Catalogue Bulletin

No. 1

MOORHEAD AUDIONS
BASE SOCKETS
GRID LEAKS
GRID CONDENSERS
PLATE CONDENSERS

WIRELESS IMPROVEMENT COMPANY
47 West Street, New York, U.S.A.

MOORHEAD AUDION

Licensed Under the Marconi and Deforest Patents for Experimental and Non-commercial Use.

This tube consists of a very highly exhausted glass bulb about $1\frac{3}{4}$ inches in diameter and about $2\frac{1}{2}$ inches long. A standard four-point brass socket is attached to one end of the bulb and connections from the internal elements of the vacuum tube are permanently fastened to an insulating disc secured in the brass casing. This base has been used exclusively on the vacuum tubes which were purchased by the Army and Navy during the War.

The elements of the vacuum tube are a cylindrical *plate*, a spiral *grid* and a single wavy *filament*. The *plate* is a nickel cylinder about $\frac{3}{8}$" long. The *grid* consists of a nickel spiral about 3/32" in diameter, $\frac{5}{8}$" long, and wound with a pitch of about 1/16". Each turn of the spiral is spot welded to a vertical supporting nickel rod. The *filament* is a strip of metal about 1/1000 of an inch in diameter and one inch long.

The over-all length of the vacuum tube is about four inches, the diameter of the base $1\frac{3}{8}$", and the maximum diameter of the glass shell is $1\frac{3}{4}$". The weight of the tube is 1.8 ounces.

The voltage drop across the filament at 0.65 amperes is about $4\frac{1}{2}$ volts. For operation it is desirable to use a 6-volt storage battery in series with a 10-ohm rheostat and the filament. The normal filament current of this tube is from 0.60 to 0.75 amperes. The grid bias voltage of this tube is 1.3 volts. Neither the filament current nor the plate voltage of this tube is critical. It is sufficient to connect a battery which has a voltage of 20 to 50 volts with the plate without adjustment for variation of the plate voltage.

This tube is a good detector of spark signals and a powerful oscillator and amplifier. It is being purchased by the

Navy Department extensively for use as a generator. The *plate* will easily stand a potential of from 600 to 1,000 volts, and when so used the output is from 5 to 10 watts.

Tubes of this type are very uniform in operation and are free from gas. The slight coloration of the glass shell is the result of a chemical process used to secure an extremely high vacuum. This coloration in no way affects the operation of the tube.

Price $7.00. Code Wieval.

Shipping weight 8 ounces.

MOORHEAD RELAY VALVE

This valve consists of a highly evacuated glass tube about 1″ in diameter and about 3½″ long. It contains a cylindrical aluminum plate about 1″ long, a spiral copper grid about ½″ in diameter and two straight wire filaments. Five leads are brought out of the tube, two from one end and three from the other.

The wire covered with red cotton insulation is the *plate* lead. The wire covered with green cotton insulation is the *grid* lead. The three wires covered with white cotton insulation are *filament* leads.

The filament is V-shaped. The single white lead is connected with the apex of the V and the two other white leads are each connected with one of the free ends of the filament.

In normal operation, connection with the filament is made between the single white lead which comes from one end of the tube and one of the two white leads which come from the other end of the tube.

For operation, a 6-volt storage battery in series with a 10-ohm rheostat should be connected with one of the filaments. The normal operating plate voltage of this tube is from 20 to 50 volts.

The operation of this tube is critical for filament current; careful regulation of the filament current is required for the best results. This tube is also critical for plate voltage. It is desirable to have a means for regulating the voltage in order to secure the best results.

The Moorhead Relay Tube is a good detector of spark signals and a good oscillator and a fairly good amplifier. It cannot be used as a transmitting tube to any great advantage.

Price $7.00. Code Wicrel.

Shipping weight 8 ounces.

TYPE WI-111A VACUUM TUBE SOCKET BASE

Designed to take the Moorhead Type Vacuum Valve.

At the bottom of an aluminum socket are four springs making perfect contact with the four prongs projecting from the base of the valve. Connections with the springs are made to a terminal with a bakelite binding post on each top corner of a bakelite base. Under the base on each corner is a nickel leg, hollowed and threaded to facilitate attach-

ment to a panel or fastening to a table. Handsomely finished, ruggedly constructed.

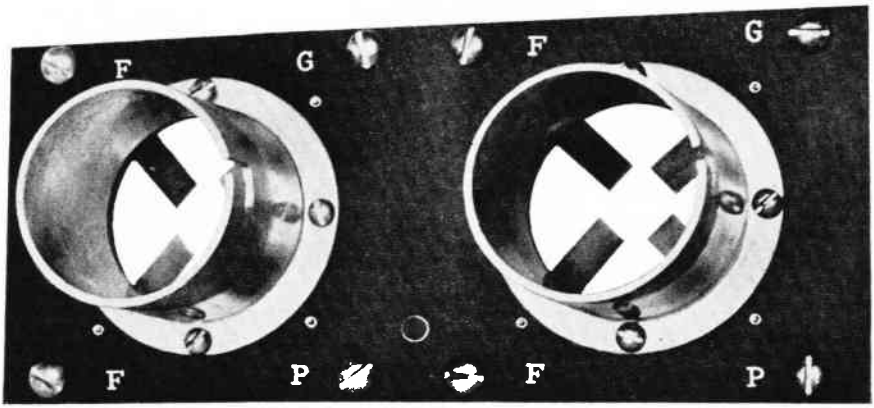
Price $1.75.
Code Wicbas.

Shipping weight 6 ounces.

Dimensions: 2¾″ x 2¾″ square x 2″ height.

TYPE WI-112A DOUBLE VACUUM TUBE SOCKET BASE

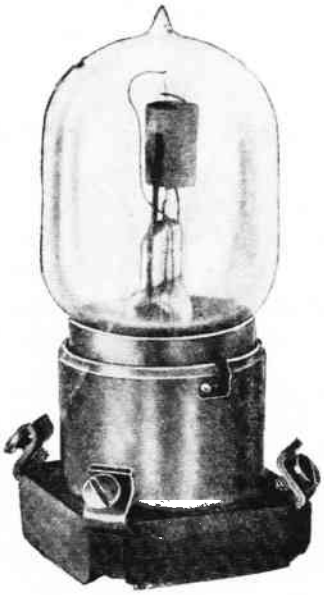
A double base, similar in general design to type WI-111A, constructed for use with amplifiers.



Price $2.50. Code Wicsoc.
Shipping weight 10 ounces.
Dimensions: 5½″ x 2¾″ x 2″.

TYPE WI-113A VACUUM TUBE SOCKET BASE

Designed to take all standard four-prong vacuum tubes.



Price $1.50. Code Wictub.

Shipping weight 6 ounces.

Dimensions: 1¾″ x 1¾″ square x 1⅝″ height.

GRID AND PLATE CONDENSERS

Designed for use with vacuum valve circuits. Ruggedly constructed with mica dielectric.

Capacities: Type WI-120A—Grid .0005. Price $1.75
Type WI-121A—Plate .0002. Price 1.50
Dimensions: 1″ square x ⅜″. 120A Code Wicrid.
121A Code Wicpla.

GRID LEAK

This resistance has been found by careful tests to be specially adapted for Moorhead Vacuum Valves. Enclosed

in a glass tube designed for convenient mounting. Resistance 500,000 ohms. This tube is moisture and heat-proof.

Price $1.00. Code Wiclea.

Dimensions: 2″ x 1/4″.

RECEIVING AND OSCILLATING CIRCUITS.

In Figure 1 is shown a schematic wiring diagram of a very efficient and simple circuit for receiving spark and undamped signals, and also radio phone speech. It has been used to a considerable extent by the Navy and has proved extremely sensitive and reliable in operation.

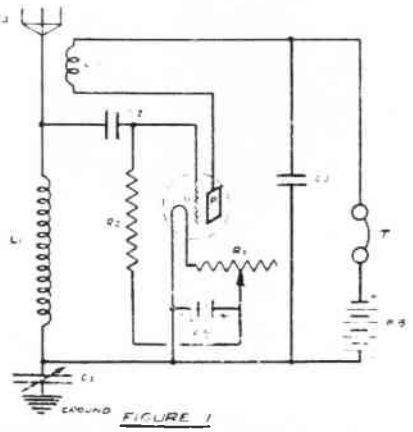


FIGURE 1

The oscillating circuit is composed of the Antenna A, the Antenna Inductance L_1, and the Series Variable Condenser C_1, connected with the ground. This constitutes a single circuit receiver which is gradually becoming used universally because of its simplicity, few parts, minimum number of adjustments and small volume and weight.

As shown in the diagram, the Antenna A is connected with one terminal of a condenser C_2, called the grid condenser, which may be a fixed condenser of about .0005 Mfd. capacity. The other terminal of the condenser is connected with the Grid G. R_2 is a non-inductive resistance of 500,000 ohms and is to be connected between the grid and the positive terminal of the filament battery FB.

In series with the *plate*, there is connected a coil L_2, which is usually referred to as the "Tickler Coil." The coupling between this coil and the Antenna Inductance should be variable and the inductance of the tickler should be the maximum which can be obtained without making the natural period of the "Tickler Coil" come within the wave length range of the receiver. The filament battery is indicated by FB and should preferably be a 6-volt storage battery. The filament rheostat is indicated by R_1, and may be a small porcelain base resistance. T represents the telephone, which should have a resistance of not less than 2,000 ohms. The plate battery is indicated by PB. C_3 is the bridging condenser and may be a small fixed mica dielectric condenser of 0.002 Mfd. capacity.

In the above circuit the coil L_2 serves to couple the plate or output circuit of the vacuum valve to the grid or input circuit. When the filament is lighted and the plate circuit is closed a slight amount of energy is transferred from the plate to the grid circuit. This transfer of energy causes a feeble, natural oscillation in the secondary circuit which impresses an alternating voltage on the grid of the vacuum valve. Due to the inherent amplifying characteristics of the tube this feeble oscillation is amplified in the plate circuit, which, because of its inductive relation to the secondary circuit, reinforces the oscillating energy in this circuit. This action is repeated, with the plate current constantly increasing, until it is limited only by the secondary and tube characteristics. It is possible to receive spark signals by loosening the inductive coupling to such a point that no oscillations are set up in the secondary coil. It is possible to increase the intensity of spark signals about 10 to 100 times by increasing the tickler coupling to such a value that the tube is just at the point of oscillation. In such a condition the tube is very sensitive. This phenomenon of amplification of spark signals is known as "Regeneration." To receive arc signals, it is merely necessary to increase the tickler coupling to such a point that sustained oscillations are set up in the secondary circuit. When this is the case and when the secondary is slightly detuned, a musical note, of a pitch which may be varied at will by detuning, will be heard in the telephones.

AMPLIFYING CIRCUITS

Figure 2 shows a standard amplifying circuit for use with Moorhead Audions. T_1 and T_2 are specially designed amplifying transformers for use with the audions V_2 and V_3. The grids G_2 and G_3 of the audions should be kept at a negative potential in order to cut down the grid current, and thereby minimize the losses in the circuit. This may be accomplished by connecting a single flashlight dry cell B_2 and B_3 of approximately $1\frac{1}{2}$ volts in series with the grids G_2 and G_3 respectively. The grid is maintained at a negative potential of about $1\frac{1}{2}$ volts. The same filament and plate batteries that are used for the detecting tube may be utilized for the amplifying tubes. A dry battery of from 20 to 40 volts should be used in the plate circuit and a 6-volt storage battery to supply the filament current. R_2, R_3 and R_4 represent the filament rheostats; 110 volts D. C. should not be used to supply the plate circuits of any of the vacuum valves because commutator ripples and line surges will be amplified and interfere with the reception of the incoming signals.

The circuit shown in Figure 2 has been used very extensively by the Navy and Commercial interests and has proven most satisfactory. A signal amplification of approximately 400 to 900 times is easily obtained in the second stage when the amplifier is functioning properly.

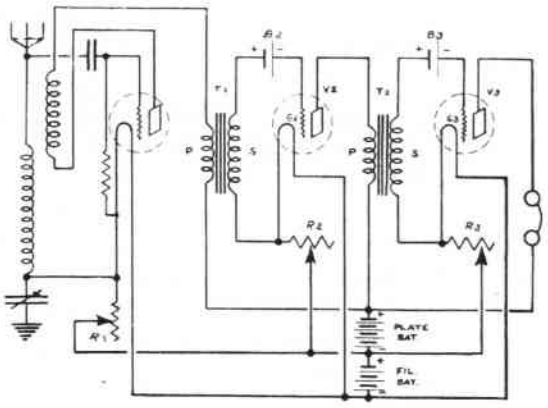


FIGURE 2