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DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

Letter
Circular
LC 73

(August 1, 1922)

FEES FOR TESTING RADIO APPARATUS

Information regarding Tests

This pamphlet is a revision of the section on radio apparatus in Bureau of Standards Circular 6, "Fees for Electric, Magnetic and Photometric Testing."

Additional information concerning tests of electric, magnetic and photometric standards, measuring instruments and materials will be found in the various publications listed in Bureau of Standards Circular No. 24, "Publications of the Bureau of Standards." Copies of this Circular will be sent to interested persons on request. Inquiries should be addressed, Bureau of Standards, Washington, D.C.

The radio publications of the Bureau are listed in Bureau of Standards Circular No. 122, "Sources of Radio Information." Copies of this Circular may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., at five cents per copy.

General Instructions to Applicants for Tests

(1) Application for Test. The Bureau of Standards limits its tests of radio material to tests for the Government, tests of instruments which are in turn to be used as standards for testing considerable numbers of other instruments, tests of importance to the Bureau as a matter of research, tests in which this Bureau is asked to act as referee, and a few other tests in which special reason is shown why they should be undertaken by this Bureau. Therefore, before an article is submitted for test, it must be preceded by a written request for test. If the test is not one that can be undertaken by the Bureau of Standards, the applicant will be furnished, if possible, with the name and address of one or more laboratories who may make the test if requested. The request should enumerate the articles, giving the serial numbers or other identification marks of each, and should state explicitly the nature of the test desired. It is also desirable that the conditions under which the apparatus is used be stated. Two examples of the facts to be stated explaining the nature of the test desired are: the number of points on the scale of a wavemeter, variable

condenser, or variable inductor at which test is desired; the frequency at which a capacity, phase difference, or apparent inductance measurement is to be made. Two examples of the conditions to be stated under which an instrument is to be used are: the position (vertical or horizontal) in which an ammeter is to be used, and whether a condenser is to be used with one terminal grounded. In the absence of specific instructions, such tests will be performed as are necessary to determine the ordinary constants or operating behavior of the apparatus. Thus, for a wavemeter, variable condenser or inductor, the results obtained would make possible the use of the instrument as a secondary standard, provided it was properly designed.

For special tests involving measurements not specified in the appended schedule, a charge will be made based upon the time required for the test. When the test is one regularly provided for in the appended schedule the fee may be computed in advance and should be sent at the time the apparatus is shipped. In making reference to the appended schedule refer as: Letter Circular 73, "Fees for Testing Radio Apparatus," item (D) (a).

(2) Condition of Apparatus. Before submitting apparatus for test, the applicant should ascertain that it is in good working condition. When defects are found after a test has been begun, which exclude an instrument from receiving the usual certificate, a report will be rendered giving such information as has been found. All possible care will be taken in handling apparatus but the risk of injury or breakage in shipment or under test must be borne by the applicant.

(3) Identification Marks. All packages should be plainly marked with the shipper's name and address, and, when convenient, a list of the contents. Each separate piece of apparatus or sample of material should be provided with an identification mark or number. The identification mark should be given in the application for the test.

(4) Shipping Directions. Transportation charges are payable by the person requesting the test. The charge for shipment to the Bureau of Standards must be prepaid, and unless otherwise arranged, articles will be returned or forwarded by express "collect." Apparatus submitted for test, as well as all correspondence, should be addressed, Bureau of Standards, Washington, D.C. Since apparatus is generally returned in the same container in which it is sent to the Bureau, this container should be such as to prevent not only actual breakage of the apparatus, but also any jarring which might change the electrical characteristics of the instrument.

(5) Remittances. Fees should be sent when the apparatus

is shipped, in accordance with the appended schedules, or promptly upon receipt of bill. Certificates are not given, nor is apparatus returned until the fees due thereon have been received. Remittances may be made by money order or check, drawn to the order of the "Bureau of Standards."

(6) Nature of Tests. The general methods used in most of the tests of radio apparatus are described in Circular 74 of the Bureau of Standards, entitled, "Radio Instruments and Measurements." A copy of Circular 74 may be purchased for sixty cents from the Superintendent of Documents, Government Printing Office, Washington, D.C.

(7) Reports, Certificates, and Standardization Curves. The results of a test will be set forth in an official report or certificate. Applicants for tests should state whether or not standardization curves are desired. If no information is furnished on this point, it will be assumed that curves are wanted in the case of all apparatus for which curves are customarily used, and fees will be charged accordingly. A fee of one dollar is charged for curves.

SCHEDULE 90 (Revised)

A. Condensers

Fixed condensers -	
a. Capacity at one radio frequency	$ 2.00
b. Capacity at additional frequencies, each	1.00
c. Capacity and phase difference (or radio-frequency resistance) at one radio frequency	10.00
d. Capacity and phase difference at each additional radio frequency	4.00
Variable air condensers -	
e. Capacity of variable air condenser over range of radio frequencies corresponding to range of capacity variation, per point (Minimum charge, $5.00. Frequency at one point may be specified).	1.00
f. Capacity and phase difference (or radio-frequency resistance) one point at one radio frequency	10.00
g. Capacity and phase difference at each additional point at same radio frequency	4.00
h. Each additional radio frequency at same point	4.00
i. Standardization curves	1.00

B. Inductors

Fixed inductors -	
a. Effective capacity	$ 14.00
b. Pure inductance and effective capacity	16.00
c. Apparent resistance at one radio frequency	6.00
d. Apparent resistance at each additional radio frequency	4.00
e. Apparent inductance at one radio frequency	2.00
f. Apparent inductance at each additional radio frequency	1.00
g. Fundamental wave frequency (wave length)	2.00
h. Complete test of one coil including, unless otherwise specified, effective capacity, pure inductance, fundamental wave frequency, and radio-frequency resistance at five radio frequencies	36.00
Continuously variable inductors -	
i. Apparent inductance of continuously variable inductor at one radio frequency or over range of radio frequencies corresponding to range of inductance variation, per point (Minimum charge $5.00. Frequency at one point may be specified).	1.00
j. Apparent resistance, one point at one radio frequency	6.00
k. Apparent resistance at each additional point at same radio frequency	4.00
l. Apparent resistance at each additional radio frequency at same point	4.00
m. Standardization curves, each	1.00

C. Resistors

a. Determination of resistance at one point and one radio frequency	6.00
b. Determination of radio-frequency resistance at each additional point	4.00
c. Determination of radio-frequency resistance at each additional frequency	4.00

D. Wavemeters

a. Wave length standardization, resonance being indicated by an alternating-current ammeter or galvanometer or by a lamp, per point (Minimum charge, each coil - $5.00)	1.00
b. Wave length standardization, resonance being indicated by a detector and telephone receiver, per point (Minimum charge, each coil - $7.50)	1.50

c. Wave length standardization, the wavemeter being buzzer excited, per point.....$ 2.00
(Minimum charge, each coil - $10.00)
d. Radio-frequency resistance or decrement, one wave frequency..... 6.00
e. Radio-frequency resistance at each additional wave frequency..... 4.00
f. Standardization curves, each..... 1.00

For wavemeters not classified under a, b, or c, the charge will be determined by the time required for the test.

D'. Characteristics of wavemeter coils
(See above under Inductors)

D''. Characteristics of wavemeter condensers
(See above under Condensers)

E. Decremeters

a. Wave frequency and decrement standardization of a direct-reading decremeter, per point..... 1.20
(Minimum charge for each coil - $6.00)
b. Standardization curves, each..... 1.00

For standardizing decremeters not direct-reading, the fee will be the same as for determining the wave frequency and decrement of a wavemeter.

In general, the Bureau does not adjust decremeter coils to have the proper distributed capacity and overlap between coils. In special cases, this work may be done, if found convenient, and will be charged for at the rate of $1.50 per hour.

F. Electron Tubes

a. Characteristic curve of receiving tube, first curve. 8.00
b. Each additional curve, same tube..... 4.00
c. Amplification constant and internal resistance of receiving tube, first determination..... 4.00
d. Each additional determination, same tube..... 2.00
e. Output of power tube, first determination..... 4.00
f. Each additional determination, same tube..... 2.00
g. Characteristic curve of power tube, first curve..... 8.00
h. Each additional curve, same tube..... 4.00
i. Amplification constant, and internal resistance of power tube, first determination..... 4.00
j. Vibration test of power tube, first tube..... 4.00
k. Each additional tube in same test shipment..... 2.00

l. Detection coefficient of detector tube, under best operating conditions, first determination..... $ 8.00
m. Each additional tube in same shipment..... 6.00
n. Detection coefficient of amplifier tube, first determination..... 6.00
o. Each additional determination on same tube..... 2.00
p. Each additional tube in same shipment..... 2.00

Special fees will be charged for tests of power tubes at very high voltages, and other special measurements.

G. Amplifiers

a. Voltage amplification of audio-frequency amplifier at one frequency..... 8.00
b. Each additional frequency..... 2.00
c. Voltage amplification of radio-frequency amplifier at one frequency..... 10.00
d. Each additional frequency..... 4.00

Note: A combined radio and audio-frequency amplifier is treated as two separate amplifiers and the fee charged according to above schedules.

H. Radio-frequency Ammeters

a. Thermoelement and separate galvanometer, tested at five points at one radio frequency..... 12.00
b. Radio-frequency ammeter, tested at five points at one radio frequency, maximum not exceed one ampere..... 10.00
c. Radio-frequency ammeter, tested at five points at one radio frequency, maximum not to exceed twenty amperes..... 15.00
d. Radio-frequency ammeter, tested at five points at one radio frequency, maximum not to exceed 100 amperes..... 20.00
e. Each additional point above five will be charged at 1/5th of base fee.
f. Each additional instrument will be charged at 3/4th of base fee.
g. Tests at additional radio frequencies will be at 1/5th of base fee per point.
h. Calibration curves..... 1.00

I. Insulating Materials

a. Dielectric constant at one radio frequency, per sample..... 6.00
b. Each additional frequency..... 1.00

c. Phase difference (power loss or radio-frequency resistance)at one radio frequency, per sample.....$ 8.00
d. Each additional frequency..... 5.00
e. Dielectric constant and phase difference (power loss or radio-frequency resistance) at one radio frequency, per sample..... 10.00
f. Each additional frequency..... 5.00
g. Effect of high voltages - Fees for the determination of flashover or breakdown voltage or the effect of high voltage at radio frequencies are computed on a basis of the special modifications of the regular apparatus which are required for test and also the time necessary for its performance.

Note: Samples of insulating materials should conform approximately to the following sizes. When samples of other sizes are submitted an additional fee may be charged depending upon the time involved in preparing the sample.

For determination of phase difference and resistance, laminated materials, 25 cm by 31 cm by 0.3 cm to 1 cm in thickness.

Moulded materials, 25 cm by 31 cm by 0.3 cm to 1 cm in thickness, or discs 25.4 cm in diameter and from 0.3 cm to 1 cm in thickness.

For determination of flashover voltage, samples should be 10 cm by 10 cm by approximately 0.63 cm (1/4 in.)

J. Buzzers, Detectors, Amplifier Transformers, Radio Receiving Sets, Transmitting Sets, Telephone Receivers.

Specific tests are undertaken or a critical study made of the electrical constants of the parts of assembled apparatus. Fees for such tests depend upon the special requirements and work necessary to carry them out, but in general are made equal to the cost to the Bureau.

Department of Commerce,
Washington, D.C.