

General Motor Knowledge
Part 11

Breakdown Tests -vs- Leakage Tests

by
Lynn R. Dutro
June 10, 1993
GKM11.wp5

This month we will continue our discussion with the difference between a high voltage or hipot test for BREAKDOWN and LEAKAGE. Again, we will make reference to Mr. Slaughter's book, "Basic Facts About High Voltage Testing".

Recall the example where we had a motor with a wire spacing less than $3/32$ of an inch from the motor frame. Ordinary line voltage will not bridge this gap and no current will flow. But a high voltage will arc across the close spacing and we will have a high voltage BREAKDOWN. A high voltage breakdown tester is the only manner in which we can expect to find defects of this type.

On the other hand, we find that the breakdown test gives us no information about the general quality of the insulation system. In our motor we have a combination of several types of insulation, and this combination will have a nominal value, both in breakdown voltage and leakage current. What if the wrong solvent is used in the motor varnish, or suppose the wire supplier reduces the insulation thickness, or perhaps the possis powder is changed?

If we establish a nominal leakage current limit, and run leakage tests as a routine inspection, these weaknesses will be detected - immediately, not a year or so later after thousands of motors have been shipped.

Since breakdown and leakage tests are complimentary and neither is a substitute for the other, can these tests be combined in the interests of production efficiency? The answer is "YES" without qualification. Since, as discussed previously, leakage current is practically a linear function of the test voltage, we can make the leakage test at any voltage desired - so long as we set the limits accordingly. So, we can choose to make the leakage test at the breakdown test voltage. Then we have but to check the actual leakage current during the breakdown test to obtain a combined test.

Our final electrical test stands check the leakage current during the high voltage breakdown test. This information is recorded by the computer for each motor tested. Next month we will begin a discussion of the components of our insulation system.