

**FACILITIES INSTRUCTIONS, STANDARDS,
& TECHNIQUES**

Volume 3-11

**GENERATOR THRUST BEARING
INSULATION AND OIL FILM
RESISTANCE**

Generator Thrust-bearing Insulation and Oil Film Resistance

The thrust and upper-guide bearings of large vertical generators are insulated from the frame to prevent circulating current from passing through the bearing surfaces which might damage them. Test terminals are provided for periodic ohmmeter checks across the thrust bearing insulation. Some generators have three terminals A, B, and G (fig. 1), which permit checking the insulation on both sides of the metal plate separately, as well as measuring the thrust bearing oil film resistance. Other generators have only the terminal A, which only permits checking the thrust-bearing insulation to ground.

This bearing insulation test should be performed annually on all Reclamation generators. If the insulation resistance is abnormally low, the cause of the trouble should be investigated. Before concluding that the insulating sheets under the bearing supports are causing the low resistance, check the RTD leads, temperature device tube, or high pressure oil connection to the bearing shoes. On machines with a B terminal it is possible to determine when the bearing shoes are grounded through these accessories by measuring the resistance between terminals B and G with the machine running (provided there is a high oil film resistance, and the bearing support insulation is good). The insulation on both sides of the metal plate can be checked separately by connecting the ohmmeter between terminals A and G, and between A and B. The thrust-bearing insulation resistance should measure from about 10,000 ohms to infinity. Low resistance can indicate mechanical damage or damp insulation from leaky cooling coils. Dampness in the oil pot, due perhaps to a very slow cooling-coil leak, can cause serious corrosion damage or saturation of insulation, if allowed to persist. These problems are difficult to detect except by this test.

An additional test may be periodically made on the thrust-bearing oil-film resistance while the generator is running, and with the ohmmeter connected across terminals B and G. Although not entirely reliable, this test has indicated metal-to-metal contact where the bearing was slightly wiped, or a high spot had developed.

When there is very high resistance with the machine running, it is a good indication that the bearing surfaces are free of high spots or roughness, and the bearing is not grounded. This test can also be used when establishing an oil film with a high pressure lubrication system or to determine how quickly a complete oil film is established on starting a unit, or how long it persists on stopping.

The insulation resistance between the bearing shoes and the frame should be checked first, before the oil film resistance is checked; because, since these resistances are in parallel, a false impression of oil film resistance could be obtained if the bearing insulation resistance is relatively low. When the generator is stationary, the oil having been squeezed from between the bearing surfaces allows metal-to-metal contact, and zero resistance between terminals B and G. When operating at normal speed the oil film resistance should be from 100,000 to 500,000 ohms.

Measurements of oil film or bearing insulation resistance should be made using an ohmmeter operated from batteries of not more than 9 V d-c, and connected only long enough to take the reading. Under no circumstances should an a-c or d-c power circuit be connected to the test terminals, because damage could occur to bearing surfaces if high current should pass through them. As an added precaution, generators provided with the B terminal connected to the bearing shoes, should have a red nameplate mounted adjacent to the terminals with the following inscription:

WARNING

Do not connect any source of power over 9 V d-c to these terminals. To check resistance, use an ohmmeter operated from d-c batteries of not over 9 V, and connect only long enough to take the reading.

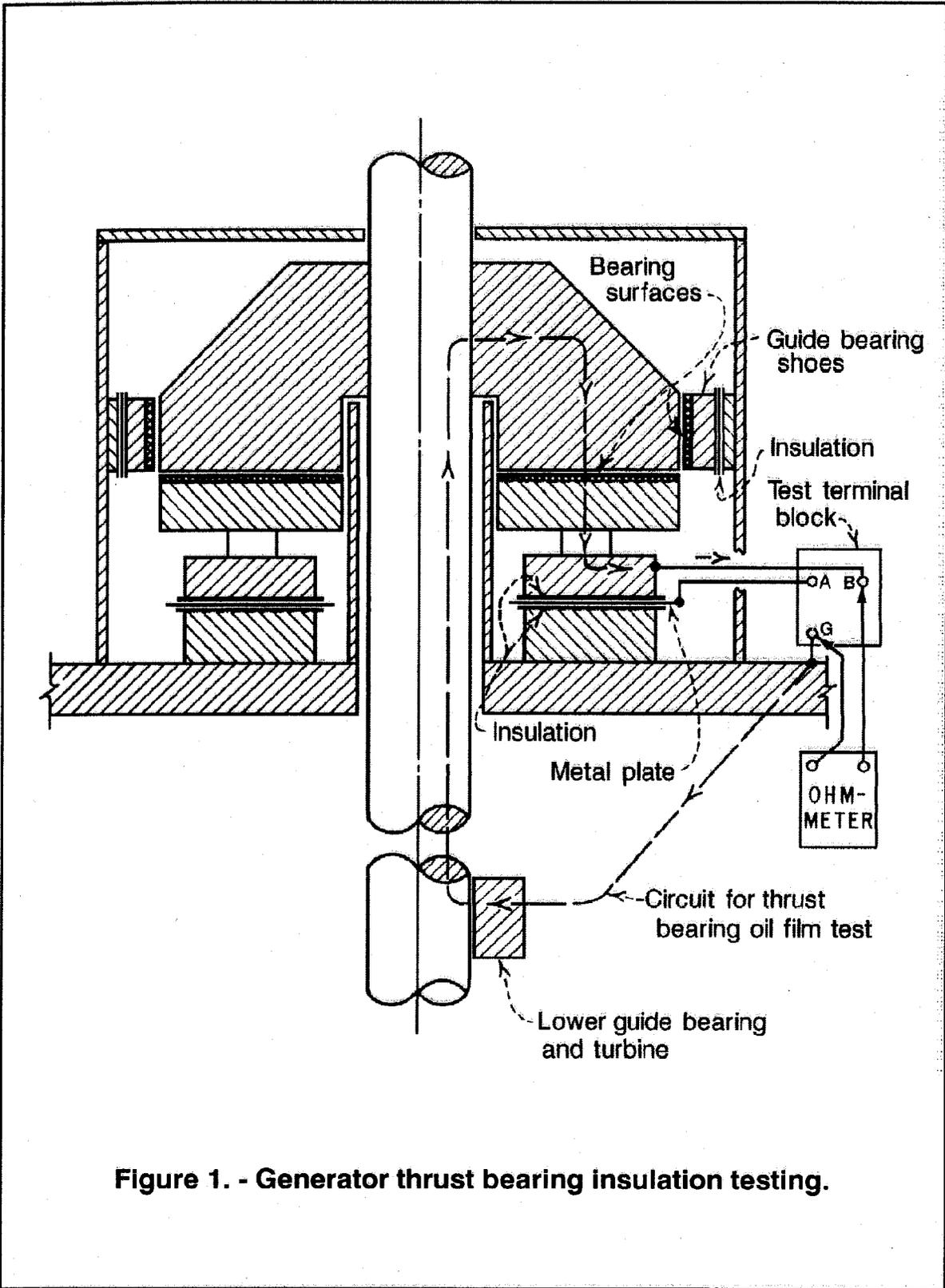


Figure 1. - Generator thrust bearing insulation testing.