

AC UNIT DRIVE MOTORS
PANEL MACHINE SWITCHING SYSTEMS
REQUIREMENTS AND ADJUSTING PROCEDURES

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SECTION 1

1. GENERAL

- 1.1 This specification covers the installation and maintenance requirements for AC unit drive motors, used in Panel Machine Switching Offices.
- 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 Section 2 of this specification gives the requirements for the inspection of mechanical adjustments which shall be used to determine whether AC unit drive motors are in the proper condition for service and delivery to the customer. These are called "Installation Test Requirements".
- 1.4 Section 3 of this specification is intended for maintenance purposes only. It covers the operating and mechanical requirements which must be met in re-adjusting an AC unit drive motor which fails to meet the test requirements. These are called "Maintenance Requirements." In addition to the maintenance requirements, section 3 also gives the approved methods of meeting these requirements.
- 1.5 The following drawings are attached to and form a part of this specification:
 - Figure 1, Unit Drive Motor Outline
 - Figure 2, Parts of 1/8 HP AC Unit Drive Motor
 - Figure 3, Bearing Assemblies
- 1.6 The unit drive motor is a polyphase, squirrel cage induction motor. The general appearance and size of the motor are shown in figure 1. One end of the shaft is extended for a driving coupling and the opposite end is enclosed in the bearing housing except for a screw cap which may be removed for taking speed readings. The parallel base supports, or feet, are accurately machined on the bottom and outside edges to fit a correspondingly shaped slot in the supporting motor bracket on the frames. Connections to the motor are made by means of a special connector as shown in Fig. 1. This connector is separable. The plug half containing projecting contacts is mounted in a projecting boss on the motor frame and terminates the motor leads. The receptacle half is removable and is arranged for connecting with the power service leads.

1.61 The bearings are of the separable ball-bearing type and consist of the following parts:

1. The inner ring or ball race on the shaft.
2. The ball cage and balls.
3. The outer ring, or ball race, which in the end opposite the coupling bears against a shoulder turned in the bearing chamber and in the coupling end bears against either a flat spring thrust washer in machines of earlier manufacture or against a steel washer and coil spring in the bearing chamber in later machines. A felt gasket is held between the bearing housing and a copper washer on the coupling end to prevent lubricant from escaping along the shaft. Oil slingers on the shaft prevent the escape of lubricant to the inside of the motor.

SECTION 22. INSTALLATION TEST REQUIREMENTS2.1 General

2.11 Each motor is shipped adjusted and ready for service. Do not unpack the motor until ready to install. When unpacking see that the motor is not damaged by the tools used for this purpose. See that none of the parts are missing or broken.

2.2 Starting and Stopping the Motor

- 2.21 See that the receptacle half of the separable connector (See Figure 1) has been connected to the cable leading from the motor fuse box, provided for the motor. Before starting the motor for the first time see that the supply voltage and frequency corresponds with the data on the motor nameplate. See paragraphs 2.42 and 2.43 for permissible variations in power service.
- 2.22 Be sure that the rotor turns freely and that no loose bolts, nuts or other objects have been left inside the frame. Test by lightly pulling and pushing on the shaft extension to determine that the end play is taken up by the thrust spring referred to in paragraph 3.42. Also see that the coupling head on the motor is set with its face located $2 \frac{7}{16}'' \pm 1/64''$ from the finished end of the motor feet.
- 2.23 Slide the motor part way into its bracket in the frame so that the two halves of the coupling are not engaged and clamp it. Turn the snap switch to the "Off" position.
- 2.24 Plug the two halves of the separable connector together at the motor and start the motor by turning the switch to "ON". Check the rotation to see that the motor shaft rotates in a clockwise direction facing the end opposite the coupling. If the rotation is in the opposite direction the leads connected to one phase should be reversed in the receptacle half of the connector (R, Figure 2.)

- 2.25 To stop the motor turn the line switch to the "OFF" position.
- 2.26 If the operation of the motor is apparently satisfactory, unclamp the motor in its base bracket and push the motor in as far as it will go until the end of the motor base is against the end of the bracket making sure that the two halves of the coupling are properly meshed and then securely clamp the motor in this position.
- 2.27 Start the motor by turning the line switch to "ON" to see that it operates with the frame load satisfactorily.

2.3 Cable Slack

- 2.31 After the motor is in operation the slack in the connecting cable should be taken up by a single or double loop as required and secured with cord.

2.4 Operating Requirements

- 2.41 The boss on the motor and the receptacle half of the connector are marked with a white line which should correspond when the connector is inserted.
- 2.42 The line voltage and frequency should not vary more than $\pm 5\%$ and $\pm 2\%$ respectively from that marked on the motor nameplate, unless otherwise specified in the order.
- 2.43 The speeds of unit drive motors for all conditions of load and temperature, line voltage within the limits given in paragraph 2.42 and normal frequencies, should come within the limits of 1725 to 1800 rpm for 60-cycle motors and 1797 to 1875 rpm for 62 1/2-cycle motors. For frequencies other than normal there will be a proportional change in the above motor speed ranges.
- 2.44 When coupled to its drive the motor should run without excessive vibration in a clockwise direction facing the end opposite the coupling.

SECTION 3

3. MAINTENANCE REQUIREMENTS

3.1 General

3.11 Routine maintenance adjustments should always be made in the sequence presented in this specification to prevent interference of one adjustment with another.

3.2 Cleaning

3.21 Each Week

3.211 Blow the dust from the windings of the motor with dry compressed air or a small bellows.

3.212 Wipe all of the exterior surfaces of the machine with cheese-cloth. Do Not Use Cotton Waste.

3.22 Every 12 Months

3.221 Disassemble the motor as explained in paragraph 3.4 and thoroughly clean as covered in paragraph 3.34. Replace the felt bearing washers if worn.

3.3 Lubrication

3.31 The bearings of motors when shipped are packed with grease and need no further attention for twelve (12) months other than the lubrication routine covered in paragraph 3.32.

3.32 Lubricate the bearings of motors in service once every two weeks by inserting three or four drops of medium grade machine oil, such as the oil used in the bearings of charging and ringing sets, through the spring oiler on each bearing.

3.33 Care should be taken to see that the spring oilers are free from dirt before pushing the ball down with the oil can spout.

3.34 Each motor should be taken from service periodically by regular routine, disassembled in accordance with paragraph 3.4, and the end shields, ball-bearing parts and bearing chambers

thoroughly cleaned with petroleum spirits and repacked with fresh grease by inserting a grease gun into the bearing chamber. For this purpose "Oneida" grease should be used. The above mentioned grease may be obtained from the Western Electric Company, Inc. It is sufficient to fill the bearing chamber with an amount of grease corresponding to 2/3 of one turn from an E. Edelman "Gem" grease and oil gun. The correct flow of grease from the gun can be assured only if the grease is packed in the gun without air pockets. The cleaning routine should be arranged so that all of the motors in the office will be gone over once in every 12 months or more often as conditions in an office may require and should include cleaning the accumulated dirt from the inside of the frame and windings.

3.4 Disassembling and Assembling the Motor

- 3.41 In disassembling the motor for cleaning the bearings use a socket wrench (WE code No. 46 tool) and a screw-driver. Before removing the end shields it is necessary to remove the coupling head and the acorn nuts from the tie rods. The end shields may then be taken off and the ball-bearing parts removed from both ends of the motor.
- 3.42 In assembling the motor be sure to replace the spring thrust washer with the prong projections towards the ball bearing in the coupling end if the motor is of the earlier design. In motors of later design or those having a steel washer, thrust spring, copper and felt washer in the coupling end, these parts should be replaced in the order given after replacing the balls and retainer and the outer ball race. The cupped side of the steel washer and the convex side of the copper washer should be towards the thrust spring.
- 3.43 Replace the end shields, tie rods and acorn nuts, securely tightening the latter with the socket wrench (WE code No. 46 tool). Test the end play by lightly pushing and pulling on the shaft to see that the spring thrust arrangement is operating satisfactorily.
- 3.44 Test the motor and replace the coupling head on the shaft extension according to paragraph 2.22.

3.5 Motor Couplings

3.51 Spare motors should be equipped with coupling heads, assembled according to paragraph 2.22.

3.6 Troubles

3.61 If trouble is experienced in operation look over all nuts and bolts to see that they are tight and make sure that the rotor is free to turn in its bearings, that is that the bearings themselves are in good condition and there is no mechanical obstruction to prevent rotation. Be sure that the machine switching frame drive shaft is not stuck.

3.62 Hot bearings may be due to worn out or dirty lubricant, not enough lubricant or damaged bearings. Remove the end shields and inspect the steel balls and the inner and outer ball race surfaces. Roughness may be due to grit in the lubricant. Remember that the bearing may be hot enough to burn the hand and still be at a safe operating temperature. The maximum allowable temperature is 80° C.

3.63 Electrical troubles should be checked for the following:

3.631 That the proper voltage and frequency are actually available at the motor switches and at the motor terminals.

3.632 That the fuses are not blown.

3.633 Checking the above points will frequently locate the cause outside the motor, otherwise much time might be spent searching for it inside the motor.

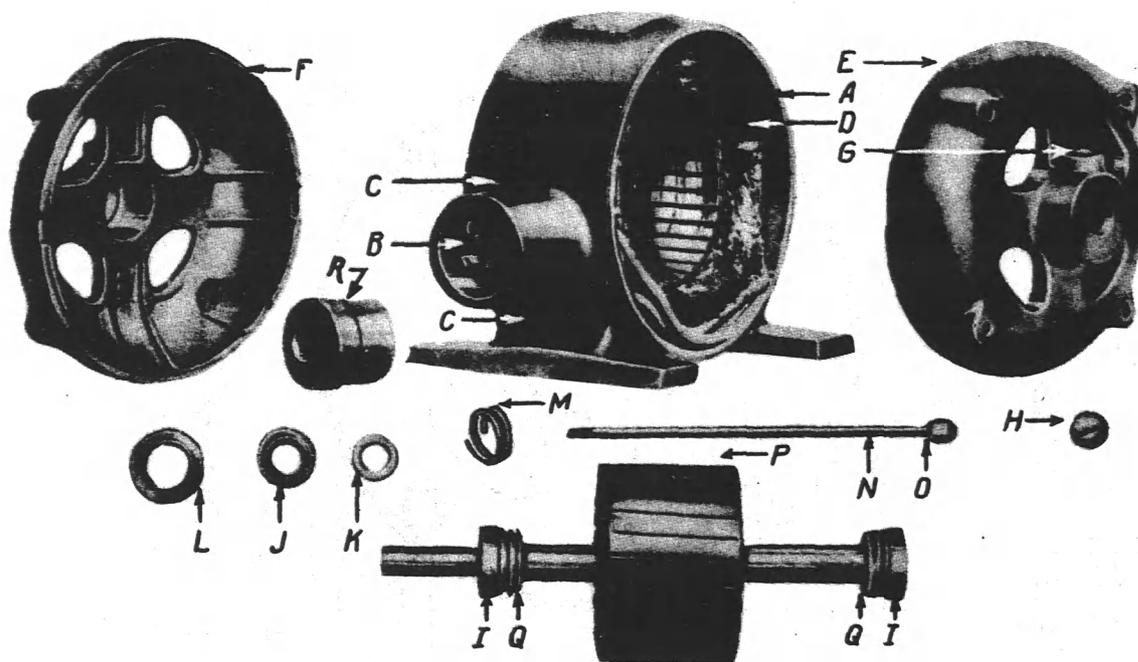
3.7 Defective Motors

3.71 If a machine is found to have a defective field, or rotating element or any other trouble which cannot be remedied by any of the means recommended in this specification, a report should be sent through the regular channels for reporting complaints, giving in detail the nature of the trouble and complete nameplate data including the serial and model numbers of the motor affected.

3.8 Spare Parts

3.81 It is not expected that any spare parts will be required for this motor with the exception of the felt bearing washer mentioned in paragraph 3.221. When ordering motor parts give on the order the reference letter and name of the part from figure 2, and give the name, viz, unit drive motor, rating, and model number of the motor as for example: 20 - Part I ball bearings for unit drive motors, 1/8 HP, 60-cycle, 220 volt, 1725 rpm, model No. 21809. When the spring thrust washer used in the bearing housing on the coupling end of motors of earlier design is to be renewed, the steel washer, coil spring and copper washer (parts L, M and J, figure 2) which are interchangeable with the older thrust washer should be ordered.

Attached:
Fig. 1, 2 and 3



REF.
LETTER NAME OF PART

A MOTOR FRAME
 B SPECIAL CORD CONNECTOR
 C SET SCREWS FOR "B"
 D STATOR CORE WITH
 WINDING
 E END SHIELD, END
 OPPOSITE COUPLING
 F END SHIELD, COUPLING
 END
 G SPRING OILER
 H SCREW CAP FOR "E"
 I BALL BEARING

REF.
LETTER NAME OF PART

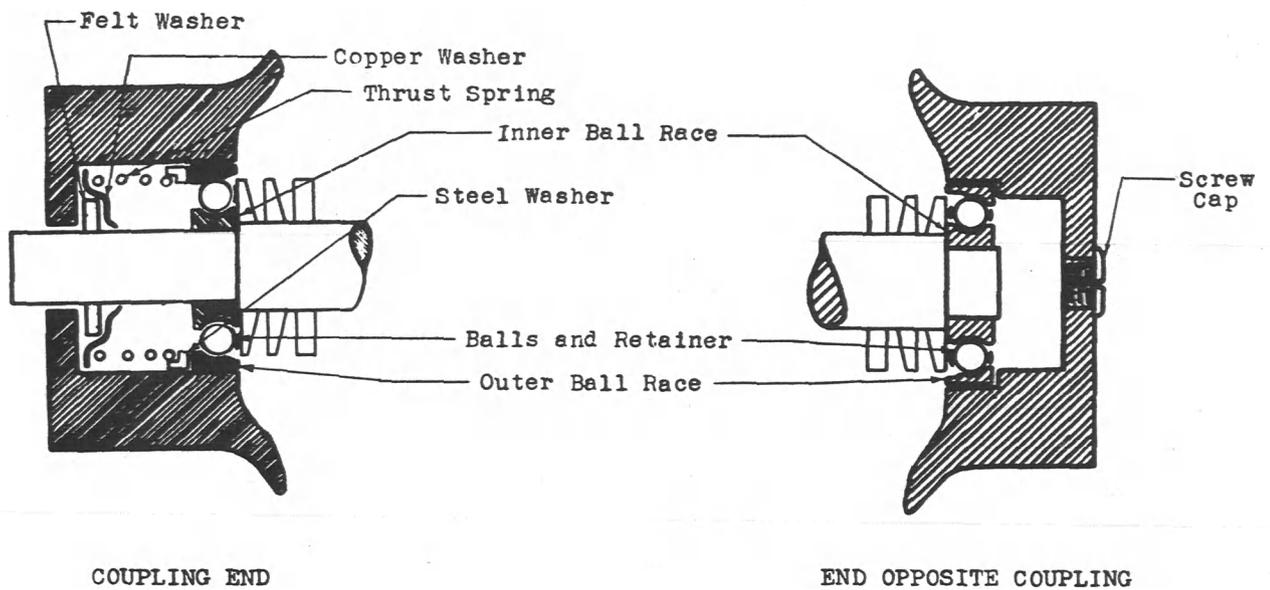
J COPPER WASHER FOR
 "K"
 K FELT WASHER
 L STEEL WASHER FOR
 "M"
 M THRUST SPRING
 N TIE ROD
 O ACORN NUT FOR "N"
 P ROTOR WITH SHAFT
 Q OIL DEFLECTOR
 R SPECIAL CORD CON-
 NECTOR RECEPTACLE
 FOR "B"

PARTS L AND M REPLACE A SPRING THRUST WASHER USED IN EARLIER TYPES. THESE PARTS ARE INTERCHANGEABLE WITH THE SPRING THRUST WASHER AND SHOULD BE ORDERED FOR REPLACEMENT WHEN REQUIRED.

IN ORDERING GIVE REFERENCE LETTER AND NAME OF PART, NAME, RATING AND MODEL NUMBER OF MOTOR.

PARTS OF 1/8 HP AC UNIT DRIVE MOTOR

FIG 2



Note: If the motor is of the earlier design and a new spring thrust washer is required, order the felt washer, copper washer, thrust spring and steel washer as shown in Fig. 3.

FIG. 3 - BEARING ASSEMBLIES