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AVIATION & WIRELESS NEWS

At EATON'S A New Shipment of "ACME" Transformers

110 VOLTS - 25 CYCLES.

300 WATT TRANSFORMER

Secondary voltages—750 and 1000 volts each side of the center. Secondary current—200 milliamperes.

This transformer will supply plate voltage and current for four tubes of either 550 or 350 plate voltage, and 50 milliamperes plate current with extra voltage for the drop in a choke coil used for smoothing out the alternating current in a self-rectifying set, and will also heat the filaments of four vacuum tubes of 2.5 ampere rating. (Two tubes per filament winding.) Price, \$58.50.

200 WATT TRANSFORMER

Secondary voltages—550 and 350 volts each side of the center. Secondary current—200 milliamperes.

This transformer will supply plate voltage and current for four tubes of either 550 or 350 plate voltage and 50 milliamperes plate current, and will also heat the filaments of four vacuum tubes of a 2.5 ampere rating. (Two tubes per filament winding.) These values are for continuous duty. Price, \$54.00.

50 WATT TRANSFORMER

Secondary voltages—325 volts each side of the center. Secondary current—100 milliamperes.

This transformer will supply plate voltage and current for two tubes of 350 plate voltage and 50 milliamperes plate current, and will heat the filaments of two vacuum tubes of a 2.5 ampere rating. (One tube per filament winding.) These values are for continuous duty. Price, \$42.00.

FILAMENT HEATING TRANSFORMER

Filament Transformers, fully mounted, 8 and 10 volts, 75 watt	\$37.00
Filament Transformers, fully mounted, 10 and 12 volts, 150 watt	39.00
Filament Transformers, fully mounted, 10 and 12 volts, 300 watt	47.00

Filament Transformers, larger capacity, prices on application.

ACME CHOKE COILS. 1½ HENRIES

In order to smooth out the pulsations in the direct current supply to keep the direct current constant when modulating, and to prevent the high frequency from getting into the power supply, it is essential that a choke coil be inserted in the direct current leads.

When used for smoothing out pulsation in the direct current supply it is advantageous to have a choke coil in each side of the line. The double choke coil is used for this purpose.

The Acme Apparatus Company has developed choke coils which successfully fulfill these conditions, and which are supplied core and coils assembled with supports.

1½ Henry Choke Coil, 500 MA capacity, single coil	\$9.50
1½ Henry Choke Coil, 500 MA capacity, double coil	12.75
1½ Henry Choke Coil, 150 MA capacity, single coil	6.25
1½ Henry Choke Coil, 150 MA capacity, double coil	9.50

NOTE.—Orders for radio supplies and enquiries by wireless until Xmas received daily 4.30 to 5 p.m.

THE T. EATON CO LIMITED
TORONTO CANADA

HOUSEFURNISHING BUILDING—
Sixth Floor



RADIO TRANSFORMERS

Acme Radio Transformers in 250, 500 and 1000 watt sizes.

These transformers are of the non-resonant type and draw full rated power when operating with a rotary spark gap of 700 to 800 sparks per second and .007 MF condenser, and show under these conditions an efficiency of 82 per cent. or better at full load with a power factor of .90 or better. The best of materials are used in construction and each unit tested under actual working conditions. The fully mounted type has secondary terminals with safety gap, finished castings and primary binding posts on engraved bakelite terminal board.

The 500 and 1000 are provided with means of reducing the power input to one-half value.

250 watt size	\$37.50
500 watt size	56.00
1000 watt size	91.00

BROWN'S RECEIVERS

We have just received a new shipment of the renowned Browns' Phones. These are highly efficient and very sensitive.

Type A—4000 ohms	\$16.25	Type D—4000 ohms	\$15.00
Type A—8000 ohms	18.75	Type D—8000 ohms	15.50

We also have a complete range of Murdock, Brandes and Federal Receivers in stock at attractive prices.



WIRELESS AMATEURS ATTENTION!

If You Want SERVICE—Order From Us.

We carry a large stock of High Grade Wireless Apparatus of our own and other manufacturers. Let us build your special apparatus to your specifications. Experimental machine work done.

LATERAL WOUND COILS

Turns	Appr. Wave Length	Price
25	130—375	.55
50	180—515	.60
100	450—1460	.80
200	930—2850	\$1.10
300	1550—4800	1.25
500	3000—8500	1.50
600	4000—12000	1.65
750	5000—15000	1.75
1000	6200—19000	2.50
1250	7000—21000	2.60
1500	8200—25000	3.00

Send for our complete list.



Plugs for Lateral Wound Coils	60c
Straps	15c
Three-Coil Mountings	\$5.00
Spider-Web Forms	25c

Special Sizes of Coils to order.

WIRELESS SUPPLIES

VARIABLE CONDENSERS

Chelsea, 21 plate	\$4.50
" 21 " with knob and dial	5.25
Murdock, 21 plate	5.00
" 43 "	6.00
Signal, 21 " (glass case)	4.00
" 43 "	5.00
" 21 " Panel Mount	4.50
" 43 "	5.50

SUNDRIES

High Frequency Buzzers	\$1.75
Rheostats	1.25
V. T. Sockets	1.00
V. T. Sockets (Murdock)	1.35
Reliable "B" Batteries	1.50
Lightning Switches, 100 Amps.	4.00
Chelsea Grid Leaks	3.95
Hoyt Ammeters, 0-30 Amps.	3.00
Firth Bull-dog Grip Tel. Plugs	3.00

AMPLIFYING TRANSFORMERS

Saco Clad	\$6.95
Rhamstine*	5.15
Acme	7.45
Federal Tel. Audio Frequency	9.75
Can. Ind. Tel. Audio Frequency Transformer	6.25

AUDION BULBS

R. A. C. Audions	\$4.75
Base, with clips, for bulb	1.50
Marconi Q. V. Valve	7.50
Mullard "Type A" Valves	9.00
Base for above tube	1.00
Galena or Silicon	.30

SPECIAL! Fircro Vocalouds - \$40.00

Send 5c for our large illustrated catalogue.

787 Queen St. W. **J. M. PAQUIN** Toronto, Ont.
THE ELECTRICAL SHOP

WIRELESS Your Xmas Presents

Complete Your Radio Equipment as a Christmas Gift---We can supply what You Want at Right Prices.



Our type R2 filament rheostat for power tubes--3.3 ohms, 4 amps. capacity

WE are manufacturing complete units for receiving and transmitting and also combination units. Get our prices and descriptive literature.

Our parts, such as Transformers, Rheostats, Microphones, etc., have made a record for design and satisfaction in service.

THE RAC-3 AUDIONS.

The RAC-3 Audion is a distinct advance in radio communication. It functions as a detector, oscillator or amplifier. This tube is in a class by itself, being superior in every respect to any other vacuum tube on the market. We are the sole distributors in Canada for the RAC equipment.



RAC-3 Audions. The first Universal Audion for reception and amplification.

De FOREST EQUIPMENT

The contributions made by Dr. De Forest to the art of radio communication are well known to all. We are carrying a stock of De Forest equipment, being the sole distributors for Canada for the complete line of De Forest products. We are in a position to supply these well known goods promptly and will be glad to send descriptive literature and prices upon request.



Our De Forest Vernier Condenser giving straight line wave length curve. It is highest grade and carried in various sizes.

OUR PRICES on our own manufactured apparatus will be found considerably lower than the prices heretofore asked for apparatus of the same high grade. On our imported equipment and apparatus we are taking a very small margin of profit in order to make our prices reasonable.

We allow special discounts to bona fide dealers.

Place your orders before the Christmas demand begins.

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

Concerts (450 meters) every Monday and Thursday Evening from 8 to 9.30 o'clock.

CANADIAN INDEPENDENT TELEPHONE CO., LIMITED

Offices : 212 KING STREET W.

Factory : WALLACE AVE., TORONTO

AERO CLUB of CANADA

Affiliated with
The Royal Aero Club of The United Kingdom and The Federation Aeronautique Internationale

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E. M. WOOD, Secretary

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 luncheon.

- * 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 airharbour 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.

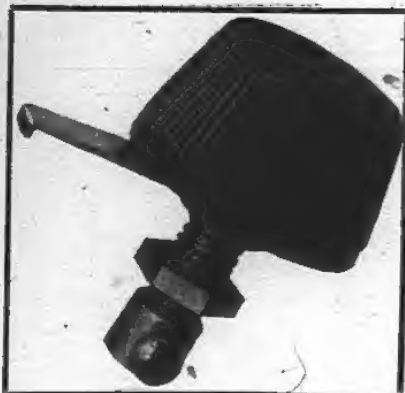
The regular monthly issue of *Aviation News* is mailed free to all members.

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.

STEPPING-STONES TO BETTER SIGNALS

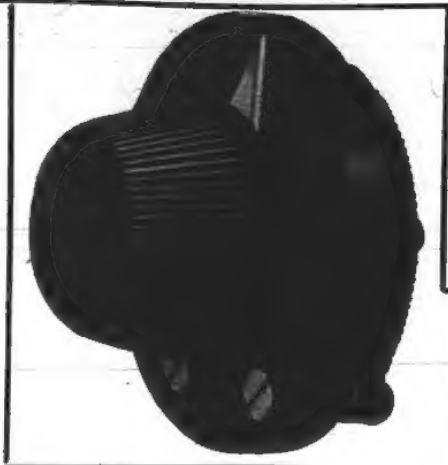
Every FADA instrument, be it detector and two-stage amplifier or only a simple inductance switch, is a real asset to your station. Step by step as you progress from your crystal detector set to vacuum tubes, regenerative circuits and radiophone work you will find that FADA supplies are necessities, and what is more, necessities that can be purchased from your own dealer at most reasonable prices for the value you receive.



INDUCTANCE SWITCH

The neatest switch on the market and the easiest one to adjust. Has the FADA Thermoplas knob. 1 1/4 inch radius. Each\$0.80

With eight twitch points and two switch stops complete. Each\$0.75

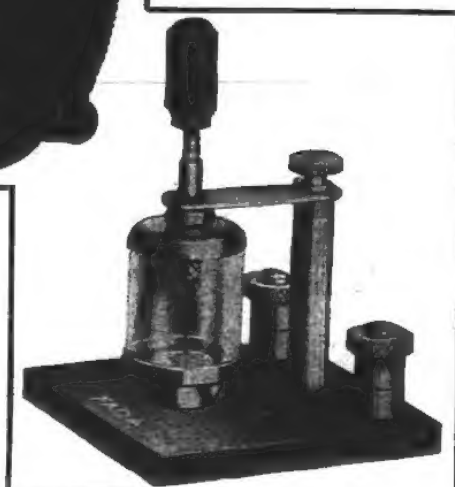


PANEL-MOUNTING RHEOSTAT

FADA rheostats are made with a heat proof Thermoplas base. The resistance is 6 ohms and it will carry 1 1/2 amperes. Supplied with the FADA conical Thermoplas knob. Adjustment very smooth. Without question the best value obtainable for\$1.00

FADA CRYSTAL DETECTORS

are used in thousands of amateur stations with mighty good results. Beautiful in appearance, convenient to adjust, and supplied with a super-sensitive galena crystal that enables long distance reception. Each\$2.25



SERIES-PARALLEL SWITCH

Another FADA switch that is very popular. 1 1/4 inch radius, Thermoplas knob. Each\$0.75

Complete with eight switch points and two stops. Each\$1.00

FADA DETECTOR-AMPLIFIERS

include the following instruments, in beautiful cabinets and with full automatic filament control:—

- Detector Control\$16.50
- Detector and One-stage Amplifier 45.00
- Detector and Two-stage Amplifier 65.00
- Two-stage Amplifier 50.00

A BEAUTIFUL FADA CATALOG

of instruments will be mailed upon receipt of ten cents. Contains complete description and illustrations of all FADA instruments and supplies. You should study this catalog before purchasing any equipment.

CANADIAN RADIO STORES

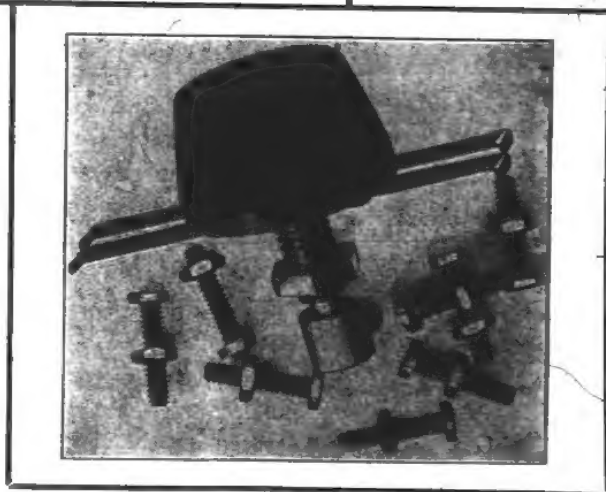
FADA products are fast sellers that stay sold. The sales prices are reasonable and your profits good. Write for catalog and terms.

FRANK A. D. ANDREA

Manufacturer of FADA Radio Products

1882-E JEROME AVE.

NEW YORK CITY



When writing to Advertisers please mention Aviation & Wireless News.

THERE WILL COME A TIME WHEN YOU WILL HAVE TRIED PRACTICALLY ALL TYPES OF APPARATUS AND YOU WILL DISCARD THEM ONE BY ONE BECAUSE OF BLOW-OUTS - BURNING UP - OR POOR CONSTRUCTION IN SOME PLACE -



AND WHILE YOU STILL HAVE PRESENCE OF MIND YOU WRITE TO THE CHICAGO RADIO LAB. FOR ONE OF THEIR CATALOGUES -



AND YOU DECIDE TO PLACE AN ORDER WHICH YOU RECEIVE IN DUE TIME - THEN - BEFORE THE NEXT YEAR ARRIVES WE ARE SURE THAT THE APPARATUS IS SATISFIED IN REGARD TO EFFICIENCY AND FUNCTION -



AND THAT YOU ARE READY TO MAKE A NEW YEAR'S RESOLUTION TO THE EFFECT THAT

THE C.R.L. WISHES ALL A MERRY XMAS AND A HAPPY NEW YEAR

ANDERSON
Dogs



I RESOLVE : NEVER TO USE ANY OTHER APPARATUS THAN THAT OF THE CHICAGO RADIO LABORATORY

MAKE YOUR RESOLUTION NOW - NOT NEXT YEAR !!

An
Xmas
Present



Z-NITH REGENERATOR

Lasting
the Year
Round

What could be more desirable as a Xmas Gift than an instrument that opens to its owner the gateway to a world of new, interesting, and instructive experience ?

The user of a Z-Nith Regenerator has the Radio world at his will, Radiophone, CW and Spark Stations inaudible on ordinary equipment can be copied with ease

on this improved set, with Balanced Variometers, 180-1200 meters range, 180° coupling, etc.

If your station already has a Z-Nith Regenerator; a Hy-rad Rotary Gap, an Amplifigon or one of the many other Individual Z-Nith Products will form an equally satisfactory gift.

We are making a special price reduction offer for Xmas.

Special Preparations Enable Us To Make Immediate Shipments

CHICAGO RADIO LABORATORY, Inc.

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RADIO APPARATUS

**Distributors of Reliable Radio Apparatus
to Dealers, Schools, Colleges, Radio Clubs and
Experimenters All Over the World!**

"PITTSICO"

SERVICE DISTRIBUTES "RADIO
CORPORATION'S" PRODUCTS ALL OVER
THE WORLD! TRY US AND SEE!



"PITTSICO"

NOW HAS TWO STORES! BOTH
CARRY "RADIO CORPORATION'S"
COMPLETE LINE. ORDER TODAY

RADIO CORPORATION'S PRODUCTS

- No. UV-200 Radiotron, Detector \$ 5.00
- No. UV-201 Radiotron, Amplifier 6.50
- No. UV-202 Radiotron, 5 Watt tube 8.00
- No. UV-203 Radiotron, 50 Watt tube 30.00
- No. UV-204 Radiotron 250 Watt tube 110.00
- No. UT-301 End-mountings for UV-204 2.50
- No. UT-302 End-mountings for UV-204 2.50
- Per pair
- No. UR-342 Porcelain Socket 1.50
- No. UP-522 Bakelite Socket 1.50
- No. UV-541 Porcelain Socket for UV-200, and UV-217 "Kenotron" tubes 2.50
- No. UV-215 20 Watt "Kenotron" tube 7.50
- No. UV-217 150 Watt "Kenotron" tube 26.50
- No. UP-1308 325 Watt C.W. Trans 25.00
- No. UP-1016 730 Watt C.W. Trans 22.50
- No. UL-1008 Oscillation Transformer 11.00
- No. UT-1243 Magnetic Modulator, 1/2 to 1 1/2 Amps. 9.50
- No. UT-1257 Magnetic Modulator, 1 1/2 to 3 1/2 Amps. 12.50
- No. UT-1267 Magnetic Modulator 2 1/2 to 3 Amps. 17.00
- No. UP-1026 Filter Reactor, 100 MA 11.50
- No. UP-1027 Filter Reactor, 300 MA 15.75
- No. UP-415 Plate Circuit Reactor 5.75
- No. UC-1021 Filter Condenser, 1/2 MFD, 750 Volts 1.25
- No. UC-1022 Filter Cond. 1 MFD, 750 volts 1.45
- No. UC-1024 Filter Cond. 1/2 MFD, 1750 volts 1.50
- No. UC-1025 Filter Cond. 1 MFD, 1750 volts 2.00
- No. UP-1719 Trans. Grid leak, 5000 ohms 1.15
- No. UP-1718 Trans. Grid leak, 5000 ohms, for UV-203 and UV-204 Tubes 1.45
- No. UM-530 Hot Wire Meter, 0-2 1/2 Amps. 6.00
- No. UV-523 Hot Wire Meter, 0-5 Amps. 6.50
- No. UC-500 Sounding Key for C.W. Trans. 7.25
- No. PR-525 Filament Rheostat for UV-200 201 and 202 tubes 3.00
- No. PT-527 Filament Rheostat for UV-203 and UV-204 Tubes 10.00
- No. PX-1035 Rotary Grid Chopper 7.25
- Shaft Bushings for 1/4" or 5/16" motor shafts each .20
- No. UC-1045 Antenna Series Condenser, 7500 V., .0001, .0004, .0005 MFD. 3 values 5.00
- No. UC-1044 Plate and Grid condenser, 3000 V., .002 MFD. 2.00
- No. UC-1002 Special Condenser, 10,000 Volts .000025 MFD 5.00
- No. UC-1003 Special Condenser, 6000 Volts .002 MFD 7.00
- No. UV-712 Amplifying Transformer 7.00
- No. PP-530 "A" Battery Potentiometer 2.00
- No. UC-567, .00025 MFD Grid and Plate Condenser 1.50

- No. UC-568, .0005 MFD Grid and Plate Condenser 1.25
- No. UC-569 .001 MFD Grid and Plate Condenser 1.50
- No. UC-570 .0025 MFD Grid and Plate Condenser 2.00
- No. UP-500 to UP-527 Grid leaks, .05 to 5 megohms, each .75
- No. UX-543 Grid leak mounting .50
- Notes.—Radio Corporations, C.W. Instruction Book giving book-ups and complete information .25

GREBE APPARATUS.

- No. RORH Audion Control panel in cabinet with Ticker connections 17.00
- No. RORK Two step amplifier with automatic filament control jacks 35.00
- No. RORD Del and two step amplifier with automatic filament control 75.00
- No. CR-3 Regenerative receiver, 175-600 meters, "Relay Special." 65.00
- No. CR-2A Reg. Receiver, 175-375 Meters, complete set, special value at 30.50
- No. CR-5 Reg. Receiver, 150-2000 meters, complete set, ideal for phones, music and time signals 40.00
- No. CR-6 Reg. Receiver, 175-800 meters with 2 step amplifier self contained, complete set, splendid unit 200.00
- No. CR-7 Reg. Receiver, 500-20000 meters, complete set, ideal for arca 210.00
- No. CR-8 Reg. Receiver, 175-1000 meters, "Relay Super-Special," complete set 16.00
- No. CR-9 Receiver, 150-3000 meters, with 2 step amplifier self contained, complete set, Grebe's latest 130.00
- No. ROCC Fixed mica cond., .0002 MFD. 1.00
- No. ROCD Fixed mica cond., .0005 MFD. 1.00
- No. ROCE Fixed mica cond., .001 MFD. 1.00
- No. ROCF Fixed mica cond., .005 MFD. 1.00
- No. ROCA Grid. cond., .0002 MFD and 1/2 Meg. leak 1.50
- No. ROCB Grid cond., .0002 MFD and 3 Meg. leak 1.50
- No. RIDD Crystal Detector, dustproof (Grebe apparatus always in stock) 2.75

WESTINGHOUSE APPARATUS

- No. RA Short Wave tuner, 150-700 meters, very selective and desirable unit 65.00
- No. CB Loading Coil, for use with Short Wave Tuner for time signals 1.00
- No. DA Detector and 2 step amplifier, for use with Short Wave Tuner 65.00
- No. RC Short Wave Tuner and Det. and 2 step amplifier, complete set 125.00
- No. DB Double crystal detector 1.00
- No. DE Spare crystals for above detector 1.00
- No. DD Spare crystals for above detector 1.00

- No. RE "Aerola" JR., Crystal Receiver, complete set, ideal for music 23.00
- No. ME Motor-generator set, 100 Watts, 110 Volts, 60 Cycle, AC motor, 500 Volts DC Generator 55.00
- No. MH Motor-Generator set, 250 Watts, 110 Volts, 60 Cycle AC motor, 1000 Volts DC generator 145.00

Send "PITTSICO" Your Orders for Westinghouse Apparatus.

Announcement

The policy of the F. D. PITTS CO. has been and will be to render a "Superior Service," a service based on carrying in stock for immediate delivery all desirable radio apparatus, to serve our customers promptly and intelligently and to make them feel that we are truly grateful for their patronage.

In order to accommodate our ever increasing business we take pleasure in announcing the opening of OUR STORE at PROVIDENCE, R. I., in the WOOLWORTH BLDG., at 103 Westminster Street, the very heart of the business section.

Mr. H. E. Tilley, an experienced member of our organization, will be in charge. His experience is wide and diversified, having in turn been an Amateur, Commercial Operator, Engineer, Instructor and Sales-Manager. You are cordially invited to visit our new store and experience real SERVICE.

If at any time you are interested in Radio to the extent of desiring instruction, Amateur or Commercial; Spark, Arc or Vacuum tube, let the EASTERN RADIO INSTITUTE train you—New England's Oldest, Largest and Best equipped Radio School. For over six years I was Chief Instructing Engineer at this Institute, and I am in a position to know! Over 4,000 satisfied graduates tell the story best! Our organization with Years of phenomenal Results and Success is behind every man who enrolls.

F. D. PITTS,
President and General Manager

"LET 'PITTSICO' products, SUPER-SERVICE and delivery solve your Holiday problems"

SEND US YOUR ORDERS TODAY!

Send ten cents for Catalog No. 22. Over 100 pages, over 150 illustrations, over 600 items

F. D. PITTS CO., Inc.

12 Park Square, Boston, Mass. Branch, Woolworth Bldg., 193 Westminster St., Providence, R. I.



Our Super-Sensitive Detectograph Transmitter No. 2
Price, \$8.00 Complete



Adjusted Model No. 80 Horn, High Grade Loud Talking Receiver, Cord Plug and Desk Stand. Price, \$15.00 Complete

Low Resistance
SUPER-SENSITIVE
Detectograph
MICROPHONE DEVICES

Practical Instruments for Commercial and Scientific Purposes

AMPLIFY YOUR RADIO SIGNALS

With the new DETECTOGRAPH-TRANSMITTER, the amateur can amplify radio signals to such an intensity that he can hear the signals about his station without the need of the telephone head set.

The manner in which the amplifying process is attained is by attaching with tape the DETECTOGRAPH-TRANSMITTER to the regular wireless receiver.

By the addition of a loud talking telephone he is able to hear the messages many feet away from the instrument.

The super-sensitive DETECTOGRAPH-TRANSMITTER herewith shown is two and

three-eighths inches in diameter, five-eighths of an inch thick and weighs less than three ounces. It is the most sensitive sound-detecting device ever brought before the public.

Not only is this instrument applicable for amplifying radio signals, but it can be used with equal satisfaction for amplifying other sounds. Phonograph music can be transmitted from one place to another by means of this instrument, and those who are afflicted with deafness will find enormous benefit by using this transmitter.

Can be used for any purpose where a sensitive detecting instrument is required.



Our New Special Limited Talking Receiver No. 25
Price \$7.50



Detectograph Rheostat, especially made for amplifying circuits. Price, \$2.00 Complete



Detectograph, \$18.00
This detecting instrument of marvelous sensitivity can be used for detecting secret conversations. Outfit consists of Sensitive Transmitter, 25-ft. Black Cord, Receiver, Headband, Case and battery.



Our Special Loud Talking Telephone Transmitter No. 5, Price \$12.00

This model is especially made for Loud Talking Telephone reproduction. This transmitter can be used to advantage in connection with our Loud Talking Receivers or Horn Apparatus by wireless operators, window demonstrators, and in fact by every one desiring to build up their own loud talking telephone apparatus.



The Detectograph Junior
Desk-Phone, \$18.00

Equal to any \$35 instrument made. Outfit consists of Super-Sensitive Transmitter with cord connector, Super-Sensitive Ear Piece with small black cord, Black Single Headband, Black Case and Two Batteries.

High Resistance

WIRELESS RECEIVERS

SUPER-SENSITIVE
Superphone
TELEPHONE DEVICES

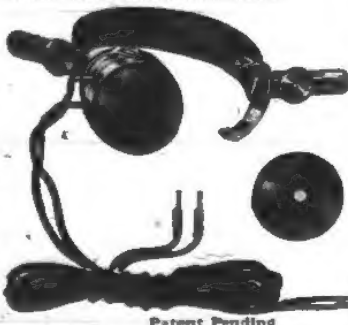
MAGNIFYING APPARATUS

A Set of Receivers offering a Combination of a silent and loud reproduction of Wireless Signals
Efficiency of the Superphone Receivers

Sound is transmitted from one medium to another in vibrating waves. These waves travel in every direction unless they are forced into one particular direction. Attached to the second cap close to the diaphragm is a small round tube, this tube is made so that it fits snugly into the operator's ears. The sound waves are now forced into one direction—the operator's ears. This attachment makes the loss of sound impossible, giving the maximum reproduction. The feature that aids the clear reproduction is the resonant chamber directly below the diaphragm and above the magnet and coils.

THIS CUT ILLUSTRATES THE RECEIVERS WITH HORN ATTACHED

The high tension metal used as a spring forces the receivers close to the ears. The receivers are so attached to the head band that they rest against the ears in a vertical position. This makes it comfortable for the operator.



Patent Pending



Superiority of the Superphone Receivers

The features that are enjoyed by only the SUPERPHONE receivers, that of the LOUD TALKING HORN attachment and the attachment that fits into the operator's ears, make them superior to any set of receivers on the market at present. The construction and arrangement, not to say anything of the matched tones of the two receivers, place them far above the ordinary receivers.

Superphone Receiving Set with Cord and Headband

2000 Ohms	\$12.00
3000 Ohms	15.00
4000 Ohms	20.00
With Horn Attachments as above	\$ 5.00 Extra

High Resistance Loud Talking
Horn Apparatus for Use on
Wireless Instruments
Direct



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12 In. Long
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RADIO RESEARCH CLUB OF CANADA

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Assistant Lab. Eng., Hydro Electric Power Commission of Ontario
8 Strachan Ave., Toronto.

Committee

W. C. C. DUNCAN, E. J. BOWERS, CAPT. J. E. GENET

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

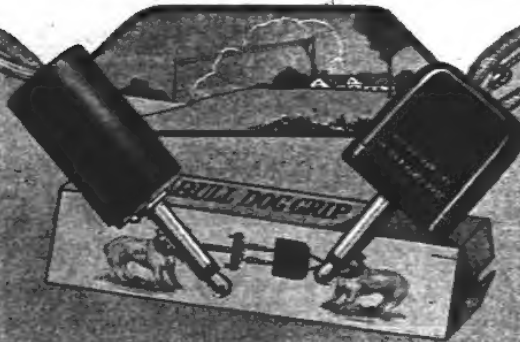
Meetings are held every third Thursday in Room 23, new Electrical Building, University of Toronto. A programme of papers by prominent Canadian Radio Engineers is being prepared for the coming season.

RADIO INQUIRY DEPARTMENT

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



FIRCO SACO-CLAD
amplifying transformer



FIRCO RADIO EQUIPMENT



FIRCO VOCALLOUD
Station Type



FIRCO STANDARD
Detector and 2-Step

HERE might be a full page ad. devoted to every instrument on this page. But the actual apparatus is far more convincing than anything we could say. So we simply refer you to your dealer.

Firco Saco Clad Audio Frequency Transformer. (Patents applied for throughout the world). No howling even with six steps.

Firco Standard Apparatus. Equal to apparatus supplied to the Government. One to six-step amplifiers. Detector and two-step shown.

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Telephone Headsets. Baldwin Mica Diaphragm, three types, reduced prices. The best money can buy. Brown imported, two types.

Seibt, a low priced, efficient bi-polar headset embodying several marked improvements. 2000 ohms.

Imported Seibt Adjustable Phones, 2000 ohms.

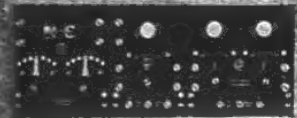
24-page vest pocket Catalogue briefly describing all instruments sent for your dealer's name and address. Large loose-leaf Catalogue and your name on our mailing list for six months for 25 cents.

Vocaloud. This clear-toned loud speaker is proving the sensation of 1921 radio. No batteries, no adjustments, no extra equipment. Station type, in polished mahogany cabinet, as shown, also lower priced. Laboratory type mounted on adjustable base.

Firco Midget Units. Quality equal to Standard Apparatus, but greatly simplified. Single and double circuit receivers, audion detectors and amplifiers, embodying new features. Perfect results and workmanship.

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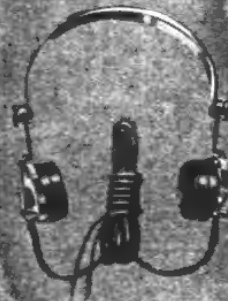
FIRCO MIDGET UNITS
(Tuner, detector and 2-step, \$56.00)



FIRCO MIDGET
receiving UNIT



FIRCO VACUUM
TUBE SOCKETS



IMPORTED BROWN
super-sensitive PHONES



FIRCO 600
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A WORD TO YOU CANADIAN RADIOISTS: As a pioneer who has been, and is, associated in executive capacity with some of the largest radio companies and projects, I extend to you "GREETINGS." Your country offers wonderful and unlimited radio

possibilities which you must develop. If any of our apparatus can serve you, I would ask that you order from your regular dealer, who is always glad to provide our products.

JOHN FIRTH, President.

AVIATION

WIRELESS NEWS

ADAM F. PENTON, Publisher

C. E. WILLIAMS, EDITOR

G. LINCOLN MITCHELL, Publication Manager

Volume 4

TORONTO, DECEMBER, 1921.

No. 10

Development of the Wireless Telephone

By F. K. DALTON

Before Electric Clubs of Central Technical School, Toronto, on Nov. 17th, 1921.

The earliest methods of communication of which we have knowledge was by means of the human voice, a truly radio method in that the waves carrying the signals spread out in all directions, thus being receivable at many points.

Schemes whereby the signals were more confined were later used, and the result of their application was a marked increase in distance combined with secrecy. It was not until comparatively recent years, however, that electricity was sufficiently well understood to permit its use for the communication of intelligence, but when it was first introduced, e.g., the land telegraph, distances were increased enormously.

The telephone has superseded the telegraph in many lines, but the latter is not entirely set aside. Possibly the great difficulties due to distortion of speech in long telephone lines has given the telegraph another lease of life.

Speech is merely a conventional code of signals using sound waves. In the early years of life each human being learns this code according to the particular country in which he was born and is being brought up, and it becomes so common and so easy of interpretation that he is inclined to consider it as a natural faculty. It is only when we come in contact with a foreigner, one who does not know our code of speech, that we realize how conventional it actually is.

The chief reasons then for the success of the telephone over the telegraph in the business world are (a) that it uses this well-known code which becomes second nature with us, and (b) that by using speech greater speed is obtained.

In signalling by the voice, or light waves, the human senses are capable of acting as detectors, but in electrical systems special devices must be used to convert the signals into sound or light, although the latter is not much used.

In wireless communication we use a wave which is not produced by the human organs nor detectable by human senses, and it is necessary, therefore, to have transmitting equipment under human control and receiving devices which detect and give audible (or visible) signals, the medium of transmission being the ether, and the velocity of the waves being the same as for light waves.

The wireless telephone transmitter, an evolution of the

spark telegraph, and continuous-wave transmitter, radiates a high-frequency wave, the amplitude of which is varied in accordance with fluctuations of the human voice. The receiving device, being one of the well-known and commonly used wireless telegraph receivers, gives quantitative response and produces sound waves in accordance with the fluctuations in the received waves. These fluctuations are according to the original human voice, hence speech is reproduced, though not actually transmitted as speech.

The waves used in wireless systems are much longer than light waves, but follow the same laws of refraction and reflection. They are reproduced in any electrical circuit where high frequencies (20,000-50,000,000 cycles) exist, and appear to be due to the rapid reversal of current. Radiation in wireless transmitters is obtained by forcing these high-frequency currents into a dead-ended aerial wire, thus charging it with rapidly alternating polarity in respect to its ground.

The wireless telephone is said to use a voice modulated continuous wave. The wave is generated by the high-frequency currents, which are obtained by means of a three-electrode vacuum tube operating on direct current, and the variations of amplitude are obtained by causing the human voice to vary the voltage between two of these electrodes. The frequency obtained will be that for which the electrical circuits are resonant.

At the receiving end the waves are timed so as to get the greatest response, the principle being very simple. Any coil of wire has a certain tendency to retard changes of current through it, and this effect depends upon the number of turns in the coil, the mean diameter of these turns and the rate of actual change of the current. A condenser is said to have capacity, meaning that it can hold a quantity of electricity, but the feature which gives it an important place in electrical tuning is that it is ever ready to change the quantity of electricity it is storing and upon the slightest change in voltage will allow an appreciable current to flow.

With a certain coil and condenser (capacity) there will be some particular frequency at which the retarding effect of the coil will equal the augmenting effect of the condenser, and at this frequency tremendous currents may be established in the circuit by the application of very

small forces actuating at this critical frequency. Thus, by varying either coil or condenser, or both, the circuit may be made resonant at the frequency of the incoming waves. These signals will be very much increased; the lower the actual ohmic resistance of the circuit, the greater will be the increase produced by tuning.

The fact that receivers giving a quantitative response were already in existence when the principle of modulating the radiated waves by the voice was discovered allowed the method of communication to spring into existence immediately the wireless telephone transmitter was invented.

The original spark transmitter could not be used for telephony, as there was a note inherent in the radiated waves. Voice control of the energy in continuous waves was the main step necessary, but for many years progress was impeded, due to the fact that no telephonic transmitter could be made to carry the large currents used in the aerial, or other circuits. Upon the discovery of the fact that the three-element vacuum tube, with certain connections, would give high-frequency currents the amplitude of which could be easily controlled by the voice, the wireless telephone transmitter quickly became a realized dream.

There are many methods of modulating the radiated wave in accordance with the voice, and each of these has

its particular merits, depending upon the wave lengths and power to be used.

Suitable receivers were already in existence, and the low cost of the vacuum tube oscillator placed it within the reach of amateurs, with the result that wireless telephony has become very popular in an extremely short time.

As a result of this popularity of radio, particularly the radio telephone, many manufacturers of wireless equipment use it to advertise their products and to entertain those who are using radio equipment of different types. For the amateur living near Toronto and having a fairly sensitive receiving set (two-step amplifier) the following are within his reach:—

MUSIC

Martoni Wireless Telegraph Co., Toronto, Tuesday evenings.

Canadian Independent Telephone Co., Toronto, Monday evenings.

Westinghouse Electric & Mfg. Co., Pittsburg, Pa., every evening.

Westinghouse Electric & Mfg. Co., Newark, N.J., every evening.

Westinghouse Electric & Mfg. Co., Chicago, every evening.

CHURCH SERVICES

Westinghouse Electric & Mfg. Co., every Sunday, morning and evening.

MARKET REPORTS, POLICE INFORMATION, ETC.

Westinghouse Electric & Mfg. Co., every week night.

The fact that these entertainments are in the air regularly should tend towards the popularity of receiving, and the suppression of a great deal of needless and entirely useless transmission of amateurs during the periods in which there are things worth while to be heard.

The appreciation of the various listeners is showing itself in the agitation of various clubs to have interfering amateur stations confined to certain hours for their operating in order to have the air clear in the evenings.

EQUIPMENT USED BY F. K. D'ALTON, DURING WINTER OF 1920-21

Transmission by spark, continuous wave, huzzer modulated C. W., radio telephone

Reception by one step amplifier with valve oscillating, or as simple detector

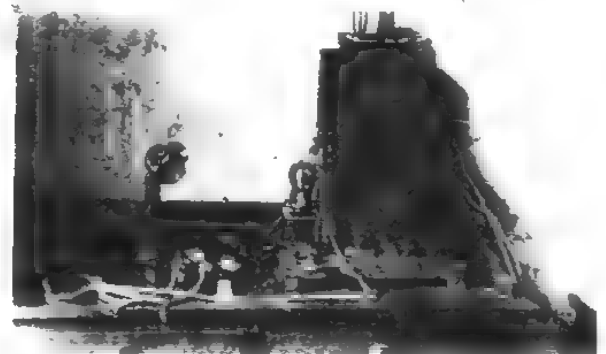
The amplifying valve was so connected that by means of a change-over switch (4 P.D.T.) it was thrown from the position of amplifier to that of oscillator, hence high frequency generator for the radio telephone. This change-over switch made necessary changes in aerial grid and plate circuits in one quick operation

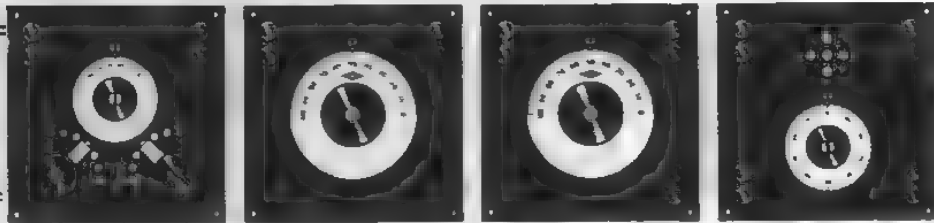
This apparatus has now been disassembled and parts rearranged



F. K. D'ALTON

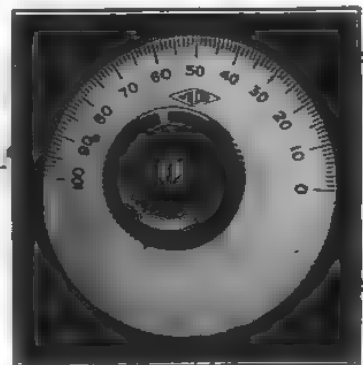
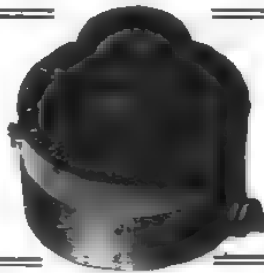
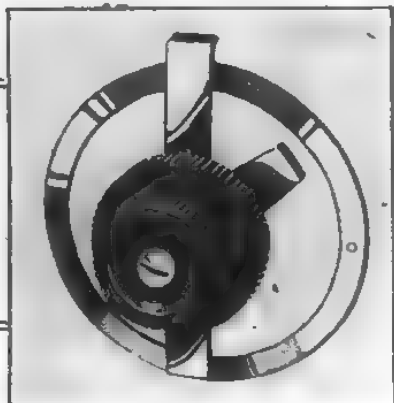
B.A.Sc., School of Practical Science, University of Toronto 1911; Assoc. Member A.I.R.E.; Assistant Laboratory Engineer, Hydro Electric Power Commission of Ontario; Secretary-Treasurer Radio Research Club of Canada.





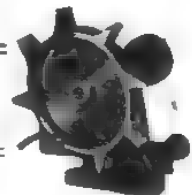
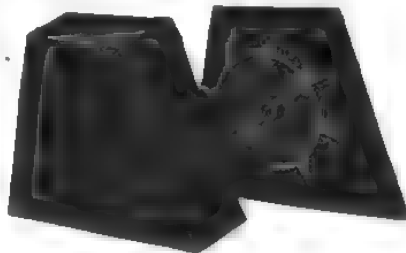
WILCOX Standardized Unit Panels—

form the cheapest, best and most versatile receiver. When coupled together the four instruments shown form a high grade, efficient short wave receiver complete with audion control for only thirty-one dollars. On the left is shown the variocoupler, with fine and coarse primary tuning switches and variable secondary coupling. Next is the grid variometer which controls the wave length from 175 to 450 meters, a range which may be increased if desired by a small fixed condenser. The third instrument is the plate variometer and last is the audion panel with grid condenser, leak, socket, rheostat, etc. The variocoupler and variometers are priced at \$8.00 each and the audion control at \$7.00, all postpaid.



WILCOX Standardized Parts—

make home construction easy. By building your own apparatus from WILCOX parts you can save money, learn more about radio and have instruments as fine as any. They are as great an improvement over "hit or miss" parts as the audion is better than the coherer. No need now to buy a rheostat with one style knob, a switch with another and a dial with a third; neither is there any need of buying parts that are hard to mount, poorly constructed, inefficient or not just what you need. Instead—Standardize On WILCOX Standardized Parts.



WILCOX Rotary Gaps—

have made themselves famous. Known the world over because of their many long distance records.

Send five cents (Canadian coin accepted) for our new interesting loose leaf catalog describing these and other WILCOX products.

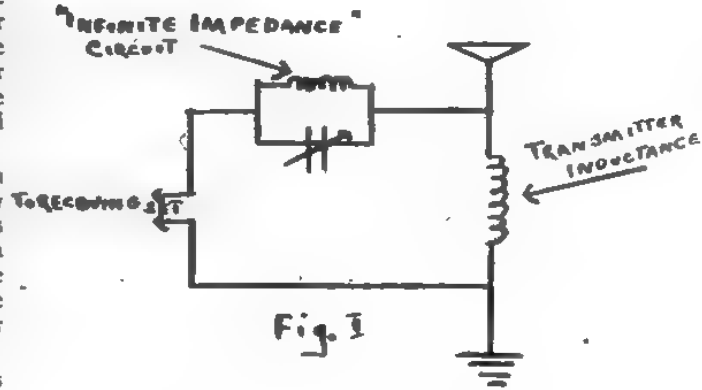
THE WILCOX LABORATORIES, LANSING, MICH., U.S.A.

A Simple Method of "Duplicating" for Radiotelephony—By R. A. H. GALBRAITH

A very simple "duplex" system, of which the principle is shown in Fig. 1, has been employed by the writer for several weeks and has proven quite satisfactory when the wave-length of reception differed by more than five per cent. from the wave-length of transmission. It is here published in the hope that it will promote thought and discussion of a very interesting problem.

The "infinite impedance" circuit, or filter circuit, shown in Fig. 1, is tuned to the wave-length normally emitted by the transmitter. An easy way of effecting the tuning is to connect a hot wire, or thermo ammeter, in the antenna circuit of the transmitter, cause the latter to oscillate feebly, connect the filter circuit as shown through the receiver, and adjust the filter circuit so that the ammeter reading is a maximum once more.

The impedance of the filter circuit naturally depends



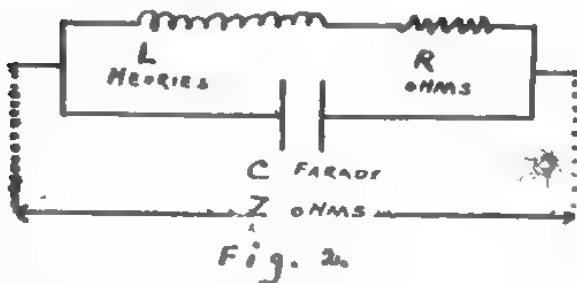
$$Z = \frac{1}{\sqrt{\left(\omega C - \frac{\omega L}{R^2 + \omega^2 L^2}\right)^2 + \left(\frac{R}{R^2 + \omega^2 L^2}\right)^2}}$$

on the constants of the circuit. It is for a wave-length other than to which it is tuned. For the "in-tune" wave-length the impedance reduces to

$$Z = \frac{L}{CR}$$

The resistance **R** is the high-frequency resistance of the coil. The equivalent circuit with "lumped" constants is shown in Fig. 2. The condenser is assumed to be without losses.

In one instance the writer was sending on a wave-



length of 261.5 metres, and receiving on a wave-length of 251 metres. Although the reduction of signal strength of the received signal was considerable, the operation of the system was really remarkable. For wave-lengths of reception of about 200 metres (with the same transmitted wave) the reduction of received signal strength was negligible.

The constants of the circuit were approximately
 L=40 micro henries.
 C=.00048 micro farads.
 R=1 ohm.

Under these conditions the impedance of the circuit at its natural wave-length is

$$Z = \frac{40 \times 10^{-6}}{48 \times 10^{-11} \times 1}$$

At a wave-length of 251 metres the impedance was calculated to be

$$Z=3,750 \text{ ohms.}$$

It should be noted that, with a large condenser of low effective resistance and with a very small inductance (consequently of very low high-frequency resistance) the values of impedance could be much improved.

CONQUEST OF ATLANTIC BY WIRELESS AMATEURS

At the last moment of going to press the following telegram was received from Mr. K B Warner, Secretary of the American Radio Relay League. The successful Canadian mentioned is Mr. Rogers of Newmarket, Ont.:

Hartford, Conn., Dec. 13, 1921.

C. E. Williams.

Editor, Aviation & Wireless News, Toronto, Ont.

To date twenty-five amateurs reported by Godley from Ardrossan, Scotland. All in eastern third of country. Nineteen continuous wave, some of low powers, six spark. Only Canadian is Rogers, whose spark heard December tenth. Tests continued until sixteenth.

Warner.

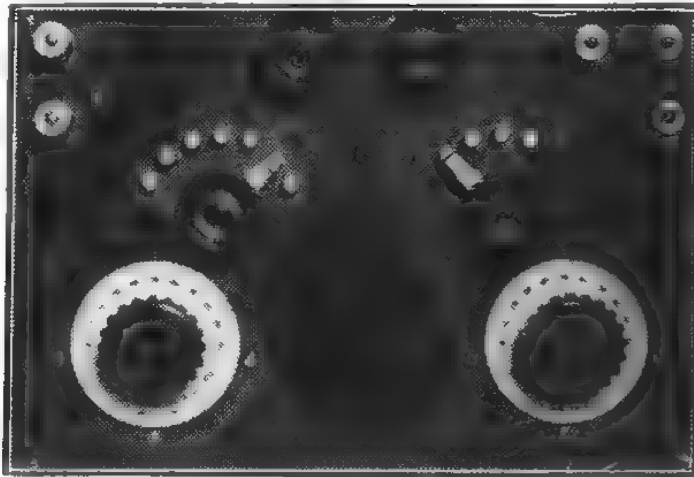
A Receiving Tuner for C. W.

"Do you believe it possible that C.W. can be tuned in much easier than spark? accustomed as you are to the modern regenerator with its multi-controls, where the plate circuit has to be carefully tuned to the grid circuit and then returned each time the grid circuit is varied, to say nothing of critical adjustments of antenna circuit and coupling? No doubt it sounds improbable, and indeed it is a hard job on our regenerators, but can you imagine a tuner that would oscillate nicely at whatever wave length the grid circuit was turned to, and in which the aerial circuit and coupling didn't have to be adjusted at all, so that all that would be necessary would be to start at oscillating and vary the secondary and then be able to hear the C.W. stations as you pass their waves, be able to stop without effort on any of them, or to switch

receiving set which can be easily adjusted with one hand, but which does not appreciably decrease the strength of the signals, is a Godsend to the radio fraternity.

A receiving set of this type has recently been constructed by Mr. E. J. Bowers of 3CZ. With the average amateur antenna, it has a wave length range of from 150 to 450 meters, and is a remarkably efficient receiver of either spark or continuous wave signals, although it was primarily designed for CW.

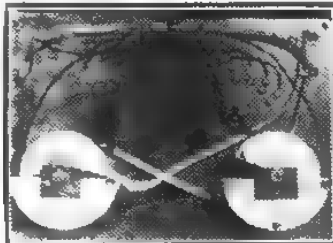
As can be seen from the photograph the set is entirely contained in a neat cabinet. This cabinet is 10 inches long, 7 inches high, and 4½ inches deep. It may be made of any kind of wood according to the builder's taste, and should be given a hand-rubbed mahogany finish. The panel is of bakelite, 7 inches by 10 inches, and one-eighth



Front View of the C. W. Receiver

almost instantly back and forth from one to the other and find them always in the same spot, and all totally free from capacity effects? A set that does these things has been devised by Mr. John L. Reinartz, I Q P, of South Manchester, Conn., and forms the basis for this article."

The above startling announcement which appeared in June issue of our esteemed contemporary "Q.S.T." leads us to believe that we should bring Mr. Reinartz's clever idea again to the attention of our readers



Interior of the C. W. Receiver

Every amateur who has used the variometer type of regenerative receiver knows that it would be all right for CW reception if he had three hands to tune it with. But since Nature has only provided him with two the task of tuning in a particular station is like looking for a needle in a hay stack, only worse. For this reason any

of an inch thick. On it there is mounted a seven point switch, a three point switch, two variable condensers, three spider web inductance coils, and five binding posts. The disposition of these instruments is shown in the photographs.

The spider web coils are wound on fibre discs three-sixteenths of an inch thick and 2 inches in diameter. Around the periphery of each disc there are 21 wooden pegs on which the wire is wound. These pegs can be made by drilling 21 holes ¼ inch deep around the edge of each disc with a No. 53 drill, and then dipping the ends of round toothpicks into shellac and sticking them into the holes. The shellac soon hardens and holds the toothpicks firmly in place.

In winding any coil the aim is to get a high value of inductance with the lowest possible distributed capacity. Mr. Bowers achieved this by winding the wire around every second peg instead of around every peg, as is done in the usual type of spider web coils.

By making the coils in this manner only every fifth

JATH WIRELESS CO.

343 PARKDALE AVE., BUFFALO, N.Y.

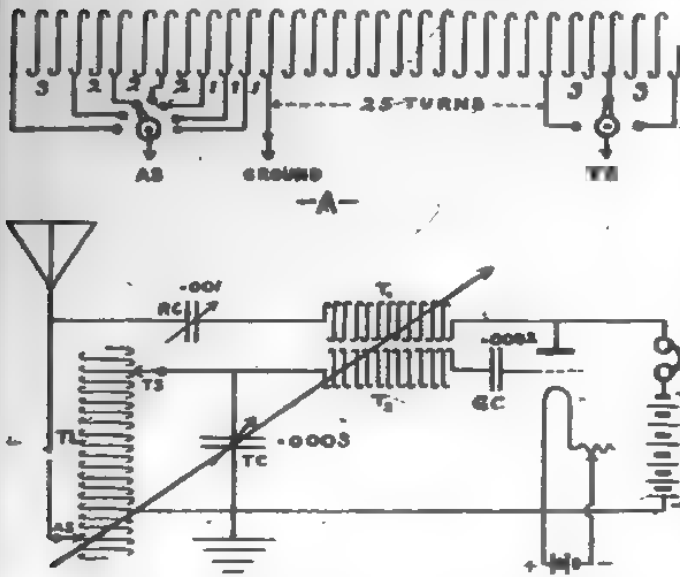
We carry a complete stock of RADIO CORPORATION TUBES
UV-200-201

Immediate delivery. Mail orders must precede

All Standard Makes of High-Grade Wireless Equipment.

turn of wire is parallel, whereas in the usual type of spider web coil every second turn is parallel.

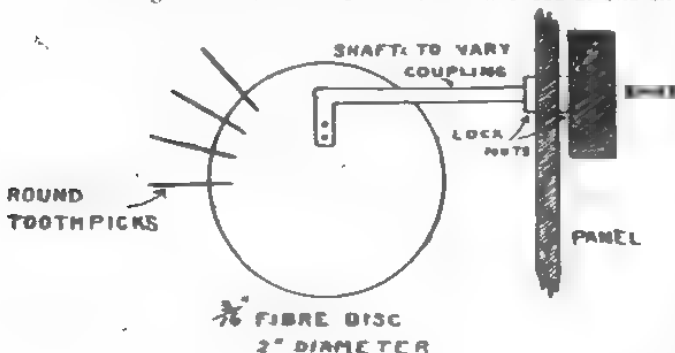
Three coils are made up in this way. Each of the first two require 25 turns of No. 22 D.C.C. magnet wire and are connected as shown at T1 and T2 in Diagram



No. 2. The main inductance TL is wound in the same manner with 43 turns of No. 22 D. C. C. magnet wire, but eleven taps are taken off, including the ends. The method of tapping this coil is shown in Diagram 1A and should be followed carefully.

In taking off these taps, make long loops at the proper turn, bare the wire and solder each one close to the winding and continue. Now this main inductance is the only one entering into the actual tuning of the set, and the feedback is primarily by means of a condenser, but difficulty is experienced in making such a circuit oscillate at every short wave lengths, and for this reason the two auxiliary inductances are introduced into the circuit to give a greater measure of coupling between grid and plate circuits.

The coils are mounted so that the coupling between them is variable by turning them at right angles to each other, the same as honeycomb coils. The main inductance is fastened securely to the panel, and one of the small tickler coils is mounted on each side of it. If these coils are placed about 1-2 inch from the main inductance there will be ample clearance for them to turn at right angles. The method of controlling the coupling is shown in Diagram 3. A small brass rod is threaded at one end



and bent at the other as shown in the diagram. The fibre disc is then riveted to the bent end and the threaded end is brought out through the panel and equipped with a knob and pointer. The other tickler coil is mounted in the same manner.

TC is a 23-plate condenser for tuning the secondary circuit. RC is a 43-plate variable to control regeneration. GC might well be a variable condenser but very good results are obtained by using the ordinary fixed grid condenser. AS is a 7-point switch to vary the aerial circuit inductance, which is part of the main inductance and therefore very closely coupled to the secondary winding, from 1 to 12 turns. TS is a three-point switch so that more inductance can be added and less capacity be necessary for reaching the longer waves. The two binding posts on the left of the panel connect to aerial and ground, while the three on the right connect to the grid, plate and filament of your tube or amplifier.

The initial adjustments of the set are a little tricky. The negative terminal of the "B" battery MUST be connected to the positive terminal of the A battery. When an amplifier is used the grid circuits of same should connect with the negative side of the "A" battery. The polarity of the two tickler coils must be right—they will work in one direction and not in the other. It requires a somewhat greater detector filament current than is necessary for the same tube in a tuned plate-circuit regenerator, and if results are not at first obtained, the filament should be crowded a little. Tune with condenser TC and regenerate with condenser RC.

On the first tap the set tunes very sharply, there being but one turn in the aerial circuit, and TC will accurately measure incoming waves if calibrated, while on the seventh tap the tuning is quite broad for C.W. It is fairly easy to stop on any desired signal and R.C. provides a fine adjustment for varying the note to any pitch desired. The movable plates of T.C. are connected to earth, while the aerial connection to R.C. is made to the movable plates, with the result that no capacity effects from the operator's hands are noticeable. There is one adjustment of coupling that will be found best for a given aerial and tube adjustment, and when once secured the coupling need never be disturbed.

(Editor's note—This is a wonderful little set. We had the pleasure of listening in on Mr. Bower's tuner and we believe I Q.P. has certainly handed us down something really worth while.)

WIRELESS DISPLACES PHONE IN REMOTE PLACES

The superior efficiency of wireless as a means of communication is being more clearly demonstrated almost daily. Its latest use as a connecting link between the construction camps and headquarters of a Southern California electric company in the place of telephone lines proves the assertion. These camps are located high in the Sierra Madre mountains and present almost insuperable obstacles to the maintenance of a metallic circuit in the face of extreme weather conditions. A continuous-wave set, radiating $2\frac{1}{2}$ amperes antenna current has been adopted as the standard communicating means in the installation. The masts for the antenna are tall pine trees stripped of their branches, and from this 540-meter waves are radiated. Further experiments are contemplated in which portable radio sets of 25-mile sending range will be provided for temporary camps out from the main bases. Generating means of sufficient capacity and proper construction are included in the radio equipment, to insure constant power supply for operation.

Condensite Celoron Is Real Radio Insulation

Use the highest type insulation made.

PRODUCED EXPRESSLY For
WIRELESS WORK

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.

DIAMOND STATE FIBRE COMPANY of CANADA
LIMITED

Head Office and Works :

235 Carlaw Ave. - - TORONTO, Ont.

Three-Circuit Tuner

At the present time there are three common types of tuners in general use. The two and three-circuit tuners are the most common among experimenters and lately there has been offered a simplified tuner which is meeting with popular approval. At the present time no attempt will be made to compare the merits of the various types, but instead some practical suggestions in the operation of a three-circuit regenerative tuner, consisting of the usual variocoupler, grid and plate variometer.

To watch some amateurs manipulate the control knobs of their tuners would lead one to believe that they would make expert safe-robbers if dexterity in twisting knobs counted for anything. The principles involved in the tuning of an incoming signal should be mastered and kept in mind while manipulating the control handles.

In an ordinary loose coupler the primary and secondary circuits are brought into resonance and the best coupling position for the coils is found that gives the maximum signal strength. Any change in the position of the coupling coils changes the reaction between them, which in turn changes the wave length in both circuits, and a readjustment is necessary to again bring the two circuits into balance.

In a three-circuit tuner which necessitates the use of a vacuum tube as a detector, a third circuit (the plate circuit) is brought into resonance with a secondary or grid circuit. When the tuner is in this condition it possesses the greatest degree of sensitivity, that is, it will pick up the weakest possible signal, hence your range is increased. It is also in the most selective state; that is, it possesses the ability to select from a dozen sending stations (using waves of nearly the same length and having about the same decrement) one station and reject all the others. This gives a minimum of QRM, the dream of all of us.

Referring to the diagram above, the reader should first analyze this hook-up into its three component parts, namely:

1. The primary circuit, including the antenna and ground, condenser C-3, primary P:

2. The secondary or grid circuit, consisting of the secondary of the variocoupler S, the grid variometer V-1, grid condenser C-1, and filament. It should be noted here that this circuit has no variable condenser across its secondary. Audion circuits are more sensitive without one.

3. The plate or wing circuit, consisting of the plate of the vacuum tube, the plate variometer V-2, "B" battery, phones and telephone bridging condensers C-2, and the filament.

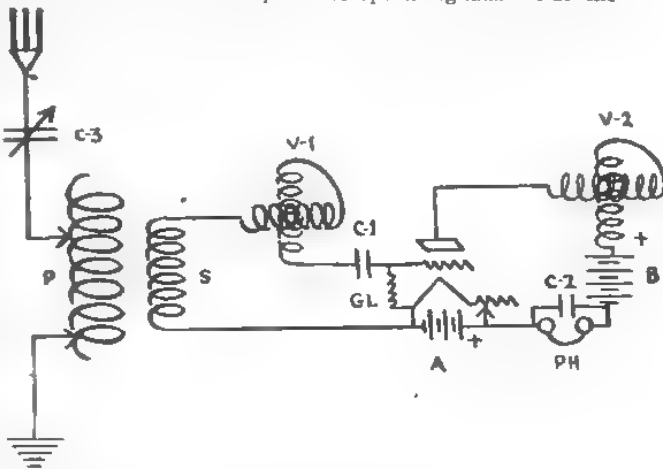
The following steps will be found helpful in properly tuning in a signal. Ordinarily the plate variometer V-2 is set at zero. Adjust audion filament current by means of the filament rheostat in series with the "A" battery and also plate voltage until a slight hiss is heard in the phones. Then reduce filament current until hissing stops. Set the coupling at a trial value, keeping in mind that a little tighter coupling is required for shorter waves than the longer ones.

Tune in the desired signal by resonating the primary and secondary circuits by varying switch arms in primary and grid variometer and coupling knob. Next slightly reduce the coupling between these two circuits to a point slightly below that where the maximum signal strength is obtained.

We are now ready for regeneration. Advance the plate circuit variometer dial to a point where the circuits begin

to go into oscillation, which is indicated by a click in the phones or a peculiar hissing sound. At this point reduce slightly the secondary setting (grid variometer), at the same time adjusting the plate circuit variometer. It should be noted here that grid and plate variometers are varied simultaneously. If the coupling is correct a combination of adjustments exists whereby a slight change of any of the controls of either circuit will throw the circuits into or out of oscillation. This is the critical adjustment to be desired and indicates that all the circuits are in resonance and that the receiver is in its most sensitive and selective condition.

Summing up, we find that it is necessary to resonate the primary and secondary circuits and then the plate circuit, and then obtain that critical adjustment between all the circuits whereby the entire system is just at the point of oscillation for the reception of spark signals. For the



Wiring diagram three circuit regenerative receiver, using variocoupler, grid and plate variometer.

reception of CW, the best adjustment is at the point where the circuits are about to stop oscillating, which, by the way, is approximately the same adjustment as above.

Toronto Sunday World

CANDIDATES SUCCESSFUL IN EXAMINATION

The Department of the Naval Service announce that thirty-six (36) candidates were examined during the month of November, 1921, of which the following were successful and obtained Certificate of Proficiency in Radiotelegraphy:

1st Class

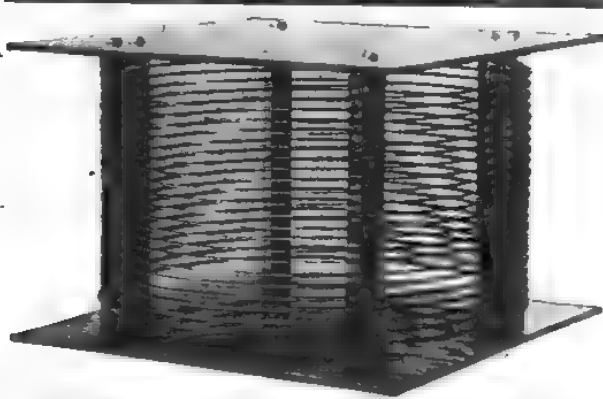
Barr, Jas., Three Rivers, P.Q.
 Bun, E., Vancouver, B.C.
 Dobell, J. D., Vancouver, B.C.
 Dunbar, L. S., Spencer's Isl. Cumberland Co., N.S.
 Edwards, F. A., Rockwood, Ont.
 Ellis, R. M., Vancouver, B.C.
 Fitzgerald, T. P., Cape Race, Nfld.
 Godward, H., Toronto, Ont.
 Holmes, A. W., Toronto, Ont.
 Linton, W. R. D., Toronto, Ont.
 Northover, H. W., Toronto, Ont.
 Rees-Thomas, G., Vancouver, B.C.
 Sparling, F. H., Toronto, Ont.
 Sutton, L. H., Cobourg, Ont.
 Williams, Enos, Portuguese Cove, N.S.
 Young, B., Codroy, Nfld.

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WE beg to announce as the result of years' experience in Amateur and Commercial Wireless, we are in a position to manufacture and design Radio Apparatus, and use the best of material obtainable. We are able to produce and place upon the market Apparatus of unexcelled value, appearance, efficiency, and a price within reach of all.

Look for our announcement in the January issue of this magazine.

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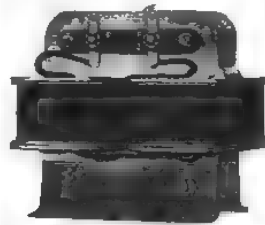
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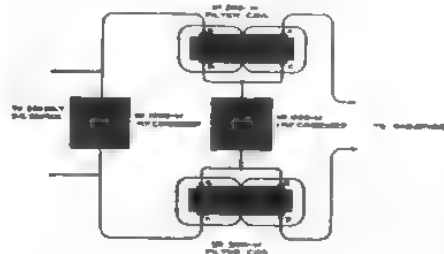
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No. 1000 W
1 M.F. Condensator



FEDERAL FILTER CIRCUIT

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FEDERAL Radio Apparatus.

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Canadian Distributors for
Federal Telephone & Telegraph Co.,
BUFFALO, N.Y.

RADIO CLUB REPORTS

On this section the Editor will be pleased to publish reports of any of the various Radio Clubs. Such reports should be submitted in the exact form in which they are to appear, the Editor, however, reserving the right to edit and curtail the reports if necessary. Papers of special interest read before such Clubs will be also acceptable for publication.

RADIO RESEARCH CLUB OF CANADA

The next meeting of the above club will be held on December 15th at the usual place—Room 23 in new Electrical Building, University of Toronto. At this meeting Mr. W. A. Dancy will give an address on "Measurement of Capacity." At the last meeting Mr. W. C. C. Duncan gave a very interesting talk on the "Measurement of Antenna Resistance." This paper will appear in full in January issue of "Aviation and Wireless News."

Editor's Note.—The real scientific research work shown by the Club's various speakers in the preparation and presentation of their respective papers, has been most gratifying to the members. These papers have proved to be of great interest and value, not only to members themselves, but to our other readers, who have had the opportunity of reading them from month to month in "Aviation and Wireless News." Many letters have been received commenting most favorably upon the quality of these articles.

W.A.O.O. PASSES RESOLUTION.

At a general meeting of the Wireless Association of Ontario held in Room E 25, School of Science, University of Toronto, on the evening of December 8th, 1921, the following Resolution was adopted by a complete vote of the W. O. members present.

Resolved, That the following recommendations be submitted for the consideration of the Department of Naval Service, Ottawa:—

1. That the present regulations governing citizen radio communication be amended in such a manner that a wave-length range of 180 to 250 meters be allowed for transmission the year around, and *graded according to the degree of interference possible.*

2. That the amateur licenses be graded according to the ability and experience of the operators, and limitations

as to power, wave-length and operating hours be modified according to the class of amateur license held by the operator and the type of transmitter used.

3. That the decrement of a transmitter *be not allowed* to exceed the value 2/10.

4. That a part-time Radio Inspector be appointed at once, the said inspector to be paid a nominal fee of, say, Two Dollars (\$2.00) per annum, and be empowered to appoint competent assistants at a fee of say, One Dollar (\$1.00) each per annum, these inspectors to be residents of the City of Toronto and to be empowered to effectively enforce the Radio laws.

GENERAL MEETING W. A. O. O.

Well, fellows, the December 8th meeting of the W. A. O. O. was sure a humdinger, eh? We had an auction sale and the fellows sure came across fine. There was a large assortment of "junk," ranging in price from \$25.00 down to 10c. Upwards of \$60.00 changed hands during the sale, and our ever-popular A. R. L. traffic manager, Mr. A. H. K. Russell, made a great hit as auctioneer. About 130 members and friends were present, and every one entered into the spirit of fun and frolic as the bidding became fast and furious.

Two matters of club business were disposed of at this meeting. The Vimy Supply Co. of Toronto agreed to give a 10 per cent. discount on sales to club members. This announcement was greeted joyfully, and a vote of thanks for this kind offer was most unanimously given to Capt. Askham.

The attitude of the club membership on the QRM situation was clearly shown by the passing of a resolution to be submitted to the Department of the Naval Service, Ottawa. The vote on this resolution was 120 in favor and none contrary, members only being permitted to vote.

The meeting adjourned at 11.20 p.m.



DAH-DE-DE-DA DAD!

With most humble apologies to our er-ah-esteemed contemporary, we have "taken" the title on his November cover as a heading for this article. We have been writing all kinds of things for our brother amateurs, but this one fellow's is for *your Dad*. We want you to get him to read it because we are, in the next paragraph, going to stop being facetious and have a heart-to-heart serious talk with dear old Dad.

Within the mind of every youth, constantly contending for the mastery, are two great forces—the CONSTRUCTIVE, and the DESTRUCTIVE.

You are particularly fortunate in possessing a son who is a "Wireless Bug." To have a real interest in the radio art is to possess an asset that cannot fail to be of use when the maturing mind of youth begins to tackle the greater problems of Life.

Leave a young man to his own devices and for some reason the Destructive force is almost certain to assert itself . . . The youth who spends his time in pool-rooms and on street corners is putting upon himself a handicap that gives to destructive tendencies a full opportunity to develop.

Now, you doubtless realize that a parent's influence should always be directed along CONSTRUCTIVE lines. We can state with the utmost conviction that the study of Wireless phenomena, the most absorbing and fascinating pastime that can possibly be imagined, is highly instructive and broadening to the minds of both young and old.

Parents often do not realize the strongly educational value attached to radio experimentation. As a result they look upon the lad's wireless set as an expensive toy, and, failing to appreciate its value as a Constructive Educator, are inclined to grumble at the frequent calls made upon the family purse, as the youthful enthusiasm rises to greater heights.

The best pal a boy can have is his own Father. If "Dad" and Son are to be Pals they must share a common interest. Start now to take a real personal interest in your boy's Wireless activities and you will have found a key to the lad's confidence and respect.

A working knowledge of Radio is by no means difficult to acquire . . . In fact, we venture to predict that in a short space of time, Dad will have forgotten all about his club and the "sick friend," and TWO good pals will be "Staying home evenings," to sit by the fire-side-radio-set, absorbed in the "Wonders of Wireless."

Mr. Canadian Father, think it over! A few dollars on one side of the balance, *Your* boy's good character and future on the other. What is it worth to YOU?

WIRELESS IN POLITICS

For the first time in the history of politics, so far as is known, the wireless telephone was called into use at Haverhill Sept. 8. The message went broadcast from Haverhill, which now has the distinction of leading the country in this unique campaign accessory. It was a Pingree speech read by Charles S. Harding from his sending station in Bradford. The next morning results of his speech came in by mail and telephone from all over the district. In some cases arrangements had been made to have the wireless apparatus attached to loud speaker which magnified the sound and enabled families and friends to hear the speech at the same time. Haverhill Mass., Gazette.

RADIO IN FAR NORTH

Government surveyors and engineers carrying their lines across the far-northern banks of the great Mackenzie River during the past summer knew the result of the Carpentier-Dempsey fight as soon as the crowds on the streets of Toronto. They received news daily from Japan, Cuba and the Philippines, and every 24 hours they checked their time with the chronometers at Annapolis, Maryland.

All this they did by means of a portable wireless receiving set, carried by one of the three Dominion Land Survey parties. One member of that group, Fred V. Seibert, D.L.S., passed through Toronto recently, on his way back to Ottawa from the bleak barrens of the sub-Arctics. Mr. Seibert, in a brief interview with The Globe, referred to some of the things accomplished since last June by Dominion engineers operating in the Mackenzie basin.

CANDIDATES SUCCESSFUL IN EXAMINATION FOR RADIOTELEGRAPHY

The Department of the Naval Service announces that fourteen candidates were examined during the month of October, 1921, of which the following were successful and obtained Certificates of Proficiency in Radio-telegraphy:

- | | |
|--------------------------------------|------------------|
| | 1st Class |
| Anderson, John, Montreal, P.Q. | |
| Poster, R. McA., Westmount, P.Q. | |
| McNeil, F. F., Prince Edward Island. | |
| | 2nd Class |
| Webb, Rodney, Verdun, P.Q. | |

BUFFALO POLICE USE RADIO

The set illustrated in this article and which the editor had the pleasure of seeing recently, is that belonging to Charles S. Taylor, 598 Masten St., Buffalo, N.Y. Unfortunately, the photo shows only a part of his very complete station. Mr. Taylor started some three years ago with "spark," but, like many others, took to C. W. He is using a 50 watt radiotron. His station has been heard many times—both voice and music—in Toronto and Erie, Pa. He operates for the Police Department of Buffalo by sending out nightly at 9 p.m. data on stolen automobiles. He has done this work for the past eight or nine months, and Chief Higgins has asked any amateur station hearing such broadcasts to turn over the information to the nearest police station. The results have been so satisfactory that the Buffalo Police Department are now figuring on the purchase of a set of much higher power.



Radiola 8 BQL—Charles S. Taylor

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Wireless Association of Ontario

(Organized in October, 1913)

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OFFICERS

W. C. C. DUNCAN, Past President.

C. A. LOWRY, President.

KEITH RUSSELL, Vice-President.

W. F. CHOAT, Secretary-Treasurer,
241 Robert St., Toronto.

COMMITTEE

H. H. MOOR. E. J. BOWERS. R. YOUNG,
F. A. CLARK. T. C. CHURCHILL.

Radio Manufacturers and Dealers Section

T. EATON CO., LTD.

Radio-Price List-No. 1 of the above company has just been issued, and shows a very complete line. We understand this list is being mailed to all registered Canadian amateurs. This company is stocking a very full line of tubes, including those manufactured not only in the United States and Canada, but in England, France and Japan. Samples of various makes are already being shown.

The Radio department of this great organization has met with marked success, and the precedent has already been followed by other departmental stores in Canada and the United States.

Their Radiophone concerts, which are sent out daily from 4.00 to 4.30 p.m., on a wave-length of 200 metres, are reported as having been heard in Ottawa, Gananoque, Belleville, Kingston, Listowel, Niagara Falls, N.Y., and Buffalo. They are using a DeForest Midget Radiophone with 2-5 watt Radiotron tubes radiating 6/10 to 8/10 of an ampere, plate voltage 300, and "B" battery.

TORONTO DEALER HAS INNOVATION

The Vimy Supply Co., 567 College St., Toronto, have installed a complete demonstrating equipment in their showrooms. Amateurs may borrow apparatus from this firm's extensive stock and test it out right in the store. In this way the amateur can compare various competing makes of apparatus right in the store and so determine which style is most suited to his needs. This is a service that will appeal strongly to the hard-headed radio enthusiast who wants to KNOW the worth of the apparatus on which he spends his money.

The radio department of this firm is in charge of Capt. J. W. Askham, who, during the war, was in charge of training and supply departments of R.A.F. in Canada; patrons can rely on receiving fair treatment and friendly co-operation from Capt. Askham, who is himself an honest-to-goodness dyed-in-the-wool Ham. The fact that the Vimy Supply Co are the oldest radio supply firm in Canada, places them in a position to deserve the full confidence of the Canadian Wireless Fraternity, and we extend to them best wishes for the success of this new and timely venture.

RADIOS ON "COF CAME"

Motor patrol cars in St. Louis are equipped with radio-telephones by the police department. One officer con-

stantly wears a head receiver, by which means new orders or additional information can be given to the squad at any time with a range of forty miles.

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RADIO INQUIRY DEPARTMENT

Conducted under the direction of The Radio Research Club of Canada.

This department will be edited by the Secretary of the above club and the questions will be answered by the member considered to be most familiar with the particular field in question. Where the question is considered of sufficient importance it will form the basis for a discussion at a regular meeting of the club.

Answers will be given covering the full range of wireless subjects, but only those which relate to the technical phases of the art and which are of general interest to readers will be published here, other queries being answered by mail.

The subscriber's name and address must be given in all letters and only one side of the paper written on; where diagrams are necessary they must be on a separate sheet and drawn with India ink. Not more than five questions from one reader can be answered in the same issue. The club does not obligate itself to answer here any question entailing considerable research work, intricate calculations, patent research, etc. However, such an inquiry will be acknowledged and the writer advised as to the basis upon which the question can be answered.

CANADIAN ELECTION RETURNS BY WIRELESS

No better evidence of the practicability and efficiency of radio as a present day means of broadcasting news can be desired than that furnished in connection with the returns of the Canadian General Elections, held on December 6th. In at least four Canadian cities—St. John, N.B., Montreal, Toronto and Vancouver, B.C.—wireless broadcasts proved very popular, not only as being a unique, but as being a quicker way by which to receive information.

Many radio amateurs and their friends were glad to forego the doubtful pleasures necessary to an attendance among the crowds in front of the newspaper bulletin boards. Not only were they enabled to hear the results in comfort, but to receive them more expeditiously.

One particular instance of this has been brought to the attention of the writer. At Weston—a suburb of To-

ronto—many made a long journey to the Toronto downtown bulletin boards, only to find on their return that those who had remained home had for some time been in receipt of more complete returns than had been available to them.

Mr. F. K. D'Alton—Secretary of the Radio Research Club of Canada—and some fellow amateurs in Weston, got together about half an hour or so before the returns were due and threw up a temporary aerial 240 feet long. With this strung from tree to tree and a ground stake driven they proceeded to set up their apparatus in a hall. Using three steps of audio amplification, they turned the results into a magnavox, and gave most prompt and complete returns to those present in the crowded hall. As in grand opera, those in the rear heard to even better advantage than those in front



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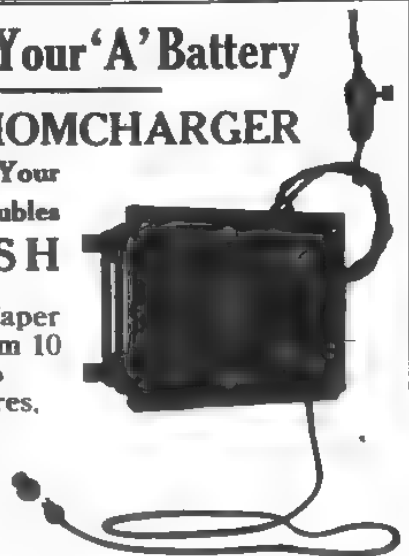
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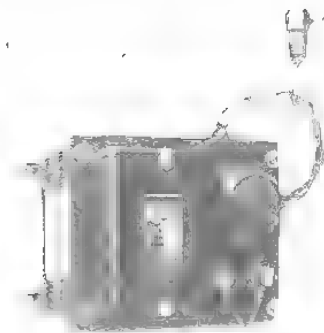
RADIO INQUIRY DEPARTMENT



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Port of New York

NEW YORK



AERO CLUB OF CANADA

The subscription list for the Aero Club Ball on January 6th, is being steadily enlarged. As soon as 200 names are received the list will be closed. A member in making reservations need not give at the same time the name of his guest. This can be done any time before the end of December.

At a meeting of Directors held on December 7th it was decided that all members whose 1921 dues had not

been paid should be notified to the effect that those whose dues remained unpaid four days after the mailing of such notice would have their names posted for one week on the Club Bulletin Board. At the end of the week, those whose dues still remain unpaid will automatically cease to be members of the Club. The same applies to non-resident members except that a week instead of four days is allowed between mailing of notice and posting of names on bulletin board

CRUISE OF THE "SANTA MARIA"

The return of the giant aeromarine flying cruiser "Santa Maria" at Key West marks the completion of the most remarkable performance in the history of aviation, constituting a continuous flight of six thousand miles from Key West along the Atlantic seaboard, over the waters of New York State, along the Great Lakes, down the Mississippi River Valley to New Orleans, and thence along the Gulf back to Key West.

STATION PHOTOS

Send in a photograph of your layout for publication. The photos should be very clear and not too dark. The best size is that of a postal card, but any size which you have on hand can be reproduced. If requested, these photos will be returned, but make sure to specify if you want them.

PLANES FIND SHORT ROUTE FROM CAIRO TO BAGDAD

The distance from Cairo, Egypt, to Bagdad, Mesopotamia, has practically been halved for the overland traveller by recent aeroplane discoveries in that land. Lava beds that have hitherto been impassable may now be crossed successfully over a pass found by the airmen. This is very important in that it brings the two eastern cities about 600 miles closer by wagon road. The planes received the hearty co-operation of the authorities and were also accompanied by a caravan of wireless-equipped desert tenders and armored cars for marking the newly discovered route.

FIGHT FIRES WITH PLANES

The Ontario Provincial government fire ranger service may use one or two hydroplanes for observation purposes next year.

AIRPLANE SETS NEW RECORD FOR FUEL ECONOMY

What is claimed to be a new low record for fuel consumption was established by the Fokker limousine monoplane Half Moon, in a flight from Washington, D.C., to Curtiss Field, near Mincola, L.I. The airplane, carrying five passengers, covered 275 miles, a distance greater than the railroad route. The time taken for the trip was about half of that required by the railroads. The cost of the oil and gasoline for the entire trip was \$5.80, or about 2.1 cents a mile.

MOUNT BLANC CONQUERED BY PLANE

The summit of Mount Blanc, 15,872 feet high, was the scene recently of a remarkable feat in aviation. A French airman landed there with his plane, got out of the machine, walked around for about ten minutes, and then flew away, and twenty minutes later landed safely at Chamonix, the well-known Alpine resort at the base of the mountain.

RINGING UP A PLANE

The entire British fleet of airliners in regular use between London and Paris is now equipped with wireless telephones, and during their aerial journeys the machines are in constant communication with the ground stations.

It is no uncommon thing to hear while "listening in" at a ground station the pilot of an incoming air express speaking to the pilot of an outgoing machine and advising him of peculiarities of the weather along the route.

SEAPLANES IN ADIRONDACK

Seaplanes were used extensively last summer for social purposes by the members of the Adirondack summer colonies. On some of the lakes there was in effect an air-taxi service.

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Camp Borden as Seen by a Newspaper-Man

On a Staff special under date of November 2nd, 1921, the Toronto Evening Telegram publishes an account of Camp Borden. The opinion of a disinterested observer is always of interest, so we are publishing the article intact:

"Although it is difficult to say just which country is doing the most towards promoting commercial aviation and at the same time keeping aviators in readiness for any emergency, Canada is certainly doing her share. What the Johannesburg Aerodrome is to Berlin and Germany, Croydon to London and England, Mineola Field to New York and America, so is Camp Borden to Toronto and Canada. The camp is approximately seventy miles north by east of the city, but only nineteen minutes by plane, according to the record trip made recently from the camp to Leaside.

Under the command of Squadron Leader J. L. Gordon, D.F.C., an executive of high ability, and a capital staff, the camp is now a hive of activity and the last word in efficiency. From 25 to 30 officers, mostly pilots and observers who saw active service, and from 50 to 60 air mechanics and riggers are trained every month.

Once a "White Elephant."

During 1916 and the following two years, when the camp was used as an infantry training centre, it was termed a "white elephant" by many. Camp Borden of to-day, under the administration of the Air Force, is a different place. Old huts and cook houses of the historic infantry battalions still dot the area. As far as the actual ground occupied, the present camp is small, but everyone concerned is carrying on so far as the limitations set by Ottawa will permit.

Since the inception of the camp as a flying station in October, 1920, more than 400 officers have been trained and 870 air mechanics and riggers have qualified. The total flying time is 3,792 hours, during which time approximately 289,000 miles have been flown. The number of hours flown, with only two fatal accidents, is slightly better than records in England and Europe.

Town in Itself

The aerodrome, located eight miles southwest of Barrie and two miles south of Angus, contains 19,000 acres, including the old C.P.R. grounds. Many miles of concrete roads that would be a credit to any metropolis give easy access to all parts. One of the best artesian wells in the county of Simcoe assures an adequate supply of good water. An efficient fire brigade, hospital, post office, telegraph office, electric lighting system, telephone exchange, wireless telegraph station and a wireless telephone apparatus are among the modern conveniences.

Talk to Paris

In being equipped with the wireless telephone the camp is far ahead of other important centres. Many of the leading aerodromes in England and throughout Europe have yet to be equipped with this latest device for receiving weather reports, correct time and news from practically every part of the world. French may be the language of diplomacy, but English is the speech of the wireless. All the latest events in Paris are eagerly read by all the officers and men while at evening dinner, and listening to a rendering of "Vissi d'arte e d'amour" from La Tosca by Madame Galli-Curci at a concert near Washington was one of the privileges accorded The Telegram representative.

Work and Play

"Work hard and play hard" is apparently the motto and the spirit of the 200 men and 50 officers that go to make up the strength of the camp. Under six capable flying instructors, all of whom saw much active service, the officers taking the 28 days' course are instructed. There are two flights, "A" and "B," under the command of Capt. R. S. Grandy and Flying Officer G. G. Wake-man, respectively. On an average there is a total of fifteen hours of flying daily. Many lectures on practically every branch of aeronautics go to make up the busy day.

Every known recreation is fostered, and the equipment is valued at \$5,000. A nine-hole golf course, with some sporty drives of over 400 yards, a swimming tank, baseball diamond, football field, tennis courts and lacrosse fields are provided, while a covered skating rink, a prospective hockey team, snowshoe club, and a cinema, open all the year round, will give relaxation during the winter months. There is also a spacious Y.M.C.A., with all the indoor sports. The "Borden Flyer," a breezy journal, relating the station's activities, keeps everybody in touch with personal happenings and social spirit. A dinner dance, given in honor of the commanding officers, is a weekly affair at the officers' mess, and the men do not fail in following the terpsichorean art. A camp orchestra renders selections for all occasions.

The Final Touch

Married officers and married men and their families are well cared for. They have comfortable quarters of their own, and a special day school, under the supervision of Miss M. E. Thomas, gives the community the final touch of a kingdom of its own. Twenty children attend.

During the last year of the war, and until late in 1919, thousands of visitors from all parts of the globe paid a large admission fee to view the famous collection of colored war photographs at the Grafton Galleries in London, England. These same photographs, numbering 200, and valued at \$5,000, now adorn the walls of the officers' and men's mess rooms.

Zepp Engines

The building in which the officer under instruction receives "ground training" is one of the most interesting.

Instruction in engines covers many types, including Zeppelin engines. "Spotting" for the guns calls for keen observation and a quick mind. The pupil is seated high up in the building over a miniature plan of a stretch of country, and by means of a series of electric lights, guns are indicated. It is the pupil's duty to report the location of the supposed enemy gun by wireless. Aerial photography, navigation, armament and rigging are included in the ground work.

Acts of Bravery

The spirit of preparedness in case of emergency is one of the chief characteristics of the camp, and acts of bravery in face of great dangers are looked upon as everyday duties and bring out the admired traditions of the British services. In mute testimony to the adoption of the traditions as station principles the charred remains of a bungalow tell a story of heroism.

Less than two weeks ago the debris represented a happy home among the married officers' quarters. Then, in the small hours of the morning, flames enveloped the building. The officer was awakened and jumping up,

called his wife, and together they rushed to an adjoining room to rescue their two-year-old daughter. By the time they reached the room the flames had reached the head of the cot and had singed the child's hair. As the officer left the room with the child the roof of the room collapsed. The rescuers reached the verandah safely. Willing hands were ready to help them, and the officer handed the child to a brother officer, and returning to the burning cottage, rescued his wife's aged grandmother out of the building.

The family lost everything, including their clothes, but the next day Capt. C. D. Fairweather, the officer, was ready to carry on with his ordinary duties as if nothing had happened, and these are the first words briefly recording the act of bravery. Had the misfortune happened anywhere else but in a British camp it would have been featured as one of the foremost stories of the week.

Physician to Prince

Needless to say, at any large camp, and especially at a flying station, the medical officer and his staff is one of the most important units, and in securing the services of Major E. F. Nivin as senior medical officer, the Air Board left no stone unturned to assure the camp of efficient medical services. Major Nivin is a Cambridge M.A., and an Edinburgh L.R.C.P. and S. He has a long record of splendid service at the front, and during the recent Canadian tour of the Prince of Wales, he was appointed physician to the Prince while in Alberta and British Columbia. While serving at Camp Borden he has qualified as a flight lieutenant and a squadron leader in the C.A.F.

Padre is Popular

It is difficult to say who is the most popular officer on the station, because they are all popular with the men, and there is a marked spirit of harmony and co-operation throughout the camp as the result, but Capt. J. F. Tupper, the padre, is ever in demand and is ever ready to help the officers and men in both work and play. Among the others on the permanent staff are Capt. G. Logan, in charge of wireless; Flying Officer F. J. Mawdesley, adjutant; Capt. C. D. Fairweather, in charge of all stores, and Capt. M. B. Walker, in charge of the photographic section."

AN AIR SERVICE FOR ATLANTIC FISHERMEN

Major Sydney Cotton of the Royal Air Force is going out from England with a plane for service with the Newfoundland fishermen—namely, the observation from great heights of schools of cod and mackerel in the seas below, and the signalling to the waiting fishing fleets of exact information of location, character and, in general terms, the quantity of the prospective catch. What makes the pilots work particularly novel is that his signals to the fishermen will be sent by wireless telephone.

Major Cotton's first co-operation, though, will not be with the fishing fleets, but with the sealing vessels which in such large numbers outfit at St. Johns, Newfoundland.

They, too, in days gone by, have wasted four-fifths of their time in slow and often fruitless searching for their prey from vantage points no higher than their maintops. Now Major Cotton, flying low and fast, not only over sea but over the adjacent land, will locate herds and send to waiting sealers, ready for quick dashes, messages by wireless telephone, giving them exact locations. It seems rather hard on the poor seals, but the waiting sealers will be saved from many useless quests and much bad weather

Doubtless their mortality from storms and shipwreck will be greatly lessened.

As soon as Major Cotton has served the waiting sealers (they will be the first to have his services this year) he will begin to work with the cod and mackerel fishermen. Many schooners are equipped with wireless apparatus, and all these will be able to "pick up" his signals, sent as Major Cotton flies above the sea and searches it with powerful glasses. With this information in hand the skippers will be able to direct their course without much difficulty.

BALLOON MAKES CANOES FOR CANADIAN INDIANS

Popular Mechanics publishes an article which is probably the last word on the ill-fated expedition of United States balloonists last winter.

"Those who live on the border of civilization are always on the lookout for some product of civilized government that they may appropriate for their uses. Recently a group of very fine lightweight canoes appeared in the James Bay region in Canada. The source of these was quite a mystery. No such canoes had been seen there before. And they were in the hands of a group of outlaw Indians who lived in a small village over sixty miles from Moose Factory and hundreds of miles from any place where they could get material suitable for making such canoes.

"But finally someone solved the mystery. The great balloon that the United States naval balloonists had abandoned when it fell near Moose Factory had been destroyed. Orders had been issued from Moose Factory that it should not be touched, but the outlaw Indians were out of the jurisdiction of Moose Factory and the temptation to use it for canoes was too strong."

IN 1930

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JUMPING FROM THE SKY

The real designer of the parachute was Leonardo de Vinci, in 1500, although at the coronation of the Emperor Fo Kien, as early as 1306, Chinese acrobats were seen to jump from a high scaffolding with huge parachute umbrellas.

Major Orde Lee, who has made more parachute descents from aeroplanes than any other man, considers that all passenger aeroplanes should carry life-saving parachutes, just as ships carry lifebelts and boats. In a recent lecture he referred to a scheme of lowering a whole cabinful of passengers by one great parachute.

The prevailing idea that parachutes frequently fail to open is a fallacy. In 600 parachute descents from observation balloons during the war, only three failures occurred.

Many inventors do not realize that if a parachute is much less than 2 ft. in diameter the speed of descent is fatal. In 1914 an Austrian tailor jumped from the Eiffel Tower in Paris with a combined parachute-overcoat. The apparatus worked perfectly, but as it was only one-sixth the size of a standard life-saving parachute, it descended too quickly and its inventor was killed.

The real danger of parachuting is in landing. You never know where you are going to land. Major Lee has described how in July, 1920, a rival parachutist in Sweden challenged him to land on a given spot, and how he dropped from only 400 ft. and scored an "inner." His rival ascended to 3,000 ft. and landed a third of a mile away.

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