Joliet Equipment Corporation
Joliet Electric Motor Co.
P.O. Box 940070
Houston, TX. 77094-7070

Phone: (713) 467-7559
Fax: (713) 467-7887

Inspection & Maintenance Manual

DRILLING MOTOR/GENERATOR
TYPE JEC 75Z

CONTENTS

WARNING: *When the JEC 75Z motors and generators are pinned (auxiliary switch activated), be alert to the fact that AC voltage is still present on the device terminal boards since:*

1.) Space heater is still on (240 VAC).
2.) Blower unit is still on unless it is independently switched off (460 VAC).

Failure to observe this warning could result in severe electrical shock.

A. DATA

Max. Permissible Speed (RPM)
Motors……. ……..…..1800
Generators……. ……..…..1200
Max. Permissible Vibration (In.), Comm. End..…… 0.002

Carbon Brushes
Type…… Duplex with Rubber Pad
Size (In.)…… ¾ × 2¼ × 2
Minimum Brush Length (Length at which
Brush becomes inoperative (In.)…….. 1-3/32
Spring Pressure on Brush, Preset (Lb.)…… 10-12

Brushholder
Clearance to Commutator (In.)…….. 1/16-3/32
Clamp Bolt Torque (Lb. Ft.)……225-250

Commutator
Side Mica Thickness (In.)…… 0.060
Slot Depth (In.)…….. 0.047
Undercutting Saw: - Width…….. 0.063
- Diameter…… 1.000
Diameter: - New…… 16.625
- Worn (Minimum Permissible)……. 15.375
Riser Width (Minimum Permissible)…….. 0.625
Dust Groove: - Width…… 0.250
- Depth…….. 0.125

Concentricity – Used Commutator
Resurface if runout exceeds 0.010 TIR or 0.003 within any group of 6 bars):
After Resurfacing, TIR (In.)……. 0.001

Bar-To-Bar Test (500 V)
Voltage Variation Bar-To-Bar……..±5%

Lubrication
Armature Bearings (oz.)
Grease Capacity
Drive End…….…….. 39
Double Shaft Commutator End……31
Single Shaft Commutator End…..…….. 12

High-Potential Test
(60 Hz., AC, to Ground for 1 Minute)
All Windings (Volts)
Reconditioned…….. 2000

CAUTION: *This machine is of open-splash-proof construction. It is force-ventilated by a fan and requires an ample supply of cooling air. The cooling air should not contain combustible gases. If it is applied in an environment which may contain combustible gases, an adequate supply of non-contaminated cooling air must be provided.*

B. LUBRICATION

The frequency of lubrication will depend, to a considerable extent, on the severity of service of the machine. However, we suggest for normal operation that a basic overhaul of the machine be performed every three years of 18,000 hours.

C. INSPECTION

1. MONTHLY

Inspect exterior of machine, including cables for damage.

Covers, Seals, Latches

Clean the outside of the machine and remove the inspection covers. Use clean, dry compressed air (at 29 psi Maximum Pressure) and below the dirt and carbon dust from the interior of the machine.

WARNING: *Personal injury may result if proper eye protection is not worn when cleaning with compressed air.*

Check exterior covers to be sure felt seals are intact. If seals are missing or covers are damaged, replace seals or covers as necessary. Make sure covers fit properly and cover latches work properly.

Brushholders

Inspect the brushholders for damage. If brushholder(s) will be replaced, refer to BASIC REPAIRS, Brushholder Replacement section for instructions.

Brushholder Sleeves

Use a clean lintless cloth and wipe dirt and grease from the Teflon brushholders sleeves. If necessary, use a cleaner such as MEK (methyl ethyl ketone) to clean the sleeves. Inspect sleeves for cracks and thin spots caused by flashovers. Replace any damaged brushholder or one having a damaged sleeve.

WARNING: *MEK is a volatile solvent. The fumes should not be inhaled. Use only in a well-ventilated area and take adequate precautions to protect eyes skin and hands.*

Note: Never paint these sleeves. Periodically wipe them clean with a dry cloth or a cloth dipped in an approved non-oily cleaning solvent.

Inspect the brushholder cables and make sure all terminal bolts and all brushholder clamp bolts are tight.

Brush Spring Pressure

Lift the brush pressure fingers to the “toggled-up” position and check for free movement of spring assembly.

Inspect brush springs for obvious failure or damage. Check brush-spring pressure by comparing spring pressure with a spring known to be good. Refer to DATA section for brush spring-pressure value.

Brushes

Brush wear is determined by measuring actual brush length from the top of the carbon. Lift the brush spring, remove the brush and measure brush length.

Note: Be sure that used brushes are of sufficient length to last until the next inspection.

If brush is worn to or near the minimum length listed in DATA section, replace all brushes.

WARNING: *To avoid possible electric shock or injury form rotating equipment. Do not remove or replace brushes while equipment is energized or rotating.*

If brushes will be replaced, see BASIC REPAIRS, Brush Replacement section for instructions to install new brushes.

CAUTION: *When replacing brushes, use the recommended grade. Mixing of brush grades in the same motor or changing brushes to another grade is not recommended as this will seriously affect commutation, surface film, commutator and brush life.*

If brushes will NOT be replaced, the following brush inspection should be made:

a.) Inspect all brushes to be sure they are not chipped or broken. Make sure brush shunts are not frayed or broken. Replace any brush which shows damage.

Note: Chipped, burned or rough-faced brushes may indicate the commutator needs resurfacing.

b.) Move the brushes up and down in their carbon ways to be sure brushes slide freely.

c.) Check the brush shunts to be sure they are not twisted or out of position. Make sure all brush-shunt terminal connections and all brushholder cable connections are tight.

Commutator

Inspect the commutator for possible flashover damage. The commutator should be clean, smooth, glossy and free of high mica, high bars, flat spots or rough surfaces.

If there are indications the commutator is out-of-round (e.g., variations in width of the ridge between brush paths), check the concentricity of the commutator with a dial indicator. Condemning limits for concentricity are listed in DATA section.

If the commutator requires grinding, refer to Commutator Resurfacing under BASIC REPAIRS section of this manual for instructions.

Creepage Band

Clean the creepage band (located on the commutator cap) with a clean cloth dipped in an approved solvent. Inspect the band for possible flashover damage.

Make sure the creepage band is tight on the commutator cap.

Flash Ring

Examine the flash ring for possible flashover damage. Wipe the flash ring clean. Keep ring free of dirt and varnish.

Insulation

Measure the insulation resistance with a megohmmeter (megger) to determine the condition of the insulation. If reading is low, make a further inspection to determine if insulation failure or excessive moisture is causing the low megohmmeter reading. Correct the cause of low readings before returning the motor to service.

Inspect all accessible parts of the field coil insulation for cracking and evidence of overheating.

Power Cables

Inspect the power cables for signs of excessive heating, poor insulation or mechanical damage. Assure all terminals are tight.

Mounting Bolts

Check all mounting bolts.

2. SEMI-ANNUALLY

a.) Perform inspection operations listed under Monthly section.

b.) Refer to DATA section for Brushholders Clearance dimensions, and check the clearance between the brushholders and the commutator surface.

If clearance, adjustment is required, refer to BASIC REPAIRS, Brushholders Clearance Adjustment section for instructions.

D. BASIC REPAIRS

1. Brush Replacement

Note: Brush spring pressure is pre-set and non adjustable for the brushholders used on these motors. Any brushholder that is damaged or has a low spring pressure should be replaced before installing new brushes. Spring pressure can be measured with a 20 lb. spring scale pulling radially on the brush pressure finger over the center of each brush. See DATA section for limits.

a.) Remove the commutator inspection covers.

b.) Disconnect the brush shunt from the terminal screw located on the brushholder body.

c.) Lift the pressure finger away from the brush to the toggled-up position. Remove the brush.

d.) Use dry, compressed air and blow the carbon dust from the carbonway.

WARNING: *Personal injury may result if proper eye protection is not worn when cleaning with compressed air.*

e.) Insert new brush and make sure brush slides freely in the carbonway.

f.) Carefully lower the pressure finger on the brush. Do not allow the finger to snap down on the brush as brush damage may result.

g.) Bolt the brush shunt terminals to the brushholder(s). Arrange the shunt strands so they clear the pressure fingers and tighten the terminal screw(s). Make sure shunts are not positioned under the pressure fingers. Check and tighten all brushholder cable connections.

h.) Seat the brushes with a white seater stone.

CAUTION: *When replacing brushes, use the recommended grade. Mixing of brush grades in the same motor or changing brushes to another grade is not recommended as this will seriously affect commutation, surface film, commutator and brush life.*

2. Brushholder Replacement

Removal

a.) Remove brushes from brushholders and cover the commutator with heavy paper.

b.) Disconnect the cable from the brushholder(s) involved.

c.) Remove bolt, washer and brushholder clamp. Lift the brushholder out of the frame.

Installation

a.) Position the brushholder in the frame with the brushholder studs resting in the clamp surfaces of the brushholder support.

b.) Install bolt and washer. Tighten bolt but do not torque until the brushholder-to-commutator clearance has been established.

Refer to the following section for instructions to adjust brushholder clearance.

c.) After brushholder clearance has been set, connect the brushholder cable, remove protective paper from commutator surface, and install the brushes.

3. Brushholder Clearance Adjustment

Refer to DATA section for brushholder-to-commutator clearance dimension and adjust brushholder as follows:

a.) Remove the brushes.

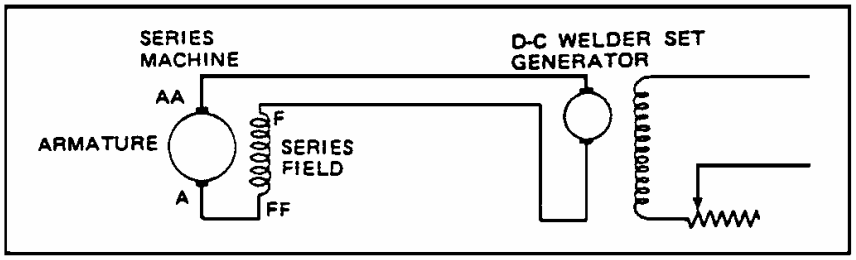

FIG. 3. DIAGRAM OF CONNECTIONS TO RUN SERIES MACHINE FROM A WELDING SET.

CAUTION: *Do not allow brushholder to touch, bump or rest on the commutator.*

b.) Insert a fiber gage (equal to the clearance dimension) between the commutator and the brushholder.

Do NOT use a metallic gage.

c.) Loosen the brushholder support bolt and move the brushholder against the fiber gage so clearance-to-commutator is the same as the gage thickness.

d.) Torque bolt to 225.250 lb. ft. and recheck the brushholder clearance gap.

4. Commutator Resurfacing

WARNING: *For the safety of personnel during resurfacing operations, the following safety precautions must be adhered to:*

1.) *A second man must be at the auxiliary power (welder) control station, ready to shut off power in case of an emergency during the grinding operation.*
2.) *The grinding operator should wear goggles and a dust mask when resurfacing or blowing out the commutator.*

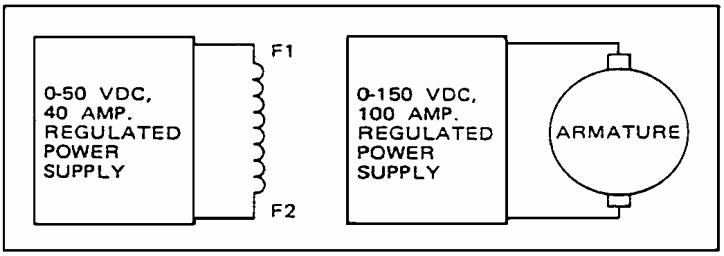

FIG. 3A. CONNECTIONS TO RUN A SHUNT MACHINE FROM A D-C POWER SOURCE.

CAUTION: *<u>Never</u> use emery cloth on a commutator. The abrasive particles will not only scratch the surface, they are conductive and lodge between the commutator segments. A flashover may result.*

Hand Stoning

If the commutator surface is mildly grooved, threaded, or burned, and only a small amount of copper has to be removed to correct the trouble, use a hand stone. Hand stoning will not correct an out-of-round commutator.

a.) Use a fine-grade stone ground to fit the commutator. It should also be of sufficient width to bridge any flat spots; otherwise, the stone will ride in and out of the flat and will not correct it.

b.) Remove one brushholder for access to the commutator.

c.) Run the motor at approximately 1000 RPM.

d.) Hold the stone firmly against the commutator surface, and with even pressure, move the stone back and forth longitudinally across the commutator surface.

e.) Blow away dust and sand with clean, dry, compressed air at 29 psi maximum.

WARNING: *Proper eye protection, such as goggles, must be worn when cleaning with compressed air. Otherwise personal injury may result.*

5. Sprocket Hub Mounting

Hub Fitting

To prevent a hub from slipping, it should have at least 75% fit on the shaft; i.e., at least 75% of the tapered bore of the hub should be in contact with the tapered fit on the shaft. Before mounting a hub, check and correct the fit as follows:

a.) Lightly cover the bore of the hub with a blueing compound such as Prussian Blue.

b.) Snap the cold hub forcefully on the shaft.

c.) Mark the relative angular position of hub with respect to the shaft.

d.) Remove the hub from the shaft. A convenient method of removal is by the use of two finely tapered steel wedges (hardened and ground) which are carefully driven between the sprocket hub and bearing seal on the shaft.

e.) Inspect the taper fit of the shaft; blueing of the hub bore should now show on the shaft. If at least 75% of shaft surface shows traces of blueing, the fit is satisfactory. If, however, only a few spots of blueing show on the shaft, the fit is not satisfactory.

f.) Dress down the blue spots on the shaft very lightly with a fine emery cloth such as No. 400A Triemite.

g.) Blue the hub bore again and repeat Steps 2, 4, 5 & 6. Be sure to place hub on the shaft in the same position as marked.

Generally, the fit will be improved, but the foregoing procedure may have to be repeated several times to obtain a 75% fit.

Under no circumstances use a lapping compound since lapping will produce a shoulder at the large end of the tapered fit. A shoulder will prevent a perfect fit when the hub is mounted hot; ie., when it is mounted in the advanced position.

h.) After a good fit has been obtained, thoroughly clean the shaft and the hub bore to remove all blueing, oil or grease. Then mount the hub.

Hub Mounting

Proper hub mounting is essential for successful operation of the sprocket drives.

a.) Thoroughly clean the hub fit on the shaft and bore of the hub (see procedure in General Maintenance of Rotating Equipment). Remove any scoring on the shaft or hub bore.

b.) Spot the cold hub on the shaft by hand and check for at least 75% fit. See hub fitting section. If necessary dress the shaft to obtain this fit.

c.) Trial mount the cold hub on the shaft. Measure and record the position of the hub with respect to the shaft. Make measurements with a micrometer indicator gage.

Mark points of measurements, and mark across the end of shaft and hub face so that the hub, when heated, can be mounted in exactly the same angular position, and so the advance measurement can be made from the same point.

CAUTION: *Zero settings of advance gage must not be disturbed until all readings on the hub are completed.*

d.) Mount the hub hot on the shaft so as to secure an advance from the cold position to the hot position along the axis of the shaft as indicated in this section. The ESTIMATED difference between shaft temperature and hub temperature (temperature rise) which will provide this advance is also given. The temperature difference is only as estimate and should be adjusted (if necessary) to maintain the advance within prescribed limits.

CAUTION: *The temperature of the hub must not exceed 250°C (482°F); otherwise, the hub may become annealed.*

Advance (in.)	**Degrees Rise Above Shaft Temperature**
0.120-0.130	215°C (387°F)
0.120-0.130	215°C (387°F)

Heat the hub in an oven until it has reached a uniform temperature (the desired number of degrees above shaft temperature). For example, if shaft temperature is 25°C (77°F), heat hub to 25°C (77°F) + 215°C (387°F) = 240°C (464°F)

An accurate method must be provided for measuring hub and shaft temperatures quickly before mounting the hub. This can best be done with a hand pyrometer. In using the pyrometer, place points of the gage inside the bore of the hub.

Measure temperature of shaft and hub with the same instrument.

e.) With hub bore and shaft taper clean, quickly mount the hot hub on the shaft in the same angular position as when cold. When the hub is nearly in engagement with the taper fit (not in actual contact), snap it forcibly into place with a quick push. It is important that the hot hub be instantly snapped into position before it has cooled; otherwise, it will freeze to the shaft and cannot be adjusted further.

f.) Check the hot or shrunk-on position of the hub on the shaft. The advance from cold to hot position along axis of the shaft must be held within the limits indicated. Check the actual advance with an indicator gage, located in the same relative position as used to measure the cold position in Step 3.

If the advance is not within specified limits, remove the hub and repeat the assembly procedure.

NOTES:

