Westinghouse

Type A Grid Glow Demonstration Set

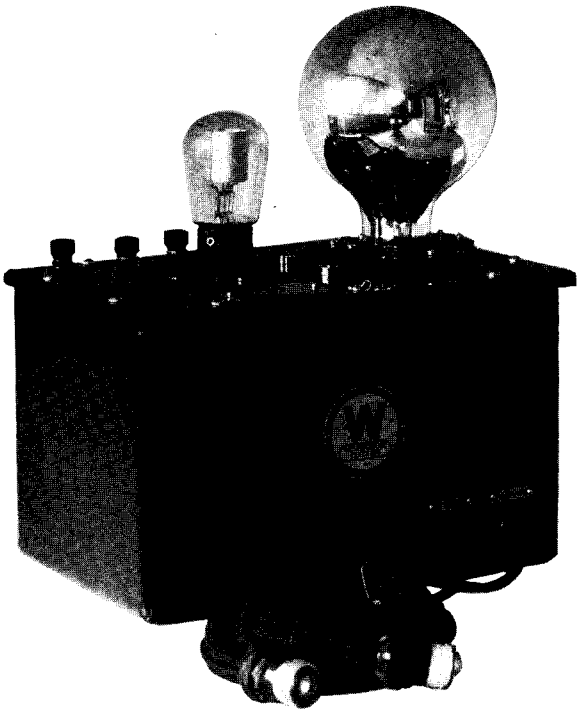

Fig. 1—The Grid Glow Demonstration Set

Operation

The operation of the Demonstration Set centers around the operation of the sensitive Grid Glow Tube. Analyzed briefly, the Grid Glow Tube consists of three electrodes—a cylindrical plate cathode and a small wire anode surrounded by a small single wire grid which constitutes the third electrode. Differing from the ordinary vacuum tube, this Glow Tube has no heated filament, and therefore does not consume energy when not operated. If a voltage is applied between the positive and negative electrodes, particles of electricity called "free electrons" attach themselves to the grid. When this grid is thoroughly insulated these minute charges of electricity cannot escape, hence they form a blocking charge which prevents the tube from passing current.

When the spectator's hand nears the silvered globe connected to the grid, a means is thereby provided for removing the small charges of electricity. The result is that the tube immediately passes a current large enough to operate the relay in the set.

The voltage applied to the glow tube is obtained by the use of a transformer, located inside the box, whose primary is to be connected to the 110 volt, 25 or 60 cycle a-c. supply circuit.

The variable condenser adjustment of sensitivity, explained further under heading of "Adjustments", provides a means of governing the amount of leakage capacity (capacity between spectator's hand and the silvered globe) required to cause the tube to glow.

Assembly

After unpacking the Demonstration Set and the silvered globe, proceed to mount the silvered globe in position. The silvered globe is shipped mounted on a circular micarta ring which serves to mount the globe on the panel.

Place the silvered globe, with its attached mounting ring in position on the face of the panel. The brass screw which projects from the under surface of the micarta ring is intended to pass through the clearance hole drilled in the face of the main panel and make contact with a spring on the under side. The head of this brass screw is in contact with a short section of metal foil which in turn makes contact with a strip of metal foil which is glued to the inner surface of the globe. Gently force the micarta ring down flush on the panel and insert the two screws which are to hold it in position.

Insert the grid glow tube in the socket on the face of the panel. Note that the small projecting pin on the side of the base of the tube must point in the same direction as the small arrow engraved on the socket in order to insert the tube.

Installation

The Demonstration Set can be used in two general ways (A) Operation by means of the silvered globe, (B) Operation by means of a conducting body, as a metal foil plate, etc., connected to the antenna terminal.

A. To install the set for use with Silvered Globe, proceed as follows:

1. Place connecting link to "Globe" position as shown in Figs. 3 and 4.

2. Connect up the display devices, which are to be operated, to the relay

contact extension cord as shown in Fig. 2.

3. Connect a source of 110 volts (25 to 60 cycle) a-c. to the extension cord marked as such.

4. Make the adjustments as outlined in paragraph headed "Adjustments."

B. To install the set for use with Antenna Terminal, proceed as follows:

1. Place connecting link in "ANT" position as shown in Figs. 3 and 4.

2. By using the "ANT" terminal the set can be controlled in many ways, the number of which is limited largely by the ingenuity of the user. A few methods are as follows:

(a) As indicated in Fig. 2, a metal disc pasted to a window can be used to control the set. The disc may be of metal foil and need not be larger than the hand. The window should be clean and dry. A **fine** wire lead (#36 B & S is large enough) should be run from the metal plate to the antenna terminal marked "ANT," running this wire as straight and direct as possible. This wire must not be run on the floor, under carpets or in contact with or even in the near proximity of any grounded objects. Neither the disc nor the wire should be closer than two feet in any direction from the structural part of the building or surrounding objects which may be slightly conducting. If in cold weather the window tends to frost over, a current of air from an electric fan should be directed at the plate to keep the window as clean as possible..

(b) The distance of a person or a person's hand from the disc, required to operate the set, can be increased from an inch or two to four or five inches by making the disc or plate considerably larger. The plate should not be larger than about 2 feet square because it is not possible to obtain operating distances larger than four or five inches with plates larger than this. A large mirror may be used instead of the large plate. In this case the same limitations apply. The antenna connection to the silvered portion of the mirror can be made by pasting a piece of metal foil to it. Actual metalic contact is not necessary if the foil is a few square inches in area and the adhesive material thin.

(c) Metal discs may be concealed in table tops, counter tops or chair seats so that operation may be obtained in a manner similar to that of placing a disc on a window pane, provided the proper precautions are taken about keeping the disc and lead about 2 feet or more away from objects that would act as ground. Table tops, counter tops or other objects of clean glass, clean dry wood on which the finish is non conducting, or other equally good insulating materials should give no trouble. If for instance a moist cloth or other slightly conducting material of comparatively large area is placed over the disc, it probably would be impossible to adjust the set for satisfactory operation.

(d) If a piece of bare wire, connected to ground, is run parallel and close to a similar wire connected to the "ANT" terminal the set can be operated by a match flame enveloping the two wires.

(e) A small unbroken jet of water, a pencil line, or any other slightly conducting medium used to connect the "ANT" connection to ground is sufficient to operate the set. Such slightly conducting media can have a resistance as high as 100 megohms.

3. Proceed as outlined in 2, 3 and 4 under A.

Capacity of the Relay Contacts:

The capacity of the contacts on the relays, which is mounted inside the box, is 125 watts—that is, 1 amp. at 125 volts

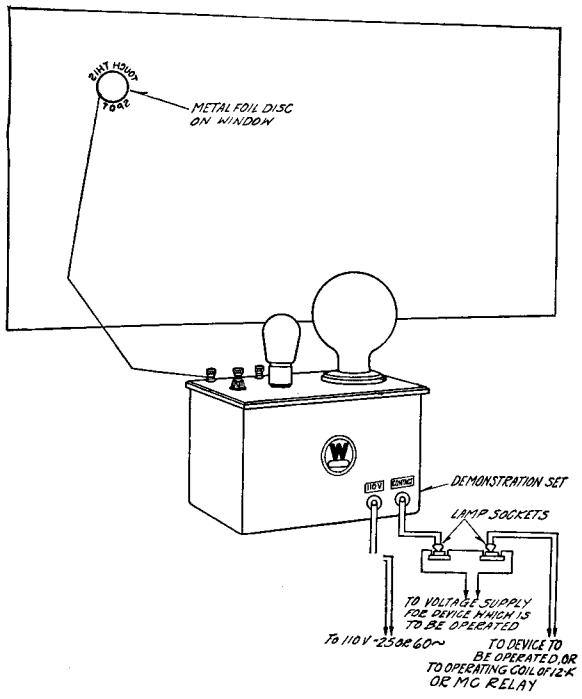

Fig. 2—Schematic Connection Diagram

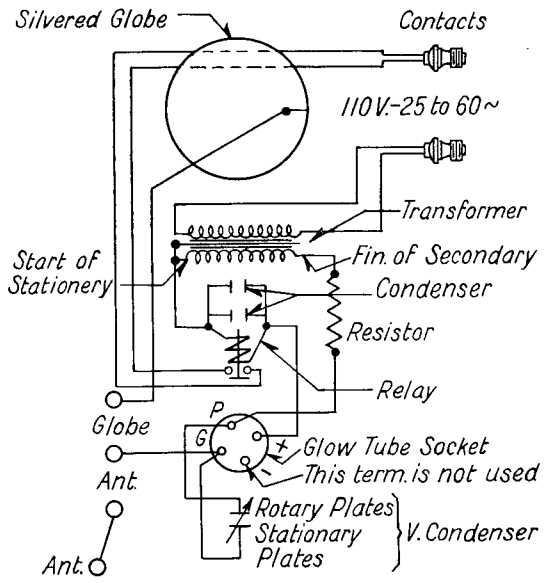

Fig. 3—Wiring Diagram for S# 557544

The maximum voltage permissible is 250 volts (at ½ amp.) and the maximum current permissible in 8 amp. at 15 volts.

If it is desired to control a device taking more power, an auxiliary relay should be used whose coil circuit is energized through the contacts of the relay in the set. In case it is desired to control several independent circuits a multicontact auxiliary relay should be used.

Adjustments

It is an extremely easy matter to make the necessary adjustments incident to placing the Demonstration Set in operation.

A. After connecting the unit to a source of 110 V. (25 to 60 Cycle) alternating-current and connecting up the display circuits that are to be controlled, it may be found upon turning the knob of the variable condenser that there are positions for which the glow tube will glow (without purposely approaching the globe, or the metal plate connected to antenna lead, with the hand) and positions for which it will not glow. The adjustment for maximum sensitivity marked "MAX" is the adjustment for which the tube will exhibit the greatest tendency to glow normally. The adjustment for minimum sensitivity marked "MIN" is the adjustment for which the tube will exhibit the least tendency to glow normally.

B. In general, it should be kept in mind that either the disc, the plate, or the mirror, and the connecting antenna wire act as a capacity to remove the charge from the grid of the grid glow tube so as to allow it to operate. Any conducting objects near these parts increase this capacity and hence increases the tendency to operate. A certain amount of this capacity can be compensated for, in adjusting the set. If the adjustments cannot be made, and it is known that the set is otherwise allright, then it is necessary to either reduce the length of the antenna lead, the size of the plate, clean the surface on which the plate rests, increase the distance of these parts from conducting objects or make any similar change which circumstances might indicate was causing more capacity than necessary.

The following is the procedure to be observed in arriving at the Proper Adjustments:

1. With the hand about 1 inch from the globe or the plate, as the case may be, or the body about 4 or 5 inches from a large plate or mirror, turn the condenser knob slowly toward the maximum sensitivity position until the grid glow tube just starts to glow steady. Do not turn the knob any farther because variations in line voltage of 5% or less might cause the set to operate. If the knob is turned farther the set is more sensitive and if it is not turned far enough it is less sensitive.

2. For operation by means of resistances such as a match flame, a pencil line, or a water jet, the set should be adjusted without these resistances by turning the knob toward the maximum sensitivity position until the tube glows steady and then turning ¼ of a division father in the reverse direction than the point where both steady glow and flicker disappear.

Tests

It is not expected that the Demonstration Sets will give trouble in service as they are subjected to a rigid inspection and test at the factory.

If, however, a Set does not operate properly when installed or after a period of service, the cause can be found as follows:

(a) **If the Set does not function properly,** it may not be installed properly. The paragraphs headed "Assembly" "Installation" and "Adjustments" should again be consulted and points therein noted carefully.

(b) **If the variable condenser, does not have sufficient range,** as will be noticed by inability to cause glow tube to stop even though condenser is turned to minimum sensitivity position, there are several possible faults.

1. There may be too much capacity in the circuit connected to the "ANT" terminal. Note again the points considered in paragraph B under Adjustments.

2. The tube may have failed. If such is the case the nature of the glow will be different. Instead of there being a bright orange colored spot on either or both sides of the grid wire there will be no orange spot, but a much brighter general glow filling the space within the cylindrical cathode. This glow will have a very slightly bluish tinge in the central portion expecially around the grid wire. This is one kind of tube failure. In the other kind of tube failure no strong steady glow is obtained at all. A faint glow around the anode does not indicate an operative condi-

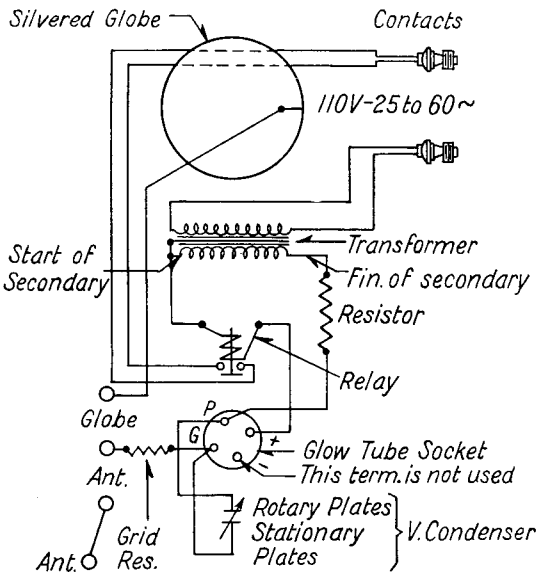

Fig. 4—Wiring Diagram for S# 674447

tion of the tube and is caused by a current too small to operate a relay.

(c) **If the glow tube cannot be made to glow.**

1. The variable condenser may be short circuited which can be determined by inspection of the condenser. To make the inspection remove the ten wood screws which hold panel in position and carefully lift the unit out of the box.

2. There may be an open circuit in which case the wiring should be carefully checked with the diagram in Figs. 3 or 4.

3. The glow tube may be inoperative in which case a new one should be tried and new ajdustments made.

(d) **If the glow tube glows properly but set fails to operate the display properly.**

1. The relay may be inoperative and fail to close its contacts. The relay should be inspected and action of the contacts noted.

2. The fixed condensers which are shunted across the relay coil in sets Style #557544 may be disconnected in which case the relay would flutter and hum. The connections should be checked.

(e) **If the set does not function when the silvered globe is used as intended, but glow tube glows only when the brass connecting link is touched.**

1. The metal foil connection between the head of the brass screw, which projects from the underside of the micarta mounting ring, and the section of metal foil which is glued to the inner surface of the globe, may be at fault. This may be caused by the globe accidentally having been turned to one side or the other in its mounting. Check this point and see that the connections are complete.

Storage When Not In Use

During periods in which the Demonstration Set is not in use it should be carefully packed away in a dry place free from dust, dirt, and moisture. It is well to wrap the entire set in paper and then place it in a well covered carton. If care is taken in storing the Demonstration Set it will be found to be in good operating condition when taken out for service again.

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