MOTORS, MOTOR STARTERS AND CHARGING GENERATORS

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1. GENERAL

1.1 Scope

1.11 This section covers general mechanical requirements for reused motor generator sets, in case the Installer is required to perform maintenance work.

1.12 Some of the work may be beyond the scope of the Installer, such as the resurfacing of commutators, and this work would be subcontracted.

1.13 This section makes reference to maintenance BSP's on the machines for certain operations. These may be borrowed from the telephone company.

1.2 Precautions

1.21 Perform all possible operations with the machine stopped. These machines are usually arranged to start automatically without warning. If this is the case remove motor supply fuses or open the motor disconnect switch before performing operations on commutators or brushes or on or near the commutator. This also applies to cleaning operations wherever possible.

1.22 Do not adjust brush pressures or remove brushes from their holders with the machine running. Brushes often reach temperatures too high for bare hands and a dropped brush could cause a short circuit or mechanical damage. Do not touch at the same time parts which may be at different potentials; for example, brushes and machine frame.

1.23 Do not use tools or perform installing operations above open commutators without installing a protective cover above the commutator.

1.24 Keep tools and other materials away from these machines while they are running. Anything falling into the machine may cause serious damage. Iron or steel tools and parts may be attracted by magnetic circuits of these machines.

1.25 Before running the machine install all protective guards. It is especially important that coupling guards, fan guards, etc. be on the machine to prevent accidental contact with rotating parts.

1.26 Never use emery or carborundum cloth or paper to smooth a rough commutator. Grains of these materials lodge between commutator segments or become embedded in brushes or commutator bars. A type of stone used for brush reseating should not be used for cleaning commutators as it was not intended for this purpose.

1.27 Avoid as much as possible using volatile solutions such as petroleum spirits, trichloroethylene, trichloroethane and acid resistant grey enamel in the power room. Provide as much ventilation as possible when using these solutions. The vapors tend to contaminate and soften the brown film on commutators. Commutators of all dc machines in the power room should be burnished in accordance with approved procedures.

1.28 Do not remove covers from power factor correction capacitors in motor starters without first disconnecting the power supply to the starter so that the starter cannot operate automatically and energize the capacitors. Each capacitor has a built-in discharge resistor to bleed off the charge. However, before disconnecting leads to the terminals of these capacitors momentarily short each terminal to the case to remove any charge that may be left.

2. MOUNTING

2.1 Check the slope of the floor or pier mounting area for the machine. If the mounting area slopes more than 1/4 inch in ten feet in any direction the telephone company should be asked to correct the condition. See Section 129 of this handbook on how to check floor slope.

2.2 If the mounting area meets the slope requirement cut out any compressible floor covering, such as linoleum or asphalt tile at each isolator location. Also refer to Section 129 for this operation.

3. LUBRICATION

3.1 Oil Ring Bearings

3.11 Check oil level in the oil cup with the machine at standstill. The level should be up to the mark on the oil cup. Pour KS-16326 oil slowly into the bearing chamber or into the oil cup until

oil level reaches the mark on the oil cup. Start the machine then shut it down. Watch the oil level rise in the cup. If it does not rise to the proper level add more oil and again start and stop the machine. Continue this procedure until the proper oil level is reached.

3.12 If the oil level does not rise in the gauge when oil is added to the bearing housing the passage to the gauge may be blocked. Push a small bare copper wire through the passage to clean it.

3.13 The oil rings shall rotate and deliver oil from the reservoir to the shaft and bearing when the machine runs.

3.131 Raise the oil well cover with the machine running to check this feature.

3.14 Oil should be drained and replenished in accordance with the maintenance BSP on the machine.

3.2 Ball Bearings

3.21 These bearings should be relubricated, as necessary, in accordance with the maintenance BSP on the machine.

3.22 Before relubricating check with the telephone company to see if this is necessary. Then be certain to relubricate in accordance with the BSP. Excessive grease is as harmful as no grease and can cause overheated bearings or excessive vibration.

3.3 Oil Gauges

3.31 Oil gauges shall be free from leaks.

3.32 If the gauge leaks, remove the drain plug in the bottom of the bearing chamber and drain the oil. Clean the drain plug and the threads in the casting, coat the threads of the plug with KS-6824 sealing compound and replace the plug. If the leak occurs where the gauge is screwed into the housing, remove the gauge, clean the threads, and coat threads with sealing compound. Replace the gauge. Refill the bearing housing with oil.

4. FLEXIBLE COUPLINGS

4.1 Flexible couplings, used on four-bearing machines, are of various types. Some couplings consist of flanges which are bolted to flexible discs. Two other types, a Falk or Zurn coupling, are also used with grease being required for internal lubrication. The Falk coupling may leak oil at the gasket between the two halves of the coupling.

4.2 If necessary to relubricate a flexible coupling refer to the BSP on the unit for the method.

5. STARTING

5.1 When automatic starters are furnished, such as for a motor generator set, start the machine and observe that it starts and comes smoothly up to speed. The running contactor in the starter shall close to put the motor directly on the line within the times listed below:

Motor HP	Seconds
15 to 30	10
31 to 40	15
41 to 75	20
76 to 125	25

Adjust time delay if time is longer than values listed.

5.2 If the motor fails to start, check for blown fuses, loose connections, or tripped overload relays in the starter.

5.3 If the machine fails to come up to speed smoothly in the time listed and "jumps" when the "Run" contactor closes to put the motor directly on the line change the taps on the autotransformers to a higher percentage of line voltage.

5.4 If the machine starts and accelerates rapidly but blows line fuses at starting change taps on the autotransformer to a lower percentage of line voltage.

6. DIRECTION OF ROTATION

6.1 Direction of rotation shall be as marked on the machine. If this is not marked rotation of the armature shall be clockwise when viewed from the commutator end of the generator.

6.2 If direction of rotation is incorrect interchange two of the three line leads to the starter or two of the three motor connections at the starter.

7. BRUSHES AND BRUSH HOLDERS

7.1 Brushes shall be free in their holders. Neither shall they be loose enough to cause poor commutation.

Gauge by eye and feel.

7.2 If a brush binds in its holder remove the brush from the holder and clean brush and brush holder with a clean dry cloth. Remove any rough projections on the brush with fine sandpaper.

7.3 If there is poor commutation, check brush spacing, alignment, pressure, fit or length. The BSP covering the equipment will include these items.

7.4 If new brushes must be cut to fit the commutator, refer to the BSP for materials and method of performing the operation.

7.5 Some generators have brush holders and brush springs known as "constant pressure" brush holders. They maintain constant brush pressure throughout the life of the brush.

7.6 Brush holder yokes have their position marked in some way. This is called the "neutral setting" and is the brush position for best commutation as determined at the factory. The marking may be a paint mark or chisel mark or a dowel

pin. The marking or dowel pin will extend from the movable brush holder yoke to the fixed end bell or bearing housing of the machine.

8. COMMUTATOR

8.1 The commutator surface shall be clean and free from scoring, pits, or other deformations of the surface except that caused by normal wear.

Gauge by eye and feel.

8.2 A dark bronze or chocolate color on a commutator is very desirable. If the commutator presents this appearance, is clean, smooth, and commutation is satisfactory, it should be left alone.

NOTE: If a bronze film fails to build up or, if once built up, is removed by continued operation, a light load condition may be the cause. When the machine is lightly loaded (30% or less load) for some time the brushes run cool resulting in excessive brush friction. This friction removes the brown film on the commutator and prevents buildup of a new film. The light load condition may be compensated for by raising or removing some of the brushes on each brush holder stud. Refer to the BSP on the machine for this operation.

8.3 Clean dirt and oil off the commutator with a clean dry cloth.

8.4 If the commutator surface becomes sufficiently roughened or pitted to cause poor commutation, it may be necessary to resurface the commutator. Refer to the BSP on the machine for this operation.

Arrows not shown due to extensive changes.

Vertical lines at sides of paragraphs indicate requirements.

9. COMMUTATION

9.1 The generator shall commutate successfully under all conditions of normal operation.

9.2 Successful commutation is obtained if neither brushes nor commutator is burned or injured to the extent that abnormal maintenance is required. The presence of some visible sparking is not necessarily evidence of unsuccessful commutation.

10. NOISE AND VIBRATION

10.1 Noise or vibration of the machine shall not be excessive for any load from no-load to full rated load.

10.2 Ball bearings are inherently more noisy than sleeve bearings. Certain noises, such as the rolling noise of the balls in the race and some squealing noises from ball cages and bearing shields, while not desirable, must be expected from commercial ball bearings.

10.3 A bearing that is worn or damaged can be detected well in advance of actual failure by the following noise test:

Start the machine and run it up to full speed at no-load. Turn off the power and allow the machine to coast to a stop. If the questionable noise stops before the machine comes to rest, the bearing has not been damaged. If the noise continues all the time the machine is coasting to a stop, decreasing in frequency as the machine slows down, the bearing is damaged.

Manager, Product Engineering

Reason for Reissue:
(1) To include information presently covered in Section 120.
(2) To make the section applicable to reused machines.

Replaces Section 122 dated 12-18-58.