

APR 30 1937

OPERATING INSTRUCTIONS  
FOR  
TYPE 834-A  
ELECTRONIC FREQUENCY  
METER  
FORM 398 C



GENERAL RADIO COMPANY  
CAMBRIDGE A, MASSACHUSETTS

# OPERATING INSTRUCTIONS FOR TYPE 834-A ELECTRONIC FREQUENCY METER

## PART I PURPOSE

This instrument is particularly intended for use in general laboratory measurements where a direct-indicating frequency meter is desirable, where rapid changes in frequency are made, or where a large number of measurements are desired and the time-saving feature of such a direct-indicating instrument is of value. This latter consideration is also important in frequency-checking stations or in crystal-grinding operations where a large

number of frequency measurements must be made as a regular routine. When employed with a vibration pickup, the instrument is valuable in analyzing vibrations in machinery. When employed with a sound or an electrical pickup the instrument is very useful in tuning motor horns, chimes or similar devices, where a continuous indication of the frequency is invaluable during the process of adjustment.

## PART 2 PRINCIPLES OF OPERATION

The instrument consists, essentially, of a gas-discharge-tube counter and an indicator. (The fundamental circuit design is due to F. V. Hunt.) On application of an alternating voltage to the grids of the gas-discharge tubes, the tubes become alternately conducting and non-conducting.

At each transition of the current from one tube to the other, a single short current pulse is sent through the indicator circuit. As the successive pulses are identical, the meter reading will depend on the number of pulses per second, or the frequency.

## PART 3 GENERAL DESCRIPTION AND SPECIFICATIONS

The instrument includes a one-stage amplifier, the gas-discharge-tube counter circuit, a diode switching tube and the frequency-indicating meter. Power supply equipment, with rectifier and voltage-regulating tubes, is included.

The instrument is designed for five ranges, each starting at zero and extending to 200, 500, 1000, 2000 and 5000 cycles. The desired range is chosen by means of a multiplier switch on the panel.

The input impedance is approximately 1 megohm. An input voltage of approximately 2 volts is required to obtain normal

operation. An increase in the input voltage from 2 volts to more than 200 volts causes no change in the indication at a given frequency.

The power supply is designed for operation from 115-volt 60-cycle mains. To allow for the rather wide differences in average line voltage in various localities a control is provided for bringing the operating plate voltage to a normal value by manual adjustment. For small fluctuations about this value, the regulator tube greatly diminishes the variations in their effect on the frequency reading.

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## PART 4 INSTALLATION

No special comment is needed, except as regards the installation of the vacuum tubes. Install as indicated in the diagram at the right.

TYPE 834 ELECTRONIC FREQUENCY METER



## PART 5 OPERATION

Connect to the 115-volt 50-60 cycle mains by means of cord and plug provided.

For best operation, turn on the instrument a few minutes before it is to be used.

Adjust the plate voltage control until the plate voltmeter reads 150 volts (at red line).

Connect the source, the frequency of which is to be measured, to terminals 7-12 of the multipoint connector or INPUT terminals on panel.

Place multiplier switch on a scale estimated to be a suitable one. If in

doubt, set multiplier first on 5 (5000-cycle range) and later go to lower ranges.

In the event that a frequency greatly above the limits of the lower scales is applied to the instrument, both gas-discharge tubes may be ignited at the same time, indicated by the frequency meter reading falling to zero. If this occurs, move multiplier to a higher scale, and if no reading is then obtained, press the "de-ionizer" switch. No damage to the instrument results, unless both tubes are left ignited for a considerable time.

## SPECIFICATIONS

**FREQUENCY RANGE:** 0-5000 cycles in five ranges having 200, 500, 1000, 2000 and 5000 cycles as maximum values.

**ACCURACY:** 2% of full-scale reading, or better.

**STABILITY:** With the exception of a drift of about 1% of full-scale reading in the first few minutes after starting, there is no material change in indication with time.

**INPUT IMPEDANCE:** The impedance between the terminals at which the frequency for measurement is applied is approximately 1 megohm.

**INPUT VOLTAGE** An input voltage of at least 2 volts is required for normal operation. The input voltage

may be raised from 2 volts to more than 200 volts with no change in indicated frequency.

**SCALE ADJUSTMENT:** Independent adjustment is provided for making the indications on each range agree with the meter scale. This adjustment is made at the factory, but if correction is required in the field, these adjustments may be used.

**POWER SUPPLY:** 115 volts, 50-60 cycles.

**POWER INPUT:** 45 watts.

**DIMENSIONS:** Panel (width) 19 x (height) 8-3/4 x (depth) 12 inches.

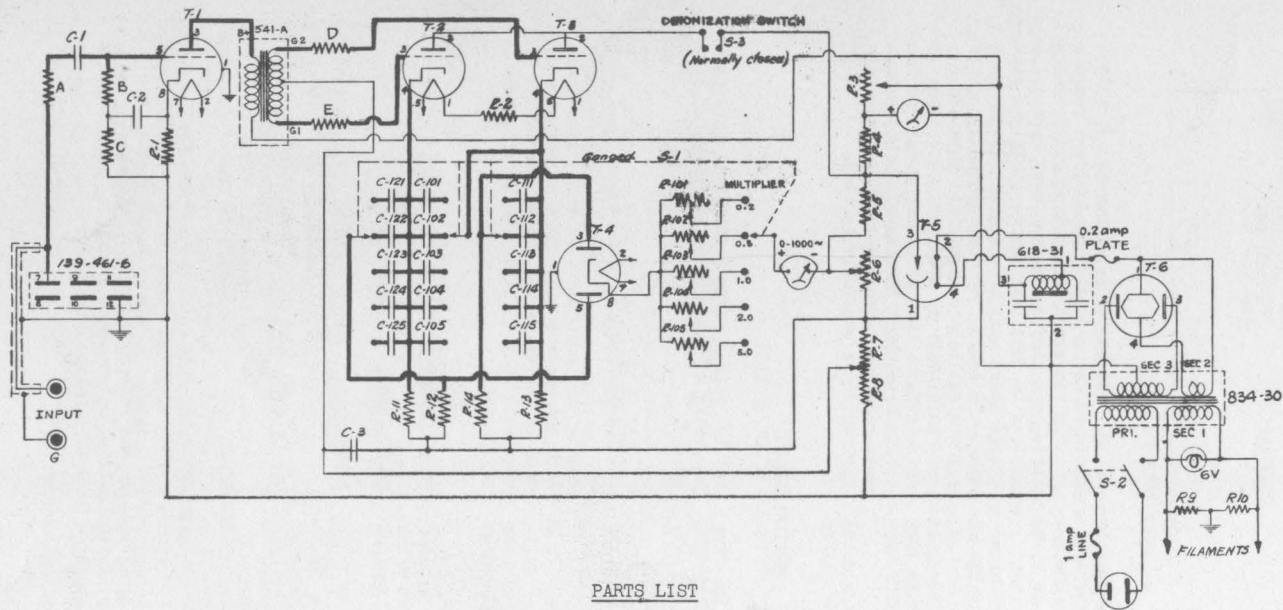
**NET WEIGHT:** 37 pounds.

## PATENT NOTICE

This instrument is manufactured under the following U. S. Patents and license agreements:

Patents of the American Telephone and Telegraph Company, solely for utilization in research, investigation, measurement, testing, instruction and development work in pure and applied science.

Designs and patent applications of Dr. F. V. Hunt.

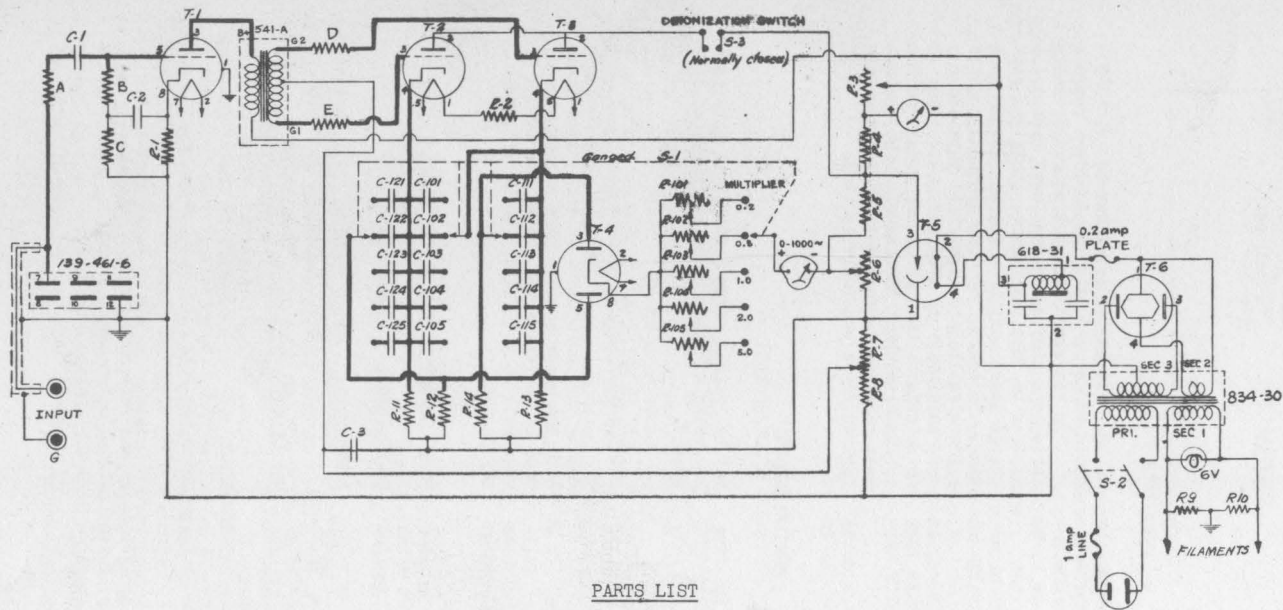


Resistors	
A	= 1 M $\Omega$
B	= 1 M $\Omega$
C	= 50,000 $\Omega$
D	= 0.1 M $\Omega$
E	= 0.1 M $\Omega$
R-1	= 500 $\Omega$
R-2	= 0.75 $\Omega$
R-3	= 1000 $\Omega$
R-4	= 500 $\Omega$
R-5	= 20,000 $\Omega$
R-6	= 600 $\Omega$
R-7	= 220 $\Omega$
R-8	= 80 $\Omega$
R-11	= 3000 $\Omega$
R-12	= 3000 $\Omega$
R-13	= 3000 $\Omega$
R-14	= 3000 $\Omega$
R-101	= 5000 $\Omega$
R-102	= 5000 $\Omega$
R-103	= 5000 $\Omega$
R-104	= 5000 $\Omega$
R-105	= 5000 $\Omega$

Condensers	
C-1	= .025 $\mu$ f
C-2	= 1 $\mu$ f
C-3	= 1 $\mu$ f
C-101	= .06 $\mu$ f $\pm$ 3%
C-102	= .025 $\mu$ f $\pm$ 6%
C-103	= .012 $\mu$ f $\pm$ 3%
C-104	= .006 $\mu$ f $\pm$ 6%
C-105	= .002 $\mu$ f $\pm$ 6%
C-111	= .04 $\mu$ f $\pm$ 3%
C-112	= .015 $\mu$ f $\pm$ 6%
C-113	= .008 $\mu$ f $\pm$ 6%
C-114	= .004 $\mu$ f $\pm$ 6%
C-115	= .0015 $\mu$ f $\pm$ 6%
C-121	= .04 $\mu$ f $\pm$ 3%
C-122	= .015 $\mu$ f $\pm$ 6%
C-123	= .008 $\mu$ f $\pm$ 6%
C-124	= .004 $\mu$ f $\pm$ 6%
C-125	= .0015 $\mu$ f $\pm$ 6%

Vacuum Tubes	
T-1	= 6C5(G)
T-2	= RCA-885
T-3	= RCA-885
T-4	= 6X5(G)
T-5	= RCA-874
T-6	= RCA-82

TYPE 834-A  
WIRING DIAGRAM



PARTS LIST

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