

1/50 HORSEPOWER DRIVE MOTOR  
USED WITH DISTRIBUTORS AND #155 TYPE AND SIMILAR INTERRUPTERS  
REQUIREMENTS AND ADJUSTING PROCEDURES

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1. GENERAL

- 1.1 This specification covers the test and maintenance requirements for the 1/50 horsepower direct current, shunt wound, drive motor, to be used on the #155 type and similar interrupters and on distributors.
- 1.2 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.
- 1.3 The section of this specification headed "Test Requirements" covers the requirements for operation and the inspection which must be made to determine whether the motor is in proper condition for service and delivery to the customer.
- 1.4 The section of this specification headed "Maintenance Requirements" is intended for maintenance purposes only. It gives the requirements for maintaining the motors in the proper operating condition.

2. TEST REQUIREMENTS

2.1 Operating Requirements

2.11 At any voltage within the limits specified on the nameplate, and with the speed regulator and its resistances connected, the motor shall run smoothly and quietly in a counter-clockwise direction (facing the coupling end) at a speed within the limits of 1800 rpm  $\pm$  2%, or 1775 rpm  $\pm$  2%, depending upon its speed rating, without overheating, when coupled to its associated drive. Before closing the motor switch the precautions covered in this specification under paragraph 3.5 should be followed regarding checking the speed regulator resistance and the speed regulator adjustment.

2.2 Lubrication

2.21 The motor shall be properly lubricated in accordance with paragraph 3.1.

3. MAINTENANCE REQUIREMENTS

3.1 Lubrication

3.11 Lubricate the bearings once every six months by means of a grease gun inserted in the grease plug hole on the top of each bearing housing. For this purpose use the lubricant "Tulc - 2 VE" which may be obtained from the Western Electric Company. It is sufficient to fill the bearing chamber about 1/3 full of grease, an amount corresponding to approximately 0.2 cubic inch of grease for each bearing. This amount of lubricant is equal to 2/3 of one turn from an E. Edlmann "Gem" oil and grease gun.

The correct flow of grease from the gun can only be assured if the grease is packed in the gun without air pockets.

- 3.12 The bearings are packed with grease when shipped, and should need no further attention for six months.
- 3.13 See that no dirt gets into the bearings and that the screw plugs are replaced in the holes after lubricating the bearings.
- 3.14 Do not place any lubricant on the commutator surface.
- 3.15 Each motor should be taken from service periodically by regular routine, disassembled in accordance with paragraph 3.4, and the end shields, bearings and bearing chambers thoroughly cleaned with commercial petroleum spirits, and re-packed with fresh lubricant, as specified in paragraph 3.11. This cleaning routine should be arranged so that all of the motors in the office will be gone over once in every 18 months.

## **3.2 Cleaning**

### **3.21 Every Week**

- 3.211 Blow the dust from the windings of the motor with dry compressed air or small bellows. This should be done when the machine is not running.
- 3.212 Clean the motor commutator by removing the commutator brushes and directing air through one of the brush holders, at the same time turning the armature slowly by hand. Clean brushes carefully by wiping with a cotton cloth moistened with petroleum spirits. Be careful to replace brushes in original positions.
- 3.213 Wipe the exterior of motor with cheese cloth.
- 3.214 Inspect the commutator and speed regulator brush for wear.

### **3.22 Every Month**

- 3.221 Remove the screw cap on the left side of the regulator housing and force air into the housing through the hole in the regulator adjusting knob to remove the nickel oxide dust. Bellows can be used for this.

### **3.23 Every 18 Months**

- 3.231 Disassemble the motor and thoroughly clean as covered in paragraph 3.15. Replace the felt bearing washers if worn.

If the commutator needs turning down it should be done at this time.

- 3.232 The regulator contacts are self-cleaning, and require no attention. Should the regulator be taken apart, it will be noticed that the nickel ring is covered with a gray or black film. Do not remove this film.
- 3.233 (1) The wearing depth of the nickel ring is 1/4 inch and should furnish enough metal for several years of continuous operation. When it is necessary to replace any part of a ring type regulator assembly other than brushes or brush holders, order a complete new center contact type regulator assembly in accordance with the following.
- (2) (One) complete new center contact type regulator assembly per the General Electric Company's drawing M2062541 G-8.
- (3) Where center contact regulators of this type are ordered for replacement the speed readings must be taken at some other point than the regulator end of the motor, either from a direct connected shaft or from shafts operating through reduction gears, applying the known ratio of speed reduction in order to obtain the actual motor speed.

### 3.3 Speed Regulator

#### 3.31 Description

3.311 The motor speed regulator consists of two elements, as follows:

3.3111 An adjustable screw and lock-nut, centrally mounted on an insulating cover on the commutator end of the motor housing. The screw supports the nickel contact ring on its inside end, and terminates in a small knob on its outside end. The lock-nut is the larger ring outside the cover.

3.3112 A collector ring mounted on the motor shaft extension inside the housing, carrying four tungsten contacts, arranged to operate centrifugally to make vibrating contact with the nickel ring.

3.312 In normal operation, the contact between the nickel ring and tungsten points is made and broken continually, maintaining the speed very closely. As the speed becomes high, the contacts close, short-circuiting the regulator resistance in series with the motor field, thus strengthening the field and slowing the motor down. When the speed becomes low, the regulator resistance is again inserted in the circuit, thus weakening the motor field and speeding the motor up.

**3.32 Adjustment of Regulator****3.321** When it becomes necessary to change the adjustment of

the speed regulator, the lock-nut should be loosened and the adjusting knob turned in a clockwise direction to lower the speed, or in a counter-clockwise direction to increase the speed. Care should be taken to hold the adjusting knob with one hand whenever the lock-nut is loosened with the motor running as the regulator contacts tend to turn the adjusting screw in a clockwise direction causing the nickel ring to jam up against the rotating collector ring with consequent inquiry to the entire regulator. In making adjustments, the small adjusting knob should be turned only a small fraction of a turn, say 5 degrees, the lock-nut tightened, and the speed checked, before proceeding further.

**3.322** The normal wear of the nickel ring causes a gradual increase in the speed of the motor. When the speed reaches 1836 rpm at the maximum voltage obtained within the specified voltage range, minimum load, hot, in the case of the 1800 rpm motor, or reaches 1811 rpm under these conditions in the case of the 1775 rpm motor, the speed regulator should be adjusted under these conditions to 1800 rpm or 1775 rpm respectively.

**3.33 Care in Adjusting**

**3.331** The adjusting screw and lock-nut should be turned by hand.  
Do not use pliers or wrenches.

**3.34 Polarity of Regulator Contacts**

**3.341** With this type of speed regulator, it is necessary, for satisfactory operation, that the direction of the current through the contacts be such as to keep the nickel ring positive with respect to the tungsten points.

**3.342** The nickel ring will have the proper polarity if the motor lead tagged "M+" is connected to the positive side of the line, and the lead tagged "M-" is connected to the negative side of the line.

**3.343** The pressure used on the speed counter in measuring the speed of the motor, should not be greater than necessary to obtain a correct readings as excessive pressure will slightly increase the contact opening of the regulator, causing the motor to run faster, thus producing a slight error in the reading.

**3.4 Disassembling and Assembling Motor**

**3.41** In disassembling the motor for cleaning the bearings, use socket wrench W. E. Code #45 and a screw driver. Before removing the motor end shield and disassembling the motor, it is necessary to remove the two acorn nuts on the coupling end, the speed regulator, the motor and regulator brushes, and the four

screws at each end which hold the steel and copper bearing washers in place. In removing the speed regulator, do not change the adjustment. Remove the three regulator cover screws, take off the insulating cover, remove the screw plug on the side of the regulator housing, loosen the set screw or screws in the collector ring hub and slide the collector ring off the shaft.

Note the position of the collector ring on the shaft before removing, so as to replace in the same position against the shoulder on the shaft extension and with the holes in the shaft, if provided, registering with the screw holes in the collector ring hub.

3.42 In assembling the motor, to facilitate lining up the four tapped holes in the steel plate and the four holes in the copper gasket, with the four holes in the end plate at each end, for the purpose of replacing the four clamping screws, use should be made of the W. E. Code #309 tool which has been provided for the purpose. This tool is a threaded stud which is introduced through one of the holes in the copper gasket and screwed into one of the holes in the steel plate. By introducing this stud into one of the holes of the end shield, the four holes in each of the three associated parts are brought into line. Two of the screws on opposite sides are then put in place and set nearly tight, after which the stud is removed, and the remaining screws replaced. All screws should then be securely tightened. In replacing the end shield on the coupling end, be sure that the grease plug is toward the top. In assembling the motor be sure to replace the spring washer or spring and keeper arrangement whichever may be used, in the bearing housing to take up the end play.

3.43 To replace a ring type regulator assembly with a center contact type regulator assemble the motor as outlined in paragraph 3.41. Cut off the shaft extension on the regulator end for a total length of 2-1/32 inches from the end of the shaft. Place the rotor back in the machine frame and reassemble in the reverse order as outlined in paragraph 3.42. Mount the new contact assembly on the shaft extension and center the collector ring beneath the collector ring brush holder. Align the set screw with the spot on the shaft for receiving it and tighten the set screw. Readjust the brush-holder clearances if necessary as the ring diameter on the center contact type regulator is slightly less than on the ring type regulator. Mount the new insulating cover and adjust the speed as required.

### 3.5 Starting Motor

3.51 Before starting the motor for the first time or after assembling after cleaning the following procedure should be carried out:

- 3.511 See that the supply voltage is within the limits stamped on the motor nameplate, and that the motor serial number and the number on the motor speed regulating rheostat or resistance are the same. If the resistance supplied for operation with the motor is not marked with the motor serial number the value of the resistance used should be checked with the amount marked on the motor, before starting.
- 3.512 Disconnect the regulator resistance leads marked R-1 and R-2, from the motor regulator resistance, and remove one of the motor commutator brushes. See that the motor line switch is open. Connect a battery and buzzer across the ends of the leads R-1 and R-2. If the regulator contacts are closed, the buzzer will ring. Turn the regulator adjusting screw until the regulator contacts just touch or separate as indicated by the buzzer. Then turn the adjusting screw two-third of a revolution in a counter-clockwise direction and lock in position. The setting is then approximately correct. The regulator resistance leads should then be connected to the regulator resistance and the motor brush replaced.
- 3.513 Turn the armature by hand and see that it rotates freely, and test by lightly pulling and pushing on the shaft to determine that the end-play is taken up by the spring washer or spring and keeper referred to in paragraph 3.42.
- 3.514 Short-circuit the speed regulator resistance or if a plate rheostat is furnished turn the arm as far as it will go in a counter-clockwise direction facing the contacts. Start the set by closing the motor line switch.
- 3.515 If the operation is satisfactory and the direction of rotation is clockwise facing the regulator end of the motor, remove the short-circuit from the motor regulating resistance or adjust the rheostat arm to the white mark, if a rheostat is furnished.
- 3.516 The speed should then be checked and should be adjusted to 1800 r.p.m. or 1775 r.p.m. depending on the nameplate rating, for the normal motor terminal voltage.
- 3.517 In subsequent operation, the machine should come up to speed satisfactorily after closing the line switch, without short-circuiting the regulator resistance.
- 3.518 The motor is stopped by opening the line switch.