an inch.

By

FORREST E. LAYTON

Crane Packing Company

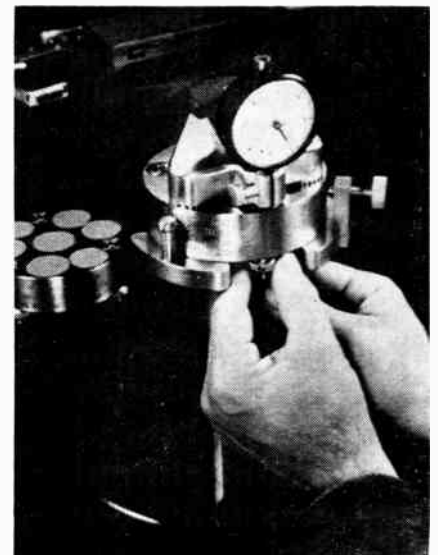
is fed by hand and drains through holes in the upper lap plate. Periodic transposing of the crystals in the carriers becomes necessary to achieve parallelism. Planetary lapping machines will hold from 3 to 80 blanks, depending upon their size. Periodic replacement of carriers, adjustment of the lap plate carrier support rings and reconditioning of lap plates by



● Fig. 1. Preliminary setting of diamond points on triangular shaped fixture used to produce thickness control to microinch accuracy when necessary.



● Fig. 2. Final setting of diamond point to microinch accuracy.



● Fig. 3. Typical germanium lapping fixture being set to an accuracy of .0001\".

As thickness approaches .005 to .002 of an inch, flatness, parallelism and surface finish become correspondingly critical in their operational effects on the finished product. On some crystals such as Quartz, microinch control of thickness is necessary. Crystals of the more brittle type such as those of Germanium and Silicon must also be flat, parallel and have scratch free surfaces. With respect to this, wafer thin crystals of the before-mentioned materials can now be lapped to both flatness and parallelism of 10 to 20 microinches, and a new and valuable technique is now available to industry.

As far as is known several types of lapping processes are now being used in the crystal industry. Typical examples are the planetary lap, optical lap, drill press and the stretched carrier type drill press lap.

In the planetary lap, work is arranged in carriers so as to ride over the edge of the lapping surface of both inner and outer diameters. Crystal blanks can be lapped to the thickness of the carrier, usually about .015\" and in some instances less. Crystals or wafers of different styles are accommodated by carriers of equivalent style. Abrasive and compound

external means is necessary to keep the machines at peak efficiency.

The optical type lap employs a single lap plate. It is used, for a large part, in experimental lapping, with a trained technician attending the flat and parallel lap work, as well as keeping the lap itself in condition. Optical type laps will accommodate from 6 to 185 blanks per plate.

With the stretched carrier type lap, work is arranged in a carrier which has been stretched over a stretch ring. It has been used for lapping extremely thin crystals of one half inch or less in diameter. This

machine usually handles from 8 to 20 blanks simultaneously. Even though this machine is simple in construction an operator must contend with a fair percentage of broken crystal blanks, as the process is not foolproof. If one or more crystals break in a carrier nest, scratching on adjacent crystals in the machine will usually be encountered. Periodic reconditioning of the lap plates by external means is needed to keep the lap plates flat.

The new method of obtaining critical flatness and parallelism involves the "John Crane" Lapmaster and a double lapping technique. With the use of the Lapmaster and its patented conditioning ring feature, flatness of the lap plate is assured at all times, since other conditioning methods such as truing plates and diamond dressing tool are completely eliminated.

The first side lapping operation is done with a standard pressure plate flattened to approximately 2 light

thickness. For microinch setting accuracy, a Swedish Mikrokator comparator gage is used (see Figure 2). For a tenth of thousandth setting accuracy, a dial indicator type setting fixture is used (see Figure 3). The diamond points, being extremely resistive to aluminum oxide abrasive, act as positive stops — thus predetermining the lapping operation to the limit set, whether or not the machine is turned off.

Work under the new method is being done on both the 12" and 24" model Lapmasters. The only deviation from standard is the use of an unserrated lap plate to prevent snagging of the diamond points.

In the "first side" operation, crystals or wafers are waxed or lacquered to a pressure plate. A 24" Lapmaster pressure plate will accommodate about 300 one-half inch diameter blanks. Using one machine with three plates, up to 900 blanks can be lapped simultaneously. Lapping can be

quired, this can readily be achieved by means of a special polishing operation on a polishing Lapmaster.

After completing the "first side" lapping operation, the pressure plate and waxed on crystals can be cleaned in an ultrasonic cleaner which will remove all grains of abrasive. The pressure plate with crystals still attached can then be placed in the polishing Lapmaster for the required 10 to 15 minutes to produce a finish in the range of .1 to .5 microinch.

To polish the "second side" of the crystals, the diamond stop points are retracted and cleaning is repeated as was done on the first side operation. The polishing step can then be repeated as was also done for the first side operation.

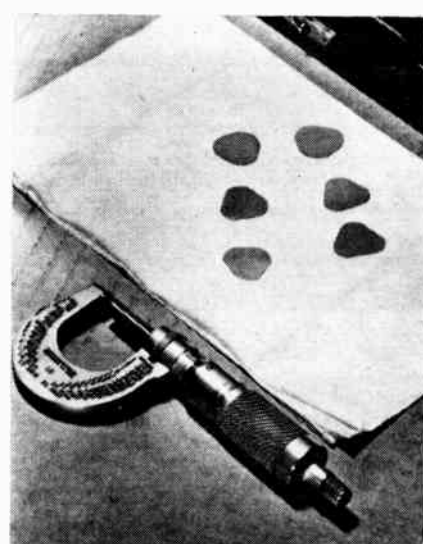
Crystals of Germanium, Silicon and Quartz have been lapped and optically polished to a thickness as low as .001" and parallel within .0001". Thickness tolerance can be controlled to .0001" on these very thin crystals.



● Fig. 4. Diamond fixture with germanium wafers attached being placed on Model 12 Lapmaster for final side lapping operation to a thickness of .003" \pm .0005".



● Fig. 5. Component parts of Diamond Lapping Fixture.



● Fig. 6. Average size and shape of typical germanium wafers.

bands (24 millionths of an inch). The second or final side lapping operation introduces a development known as a "diamond fixture" a patent of the Crane Packing Company (see Figure 1). This is a steel plate usually triangular in shape, the mounting surface of which is lapped to a flatness of 2 light bands or better. Preset diamond stop points at each corner limit the travel of the fixture during the lapping cycle. By means of a special adjustment working in conjunction with a suitable setting fixture, the diamond stops can be set to the desired crystal blank finish

carried down until sufficient material has been removed from the first side of all blanks.

In the "second side" or finish operation, the blanks are removed from the pressure plate and transferred to the diamond fixture for finish lapping. The actual process for final lapping is to clean the blanks after removal from the pressure plates and then wax down the first finished side of the blanks to the preset diamond fixture (see Figure 4). Special waxing and cooling techniques assure proper wax thickness control.

If polishing of the blanks is re-

After years of study by the laboratory staff of Crane Packing Company, it is the opinion that a waxing or lacquering down technique is the most foolproof and economical process to use for the production lapping of materials such as Germanium, Silicon, Quartz, Barium Titanate and Lead Zirconate. The capillary action of fluid wax during the hot stage of waxing permits complete encirclement of each wafer and blank and eliminates the possibility of small chips breaking off of a wafer or blank and causing scratching during the lapping cycle.

An actuating mechanism capable of advancing as little as .000,001 inch at a time promises to revolutionize a large part of the metal working industry where precise fit requirements have, for years, demanded selective mating of components to compensate for machine inaccuracies.

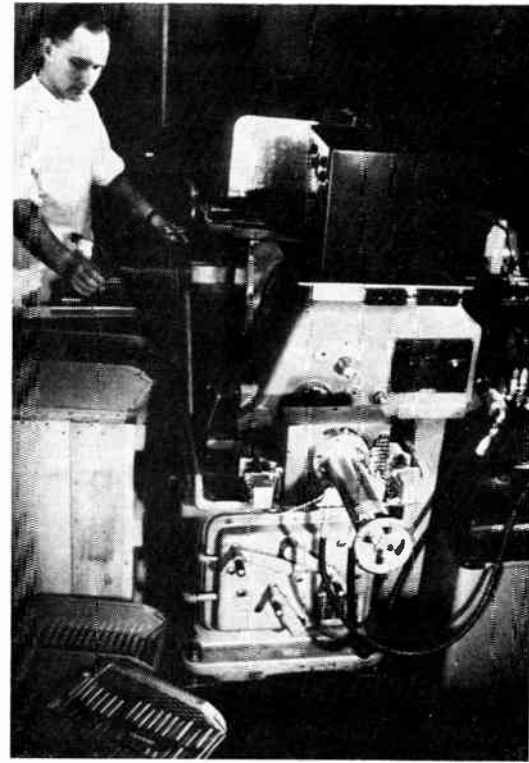
Electronic Control To Millionths Of An Inch

A LINEAR actuator has been developed to fulfill the needs of industry for a powerful feed mechanism that is accurately controllable in the range of microinches. It is a logical successor to the lead screw in all mechanisms requiring microinch (.000,005" to .0001") dimensional control and has found its first large-scale application in the machine tool field, replacing the lead screws in centerless grinders producing precisely finished hydraulic components.

The name Inchworm has been applied to this revolutionary actuator, not just as an unusual title, but rather as a description of operation — the Inchworm literally steps along (in

microinch steps), expanding and contracting like its familiar green namesake. Employing a physical phenomenon called the magnetostrictive effect, the armature of the motor shrinks under the influence of an electromagnetic field, snapping back to original size when the magnetic field is de-energized. A pair of clamps co-operating with the armature convert the expansion and contraction undulations into forward or backward motion, reversing on demand without backlash.

Present day work tolerances require machine tools with cutting surfaces that can be positioned accurately with respect to the work hold-



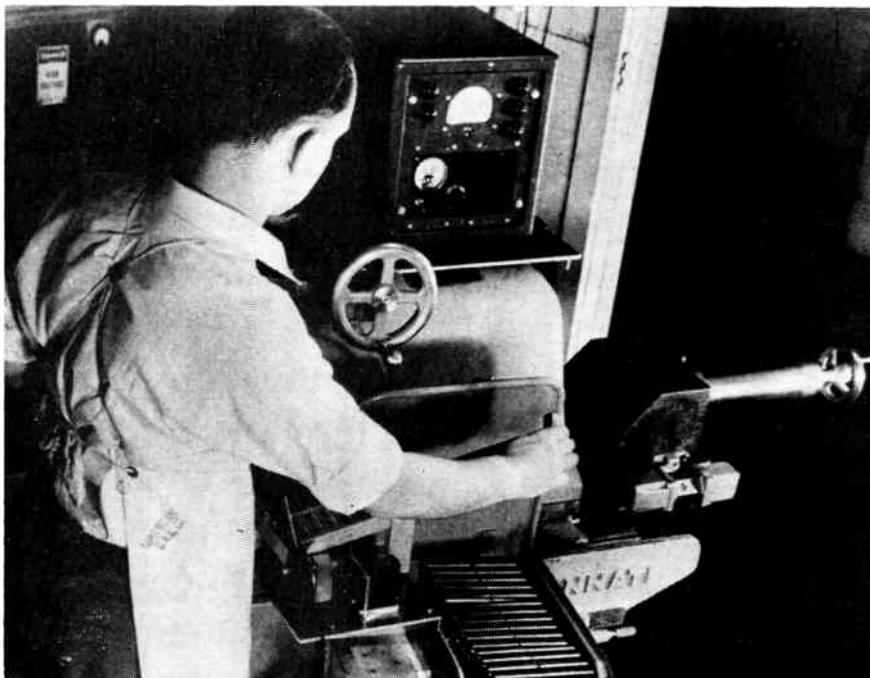
● Grinding piston pins for Ford at the pilot run plant of Airborne Instruments Laboratories Inc., Mineola, L.I.

ing system. To avoid vibration problems and make a very rigid system, the machine tool generally becomes very massive. The cutting tools are generally mounted on a heavy member which slides on accurate ways which are formed as part of the machine bed. These ways or slides possess a phenomenon known as stick-slip. Stick-slip is the characteristic of a larger force being required to start two members sliding with respect to each other than the force required to maintain a slow, steady state velocity between the members. This phenomenon must be overcome or reduced to controllable limits before positioning in the millionths-of-an-inch region can be accomplished.

The Inchworm actuator has brought the stick-slip problem under control to the extent that the minimum increment of slide motion in typical installations has been reduced by a factor of 15 through Inchworm replacement of conventional feed mechanisms. These installations have consistently repeated to an accuracy ± 5 millionths of an inch under machine load conditions requiring a break-loose force of 300 pounds and a sliding force of about 220 pounds (Cincinnati Milling Machine Co. flat bed No. 2).

The Inchworm Motor is a linear actuator which produces a controlled increment of relative motion between its two moving parts. To provide relative motion between two bodies,

(Continued on page 38)



● Front view of the control panel in the Piston Grinding operation.



TWO-WAY RADIO ASSISTS IN UNIQUE RESCUE OPERATIONS

Installed in two fast boats, PYE 2-way Radios provide reliable communications for the Trafalgar-Oakville Water-Air Rescue Force — an organization that saves many persons from water graves in Lake Ontario.

This volunteer organization — the only one of its kind in Canada — covers 16 miles of Lake Ontario waterfront, from Burlington to Clarkson. During the summer months, patrols are maintained each evening and 24 hours a day on week-ends. With more than 125 members taking duty turns TOWARF is on immediate call at all other times. In addition to the two fast, radio-equipped boats, carrying all the latest equipment for water rescue work, two seaplanes are maintained by the force. Receiving several calls each week, TOWARF is performing an outstanding public service and is credited with saving many lives.

Gord Clark, Search Master, says—"Radio has been of tremendous assistance in our operations and the Pye units we installed are giving outstanding performance, without expensive maintenance."

Pye 2-way Radio can be of real assistance in your community too. Let one of our consulting engineers explain how Pye can supply fast efficient communications at low cost.

Manufacturers and engineers of H. F., V. H. F., U. H. F. radio systems, telephone apparatus of all kinds, scientific instruments, industrial and commercial television cameras, marine radio-telephones, fish finders and depth sounders.

COMMUNICATIONS DIVISION



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AREA OFFICES
193 E. Hastings St., VANCOUVER
1191 University St., MONTREAL
78 Bank St., OTTAWA
3 Duke St., HALIFAX



Fred Oliver, police chief of Trafalgar Township and commander of TOWARF, uses PYE 2-way radio installed in fast launch.

Increases in air traffic and the expected introduction of turbo-jet operations in the next few years have emphasized the need for improving aeronautical communications both between aircraft and ground stations and between one ground station and another. The need for such improvement has become particularly noticeable in the North Atlantic and has led to a

Need For Better Telecommunications

ICAO Bulletin

DURING the year, trials have been in progress in the North Atlantic areas using two new methods of securing better communications between aircraft and ground stations. One of these methods is to site ground stations very close to the seacoast and to use the highly efficient transmission of radio waves over sea water to obtain reliable signals on board the aircraft up to distances of 500 to 600 miles. The second method is to use very high radio frequencies and, by siting the ground stations at suitable locations and beaming the transmissions, it is possible to obtain reliable ranges of from 200 to 250 miles at normal flying heights. By means of a combination of these two methods, it should be possible in future to provide for reliable communications at all times between aircraft and ground stations in most parts of the Atlantic area.

Both methods normally require the ground stations to be located at some distance from the main communication centers, so that landlines or point-to-point radio links between the stations and the centers are necessary. It is, however, possible to operate the stations by remote control from the main centers with only occasional attendance of maintenance staff at the stations themselves.

In addition to the need for better airground communications, experience during the last year has emphasized the need for better and more rapid communications among air traffic controllers. Unless such means of communication are available, unduly large separations between aircraft must be maintained, with the consequence that flights must often be delayed to provide such separations. The basic need is for

direct and immediate telephone communication between controllers in adjacent areas.

Provision of the needed communications presents a real problem, both from a technical and economic aspect, when the areas to be linked are widely separated. However, recent developments in new methods of using radio transmissions of very high frequencies may offer a solution of this problem on a reasonable basis and, in addition, provide more efficiently for other operational services. It seems likely that this new method of providing for radiotelephone communications between controllers and others will appear in future regional plans where the density of air traffic has given rise to acute air traffic and operational control difficulties.

Experience during the year has also emphasized the need for improved provision for the transmission of meteorological information, both between ground stations and between ground stations and aircraft. Much of the information required by aircraft is supplied on request from pilots or on the initiative of ground personnel, using the normal airground communication channels; some is provided by meteorological broadcasts. The volume of communication is large, and in some instances the capacity of the communication facilities available is severely taxed.

During the year, steps were taken to seek an alleviation of the problem in the North Atlantic by initiation of a project to provide radio teletypewriter broadcasting stations, one station at Halifax (Canada) and the other in the United Kingdom. These stations should be capable of providing reliable signals at all points on the

principal North Atlantic routes, and aircraft with teletypewriter receiving equipment should be able to receive automatically in printed form all transmissions made. This method of handling meteorological and other information not requiring response from an aircraft may prove to be of major importance in alleviating the airground communication problems in other areas where the problems are rapidly becoming acute, and some degree of standardization by ICAO may become necessary in future in order to ensure that airborne teletypewriter equipment will be able to receive such signals from any station transmitting these broadcasts.

In the field of radio navigation aids, developments during the year have been mainly with respect to long-range facilities. Development of the systems which the Council had already noted as offering promise has continued, and full operational evaluations may be expected in the course of the next year. One of the new systems (Dectra) is likely to be installed by the United Kingdom on a trial basis for operational evaluation on North Atlantic routes between Newfoundland and Northern Europe.

A notable development in navigational science was the encouraging results that have been obtained with equipment for inertial navigation — a system which does not depend on any communication with the ground, or require any observation of external bodies such as the sun or stars, but is entirely contained within the aircraft and determines the aircraft's position by analyzing its accelerations. The date when inertial navigation might be ready for use in civil aviation, however, can hardly be foreseen as yet.

Never before... Duplexing and Break-In Without Relays

NEW!

Northern Radio

DUPLEX TELEGRAPH SYSTEM

For Multi-Channel Tone Equipment



Dual Duplex Selector Panel,
Type 200 Model 1.S.

NEW!

Simple 4 position switch selects from 12 possible duplex combinations.

NEW!

Duplex operation between stations connected via carrier telegraph channels.

NEW!

All-electronic, without relays or moving parts to wear.

NEW!

Polar or neutral for either half duplex or full duplex.

NEW!

Break-in now also possible for all half-duplex circuits.

NEW!

Provided with positive feature to prevent space signal lock-out.

NEW!

Includes individual line battery for each channel.

The Northern Radio Duplex Telegraph System consists of one each Dual Frequency Shift Tone Keyer, Type 153 Model 3; Dual Duplex Selector Panel, Type 200 Model 1S; and Dual Frequency Shift Tone Converter, Type 152 Model 3. The Frequency Shift Tone Keyer and Converter are our latest improved Model 3's, specifically designed for use with this system.

The Dual Duplex Selector Panel makes possible complete duplexing and break-in operation of a Northern Radio or similar multi-channel Frequency Shift tone telegraph system. Such a system meets the requirements of any standard telegraph line or terminal apparatus for either full duplex or half-duplex operation. Because this system is all-electronic, it meets all speed requirements and yet has the flexibility and isolation heretofore possible only with relays.

The Front Panel Switch rapidly selects half-duplex and/or full duplex mode of operation for any of the 4 standard loop options available from the 12 loop options in the Dual Duplex Selector Panel.

The Dual Duplex Selector Panel provides 12 loop options, patching facilities for monitoring purposes and channel routing, including the possibility of patching-in another teleprinter loop circuit (T-junction). Any of the 12 loop options are available and may be selected for the Loop Switch by simple strapping arrangement. It has an individual line battery for each channel for greatest circuit flexibility. Battery and line fuses are also provided for maximum protection.

The Dual Duplex Selector Panel is provided with positive non-lockout features. An accidental "spacing" of the line, even over prolonged periods of time, such as caused by patching errors, will not lock the system into a permanent space (no loop current) condition. The system will instantly be ready to operate as soon as the fault is removed. This is due to a novel arrangement of the internal batteries which at all times can provide power to the telegraph loops.



PACE SETTERS IN QUALITY COMMUNICATION EQUIPMENT

NORTHERN RADIO

MANUFACTURING COMPANY LIMITED

1950 BANK STREET, OTTAWA, ONT.

In U.S.A. Northern Radio Company Inc. 147 West 22nd St. New York 11, N.Y.

For completely up-to-the-minute news coverage operating personnel of radio station CKRC, Winnipeg have taken to the road in a mobile take-apart radio station.

Tea-Wagon Transmitter

A 50-watt FM transmitter mounted on a "tea-wagon", along with "walkie-talkies" and a tape recorder assembly in a roomy Volkswagen van help keep CKRC (Winnipeg) literally on top of the news.

The fully-equipped mobile news unit permits direct broadcasting or on-the-spot recording of latest news events.

Main feature of the mobile studio is the "tea-wagon" transmitter which can be rolled on ball-bearing wheels to points where vehicles cannot go.

Operated from a six-volt storage battery, the 38.4 MC frequency transmitter was previously firmly mounted in a vehicle for use on outside broadcasts. It was found this limited its usefulness as many big news events happened where vehicles could not approach close enough for effective news coverage.

Not satisfied with this arrangement, CKRC chief engineer A. H. Hooper

built the present "tea-wagon" assembly. The FM transmitter is now completely enclosed in a metal framework on wheels making it entirely independent and extremely mobile. A rugged metal whip antenna completes the unit.

The "tea-wagon" assembly fits snugly into a corner of the Volkswagen van chosen to accommodate the array of equipment. Easily removed bolts hold it firm when the unit is on the move. Actuality broadcasts can be made from the transmitter while the vehicle is parked or cruising about.

The news unit frequently picks up a call from the base control room with instructions to proceed to the scene of a fire or accident. If roads in the area are blocked to vehicles, engineers can quickly unbolt the "tea-wagon" transmitter and wheel it from the low bed of the VW van to a suitable vantage point. The unit is ready



● Comfortably seated inside the mobile studio, CKRC (Winnipeg) engineer Roy Maguire listens to a roving commentator using another "walkie-talkie". Behind him in a corner of the VW van is the completely mobile FM "tea-wagon" transmitter.

for broadcast at the flick of a switch, enabling interviewers to get immediate on-the-spot comment.

Back in the station studio, a receiver picks up the mobile unit which can be switched onto the regular station program for "late flash" news.

An AC tape recorder installed in the mobile studio is useful for gathering material for sports round-ups and similar programs. The AC power for the tape recorder comes from a convertor energized by a twelve-volt supply from heavy duty storage batteries in the VW van.

Half-watt walkie-talkies are used by roving commentators and in situations where broadcasts from two or more vantage points are desired. New high-powered walkie-talkies being brought into service will soon greatly extend the range of transmission.

Although extremely compact, most industrial and taxi-cab two-way units are equipped with carbon microphones with limited frequency range which are seldom up to broadcast standard. CKRC engineers have considerably improved voice quality by building a two-stage amplifier to accommodate the standard broadcast microphone.

A new microphone with a transistorized "pre-amplifier" built into the shell, now coming onto the market, is expected to still further improve transmission standards from portable units.

Contact with the mobile studio is maintained through a station transmitter operated from the main control room. The 60-watt transmitter, working on 38.4 MC, enables the station program director to re-locate the mobile unit and permits the control room to cue the unit for direct broadcast.



● Approaching the scene of a major accident, Roy Maguire, of CKRC (Winnipeg) mobile news unit, is ready to leave the vehicle the moment traffic stops their van-studio.

LINCOLN LABORATORY

50kw UHF SCATTER

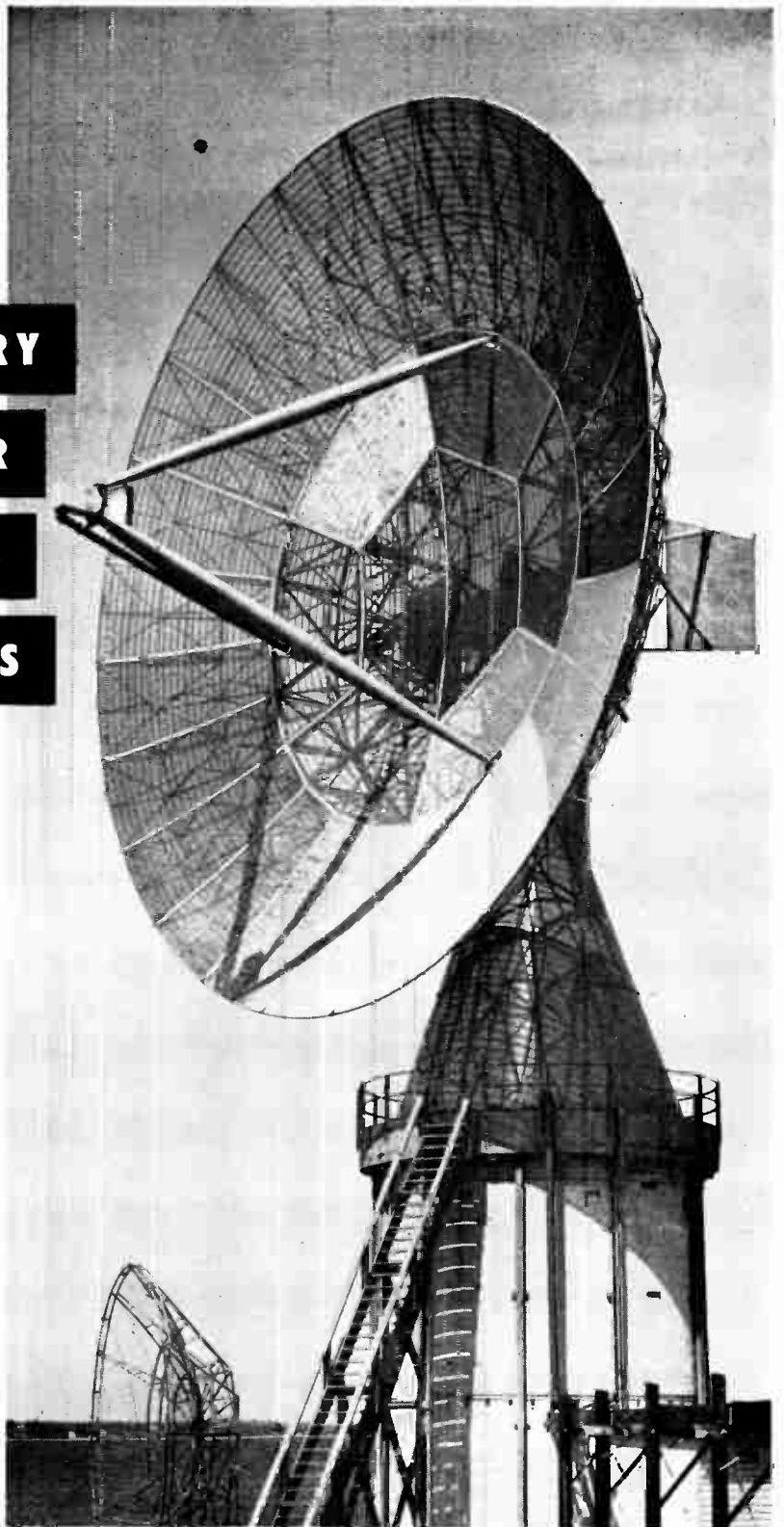
INSTALLATION USES

EIMAC KLYSTRONS

Lincoln Laboratory uses Eimac klystrons again in its 50kw experimental tropospheric scatter installation at Round Hill. As a pioneer in this revolutionary new communication concept, Lincoln Laboratory, of the Massachusetts Institute of Technology, has been instrumental in developments leading to reliable military and commercial scatter networks.

Engineers responsible for advancing the art of tropospheric scatter set forth exacting requirements. Eimac klystrons have met these requirements through each stage of the evolution of high power.

Fourth in a series on the extensive scatter application of Eimac klystrons.



Eimac

**THE POWER
FOR FORWARD-SCATTER**

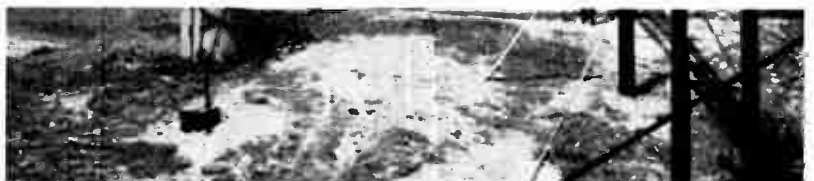
EITEL-McCULLOUGH, INC. SAN BRUNO CALIFORNIA

The World's Largest Manufacturer of Transmitting Tubes

Represented in Canada by

THE AHEARN AND SOPER

COMPANY LIMITED P.O. Box 715, Ottawa, Ontario



Labor Costs Cut 99% In Fruit Packing

AN electronic counting device, the first of its kind, has been developed exclusively for the fruit and nut handling industries. Initial reports indicate a phenomenal 99 per cent saving in labor costs, it is reported.

Two of these systems now at work, known as the Walkirt Pre-Set Fruit Counter process, totally automate production at two major citrus packing plants. One operation, using a seven-unit counter system, is located in Orange Cove, near Visalia, California. The other, an 8-unit system, has been installed for a plant of the Arlington Citrus Growers Association, near San Bernardino.

According to James B. Curtis of Fruit Equipment Service, Redlands, whose firm instigated the development and handling installation of the new pre-set counting systems, a remarkable two-way savings is reported by users in the one month they have been operating. At one plant it is reported that a single operator now does the work of 38, at the elec-

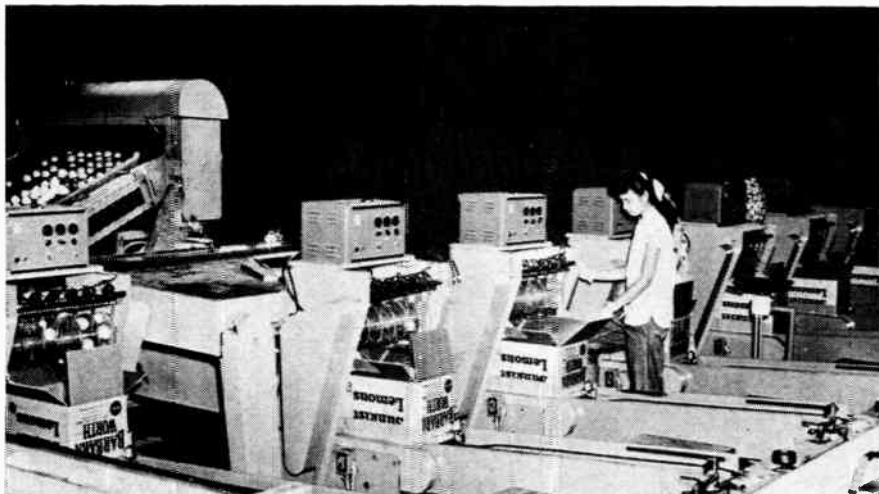
tronically controlled packing bins.

A second savings, the loss of great amounts of fruit due to the necessity to overpack has also been corrected.

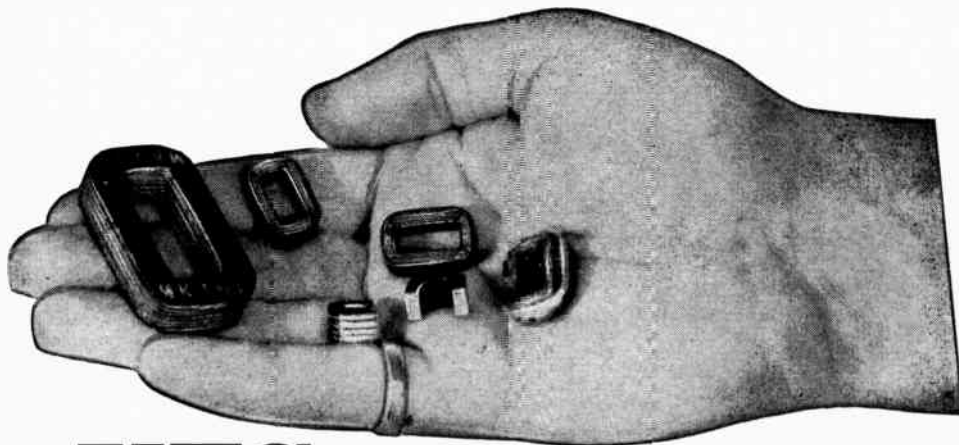
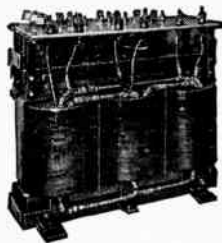
The evolution of fruit handling has

been and still is a costly process for management. The business was started by the hand-packing method wherein an operator picked and wrapped by hand, then boxed by hand at each station. The method of volume filling — a physical shakedown of fruit in the box — has proved unreliable. A further method, weight filling, was also employed by the industry. Its theory was that a given amount of fruit up to a certain weight

(Continued on opposite page)

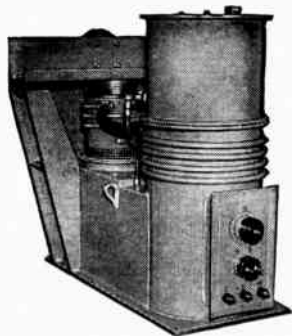


● Electronic counters in operation at a California fruit packing plant.



YES...

No core too small—No transformer too large!



Illustrated above and reading counter-clockwise: HyperCores, Chokes, Power, Pulse, Filament, and Plate Transformers.

565

MOLONEY ELECTRIC COMPANY OF CANADA LIMITED

Factory and Head Office: 213-219 Sterling Road, Toronto 3, Ont., Regional Offices: Montreal, Calgary

For further data on advertised products use page 61.

should weigh so much per box. That method was frowned upon by the Food and Drug Commission, who required that each carton be specified with exact total count of fruit. Because of a \$10,000 fine liability for underpacking, fruit handlers were forced to overpack each carton, to play safe. This process, still employed by much of the industry, is proving an exceptionally costly one.

Faced with these problems fruit packers sought a logical answer in electronics. The outgrowth is the Walkirt Pre-Set Fruit Counter devices. These units, positioned at counter height in the center of each bin, automatically start movement of fruit into box. Dials can be pre-set to any three digit number. When exact total is reached, the counter automatically stops fruit loading equipment, then starts conveyor belt which moves out the filled box. The electronic unit then automatically sets new box into position for filling to prescribed number of fruit as determined by the pre-set dial. These standardized Pre-Set Fruit Counters, are housed in attractive blue wrinkle-finish cabinets. Overall dimension is 17" x 11" x 10". All principal circuitry of the electronic unit is of a plug-in type, recognized for serviceability and ease of maintenance. Units are embedded in tough epoxy resin. Compactness is stressed — total power supply is composed of only ten tubes, including circuitry. The three digit controls on face of unit use glow tube counters and all external control functions plug into the rear of unit which weighs approximately 25 pounds.

According to the manufacturers the units will soon be installed for the handling of shell nuts, particularly walnuts and claims of the manufacturers indicate that the equipment is adaptable to handling any type of non-citrus fruit.

Philco Exhibit For IRE Convention

The Philco Electronic Training Materials which have been used very successfully by the Armed Forces and Industry in the training of electronic personnel will be displayed in conjunction with an industrial television system. The industrial television system will be used to obtain a picture of the people at the exhibit. This picture will then be transmitted through a microwave relay link constructed of Philco Electronic Training Materials. By inserting his hand in the microwave beam, a viewer will be able to remove his picture from the final display monitor.

The transistor display will feature surface barrier transistors having excellent uniformity of characteristics and capable operation at high frequencies (40-60 mc's), as well as the various audio frequency transistors manufactured by Philco.

New Honeywell High Gain Weld-Seal TRANSISTORS



New rugged terminals permit easy soldering of connections without harming the transistor.

New welded case — hermetically sealed for superior ruggedness and durability.



TYPES H5, H6, H7, AVAILABLE NOW!

They're welded! — so you can build new ruggedness and durability into your equipment! And the new line of Honeywell transistors gives you superior electrical performance and high, uniform power gain over a wide range of collector current values. You get long life, outstanding stability and performance. Take advantage of these new and improved transistors now. Mail coupon for full information today!

A COMPLETE LINE OF POWER TRANSISTORS TO MEET YOUR SPECIFIC NEEDS.

	H5	H6	H7
Input Resistance	24-48 ohms	27-54 ohms	30-60 ohms
Power Conductance	17.5-35 mhos	35-71 mhos	71-141 mhos
Current Gain, Median	30	40	60

(for collector current of 2 amps.)

Honeywell



Power Transistors

HONEYWELL REGULATOR COMPANY LTD.
DEPT. EC-TC-8, LEASIDE, TORONTO 17.

Please send data sheet TR-14 on Honeywell Weld-Seal Power Transistor

NAME

FIRM NAME

ADDRESS

CITY PROVINCE

business briefs & trends - - -

★ Senator Warren G. Magnuson, of Washington, chairman of the Senate Commerce Committee states that the committee will recommend the removal of the federal excise tax on color television sets in the United States.

* * *

★ Closed-circuit TV is being found to have infinite applications. A department store recently installed such a system as a silent witness of shoplifting, and it worked, too. In its first hour of operation a theft in the men's furnishings department was averted.

* * *

★ Expectations are that, before 1956 has run its course, almost 10 billions of dollars will have been expended by corporate treasuries in the United States for industrial research. Much of this will have been spent within the respective companies' own laboratories, but each year a larger proportionate share goes to the independent research laboratories whose work supplements that being done by individual companies.

* * *

★ At the International Labor Congress held at Geneva in June it was unanimously resolved that study should be given to the "profound impact" that technological changes are having on the world today. Automation was declared to be "an effective means of providing expanding national economies, rising employment, and higher standards of living for the peoples of the world."

* * *

★ In the eight years ending December, 1956, persons engaged in the rapidly expanding electronics industry will have increased approximately 1,100 times. It is the considered opinion of Eric L. Palin, head of the electronics department of the Ryerson Institute of Technology, that Canada's population is not growing fast enough to support the continued growth of the electronics industry.

* * *

★ Those in a position to know report that there is an acute shortage of electronics personnel in the R.C.A.F. Staff officers, in addition to understanding flying itself, must be equipped nowadays with a sound knowledge of telecommunications, which includes radio, radar, electronic computers and weapons systems.





* * *

★ More than 7,300,000 overseas telegrams, totalling 188 million words, were carried by the radio-telegraph circuits of RCA Communications, Inc. in 1955. A record number of 104,000 international Teleprinter Exchange Service (TEX) calls were also handled.

* * *

★ An aerial tramway is being built this year on Dog Mountain, near Hope, B.C., to provide access to the summit for radiotelephone engineers and construction crews, faced with the task of building and maintaining a relay station for part of the B.C. portion of a trans-Canada microwave system. Of the 13 sites in B.C. ten are located on mountain-tops.

* * *

  	FERRITE COMPONENTS TEST EQUIPMENT VACUUM TUBES
X-521 Backward Wave Oscillator	Leaders in the field of Ferrite components, Cascade Research Corporation introduces a new, more rugged and efficient microwave oscillator.
SPECIFICATIONS: Frequency 8 - 13 kmc Power Output 1 Watt minimum First Anode Voltage (to cathode) 1500 volts Second Anode Voltage (to cathode) 500-1500 volts Beam Current 30 milliamperes Focusing Field 1100 Gauss Heater Voltage 6.3 volts Heater Current 0.6 amperes Estimated Tube Weight (including magnet) 15 lbs.	FEATURES: <ol style="list-style-type: none"> 1. The frequency of oscillation is variable over the entire X-band by the adjustment of the second anode voltage. No mechanical tuning is necessary. 2. The power output of 1 watt makes it ideally suited for microwave measurements, for test purposes and for microwave relay applications. 3. Frequency of oscillation is relatively unaffected by the load. 4. It operates at a nominal 6% efficiency which is better power utilization than can be obtained with most low power oscillators. 5. The tube is of extremely rugged mechanical construction. It is made entirely of ceramic and metal parts. It has no fragile glass parts or precision wound helices.
For Further Information Write To 	MICRO TOWER LIMITED 891 O'CONNOR DRIVE, TORONTO, ONT.

telephone men!

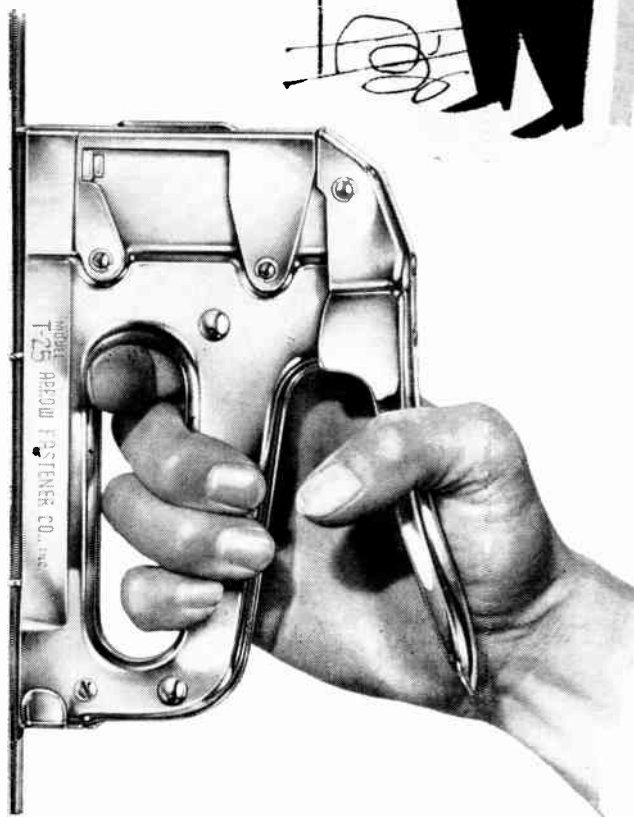
Are old-fashioned inside wiring methods
wasting your time, money and energy?

Arrow gun tackers cut costs up to 70%

The Arrow Gun Tacker shoots staples at least 10 times faster than the old hammer method. This means you can cut up to 70% of your tacking costs. And the cost of Arrow staples is *cheaper* than hammer staples!

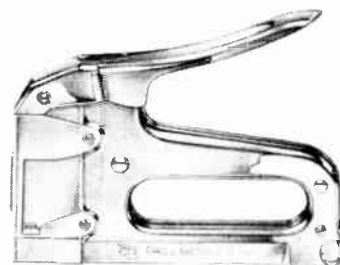
Easy, one-handed operation leaves the operator's other hand free to steady the *object* being tacked . . . instead of the tack. Also, the principal of "double-leverage" insures maximum driving power with a minimum of hand pressure. Maximum handle movement is only 1 inch.

Much safer too. There's no danger of damaging wires or causing short circuits. Built-in groove at the base of the tacker is especially designed to envelope the wire and insure accurate penetration of the staple. And there are no possibilities of accidents with loose staples.



The Arrow T-25 Gun Tacker is equipped with high-power compression springs for easy action and tremendous driving force. It also has a patented non-clogging mechanism, and can be re-loaded in a few seconds. *Yet it costs far less than any comparable gun tacker!*

Call your nearest Automatic Electric office for complete details. Save time and money with the Arrow T-25 Gun Tacker. (Incidentally, Automatic Electric also supply station wire, hooks, brackets. . . . in fact everything for inside wiring!)
Head Office: 185 Bartley Drive,
Toronto 16, Ontario.
Branches in: Montreal, Ottawa,
Brockville, Hamilton, Winnipeg,
Regina, Edmonton and Vancouver.

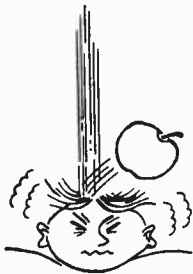


AUTOMATIC ELECTRIC
SALES (CANADA) LIMITED

5646

Origin, Observation and Present-Day Control of "Boingng!"*

This phenomenon probably began long before recorded time and, at present, gives every indication that it is here to stay. First recognition is almost universally credited to the Cro-Magnon man who attempted to describe the combined sound and tingling sensation in his palms after he had laid asunder an enemy skull with his club. His chiseled inscription, handed down to us through the ages and still used today, tells us with eloquent simplicity what he heard and felt — "Boingng!"

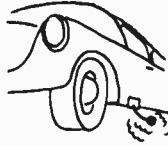


Scholarly minds since then, at odd intervals, have added to the body of scientific knowledge concerning "Boingng!". A Mr. Newton, in fact, added a rather loud, squashy one just prior to the evolving of the

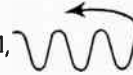
L. of G. (An identical, and somewhat more familiar observation, was made by the operatic team of W. Tell & Son.) It is interesting to note that "Boingng!" has been nearly all things to all men; sometimes with overtones



amorous; at others, with warnings of closeness-to-the-curberous. Without question, our children will enjoy a rich heritage of "Boingng!"someness.



And so, like the axe-wielder, like Sir Isaac, and like the fiend in olive drab, Sigma offers a small — but not unworthy — contribution to the cause of "Boingng!" vs. Relay Efficiency. We have watched it become a national worry, and have heard the voices crying out. Since our policy obviously could not be avoidal,



we chose to make it sinusoidal, with 10 g's to 2,000 cycles our initial goal. The achievement is formally known as the Sigma Series 22 Relay, and basically offers the following: —

SERIES 22 ADJUSTMENTS			
	G	HG	W
Vibration	10g to 300 cps 5g to 2,000 cps	15g to 500 cps	15g to 500 cps 10g to 2,000 cps
Contact Rating	2 amp., (28VDC, 100,000 115VAC operations resistive)	1 amp., 100,000 operations 25,000 operations)	1 amp., 100,000 operations (2 amp., 25,000 operations)
Sensitivity	SPDT ("C") 20 mw. DPDT ("CC") 40 mw.	20 mw. 40 mw.	40 mw. 80 mw.

Those having applications in which "Boingng!" levels reach wrenching shudder proportions are welcome to printed data on the new 22's.



ELECTRONIC CONTROL

(Continued from page 28)

each body is connected to one of the Inchworm parts; either part can be stationary depending upon the particular application. A very rigid connection between the members is accomplished because no lead screws, split nuts, or bearings are in the path of force transmission. In addition, since no lead screw is employed, there is a positive improvement in the system spring constant due to elimination of the torsional strain factor customarily introduced by the lead screw member. The resultant system is extremely rigid, yet reversible and free of backlash. It enjoys the benefits of anti-friction design and freedom from the wear inducing lost motions encountered in oscillatory or vibrating systems.

The Inchworm lends itself well to the automation trend in the machine tool field in that it will, through a simple converter, respond directly to gage signals. In this manner, machines may be made continuously responsive to tool variations as well as material hardness variations and the many other variables that enter into precise machine finishing.

The Inchworm Motor promises to revolutionize a large portion of the metals working industry where precise fit requirements have, for many years, demanded selective mating of components to compensate for machining inaccuracies. The components can now be manufactured to the precise dimensions required. Elimination of the selective fit requirement opens the door to automatic assembly and the many economic advantages known therein to lie.

Canadian Admiral Enters Industrial Field With New Electronics Division

Stuart D. Brownlee, executive vice-president of Canadian Admiral Corporation Ltd., recently announced the formation of an electronics division. The new Canadian Admiral Electronics Division will be devoted to research development and production of electronic products outside the home entertainment field, including the industrial and military application of electronics.

The new Canadian Admiral division will be headed by Len Irvine. Mr. Irvine has been with the Canadian Admiral engineering department for the past four years. Before joining Canadian Admiral he was with the Defense Research Board in Ottawa. Mr. Irvine also had five years wartime experience in radar with the R.C.A.F.

The Canadian Admiral Electronics Division will be located at 501 Lakeshore Road, Port Credit, Ont.

* Technical paper by Herr Doktor Ing. Helmut N. Greindloutten presented at the 1956 World Conference on the Forces of Ricovertibrigational Pingschafft in Hamburg.



22 KN

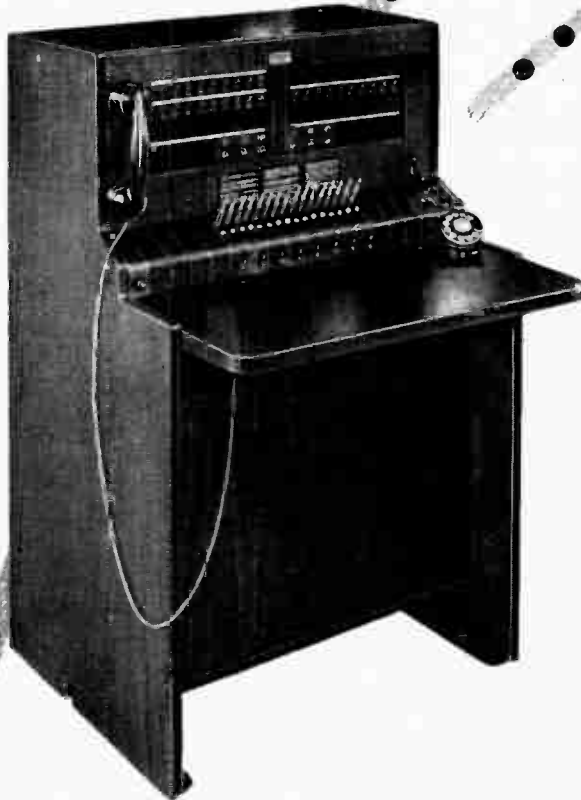
SIGMA

SIGMA INSTRUMENTS, INC.,

69 Pearl Street, So. Braintree, Boston 85, Massachusetts

Canadian Representatives: Samuel C. Hooker (Can) Ltd., Montreal and Toronto.
Ron Merritt, Vancouver, B.C.

Switchboard efficiency to meet your needs!



No. 555

PRIVATE BRANCH EXCHANGE

This is a modern switchboard with the new "plug-in" type units, permitting actual service requirements to be closely met.

Available in capacities of

60 and 120 Station Lines
14 Central Office Trunks
15 Cord Circuits

Two positions may be installed side-by-side to increase the maximum capacity to 240 lines.

The low design makes it convenient for attendant-receptionists to converse with employers' visitors or client over the top of the switchboard.

No. 507

PRIVATE BRANCH EXCHANGE

A small compact switchboard with a capacity of

12 Station Lines
5 Central Office Trunks
5 Connecting Circuits.

Requires about the same amount of space as the average typewriter.

Convenient and simple to operate by an attendant with other duties.



Northern Electric

COMPANY LIMITED

2053-1

44 BRANCHES THROUGHOUT CANADA

NEWS



CAE Appoints N. J. Sims Director Of Sales

The appointment of Mr. Norman J. Sims as Director of Sales, effective July 1st, has been announced by Canadian Aviation Electronics Limited,



N. J. SIMS

(CAE). He will be mainly concerned with the marketing activities of CAE's Consumer Products Division, manufacturers of CAE DUMONT television sets and High Fidelity radio phonographs. The creation of this new position signifies an expansion of the company's activities in the consumer field.

Mr. Sims has more than 25 years' experience in the marketing of consumer products in Canada and joins CAE from the RCA Victor Company where he held the position of general sales manager.

Len Finkler To Represent Workman TV Inc.

John E. Galbraith, sales manager of Workman TV Inc., Teaneck, N.J. has announced the appointment of Mr. Len Finkler, 1505 Park Royale Blvd., Port Credit, Ontario as Canadian representative in the Province of Ontario. According to the announcement, Mr. Finkler will stock a complete line of the company's TV products for immediate delivery to all jobbers in his territory.

W. F. Kelly Retires From Electronic Business

William F. Kelly for the past twenty-five years Eastern Canadian representative for the Triplett Electrical Instrument Company of Bluffton, Ohio, has retired from active business, it has been announced.

Mr. Kelly was one of the first manufacturers' representatives to sell electronic equipment in Canada, being established as a manufacturers' representative in 1920. In 1923 Mr. Kelly sold electronic components for the Pilot Radio and Tube Corporation of Brooklyn, N.Y. before complete radios were being sold on the market. Later Mr. Kelly represented such well known firms as Centralab, a Division of Globe Union, and Electro Voice, both of the United States.

Canadian Developed Equipment Exhibited Abroad

The airborne profile recorder of APR, a Canadian-developed electronic aerial survey device, was featured at the International Congress of Photogrammetry in Stockholm, Sweden, July 17th-26th. It has been used extensively in mapping remote areas of Canada in recent years.

Also featured was the Gamble plotter, a new Canadian map-making machine that is expected to save 30 per cent of the time required to draw contour maps; a special high-speed tri-film processor developed for the RCAF and other users; and a new type of aerial positioning camera. All these pieces of equipment were developed in Canada for aerial photography and map-making, a field in which Canada has acknowledged leadership.

The Canadian photogrammetric equipment was displayed by the associated Toronto companies, The Photographic Survey Corporation and PSC Applied Research Limited, which developed them. The latter company manufactures and markets these equipments.

Desser Representing Sightmaster

Desser E-E Limited, 441 St. Francois Xavier, Montreal and 1512 Eglinton Ave. W., Toronto, have been appointed Canadian representatives for Sightmaster Corp., New Rochelle, N.Y., manufacturers of fuses, according to an announcement by Mr. Herbert Desser.

Under the agreement, Desser will handle all Sightmaster sales in Canada except British Columbia.

Sightmaster Corp. produces an entire line of small dimension indicating and non-indicating quality fuses for aircraft, electronics, instruments, appliances, industrial, and automotive use.

Electronic Component Information Service

Announcement is made of a new firm, Derivation And Tabulation Associates, Inc., which has been organized to serve the growing need in the electronics industry for quick access to specific component data — without necessitating the present expenditure of engineering time and effort.

Henry Tulchin, president of DATA, Inc., has been associated for a number of years with the secretariat of the Advisory Group on Electron Tubes which functions under the office of

the assistant secretary of Defense (Research and Development). Formerly, Mr. Tulchin served as a project engineer with the Sperry Gyroscope Co. He holds a master's degree in electrical engineering from the Polytechnic Institute of Brooklyn.

L. F. Herbert Patent Manager For Eitel McCullough

Leon F. Herbert has been appointed manager of the Patent Department of Eitel-McCullough, Inc., San Bruno. In this capacity he will carry on patent activities begun by the late Harold Sorg, former director of research.

Herbert, who joined the Eimac staff in June, 1955, was formerly with the law firm of Watson, Cole, Grindle and Watson in Washington, D.C. He holds an aeronautical engineering degree from the Catholic University of America and an LL.B. degree from Georgetown University.

Eitel-McCullough is represented in Canada by Ahearn and Soper with offices in Ottawa.

*We are proud
to announce our*

NEW MINIATURE MODEL

RA — 3/4" Dia.

1 WATT VARIABLE

COMPOSITION RESISTOR



- It is the smallest 1 Watt Variable Composition Resistor on the market.
- It exceeds the MIL-R-94A — characteristic "Y" — specifications.
- It is fully guaranteed for 50,000 rotations under full load.

**PRECISION ELECTRONIC
COMPONENTS (1956) Ltd.**

**50 Wingold Ave.
Toronto**

Triplett Electric Appoints Four New Sales Representatives

Triplett Electrical Instrument Company of this city, through its sales manager, Norman A. Triplett, has announced the appointment of four new sales representatives. Triplett manufactures electrical measuring instruments and test equipment.

According to Norman Triplett, the firm will be represented by the following new appointees:

George Pettitt Company, 349 Ashland Avenue, River Forest, Illinois. Mr. Pettitt's company will handle distributor sales only for Triplett in Chicago and northeastern Illinois.

Al Quackenbush, 2629 North 77th Court, Chicago, will handle distributor sales only in eastern Wisconsin, eastern Iowa and northwestern Illinois.

Knoblock & Malone of 4000 West North Avenue, Chicago, will handle industrial sales only in eastern Wisconsin, northern Illinois and eastern Iowa.

Len Finkler, 1505 Park Royale Boulevard, Port Credit, Ontario, will handle Triplett sales in Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Ontario excluding the cities of Ft. William and Port Arthur.

R. Chamberlin Manager EIMAC Receiving Tube Div.

Richard Chamberlin has been named manager of the newly-created Receiving Tube Department of Eitel-McCullough, Inc., San Bruno, California, manufacturer of Eimac electron power tubes. Under Chamberlin, this organization will handle production of Eimac's new line of stacked ceramic receiving tube types.

Chamberlin, employed at Eitel-McCullough, Inc. for the past 13 years, was formerly administrative assistant to the manager of manufacturing. He will supervise pilot-plant production recently begun on the Eimac 33C3A2 twin-triode. Pilot-run production on this tube and other ceramic types already developed will involve only a few hundred tubes per week. However, Chamberlin will also be responsible for full-scale manufacturing operations using Eimac-developed automation equipment to meet a production target of 900 tubes per hour.

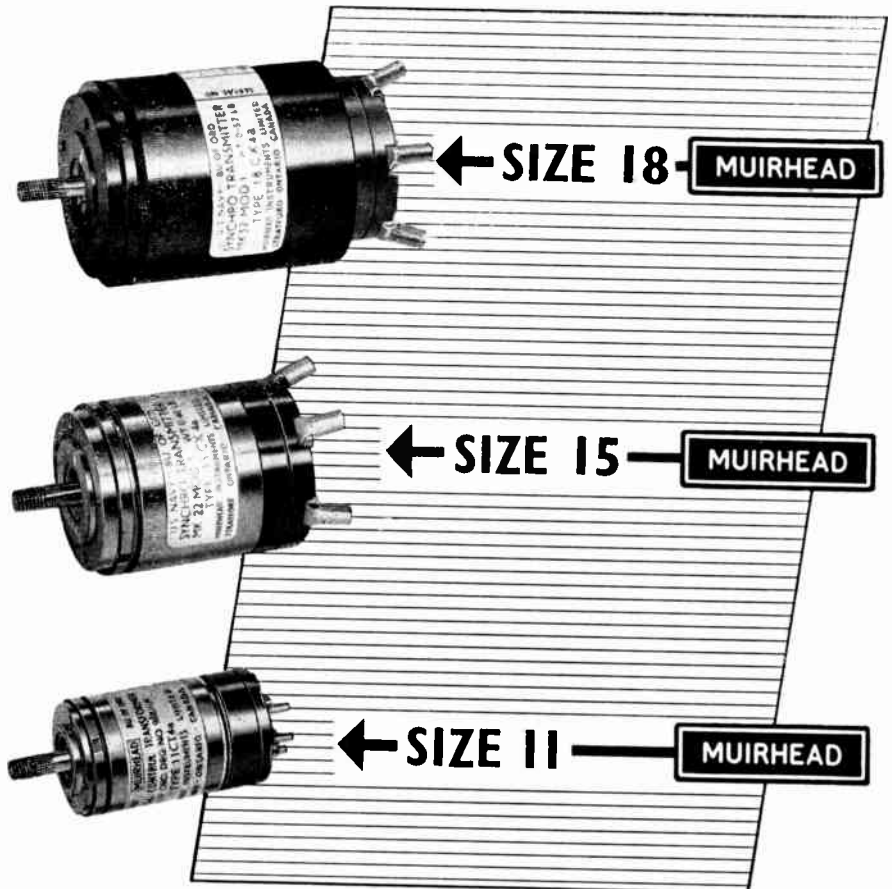
The establishment of this new Eimac department marks the advent of the world's largest manufacturer of transmitting tubes into the receiving tube field for the first time. A complete line of stacked ceramic tube types is planned for the future.

Eitel-McCullough is represented in Canada by Ahearn and Soper with offices in Ottawa.

(Turn to page 42)

MUIRHEAD

MANUFACTURERS OF SYNCHROS
FOR TWENTY YEARS



MADE EXACTLY TO
BuOrd Spec

Data Sheets and Quotations on request

220

MUIRHEAD

P R E C I S I O N E L E C T R I C A L I N S T R U M E N T S

MUIRHEAD INSTRUMENTS LIMITED STRATFORD · ONTARIO · CANADA
MUIRHEAD INSTRUMENTS INC. · 677 Fifth Ave · New York 22 · N.Y. · U.S.A.
MUIRHEAD & CO. LIMITED · BECKENHAM · KENT · ENGLAND

NEWS

(Continued from page 41)

W. W. Janney Export Manager For National Vulcanized Fiber

National Vulcanized Fiber Co., Wilmington, Del., announces the appointment of William W. Janney as manager of its Export Department. He succeeds C. V. Geisler who retired on July 1st after 43 years of service.

Mr. Janney has been associated with National since May, 1934. He joined the Export Department in 1936 and after serving in several clerical capacities became assistant export manager

in 1952. His twenty years' export experience gives Mr. Janney a broad background and knowledge of the requirements of the company's export products: National vulcanized fiber, Peerless insulation (Leatheroid, fish-paper, etc.), Phenolite laminated plastic, Kennett materials handling receptacles, Lestershire textile bobbins and Vul-vot wastebaskets.

National, the largest and oldest manufacturer of vulcanized fiber in the world, has plants located in Wilmington, Yorklyn, and Newark, Delaware; Kennett Square, Pa.; Chicago, Ill.; Johnson City, N.Y. and Toronto, Canada. Sales offices are

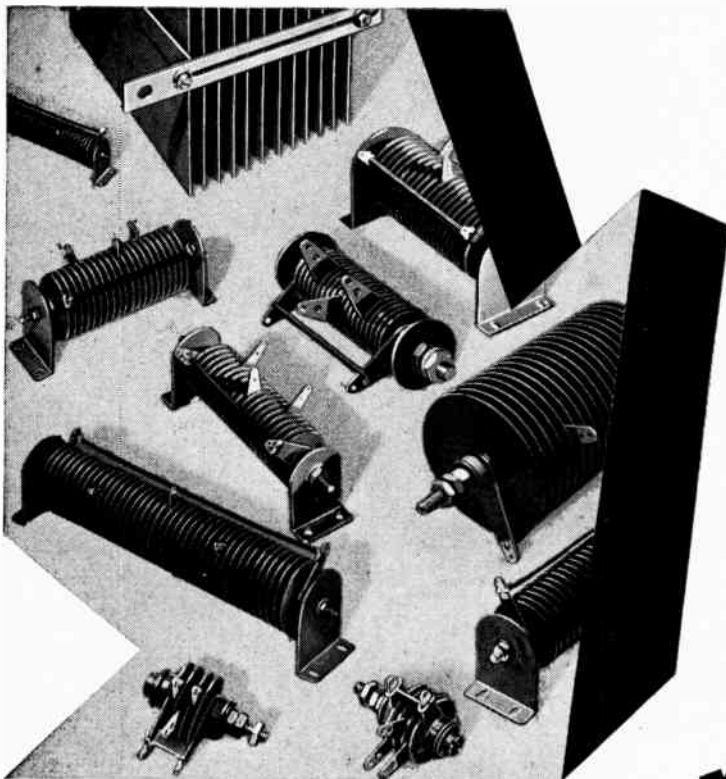
located in Toronto and Montreal, Canada, London, England and all principal cities of the United States — and sales agents in most countries of the world.

Canadian Westinghouse Announces Engineering Appointments

Two appointments within the engineering department of the Defense Apparatus Division of Canadian Westinghouse have been announced by L. C. Sentance, manager of the department.

J. M. Bester has been named manager of product engineering. Formerly section manager, Industrial Motors and Generators, he will be responsible for product design, planning, administration and operation of the department.

At the same time, the appointment of M. K. Riddell to the post of senior project engineer was announced. Mr. Riddell joined Westinghouse in 1955 as advisory engineer. He graduated from the University of Toronto in 1948 and spent six years with the Royal Canadian Navy as chief engineer, Electrical Control and Machinery Section. He will be responsible for technical liaison, specifications, technical direction of tests, approvals, systems analysis and customer trials.



rectifiers
for
INDUSTRY

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

9600 ST. LAWRENCE BLVD., MONTREAL

Successful Canadian "EM" Equipment Being Exported To U.K. And Australia

A Canadian-developed mineral-hunting device which has been responsible in little over a year's operation for discovering millions of dollars worth of exploitable sulphide ores in New Brunswick is being "exported" for use throughout Europe, Africa and Australia.

The airborne electromagnetometer or EM developed by Aeromagnetic Surveys Limited of Toronto, Ontario, is now ready for use by the Toronto company's English associate, Hunting Geophysics Limited, of Boreham Wood, Hertfordshire, throughout the United Kingdom, Europe and Africa. Another "EM" installation is being flown to Australia for use there by another associate, Adastra Airways (Pty.) Ltd., of Sydney, New South Wales.

The EM equipment, designed by Vaino Ronka, of Oshawa, Ontario was recently awarded a Blue Ribbon Mining Award as a result of a competition judged by outstanding American mining officials. A variation of this EM equipment for use by a helicopter in precipitous areas inaccessible to a fixed-wing aircraft has also been introduced by Aeromagnetic Surveys Ltd.

(Turn to page 45)

For further data on advertised products use page 61.

**It can cost
you much more
to settle for
less than this
Clare Relay**



*This ad was all but written
by a Clare customer.
Here is the story as he told it:*

"I shopped around for relays for continuous-duty, high-speed switching service. Clare engineers recommended Type HG Mercury-Wetted Contact Relays. They said they were ideal for this application. I thought so, too; but they do cost a little more than some other relays, and I thought I couldn't afford to use them. I thought the extra cost, multiplied by the large number of relays in my machine, would run my price too high. So I built a model with cheaper relays. In just a few weeks the relays wore out. I knew that Clare Type HG relays would last for years under the same conditions, and it didn't take me long then to decide that I couldn't afford not to use them."

Ask yourself whether you, too, don't have jobs for which no other relay is good enough. Consider that the life of a Clare Mercury-Wetted Contact Relay is measured in billions of maintenance-free operations. Compare the cost per flawless operation with that of other relays: this is the crux of the matter—a vital, basic point.

The price is very reasonable, and delivery is quick—one to seven weeks, depending on the particular assembly desired and the size of the order.

FOR COMPLETE INFORMATION on CLARE Mercury-Wetted Contact Relays for single or multiple circuits contact your nearest CLARE representative or address: C. P. Clare & Co., 3101 Pratt Blvd., Chicago 45, Illinois. In Canada: C. P. Clare & Co., 659 Bayview Avenue, Toronto 17. Cable address: CLARELAY.

Send for CLARE Sales Engineering Bulletins Nos. 120 and 122

CLARE RELAYS
FIRST IN THE INDUSTRIAL FIELD

**multi-range
multi-purpose**

automatic cut-out

20,000 ohms/volt d.c.

a.c. & d.c. current ranges

accurate

Model 8
**Universal
AvoMeter**

**ELECTRONICS
RADIO
TELEVISION**

The multi-range instrument with automatic cut-out protection for overload . . . just reset and carry on reading.

OTHER FEATURES:

4 Current Ranges:
100 mA. to 10 Amperes A.C.

7 Current Ranges:
50 μ A. to 10 Amperes D.C.

14 Voltage Ranges:
2.5 Volts to 2,500 Volts
A.C. and D.C.

3 Resistance Ranges:
0.5 Ohms to 20 Megohms



Comprehensive AvoMeter Bulletin available on request. Send for yours to Dept. EC-8

Complete factory repair service with all spares in stock, available at our Toronto plant.

R.H. Nichols LIMITED

2781 DUFFERIN STREET • TORONTO

EXAMINE FREE!

Profit NOW
with the latest on
successful transistor design,
application, operation
— in

ONE COMPLETE VOLUME!
**TRANSISTOR
ELECTRONICS**

by
Arthur W. Lo,
Richard O.
Endres, Jakob
Zawels, Fred
D. Waldhauer,
Chung - Chih
Cheng; all
RCA
engineers.



At last, here's an authoritative, practical book, which rounds up all available information, ideas and techniques on transistors and presents this useful data to you in 520 illustrated, easy-to-follow pages! These RCA experts cover the whole field, from design and operation of transistors to their application. Much material is just released, printed here for the first time. Whether you're a beginner or seasoned vet . . . working in radar, TV, radio, computing, or allied fields . . . this complete, new book will give you mastery of transistors and show you how to use this knowledge profitably and successfully!

**Gives Complete Coverage
Including:**

Physical concepts (36 pages) . . . characteristics, parameters, equiv. circuits (44 pages) . . . basic amplifier configurations (50 pages) . . . low freq. amplifiers (42 pages) . . . hi-freq. amplifiers (39 pages) . . . power amplifiers (28 pages) . . . hi-freq. operation (47 pages) . . . physical interpretation of transistor parameters (38 pages) . . . oscillators (38 pages) . . . modulation & demod. (48 pages) . . . pulse circuits (76 pages) . . . tabular-analyses of fundamental transistor networks & circuits . . . shows parallels, contrasts between transistor and vac. tube circuits . . . features practical circuits . . . plus much more valuable material and workable, useful techniques.

MAIL NOW—FREE TRIAL OFFER

Prentice-Hall, Inc., Dept. 5211-K1
Englewood Cliffs, New Jersey

Please send me a copy of TRANSISTOR ELECTRONICS for 10 days' FREE use. Within 10 days I'll either return book and owe nothing, or will keep it and remit \$4 down (plus small postage charge) and then \$4 a month for two months in full payment.

Name

Address

City

Prov.

Save! Send \$12.00 with this coupon and we pay postage. Same return and refund guarantee.

Canadian IRE Convention October 1, 2 and 3, 1956

General Information

Marking the 30th Anniversary of the Institute of Radio Engineers in Canada, this convention and exposition constitutes the largest and most dynamic program of its kind ever presented in Canada. Thousands of engineers, executives, educationalists, technicians and buyers will attend this history making event from Canada, the United States and abroad.

Convention centre is the Automotive Building at Exhibition Park, Toronto, which provides the ultimate in accommodation under one roof. In addition to the 90,000 square foot exhibit hall and meeting halls for presentation of the 132 technical papers, facilities for delegates and exhibitors will include a complete restaurant service, cinema, industry lounge and ample parking space.

Technical Program

The nation's leading engineers and scientists will present 132 papers in 26 sessions during the three day convention. The papers, both practical and theoretical, have been carefully selected by the committee to include the latest research and developments in the field of electronics and nucleonics.

Exhibits

A comprehensive exposition of the newest products and techniques in the electronic and nucleonic industries will be presented by over 130 leading manufacturers, distributors and government bodies.

Convention Banquet

All delegates, exhibitors, and their wives, are invited to attend this outstanding social event of the Convention, which will be held at the Royal York Hotel on Monday evening, October 1st, at 7.30 p.m. A cocktail hour will precede the banquet. The speaker of the evening will be announced later. Tickets are \$6.00 each, and **should be ordered in advance, as accommodation is limited.**

Registration

IRE members and all those engaged in the electronic, nucleonic and associated industries are welcome to attend the convention and exposition. The registration desk will be open during convention hours at the Automotive Building. Registration fee, including technical program and exhibits, is \$1.00 for IRE members and

registered professional engineers: \$1.50 for others. Students of universities and accredited technical schools will be registered without charge on presentation of school registration or student IRE membership cards.

Hotel Accommodation

Accommodation for delegates is available at a number of Toronto hotels and motels. Reservations should be made in advance. Registration cards are available from the Canadian IRE Convention, 745 Mount Pleasant Road, Toronto 12, Ontario.

Transportation

Arrangements have been made with Trans-Canada Air Lines to extend reduced fares to delegates and dependent members of their families. Reduced Fare Certificates are available through IRE Section Chairmen, or by writing to the Convention Manager.

IRE Region 8 Committee Meetings

The Regional Committee will meet under the chairmanship of Dr. John T. Henderson during the Convention. A meeting of the Regional Sub-Committee of the Education Committee, under the chairmanship of Professor F. S. Howes, will also be held. Dates and times to be announced.

Ladies' Program

Luncheons, tours and teas are being organized to ensure an enjoyable convention stay for the ladies. Registration may be completed, at no charge, either at the Automotive Building or the ladies' suite, Royal York Hotel. Ladies are also invited to attend the Convention Banquet on Monday evening.

Public Day

To accomplish a public relations job for the electronic and nucleonic industries, and to encourage students to enter these fields of study, the exposition only will be open to the general public from 3 p.m. to 10 p.m. on the last day, October 3rd.

Convention and Exposition Hours

Monday, October 1st
9.30 a.m. to 6 p.m.

Tuesday, October 2nd
9.30 a.m. to 10 p.m.

Wednesday, October 3rd
9.30 a.m. to 10 p.m.

For further data on advertised products use page 61.

NEWS

(Continued from page 42)

D. E. Haig Western Region Manager For Phillips Wires And Cables

Mr. F. W. Barnhouse, general sales manager of Phillips Electrical Company Limited, Brockville, announces the appointment of Mr. D. E. Haig as manager, Western Region, Winnipeg.



D. E. HAIG

In his new position, Mr. Haig will be responsible for sales in Saskatchewan, Manitoba and North-Western Ontario. Mr. Haig, who has been sales engineer for the company in the West, is a graduate of the University of Manitoba. He brings to his new position a wide background of previous experience with the Electrical Utilities in Manitoba; and is well-known throughout the industry.

Second West Coast Plant Opened By Filtron

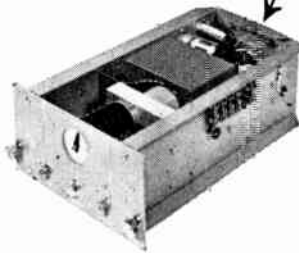
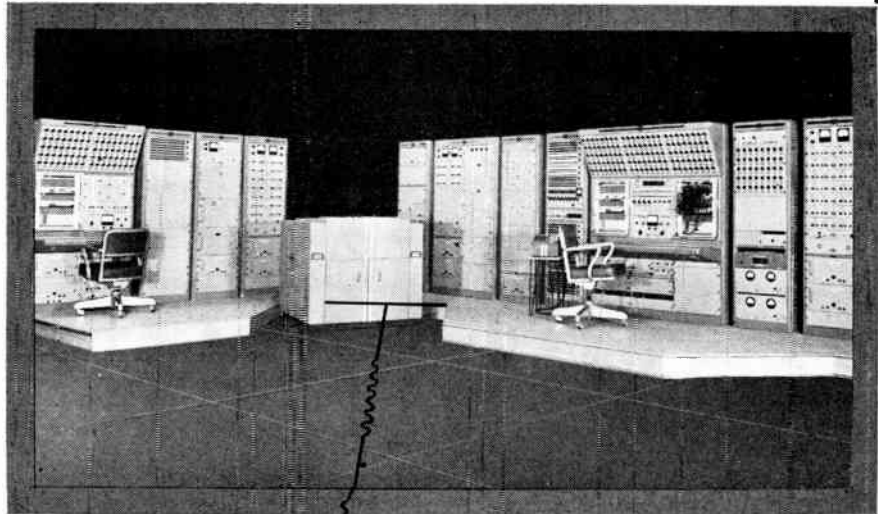
A completely-equipped new plant for the manufacture of radio frequency interference filters, capacitors, pulse-forming networks and delay lines has been built by the Filtron Company, Inc. at 4625 Leahy St., Culver City, Calif. The new facilities, which include engineering laboratories, screen rooms and test equipment, are housed in 14,000 square feet of floor space. The plant is expected to employ 200 additional people, and will be used to supplement the firm's original west coast factory, built last year. Mr. William Lana will be general manager of both units.

Filtron is represented in Canada by Aircraft Appliances and Equipment Limited of 585 Dixon Side Road, Toronto 15, Ontario.

(Turn to page 46)



Tested by Performance in the Field



Because there is no substitute for reliability,

it is no surprise that engineers, with heavier than ever work loads, are insisting on utmost reliability in Analog Computers.

And it is no surprise, either, that they are constantly turning to PACE to get it. For emphasis on Progressive Engineering has made it possible for Electronic Associates to insure complete reliability in PACE Analog Computers.

An example of what we mean is the outstanding dynamic performance of the new Servo Multiplier, Series 16-7S which extends the whole present concept of servo multiplication.

This new Servo Multiplier is a 400 cycle unit designed for the extreme problem, where the supreme in speed is the only answer. It offers an acceleration and velocity widely surpassing all others. And its high static nulling accuracy permits its use in all standard operational circuits.

We will gladly furnish information on this new Servo Multiplier, Series 16-7S—on EAI's PACE Computer Systems—and on the rental of time and equipment at EAI's Computation Center in Princeton, N. J. Write Dept. EC-8 Electronic Associates, Inc., Long Branch, N. J.



EAI SETS THE



LONG BRANCH, NEW JERSEY

NEWS

(Continued from page 45)

D. C. Appleton, Manager Electronics Corp. Of America (Canada) Ltd.

Douglas C. Appleton has been named to the newly-created post of office manager at Electronics Corporation of America (Canada) Ltd., 98 Advance Road, Toronto.

In his new post, he will be responsible for all office functions at Electronics Corporation of America (Canada) Ltd., which serves the entire country through nine district sales offices with the following products:

Fireye flame safeguard and programming control systems for commercial and industrial oil, gas or combination burners, produced by the Combustion Control Division; photoelectric and electronic controls for automatic counting and inspecting in industry manufactured by the Photo-switch Division; and electronic fire detection and extinguishing systems for industry and aircraft, products of the Fireye Division.

In another move, E.C.A.'s British Columbia district representative, Pacific Controls Ltd., has opened a branch office at 620 Queens Ave., Victoria. The firm's main office remains at 1042 Davie St., Vancouver.

Malcolm E. Adams, president, has appointed Douglas G. Donald as branch manager at Victoria. Like the Vancouver headquarters, the new office carries the complete line of Fireye flame safeguards and controls. The firm has been Fireye distributor in B.C. since 1950.

TELEPHONE REPEATER TYPE TA-289/FCC

This is a packaged voice-frequency repeater adapted for use on almost any type of two-wire or four-wire line facility. The principal components are amplifiers, hybrid circuits and balancing networks. It also includes line protectors, monitoring telephone set, d-c telegraph composite sets, adjustable line equalizers, v-f signal converter type CV-339/FCC, and rectifier for a-c operation. It has a maximum net gain of 24 db on 2-wire circuits and of 30 db on 4-wire circuits, between nominal 600 ohm impedances.

Type TA-289/FCC Repeater, Telephone, manufactured for the U.S. Army Signal Corps. This is a recent redesign of the type OA-7/FC Repeater, Telephone, and is moisture- and fungus-proofed. It meets all applicable MIL specifications.



RADIO ENGINEERING PRODUCTS

1080 UNIVERSITY STREET, MONTREAL 3, CANADA

Telephone: UNiversity 6-6887

Cable Address: Radenpro, Montreal

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



We're **DALOHM...**
miniature but mighty!
You can depend on



TYPES WWA and WWL PRECISION ENCAPSULATED RESISTORS

For critical applications. Non-inductive, Pi-wound, encapsulated in chemically inert compounds for complete environmental protection.

Superior performance assured through thorough testing, temperature cycling, salt water immersion, and overload tests.

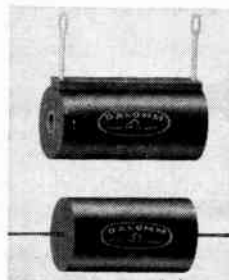
- Three wattage ranges, five sizes in each type
 - Ranges from 0.1 ohm to 5 megohms
 - Tolerances as low as 0.05%: standard 1%
 - Temperature coefficient 0.00002/Deg. C

Built to surpass MIL-R-93A

Write for
BULLETIN R-26A

DALE PRODUCTS, INC.
Phone 2139

1322 28th Ave., Columbus, Nebraska, U.S.A.



Export Dept.: Pan-Mar Corp.
1270 Broadway, New York 1,
N.Y.

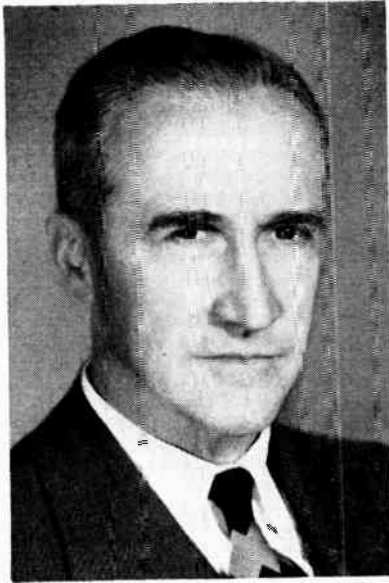
In Canada: Charles W. Pointon,
Ltd., 6 Alcina Ave., Toronto



R. D. MACLEAN

• R. D. Maclean, whose appointment as Sales Manager of the Casting Division of Aluminum Company of Canada, Ltd. is announced by Mr. F. W. A. Baulch, Manager of Alcan's Casting Division.

For further data on advertised products use page 61.



● General Edmond H. Leavey, of New York, N.Y., who has been elected president of International Telephone & Telegraph Corporation, New York, N.Y., worldwide electronics and telecommunications manufacturers, in succession to the late General William H. Harrison. General Leavey is a director of Standard Telephone & Cables Mfg. Co. (Canada) Ltd., Montreal, the Canadian operation of I. T. & T.

RCA Official Sees Women Filling Engineering Positions

Technical training of women as a solution for the serious shortage of engineers in Canada was recently suggested by J. L. McMurray, RCA Victor Company, Ltd. He claims that more women could and should be induced to enter the engineering profession.

Himself an engineer and vice-president, Mr. McMurray forecasts that the skill of women engineers and scientists will be increasingly required in Canada.

"While this company is not suffering at the moment from the general shortage of engineers and scientists, we know that there will be a shortage soon. With new electronic devices now being developed, our engineering products department alone anticipates needing double its staff by 1960," he says.

RCA Victor, which employs highly trained women in several key posts, finds them quite as good as men, says Mr. McMurray.

"A woman unquestionably has as much gray matter as a man. Female architects and airplane designers are quite as good as their male colleagues. And for tedious and repetitious tasks, women work out better than men. They've more patience," declares the executive.

Because nearly all women have a strong creative sense and are natural improvisers, those who make engineering or the physical sciences their profession usually do well at it, he says.



Modern industrial research instruments

THESE seven-ton bulldozers are truly research tools, for they are taking part in an exhaustive program for the study and revision of accepted methods of oscillographic recording system design and manufacture.

Yes, Sanborn Company is on the move! The instruments above are levelling off small mountains of earth and rock in preparation for a new and modern Sanborn plant near Boston, Mass.

Completion of the structure late this year will mean vastly improved facilities for research, manufacturing and other operations. This will directly and immediately benefit not only the work Sanborn does, but also the people who use Sanborn systems, amplifiers, recorders and other components. It will make possible more rapid development and production of new instruments, and increased opportunity for a larger number of people to apply their skills to the problems of modern instrument design and manufacture.

This represents not "just a new plant", but a reflection of Sanborn's growing role in providing better answers to industry's oscillographic recording needs.

Sanborn Company, Industrial Division, Cambridge 39, Mass.



Scale model of new Sanborn plant just off Route 128 in Waltham, Mass.

Representative: Eastern Canada: ROR ASSOCIATES, 290 Lawrence Ave. W., Toronto 12, Ontario
Representative: Western Canada: RON MERRITT CO., 470 Granville St., Vancouver 2, B. C.

TELEVISION TUNERS

Switch Type
Licencee of Sarkes-Tarzian Inc.

LOUDSPEAKERS

Domestic and Military Types

WIRE WOUND RESISTORS

Cement and Vitreous Enamelled
Coatings - MIL Approved

**VARIABLE TUNING
CAPACITORS**

Radio Tuning Types - Special
Units For Military Application

TRIMMER CAPACITORS

Conventional Air Dielectric
Glass and Ceramic

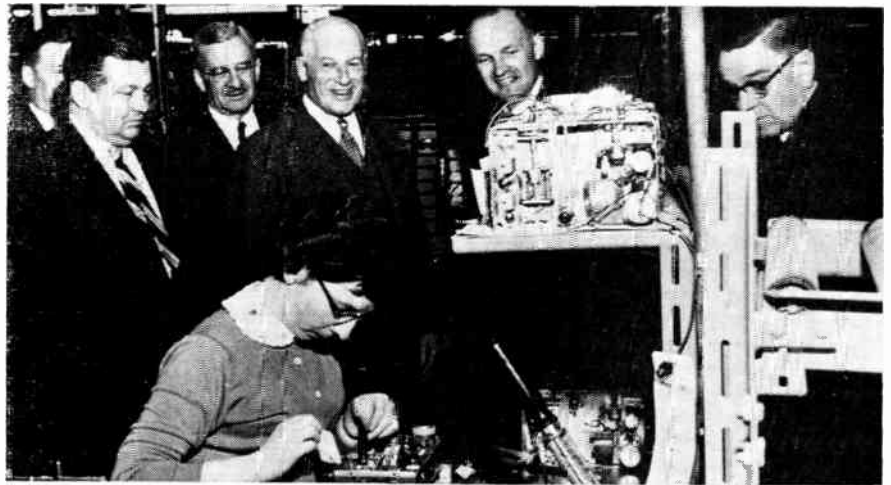
**LEDEX ROTARY
SOLENOIDS AND
SELECTOR SWITCHES****PERMEABILITY TUNERS
PRECISION GEARS AND
GEAR TRAIN ASSEMBLIES
SERVO-LOOP SYSTEMS**

MICROWAVE
COMPONENTS
Filters, Antennas

See our Display at the
Canadian IRE
Convention Booth No. 338



**Marsland
ENGINEERING
LIMITED**
KITCHENER, ONT., CANADA



● Left to right: J. A. Maloney, MPP; D. W. Stewart Jr., Mayor of Renfrew; Dr. J. J. McCann, Minister of National Revenue; S. M. Findlay, manager of the new plant at Renfrew; and F. R. Deakins, president of RCA Victor, pause during their tour to watch work underway on a radio at FCA's new Renfrew, Ontario, plant.

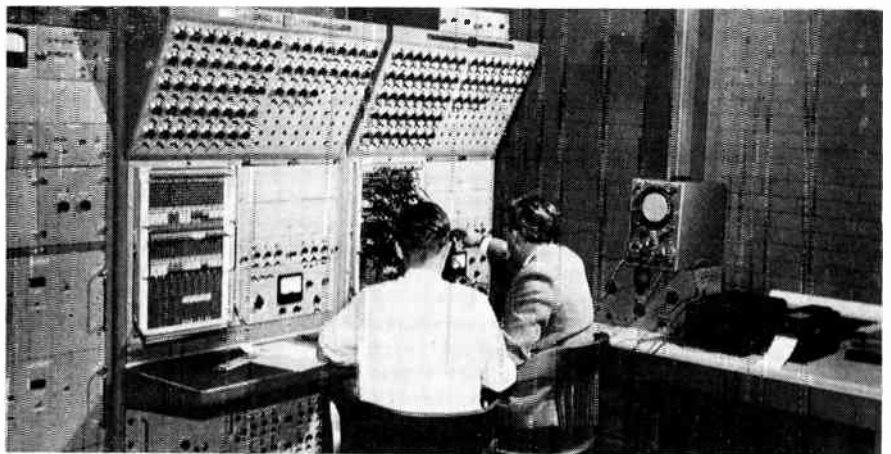
**Campbell, Kerr Named
Westinghouse Vice-Presidents**

Geo. L. Wilcox, president, Canadian Westinghouse Company Limited, recently announced the election of John D. Campbell and James W. Kerr as vice-presidents. The newly-elected vice-presidents have both served with the company almost from the outset of their careers.

John D. Campbell, after early business training at Hamilton in banking and retailing, joined Westinghouse in 1934, first as a time study and methods supervisor at Hamilton, moving later to the sales department. During war years he served overseas with the Royal Canadian Ordnance Corps and held the post of deputy assistant director of ordnance services for the 1st Canadian Corps at the conclusion of the war. Returning to the company, he won rapid promotion in appliance sales and later became manager of the appliance division, the electronics division and general manager of the Canadian Westinghouse Supply Company. He is now in charge of the con-

sumer products group, which includes the appliance, TV-Radio, lamp and tube divisions. He is currently serving as president of the Radio-Electronics-Television Manufacturers Association of Canada.

James W. Kerr, after graduating from the University of Toronto in 1937 with a B.A.Sc. in electrical engineering, enrolled in the Canadian Westinghouse graduate engineering course before starting on a career as a sales engineer in the Toronto district. He served overseas with the R.C.A.F. from 1942 to 1945, ranking as a squadron leader at the close of hostilities. His rapid postwar climb began as manager, transformer sales, later becoming assistant manager, central station sales, and then manager. In 1949, Mr. Kerr became manager of apparatus sales. In 1952 he was made manager, power products division and is now in charge of the apparatus products group, which includes the power products division, the defense apparatus division and the district apparatus division. J. W. Kerr is a native of Hamilton where he received his early education.



● One of the largest analog computers in Canada which has recently been installed in the Electronics Division of the Canadian Westinghouse Company. Designed and built by Electronics Associates Inc. of New Jersey, the equipment will play an important role in the company's advanced electronic engineering program.

For further data on advertised products use page 61.

Westinghouse Suggestion Awards Pass Quarter Million Dollar Mark

The Canadian Westinghouse Company's suggestion awards prize money to employees recently topped the quarter-million dollar mark. A small \$26 cheque, number 23,063 pushed the total over the historic milestone 14 years after the initiation of the plan.

The suggestion plan, put into effect in October 1942, was initiated as a means of stimulating interest and participation in the company war effort production. Only 900 suggestions were received the first year with awards totalling about \$10,000. Last year Westinghouse paid out \$41,000 for ideas, and in one month this year placed the stamp of approval on more than \$7500 worth of winning suggestions.

Like all other companies Westinghouse kept the names of applicants a deep dark secret in 1942. This veil of secrecy was not lifted until five years later, when the acceptance of the plan became company-wide despite bitter union resistance. Now suggestions are discussed openly by the applicant and his supervisors. Westinghouse points to "creative satisfaction and a sense of participation" being equally important to monetary gain, in the success of the suggestions awards plan.

"When industry was in the hand-manufacturing stage the person engaged in production could take a personal pride in his handiwork. However, as we moved into the machine age with its resultant less manual work, we sacrificed some of that personal pride in the product", said Jack Craig, supervisor of the Westinghouse Suggestion Plan.

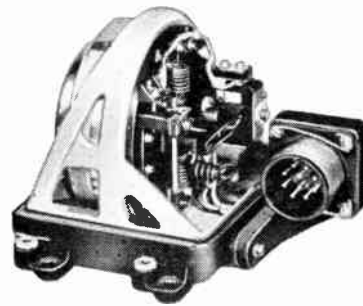
"The suggestion awards plan gives everyone a chance to become an important part of the production picture. An awards winner can take pride in suggestions for he has contributed in a creative manner to the product he is building. Participation in this manner is healthy and profitable for both the essential man in the shop and the company," he said.

Appreciation of this fact is evidenced in the response of employees that is growing every year. It is expected that 3000 ideas will be forwarded to the awards committee this year for consideration, bringing the grand total to more than 30,000 suggestions in the past 14 years. During that time slightly less than 17,000 have been rejected as unfeasible.

The largest single award was handed out in 1954 to a die-setter for an improved method of producing punchings. His award hit the record high of \$3,052 and it is estimated that his idea saved the company more than \$15,000 in the first year. Westinghouse awards are based on 20 per cent of the saving over the first year of using the suggestion, and there is no ceiling on the amount awarded.

On the right track with a complete line of HONEYWELL RATE GYROS

The major uses of Honeywell Rate Gyros have been on pilotless missile guidance systems, radar stabilization and various aircraft applications. As progress in the air has taken on its fantastic proportions of recent years, so Honeywell has been called to increase its part in our defence and civil aeronautical expansion. Honeywell Rate Gyros are an important part of our complete line of aeronautical controls. We're continually working for improvements because automatic control is important to aviation's progress. And *automatic control* is Honeywell's business.



TYPE GG13A RATE GYRO

... a damped, non-floated and spring restrained unit with maximum rates and natural frequency selected by changing springs. Unique construction consists of umbrella type wheel (the rotor) mounted in a single degree of freedom gimbal. Wiper attached to gimbal indicates position for any rate of turn.



TYPE GG16G RATE GYRO

... a small hermetically sealed instrument available for maximum angular velocities of 30, 100 and 400 degrees per second, with a high rate of shock and vibration resistance. It is made up of a spin motor, gimbal, crossed reeds, potentiometer assembly, a viscous damper, thermostatic switch, heater, gyro base, case and terminal cover.

For complete information on Honeywell Rate Gyros or other control devices call your local Honeywell office or write: Honeywell, Dept. EC-CC-8, Leaside, Toronto 17.

Honeywell

Aeronautical Division



AIRCRAFT • ORDNANCE •
CONTROLS AND INSTRUMENTATION

OPPORTUNITIES IN CANADA

FOR

TECHNICAL PERSONNEL

A MEETING PLACE BETWEEN EMPLOYERS IN
CANADA — AND EMPLOYABLE TECHNICIANS IN
THE ELECTRONIC AND COMMUNICATION FIELD.

ELECTRONIC INSTRUMENT MECHANICS

For the testing, installation and maintenance of a wide range of electronic equipment used in research and in industrial processes, including nuclear counting and measuring equipment, electronic regulators and controllers, intercommunication systems and test equipment.

Applicants must have High School graduation or the equivalent and a thorough knowledge of basic electronics, plus five years' related practical experience.

\$2.04 per hour — 40 hour, 5-day week, employee benefits.

Regular bus service between project and Deep River, Chalk River, Petawawa and Pembroke.

State all particulars in first letter to File 7G.

**ATOMIC ENERGY OF CANADA
LIMITED**

Chalk River, Ontario

APPLICATION ENGINEER

Electronics

A stimulating engineering and sales position with an expanding electronics company is open to a graduate engineer with approximately two years' experience in electronic instruments and/or microwave circuitry.

An individual with the appropriate technical background, plus the ability to meet and get along well with people, will find a challenging opportunity for professional growth and personal advancement in this position. Send resume in writing to:

Personnel Manager,
Varian Associates
of Canada Ltd.,
45 River Drive,
Georgetown, Ontario.

Electronics Technicians

Defense Research Board

Vacancies exist for Electronics Technicians especially in the Telecommunications Establishment, Ottawa, and the Canadian Armament Research and Development Establishment, Valcartier, Quebec. Some technicians are also required for northern locations during the International Geophysical Year (1957-1958). The work will be in such fields as radio communications, transistor circuitry, components, printed circuits, radar and radio countermeasure, guided missiles.

There are excellent working facilities, including up-to-date laboratories, and the latest electronic test instruments. Employee benefits include a five-day week, a pension plan, generous vacation and sick-leave benefits, medical-hospital insurance plans, and for those in the north, special northern allowances. There are excellent opportunities for the furthering of formal education and for advancement.

Qualifications should preferably include high school graduation or the equivalent, advanced technical training and relevant experience. Salaries will depend upon qualifications and will range from \$1920 to \$4860 a year. Applicants must be Canadian citizens or British subjects.

Apply in writing to the Director of Personnel, Defense Research Board, Daly Bldg. Annex, Mackenzie Avenue, Ottawa, Ontario. Please refer to file 56-D of P-2.

Engineers

Outstanding opportunities in the fields of Computers, Instrumentation and Guided Weapons available to

- Electrical Engineers
- Electronic Engineers
- Electromechanical Engineers
- Mechanical Engineers
- Aeronautical Engineers
- Engineering Physicists

Positions are now open for systems and design engineers with experience in

Pulse Circuitry
Analogue and Digital Techniques
Electronic Test and
Measuring Equipment
Aircraft Instruments
Semiconductors

If you are interested in stimulating assignments offering a real challenge and calling for creative imagination, investigate these positions by writing to

Personnel Manager
**COMPUTING DEVICES OF
CANADA LTD.**
P.O. Box 508
Ottawa, Ontario

Please quote File EC-2

ELECTRONIC ENGINEERS

We have a number of interesting opportunities for electric and physics graduates — up to men with five or more years of experience in the development and prototype construction of military radar — development of radar type electronic circuits — and other types of electronic projects. Modern plant with cafeteria — excellent library — laboratory space — up-to-date test equipment — 5 day week — group insurance benefits — pension plan.

Apply in person — or write — stating age, marital status, academic background, experience and salary requirements.

Personnel Office,
Canadian Arsenals Ltd.
Instrument and Radar Division,
Box 256, P.O. Station "H",
Toronto 13, Ontario.
Mr. G. Munroe.

Radio Technician Required

experienced in component testing, laboratory instruments and practice. Reply giving full particulars to

**T. S. FARLEY LTD.,
HAMILTON, ONTARIO**

APPOINTMENTS

M.E.L. CONTRACTS AND SALES DEPARTMENTS

D. A. Bamford, President & General Manager, Measurement Engineering Limited, Arnprior, Ontario, announces the following appointments —



E. E. WHITTAKER
Manager

Mr. Whittaker has had long service with M.E.L., was previously Contracts Administrator and will be active in the Ottawa Valley area.



L. A. DENAULT
Office Manager

As Office Manager of the Contracts and Sales Dept., Miss Denault brings with her six years' experience in the Sales Department.



F. J. BALL
Sales Representative

Quebec and Eastern Provinces, previously associated with Contract Administration, Purchasing and Expediting Depts. Will work out of Head Office.



W. EVAN-JONES
Sales Representative

Central and Western Ontario. Mr. Evan-Jones has had long sales experience with Canadian Electronic Industry. Address: 5 Harris Cres., Burlington, Ont. Tel. NElson 4-5686.

MEASUREMENT ENGINEERING LIMITED

ARNPRIOR, ONTARIO

Arnprior 400

FREED NULL DETECTOR AMPLIFIER

TYPE
1140-A



USES

A sensitive null indicator for bridge measurements, providing visual null indications or aural when used in conjunction with headphones. The unit may also be used as a high gain amplifier for general laboratory work.

DESCRIPTION

Functionally the instrument consists of a high gain linear amplifier with a 30 db. input attenuator in addition to the variable gain control. A four-inch panel meter provides visual null indications, the response of the meter circuit is approximately logarithmic over a 40 db. voltage range. Resonant circuits tuned to 60, 400 and 1000 cycles limit the amplifier transmission characteristics to the three audio frequencies commonly used for bridge measurements or it may be used as a non-selective amplifier with filter "off."

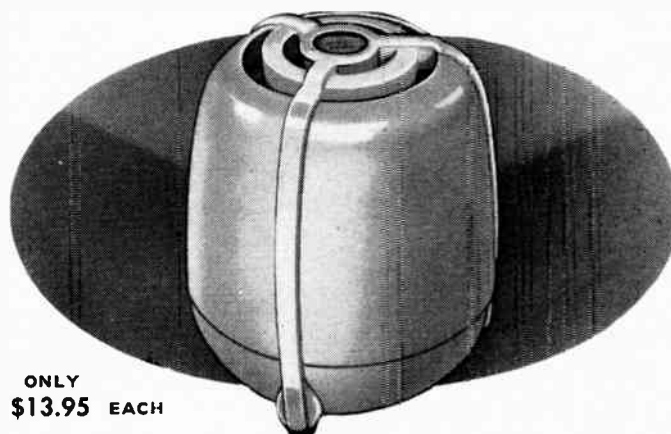
SPECIFICATIONS

Input Impedance: 1 megohm in parallel with 25 mmf. GAIN: 98 db. with 1 megohm load (6 mmf. shunt capacity), down 1.5 db. at 25,000 cycles, down 5 db. at 50,000 cycles, down 2 db. at 20 cycles.
Null Detector Sensitivity: At 1 kc. 100 microvolts will give a 15% meter deflection.
Selective Amplifier: 26 db. second harmonic attenuation at 60, 400 and 1000 cycles.
Power Supply: 105-125 volts, 50-60 cycles, 35 watts consumption.
Dimensions: 13 1/2" x 8 1/2" x 10".

SEND FOR COMPLETE TRANSFORMER & INSTRUMENT CATALOGS

FREED TRANSFORMER CO., INC.

1716 Weirfield Street, Brooklyn (Ridgewood) 27, N.Y.



ONLY
\$13.95 EACH

'LUSTRETTE' DYNAMIC MICROPHONE

World-famous Lustraphone presents 'LUSTRETTE' — a complete new style Moving Coil (Dynamic) microphone for use as Standing or Hand Instrument... truly brilliant Hi-Fi recording at low cost! Compact, dependable, with new design omnidirectional insert, "LUSTRETTE" is suitable for any tape-recorder — carries Lustraphone Standard Guarantee of unsurpassed quality and performance.

A Lustraphone Fidelity Product

IMPEDANCES & MODEL Nos.

Low: Model LD/61 — 20 ohms.
Line: Model LD-61M — 200 to 600 ohms.
High: Model LD-61Z — Grid.
Sensitivity: 52db below 1 volt.-dyne/cm² for High Impedance Models.
Frequency Response: Flat from 70 to 12,000 cycles per second.
Weight: 6 oz.
Size: 2 1/2" x 2 1/8" diam.

Industrial & Institutional Communications LIMITED

27 McNaughton Ave., Wallaceburg, Ontario

For further data on advertised products use page 61.

Varian Associates To Enlarge Georgetown Plant

Varian Associates of Canada Ltd. has announced a 1000 square foot extension to the electronics firm's present klystron tube development and manufacturing plant at 45 River Drive, Georgetown, Ontario. The new work space will house special development engineering work planned by the company.

The addition is part of the company's general expansion plan and represents a 10 per cent increase in floor area within the first year of operation. The new construction has already been started by the McNally Construction Company of Georgetown and is scheduled for completion August 1st.

The Georgetown company opened for business on October 21st of last year. The plant now has 43 employees and is producing approximately 150 klystron tubes per month.

The company is a subsidiary of Varian Associates, a California corporation with headquarters in Palo Alto. The parent company is one of the world's largest manufacturers of klystron tubes and special laboratory instrumentation. Specialists on loan from the parent company have been supervising the initial operation of Varian Associates of Canada and have been training Canadian personnel in the specialized field of klystron development and manufacturing. It is



● The above photograph shows the existing plant of Varian Associates at Georgetown, Ontario, to which will be added a further extension providing an additional one thousand square feet of floor space. The addition will represent a ten per cent increase in floor area within the first year of operation.

planned that management and operating functions will be assumed by an all-Canadian staff after the completion of the necessary training program.

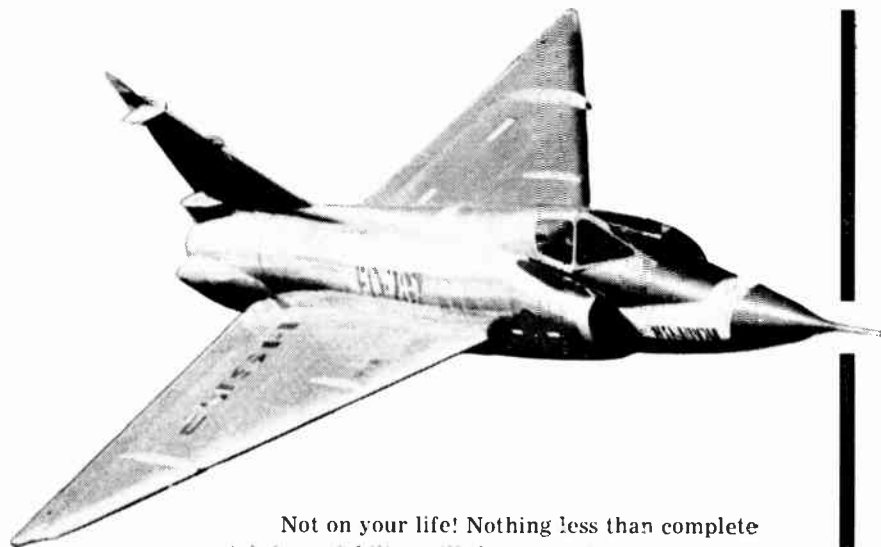
In keeping with this policy, the appointment of B. H. Breckenridge to the position of assistant general manager has been announced. Mr. Breckenridge has been business manager for the company.

The first of the parent company personnel scheduled to return to California will be R. F. Woodward, who has been in charge of the Test Department in Georgetown. He is returning to Palo Alto in September.

Pye Canada Limited Open Ottawa Branch

Pye Canada Limited have announced the opening of a new branch office at 78 Bank Street, Ottawa. This new sales office will be under the supervision of Mr. Eric Sullivan, manager of the Scientific Instruments Division.

Although specializing in scientific instruments manufactured by W. G. Pye Limited and Unicam Instruments Limited both of Cambridge, England, Mr. Sullivan and his staff will also handle enquiries regarding other Pye products.



Not on your life! Nothing less than complete crystal dependability will do — up there. You can't afford a single failure. So make sure — with Snelgrove. Snelgrove crystals are pre-tested for maximum, built-in resistance to time and temperature changes. Snelgrove assures you top efficiency, endurance, long life — all the Snelgrove extras you need — at no extra cost.

NOTHING LESS WILL DO...

CANADA'S FOREMOST
FREQUENCY CONTROL
SPECIALISTS

LICENSED BELL SYSTEM
PATENTS

C. R. SNELGROVE CO. LIMITED

TELEPHONE: HICKORY 4-1107 - - - 1108
BOND AVENUE, DON MILLS, ONTARIO
P.O. BOX 10, STATION R, TORONTO 17

For further data on advertised products use page 61.

You'll be seeing more of

Bendix-DECCA

The Low Frequency Area-Coverage Navigation System
of pin point accuracy



DECCA

THE OUTSTANDING ALL-PURPOSE SYSTEM

Bendix-Decca has universal application as an all-weather system. Its low frequency transmissions are not affected by buildings, beyond line of sight and below the curvature of the earth. A single station covers an area of over 250,000 square miles from ground level to all air-able flight altitudes. No shadow effects or reflections occur to interfere with the accuracy of the Bendix-Decca information. The system is equally applicable to boats, ground vehicles, helicopters and fixed wing aircraft.

Bendix-Decca incorporates a Flight Plotter which can also trace on a chart the exact course being travelled.

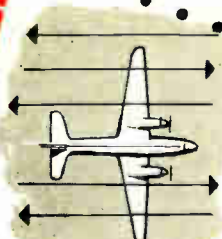
Decca has already been proved by years of service in Great Britain and Europe, and Bendix-Decca now brings to both Canada and the United States the ultimate in safety and safety of an area-coverage all-weather system.



Marine Navigation



Fixed Wing Navigation



Aerial Photography and Survey



Helicopter Navigation



Rescue Operations



Air-Traffic Control

Bendix
PACIFIC DIVISION
Bendix Aviation Corporation
 NORTH HGLLYWOOD, CALIF.

Represented in Canada by COMPUTING DEVICES OF CANADA, LTD., Box 508, Ottawa.

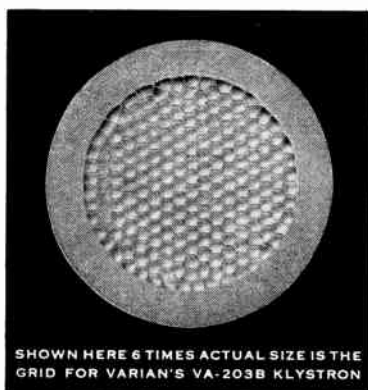


Lesson from a bee...

The cell structure of a honeycomb inspired this ingenious klystron grid-making technique. Pioneered and perfected by Varian as a mass production process performed chiefly under microscopes, it consists of forming a bundle of fine copper-plated aluminum wires into a solid, honeycomb-like structure . . . then etching out the aluminum.

The end product is a pure copper grid having extremely low microphonics, high power handling capacity and great rigidity . . . essential requirements for airborne klystrons.

Of all known methods, this has proven the *only* one that assures optimum grid performance and reliability under conditions of extreme shock and vibration. Painstaking techniques like this typify Varian's manufacture of more than 60 different klystrons for every application.



SHOWN HERE 6 TIMES ACTUAL SIZE IS THE GRID FOR VARIAN'S VA-203B KLYSTRON

FOR COMPLETE INFORMATION
write for the new Varian klystron catalog . . .
address Applications Engineering Dept.



THE
MARK OF
LEADERSHIP



VARIAN associates
OF CANADA, LTD.
GEORGETOWN, ONTARIO

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

For further data on advertised products use page 61.

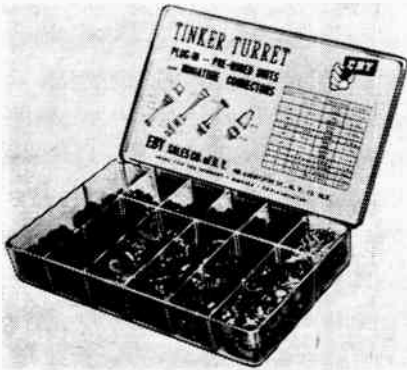
NEW PRODUCTS

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 61. Just mark the products you are interested in on the coupon on Page 61 and the information will be in your hands within a few days.

● Tinker Turret Kit No. 1050

Item 1172

This kit comprises individual parts with which to assemble any type of 7-pin turret assembly or 7-pin miniature chassis or in-line cable connectors. The component parts are housed in a sturdy plastic box with separate compartments for each item. On the inside lid of the box are drawings illustrating the assembly and usage of each part, also the list price of each individual part.



The basic function of the kit is to provide the lab technician, experimenter, engineer or any other individual or group with the parts to construct any type of turret assembly to fit individual requirements.

Parts are available for replacement in packages of 20 pieces.

● Catalog Of Waveguide Components

Item 1173

A new 4-page catalog of Waveguide Components for use in the 26.1 kMc to 39.5 kMc (8-10 mm) band is now available.

Manufactured by a well known producer of precision scientific instruments in Great Britain, these Waveguide Components are now being introduced to the market on this continent.

● Sweep Frequency VSWR Measuring System

Item 1174

Band-sweeping equipment for continuous display or recording of VSWR in the region 8500 to 9600 mc for laboratory research or production-line testing applications is described in a new leaflet, identified as Form 125-256. The system illustrated in the literature is described as being of the instant-reading, ratiometer type. Description of the unit points out that the continuous display independently adjustable as to both center frequency and sweep width anywhere across the rated spectrum, provides an ideal facility for observation of adjustments made on broadband microwave components while undergoing measurement.

Specifications, listed in the sheet, cover details on the meter scales, the cathode-ray indicator, the klystron oscillator, the bidirectional coupler, the calibrated load, and the output arrangements for use with an Esterline-Angus Recorder. System accuracy of ± 2 per cent is indicated, physical arrangements and dimensions are given, and the price is included.

● Microwave Standing Wave Indicator

Item 1175

The new Elliott Type B433 Microwave Standing Wave Indicator for 3.2 cm waveband (10,000 Mc/s) is extremely accurate. At any wavelength within a 12% band centered on 3.2 cm the overall voltage reflection coefficient obtained when measuring a perfectly matched load is not worse than 0.003.

Total enclosure eliminates dust and ensures long life and suppression of radiation problems. A unique Hybrid Tee probe matching transformer eliminates reactive component errors.

Other features of the unit are: maintenance of uniform coupling to the probe as it moves along the waveguide; and slow-motion, two-speed drive for probe movement.

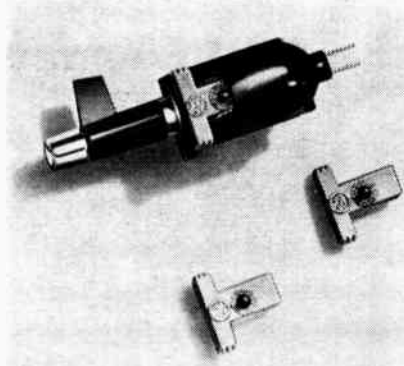
The companion Type 443 Rotary Attenuator brings a new standard of precision to measuring and a new ease in reading.

● Half-Mil Stylus For "Fluxvalve" Pickups

Item 1176

A new high precision in the playing of microgroove recordings can be attained by owners of "Fluxvalve" pickups through the use of a stylus with one-half mil tip radius.

The half-mil stylus can be installed in any "Fluxvalve" simply by placing in the pickup the proper plastic insert, a job which the owner can complete in a second or two without the use of tools.



The ultra-small tip of the stylus shows up particularly well in reproducing the remarkable top sheen and definition of the newest recordings, which carry recorded frequencies as high as 15,000 c.p.s. In addition, the small tip reduces wear on these new "miracle" recordings, since it is able to follow around the tiny twists of the top frequencies, rather than plowing through them.

Another discovery made by users of the half-mil stylus is that it makes old records sound new, by "riding" lower down in a portion of the groove that has not been worn in use. The combination of the half-mil stylus with the "Fluxvalve" is particularly appropriate, because of the very high compliance of the pickup, which allows it to track at two or three grams. This low tracking force is a necessity with such a sharp stylus.

● Single Meter Vacuum Gage

Item 1177

A new single meter type vacuum gage, with a range of 0-100 microns Hg full scale, has recently been announced.

The instrument has a four inch indicating meter with knife edge pointer for direct reading on a logarithmic mirror meter scale. Half scale on the dial face is 15 microns, providing excellent readability for low micron measurements. The instrument is highly accurate throughout the entire range.



An improved design of the gage tube, incorporating the Hastings patented temperature compensated noble metal thermopile, provides greater sensitivity and higher accuracy in the low micron range. The noble metal thermopile is housed in a nickel plated gage tube, thus affording freedom from outgassing, system contamination and corrosion. The gage tube is extremely rugged, has quick response, and is not damaged by release to atmospheric or positive pressures. The gage tube need not be removed during cleaning of the vacuum system.

The instrument operates on 115 volt a-c and includes an internal voltage regulator to eliminate any effects from line voltage variations. The basic circuit is the same circuit which has been successfully employed in other Hastings vacuum and pressure measuring instruments.

The manufacturer also reports the production of two other new single meter model instruments . . . a vacuum gage with a range of 0-1000 microns Hg, and an absolute pressure indicator with a range of 0.1-20 mm Hg. These instruments are suitable for laboratory use or industrial installations.

Dimensions of the sloping front instrument case are $5\frac{1}{4}$ " x $5\frac{3}{4}$ " x $7\frac{1}{2}$ " and it is also available for panel mounting. The gage tube has a standard $\frac{1}{8}$ " i.p.s. male thread coupling for connection to the vacuum system.

● Illuminated Probe

Item 1178

"Probe-lite", a new illuminated probe, combines both a probe and a source of illumination in one simple device no larger than the probe alone, thereby filling a long-felt want of technicians, service men and experimenters.

The device eliminates the necessity of holding an extra flashlight, usually in an awkward position, and in effect gives the user the benefit of an extra hand.

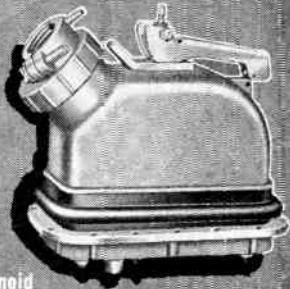
Operation is simple: the tip of the cord set is inserted in jack of the "Probe-lite" and instantly a brilliant, pre-focused light is available right on the work.

"Probe-lite" has an extra long, slender probe tip to provide easy access in difficult areas. This durable light-weight device uses a standard pre-focused globe and a Penlite battery, No. 912 Eveready, or equal.

(Turn to page 56)

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NEW PRODUCTS

(Continued from page 56)

● Potted Transformers Use Heat-Conducting Compound Item 1182

A newly developed heat-conducting compound is making possible better and more economical transformers for use in television receivers.

It is common practice to depend on air circulation around the outer surface of the transformer for cooling, but conventional construction provides a very poor path for the heat traveling from the inner windings to the outer surface of the unit.

A typical television power transformer of conventional construction may have a difference in temperature from the inner windings to the outer surface of 20°C. to 25°C. when measured according to RETMA standards.

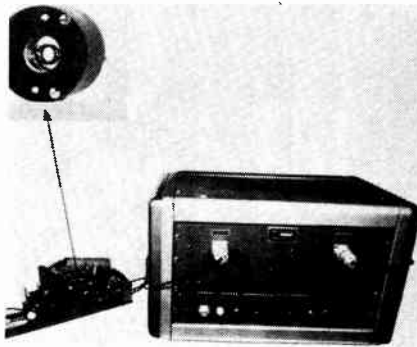
When this transformer is potted with the new heat-conducting compound, this difference is reduced to about 10°C. to 15°C. Thus the heat is moved from the inner windings to the outer surface where it can be dissipated by air circulation.

Potting compounds of various types have been used for many years, and the term "potted transformer" has come to suggest best quality and low price. With this compound it is possible to have the advantages of a potted transformer at the same cost as a conventional unit, and, in certain cases, to realize a cost saving.

In general, potting is most effective in transformers of 100 volt ampere capacity and larger. With color television coming into its own, the more complicated electronic circuits will require larger transformers, and the advantages of a heat conducting compound can be utilized to a greater degree.

● High Speed Light Pulsing Modulation Apparatus Item 1183

Light pulses in the microsecond range and modulated light beams at variable frequencies from D.C. through the video region are easily obtained with a new model high speed light pulsing and modulation apparatus. Applications for this equipment to date include use in such areas as sound-on-film, video-on-film, polarimetry, densitometry, photography, photometry, interferometry, measurement of semiconductor parameters, psychological experiments and biological studies.



The light modulator, a crystalline analogue of a Kerr cell, is made up of a Z cut (001) plate of ammonium (ADP) or potassium (KDP) di-hydrogen phosphate. The crystal plate is placed between electrodes which will allow light to pass in the same direction as the applied electric field. For normally incident collimated light, the unit has the properties of a polarization retardation plate, with magnitude of retardation directly proportional to the applied voltage. When the crystal device is placed between polarizers, a light beam can be intensely modulated in accordance with the voltage applied to frequencies well beyond the video region.

Five models of the light modulator are available to meet a wide range of operating requirements. Baird - Atomic says one of its models — JV-2 — provides the highest degree of versatility since it features a moderately large angular field, has low voltage requirements and is designed for use at frequencies from D.C. to 10 megacycles per second. Modulators of special crystal or case dimensions can be supplied on order.

When used with a high voltage pulser, the light modulator "floats" between the plates of two 5C22 thyatron tubes. Initially, this system is at the same potential as the power supply which has charged the high voltage plate condensers. At the beginning of the pulse, one of the 5C22 thyatrons is fired, bringing one electrode of the light modulator to ground potential. The pulse is terminated with the firing of the second thyatron, which brings the other end of the crystal to ground potential. Both thyatrons then extinguish, and the charging process begins again.

Two models of high speed pulsers are available, both of which incorporate a variable high voltage power supply and a trigger rate generator which is set to approximately 20 c.p.s. The two units differ principally in output pulse lengths and rise and decay times. Type JK produces pulses having a rise and decay time of approximately 0.2 microsecond and continuously variable widths from 50-1000 microseconds. Type JS produces pulses having a rise and decay time of approximately 0.1 microsecond and a length of 2 microseconds. Both require approximately 200 watts at 115 volts, 60 cycles.

Pulse amplitudes are continuously variable from 2.5 kv. Special models with different pulse widths or repetition rates can be built on request. For signals of arbitrary shape, special modulating amplifiers can be supplied for audio or video bandwidths. Tuned amplifiers requiring very little power are adequate for fixed or variable single sine wave light intensity modulation.

● "Teflon" Tape Insulation Miniaturizes Transformers Item 1184

A new line of high voltage transformers has been developed which utilizes Teflon tape to meet aircraft requirements for smaller, lighter and more rugged units. The transformers are used for airborne radar and electronic applications.

The manufacturers of the transformers report that the high dielectric strength and high heat resistance of the Teflon tape insulation permitted them to produce a 42,000 volt transformer weighing only 14 pounds. A 20 pound minimum weight was required using other insulation. In the case of a smaller transformer, the weight was reduced from 11 to 3 pounds.

Teflon tape can be continuously used up to 550°F. This heat resistance greatly assists the miniaturization since smaller transformers have higher temperature rises. This tape may be used in thicknesses of .002", .005" and .010". These thin sections of Teflon tape have a high dielectric strength of 400-500 volts/mil, a low dielectric constant of 2.0, and a dissipation factor of .0002. These values are unaffected by high temperature operation.

The tape is used for interlayer insulation, wrapping of hypersil cores, wrapping the lead wires, as pads, for "U" insulation and for case lining to house the transformers.

Teflon tape is used without fear of field failures because it will not generate a conducting carbon path due to arcing; it has a volume resistivity of 10^{15} ohm-cm and a surface resistivity of 10^{13} ohms at 100% relative humidity; it has zero water absorption and is fungus resistant.

A thermo-setting fiberglass wrapping is used over the Teflon to permit liquid resin impregnation of the units. This impregnation prevents internal movement as well as moisture and dirt penetration.

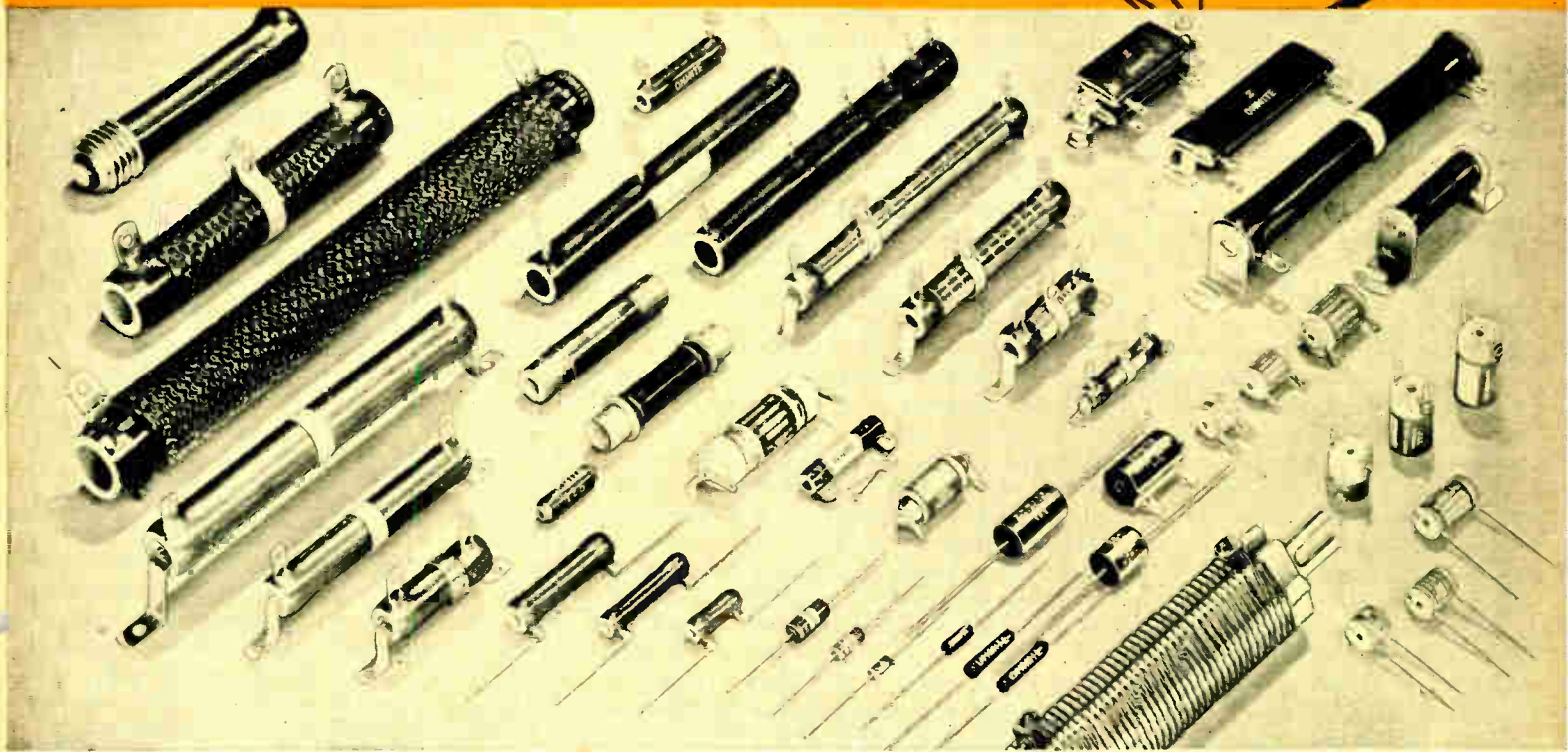
(Turn to page 60)

For further data on advertised products use page 61.

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NEW PRODUCTS

(Continued from page 58)

● Electronic Analog Computers Item 1185

A 16 page, fully illustrated catalog describing the complete line of Philbrick Electronic Analog Computers has just been released. Complete descriptions are presented on the following: Areas of Application in Industry, Military and Business; Modular Concept of building new or expanding existing installations; Exclusive Philbrick Electronic Graph Paper for instantaneous and automatic calibration of both voltage and time on the oscilloscope and simultaneous display and precise comparison of as many as five variables; K3 Series of Analog Computing Components (both linear and non-linear) for rapid setup of problem where operator has mini-

mum knowledge of electronic circuitry; New Stabilized Units; Central Signal Components; Regulated Power Supplies; K2 Series of Plug-in Components offering the most computing per dollar invested; New Function of Two Variables Component; Delay Line Synthesizer and other miscellaneous computing equipment.

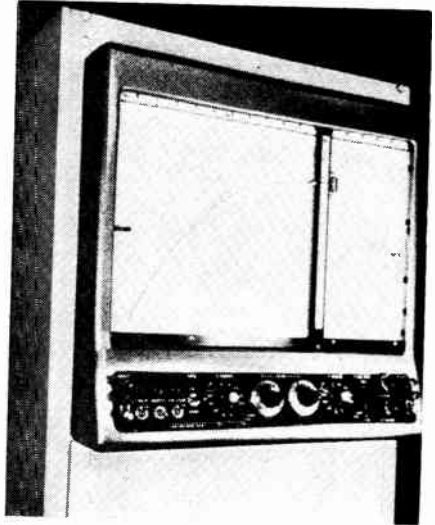
● Rack Mounting Autograf X-Y Recorder

Item 1186

Development of the Model 4, Autograf X-Y Recorder is announced. Built specifically for rack mounting, the Model 4 incorporates many special features in addition to those found on the widely used Models 1, 2, and 3 Autographs. Occupying 19 $\frac{1}{4}$ inches of standard rack space the Model 4 Autograf accommodates either 11 x 16 $\frac{1}{2}$ or 8 $\frac{1}{2}$ x 11 standard graph paper on

an illuminated translucent table equipped with a self contained vacuum hold down system. Illumination of the table facilitates alignment of the paper and comparison of curves when desired.

Smooth, stepless range controls, selected by detent switches permit fitting of arbitrary voltages to any desired portion of the recording area in addition to full range zero set and one scale length of zero suppression on each axis. Three step input filters on each axis permit smooth plotting of unfiltered signals.



Specifications:

Two independent servo actuated drives for X and Y axes; free of ground

Paper size: 11 x 16 $\frac{1}{2}$ or 8 $\frac{1}{2}$ x 11 standard graph paper.

Recording speed: $\frac{1}{2}$ second for full scale travel, Y axis; 1 second speed on X axis.

Voltage ranges: 5 millivolts full scale to 100 volts on Y axis; 7.5 millivolts full scale to 150 volts on X axis. Other ranges available on request.

Input resistance: 200,000 ohms per volt up to 10 volt range; 2 megohms on all higher ranges.

Accuracy: Better than .25% of full scale; resetability better than .1% of full scale.

Available as curve follower without external attachments.

Power: 115 volts, 60 c.p.s., 100 watts. Other voltages and frequencies available.

● Transistorized Power Line Carrier

Item 1187

A new transistorized power line carrier for use in telemetering and control has recently been announced.

The new unit is designed to permit maximum utilization of the crowded power line — carrier frequency spectrum (40-200 Kc. s). A communication channel for sub-audio sine wave signals or on/off signals is available in any 500 cycle portion of this spectrum.

Outstanding features of the new carrier include transistorized receiver and transmitter and a built-in power supply. Only two vacuum tubes are contained in the equipment and these are used in the power output stage of the transmitter. Unique circuitry in this part of the carrier provides reliable operation should one of the two tubes fail.

The built-in power supply of the new product operates from AC or DC primary power. Both sides of the input line are fused for complete protection of the primary source.

The several types of signals which can be sent with the carrier include telemetering, teleprinting, telegraph, load control, remote control, remote signalling and supervisory indications.

FM detection provides constant receiver output despite wide range variations in power line attenuation characteristics.

(Turn to page 63)

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

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Capacitance: $1\mu\text{fd.}$ to 100 $\mu\text{fd.}$
Resistance: 0.1 ohm to $10\text{M}\Omega$
Dimensions: 11 $\frac{1}{2}$ " x 19" x 10"
Weight: 33 lbs.

Marconi Instruments Department

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For further data on advertised products use page 61.

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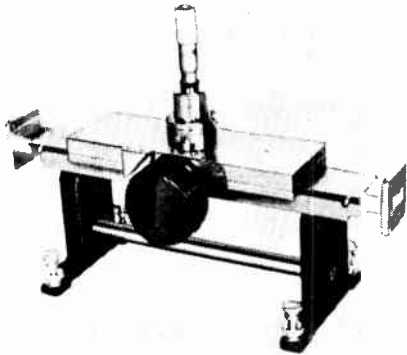
NEW PRODUCTS

(Continued from page 60)

● High Power Variable Reactance Instrument

Item 1188

Model 910, a new versatile high power variable reactance for the 8.20-12.4 (kmc) frequency range, has recently been developed. This instrument is used to introduce a standing wave of desired magnitude and phase in a waveguide transmission line.



Model 910, rated at 300 kw. peak power in matched line, operates directly at any power level up to the breakdown power level of the waveguide. Model 910, according to the manufacturer, reduces testing cost by eliminating low power measurements and set-ups in development and production.

The magnitude of the standing wave ratio in the line can be varied from 1.02 to 2.0 by means of a micrometer adjustment on the top carriage. The residual V.S.W.R. is less than 1.02 and the phase of the standing wave is separately variable by the movement of the carriage. Phase adjustment is greater than one-half guide wavelength at the lowest frequency. The phase scale offers direct reading to 0.5 mm with vernier reading to .05 mm.

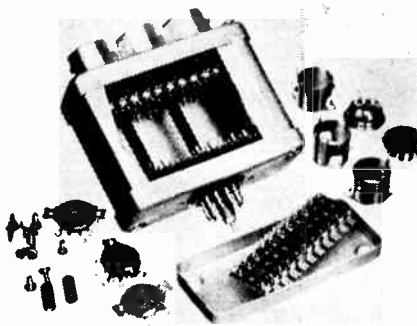
Applications of the Model 910 are: high power breakdown studies, plotting Rieke diagrams, determining characteristics of high power magnetrons and klystrons, and determining breakdown power of system components.

The overall length of the Model 910 variable reactance is 12 inches. Conducting surfaces are silver plated and mechanical parts are of stainless steel or chrome plated. Plain cover flanges mate with UG cover or choke flanges.

● Multi-Use Plug-In Kits

Item 1189

These flexible Vector assembly kits provide simple readily wired packages utilizing Vector Lip-Loc cases and Deck-Turrets which may be arranged to mount various circuit assemblies. For example, Vector Kit 4-EK3, with its accessories, may be set up



to mount 1 to 3, either 7 or 9 pin, miniature sockets in any order using adapter rings to accommodate different socket diameters. Socket holes are $\frac{3}{4}$ " diameter with slots

for saddle screws. Plug buttons are supplied to close socket holes where tubes are not required. 7 or 9 pin sockets are supplied, and also an equal number of JAN type shield bases of each type. An extra undrilled base is supplied so that larger plugs, such as the "Blue-Line" may be mounted. Kit is assembled with two Decks with ZIP terminals, 9 pin sockets, and an 11 pin octal type plug-in case. One extra third deck is supplied as a loose part which may be inserted in the stack if desired. Overall height of 3, 4 and 5 socket plug-in units is 3".

● New "G-Line," Low Power Replacement For Coaxial And Waveguide Transmission Line

Item 1190

The G-Line, a new economical single wire surface wave transmission line assembly designed to eliminate coaxial trans-

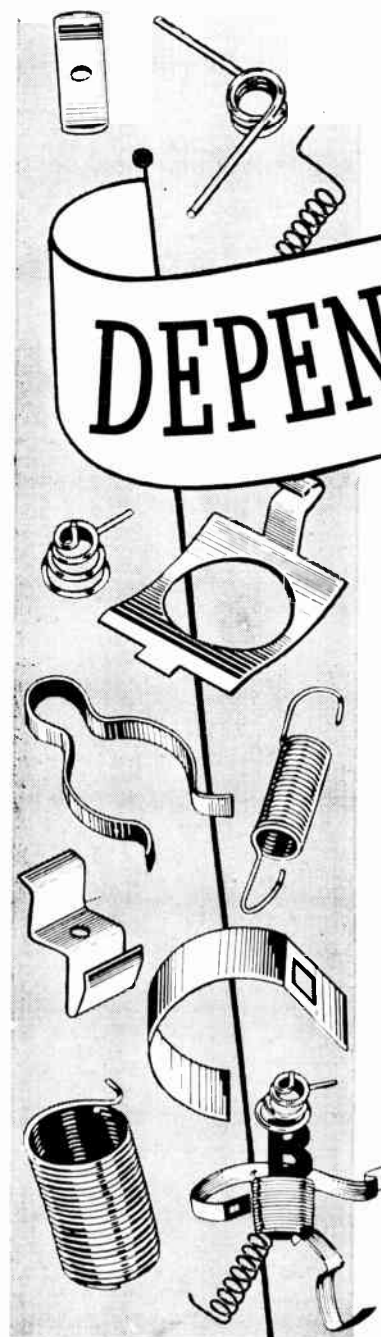
mission line and waveguide in low power microwave and television broadcasting has been announced.

Designed for high efficiency operation at frequencies from 1700 to 2400 megacycles, the G-Line assembly consists of a modified copper wire, coupled at each end with identical RF field transformers (launcher and collector). The transformers serve to couple the transmission line ends to the coaxial feed line and provide an efficient transition between the radial field on the wire and the transverse electric field in the coaxial feed line. A simple, highly efficient de-icing system is built into each RF transformer.

Power rating is equal to RETMA 7_N 50 ohm air dielectric line. Operating wire loss is extremely low ± 0.5 db per transformer.

The new G-Line is simple to install — requires no elbows, bends or complicated plumbing. It has the lowest wind loading of any line currently available, requires no pressurization and little maintenance.

(Turn to page 64)



WHATEVER YOU MAKE

DEPENDABILITY

COUNTS

All the components that go into your product contribute to an efficient over-all operation—often the spring work involved plays a very important part. You need dependable materials, you need a dependable supplier. Next time you order springs, call Bohne Industries—hundreds of manufacturers rely on them.

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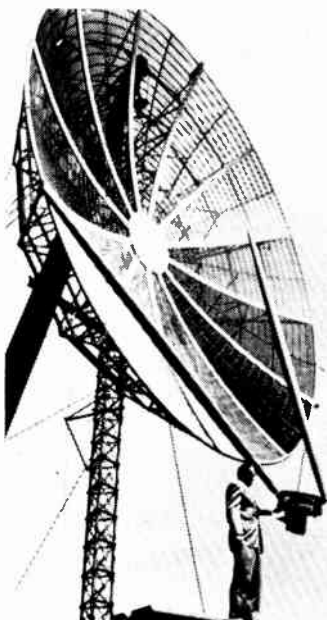
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● **28 Foot Parabolic Antenna
For Tropospheric Scatter**

Item 1191

Availability of a new 28 foot parabolic antenna for tropospheric scatter transmission has recently been announced.

Antenna feeds have been designed for use in the 450 to 2700 mega-cycle range. These new units are the only large tropospheric antennas on the market for which actual verified manufacturer's pattern and gain measurements are available. Quality control tests are made on these antennas with Prodelin's new scatter site turntable facilities.



Utilizing an aluminum mesh reflecting surface and back-up support, a 65 lb. wind load rating is provided. The new 28 foot parabolic antenna achieves excellent structural stability through the use of popular tower "K" frame construction using all aluminum members.

A unique new design feature permits the raising and lowering of the antenna feed to facilitate installation and maintenance. To eliminate transportation problems and minimize damage normally attendant to the shipment of large crate items, this antenna is shipped in 12 sections each of the reflecting surface and "K" frame members and then enclosed into two easy to handle shipping boxes.

● **50% Smaller Mica Capacitors
From New "K" Gaged Mica**

Item 1192

Tiny mica capacitors, having the same capacity but only $\frac{1}{2}$ to $\frac{1}{3}$ the size previously used in transistorized and other printed circuits, may now be manufactured from new "K" gaged mica which has recently become available. "K" gaging is a new electronic method of accurately gaging mica film which permits utilizing smaller area mica to obtain pre-determined capacity. Any desired tolerance can be held on electronically "K" gaged mica film including tolerances as close as the mechanical equivalent of .00025. After silvering, costly time-consuming hand adjusting or scraping on mica may be entirely eliminated because capacity is accurately pre-determined by "K" gaging. In addition, wastage is cut 40% to 50% by using "K" gaged mica. "K" gaged mica is offered to design engineers as an aid in creating new transistorized printed circuits utilizing

much smaller components than formerly possible.

● **Vulcanized Fiber And
Laminated Plastics Bulletin**
Item 1193

A new 4-page bulletin entitled "Engineering Materials To Improve The Design and Performance Of Your Product" describes and illustrates the physical properties and use benefits of two basic engineering materials — National vulcanized fiber, a converted cotton cellulose, and Phenolite laminated plastic, a family of thermosetting high pressure laminates.

Sixteen photographs and drawings illustrate a few of the many industrial uses of these materials: noiseless gears, thrust washers, cams, terminal blocks, armature slot insulation, shock plates in gun mounts, printed circuits, abrasive wheels, textile bobbins, waste baskets, fuel pumps, carburetors, propeller pitch controls, athletic equipment, luggage, and material handling receptacles. Tables list fiber and Phenolite grades, specifications, characteristics and applications.

● **Rack And Panel
Connector Catalog**
Item 1194

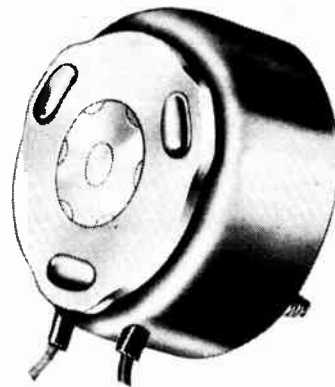
The new R2 Catalog issued by Amphenol Canada Limited gives a complete listing of the rack and panel connectors manufactured by this company. Blue Ribbon connectors, in standard, miniature and circular types, pin and socket connectors, and printed circuit connectors are included. Dimensions, current ratings and availability are given for each type.

● **New Rotary Solenoid
Weighs 1½ Ounces**
Item 1195

Smallest of eight basic sizes, the new Model BD1E rotary solenoid weighs 1½ ounces and has a diameter of one inch.

Starting torques for the entire line now range from the new model's .2 lb.-in. to 54 lb.-inches, based on ampere-turns for normally intermittent duty cycle and rotary stroke of 45 degrees.

Standard rotary strokes for the new solenoid are 25, 35 and 45 degrees, either clockwise or counter-clockwise rotation. Most of the features available on the other seven models are also available on the BD1E. Voltage requirements of from two to 200 volts D.C. can be accommodated with coil wire gages ranging from No. 25 to No. 40.



All eight models employ the same principle of operation. The magnetic pull moves an armature along the solenoid axis and this linear action is efficiently converted into rotary motion by ball bearings on inclined races. The resulting snap-action power can be harnessed with a minimum of linkages.

(Turn to page 66)

For further data on advertised products use page 61.

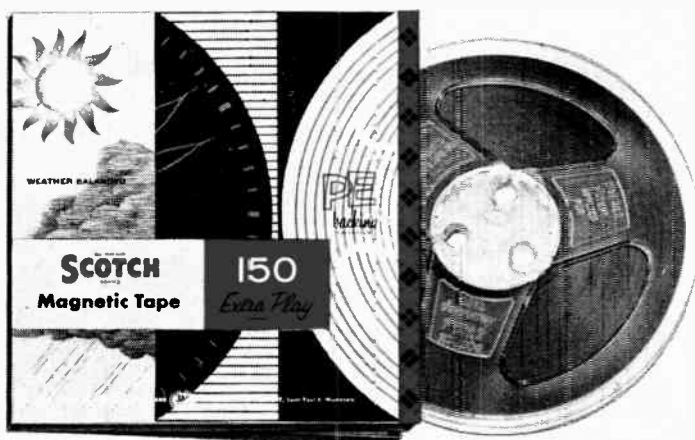
Now! Your choice of backings

each with "Scotch" Brand's proven potent oxide



Famous acetate-backed "Extra Play" Tape 190 new economy price saves you 28%.

Here's your chance to buy the magnetic tape everyone's talking about—at a special *new economy price!* It's popular "SCOTCH" Brand "Extra Play" Magnetic Tape 190, first long play tape on the market and *still* the best seller. With 50% more recording time on every reel...higher fidelity...strength to spare...high potency oxide... "SCOTCH" "Extra Play" Magnetic Tape 190 has been making recording history. Buy now and save 28% on every reel!

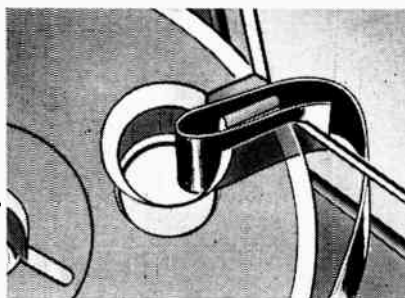


New polyester-backed (Made from DuPont's "Mylar"*) "Extra Play" Tape 150— for extra strength.

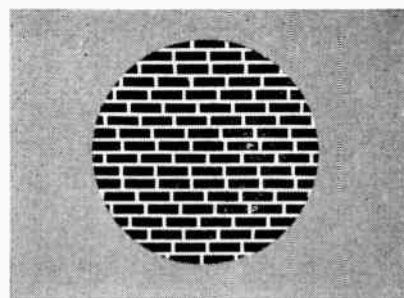
Years ago "SCOTCH" Brand pioneered tough polyester-backed magnetic tape for experimental government orders. Now *you* can enjoy the *same* benefits of "SCOTCH" Brand research and development with new "Extra Play" Magnetic Tape 150. "SCOTCH" Brand's extra-strength polyester backing assures you long-lasting recordings...perfect tape performance in all weather, all climates—(It's "Weather-Balanced"! "SCOTCH" Brand's exclusive high-potency oxide coating guarantees you superior recording quality on any machine.

*"Mylar" is a registered Du Pont trade-mark.

Both of these
SCOTCH Magnetic Tapes
offer "Loop-Lok" Reel and
famous high-potency oxide



EASIER THREADING with new "Loop-Lok" Reel! Saves time . . . saves tape! It's "SCOTCH" Brand's exclusive "Loop-Lok" reel. Just loop tape around the new-design center pin for instant threading. Tape locks tight without troublesome wrap-around, releases fast at end of reel.



CRISP, BRILLIANT SOUND thanks to newest oxide coating! By laying fine-grain oxide particles in a neat, orderly pattern (as shown here), "SCOTCH" Brand is able to pack in thousands more particles than standard long play tapes—to produce a super-sensitive magnetic recording surface.

SCOTCH REG. TRADE MARK *Extra Play* **Magnetic Tapes**
BRAND

MINNESOTA MINING & MANUFACTURING OF CANADA LIMITED • LONDON, CANADA



TUBELESS AUDIO COMPENSATION

only 14 db
insertion loss!

The Model 4201 Program Equalizer has been developed to provide utmost versatility for the compensation of sound recording and broadcast channels. High and low frequencies may be boosted or attenuated while the program is in progress with negligible effect on volume levels. It may be switched in or out instantaneously to permit compensation at predetermined portions of the program. This feature is especially useful in tape dubbing work.



Model 4201, Program Equalizer

FEATURES:

Equalization and attenuation in accurately calibrated 2 db. steps at 40, 100, 3000, 5000 and 10,000 cycles. Insertion Loss: Fixed at 14 db. with switch "in" or "out." Impedance: 500/600 ohms. Low Hum Pickup: May be used in moderately low-level channels.

send for Bulletin E for complete data
Net Price \$195.00
F. O. B. North Hollywood

Model 4201 Program Equalizer is also available for the custom builder in kit form with complete wiring instructions. Send for Bulletin TB-4.

Representatives in
Principal Cities

HYCOR

Division of
International Resistance Company
12970 Bradley Avenue,
Sylmar 9, Calif.

NEW PRODUCTS

(Continued from page 64)

Professional Radiation Counter Kit, Model RC-1

Item 1196

This radiation counter provides design advantages found only in units costing several times its low kit price. It incorporates features essential to the serious prospector. High sensitivity is provided, with ranges of 0-100, 600, 6,000, and 60,000 counts per minute, and 0-.02, .1, 1, and 10 milliroentgens per hour. A type 6306 Bismuth tube is employed in the probe, and the probe and a radiation sample are included in the kit price. The circuit employs 5 tubes (plus a transistor) to assure stable and reliable operation. High quality, 4½" 200 micro-ampere meter eliminates "guess work" and indicates radiation level directly in c.p.m. or mR/hr. In addition, transistor oscillator provides aural signal from panel-mounted speaker. High voltage power supply is "packaged" pre-built unit with reserve capacity above 900 volt level at which it is regulated. Merely changing regulator tube would allow use of scintillation probe if desired.

Fulfills requirements of those who want a prospecting instrument that can be relied upon. Has selectable time constant, to allow for different rates of travel over the area being investigated. Measures only 9½" high x 6½" wide x 6¼" deep, and weighs only 6½ lbs. Not to be confused with novelty radiation detection devices on the market. A top-quality instrument, yet simple to build.

Telescoping Antenna Mast

Item 1197

A completely new type of telescoping mast was introduced recently. The mast, available in 30, 50 and 100 foot hydraulic or pneumatic models, may be mounted respectively to station wagon, small trailer or truck, or used as an independent field unit.



The mast is ideal for mobile radio, broadcast or microwave survey work; TV broadcast remote pickup and for emergency communications. The patented valve system incorporated into each model provides co-ordinated sequence of sectional elevation for quick and easy guying. The 100 foot mast may be raised to full extended height in 15 minutes. The 30 foot car-top model nests 18 inches above roof-top and is operated from the vehicle's electrical system. Pictured here is the self-contained 100 foot portable model, supplied complete with trailer, an ideal unit where the mast is to remain erected for an extended period of time, yet must be mobile for quick relocation.

GT-66 — A New Phototransistor

Item 1198

A new germanium P-N-P alloyed junction three-lead phototransistor has recently been produced. Known as type GT-66, it is a miniature, light-sensitive photocell intended for use in circuits employing AC



amplification for modulated light. It may also be used as a two-lead device with DC (unmodulated) light. Even though it is a miniature, it is capable of performance at a level sufficient to operate a relay.

Some possible applications include: automobile headlight dimmers, tape and punch card reading, optical sound play-back, liquid level control, television receiver automatic brilliance control, industrial safety devices, automatic door openers and other ingenious applications. It is also sensitive to relative position of the light source, making it useful in positioning controls.

1.1 MC Frequency Counter

Item 1199

A new multipurpose electronic counter measuring frequency 10 c.p.s. to 1.1 MC, period 0.00001 c.p.s. to 10 KC, and time interval 3 microseconds to 27.8 hours has recently been announced.

The new counter, Model 523B, presents direct reading results in seconds, milliseconds, microseconds, or kilocycles. Accuracy of frequency measurement is ± 1 count \pm crystal stability of 2 parts per million per week. A special pulse output permits Z-axis modulation of an oscilloscope to visually observe time interval start and stop points on an input waveform, shown in the figure as bright spots on the input signal.

The instrument includes a wide selection of gating and display times or may be controlled manually. An automatic illuminated decimal point facilitates interpretation.

The use of compact etched circuitry and conservative component ratings increases both reliability and portability. The etched circuits are laid out for optimum visibility and their sectionalized design, together with trouble localizing lights in the circuit, greatly eases servicing.

Model 523B is designed for maximum dependability and operating simplicity and may be used readily by non-technical as well as semi-skilled or professional personnel, the manufacturer states.

For further data on advertised products use page 61.

• Remote Indicating And Mechanical Counter

Item 1200

Two new mechanical totalizing counters have been designed for use for remote indication and control shaft position, telemetering by radio link, direct readout to card punching equipment, remote control of communications equipment, and as components of analog and digital servo systems.

Known as the Digicon and Digipot, the counters have ten contacts or a potentiometer coupled to each visual indicator wheel. They are rated for continuous duty at 1,000 r.p.m., or at 2,000 r.p.m. intermittent duty. Life without maintenance is claimed in excess of 50,000,000 counts.

Size is small — one and three quarters inches wide for the three digit unit, and two and three quarters inches wide for the five digit unit. Number wheels are lighted. Additional features claimed are high speed operation from either step or shaft rotation inputs, and extreme stability under adverse environmental conditions.

• Dynamic Force Gages

Item 1201

A new series of force gages are now available for the accurate measurement of dynamic forces in any system or structure. New methods of dynamic testing are claimed through the use of this device, which provides a voltage output proportional to dynamic force. Applications include the testing of plastics for their dynamic properties, measuring the dynamic driving forces of electro-dynamic vibration tables, and measuring the transient shock forces in ejection type mechanisms and shock absorbers.

The Endeveco Model 2103 and 2104 force gages provide large, self-generated outputs of approximately five volts full scale. They are available in full scale ranges of 100, 500, 1000 and 5000 pounds. The unloaded natural frequency of the units ranges from 20 kc to 50 kc, providing flat frequency response to at least 5000 c.p.s. The physical design of the gage permits its inclusion as part of the support structure or coupling linkage. The basic electro-ceramic sensing element of the pickup is a new development claimed to provide large output and linearity with temperature from -65°F to $+230^{\circ}\text{F}$.

• 3-Watt Axial-Lead

Vitreous Enameled Resistors

Item 1202

A tiny 3-watt axial-lead, vitreous-enameled resistor is now available in a wide range of resistance values, from 1 to 10,000 ohms. The stock line now consists of three sizes rated at 3, 5, and 10 watts. The 3-watt size is only $\frac{1}{4}$ inch in diameter and $\frac{1}{8}$ inch long.

Axial-lead resistors are simple to mount by their tinned wire leads and occupy small space because of the absence of mounting brackets. Axial-lead resistors, particularly the very small sizes, are especially suited for printed circuits, terminal board, and point-to-point wiring applications.

These small, power-type resistors with axial leads are wire-wound units with steatite cores and a special-formula, vitreous-enamel coating. The resistance wire and terminal lead are both welded to the end cap, thus assuring perfect and permanently stable electrical connections.

All parts of these axial-lead resistors — core, resistance wire, vitreous-enamel coating, and terminal bands — are "thermally balanced," so as to expand and contract as a unit. This enables the resistors to stand up under high operating temperatures without loosening of terminals or cracking, and subsequent entrance of moisture.

Fast, accurate VOLTAGE MEASUREMENTS 10 cps to 700 MC

Hewlett-Packard, leader in electronic test instruments, offers 3 precision vacuum tube voltmeters that provide coverage for almost all voltage measuring needs. Together these three instruments cover frequencies 10 cps to 700 MC, and measure voltages from 0.1 millivolts to 300 volts. Each has high sensitivity, wide range, simple operation and broadest usefulness in research or production testing. Construction is sturdy and of highest quality. Accessories extend voltage range to 30 kilovolts and make possible measurements from 1 microampere to 3 amperes.



NEW! -hp- 400AB Vacuum Tube Voltmeter

Here is a new precision instrument for general ac measurements that can be the most useful equipment on your bench. -hp- 400AB covers frequencies from 10 cps to 600 KC, and measures voltages from 0.3 mv to 300 v. Accuracy is $\pm 2\%$ from 20 cps to 100 KC. A high input impedance of 10 megohms with 25 μmf shunt insures that circuits under test are not disturbed. Readings are direct in volts or dbm. \$200.00



-hp- 400D Vacuum Tube Voltmeter

This instrument's frequency coverage is 10 cps to 4 MC, voltage range 0.1 mv to 300 v. New amplifier circuit provides 56 db of feedback (mid-range) for highest stability. Input impedance is 10 megohms to prevent disturbance to circuits under test. Readings are direct in dbm. Condensers are sealed or long-life electrolytic. \$225.00



-hp- 410B Vacuum Tube Voltmeter

Industry's standard for vhf-uhf voltage measurements. Wide frequency range of 20 cps to 700 MC; response flat within 1 db full range. Diode probe places 1.5 μmf capacity across circuit under test. This plus 10 megohms input impedance assures circuits are not disturbed. Combines ac with dc voltmeter (100 megohms impedance) and ohmmeter measuring 0.2 ohms to 500 megohms. \$245.00

GET COMPLETE INFORMATION TODAY

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ELECTRONIC TEST
INSTRUMENTS

4

leads to efficient reception

CW-TELCON

Canada's Radio and Television industry depends on CW-TELCON radio frequency cables for the latest in design development and the utmost in efficient performance. Canada Wire produces a full range of high frequency balanced and coaxial cables to the most exacting specifications. Write for CW-TELCON pamphlet for complete information.

CANADA WIRE AND CABLE COMPANY LIMITED

FACTORIES:
Toronto, Montreal, Smith Falls, Vancouver
Sales Offices from Coast to Coast

● Toggle Switch Boots With Rigid Hex-Nut

Item 1203

APM part No. N-1030B toggle switch boots are a new, improved version of the company's standard HEXSEAL design.

Constructed with an integral hex-nut, they can be tightened with ordinary pliers eliminating the need for special tools. They retain the one-piece construction of the standard HEXSEALS, and also the excellent qualities of the silicone rubber. The boots will withstand temperature variations from -125°F to 500°F and remain unaffected by salt-water, acids or ozone.

Design of the N-1030B permits the toggle switch bat to be exposed while the high-pressure seal is maintained. Sealing takes place at three places: a double "O-ring" construction formed in the neck of the boot provides firm sealing against the bat handle of the switch (two distinct seals) and effective panel sealing is obtained by a gasket rib formed in the base of the holding hex-nut. All units are pre-lubricated at the factory and supplied ready to install. (Mounting thread is 15-32-32NS2; measures 5/8" across flats).

APM part No. N-1030B has been designed for standard toggle-switches in accordance with MIL-S-3950, JAN-S-23 and MIL-S-6745. The boot also meets all the requirements of the recently issued military standard MS24371 and recently revised MIL-B-5423. This new standard supersedes the AN3223 drawing for single-hole mounting boots.

● Standard Barretter Bridge

Item 1204

Model 202-C Standard Barretter Bridge has been designed to accurately and reliably measure the voltage and power of high-frequency signals. This instrument, engineered for maximum simplicity of operation, measures voltages from 20 to 70 millivolts r.m.s. and power from 8 to 100 microwatts in 50 ohms over a frequency range of 2 Mc. to 1000 Mc. Resistive pads can be used to extend the voltage and power ranges upward. No special input probes or tuning for frequency correction are necessary.

The Bridge network of the Model 202-C contains a Bolometer, sensitive to high-frequency currents, which produces a resistance unbalance proportional to the input signal. The Bridge is re-balanced by adjustment of a dial directly calibrated in millivolts, microwatts and DBM. High sensitivity is achieved by amplification of the Bridge unbalance error signal which is indicated on a null meter. The Bolometer leg of the Bridge is enclosed in a thermostat-controlled oven in order to insure good stability and high accuracy.

The Model 202-C Standard Barretter Bridge is recommended for calibrating signal generators, checking transistor oscillators, and measuring the signal output of other low-power apparatus.

● Standard Test Set For Transistors

Item 1205

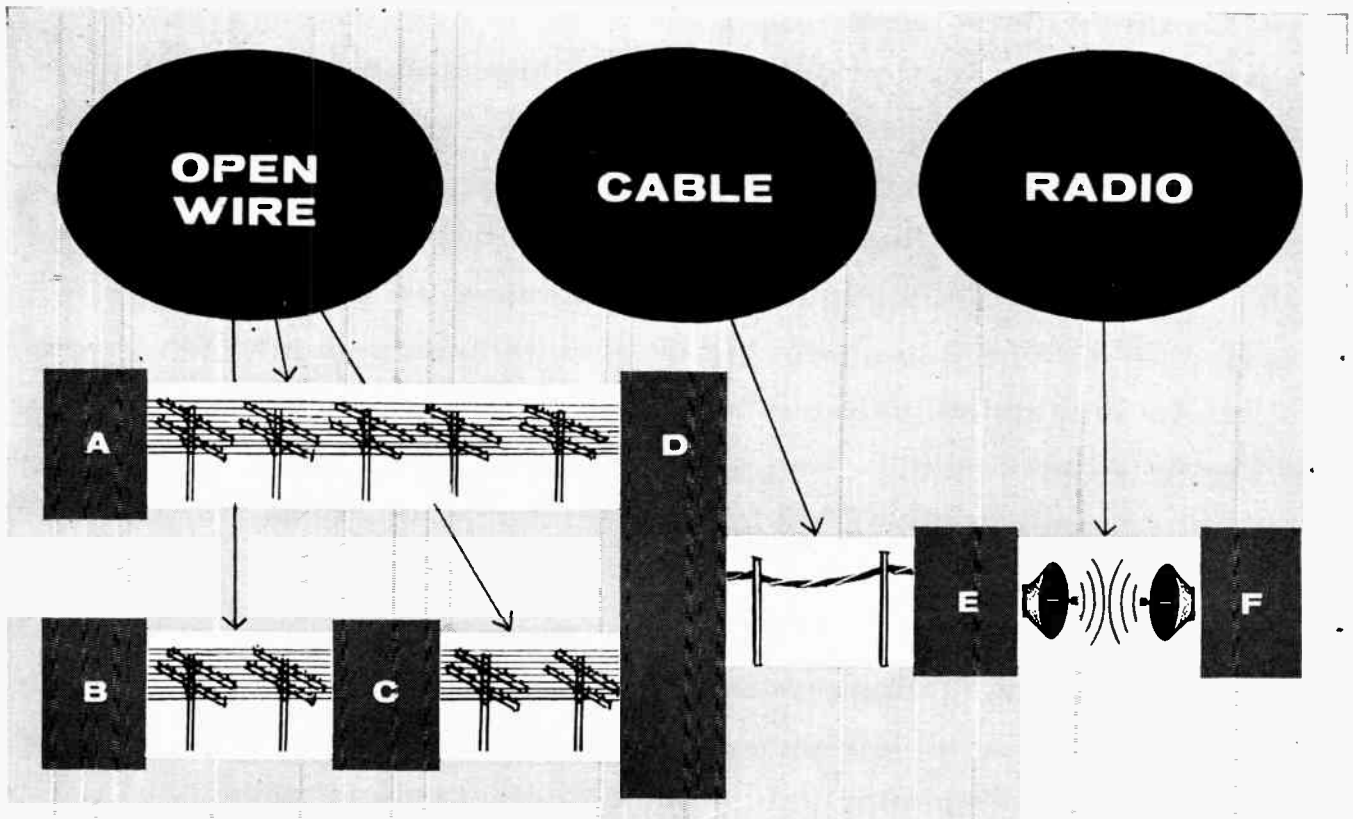
Model 505 Standard Test Set for transistors is available for rapid evaluation and testing of junction transistors. This portable, battery-powered instrument is designed to conveniently determine important parameters of PNP and NPN small-signal, medium-power and switching transistors.

Two test positions for both PNP and NPN units permit multiple testing of transistors operating in the common-emitter configuration. Short-circuited junctions are indicated by a panel meter which also indicates collector cut-off current with base open, or collector-to-emitter leakage current, in three ranges up to a maximum of 10 milliamperes.

D-c current gain (d-c Beta) up to a maximum of 200 is directly indicated. The Model 505 also measures incremental or

(Turn to page 70)

For further data on advertised products use page 61.



45-CLASS CARRIER NETWORKS give you direct interconnection

AT CARRIER FREQUENCIES

ABOVE NETWORK INCLUDES:

- LOCATION A**
Type 45A
- LOCATION B**
Type 45CB
- LOCATION C**
Type 45CB base group terminal
Type 45A terminal
1 pre-group connector
- LOCATION D**
2 Type 45A base group terminals
Type 45BN base group terminal
2 base group connectors
- LOCATION E**
Type 45BN base group terminal
Type 45BX terminal
2 base group connectors
Radio terminal
- LOCATION F**
Type 45BX terminal
Radio terminal

Direct interconnection is the basis of Lenkurt's famous 45 "universal" class of carrier systems. Each of these carrier systems—open-wire, cable and radio—is designed to connect directly with the others *at carrier frequencies*. Thus, your entire carrier network can be completely coordinated. Think of the savings and improved performance this means to you! Expensive back-to-back equipment arrangements to convert carrier to voice frequencies, and then back to carrier, are no longer needed. Maintenance is simpler. Distortion is reduced. Here is a new approach to planning and engineering your toll routes.

The systems of the 45 class offer other important savings, too. *Miniaturized* components permit a maximum number of channels in minimum space. *Plug-in construction* means more flexibility in applications and fewer parts to stock. And you save on installation labor because Lenkurt 45-class carrier comes factory-assembled, rack-mounted and tested as a system.

Learn how Lenkurt Carrier systems can economically help solve your communication problems. Contact Automatic Electric Engineers for their specific recommendations. Address: Automatic Electric Sales (Canada) Limited, 185 Bartley Drive, Toronto 16, Ontario. Branches in Montreal, Ottawa, Brockville, Hamilton, Winnipeg, Regina, Edmonton, Vancouver.

5635

AUTOMATIC ELECTRIC

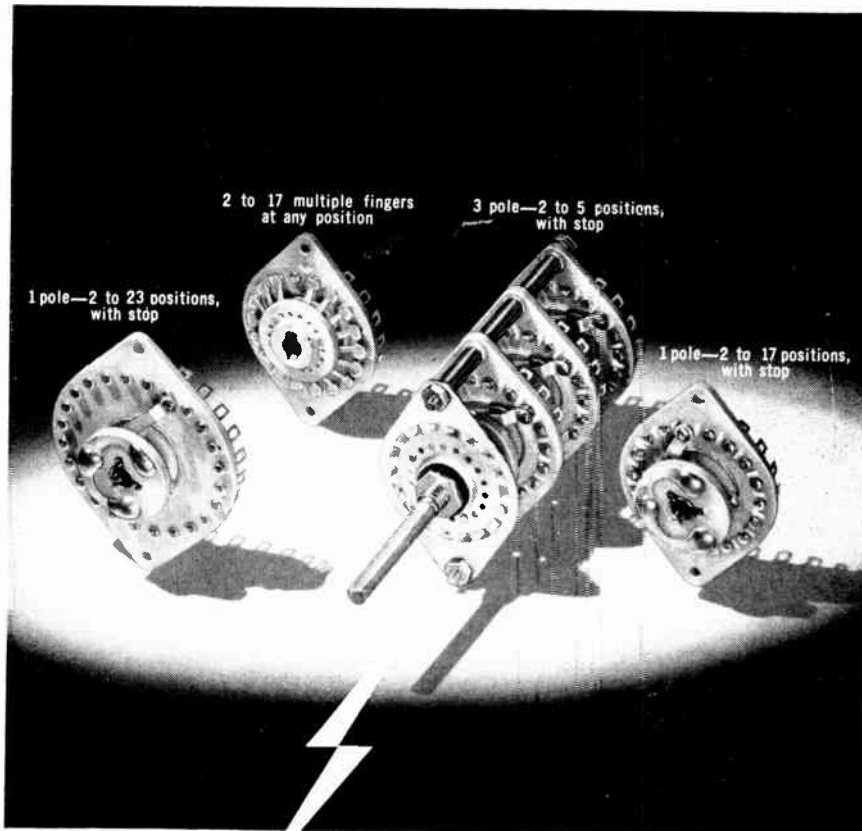
PIONEERS IN AUTOMATIC CONTROL



AUTOMATIC ELECTRIC • LEADERS IN CARRIER COMMUNICATIONS • LENKURT

ELECTRONICS & COMMUNICATIONS, AUGUST, 1956

For further data on advertised products use page 61.



More contact combinations within medium-duty power range

Centralab Series PA-230 Rotary Power Switch (7½ amps. — 115 v.a.c.)

Meets the requirements of...
Transmitters
Industrial controls
Laboratory testing
Other military and commercial applications

- ◊ Wafer can be stacked up to 20 sections per switch.
- ◊ Grade L-5A Steatite sections have low loss factor. Operating voltages up to 3000 volts R.M.S., 60 cps. between electrical circuits.
- ◊ Available in a number of switching configurations, shorting or non-shorting.
- ◊ Smooth-operating, roller-bearing index insures minimum of 25,000 operating cycles.
- ◊ Square rotor shaft prevents "play" in rotation — provides pin-point accuracy.
- ◊ Coined silver contacts, for better current-carrying characteristics.

Write for Technical Bulletin EP-74,
for complete engineering data.

Centralab Canada Ltd.

804 Mt. Pleasant Rd., Toronto 12, Ontario

A DIVISION OF GLOBE-UNION INC.

9641 East Keete Avenue • Milwaukee 1, Wisconsin
In Canada: 804 Mt. Pleasant Road, Toronto, Ontario



VARIABLE RESISTORS



ENGINEERED CERAMICS



SWITCHES



PACKAGED ELECTRONIC CIRCUITS



CERAMIC CAPACITORS

For further data on advertised products use page 61.

dynamic current gain; intrinsic transconductance, Gm; and emitter forward resistance. D-c characteristics of switching transistors are determined at saturation and cut-off conditions by selecting the proper position of the panel control. External plug-in jacks are provided to facilitate the use of auxiliary test equipment for the measurement of "h", "r", or "hybrid Pi" parameters, and emitter and base currents.

The Model 505 meets the urgent need for a standard required by quality control, production and engineering groups to rapidly and accurately test transistors.

● Single Unit Resistor-Capacitor Item 1206

A new single unit resistor-capacitor that requires only the space of a tubular capacitor alone has been developed. It is called TUBE-R-Cap.

The miniature combination is a standard size CC32 tubular ceramic capacitor that also incorporates, on the same body, a ceramic base resistor in parallel. It is designed to permit greater performance and cost saving in applications where space is at a premium. Tests have shown that this miniature unit lends itself to many electronic assemblies, and it is described as perfect for antenna line applications.

Maximum length of the TUBE-R-Cap. is .900" maximum with an approximate diameter of .280". It is rated as 470 mmf; GMV-1500 volts A.C. test per U.L. specifications; resistance ½ megohm nominal, ½ watt.

The TUBE-R-Cap. body is of ceramic, impervious to moisture, unaffected by heat, vibration, or common acids. A double coating of Durez phenolic provides insulation.

● Two Cable Connectors Of Novel Design Item 1207

Two radio frequency cable connectors with novel design features have recently been announced. The 83-850 is a completely solderless Series UHF plug; the 83-851 is a semi-solderless Series UHF plug. Both connectors completely eliminate the necessity of soldering the center conductor of the cable to the connector contact. No special tools are needed for assembly. Both connectors are re-usable and are therefore ideal for laboratory and service use where they may be assembled and disassembled for different projects.

Electrically similar to the widely-used 83-1SP plug, the 83-850 and 83-851 are made of brass with a durable cadmium plate finish; contacts are silver-plated for peak conductivity; dielectric material is mica-filled bakelite.

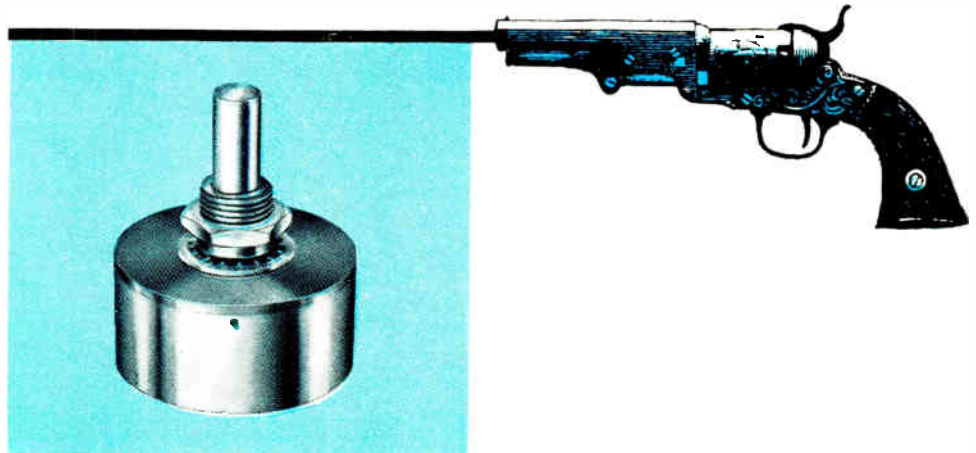
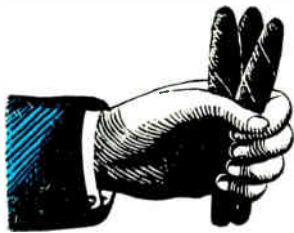
● Multichannel Radio Relay Equipment Item 1208

A new RBB 44 series of 450 Mc s Multichannel Radio Relay equipment designed to provide an economical transmission facility for voice, alarm, telemetering and control channels has recently been announced. Tandem operation of several links carrying up to 24 high quality voice channels is possible. The equipment contains built-in metering facilities as well as path and equipment failure alarms.

This new, high quality Radio Relay equipment has been built for continuous duty, long-term, unattended operation and is particularly suited for use by power, telephone, petroleum, gas and lumbering companies that depend on completely reliable telecommunications service in their day-to-day operations.

**FOR FURTHER INFORMATION
ON NEW PRODUCTS USE
COUPON ON PAGE 61.**

Another
product
surprise
from
Helipot!



Fanfare & Cigars

Tooting a symbolic clarion and passing out imaginary cigars, Helipot introduces one of its new-born offspring . . . the series 5300 precision potentiometer.

A single-turn unit, it's 1-1/4 inches in diameter . . . designed for bushing mounting. With its innards comfortably ensconced in an accurately drawn one-piece aluminum cup, the 5300 gives you ruggedness, compactness and long life. We proud papas direct your attention to such salient features as the range of total resistance . . . from 25 to 49,000 ohms . . . linearity as close as $\pm 0.25\%$. . . and considerable improvement in torque, noise and mechanical runout.

For vital statistics on this prodigy of a progeny, write for data file 807.

Helipot makes precision potentiometers . . . linear and non-linear . . . in the widest choice of sizes, mounting styles and resistances. Many models are stocked for immediate shipment. Our engineers will gladly adapt standard models to your requirements or design entirely new HELIPOT® precision potentiometers for you.

 **Helipot**
®

first in precision potentiometers
Canadian Factory: No. 3 Six Points Rd., Toronto 18, Ont.
Sales Representative: R-O-R Associates, Ltd.
290 Lawrence Ave. West, Toronto 12, Ont.
a division of Beckman Instruments, Inc.

TESTED 200%

plus!

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

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

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

As for service in meeting resistor requirements accurately and when promised—this is a Stackpole factor that is just as carefully controlled and tested as the manufacturing processes themselves.

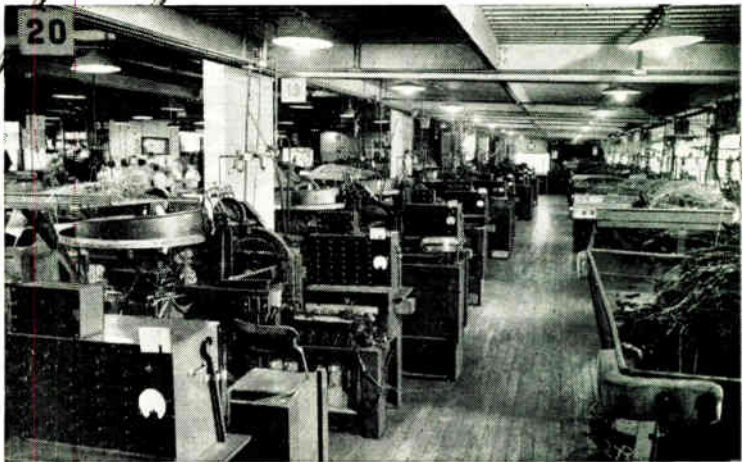
And it is our sincere aim to keep it that way.

Electronic Components Division

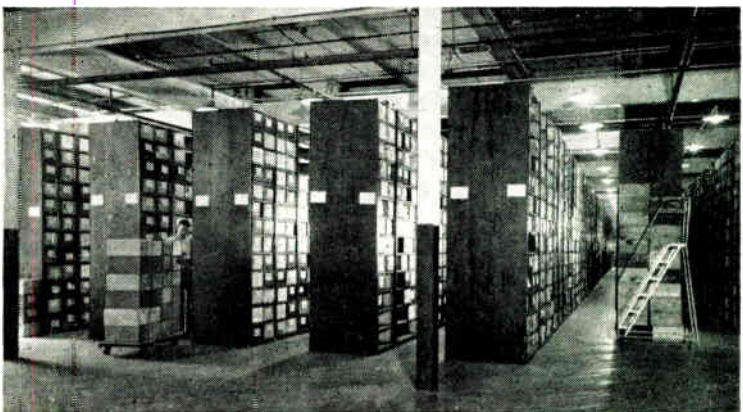
CANADIAN

STACKPOLE LTD.

550 Evons Ave., Etobicoke, Toronto 14, Ont.



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



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



STACKPOLE

FIXED COMPOSITION

RESISTORS