

## MAINTENANCE - BEARING REPLACEMENT

The 971-C Monitor is designed for long life but any device with moving parts will eventually require maintenance. Excessive wear of probe bearings will be indicated by an increase in water leakage through the bearings. Initially, water flow will be only a few ml/minute. When leakage approaches 200 ml/minute, the bearings should be replaced with the spare set furnished.

Bearing replacement is quite simple but it is best to perform the operation in the instrument shop. Refer to the installation manual for probe component locations.

1. Disconnect the water supply, remove the motor splash cover and disconnect the incoming wires. Remove the probe and wash off adhering syrup, protecting the motor from splashing.
2. Loosen the two spline head set screws in the motor end of the flex coupling and back off the three set screws in the motor mount sleeve. Carefully pull the barrel and shaft assembly out of the motor mounting sleeve.
3. Remove the rotor and pull the shaft out from the flex coupling end. Remove the three set screws at the rotor end of the barrel and pull out the inner bearing retainer bushing.
4. Inspect the shaft and inside of the barrel for possible scale or dirt accumulation and clean them.
5. Press the old bearings out of their retaining O-rings using finger pressure or a 5/8" rod if necessary. Inspect the two internal O-rings and the one external O-ring on the inner bearing retainer and replace if needed with the spares furnished. Grease the O-rings lightly with silicone lubricant.
6. Press new bearings into the retainers until the O-rings snap into the bearing grooves. Be very careful not to get grease on the inside bearing surfaces or it will cause erratic and high readings until it is finally washed out by the water purge.
7. Inspect the shaft for excessive wear or scoring and replace if necessary. Wipe the shaft clean and slide it through the outer bearing. Slip on the inner bearing retainer and press it into the barrel until it seats. Replace the three set screws that hold the inner bearing retainer in place. See that the shaft is seated in the flex coupling and set screws are tight. Replace the rotor.
8. Slide the barrel and shaft assembly into the motor mount sleeve and tighten the three set screws with the water connection at the required angle.
9. Push the flex coupling fully onto the motor shaft seeing that one set screw is over the flat and tighten the two set screws through the access hole.
10. Install the probe. Connect the water and wires. Be sure the barrel fills with water before operating. If the probe is ever to be run on the bench, fill the barrel with

water and keep the probe horizontal so that the bearings are both wetted continuously.

11. New bearings and shafts sometimes give a high reading until they have "run in" for an hour or more. After the readings have stabilized, recheck the calibration as described in STARTUP.

## **TROUBLESHOOTING**

If the motor fails to run, see if shaft and rotor are free by turning with a finger through the access hole. Check to see the voltage across test points A and D on the circuit board (see Figure 4) is 120 VAC (or 240 VAC if applicable). If not, check continuity of the 0.25 ampere fuse and the on-off switch on the front panel. Wiring terminals 1(-) and 2(+) and should be about 6 VDC when the motor is stalled and about 25 VDC when the motor is running free. A voltage greater than 26 VDC indicates either a faulty motor connection or an open circuit motor. An open circuit motor can be caused by excessively worn motor brushes.

Changes in armature current with rotor load actuate the indicating meter and supply the 4-20 mA output signal. With the motor running free, the armature current is at a minimum. The voltage between terminal 1(+) and test point C(-) is a good measure of the armature current. With the motor running free, this voltage should be about 0.35 volts. With the motor at stall, the voltage should be about 2.0 volts. Armature current changes from about 280 mA to 1,500 mA as load is applied.

The motor should never stall completely in normal operation, even in very heavy masecuite. If it does, it could indicate worn motor brushes or a dirty commutator segment. Check brushes and replace if badly worn. Remove back end bell of motor and inspect the commutator, cleaning with fine sandpaper if needed. To be sure that external friction is not the cause, disconnect the probe shaft near the flexible coupling and check for dirty or scaled bearings or compaction of sugar crystals around the rotor.

The Bodine motors have special brushes that should be ordered from the supplier listed inside the front cover of this manual. When ordering replacement brushes, specify the motor manufacturer, motor type, voltage and brush dimensions.

The circuit board is protected by a 0.25 ampere fuse. Do not over-fuse, as circuit board damage can result.