OPERATION • MAINTENANCE • DISASSEMBLY

INSTRUCTIONS

WESTINGHOUSE A-C TO D-C M-G SETS
UNIT FRAME SIZES 0900 TO 2000
L.L.A.—SK-H

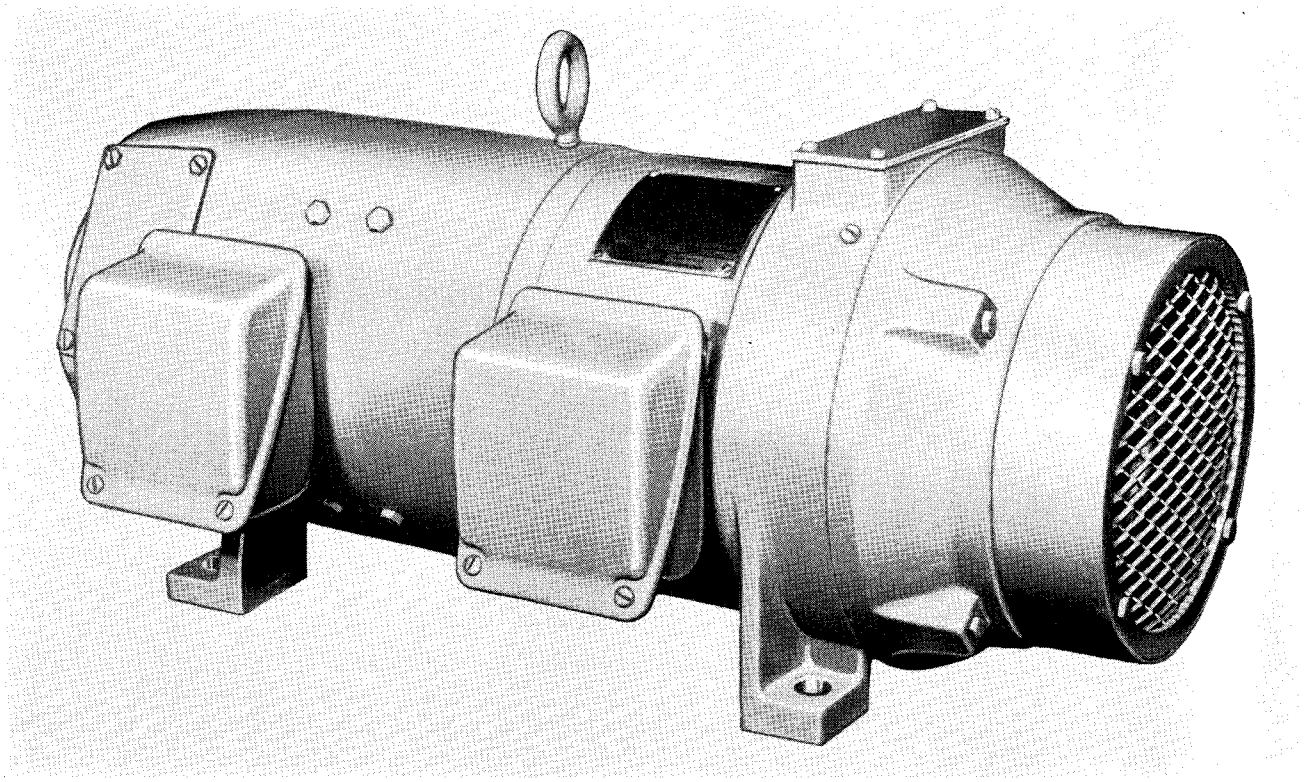

FIG. 1. Typical Construction of Unit Frame M-G Set

The unit frame M-G set consists of a Life Line® A, a-c squirrel cage motor; unitized with an SK-H d-c generator.

A standard d-c front bracket and frame, (less the rear set of feet) is combined by a connecting ring with a standard a-c footless frame. This frame, assembled to a special rear bracket with feet, is further united with a blower hood and screened blower guard. Since the mechanical design features a minimum distance between the two bearing centers, a compact, rugged, low vibration unit with long bearing life results.

The common shaft supports the d-c armature, a-c rotor, and high performance centrifugal blower. Air is drawn through the protected opening in the rear, axially directed through the a-c motor, d-c generator, and exhausted at the generator bracket.

A-C Motor. The motor in the unit is a Westinghouse Life-Line A, squirrel cage induction motor. The standard set has a 3500 RPM, 60 cycle motor. Special sets are available for other speeds.

D-C Generator. The generator is a standard type SK-H shunt wound machine with a rated voltage output of 125 or 250 volts. (Generators can be supplied with other voltages. Check the nameplate data). Brushholders and brushes are readily accessible through the openings in the front bracket.

Figure 1 shows a completely assembled machine.

Figure 2 shows an arrangement of parts of a typical set.

Note: Check the nameplate for information about a specific machine. Full data including ratings is given on the nameplate of the unit. Connections are given on a separate plate for the motor, and on the inside of the conduit box cover for the generator.

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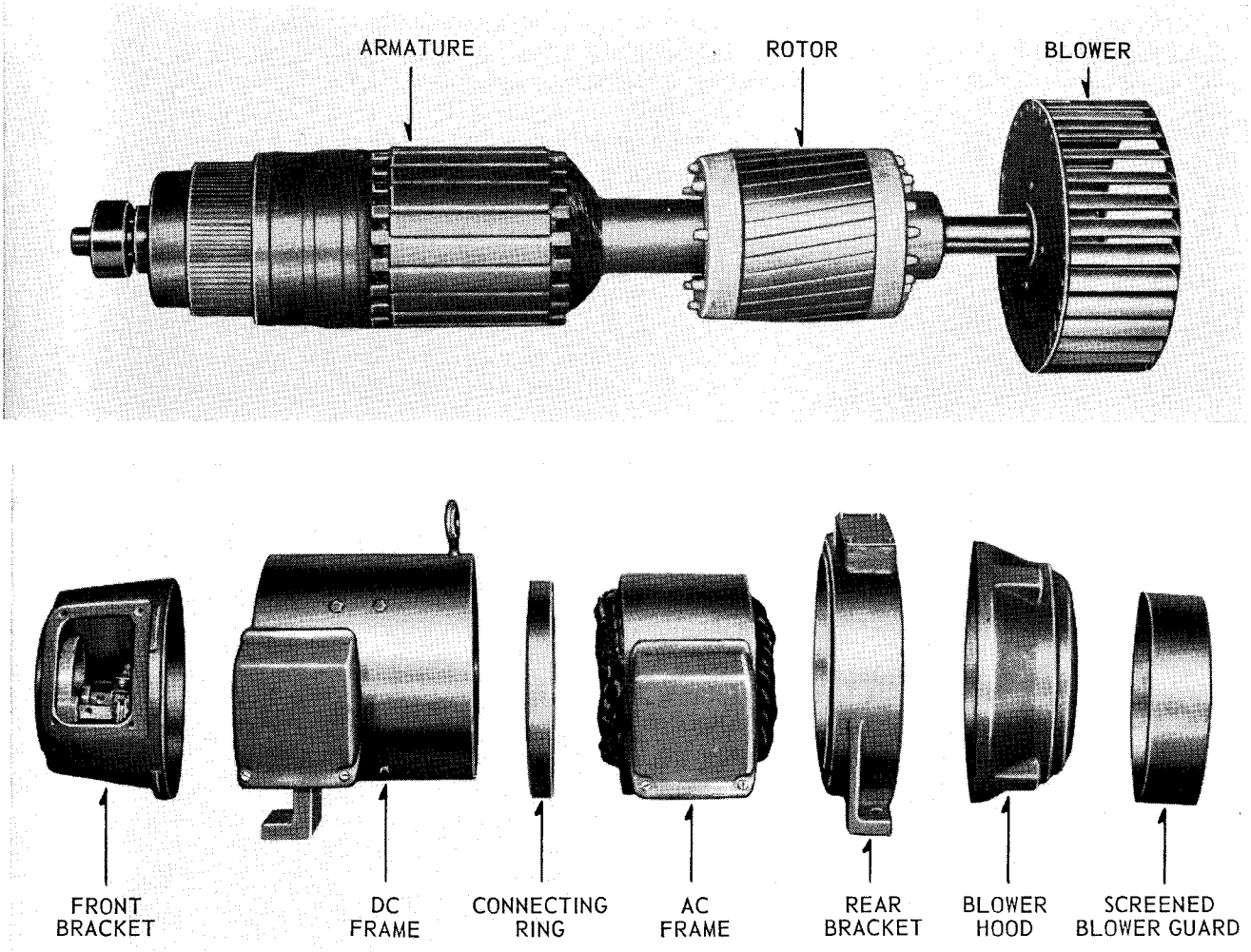

FIG. 2. Arrangement of Parts

OPERATION

Before Starting. Make certain that the motor nameplate data matches the voltage and frequency of the electrical supply system. Observe the National Electrical Code and local requirements for all wiring and fusing. Be sure all connections are properly made.

Starting. Open the generator load switch. Turn the field rheostat to the "all in" position (minimum field current). Close the a-c line switch to start the motor.

Note the direction of rotation and compare it with the arrow on the frame of the generator; they should be the same. If not, reverse the direction of rotation by reversing two of the a-c motor line connections. The direction of rotation should be clockwise, facing the commutator. With the unit rotating in the correct direction, check for excessive vibration, noise, or other indications of trouble.

Turn the generator field rheostat to increase the voltage. Check the polarity. The polarity can be reversed in a separately excited machine by reversing the field connections. With the correct polarity, adjust the field rheostat to obtain the desired voltage, and close the load switch. The generator should carry its rated load with little sparking at the commutator. If sparking occurs, see comments under "Maintenance" below. If the generator fails to build up voltage, check connections in the field circuit.

Running. Unusual noise or excessive vibration, sparking, heating or low voltage output are indications of trouble. In case of noise or vibration, check for loose mounting bolts. For other trouble, see instructions under "Maintenance" below.

When stopping the M-G set, reduce the load on the generator as much as possible before opening the load switch. After the d-c load has been removed, open the a-c line to stop the set.

MAINTENANCE

To obtain long, satisfactory service from rotating electrical equipment it is necessary to operate it

correctly, and to follow a few simple maintenance procedures. When properly used, the equipment should require very little care other than periodic inspections. The most important factor is to keep the apparatus clean and free of oil, water, dirt, and other foreign material. The following maintenance suggestions will help you get the maximum service life from the equipment. Some of these suggestions apply to both motor and generator, and others apply only to the generator.

1. Bearings. All bearings are packed at the factory with a proper amount of lubricant and will require no additional grease for many years of operation under most conditions. However, greasing and drain ports are provided on all machines for use if service lubrication is desired. When regreasing, stop motor, remove drain plug, add Westinghouse grease (with hand operated gun only) until grease appears at drain hole. Run motor for approximately ten minutes before replacing drain plug. It is recommended for easy applications no lubricant be added, for average applications motor be lubricated every three to six years, and for severe applications, greasing be done on the basis of experience.

2. Insulation. Protect the insulation from dirt, oil, and moisture as much as possible during operation and storage of the equipment. When disassembling or assembling the unit, be sure never to bump or jam the windings against the rotor or other objects, as this will cause damage.

Guard against dirt. The insulation and mechanical parts of the machine should be kept clean. Dust that is free from oil or grease may be removed by wiping with a clean, dry cloth, or preferably, by suction. Dust may be blown from inaccessible parts with clean, dry air, using not more than 30 to 50 pounds pressure. Use care to prevent personal injury from the air hose; use goggles to avoid eye injury from flying particles.

When grease or oil is present, wipe with a cloth moistened (but not dripping) with a petroleum solvent of a "safety type", such as Stoddard solvent, or similar material available under various trade names. Wear suitable gloves to prevent skin irritation when using these petroleum solvents.

Petroleum solvents are flammable, but relatively non-toxic.

Moisture reduces the insulation resistance of the winding insulation and this can lead to serious damage. Before starting a machine which has been subjected to excessive moisture conditions, the insulation resistance should be checked with a 500-volt megger. The resistance should be at least one megohm. If less, the windings must be dried out in an oven, or by circulating warm air through the machine, or by allowing a low current to pass through the windings until the insulation resistance rises above 1 megohm.

Revarnishing the windings when the unit is overhauled will lengthen the life of the machine.

Replacement of generator field windings may be necessary if a coil becomes open or shorted. Always carefully check all associated rheostats, switches and other devices in the field circuit before concluding that the winding itself is defective. Improper voltage, poor commutation, and overheating are symptoms of field coil failure. An ohmmeter or Wheatstone bridge may be used to check the field circuit for grounds to the frame as well as for short circuit or open circuit. If this produces no result, and the field circuit is still suspected as a source of trouble, comparative resistance measurements should be made of the individual coils and compared with the resistance of a similar coil which is known to be in good condition. Such measurements should be made when the coils are near normal operating temperature. Expansion due to temperature rise is sometimes the cause of short circuits between turns.

To replace a field coil, disconnect the coil from the adjacent coils and remove the bolts which secure the pole piece to the frame. Remove the pole piece with its coil and install a new one in its place. Use care in replacing the pole and coil and be sure that the same liners between the frame and the back of the pole are replaced to ensure the same air gap as in the original assembly. The new coil must be reconnected so that it produces a field of the proper polarity. This can be checked with a small compass, which should indicate alternate north and south poles all the way around the stator when the coils are properly connected and excited.

3. Brushes. The correct brush position has been located at the factory. The brush position should not require further adjustment. The brushholder should be approximately 1/16 of an inch from the face of the commutator.

Make frequent inspections to see that:

a. Brushes are not sticking in holders.

b. Shunts are properly attached to brushes and holders.

c. Worn out brushes are replaced before they reach their limit of travel and break contact with commutator.

d. Copper particles are removed from face of brush.

When necessary to replace brushes, use only brushes recommended as exact replacements. The face of a new brush should be fitted to the commu-


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tator so that it makes good contact over the entire brush face. This can best be accomplished after the brushholders have been adjusted and the brushes inserted. Lift a set of brushes sufficiently so that a sheet of sandpaper can be inserted between brushes and commutator. Draw the sandpaper in the direction of rotation under the brushes, releasing the pressure as the paper is drawn back. Be careful to keep the ends of the paper as close to the commutator surface as possible to avoid rounding the edges of the brushes. Use sandpaper of medium grit for the roughing out and fine grit for the final fit. Carefully clean away all particles of sandpaper and brush material before operating the machine. Never use emery paper or emery cloth for fitting the brushes.

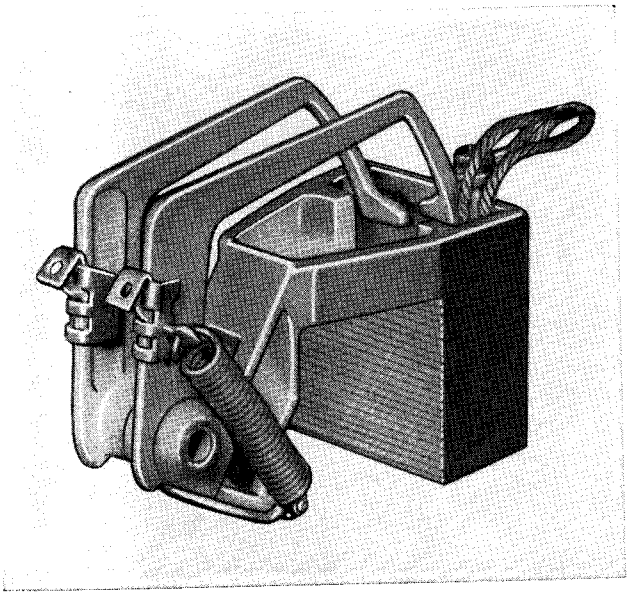

FIG. 3. "UNIFORCE" Brushholder—Sizes 1200 and Up

Brushholders. These machines are fitted with the "UNIFORCE" brushholder. The "UNIFORCE" brushholder maintains essentially constant pressure during the life of the brush. It requires no adjustment to compensate for brush wear.

Where severe operating conditions are encountered, such as severe vibration, high surges of load, line starting, etc., increased brush pressure may be desirable.

This can be obtained by adjusting the spring clip on sizes 1200 and larger (See Fig. 3). On sizes 1000 and smaller, increased brush pressure is obtained by changing the spring (See Fig. 4).

4. Commutator. Normally, after a few weeks operation, the commutator will become dark and highly polished and will remain unchanged for years. **Lubricants should never be used on the commutator.**

If the commutator becomes roughened through neglect or accident, it can be smoothed by using fine sandpaper, never emery cloth or emery paper. If very badly roughened it will be necessary to remove the unit rotor and turn the commutator down on a lathe.

When this is done, the commutator mica should be re-under cut or thoroughly cleaned out between bars.

When reassembled, sandpaper can be used to smooth the surface. Raise the brushes when performing this operation and clean the commutator thoroughly before operating the generator.

All commutators are thoroughly baked and tightened before they leave the factory, but if a bar should work loose it must be tightened at once.

Trouble sometimes occurs from the burning out of mica insulation between the commutator segments. This is generally caused by allowing the mica to become oil soaked, or by loose commutator bars. When this burning does occur, it may be stopped by scraping out the burned mica and filling the space with a solution of sodium silicate (water glass), or other suitable insulating cement.

Sometimes "high mica" develops and starts sparking which burns away the copper and makes the condition worse. In this case the mica must be cut away to a depth of 1/32 of an inch below the adjacent copper. This is usually done by means of a small high speed circular saw about 0.003 of an inch thicker than the nominal thickness of the mica.

Excessive sparking may be due to one of the following brush or commutator conditions:

a. Brushes may be off neutral.

b. Brushes may be wedged in brushholder, or may have reached their limit of travel.

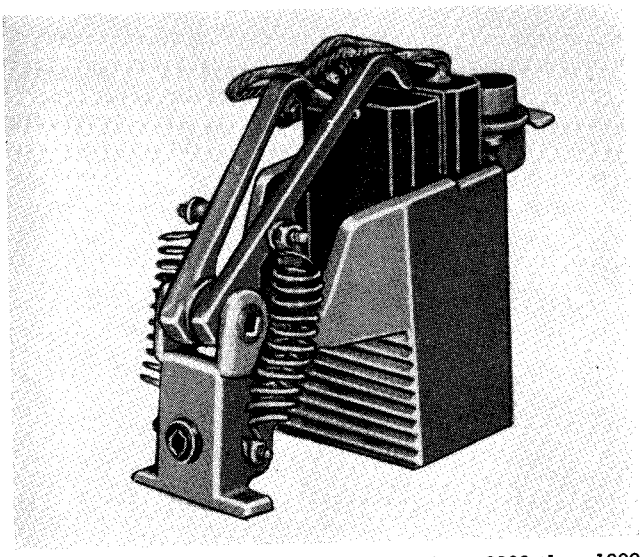

FIG. 4. "UNIFORCE" Brushholder—Sizes 0900 thru 1000

c. Brushes may be improperly fitted to commutator.

d. Brush pressure may be too low.

e. Brush faces may be burned.

f. Commutator may be rough.

g. A commutator bar may be loose, or project above the others.

h. Commutator may be dirty, oily, or worn out.

i. Brushes may be of an unsuitable grade of carbon.

j. Brushes may be unequally spaced circumferentially.

k. Brushes may have unequal pressures, causing some brushes to take too much of the load.

l. High mica.

m. Loose brushholder.

n. Incorrect brush angle.

Localized sparking may be due to an open circuit or loose connection in the armature, or between the armature and commutator. This trouble usually is noted as a bright spark which appears to pass completely around the commutator.

DISASSEMBLY

Before disassembling a unit, special care should be taken to remove any accumulation of dirt to prevent it falling into the machine as the disassembly proceeds.

To remove the unit rotor (d-c armature, a-c rotor and unit shaft) from the set, disassemble the front and rear bracket.

In removing the front bracket, first remove the brushes from the brushholders, identify and disconnect the leads to the brushholder rods. Remove the front bracket bolts and slide off the front bracket. In removing the rear bracket, first remove the bolts holding the blower hood to the rear bracket and remove the blower hood. Loosen the set screws on the blower and slide it off the shaft using the puller holes provided in the blower hub if necessary. Remove the blower key. Remove the rear bracket bolts and slide off the rear bracket. The unit rotor (d-c armature, a-c rotor and unit shaft) may now be removed from the set. Determine which end has the larger diameter (the a-c rotor or d-c armature) and remove the unit rotor from that end.

If necessary, the a-c and d-c frames can be disassembled. On sizes 0900 through 1600, the a-c frame and connecting ring are disassembled as a unit. This is done by removing the bolts securing the connecting ring to the d-c frame. These bolts are accessible through the inside of the a-c frame.

On sizes 1800 through 2000, the d-c frame and connecting ring are disassembled as a unit. This is done by removing the nuts from the studs in the a-c frame. These nuts are accessible through cover plates on the connecting ring.

Before disassembling the frames, mark their position with respect to the connecting ring to enable their reassembly in the correct position.

RENEWAL PARTS AND ADDITIONAL MAINTENANCE INFORMATION

Renewal parts information may be obtained from the nearest WESTINGHOUSE Sales Office. Be sure to designate completely the parts required, and give the complete nameplate identification of the machine. Fuller details relating to a specific maintenance problem will also be supplied on request.

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