THE General Radio EXPERIMENTER

VOLUME XXVIII No. 4 SEPTEMBER, 1953

ELECTRICAL MEASUREMENTS AND THEIR INDUSTRIAL APPLICATIONS®

A UNIT OSCILLATOR FOR THE 0.5- TO 50-MC RANGE

Also IN THIS ISSUE

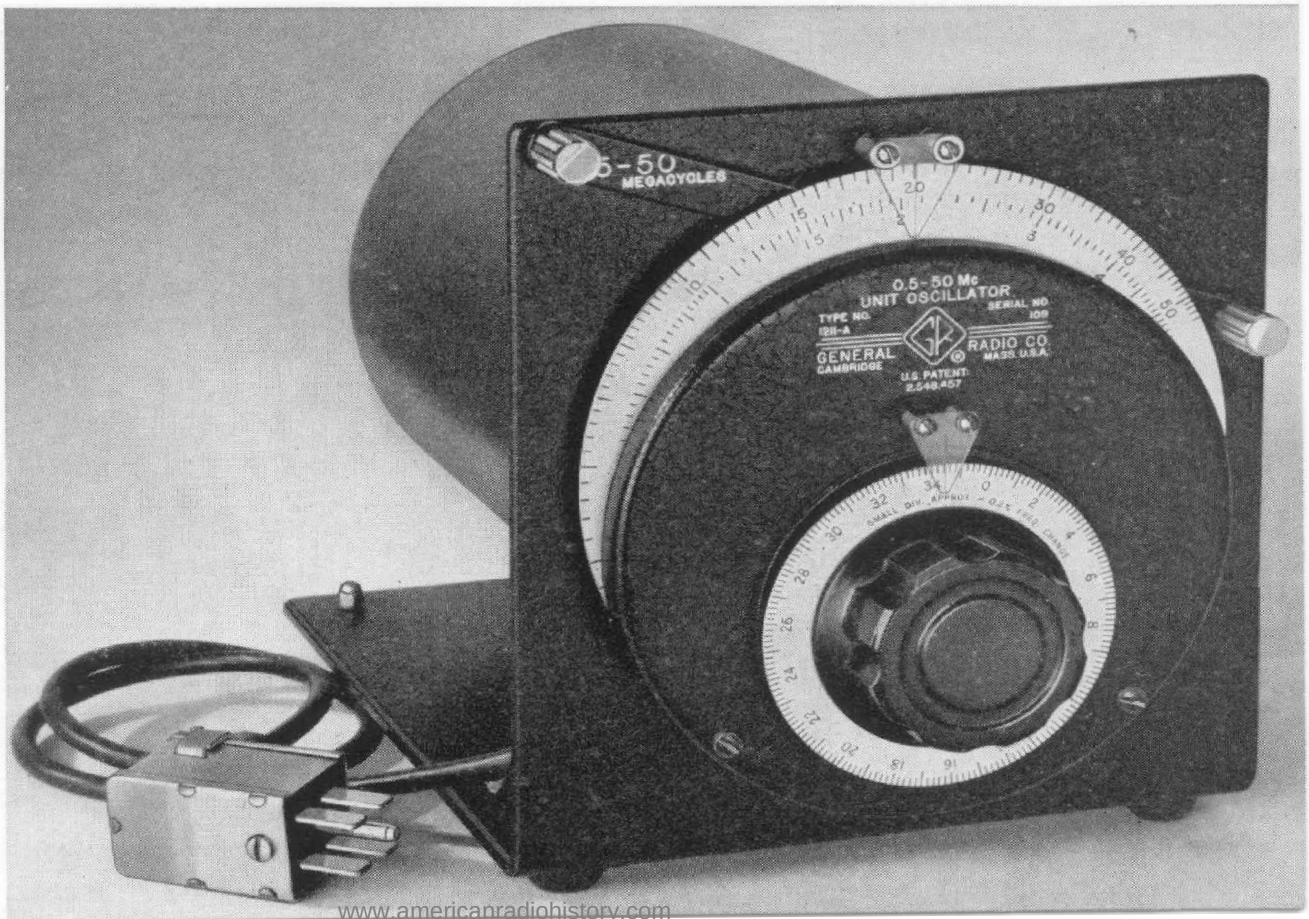
●**THE TYPE 1211-A** Unit Oscillator, latest addition to the rapidly growing line of General Radio Unit Oscillators[1], extends the frequency range covered by the versatile units downward by a factor of 100.

This new oscillator has a frequency span of 0.5-50 Mc, which is covered in two logarithmic ranges. The output power is well over one

[1]Eduard Karplus, "V-H-F and U-H-F Unit Oscillators," *General Radio Experimenter*, Vol. 24, No. 12, May, 1950.

A. G. Bousquet, "A New Unit Oscillator — 50 to 250 Mc," *General Radio Experimenter*, Vol. 27, No. 8, January, 1953.

Figure 1. View of the Type 1211-A Unit Oscillator.



watt over the 0.5-to-5 Mc range and is at least 200 milliwatts over the 5-to-50 Mc range. The frequency is indicated directly on a six-inch dial, and approximate increments of frequency expressed in percentage are given on a 3¼-inch slow-motion-drive dial.

To avoid the necessity of frequent range switching, the tuning ranges have been made as wide as possible. The span of each of the two ranges in the TYPE 1211-A Oscillator is 10 to 1. This wide frequency range is obtained by varying simultaneously the capacitance and the inductance as the frequency dial is turned. A frequency change of about 5 to 1 is due to the variable capacitor, and the remaining 2 to 1 frequency change results from inductance variation.

Electrical Circuit

The TYPE 1211-A Unit Oscillator uses a Hartley circuit with a TYPE 5763 oscillator tube. This tube type was selected because it can handle all the power provided by the TYPE 1203-A Unit Power Supply. The output circuit is coupled inductively to the oscillator tuned circuit and includes a voltage divider as output control.

An audio oscillator can be connected to terminals in series with the plate supply for direct amplitude modulation of the oscillator. A convenient audio source is the TYPE 1214-A Unit Oscillator which yields about 25 per cent modulation at 400 or 1000 cycles. The envelope distortion at this modulation level is around two to four per cent, depending on the carrier frequency.

Since modulation is accomplished directly in the oscillator circuit, some unwanted frequency modulation is unavoidable. Amplitude modulation practically free of frequency modulation can be obtained at carrier frequencies above 10 Mc by using the TYPE 1000-P6 Crystal Diode Modulator.

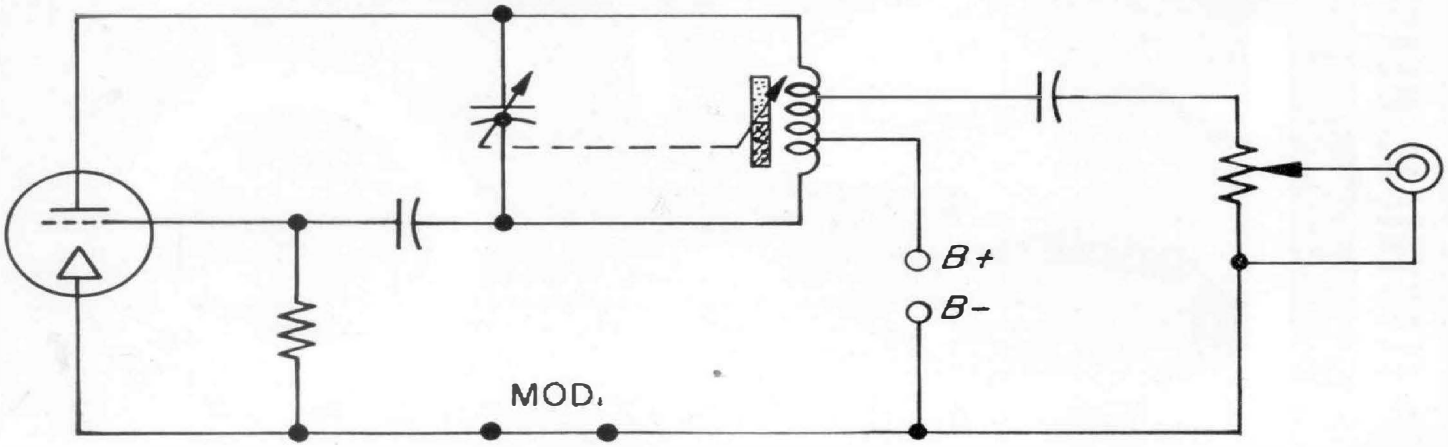
Construction

The oscillator circuit is assembled on an aluminum casting with filtering components mounted within the casting. A spun-aluminum cylindrical cover completes the shielding much more effectively than would a conventional rectangular dust cover. The output control and the coaxial output connector are at the rear of the cover; the entire assembly is mounted on an L-shaped panel and base.

The tuning capacitor and the switch contacts are the same as those used in the TYPE 1001-A Signal Generator and TYPE 1330-A Bridge Oscillator.

The 0.5- to 5-Mc and the 5- to 50-Mc oscillator coils are arranged in a plane perpendicular to the tuning capacitor shaft, and range selection is obtained by switching in the appropriate coil by means of a rocker arm on the panel. The

Figure 2. Elementary Schematic Diagram of the Type 1211-A Unit Oscillator.



frequency ranges are engraved at the arm extremities, and the main frequency dial shields one end of the arm so that only the range selected is indicated.

The core assembly, which helps to produce the wide frequency span, is concentric with the coils and is mounted to turn with the capacitor shaft. This assembly consists of a dust core and an aluminum core, both of a sickle shape, to produce a smooth transition from full iron-dust core for maximum inductance through a minimum of core to a full aluminum core for minimum inductance. The cores and the tuning capacitor plates are shaped to yield an approximate logarithmic response of frequency with angular rotation over the 10-to-1 frequency span. (See Figure 3.) The iron-dust core increases the circuit Q, while the aluminum core reduces it.

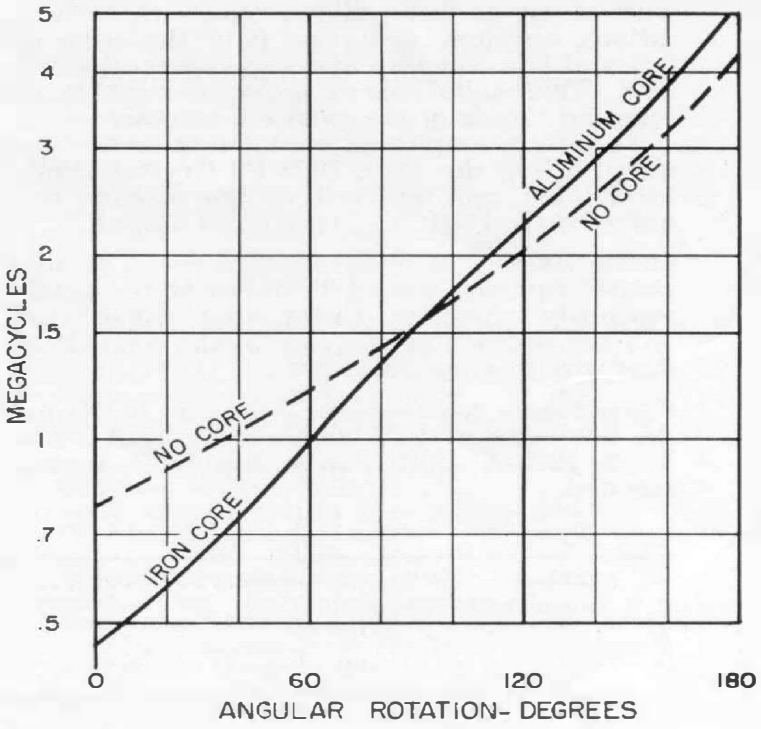


Figure 3. Frequency versus rotation angle showing the effect of the metal cores.

Features

The major features of this oscillator are the compact unit design, the 10-to-1 frequency range for each switch position, and the approximately logarithmic frequency response of the main dial with a smaller auxiliary dial indicating frequency increments of 0.2% per division. The 874-type coaxial output system and the effective shielding add appreciably to the usefulness of the instrument. All power leads are carefully filtered, and the dial shaft is enclosed within a grounded capsule inside the main knob.

The shielding is entirely adequate for use of the oscillator as a power source in bridge measurements. The 874-type coaxial output connector permits extension of the shield system to the bridge.

Since all leads to the power unit are carefully filtered, batteries can be used as the power supply for field applications. For general laboratory operation, the TYPE 1203-A Unit Power Supply is recommended.

— A. G. BOUSQUET

SPECIFICATIONS

Frequency Range: 0.5 to 50 Mc in two ranges.

Frequency Calibration Accuracy: 2% at no load.

Frequency Controls: A two-position range switch. A 6-inch dial with calibration approximately logarithmic against angular rotation. A slow-motion vernier dial to indicate frequency increments of 0.2% per dial division.

Output System: The oscillator output is available at a coaxial connector at the rear of the instrument. An adjacent ground terminal also permits connection by means of a TYPE 274-M Plug. The output is controlled by a small dial calibrated in arbitrary units.

Output Power: At least 200 milliwatts into a 50-ohm load at any frequency within the range. For the 0.5-5 Mc range, the output power is of the order of 2 watts.

Modulation: Direct amplitude modulation over the audio-frequency range can be obtained with an external audio oscillator. The impedance at the modulation terminals is about 8000 ohms, and 25% modulation is obtained

with about 45 volts audio. Under these conditions, envelope distortion is of the order of 3% and is a function of carrier frequency setting. The audio source must be capable of carrying the dc of the carrier oscillator.

To obtain amplitude modulation free of incidental f-m, the TYPE 1000-P6 Crystal Diode Modulator can be used at the carrier frequencies above 10 Mc, at reduced output.

Circuit: Hartley oscillator coupled direct to output. Frequency tuning is obtained by simultaneously changing the tuning capacitance and the position of the core in the coils (iron-dust core to aluminum core).

Power Supply Requirements: 300 volts at 50 ma dc, 6.0 volts at 0.75 amperes ac or dc. The TYPE 1203-A Unit Power Supply is recommended.

Tube: TYPE 5763 Miniature VHF Beam Power Amplifier, which is supplied with the instrument.

Mounting: The oscillator is mounted on an aluminum casting and is shielded with a spun-aluminum cover. The assembly is mounted on an L-shaped panel and chassis, finished in black-crackle lacquer.

Accessories Supplied: TYPE 874-R21 Patch Cord, TYPE 874-Q2 Adaptor and TYPE CDMS-466-4 Multipoint Connector.

Accessories Available: TYPE 1000-P6 Crystal Diode Modulator, TYPE 1214-A Unit Oscillator, TYPE 1203-A Unit Power Supply, TYPE 1204-B Unit Variable Power Supply, and the TYPE 874 Coaxial Elements.

Dimensions: 7 x 8 x 12 inches over-all.

Net Weight: 11½ pounds.

Type		*Code Word*	*Price*
1211-A	**Unit Oscillator**	ATLAS	**$295.00**

U. S. Patents 2,125,816 and 2,548,457.

INDEX

TO GENERAL RADIO EXPERIMENTER

Volumes XXVI and XXVII, June, 1951, through May, 1953

INDEX BY TITLE

INDEX BY AUTHOR

INDEX BY INSTRUMENT TYPE NUMBER

GENERAL RADIO AT N. E. C. 1953

General Radio products will be on display in Booths 87 and 88 at the National Electronics Conference to be held in the Hotel Sherman, Chicago, September 28, 29, and 30.

Among the General Radio instruments shown will be:

Type 1217-A Unit Pulse Generator — a small, compact, inexpensive generator of pulses, with rise time as short as 0.05 microsecond and repetition rates between 30 and 100,000 cps.

Type 1000-P7 Balanced Modulator — a crystal-diode modulator designed to operate on the output of standard-signal generators to produce 100% amplitude modulation without incidental frequency modulation. Carrier frequency range is 60 to 2500 megacycles, and modulating frequencies up to 20 megacycles can be used. Pulse modulation can also be applied, with rise times as short as 0.02 microsecond.

Limit bridges for measuring d-c resistance and for comparing resistors, capacitors, and inductors at audio-frequencies.

Sound-measuring equipment — a complete line of sound-level meters, analyzers, and accessories for the measurement of noise and other sounds.

Type 1602-B U-H-F Admittance Meter, with a full line of accessories, set up to measure television transmitting antennas.

Variac® autotransformers with General Radio's new Duratrak contact surface that stands up under punishing overloads — an outstanding development that makes the variable autotransformer as durable as a fixed-ratio transformer.

THE General Radio EXPERIMENTER is mailed without charge each month to engineers, scientists, technicians, and others interested in communication-frequency measurement and control problems. When sending requests for subscriptions and address-change notices, please supply the following information: name, company address, type of business company is engaged in, and title or position of individual.

GENERAL RADIO COMPANY
275 MASSACHUSETTS AVENUE
CAMBRIDGE 39 MASSACHUSETTS
TELEPHONE: TRowbridge 6-4400

BRANCH ENGINEERING OFFICES

NEW YORK 6, NEW YORK
90 WEST STREET
TEL.—WOrth 2-5837

LOS ANGELES 38, CALIFORNIA
1000 NORTH SEWARD STREET
TEL.—HOllywood 9-6201

CHICAGO 5, ILLINOIS
920 SOUTH MICHIGAN AVENUE
TEL.—WAbash 2-3820

REPAIR SERVICES

WEST COAST
WESTERN INSTRUMENT CO.
826 NORTH VICTORY BOULEVARD
BURBANK, CALIFORNIA
TEL.—ROckwell 9-3013

CANADA
BAYLY ENGINEERING, LTD.
5 FIRST STREET
AJAX, ONTARIO
TEL.—Toronto WA-6866

PRINTED IN U.S.A.