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You'd think that a common testing method (i.e., in practice for well over a century and referenced in testing standards) shouldn't have to be identified as something you need to verify through repair and troubleshooting. But it is.

Slight torsional vibration causing problems in machines attached to a synchronous motor, trouble starting, cracked amortisseur windings, broken couplings and the inability to maintain synchronous speed should signify potential problems in a rotor circuit. These may include problems in the excitation circuit, failed/failing diodes in the rotating rectifier or rotating fields that are shorted, open or grounded. For purposes of this article, we'll discuss a simple method for evaluating rotating fields.

The unbalance test must be performed with power to the stator tagged-out and—*preferably*—th e rotor out of the stator and isolated from other coils or large metal objects that could influence test results. The rotor should be insulation-resistance tested and must be over 100 MegOhms at either 500Vdc or 1000Vdc applied. A 120 Volt source is applied to the rotor leads, and voltage is read across each of the field coils. The values should be actual supply voltage divided by the number of coils. If there are six coils at 120 Vac, the voltage drop across each coil should be 20 Vac. The maximum unbalance is +/- 5% with coils that are showing a significant unbalance being shorted and coils showing no voltage drop being open.

Why AC Voltage applied? Most rotating fields will degrade from the inside of the coil toward the outside. Basic insulation breakdown will leave air gaps and resistances high enough that they can't be detected by simple DC resistance or applied DC Voltage: You need an alternating current to "jump the gap" and show the short.

This test, and others, must be insisted on during the repair process (and all can be referenced to IEEE Standard 115-1995, "IEEE Guide: Test Procedure for Synchronous Machines"). Don't *a ssume*
your repair center is following this standard or the common test procedures for synchronous machines. Ask to see the data. I've done this myself—
when a machine operated no differently than when it was originally pulled from service
—and discovered even a manufacturer's repair shop had not performed these tests after a salient pole generator was returned to service for a life-critical system!
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