

VOLTAGE REGULATOR

GENERAL ELECTRIC TYPE TA-125, FORM L

REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

- 1.01 This section covers the General Electric Company's type TA-125 form L voltage regulators per KS-5094.
- 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 Re-

quirements 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.

2. REQUIREMENTS

- 2.01 Voltage Regulation With an alternator speed variation of not more than + 5% from the rated nameplate speed, the voltage regulator shall maintain the alternator voltage within $\pm 5\%$ of the voltage specified for the installation under all conditions of machine temperature and no load to full load. If this requirement is met Req. 2.02 through Req. 2.08 inclusive need not be checked.

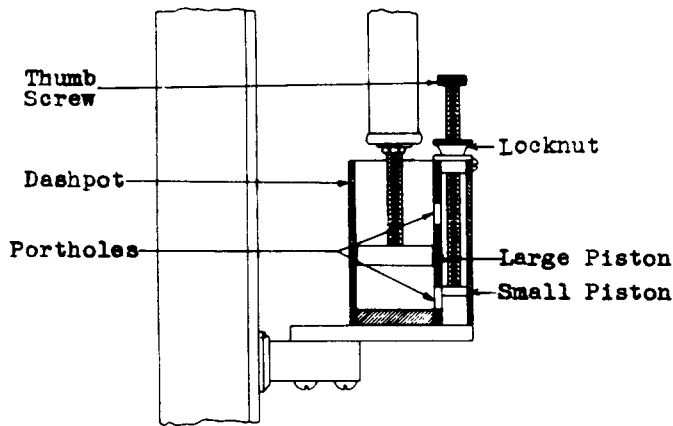


FIG. 1 DASHPOT

- 2.02 Freedom of Operation
 - (a) The pivot bearings supporting the lever arms for the d-c. and a-c. magnets and supporting the armature for the relay shall not bind or have appreciable end play.
 - (b) The movable cores for the d-c. and a-c. magnets shall be centrally located in their magnet coils and shall move freely without binding.
 - (c) The large piston of the dashpot shall move freely without binding.
 - (d) The stops used for supporting the d-c. and a-c. magnet lever arms shall be so placed that they will not interfere with the operation of the lever arms.

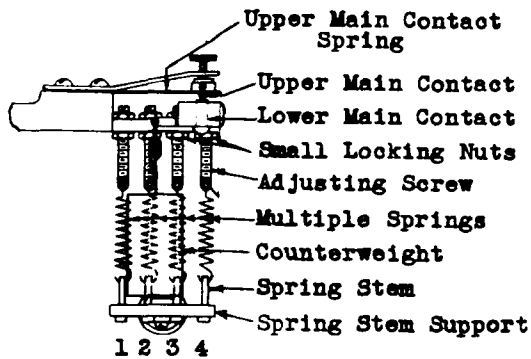


FIG. 2 MAIN CONTACTS

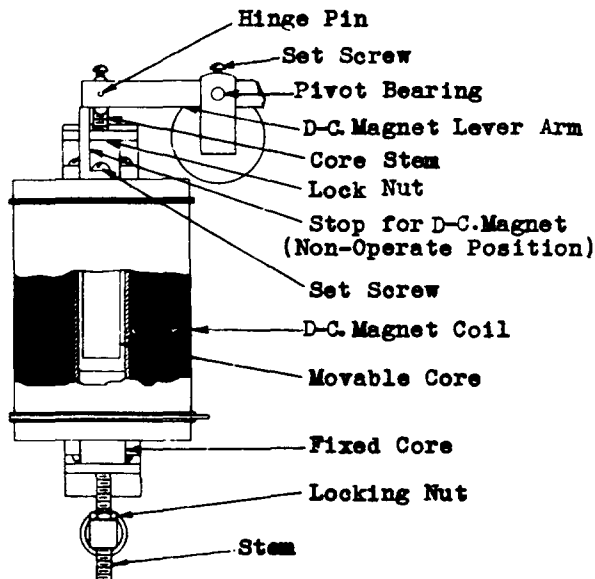


FIG. 3 D-C. MAGNET

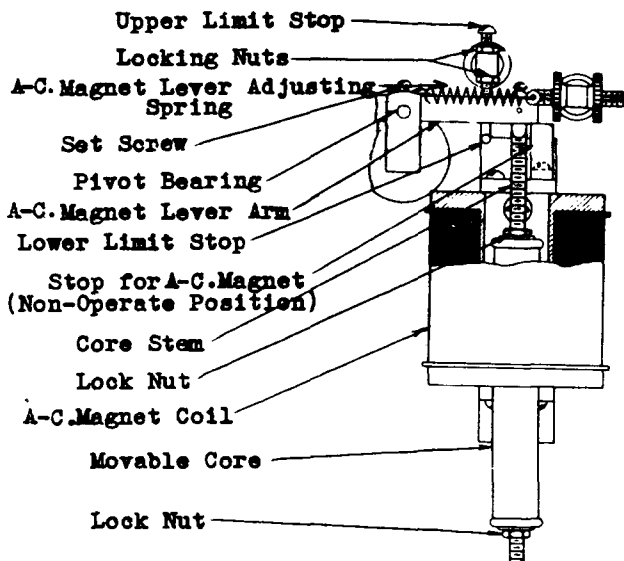


FIG. 4 A-C. MAGNET

2.03 Condition of Oil in Dashpot

- (a) The dashpot shall be filled approximately to, but not closer than 1/8 inch of the top of the dashpot with light dynamo oil.
- (b) The dashpot shall be free from dirt, grit or other foreign material.
- (c) The oil shall be changed at least once every twelve months.

2.04 Condition of Contact Surfaces The main and relay contacts shall be clean and free from pits or burrs.

Note: It is not essential that the contacts shall be smooth or polished.

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 main contact spring shall be free of sharp bends, due to injury or improper adjustment. A gradual bow is permissible.
- (c) With the lever arms against their respective stops, the main contacts should just touch.

2.06 D-C. Magnet

- (a) The movable core shall be fastened to the core stem so that the distance from the center of the hinge pin to the lock nut shall be approximately 1/2 inch. Use scale.
- (b) The multiple springs shall be adjusted as follows:

Spring No. 4 to pick up at 45 volts, to trip at 115 volts.
 Spring No. 1 to pick up at 65 volts.
 Spring No. 2 to pick up at 90 volts.
 Spring No. 3 to pick up at 120 volts.
 Tripping Point (all four springs operating) 170 to 180 volts. Use voltmeter.

2.07 A-C. Magnet

- (a) With the lever arm in a horizontal position, the movable core shall be fastened to its core stem so that the core extends approximately 1 7/8 inches below the bottom of the a-c. magnet coil. Use scale.
- (b) With an exciter voltage of 40 volts, and the movable core raised by hand until the main contacts just touch, the upper limit stop shall just touch the a-c. magnet lever arm.

3. ADJUSTING PROCEDURESTOOLS

Contact Burnisher - #265-B Tool
 Duck-bill Pliers
 Screw-driver, Jeweler's 7/8 inch
 Screw-driver, 3 1/2 inch Cabinet Style
 per A.T.&T. Company's Std. Drawing
 46-X-40
 Screw-driver, 5 inch per A.T.&T.Co's Std.
 Drawing 46-X-34
 Wrench, Open End, Special, #63 Tool
 Wrench, Open End, Flat, 3/4 inch

GAUGES

Feeler Gauge, Starrett #66 or Equivalent
 Scale, 6 inch

MATERIALS

Petroleum Spirits
 Cheesecloth
 Dashpot Oil or Light Dynamo Oil

TEST APPARATUS

Test Set, Buzzer or Equivalent
 Voltmeter, D-C. Weston Model 280,
 Scale 3-60-150 Volts

- 3.001 Before making any adjustments upon the voltage regulator open the disconnect switches and check the exciter and alternator voltage to see that the alternator voltage is not less than 200 volts with an exciter voltage of 125 volts. Examine the exciter brushes, alternator slip rings, commutator brushes and the exciter and alternator field rheostats and if necessary clean or adjust according to the instructions found in the section covering the Requirements and Adjusting Procedures. After any adjustments reset the exciter and alternator field rheostats to their respective operating positions and close the disconnect switches.

- 3.002 Unless noted to the contrary, adjustments to the regulator shall be made with the disconnect switches open, and the a-c. coil deenergized and in the sequence given in this section.

3.01 VOLTAGE REGULATION (Rq.2.01)

M-1 If there is a slight error in the regulated a-c. voltage, the counterweight may be readjusted so that the proper value of a-c. voltage is obtained. Placing shot in the counterweight will lower the regulated a-c. voltage and removing shot from the counterweight will raise the regulated a-c. voltage.

M-2 For making fine adjustments the a-c. magnet lever adjusting spring should be readjusted. Tightening this spring raises the regulated a-c. voltage and loosening this spring lowers the regulated a-c. voltage.

M-3 If there is more than a slight error in the regulated a-c. voltage, the mechanical requirements as outlined in paragraph 2.02 through 2.08 should be checked.

3.02 FREEDOM OF OPERATION (Rq.2.02)

M-1 If binding is present loosen the set screws for the pivot bearings. 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.

M-2 Adjust the position of the d-c. and a-c. magnet lever arms by shifting the associated pivot bearings until the movable cores are centrally located within their magnet coils in a plane perpendicular to the panel. Loosen the mounting screws for the d-c. and a-c. magnet coils and adjust the position of the coils until the cores are centrally located within the coils in a plane parallel to the panel. Tighten the mounting screws.

M-3 Examine the dashpot for dirty or gummed oil and replace the oil if necessary as outlined in paragraph 3.03.

M-4 Loosen the set screws and swing the stops until the d-c. and a-c. magnet lever arms will operate without striking the stops. Tighten the set screws.

3.03 CONDITION OF OIL IN DASHPOT (Rq.2.03)

M-1 If the dashpot oil is gummed or dirty remove the dashpot from the panel taking care to spill no oil in the regulator case. 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 or light dynamo oil, moving the large piston up and down to free the oil from air bubbles which may cause a fluctuating voltage. This should be done with the small piston in the extreme lower position. Reset the small piston.

M-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, lower the small piston by turning the thumb screw clockwise. This results in opening the lower porthole, thus accelerating the movement of the large piston. If the large piston moves too readily the thumb screw should be turned counter-clockwise thus raising the small piston and closing the porthole. Adjust the small piston until the regulated a-c. voltage remains stable.

3.04 CONDITION OF CONTACT SURFACES (Rq.2.04)

M-1 Remove pits or burrs with a contact burnisher.

3.05 MAIN CONTACTS (Rq.2.05)

M-1 If it is necessary to adjust the main contacts proceed in the following manner. Screw the lower main contact firmly into the a-c. magnet lever arm with a screw-driver. Loosen the set screws for the stops and slip the stops under the d-c. and a-c. magnet lever arms after which the set screws should be retightened. With the lever arms resting against their respective stops, and a buzzer test set connected across the contacts adjust the upper main contact until contact with the lower main contact is made as indicated by the operation of the buzzer. Loosen the set screws for the stops and replace the stops in their original position, and retighten the set screws.

3.06 D-C. MAGNET (Rq.2.06)

M-1 Before adjusting the movable core on the core stem to obtain the proper distance from the center of the hinge pin to the lock nut, check to see that the movable core has been centrally located as described in M-2 of Paragraph 3.02. Loosen the lock nut which secures the movable core to its associated core stem. Adjust the core to obtain the proper distance from the center of the hinge pin to the lock nut.

M-2 Before adjusting the four multiple springs (1, 2, 3 and 4) and the lower fixed d-c. magnet core, the movable core for the a-c. magnet should be raised to its highest position and blocked thus bringing the lower main

contact to its lowest position to prevent contact being made between the upper and lower main contacts while adjusting these four springs. Springs (1, 2 and 3) should be loosened to their fullest extent, or taken out while spring (4) is being adjusted. To adjust spring (4) maintain the voltage on the exciter to which the direct current magnet coil is connected at 45 volts, by adjusting the exciter field rheostat as required, then adjust spring (4) by means of the small nuts at the top of its adjusting screw until the underside of the lever arm associated with the d-c. magnet comes even with the top surface of its stop. After this adjustment has been made, increase the exciter voltage to 115 volts. At this point spring (4) should be overpowered by the d-c. magnet whose upper movable core should strike the lower fixed core. Should it require more or less voltage to overpower the spring and bring these two cores together, the lower fixed d-c. magnet core should either be raised or lowered and spring (4) readjusted until the underside of the lever arm comes even with its stop as before. The locking nut which holds the lower fixed d-c. magnet core in position should be securely tightened after each adjustment. The adjustment of spring (4), the lever arm and the lower fixed core should be repeated until their operation is correct. After the proper adjustment has been obtained the small locking nut (beneath the lever arm) on the adjusting screw of spring (4) should be securely tightened, and the adjustment rechecked.

M-3 With spring (4) adjusted according to M-2, spring (1) should next be adjusted in a similar manner. Raise the exciter voltage to 65 volts. At this point this spring should begin to come under tension bringing the small head on this spring stem against its support. After this adjustment has been made the small locking nut (beneath the lever arm) on spring (1) should be securely tightened and the adjustment of spring (1) checked to see if it is correct.

M-4 With springs (4) and (1) adjusted according to M-2 and M-3, spring (2) should next be adjusted. Increase the exciter voltage to 90 volts. At this point this spring should come under tension as did spring (1). After adjusting this spring the small locking nut (beneath the lever arm) on the adjusting screw of spring (2) should also be securely tightened and the adjustment checked.

M-5 With springs (4), (1) and (2) adjusted as outlined above spring (3) should next be adjusted. Raise the exciter voltage to 120. At this point this spring should come under tension as did springs (1) and (2). Following this adjustment the small locking nut (beneath the lever arm) on the adjusting screw of spring (3) should be securely tightened and the adjustment of spring (3) checked. If, after the above springs have been adjusted, the tripping point or voltage at which the upper movable and lower fixed d-c. magnet cores come together, does not occur within the range given, recheck the adjustments of the individual springs or replace.

3.07 A-C. MAGNET (Rq.2.07)

M-1 Before adjusting the movable core on the core stem, check to see that the core has been centrally located as described in M-2 of Paragraph 3.02. Loosen the top and bottom lock nuts and shift the core up or down to the desired position. Tighten the lock nuts.

M-2 With the core adjusted as described in M-1 and the locking nuts on the upper and lower limit stops loosened, adjust the exciter voltage by means of exciter field rheostat to 40 volts and raise the movable core manually until the main contacts just touch. With the a-c. magnet lever arm held in this position adjust the upper limit stop until it just touches the a-c. magnet lever arm. Tighten the locking nuts for the upper limit stop. Raise the exciter voltage by means of exciter field rheostat to 150 volts and move the movable core manually until the main contacts again just touch. With the a-c. magnet lever arm held in this position adjust by hand the lower limit stop until it just touches the underside of the a-c. magnet lever arm. Tighten the locking nuts for the lower limit stop.

M-3 With the core adjusted as described in M-1, no load on the a-c. generator and the regulator in operation, vary the exciter voltage applied to the a-c. generator field from 50 to 125 volts by means of the a-c. generator field rheostat and note if the a-c. voltage rises or falls. If the a-c. voltage falls on increasing the exciter voltage from 50 to 125 volts, lower the movable core, or if the a-c. voltage rises upon increasing the exciter voltage raise the movable core until a point is reached

that will give neither rise nor fall of the voltage upon varying the exciter voltage. After adjustment tighten the locking nuts holding the movable core on the supporting core stem.

3.08 RELAY (Rq.2.08)

M-1 To adjust the core tips, loosen the set screws holding the core tips and move core tips until the iron core does not extend beyond the top surface of the core tips.

M-2 The gap between the armature and the core tips should be adjusted as follows: With the contact holder resting firmly against the stop stud loosen the four set screws holding the iron core in position, shift the U-shaped core until the core tips are the proper distance from the armature. Tighten the four set screws after adjusting the core.

M-3 Take care not to loosen the lock nuts upon the relay armature spring stem, thereby changing the setting and necessitating the readjustment of the relay armature adjusting spring. In adjusting the relay contacts see that the upper relay contact is firmly attached to the relay contact spring which in turn should be securely fastened to the relay contact spring support. The position of the upper relay contact and the relay contact spring and relay contact spring support is such that the center of the relay contact is directly opposite a small hole in the end of the relay contact spring support. Loosen the clamping screws, and adjust the relay contact spring support until the two relay contacts are opposite each other after which the clamping screws should be securely tightened. The set screw for the lower relay contact may now be loosened and the contact stud adjusted in the relay contact holder to obtain the required air-gap. The set screws should then be securely tightened.

M-3 With the relay contacts adjusted as described above, place an insulating strip between the main contacts. Adjust the relay armature by means of the relay armature adjusting spring, so that with 38 volts on the exciter the lower relay contact together with the contact holder floats midway between the upper relay contact and the stop stud. Reset the exciter rheostat to its operating position and remove the insulating strip.

M-4 Readjust the relay armature adjusting spring until the relay armature operates at a maximum speed. Make sure that the relay armature strikes the stop stud at every cycle of operation. Recheck the operation of the dashpot and readjust if necessary to obtain stable voltage.

M-5 If after adjusting as outlined above, the regulator still continues to operate unsatisfactorily, or the voltage limits are not met, the matter of readjustment should be taken up with the manufacturer in the regular manner.