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AVIATION & WIRELESS NEWS

Radio Supplies for Amateurs & Experimenters

THE Radio Section is in charge of a licensed operator. He is at your service for the supplying of information and for helping you with any problems relating to wireless telegraphy and telephony.

Listen for EATON Concerts by Wireless, 4 to 4:30 p.m. daily, and 12 to 12:30 Saturdays

If you wish to order radio supplies by wireless you may do so at any time from 4.30 to 5 p.m. daily. The call signal is "9 Bc" wave lengths of 200 metres. Answered on continuous wave.

Some of the EATON Prices on Wireless Supplies

E Storage Batteries made up specially for Radio use

40 Ampere Hour \$17.50 60 Ampere Hour \$20.00 80 Ampere Hour \$22.50

New Shipment of A.B.C. Units

These cabinets are covered with imitation leatherette and are thoroughly reliable.

A.B.C. Radio Receiver.....	\$32.00	Detector and One Step Am- plifier	47.00	A.B.C. Completion Package, containing Phones, Aerial Wire, Insulators, Switch and Ground Clamps	9.50
A.B.C. Detector	21.00	Detector and Two Step Am- plifier	56.00		
A.B.C. One Step Amplifier.....	28.00				

N. A. A. Tested Galena or Silicon	Radio Audion Tubes with .30 Receptacles	6.75
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BROWN'S SUPER-SENSITIVE PHONES

Type D— 8,000 Ohms	\$15.00
Type A— 8,000 Ohms	18.75
4,000 Ohms	18.25

WILCOX PANEL SWITCHES

No. 101	\$0.85
No. 102	1.65
No. 103	1.15
No. 104	\$3.15 & 3.45
Wilcox Type 14A Gap.....	14.50
Wilcox Electrodes	2.35

AMPLIFYING TRANSFORMERS

Can. Ind. Tel. Co. Audio Fre- quency Transformer	\$6.25
Saco Clad	7.00
Acme Audio Frequency Transformer	7.50
Can. Ind. Tel. Co. Modula- tion Transformer	6.25

VARIABLE CONDENSERS

Murdock 21 Plate	\$5.00
Murdock 43 Plate	6.00
Chelsea 21 Plate	4.50
Chelsea 21 Plate, with Knob and Dial	5.25
A.B.C. 3 Plate	2.75
A.B.C. 11 Plate	3.75

STANDARD V. T. SOCKETS

Murdock	\$1.50
De Forest	1.50
Paragon	1.65
Wilcox	1.15
Connecting Blocks	Ea. .27
Chelsea Inductance	4.25
Chelsea Oscillator	4.00
Chelsea Grid Leak	4.00

High Frequency Buzzers.....

De Forest Rheostats, 6 ohms, Porcelain	\$2.00, \$3.25, 4.00
Wilcox Variometer, Type 5A	1.50
Crystal Detectors	\$2.75, 3.75
Polarity Indicators	3.00
Dublier C. W. Transmitting Condensers	10.00
Microphone	7.25
"Clarion" Loud Speaker	\$2.50
Bakelite Panelling, 3c and 4c per sq. inch.	

Also a full line of "B" Batteries,
Magnet Wire, Honeycomb Coils, In-
sulators, Spark Coils, Spark Gaps,
Practice Sets, etc.

THE T. EATON CO LIMITED
TORONTO CANADA

Wireless Dept.
—House Furnishings Building,
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RELIABLE
TRADE MARK
Canadian Products



Wireless Batteries

The fascination of Wireless Telegraphy has brought to the Dominion Battery Co., Limited, numerous enquiries from all over Canada for **RELIABLE** high-voltage batteries. We are the pioneer manufacturers of all types of Wireless Batteries in Canada, and recommend their use on account of their being made from the highest grade materials only, and the thorough test which they are put through before leaving the factory.

RELIABLE Wireless Batteries are being used by the largest Wireless Companies, and in order that we may further assist them in taking care of their requirements, we have compiled the list shown below:

No.	Style	Size in inches			Approx. weight in lbs.	Taps	Voltages					No. of Cells	Retail Price	
		L	W	H			22½	7½	10½	13½	16½			19½
B-1	Plain	6½	4¼	3	4	0	22½					15	\$3.00	
B-1T	Variable	6½	4¼	3	4	5	7½	10½	13½	16½	19½	22½	15	3.25
B-2	Plain	5	4	3	3	0	45					30	3.25	
B-2T	Variable	5	4	3	3	5	22½	27	31½	36	40½	45	30	3.50
B-3	Plain	4	2¾	3	2	0	22½					15	1.85	
B-3T	Variable	4	2¾	3	2	5	7½	10½	13½	16½	19½	22½	15	2.10
B-4	Plain	3¾	2	2½	1	0	22½					15	1.50	
B-4T	Variable	3¾	2	2½	1	5	7½	10½	13½	16½	19½	22½	15	1.75
B-5	Plain	7¾	5½	3	8	0	45					30	6.00	
B-5T	Variable	7¾	5½	3	8	5	22½	27	31½	36	40½	45	30	6.25
B-6	Plain	7½	27¼	2¾	2	0	66					44	6.00	
B-6T	Variable	7½	27¼	2¾	2	4	15	30	45	60	66	44	6.25	
B-100	Plain	7½	7½	6¾	14	0	100					66	10.00	

The Batteries listed above are a selection only of a large range which we manufacture

Nos. B-2, B-3 and B-4 are the small cell type for use where light weight is essential. Nos. B-1 and B-5 are made from the larger size cells and have greater capacity and shelf sustaining life. We recommend the latter types in all cases where weight is not an important factor.

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TORONTO

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Use the highest type insulation made.

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Adaptable to every machining process and ready for every use—panels, plates, bases, rods, tubes, bushings, handles, cleats, etc.

To high resistivity and extreme water resistance CONDENSITE CELORON adds every other good quality demanded of an efficient insulator. It puts wireless insulation a step ahead. This Bureau of Standard test tells why :

Wave Length Meters	Approximate Frequency Cycles per second	Phase Difference Degrees	Dielectric Constant-K
373	804,000	2.0	4.7
1,295	231,500	1.8	4.8
3,067	97,800	1.8	4.9



CONDENSITE CELORON is regularly supplied in standard size sheets, rods and tubes ready for all machining purposes—for experts and amateurs. Sold by radio equipment dealers everywhere. If your dealer cannot supply you, write us.

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If you want service, order from us.
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Vacuum Tube Sockets	\$1.25
Rheostats	1.25
22½ Volt "B" Batteries	1.50
Rasco Dials60
Rubber Binding Posts20
Tested Galena40
Lateral Wound Coils. All sizes.	

Send 5c for our large illustrated catalogue.

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Catalogue
No. 21A



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6 Ohm filament rheostat for panel or flush mounting,
with knob and pointer \$1.75
Standard 4 prong receptical \$1.00

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57 MURRAY STREET, NEW YORK

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same price in Canada as in the U. S. A.

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22-3½ V Large	\$2.50	"	\$3.00

We cordially invite you to visit our store, and get our advice before purchasing.
It is our policy to supply an Amateur with apparatus suitable for his requirements, and
not to sell him apparatus totally unsuitable, merely to make a sale.

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When this Apparatus of Commercial Standard is

BUILT IN CANADA

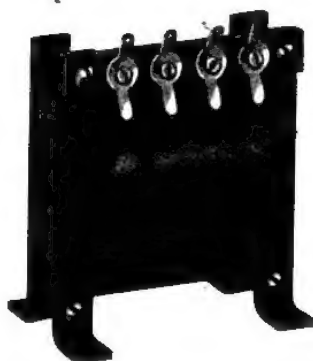
At prices below those asked for inferior imported apparatus

THE CANADIAN INDEPENDENT TELEPHONE CO., LIMITED, designs, builds and installs high-frequency communication equipment, specializing in guided wave telephone and telegraph apparatus, as well as standard radio equipment. We maintain a high frequency engineering research laboratory and a staff of able engineers, devoted exclusively to this line of work.

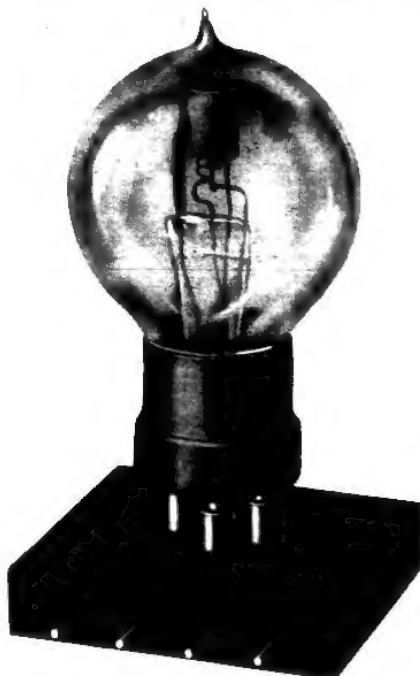
Several months ago we offered for general sale, a number of radio parts which enter into our standard commercial units. The gratifying results reported to us by purchasers of these accessories, have encouraged us to add a number of units to our original list. Detailed announcements regarding these new units will appear in succeeding advertisements.

HIGH-GRADE PARTS

The following high grade parts are now carried in stock by all first-class local dealers—



Amplifying Transformer of merit.
Does not burn out or become short circuited under normal conditions.
Price \$6.25 each.



A British-Made Transmitting Tube, the filaments of which may be operated from dry cells.
Price \$9.00 each.



A Modulation Transformer of correct design and adequate insulation. Price \$6.25 each.

Among the other units are

2-Stage Amplifier \$50.00

Radio Hand Microphone with handle and cord \$6.25

RAC Audion Tubes (cartridge type) a good detector, amplifier and oscillator. No critical filament in plate current adjustments. Almost unbreakable.
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The following units are in preparation—

A high-grade Variable Condenser suitable for accurate measurements and use in continuous wave transmitting sets.

Continuous Wave Inductances, suitable for incorporating in transmitting units.

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Order through your local dealers or direct from the factory. Write us if you want any information re Wireless.

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AMPLIFYING TRANSFORMERS

No. UV-712 Radio Corporation	\$7.00
No. P-1 Bacco-cad, shielded type	5.00
No. QO. Clapp-hadham, seal-mounted	4.00
No. 30 Chelsea, just out	4.50

ANTENNA WIRE

"Pittsco" No. 14 hard drawn copper (89 ft. per lb.), per lb.	.40
500 ft. special value at	1.25
"Pittsco" 7-strand No. 22 tinned copper, per ft.	.81
500 ft. special value at	4.25
1000 ft. special value at	1.50
"Pittsco" 7-strand No. 20 poor. bronze, per ft.	.92
500 ft. special value at	7.50

AUDION CONTROL PANELS

No. RORH Grebe in cabinet with leader connections	\$17.00
---	---------

No. 250 Remler, with "A" Battery potentiometer	1.00
No. Y-1 Acme in cabinet	10.00
No. 70 Paragon, moulded type	0.90

"B" BATTERIES

No. 7822 Standard, 22.5V. small	\$1.50
No. 7845 Standard, 22.5V. large	2.45
No. 7850 Standard, 22.5V. variable	1.50
No. 782 Eveready, 22.5V. small	1.25
No. 786 Eveready, 22.5V. variable	1.20
No. 827 Ace, 45V. variable	1.50

BOOKS

Practical Wireless Tel., by Bucher	\$2.25
Wireless Experimenters' Manual, by Bucher	1.25
Vacuum Tubes in Wireless Communication, by Bucher	1.25
How to Pass the U.S. Govt. Exams, by Bucher	.75
Practical Amateur Stations, by Bucher	.75
How to Conduct a Radio Club, by Bucher	.75
Robinson's Manual of Wireless Tel., by Lt. Comdr. Robinson, U.S. Navy	2.00
Radio Telephony, by Goldsmith	1.50
C. W. Instruction, by Radio Corp	.25

BUZZERS

No. 77 Mesco, high frequency	\$2.50
No. 100 Century, high frequency	2.50
No. 170-A General Radio, high frequency	1.00
No. 9010 Bunnell, watch-case, nickel or brass	.75

CONDENSERS (Grid Type)

No. P-1 GA .0005 MF	.35
No. P-2 GA .001 MF (phone)	.35
No. P-3 GA .0005 MF and 1/4 meg. leak	.50
No. ROCA Grebe .0002 MF and 1/2 meg. leak	\$1.20
No. ROCB Grebe .0002 MF and 2 meg. leak	1.50

CONDENSERS (Variable)

No. 388 Murdock, .001 MF in case	4.75
No. 388 Murdock, .0005 MF in case	4.00
No. 1 Chelsea, .001 MF in case	1.00
No. 2 Chelsea, .0005 MF in case	4.50
Perfection, 11 Plate knockdown	1.25
Perfection, 21 Plate knockdown	1.20
Perfection, 41 Plate knockdown	1.20

COILS (DeForest duo-lateral)

Lower Prices—

DL-25	\$1.00
DL-35	1.00
DL-50	1.50
DL-75	1.50
DL-100	1.50
DL-150	2.00
DL-200	1.65
DL-250	1.70
DL-300	1.75
DL-400	1.50
DL-500	2.00
DL-800	2.00
DL-750	1.15
DL-1000	1.00
DL-1250	1.00
DL-1500	1.50

CRYSTALS

No. P-1 Silicon, unmounted	.25
No. P-2 Galena, unmounted	.25
No. P-3 Silicon in Wood's metal	.50
No. P-4 Galena in Wood's metal	.50
No. P-5 Radiolite, unmounted	.50
No. P-6 Wood's metal, only	.25

CRYSTAL DETECTORS.

No. RPDE Grebe, dustproof	\$2.75
No. 8534 Jute	.70
No. 224 Murdock	.70

DIALS

No. P-1 Somerville, dial indicator	\$2.00
No. P-2 Tuska, 1/4 inch or 3/16 inch shaft	1.50
No. P-3 Chelsea, 1/4 inch or 3/16 inch shaft	1.00
No. F-800 Clapp-Eastham 190 type	.75
No. 100 Remler 8-1800 complete	1.00

GRID LEAKS

No. UP 518 Radio Corp, 1/4, 1, 1.5, 2, 1.5 or 3 megohms, each complete	1.25
Grid caps, only	.75
Bases only	.50
No. 96 Remler, adjustable type	.60
No. 21 Chelsea, variable, 10 values	1.00

INSULATORS

No. P-1 Electrore, Ball type	.35
No. P-2 Electrore, 4 inch type	.65
No. P-3 Electrore, 10 inch type	1.50
No. P-4 Electrore, 16 inch type	1.50

JACKS

No. 1421-W Federal, open jack	.70
No. 1422-W Federal, closed jack	.15
No. 1423-W Federal, 1 circuit jack	\$1.00
No. 1425-W Federal, Auto. Fil control	1.20
No. 1428-W Federal, Auto. Fil control	1.50

KEYS

No. 8650 Masco, brass up to 1/4 KW	\$3.00
No. 7943 Reeko, practice type	1.40
No. 285 Murdock, strap type	.70

LOOSE COUPLERS

No. 344 Murdock, 1500 meters	\$ 3.00
No. F-673 Clapp-Eastham, 2,000 meters	14.00
No. A-1 Arnold, Navy type, 3,000 meters	20.00

OMNIGRAPHS

No. 2 Omnigraph, 15 watt masculine	\$20.00
No. 2 Jr. Omnigraph, 5 dial machine	22.00
No. 5 Omnigraphs, 1 dial machine	14.00
Set of 15 dials, Continental	4.00

PLUGS

No. 30 Patent, universal type	\$3.00
No. 1428-W Federal, Brass	1.00
No. 1428-W Federal, Silver-plated	1.50

PLUGS (Bakelite)

No. 40 Remler, Bakelite coil plug	.65
No. 41 Remler, Bakelite panel plug, stationary type	.65
No. 43 Remler, Bakelite coupling plug	1.50
No. 45 Remler, 14 inch Aberoid strap for coils	.15

POTENTIOMETERS

No. PR-536 Radio Corp. "A" Battery type	\$2.00
No. 93 Remler, "A" Battery type	.75
No. F-742 Clapp-Eastham "b" Battery type	1.00

RECEIVING SETS (Crystal)

Westinghouse, "Aerolite," with Brandes' "Superior" phones	\$25.00
Radio Service, Type S-3, without phones	7.50
Amrad, latest model, without phones	20.00

RHEOSTATS

No. PR-535 Radio Corp., moulded, for UV-200, UV-201 and UV-202 tubes	1.00
No. 90 P Shramco, 8 Ampere type, for 1 UV-201, 50 watt tube	2.00
No. 560 Murdock, new type	1.00
No. 810 Remler, junior, 1.5 amps	1.00

SOCKETS

No. UP 552 Radio Corp. Bakelite type for UV-200, UV-201 and UV-202 tubes	1.50
No. 92 Remler, moulded	1.50
No. 156 General Radio	1.00
No. 350 Murdock, moulded type	1.00
No. 8-2 Radio Service, double	2.25
No. 8-3 Radio Service, triple	1.25

TELEPHONES

No. 56 Murdock, 2000 ohms double	\$ 5.00
No. 56 Murdock, 3000 ohms double	6.00
Baldwins Type C	12.75
Baldwins Type E	15.00
Baldwins Type F	16.25

VARIOMETERS

No. 506 Remler, Bakelite, moulded	\$5.00
No. 501 Remler, with knob and dial	7.00
No. 502 Remler, panel mounted type	9.75
No. 2846 Amrad, new type, basket wound	6.50
No. 2806 Amrad, new type with knob and dial	6.75

VARIOCOUPERS

No. 93 Remler, 1800 type	\$ 4.00
No. 505 Remler, with knob and dial	4.00
No. 505 Remler, panel mounted type	12.75
No. 2613 Amrad, new type, just out	6.25
No. 2613 Amrad, new type with knob and dial	6.50

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Club Headquarters: 34 Yonge Street, Toronto

OBJECTS OF THE AERO CLUB

1. TO PROMOTE AND MAINTAIN A SOCIAL ORGANIZATION OR CLUB FOR THE ADVANCEMENT AND ENCOURAGEMENT OF VARIOUS FORMS OF AVIATION.
2. TO ADVANCE THE DEVELOPMENT OF THE SCIENCE OF AERONAUTICS AND ITS PRACTICAL APPLICATION.
3. TO ENCOURAGE AND ASSIST THOSE DESIROUS OF TAKING UP AVIATION WITH A VIEW OF RENDERING SERVICE TO KING AND COUNTRY:

OBJECT NO. 1

Club quarters are being maintained, including lounge, billiards, cardroom and lunchroom.

* Until further notice the Clubrooms are open daily from 9 A.M. to 10 P.M. except Sundays and public holidays.

* Meals are served daily to members and their guests.

* THE DIRECTORS ARE NOW CONSIDERING PROPOSITIONS FOR MORE ADEQUATE QUARTERS IN WHICH IT IS HOPED TO PROVIDE BEDROOM ACCOMMODATION FOR VISITING MEMBERS.

* As soon as deemed advisable and practicable, the Club will endeavour to maintain and operate an airharbor and suitable aircraft for the use of members, or to make suitable arrangements with an existing concern.

* Out-of-town members are invited to write in to the club on any matters in which the Club can reasonably render personal service for members.

OBJECT NO. 2

Ways and means are being provided for making the Club a clearing house and information bureau on matters of aeronautical interest.

* Members and others are invited to correspond with the Club — especially those who are engaged in commercial aviation, or are in a position to teach flying.

* Owners of aircraft open for contract work are invited to register with the Club. Full information with regard to equipment and terms should be given.

* It is desired to obtain costs of operation in order that reliable data may be compiled for the use of members and aviation interests.

OBJECT NO. 3

The Club is in favour of the Government maintaining an Air Force on adequate and economical lines consistent with the considered opinions, as to organization, of those competent to advise.

* The Club will use its influence and organization in encouraging the youth of our country to engage in aeronautical work for the development of our commerce and natural resources, and for service to the Empire when necessary.

MEMBERSHIP

Membership is open to Officers of the Canadian Air Force, Officers and Cadets of the Royal Air Force, and other branches of the Canadian and Imperial United Services, also to civilians wishing to take up or become interested in aviation generally. Apply to the Secretary for terms of membership and application forms.

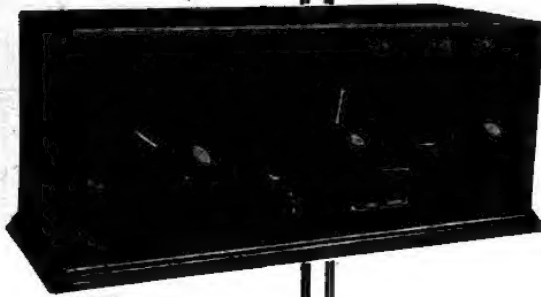
Membership carries privileges of visiting membership in all Aero Clubs throughout the world affiliated with the Federation Aeronautique Internationale.

The regular monthly issue of *Aviation News* is mailed free to all members.

AERONAUTICAL SPORTING EVENTS, RECORDS, ETC.

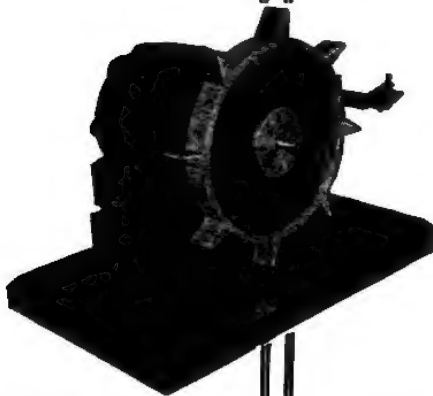
The Federation Aeronautique Internationale is recognized throughout the world as the dominant authority for the control of aeronautical sporting events and for the establishment of aeronautical records, and provides the necessary rules and regulations for the conduct of such. By agreement through the Royal Aero Club of the United Kingdom, authority has been vested in the Aero Club of Canada to represent and act for the F. A. I. in the Dominion of Canada.

Canadian Amateur Radiomen—



Z-NITH
REGENERATOR

A Super Short-wave Receiver.



Z-NITH
HY-RAD GAP

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BECAUSE of the increasing number of Canadian Amateur Radiomen and their demand for a higher class of apparatus which will enable them to greatly improve their stations, we are entering this new field with an extensive advertising campaign through which we hope to acquaint you with the most perfect and highly efficient radio apparatus on the market today—the Z-Nith equipment.

We wish to impress upon you the reliability of every Z-Nith product, all of which are fully guaranteed.

No matter what your needs may be, there is a Z-Nith product that can't be beat. Anything, from the most minor piece of apparatus to a complete station equipment.

We want you to know of every detail concerning the Z-Nith apparatus. This is given in our new beautiful catalog which we will gladly send to you upon request. Write for it today.

Chicago Radio Laboratory,

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AERIAL SWITCHES

DETECTORS
O.T.'S

AMPLIFIERS
REGENERATORS

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THE OBJECTS OF THE CLUB

- (1) To advance the art and science of radio communication by bringing together those who are interested in radio work, whether as scientists, professional radio engineers, manufacturers of radio apparatus, students, experimenters—in short—all those whose work or interest brings them in touch with the problems of radio.
- (2) To conduct and co-operate in radio research.

MEMBERSHIP

Membership is open to engineers, students and anyone else interested in the electrical side of Radio. Application for membership should be sent to the Secretary-Treasurer. They should state experience in Radio work and give as references names of three members of the Club.

MEETINGS

Meetings are held every third Thursday in Room 23, new Electrical Building, University of Toronto. A programme of papers by prominent Canadian Radio Engineers is being prepared for the coming season.

RADIO INQUIRY DEPARTMENT

As an assistance to those interested in Radio, a Radio Inquiry Department is being conducted in "Aviation and Wireless News," for particulars of which see announcement set out elsewhere in this issue.

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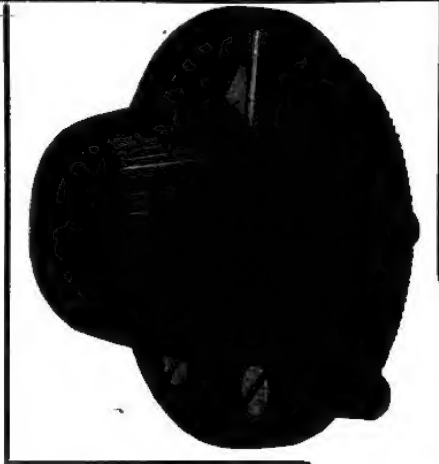
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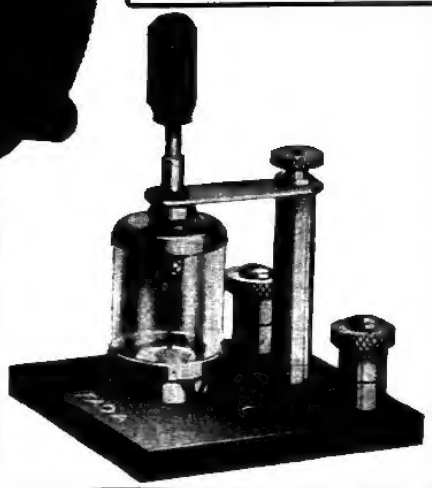
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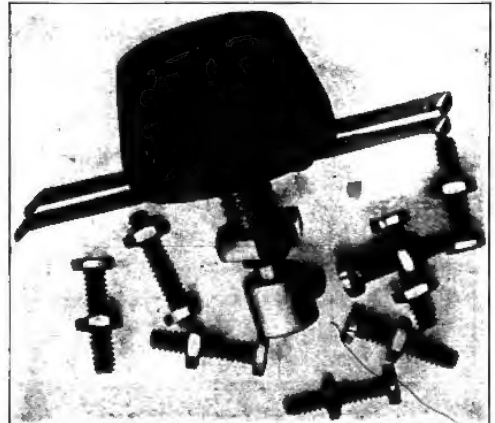
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ADAM F. PENTON, Publisher

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TORONTO, OCTOBER, 1921.

No. 8

Radio Essential to Aeronautics

Radio is one means of communication. Radio communication may be divided into two general divisions: Radio telegraph and radio telephone communication, which are similar to wire telegraph and wire telephone.

Radio telegraph communication is carried on between radio stations the same as wire telegraph communication is carried on between telegraph operators. Radio signals travel through the air from the transmitting station to the receiving station with approximately the speed of light while the telegraph communication may be divided into two general classes — spark and continuous wave.

Spark Transmission

The spark radio transmitting set was the first set developed. The ignition system of an automobile is a good small power radio transmitter. If a wire about 200 feet long were raised 25 to 30 feet above the ground and one end connected to the high-tension side of the spark plug, and a key inserted in the low-tension side of the ignition system, this ignition system (radio transmitting set) would transmit signals from 25 to 40 miles.

Continuous Wave Transmission

The next step in the development of radio telegraph transmission was the development of continuous wave telegraph.

The difference between the spark and the continuous wave transmitting sets is explained by the name "continuous wave." Spark signals are made by the oscillatory discharge of a condenser through a spark gap, and the wave transmitted is made up of wave trains of each oscillatory discharge, while the wave transmitter from the continuous wave set is a continuous cycle of the same amplitude. The frequency of the cycle on continuous wave

transmission varies from 3,000,000 down to 15,000 cycles a second, which is far above audibility.

Now in order that this wave may be audible it must be changed in the receiving set to an audio oscillating frequency. This is accomplished by means of a variable oscillating receiver. As an example: If the received wave was 50,000 cycle and the oscillations of the receiver were 49,000 cycles a beat note of 1,000 cycles would be produced in the receiver, which would be an audible signal. The first continuous wave transmitter was the arc sets and later the vacuum tube sets.

Vacuum Tubes

A word about three types of vacuum transmitting tubes: The VT 2 and 8-watt tube which was developed for use in the world war; the 50-watt tube and the 250-watt tube which have come into general use since the war. The vacuum tube is nothing more than an electrical valve of three elements — filament, grid and plate. The operation is as follows: A high-potential of from 300 to 3,000 volts D C (depending on size of tube) of positive potential is placed on the plate and the negative of the high potential on the filament. Now, when the filament of the tube is heated it gives off negative charged ions which are drawn to the plate by the positive high voltage charge on the plate. But between the filament and the plate is the grid, which is the control element of the valve. A small negative charge on the grid will cause a large change in the flow of ions from the filament to the plate hence a large change in the plate current. Vacuum tubes may be used as detectors, amplifiers, or oscillators. The vacuum tube is the one thing that made radio telephone possible.

Radio Telephone Transmission

Radio telephone waves are produced by impressing voice frequencies on a continuous wave. The ordinary telephone transmitter produces electrical voice frequencies which travel over the wire to the receiver. In a radio telephone set the same transmitter is used and the electrical voice frequencies are impressed on the grid of an oscillating vacuum tube, which, as explained above, controls the plate current of the vacuum. By the proper connections to an antenna this voice modulated oscillating wave is radiated in the air. The radio telephone wave may be received on a non-oscillating receiver.

In tests conducted on an aircraft-radio set radio telephone communication has been maintained from the aeroplane to a ground station up to a distance of 300 miles.

With the change of a few connections controlled by a switch the radio set can be used either as a telephone or continuous wave telegraph set. All aeroplane radio sets are now designed for both telephone and continuous wave telegraph.

Operation

The radio sets on aeroplanes furnish communication between aircraft in the air, from aircraft to ground station, and from ground station to plane.

There are almost no missions on which service planes are sent out that do not require communication either to ground stations or other aircraft. A few of the most important missions on which radio is absolutely necessary are as follows:

Artillery fire control, infantry contact work, reconnaissance, and many other military missions.

The air mail of the United States postoffice department uses radio on almost all of their aeroplanes. The radio is used to obtain information concerning weather conditions of landing fields on the route. They are used for communication to ground stations along the route, and at night to ask the landing fields for landing lights.

Direction finding by radio is another phase of wireless. The waves radiated by an antenna travel out in all directions similar to water waves when a rock is thrown into still water. Now, if a long narrow piece of cork were placed in the water at its length perpendicular to the line joining its center and the place where the rock struck the water, the two ends of the cork would rise and fall at the same time; but if the cork were turned 90 degrees, so that its length pointed to the place where the rock hit the water, one end of the cork would rise before the other — would bob up and down. If the cork were half the distance spanned by one wave the movement of the cork strip would be maximum.

This may be applied to a direction finder. The waves are produced by a radio transmitter and the cork strip is a loop of one or more turns of wire. When the plane of the loop of wire is perpendicular to the direction of the transmitting station no signal is received in the radio receiver connected to the loop, but when the plane of the loop is pointing toward the transmitting station the signals are maximum.

Radio direction finding was used extensively during the war to locate the enemy radio stations and the radio aeroplane on artillery fire-control missions. It was also used in the navigation of aircraft. To locate a radio station in range and azimuth at least two stations must take direction on the transmitting station. Then by knowing the location of the two direction finding stations the location of the transmitting station is determined by triangulation.

Direction finding stations are now used to locate a target out to a distance of 30,000 to 40,000 yards. An aeroplane equipped with a radio transmitting set is sent out and, when directly over the target, transmits the given

radio signal. The position of the aeroplane, hence the target, is located by the direction finders.

The radio game, like the automobile game, is not very old; in fact, they are about the same age. With the present rate of progress it is hard to conceive what the research and development of the next twenty-five years will bring forth.

WIRELESS ASSOCIATION OF ONTARIO

The first general meeting of the Wireless Association of Ontario for the season 1921-22 was held on Thursday, September 15, in the north school of Science Building, University of Toronto. The programme was exceedingly interesting and was thoroughly enjoyed by the large number of wireless men present.

After the secretary had read the minutes of the last general meeting Mr. Clark was called upon to give a lecture on his 15-watt radiophone set. Mr. Clark exhibited two sets, one of which was his own, and gave a brief description of the constructional details.

Mr. A. L. Leslie also exhibited a very neat and efficient three-tube transmitter with which he has worked as far as Ingersoll. Mr. E. J. Bowers showed the club a new CW receiver of which he is justly proud. To quote Mr. Bowers' own words, this set is "A little better than anything else for CW, but perhaps not quite as good as variometers for spark." After describing the set in detail he and Mr. Duncan gave a demonstration of its receiving ability with the aid of a six-tap amplifier and loud-speaking horn.

Mr. Moore demonstrated a simple solution of a ticklish problem when he showed how the inside of the variometer stator could be wound with wire by first placing the wire on a plaster of paris cast and then transferring it to the inside of the stator.

Mr. Keith Russell, who occupied the chair in the absence of the president, then introduced the chief speaker of the evening, a distinguished visitor from Holland. This gentleman was Mr. Tappenbeck, the president of the Noordwyck Radio Club, Holland. Mr. Tappenbeck's slight unfamiliarity with the English language was more than compensated for by his smiling good nature, and his illustrated talk on amateur conditions in Holland was enjoyed by all.

According to Mr. Tappenbeck, amateur transmission is absolutely forbidden in Holland, but in spite of this almost every amateur owns and operates a bulb transmitter. He explained that they were able to do this because all the Dutch government and commercial stations were equipped with spark sets which could transmit and receive only on 600 meters. Thus if amateurs operated sets below 300 meters or above 800 meters the government stations knew nothing about it. He also added that since the amateurs had no definite call signals the government stations didn't know who they were even if they did happen to overhear them.

Mr. Tappenbeck then exhibited some very interesting lantern slides of Dutch sets and of POZ and LP, the two big German stations near Berlin. One picture was particularly interesting. It showed the 120-foot loop aerial used at POZ for receiving the American stations, and Mr. Tappenbeck said that during the war copper was so scarce in Germany that the wires used on this loop had to be made of iron.

All the members were unanimous in giving Mr. Tappenbeck a hearty vote of thanks for his interesting lecture. The meeting then closed at 10:15 p.m. after Mr. Choat had given a brief description of the break-in system used at his station.

CANADIAN RADIO APPARATUS

One of Toronto's largest telephone companies, the Canadian Independent Telephone Company, Limited, has devoted a staff of trained electrical engineers to the development of modern radio apparatus. The instruments which they are putting on the market are accurately made and thoroughly reliable in every detail. An audio-frequency amplifying transformer is one of the carefully designed accessories which they have brought out and it should meet with a good deal of favor among Canadian radio

This instrument is of the well-known shell type, since both theory and actual experience have proven it to be the most effective in intervalve coupling. This gives a transformation ratio of about 1 to 6. The insulation throughout is exceptionally good, allowing the use of unusually high plate voltage if so desired. Each transformer is tested at 1,500 volts.

In designing these transformers the engineers have been careful to give the impedance such a value that they work exceptionally well with any of the receiving and amplifying tubes now on the market for amateur use. Due to the mechanical design of the core they are provided with an exterior magnetic path of uniform cross-section and the corners are carefully rounded off. This all tends to eliminate points of high magnetic density at the corners and consequently reduces the disturbing leakage of energy to other adjacent circuits.

In quantitative tests conducted by the company's engineers they claim that these transformers will give a much higher amplification than the best transformers previously obtainable. These tests were carried out with both "soft" and "hard" tubes.

Before being placed on the market each transformer is rigorously tested in the company's engineering laboratory. Thus the purchaser may rest assured that in investing in one of these transformers he is getting an instrument that is as nearly perfect as possible in every detail.

RADIO MAP OF CANADA

Aviation and Wireless News has in course of preparation a radio map of Canada, which will appear in sections of at least a full page each, from month to month, commencing with the November issue. The first section will be a map of the city of Toronto, showing the position of the numerous amateur experimental radiotelegraph stations. Each call signal will be marked on its proper street location on the map, and a key will be published which will give the full name and address of each amateur. In such manner the larger cities will be covered and similarly the rural sections, so that by keeping each monthly copy one will finally have a complete radio map of Canada. The map, or any section, can be kept up to date by simply adding from time to time any new stations, as particulars of such will also be published from month to month

AN APPRECIATION

The editor is in receipt of a letter from Frank A. D. Andrea, of New York City, the manufacturer of the well known "Fada" line of radio apparatus. In part Mr. Andrea says:

"Have carefully read the magazine from cover to cover and I must congratulate you on its appearance and effectiveness."

We want to hear from our other readers — not necessarily by letters of such gratifying approval as the above, but even by letters of criticism, that we may make this

publication mean to its radio readers what, for the last three or four years, it has meant to those interested in aviation. In the few months since we added the wireless field to the publication the response, both from readers and advertisers, has been a matter of great satisfaction to the management, who are endeavoring to live up to the responsibility of giving to the public the only Canadian magazine dealing with the allied subjects of aeronautics and wireless — subjects which are of peculiar importance to a new and far-stretching country such as Canada.

INDUCTION COILS FOR C. W.

The catalogue of the Wireless Manufacturing Company of Canton, Ohio, has just come to hand. The book is made up in the popular loose-leaf style so that new sheets can be added, and its radio information kept up to the minute. As is known, the products of the above company are sold under the trade name of "Wimco" radio apparatus. In addition, however, to their own products they handle other standard lines which they sell on their general money-back guarantee.

Among the products of their own manufacture is the Wimco CW Inductance Coil. The entire frame and end pieces of this coil are made of formica. The winding supports, also made of Formica, are $\frac{7}{8}$ in. wide and $\frac{3}{8}$ in. thick. Turns are spaced $\frac{1}{8}$ in. apart and are of edge-wise wound copper strip $\frac{3}{16}$ in. wide, .050 in. thick, supported in four places, inside diameter of turns being six inches. Sensible clips, five in number, are provided. This inductance may be either mounted on a panel or used on the bench or operating table.

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VOICE MODULATION IN RADIOTELEPHONY

CHARLES A. CULVER, Ph. D.
Canadian Independent Telephone Company, Limited

The growing general interest manifested in communication by means of radiotelephony makes this subject one of wide technical and popular interest. It is recognized by those familiar with the art that the advent of the audion as a generator of continuous waves made possible commercial radiotelephony. Since the introduction and improvement of this device, both as a generator of undamped waves and as a control device, the progress in this branch of communication engineering has been remarkably rapid, until to-day there are in existence scores of commercial and privately-owned radiotelephone installations of moderate power output. Some of these installations work at a comparatively high efficiency, covering distances measured in hundreds of miles, while others operate more or less ineffectively. All of the well-known circuits for producing undamped waves by means of the audion functionate, when properly designed and adjusted, at approximately the same efficiency. The difference in the range of effectiveness of most radiotelephone installations is largely due to the arrangements which are employed for impressing the voice currents upon the continuous waves. We will, therefore, confine our attention to the various plans for voice modulation in connection with this means of communication.

In the plans for modulation about to be discussed, we



CHARLES A. CULVER,

B.Sc. from Carleton College, 1902; Ph.D., University of Pennsylvania, 1907; in charge of Department of Physics, Belet College, 1907-1920; Major in Signal Corps U.S. Army, on General Squier's Staff (Squier was and is Chief Signal Officer); author of numerous papers bearing on the art of Radio and other branches of High Frequency Communication; now Engineer in charge of the high frequency department of the Canadian Independent Telephone Company.

have taken a more or less typical generating circuit as a unit around which to construct the accessory control circuits. It will be noted that the frequency determining circuit consists of a tuned plate and an untuned grid circuit, with the anode potential supplied in parallel with the tube and load. It will, of course, be understood that the anode potential might be supplied in series, as for example, at the points X or X1. The generating circuit diagram has been reduced to its simplest terms. In practice, in order to control the generated wave length, the plate inductance would be variable, or a variable condenser might be inserted between the common negative point Q and the earth.

The methods employed for impressing the voice sound waves upon the carrier current might be classified in several different ways. For our present purposes the following classification will suffice:

1. Control of generation.
2. Control of power supplied —
 - (a) By varying the anode voltage;
 - (b) By varying the current.
3. Drainage or absorption.
4. Amplifier control.

Control of Modulation

One of the simplest and most widely used methods of impressing the voice currents upon the carrier current is illustrated in Fig. 1a. For wave lengths of the order of 600 meters or under, and with properly chosen circuit constants, this method, though frequently criticized, gives very satisfactory results. Variations in potential are impressed upon the grid by means of the microphone and modulating transformer T. If the transformation ratio of this transformer be properly chosen for operation with sound waves of average intensity, the potential of the grid will be caused to vary over the entire straight portion of the tube's static characteristic curve, with the result that the high frequency output of the tube will be varied accordingly. The result is that it will be found that there is an optimum coupling between the plate and grid coils for maximum modulation. If the sound waves are at too great an amplitude, or if the transformation ratio of the modulation transformer be too great, the potential of the grid will be caused to pass beyond the straight portion of the tube's curve, and the tube will probably momentarily cease oscillating, with the result that the articulation will be rough and otherwise unsatisfactory. This may be remedied by inserting a variable condenser having a capacity of the order of 0.0005 mf, in parallel with the secondary of the modulating transformer. By varying this condenser the modulation may be smoothed out to the desired degree. With properly designed constants, and with a tube of high output impedance, this system of modulation is capable of operating at an efficiency approaching 100 per cent.

As evidence of the effectiveness of this general plan of modulation it may be noted that this company has worked Buffalo when utilizing a De Forest type D tube, having an output varying from 15 to 20 watts. Those who have listened to the transmission from our Toronto station will bear testimony to the fact that the quality is all that might be desired, and the distances which have been covered

would indicate that the modulation is very nearly complete.

It may not be out of place at this point to make a brief digression in order to note what is meant by degree or percentage of modulation. There are various ways of expressing this relation. Referring to Fig 2, the line I representing

condition is the one to be sought for, provided it can be attained without accompanying distortion. It will be agreed that fidelity of speech reproduction is as important as volume, and it is not possible under all conditions to secure 100 per cent. modulation and at the same time have the transmission entirely free from distortion.

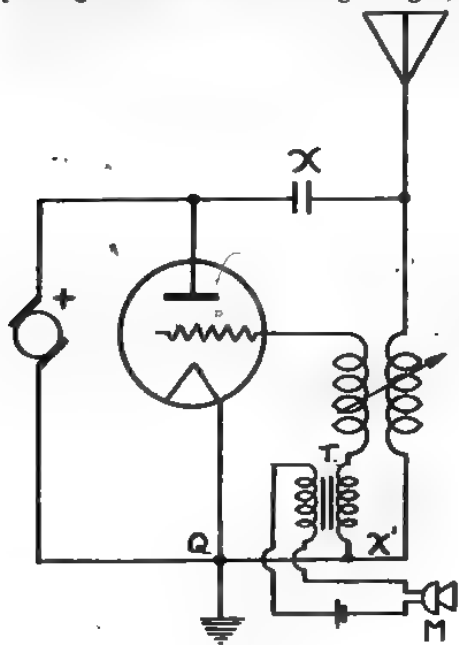


Fig. 1A

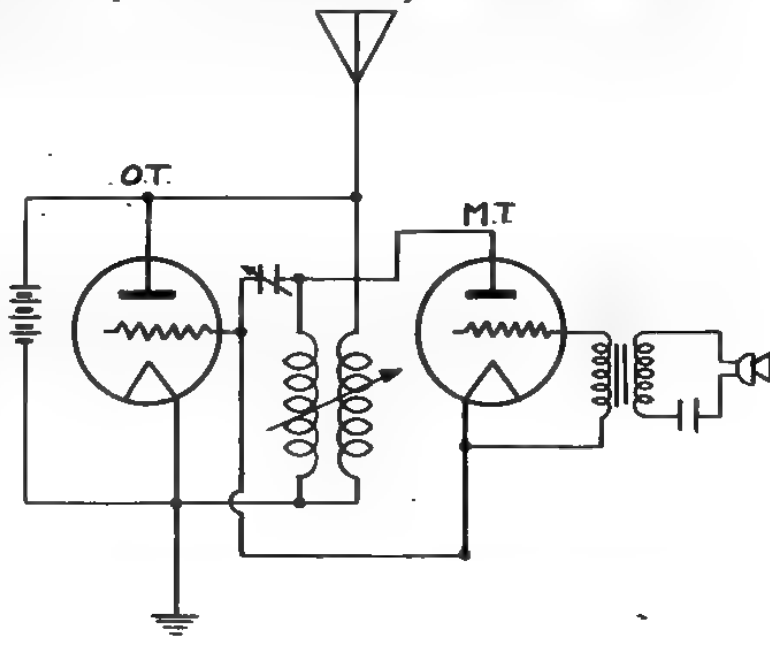


Fig. 1B

resents the unmodulated value of the output or antenna current. If we assume, for simplicity sake, that the control current has the form of a sine wave, the dotted curve would indicate a modulation of the order of 50 per cent. It will be noted that the value of the carrier current does

Again returning to our general discussion, reference may be made to Fig. 1b. In this scheme of modulation an audion is used as the grid leak and is shunted by a variable grid condenser. It will be obvious from an examination of this plan that the modulating tube need only be of suf-

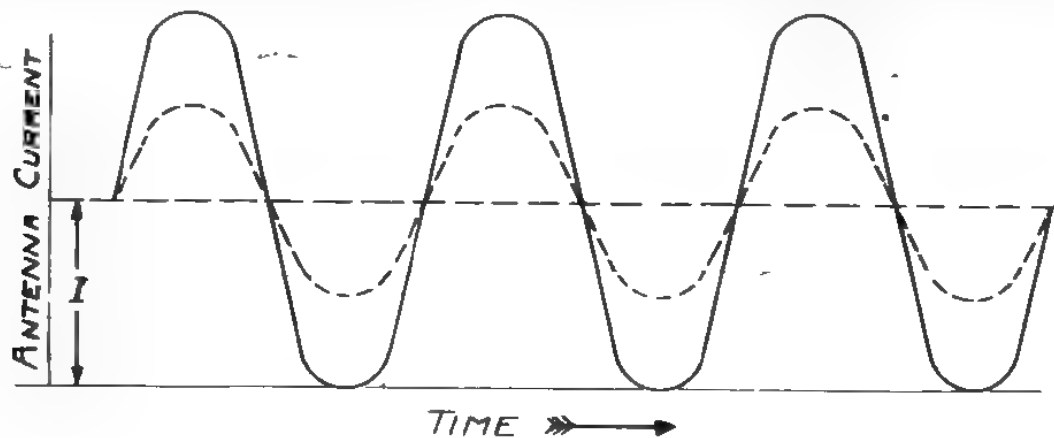


Fig. 2

not at any time decrease to zero, or rise to twice its non-modulated value. The full line curve represents a modulation of the antenna current which is complete, or, as it is frequently expressed, 100 per cent. The antenna current in this instance varies from zero to 2I. This latter

efficient dimension to carry the comparatively small grid circuit current, and hence a tube of small current-carrying capacity may be utilized to control the output of a comparatively large generating tube. This method of modulation falls under the head of "Control of Generation," for

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Since May last, our already large circulation has steadily increased. We wish to thank our old-time Aviator friends for their loyal patronage in the past and to assure them of our best endeavours on their behalf in the future. In entering the Wireless field, we believe we have but added interest to their reading of our pages. As one authority has said: "Radio is the very life-blood of flying." In other countries, such as Australia, we find, in leading publications, a similar combination of interests.

To our new friends, we can only say that we appreciate the great interest taken in Canada in Radio matters—Aviation and Radio being essential to the development of Canada's vast expanse. For the best of Canadian Radio enthusiasts, we will endeavour to make our publication of vital interest, not only by treating of Canadian Radio matters in general, but by the publication of articles by Canadian authorities and a digest from month to month of the Wireless news of the world. We ask only their co-operation by subscribing and the sending in of club reports, descriptions of apparatus, queries, suggestions and ideas, etc.

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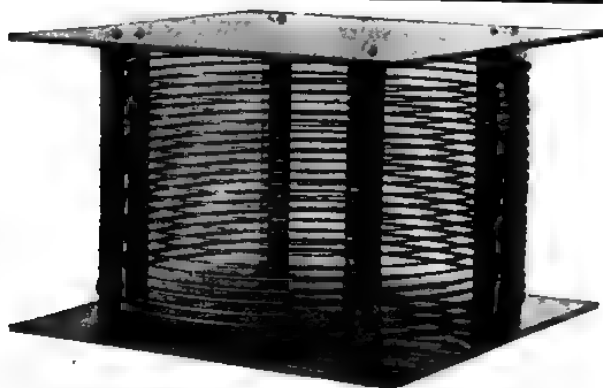
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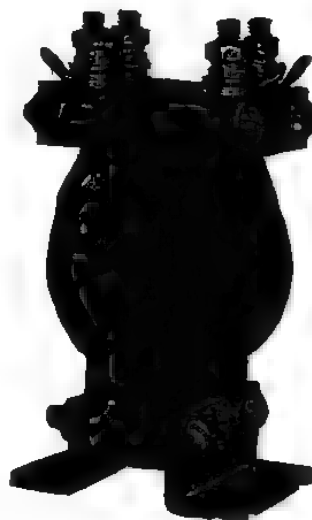
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the reason that the potential of the grid of the oscillating tube will be determined by the value of the grid leak resistance, and if this is made to vary in accordance with the voice waves, the high-frequency output of the generating tube will be modified accordingly. This method of modulation, under certain conditions, gives very satisfactory results, the articulation being crisp and the volume fairly satisfactory.

small and moderate powered sets. In common with certain other methods of modulation the modulator tube or tubes must be of approximately the same capacity as the power tube, which is obviously a disadvantage, if the same results can be otherwise accomplished.

Another plan by which the unit voltage may be varied is shown in Fig. 2c. In this scheme the secondary of the modulating transformer is in series with a source of direct

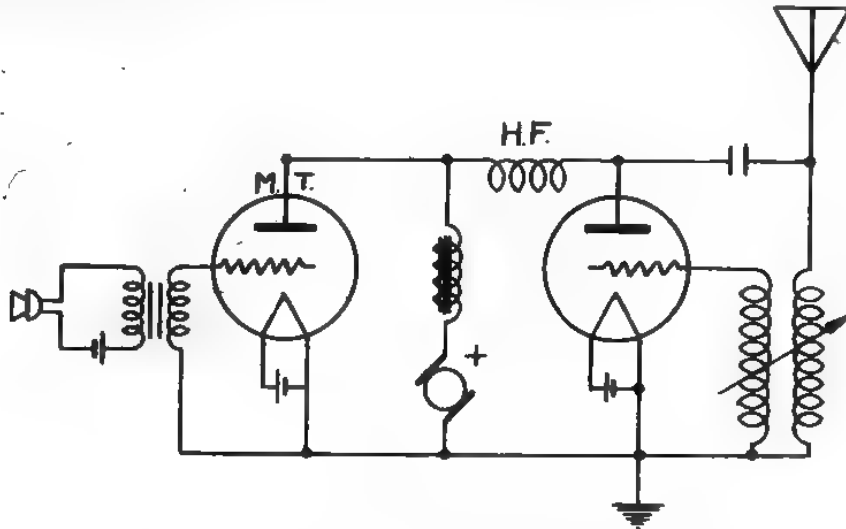


Fig. 2 A

Control of Power Supply

The second general method of securing voice control of the power output is by varying the power supplied to the oscillating tube. This may be accomplished either by varying the anode voltage, or by varying the current supplied to the tube.

potential in the plate circuit. The general condition to be brought about is that the direct current component of the plate circuit shall be so related to the alternating current voltage generated by the voice currents in the secondary of the modulated transformer that the resultant plate voltage will vary between zero and twice the D.C. value. This method in its simplest form has very narrow limitations owing to the fact that the energy output of the modulating transformer is limited. The method, however, gives excellent results in small tubes, when using a small amount of power. The output of such an organization may serve to excite one or more power amplifying tubes, and by this means it is thus possible to effectively control an output of considerable magnitude. A circuit incorporating this idea is shown in Fig. 4a.

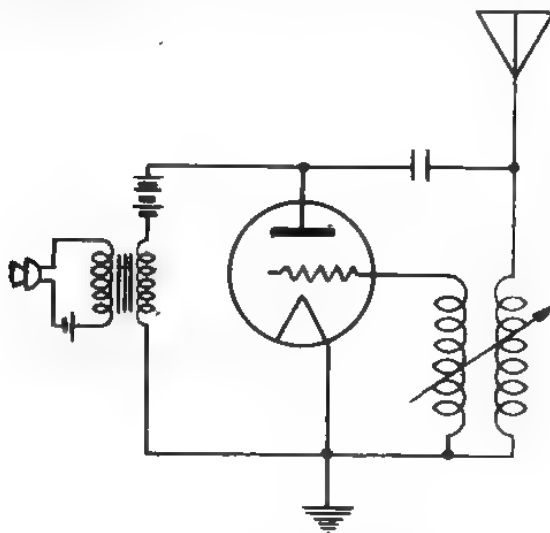


Fig. 2 C

A third method of controlling the voltage supplied to a power tube (Fig. 2b) consists in introducing a tube having suitable characteristics into the field circuit of the generator which supplies the anode voltage to the oscillating circuit. In this case the tube associated with the D.C. generator acts as a variable field resistance, which resistance is controlled by the potential of the grid as acted upon by the voice currents through the modulating transformer. Obviously, in such a case, the characteristics of the tube and the field winding of the generator must be carefully designed to operate as a unit.

Probably the most widely used method of modulation is that due to Heising of the Western Electric Company, and is shown diagrammatically in Fig. 2a. This method is so well known that we will not take the space to further describe the plan, but simply note in passing that the method gives good results and is applicable in cases of

In arranging to vary the power supplied to the oscillating circuit by controlling the current, use may be made of the circuit shown in Fig 2d. In this scheme the modulating tube which is inserted in one of the leads from the generator supplying the plate voltage serves as a variable resistance, this resistance being voice-controlled. The obvious disadvantages of this method are that energy is dissipated in the resistor tube, and also that the modulating tube must have the same current-carrying capacity as the power tube itself. However, with a tube of the proper

characteristics, the method gives excellent results both as to articulation and volume.

Drainage Method

When it is desired to control outputs of the order of a kilowatt, a method which has found favor, is one known as the drainage or absorption plan. A typical circuit of this character is shown in Fig. 3. The modulating tube is

Amplifier Control

Space does not permit a discussion of the circuits and conditions necessary for securing optimum power amplification, but the general principles on which such circuits operate are not essentially different from those which obtain in connection with amplifiers utilized for receiving purposes. A method of control which is credited to van

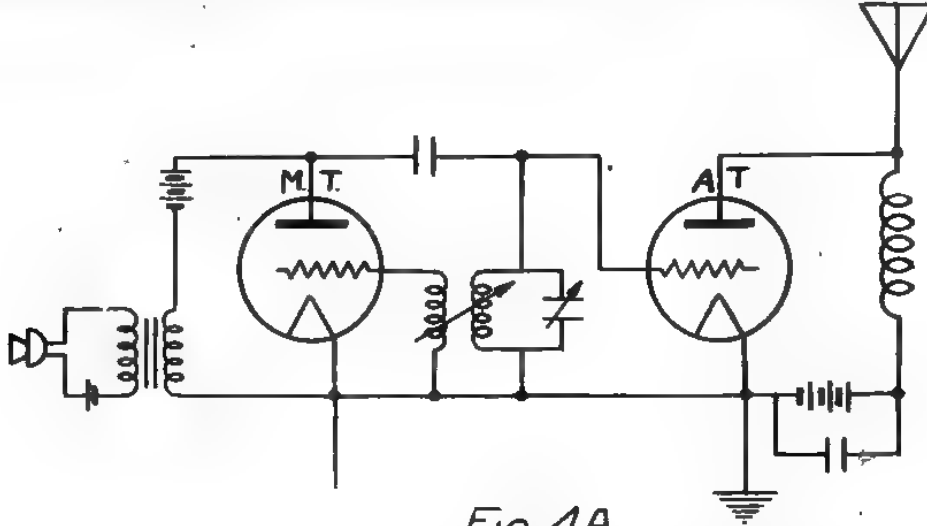


FIG. 4A

arranged in shunt to the antenna inductance and hence serves to dissipate a part or all of the energy which would normally be radiated. While there are certain theoretical considerations which appear to indicate that this method would be inefficient, yet in actual practice it has been found to be quite satisfactory. One of the largest private radiotelephone stations in the States has used this method very successfully, having some unusual distance records to

der Bijl is shown diagrammatically in Fig. 4b. In this type of circuit a small oscillating tube supplies energy to a tube of larger dimensions, suitable for power amplification. In series with the high-frequency source is the secondary of the modulating transformer. The voice currents and the high-frequency carrier current are thus simultaneously impressed upon the grid of the amplifier tube, with the result that the alternating current in the

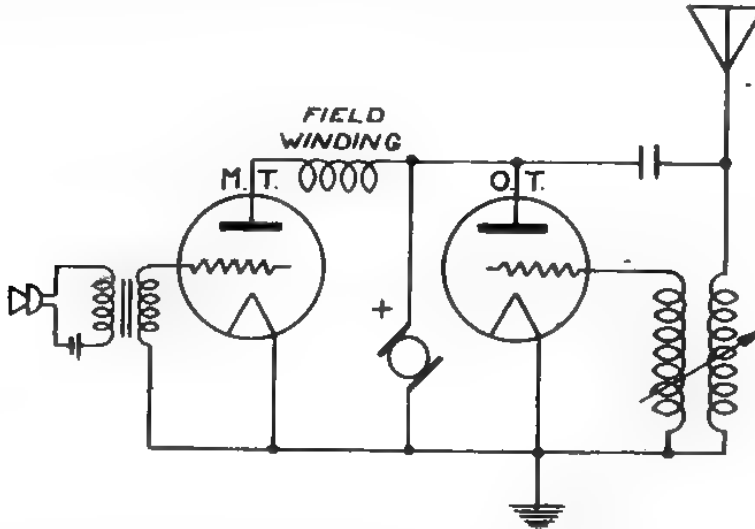


FIG. 2 B

its credit. In utilizing this scheme the characteristics of the modulating tube would, in general, be somewhat different from those of the power tube in order that little if any energy would be dissipated when the modulator was quiescent.

plate circuit of the amplifying tube has a form which is the envelope of the composite input to the amplifier. This general plan was utilized in the historical experiments conducted at Arlnington in 1915, when that station transmitted speech to Paris and Honolulu. The details of the instal-

lation used at that time have been recently described by Mr. Heising in a paper appearing in the August number of the Proceedings of the Institute of Radio Engineers.

All of the methods of modulation described in the foregoing paragraphs have been more or less carefully tested

may produce potentials of very low value in the secondary.

Again, the grid current of the modulating tube may also be of sufficient value to saturate the iron of the transformer. The direction of the magnetic flux, due to the

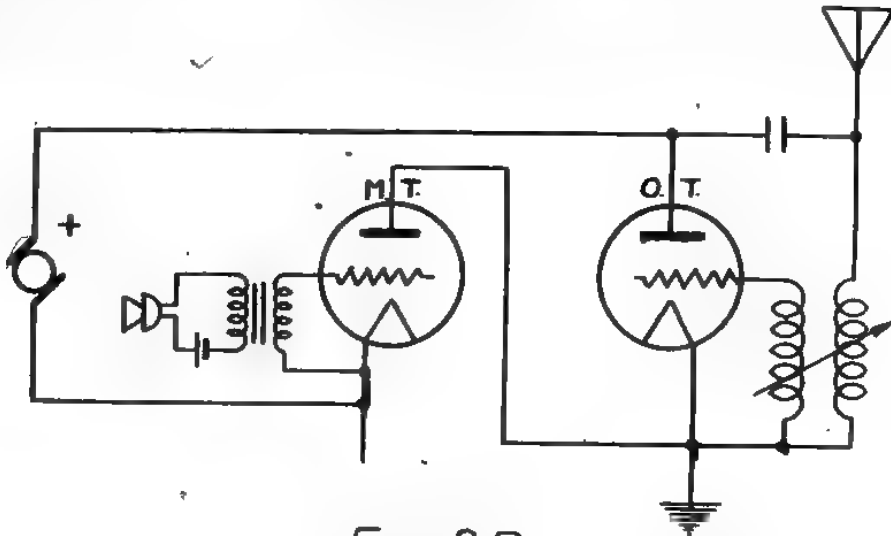


FIG. 2D

by the author, and each has been found to have its advantage and disadvantage. The particular modulating circuit to be used in any given case depends upon the conditions under which the radiotelephone service is to be given, and, in the case of the experimenter, upon the facilities available for setting up the various circuits.

grid current, may also be such direction as to more or less nullify the magnetic action of the microphone current in the primary. It is, therefore, desirable from the standpoint of modulation, to keep the grid current in the modulating tube at zero value. If for any reason this cannot be done the direction of the current in the primary and

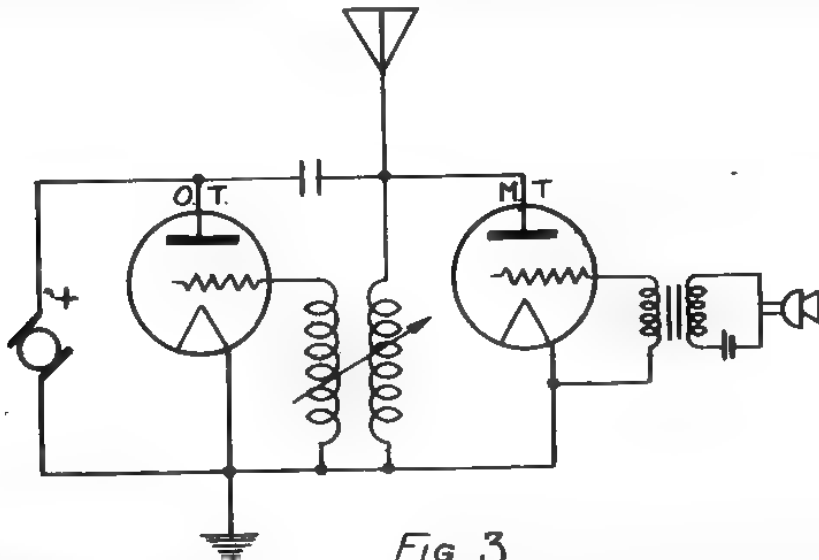


FIG. 3

Modulating Transformer Design

Whatever modulating organization is utilized, there are one or two general precautions which should be observed if optimum results are to be expected.

In the first place, the design of the amplifying transformer is of primary importance. If the quantity of iron in the transformer is not sufficiently great it is possible that the direct current component of the microphone circuit may practically saturate the transformer core, and hence the variations in this current caused by the voice

secondary of the modulating transformer should be carefully considered.

In closing it may be noted that the results secured by any given modulating arrangement cannot be accurately judged when the circuit by which the transmission is being received is oscillating. Frequently a modulating scheme is improperly judged because the receiving tube is in an oscillatory state, and hence producing distortion. While auto-amplification results when the receiving tube is oscillating, yet in actual commercial practice this condi-

tion cannot be allowed to obtain when receiving vocal transmission, the reason being that it is extremely difficult to hold the receiving circuit and the transmitting circuit in

in actual use or which give promise of early practical results have been considered. Undoubtedly other and per-

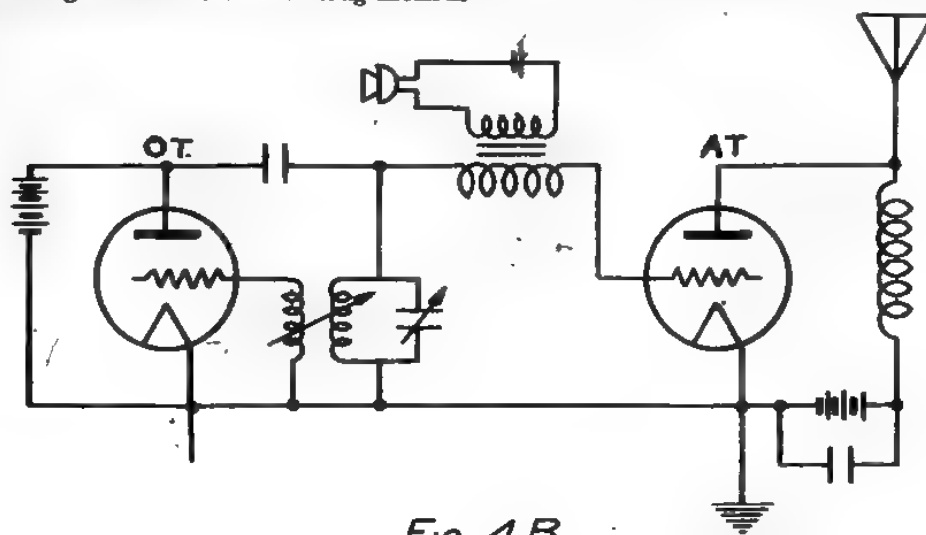


FIG. 4B

synchronism, and if synchronism does not obtain distortion will result.

No attempt has been made to outline all of the methods which have been suggested for amplification. Only those

haps fundamentally different circuits for effecting modulation will be devised. It is this quest for new and improved methods which adds interest and zest to all endeavors connected with the development of radio communication.

NOTES OF WIRELESS ASSOCIATION OF ONTARIO
By 3GK

Mr. W. C. C. Duncan (9AW) has been appointed official delegate to the Buffalo convention and his report of the trip will be looked forward to with interest by all members.

Mr. W. E. Linton (30W) certainly has a very well modulated and consistent radiophone set with which he furnishes those around Toronto with excellent music when KDKA is weak.

A fine pole 40 feet in length has been erected at station 3CY. This pole is mounted on a base 40 feet from the ground, making a total height of 80 feet.

9AW has been "raising" the "States" all right. Here are some he has "worked": 4GL and ITS on radiophone, as well as CW; QSA through QRM and QRN, as well as 8IQ, ZZL and ZZV.

Say, boys. If you have any radio items of interest that the other "hams" might like to have just drop a line to—
Publicity Manager of W. A. O. O.,

24 Boswell Avenue, Toronto, Ont

and I'll be glad to publish them for you

If there are any stations handling traffic, please communicate with A. H. K. Russell, 11 Pinewood Avenue, Toronto—so that relay routes can be made throughout Canada.

About two stations are handling all the traffic in Ontario—3BP and 3JL, who have been talking regularly with New York.

WIRELESS BATTERIES

Our September issue contained an article entitled "Wireless Concerts at C. N. E." Owing to incorrect information received we stated that dry cells were used. This we now find not to have been the case. The 500 volts required were supplied by five Reliable "B" 100 batteries connected in series. These are Canadian-made batteries,

being manufactured in Toronto by the Dominion Battery Co., Limited, who have also branches in Montreal and Winnipeg.

BUFFALO RADIO CONVENTION

On October 28th and 29th there will be held at the Iroquois Hotel, Buffalo, a convention of the eighth American district and third Canadian district. Several enthusiasts from Toronto expect to attend. The W.A.O.O. has appointed Mr. W. C. C. Duncan (9AW) as official delegate. The editor of AVIATION AND WIRELESS NEWS will be in Buffalo on the above dates, and full details concerning the convention will appear in the November issue.

WESTINGHOUSE BROADCASTS

The Springfield (Mass.) plant of the Westinghouse electric manufacturing plant is preparing to send radio broadcasts on regular schedules. This broadcasting station is but one in a chain of existing and proposed stations that will cover the entire country and supply the beginner with up-to-date news and entertainment. They are going to follow the same general scheme as prevails at the company's East Pittsburgh plant, KDKA, and eliminate the "canned music," substituting in its place vocal selections by regular musical talent hired for this purpose. On Sundays those who do not go to church will probably have an opportunity of having the church brought to them in the form of wireless sermons. Connections will also be made with local theatres whereby one can hear their concerts

PRESIDENT OF W. A. O. O.

Mr. C. A. Lowry, president of the Wireless Association of Ontario, has returned to Toronto after a summer's absence in the United States. Mr. Lowry has taken over the radio sales department of Powley & Moody, Ontario representatives of Edison Storage Batteries and Hom-charger Rectifier. Mr. Lowry's address is 219 Robert street, Toronto.

Aeroplane Too Swift For Opium Smuggler

By CAPT. J. F. TUPPER

At last the opium smuggler has been outmanoeuvred. The aeroplane has done it. For years this traffic has been carried on almost unhindered on the western coast of our fair Dominion and thousands of lives have been blighted thereby.

What would some have given had it been within their power to prohibit this curse from our land. Large profits enabled smugglers to compete with every effort to thwart their schemes. It would take volumes to relate the weird tales of boats being overhauled by government patrol boats only to find that while they were climbing over one side of the boat the cargo was being thrown over the other side. Equally interesting and quite as profitless was the watchfulness of the guards, who discovered that opium was being thrown into the sea from passenger ships to be taken up in skiffs by receivers. Quite as thrilling were the intrigues of women who had garments made purposely to conceal tacts of opium.

A new era has dawned! In one instance alone a long-shoreman was apprehended at Union Bay, B.C., smuggling ashore about \$1,500 worth of opium from the Blue Funnel steamship Talthybius.

The collector of customs at Vancouver in his official report to the Superintendent of Air Operations, which, because of the confidential nature of these proceedings has, for obvious reasons, been only now released for publication, states:

"It was necessary, due to receiving new information, to radically change our plans at the last minute, and because of the short time it was only possible to do so by making the trip by plane. The taking of the longshoreman, while very gratifying, is not in itself nearly as important as the fact that we have disclosed this point and method of smuggling, for we have realized for some time past that the dope smugglers had adopted some new point rather than Vancouver for illicitly landing their drugs, the drugs later finding their way to Vancouver, and we now feel that the second round in this campaign has been won. Without the assistance given by your planes this smuggling probably would have gone on at Union Bay for a number of months before we could have actually demonstrated what was taking place.

"I have also reason to believe that the air patrols have effectively stopped the dropping of drugs overboard from ships in the areas that we have closely patrolled, but believe, now that Union Bay will be closed to this traffic, that we must expect efforts to continue the drug smuggling at some new point further distant, and to completely assure ourselves that we have effectively blocked the disposing of drugs en route, our air patrols should now regularly be carried out, when the daylight and weather permit, by the leap-frog method adopted when Pilot Brown accompanied by myself recently covered the Montagle from Sooke to Vancouver.

"I also attach great importance to plane obviously securing the names of all small craft which appear in the slightest degree acting in a suspicious manner, and from time to time asking crew questions regarding movements. These actions are always noted and commented on when these boats arrive in harbor, and have splendid moral effect."

ENTHUSIASTIC FIELD DAY OF AERO CLUB OF CANADA

The Aero Club of Canada held its first field day of 1921 at the Leaside Aerodrome of Mr. F. G. Ericson, Saturday afternoon, October 22. It turned out to be a gala event for the club and the field day idea has aroused so much enthusiasm in flying that other equally interesting events are sure to follow.

Mr. Ericson provided a number of aeroplanes and pilots for those who wished to "go up in the air." It was a windy day but the machines were kept busy, and stunt flying, looping the loop, etc., entertained a crowd of more than a thousand people. Details of the meet will appear in the next issue.

PROFESSOR ROSEBRUGH ILL

Many Canadian radio enthusiasts have learned with regret of the illness of Prof. Rosebrugh, professor of electrical engineering at the University of Toronto, and honorary president of the Radio Research Club of Canada. Members of the last-mentioned club fully appreciate his efforts on behalf of the club, and especially the work which he did in connection with his course of lectures last spring. His speedy and complete recovery is certainly wished by his many friends.

When Money is Tight

Practically all classes of investments—bonds, stocks, debentures, real estate—depreciate in value to a ruinous extent. Investors are often forced into bankruptcy at such times through conditions over which they have no control.

But an Imperial Life policy never depreciates. On the contrary, it continues to increase in value during week-days, nights and Sundays, from the time it is issued until its maturity, no matter what business conditions or the state of the money market may happen to be.

If you would like to know more about this "panic-proof" investment just send us your name and address. Then we'll send you some interesting literature by return mail.

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New Activities at Aero Club of Canada

At the special general meeting of the club, held September 22 last, and reported in our last issue, ways and means of bringing about greater activity were discussed. As one result Mr. W. F. Sparling was appointed chairman of the new entertainment committee. Mr. Sparling is a director of the club and one of its most active members.

Mr. Sparling and his associates on the committee have lost no time in arranging a programme to commence immediately. The evening of October 19th was bridge and card night. Wednesday evening, October 26th, was devoted to new members. There was a smoker on that evening and each member was expected to bring at least one new member. Arrangements are being made to hold a dance during the first week of November. If possible, Jenkins' Galleries will be secured for the occasion.

Mr. Ericson has kindly offered the members the use of some machines for the afternoon of Saturday, October 22nd. For those who may fear that they have lost their sense of touch as regards the "joystick," pilots will be on hand. Those interested are requested to meet between 2 and 3 p.m. at the aerodrome at Leaside.

The management of the club premises is now in the hands of a special committee of the directors, it having been arranged that two directors be appointed for each week to have charge for that particular period. Particular attention is to be given to the dining room, and it is hoped that all members who have not been in the habit of patronizing the club's service in that respect will show their appreciation of such efforts, not only by coming themselves,

but by bringing prospective members, who may thus gain a good idea of some of the many advantages of membership in the Aero Club of Canada.

The directors want the active co-operation of all members, not merely by dropping in at the club when convenient, but by making full use of their club membership, and also by giving to the directors any suggestions which may prove of value in furthering the aims of their club.

Out-of-town members should call whenever in the city. Lieut. F. G. Haycke, R.N.V.R., from Porcupine, called a few days ago and it was remarked that he was as lucky at bridge as at flying.

The directors have received from Major E. Graham Joy, on behalf of the old Flying Club, a letter enclosing cheque for \$85.66, being balance in hand. This letter was accompanied by a statement showing receipts of \$221.33, made up as follows: Proceeds from sale of dinner tickets, \$101.75; membership fees, \$113; interest, \$4; sundries, \$2.42. From these amounts there was paid for the Y.M.C.A. dinner the sum of \$90; for printing and stationery, \$16.02; for advertising, \$29.25; for postage, 40 cents; leaving the above-mentioned balance of \$85.66.

One of the conditions of Major Joy's letter was that the Aero Club would assume any responsibility as between Major Joy and the treasurer and the old Flying Club. The directors have accepted the money in trust and have asked that the secretary and treasurer of the Canadian Flying Club call a meeting of members to dispose of the amount

PLAN UNIVERSITY COURSES IN AERONAUTICS

A draft plan for the training of university cadets by the Canadian Air Force, and by that means providing a reserve of flyers and aeronautical mechanics in case of need, has been submitted by the Air Board to the various heads of universities in Canada for consideration and comment. The plan includes the giving of a three months' course for three consecutive years to university students who are desirous of studying aeronautical engineering where they can secure first-hand information. The number taking the first course, which is proposed for opening about May 1, 1922, will be limited to 30. Students must be under 21 years and unmarried, and physically fit for military service.

PHOTOGRAPHIC SURVEY OF PETAWAWA CAMP

At the request of the Department of Militia and Defence a complete aerial survey has been made of the Petawawa Military Reserve, comprising approximately 240 square miles.

Photographs were taken from a Bristol fighter at an altitude of 8,000 feet, giving a mosaic 148,000, which when completed and mounted on beaver board was twelve by 15 feet in size. It was afterward reduced by the Department of Militia and Defence to a scale of 1/20,000.

The photographs turned out remarkably well and all concerned expressed satisfaction, as full details were given in all sections of the photographs to enable an accurate map to be made.

Six hundred feet of film, giving approximately 600 exposures, and about fifteen actual flying hours were required for the purpose of obtaining the pictures.

WANTED, AND FOR SALE

Line advertisements under this heading 4 cents a word, minimum \$1.00.

Pilots seeking positions or companies wanting pilots will hit the nail on the head by advertising in this column.

If you have anything to sell advertise here.

Notices of meetings and propaganda work reaches the right people through this medium.

Through this column you are talking to your prospect direct.

Address Editor Aviation News, 66-62 Adelaide St. East, Toronto.

FREE Illustrated Literature. Outboards, New and Rebuilt Engines, Universal Joints, Pumps, Clutches, Gears, Aerial, Hyde, Gordon Reversible Propellers, etc. Canadian Boat & Engine Exchange, Toronto.

FOR IMMEDIATE SALE—One Curtiss Canuck in flying condition. Airworthy Certificate, with \$200 worth of spares. Make me an offer. F W McCrea, Sherbrooke, Que.

Sport Plane Builders Attention.—We can furnish for immediate deliveries the Lawrence L-A 3, 30/40 H.P. aviation motor, the latest 2-cylinder opposed type, air cooled; weighs only 128 pounds. Specially priced in original factory crate, \$200.00 complete.

Free advice and blueprint design of latest L-A 3 Sportplane. Bordelon, 108 Trolleyway, Venice, Cal.

WHO'S WHO AT CAMP BORDEN

In our July issue we were pleased to set out certain particulars regarding the career of Hon. Capt. the Rev. J. T. Tupper, chaplain to the Canadian Air Force. From the ministry we now turn to medicine and have much pleasure in introducing to our readers Major Ernest Fielden Nivin, senior medical officer at Camp Borden. Major Nivin is a man of broad education and experience. In 1901 he received his M. A. degree from Cambridge, England. In 1907, both at Edinburgh and Glasgow, he was made a L. R. C. P. and S., and is a registered member of the British Medical Association.

During the late war he was among the first to offer his services. On October 16, 1915, he was made a lieutenant, in the R. A. M. C., attached to the 17th King's Royal Rifles. At Neuve Chappelle, while M. O. to the 132nd Field Ambulance, in the 39th Division, B.E.F., he was wounded. He attained his captaincy in the Army Medical Corps of the C.E.F. in 1917. In the same year he became president of the standing medical board, M. D. No.

13, at Calgary. The following year he was made a member of the medical board of review for the Province of Alberta in connection with the operation of the Military Service Act, and later Deputy A.D.M.S. in care of sanitation.

On January 7, 1919, he became Major Nivin, and Deputy A.D.M.S. in care of administration. Later he became Acting A.D.M.S., and during the recent Canadian tour of H. R. H. Prince of Wales he acted as physician to the Prince while in Alberta and British Columbia. On the expiration of such duties he was appointed O. C. at Calgary Military Hospital.

At Camp Borden Major Nivin, in addition to being senior medical officer, has qualified as flight lieutenant and squadron leader in the C.A.F.

KOKOMO AERO MEET

Forty-three aeroplanes of various types and sizes, and representing practically every State in the United States central west, took part in the aviation meet held there on September 22 to 25. The Detroit Free Press says:

"No one could have attended the four-day meet without taking back with him a definite impression that the aeroplane was slowly but surely taking its place as a commercial vehicle that will soon be in everyday use between large cities throughout the entire country. It is just such air meets as this one that do much toward convincing the skeptic that aviation is not a 'game,' but a business, headed by conservative and intelligent business men. The more of these meets that are held in various parts of the country the sooner the aeroplane will be accepted by the public as a safe and speedy method of transportation, and for this reason it will pay each community to begin now to formulate plans for a similar meet to be held in its vicinity this fall or early next spring."

COMPETITION FOR SAFETY FUEL TANKS

The above competition in England is arousing considerable interest in Canada. The September issue of AVIATION AND WIRELESS NEWS gave full particulars of the competition and directed those wishing to enter to confer with the secretary of the Aero Club of Canada from whom application forms might be obtained. The secretary states that he already has some Canadian entries and in response to a letter to England inquiring as to latest possible date for receiving Canadian entries he has received the following:

"Air Ministry, Kingsway, London, W C 2

"Sir In reply to your letter of the 13th inst. I am directed to forward you twelve copies of the regulations governing the above competition, and to state that there is no objection to entries from Canada being received up to and including November 14, provided the tanks themselves are delivered on or before November 23, as provided in the regulations.

"I am, sir, your obedient servant,

J. M. MAUNSER,
Major R D I (A).

"Secretary Safety Fuel Tank Competition"

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We carry a full line of FOOT COMFORT APPLIANCES

And can give you FOOT EASE, at all times

Men's Black or Colored Calf Boots, Welting Soles, specially priced
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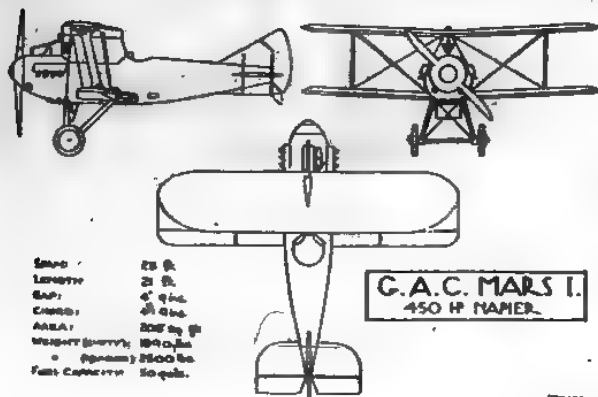
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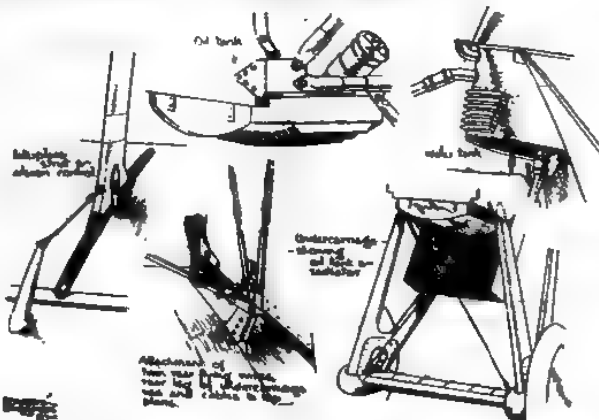
TORONTO, ONT.

Winner of the London Aerial Derby



SPAN 23 ft.
 LENGTH 21 ft.
 GAP 4 ft. 9 in.
 CHORD 4 ft. 9 in.
 AREA 205 sq. ft.
 WEIGHT (empty) 1,890 lbs.
 (loaded) 2,500 lbs.
 FUEL CAPACITY 50 gals.

G. A. C. MARS I.
 450 H. P. NAPIER.



The winner of the recent London aerial derby was Mars I, designed by Mr. H. P. Folland. The machine is in many respects similar to previous machines of his design. The greater part of the fuselage, the undercarriage and the tail unit are constructed from the same component parts, as are the same parts of the well-known Nighthawk. The machine is equipped with a 450 h.p. Napier engine

and has a fuel capacity of 50 gallons. Other specifications are: Span, 23 feet; chord, 4 feet 9 inches; gap, 4 feet 9 inches; stagger, 1 foot 4 inches; total wing area, 205 square feet; length over all, 21 feet; oil capacity, 5 gallons; water capacity, 7 gallons; weight empty, 1,890 lbs. approximately; weight loaded, 2,500 pounds; loading per square foot, 12.2 lbs.; weight per horse-power, 5.5 lbs.

AERO CLUB MEMBER AT FORT NORMAN

The following interesting letter was received by the secretary of the Aero Club of Canada:

"Dear Sir—Enclosed is check for my 1922 dues as non-resident member. This will leave here on the last mail out for 1921, about September 8.

"The winter dog mail will leave in January, 1922. The next boat will be July 22, so better early than late. Should amount be insufficient will make it O.K. when I arrive.

"The company's aeroplanes have been unfortunate so far. This spring two of them reached Fort Simpson; one crashed badly, the other broke a propeller. It was there that one of the mechanics made a propeller from a sleighrunner. The two crews, with the exception of one mechanic who remained behind to look after the other machine, flew back to Edmonton behind the home-made prop. The Indians and breeds were terrified when the machines appeared. Some ran for the woods to get away from the angels, while others fired with their rifles at the huge birds.

"The end of May expedition No. 2 left Edmonton with geological party. On landing at Fort Norman a pontoon was broken. It was not until the end of July that another arrived from civilization. They left here for Fort Simpson. When repairs are completed on that machine they will both go to Edmonton for orders.

"Will they come back this year? Perhaps!

"By air the trip is only 800 miles; by water 1,600, taking two weeks.

"Remember me to the boys.

"Yours truly,

"IVAN MARKS."

LLOYDS' AVIATION RECORD — PILOTS

Announcement was made earlier in the year in General Progress Report No. 6 that the Air Board had undertaken to furnish particulars of all aircraft officially certified for commercial use in Canada for inclusion in "Lloyds' Avia-

tion Record — Aircraft." It is of interest to note that the firm of Lloyds have now instituted an additional record for pilots, which is known as "Lloyd's Aviation Record - Pilots."

The Air Board has again met the request of the committee of Lloyds and has undertaken to furnish information concerning all commercial pilots officially licensed in Canada for inclusion in this new record. The particulars to be given will be the same as are already supplied by the British Air Ministry concerning pilots in Great Britain, and will comprise the following:

- Name and address of pilot.
- Nationality.
- Type and number of certificate.
- Date of issue and date of expiry.
- Type of aircraft licensed to fly.
- Date of last medical examination.

The policy of Lloyds, as previously announced, in issuing these two Aviation Records, is to create facilities whereby aircraft constructors, air transport companies, underwriters of aviation risks, or any other commercial interests affected by or interested in aviation, may benefit by having ready access to certain essential information regarding commercial pilots and aircraft. It is in effect an effort to provide commercial aviation interests with the same benefits that have been derived by shipping agents and steamship companies from Lloyds' Registry of Shipping.

AEROPLANE LAYS CABLES

The army air service of Sweden reports that a six-mile section of telegraph cable was successfully laid by an aeroplane in eight minutes. Six of the eight minutes were spent in flight and the other two in making connections.

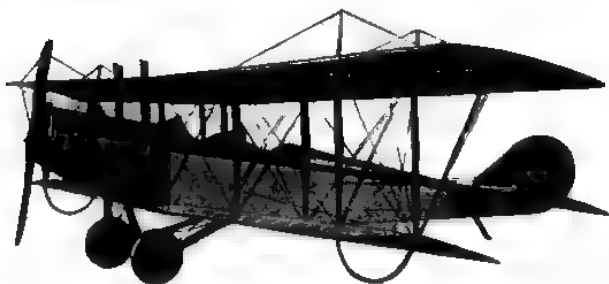
FLYING SCHOOL IN COSTA RICA

With an Italian aviator in charge, a flying school has been opened in Costa Rica.

Canadian Pioneers in Aeroplane Building.

NEW PLANES

\$2500⁰⁰



The **CANUCK**

DESIGNED BY F. G. ERICSON

The "CANUCK" is undoubtedly the most used plane on the Western Hemisphere.

The "CANUCK" has become the "Universal" plane.

The "CANUCK" has been used with success for every purpose where an aeroplane could be of service.

The foremost "Daredevils of the Air," amongst others Locklear, Elliott, A. J. Wilson, Jennings and others, all use "Canucks."

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