

VOLTAGE REGULATOR

GENERAL ELECTRIC TYPE TA, FORM B-2

REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the General Electric Company's Type TA form B-2, voltage regulators for small alternating current generators.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 Reference shall be made to Section 020-010-711, covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

1.04 Part 1 "General" and Part 2, "Requirements" form part of the Western Electric Co. Inc. Installation Department Handbook.

1.05 For the purpose of this section measurements may be made by eye unless otherwise specified.

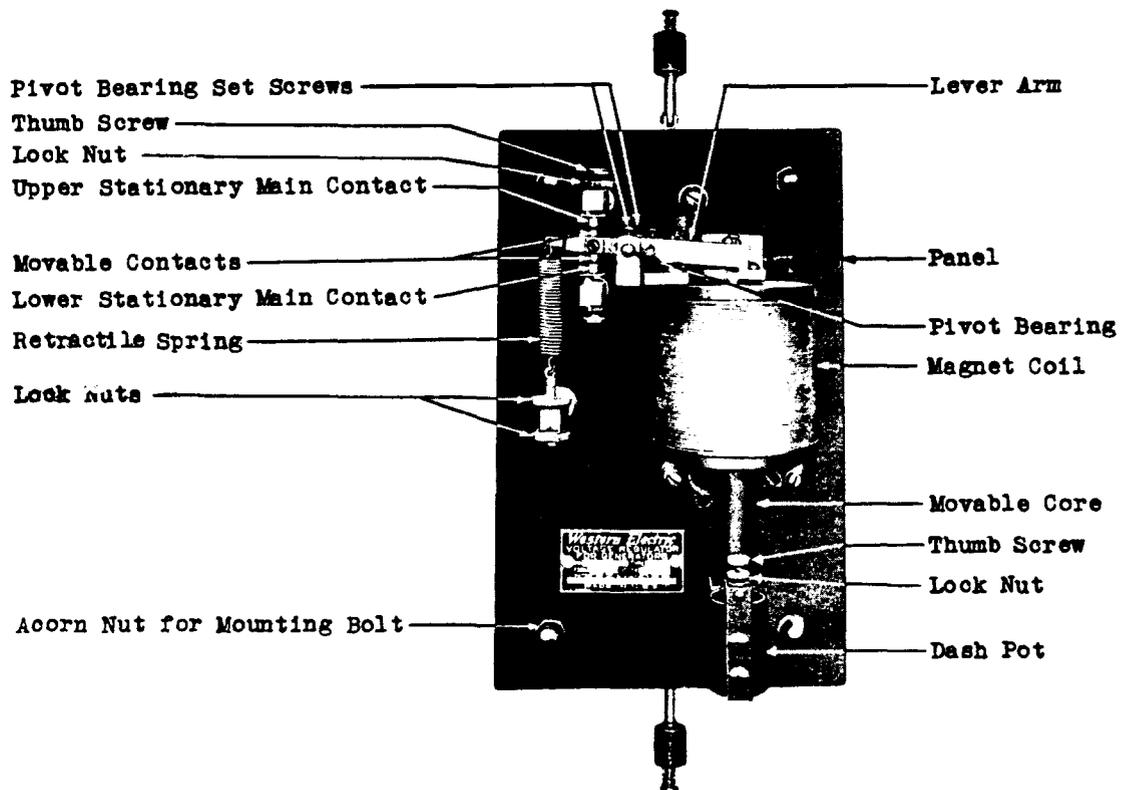


Fig. 1 - Regulator Assembly (Front View Cover Removed)

2. REQUIREMENTS

2.01 Voltage Regulation: With a speed within the limits specified on the nameplate of the machine to be regulated, and under all operating conditions of machine temperature and load (no load to full load) the voltage regulator shall maintain the a-c. voltage within the limits as specified in the Section covering the Apparatus Requirements and Adjusting Procedures for the particular machine. If this requirement is met requirement 2.02 through requirement 2.06 inclusive need not be checked.

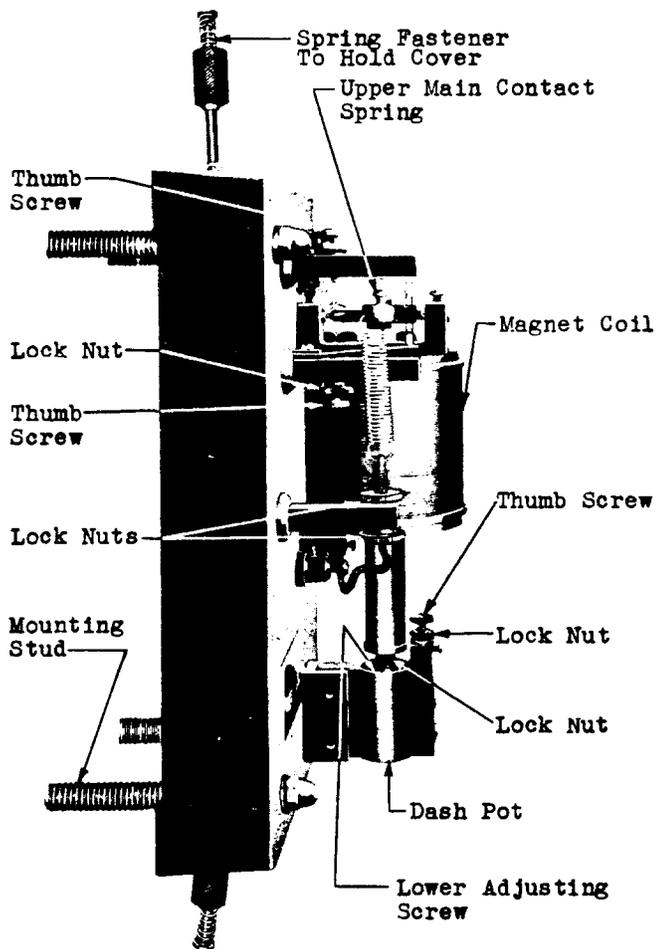


Fig. 2 - Regulator Assembly (Side View)

2.02 Freedom of Operation

(a) The pivot bearings supporting the lever arm shall not bind or have appreciable end play.

(b) The movable core shall be concentrically located in its magnet coil and shall move freely without binding.

(c) The large piston of the dashpot shall move freely without binding.

2.03 Dashpot

(a) The dashpot shall be free from dirt and other foreign material.

Oil Cushioning

(b) The dashpot shall be filled approximately to, but not closer than 1/16 inch of the top of the dashpot with dashpot oil.

(c) The oil should be changed as required to insure proper operation. Under normal conditions a life of 3 or 4 years may be expected.

Air Cushioning

(d) The inside walls of the cylinder shall be lubricated with dashpot oil at intervals as required to insure free operation of the piston.

(e) *The small piston*, shall be at the bottom of its cylinder.

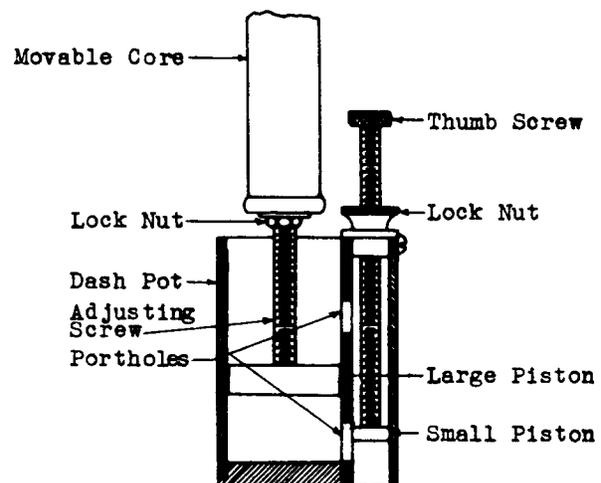


Fig. 3 - Dashpot

2.04. Condition of Contact Surfaces: The main contacts shall be inspected frequently and kept clean and free from pits or burrs.

2.05 Main Contacts

(a) The main contacts shall not have their centers out of alignment more than one quarter of the diameter of the contact surfaces.

(b) The upper and lower main contact springs shall be free of sharp bends, due to injury or improper adjustment. A gradual bow is permissible.

(c) With the lever arm in an approximately horizontal position, the stationary contacts shall barely touch their associated movable contacts.

2.06 Magnet Coil: With the lever arm in a horizontal position, the movable core shall be fastened to its adjusting screw so that the core extends approximately one-half inch below the top of the spool flange of the magnet coil. Use scale.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges and Materials

Tools

Contact Burnisher — No. 265-B Tool
Duck-bill Pliers, KS-6015
Screwdriver, 3-1/2 inch (Cabinet Style) per A.T.&T. Company's Std. Drawing 46-X-40
Wrench, Open End, Special, No. 63 Tool

Gauges

Scale, 6 inch

Materials

Petroleum Spirits
Cloth, KS-2423 or equivalent
Dashpot Oil

3.002 Before making any adjustments upon the voltage regulator see that the rheostats connected in circuit with the regulator and its associated machine are set on their marked positions. Refer to the Educational Information on the "P" Type Ringing Machines for a typical

example showing the application of this regulator. Check to see that the associated machine meets the requirements outlined in the section covering the Apparatus Requirements and Adjusting Procedures for the particular equipment. Insert a piece of paper between the upper stationary main contact and the movable contact of the regulator and see that the voltage of the associated machine is less than when the regulator is in normal operation.

3.01 Voltage Regulation (Req't 2.01)

(1) The exact voltage desired may be obtained by increasing or decreasing the tension of the retractile spring, by adjustment of the upper and lower main contact springs or by a combination of these two adjustments. Increasing the tension of the retractile spring lowers the regulated voltage while decreasing the tension increases the voltage. Adjustment of the retractile spring is made by shifting the position of the lock nuts above and below the support for the stud attached to the spring. Lowering the upper stationary main contact (turning its adjusting screw clockwise) tends to increase the voltage while raising this contact tends to lower the voltage of the associated machine.

Oil Cushioning

(2) A change in the position of the upper main contact will usually require a readjustment of the retractile spring. The retractile spring should operate with as light a tension as practicable. The tension of the lower main contact spring should not be increased in an endeavor to counteract the action of the retractile spring.

(3) If the desired regulated a-c. voltage cannot be obtained the mechanical requirements as outlined in requirements 2.02 through 2.06 should be checked. If after the above checks, the regulator fails to operate satisfactorily, replace the regulator.

Air Cushioning

(4) Where quick enough operation is difficult to obtain with oil cushioning, empty the oil out of the dashpot, wipe nearly dry with an oily rag, turn the small piston clockwise as far as it will go (piston at bottom of its

cylinder). The desired voltage should be obtained with rapid operation of the lever arm without hunting, and with a minimum of sparking at the contacts. Faster operation can be obtained by raising the lower main contact and increasing the tension on the retractile spring. The lower contact should not be raised to such a point that the upper main stationary contact and moving contact do not open or have excessive arcing. Proper adjustment may be obtained by trial. The retractile spring should operate with as light a tension as practicable.

3.02 *Freedom of Operation* (Reqt 2.02)

(1) If binding is present use a 3-1/2 inch cabinet screwdriver as required to loosen the set screws for the pivot bearings sufficiently to clean with petroleum spirits and wipe with a dry cloth (do not oil). Adjust with the fingers, pressing lightly against the ends of the pivot bearings until there is no binding or excessive end play. Tighten the set screws and recheck for freedom of movement.

(2) Adjust the position of the lever arm by loosening the set screws for the pivot bearings, shifting the associated pivot bearings until the movable core is concentrically located within its magnet coil in a plane perpendicular to the panel. Slight adjustment, if necessary, may be made in a plane parallel to the panel by loosening the mounting screws for the pivot bearing assembly and shifting the assembly with lever arm slightly. Tighten all mounting screws and set screws firmly.

(3) The movable core should be adjusted so that the lever arm, to which it is attached by means of the adjusting screw, operates in approximately a horizontal position under normal conditions. Hold the lever arm in a horizontal position and adjust the movable core so that its top is approximately one-half inch below the flange of the solenoid spool. To do this loosen the lock nuts on the adjusting screw above and below the movable core with a No. 63 tool and turn the movable core to the right to raise or to the left to lower its position. Tighten both lock nuts after an adjustment. Make certain that the main lever arm operates freely in the pivot bearings and that the position of the movable core is such that it operates in the center of the solenoid.

(4) The lower stationary main contact of the regulator is not connected into the circuit, but when the regulator is operating it is advisable to adjust this contact until it just touches the moving contact. This helps the dashpot to steady the action of the regulator, and tends to prevent it from hunting.

(5) Examine the dashpot for dirty or gummed oil and replace the oil or clean and lubricate as outlined in procedure 3.03.

3.03 *Dashpot* (Reqt 2.03)

Oil Cushioning

(1) If the dashpot oil is gummed or dirty remove the dashpot from the panel, using a 3-1/2 inch cabinet screwdriver. Referring to Fig. 3 note the position of the small piston by measuring the distance between the thumb screw and lock nut. Then loosen the lock nut and screw the small piston to its extreme lower position by turning clockwise. Empty out the oil including that in the cylinder of the small piston, by holding the dashpot horizontal and rocking slowly up and down from the horizontal, the small cylinder being on top. Clean the inside of the dashpot with petroleum spirits and make sure that it is free from dirt, grit or other foreign matter. Replace in the reverse order and refill to the proper level with dashpot oil, moving the large piston up and down to free the oil from air bubbles which may cause a fluctuating voltage. Reset the small piston to its original position and tighten the lock nut.

(2) If the regulator still does not operate satisfactorily see that the large piston of the dashpot is not sluggish in operation. Should the large piston not move readily, loosen the lock nut on the small piston and lower the small piston by turning the thumb screw clockwise. This results in opening a larger area of the lower porthole, permitting oil to pass in and out above the small piston thus accelerating the movement of the large piston. The action of the dashpot should not be too free or too sluggish, but so adjusted that it does not permit the voltage to hunt under normal conditions and will take care of sudden changes of load without hesitation. This adjustment should be made under various

conditions of load and is a matter of test. If the large piston moves too readily the thumb screw should be turned counterclockwise thus raising the small piston and partly closing the porthole. Adjust the small piston until the regulated a-c. voltage remains stable. Care should be taken in adjusting the dashpot that the thumb screw is moved but a fraction of a turn, at a time, after which the regulator should again be checked. Tighten the lock nut.

Air Cushioning

(3) If the side walls of the cylinder become gummed or dirty, remove the dashpot and clean the parts with a cloth moistened with KS-7860 petroleum spirits. Wipe with a clean dry cloth and then with a cloth moistened with dashpot oil. Excessive lubrication should be avoided.

(4) See that the small piston is at the bottom of its cylinder (turn clockwise as far as it will go).

3.04 *Condition of Contact Surfaces* (Reqt 2.04)

(1) Remove pits or burrs with a contact bur-nisher. This may be done by drawing it between the contacts, at the same time exerting a light pressure on the contacts.

3.05 *Main Contacts* (Reqt 2.05)

(1) To adjust the upper and lower stationary contacts loosen the lock nuts and turn the thumb screws of the stationary contacts in a clockwise or counterclockwise direction as necessary. Tighten the lock nuts. If the main contact springs are bent out of position reshape with a pair of duck-bill pliers.

3.06 *Magnet Coil* (Reqt 2.06)

(1) If the movable core is not concentrically located in its magnet coil proceed as outlined in procedure 3.02.

(2) With the core adjusted as described in (1), with no load on the generator and the regulator in operation final adjustment of the generator voltage may be obtained by adjustment of the retractile spring as outlined in procedure 3.01.