BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G72.235
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AT&T Co Standard

CABLE TESTING
11-A OSCILLATOR

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1. GENERAL

1.01 The 11-A oscillator is a vacuum tube generator of 1200-cycle testing current. It is a portable unit, entirely self contained, designed primarily for use with capacity unbalance sets.

1.02 The oscillator employs two 231-D vacuum tubes which operate from dry cells. It is assembled in a cabinet with the batteries necessary for its operation, the dimensions being about 10″ x 16″ x 12″ and the weight complete about 44 pounds.

1.03 The output of the 11-A oscillator is about 10 milliamperes into 500 ohms resistance. The oscillator is designed to give about maximum power output into a 3-A or 4-A capacity unbalance set with the set connected to a full cable loading section, since the sensitivity of the set decreases with increase in cable length. The power into the set decreases as the length of the cable is reduced, but the loudness of the sound in the receiver, for a given unbalance, decreases as the cable is

increased. This decrease in loudness is reduced as much as possible by delivering maximum power with the longest cable.

1.04 Approximately 150 hours of service should be obtainable from the "A" batteries and approximately 250 hours of service from the "B" batteries before replacements are necessary. The wave shape of the output of the 11-A oscillator is such that the total harmonic content is not more than 6 per cent., nearly all of which is the third harmonic.

2. DESCRIPTION OF CIRCUIT

2.01 The circuit of the 11-A oscillator is shown on Drawing No. 913-364. It consists essentially of two vacuum tubes connected in push-pull relation to a tuned circuit, the output being taken from the plate circuits of the tubes.

2.02 The tuned circuit consists of a two-winding inductance with a tuning condenser across both windings, each winding being connected to the input of a vacuum tube, the output of which is connected through a feed-back resistance and condenser to the opposite winding of the inductance. Thus, the two tubes are so connected in this circuit as to be always 180 degrees out of phase and oscillations are set up in the tuned circuit, the frequency being determined by the inductance and capacity in the tuned circuit. As is usual with vacuum tube oscillators, the circuit design is such that the constants of the tuned circuit are not appreciably affected by changes resulting from varying potentials or tube replacements.

2.03 The oscillator output is taken from a transformer connected in the plate circuits of the two tubes, the transformer being designed so that when working into an external impedance of at least 300 ohms the performance of the oscillator will be substantially independent of the output impedance. The load impedance should therefore always be at least 300 ohms.

2.04 The oscillator has been designed to meet its requirements as to output, frequency and wave shape with plate battery potentials ranging from 95 to 76 volts, the normal voltage being 90. The filament current is held at a constant amount by means of a rheostat and a meter in the filament circuit.

3. DESCRIPTION OF APPARATUS

3.01 The 11-A oscillator has been assembled as shown on Drawings Nos. 913-363 and 913-436. The face of the panel contains the meter, the filament rheostat and the output binding posts. The switch for opening or closing the filament circuit is mounted on the end of the cabinet, so that it may be operated with the cover closed. The remainder of the apparatus and the batteries are within the cabinet.

3.02 The batteries, consisting of three 1-1/2-volt cells and four 22-1/2-volt batteries, are held in place by cleats fastened with machine screws. A padded compartment is provided for carrying the two regular and two spare vacuum tubes.

4. OPERATION

4.01 The connections to the batteries should be as shown on Drawing No. 913-364.

4.02 Having placed two vacuum tubes of the 231-D type in the sockets, the oscillator may be turned on by means of the switch at the right-hand end of the cabinet. Adjust the filament rheostat until the voltage as indicated by the meter is 3.2. While 3.0 is the normal standard voltage for the 231-D tube, it has been found necessary to use a higher voltage in the oscillator to insure sufficient output with all tubes. Depress the meter button and note the plate battery voltage. This should be between 76 and 95 volts.

4.03 The output of the oscillator is obtained from the binding posts. As described above, the impedance of the load should be 300 ohms or more for the best performance of the oscillator. Under all normal conditions of measurement the 3-A and 4-A capacity unbalance sets meet this requirement.

5. MAINTENANCE

Vacuum Tubes

5.01 Average 231-D vacuum tubes should give good results in the oscillator when the battery voltages are within their limits. If, with good batteries, sufficient output cannot be obtained or if an abnormal harmonic content is noted, defective tubes may be responsible for the trouble.

Batteries

5.02 The dry cells which supply the filament current for this oscillator will usually be satisfactory for service as long as the specified voltage (3.2) can be obtained on the meter. Any standard 6-inch dry cell may be used.

5.03 The total voltage of the four 22-1/2-volt units should not be less than 76 volts and the voltage of each unit should not be less than 19 for satisfactory performance of the oscillator. The space reserved is suitable for "Eveready" type 764. This type of battery should give satisfactory operation for approximately 250 hours of service.

Calibration

5.04 The oscillator is adjusted in the factory to give a frequency of 1200 cycles ± 1 per cent. The stability of the oscillating circuit is such that no frequency adjustment will ordinarily be required unless there are unusual changes in the constants of the oscillating circuit.

5.05 In case it is desired for any reason to readjust the oscillator frequency the connections on the 126-A condenser should be changed until the desired frequency is obtained. The calibration of the oscillator should be made with average battery voltage conditions.

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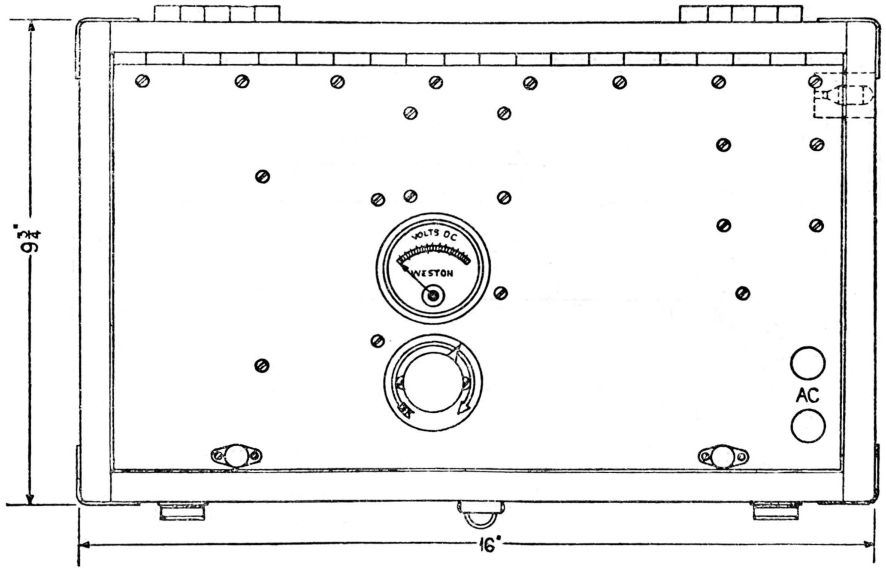
11-A OSCILLATOR
ASSEMBLY-FACE VIEW

913-363
7-30-26
8-29



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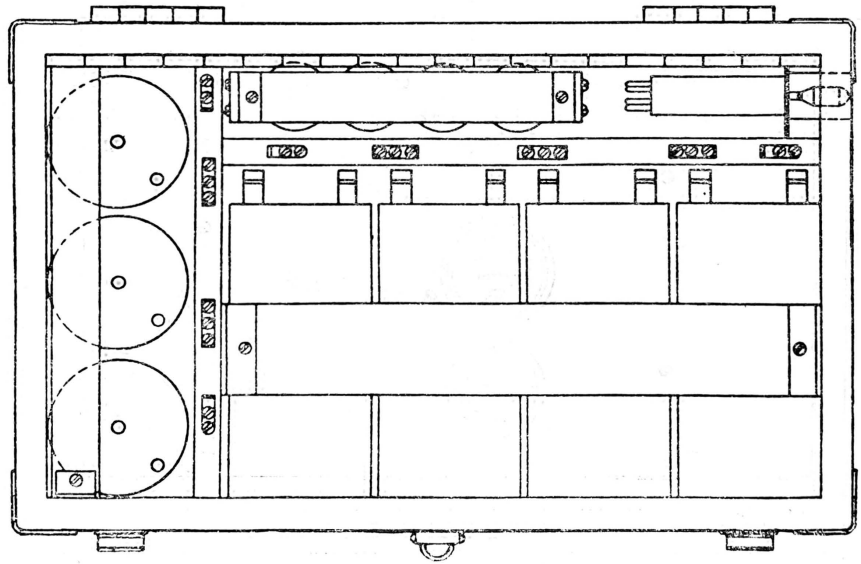
11-A OSCILLATOR
ASSEMBLY
Without Panel

913-436
7-30-26
P.J.



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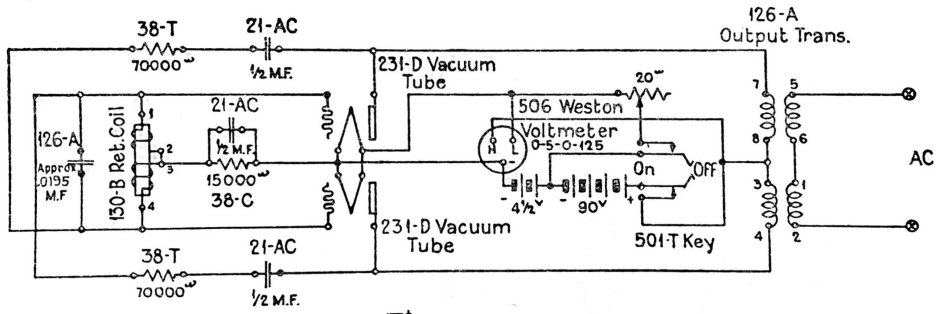
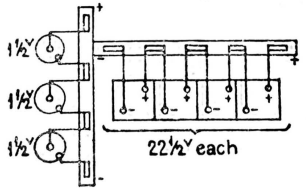
11-A OSCILLATOR
CIRCUIT

913-364
7-30-26
P.39





Battery Connections

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