

Memorandum M-2389

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Division 6 - Lincoln Laboratory  
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**SUBJECT:** MAGNETIC MEMORY PLANE INSULATION RESISTANCE TESTS

**To:** N. H. Taylor

**From:** R. J. Biagiotti

**Date:** September 2, 1953

**ABSTRACT:** Insulation resistance measurements were made on two 16 x 16 and seven 32 x 32 magnetic memory planes, in order to determine the extent of abrasion caused by threading the wire through ferrite cores. These tests show that the amount of insulation removed is not excessive.

Two experimental 16 x 16 memory planes were first subjected to non-destructive insulation resistance measurements, and then a hi-pot test to determine the breakdown voltage. These two test planes were strung with GE Heavy Formex Wire and had lower insulation resistance than the larger planes, which used GE Quadruple Formex Wire. One plane had an average insulation resistance of about twenty thousand megohms, while the other had resistance of the order of forty thousand megohms. The breakdown voltages of the two planes correlated fairly well with the resistances, being about three thousand volts on the plane with lower resistances and six thousand on the plane with higher resistances. These voltages were the voltages required for breakdown between the sensing winding, and Z winding, both of which go through every core.

On the larger planes the only tests made were non-destructive insulation resistance measurements. Individual measurements were made between the sensing winding and every other winding, the Z winding and every other winding, and then between all combinations of individual X and Y windings. The lowest measurements were obtained between wires which run parallel through the same line of cores and connected to lugs in the top tier on opposite sides of the frame. As this combination was approached, the resistance dropped from approximately thirty thousand megohms to between fifteen and twenty thousand over a span of three to five lugs. All combinations involving the long windings were at least thirty thousand megohms, with a few being almost double this value. Resistance measurements between X and Y windings ranged from fifty to one hundred thousand megohms. There was one plane which had resistances that dropped to two thousand megohms, but it was of slightly different construction, having a different type insulating board on one side. Since it was different, this frame was not included in the above discussion.

The resistance measured between top and bottom lugs on the same terminal strip, with no windings connected, was of the same order of magnitude as the lowest resistance measured, which would seem to indicate that this quite possibly was the cause of the low readings, since this path was shunted directly across the insulation at the point of lowest readings. Due to the

sensitivity of the instrument used to measure these high resistances, a definite variation in readings could be noticed as the humidity changed, with increased humidity giving lower resistance readings. Measurements were made at 500 volts DC.

Since the insulation resistance was being used as a measure of the abrasion, it seems safe to assume that the loss of insulation due to this cause may be neglected. The quadruple Formex Wire used in these planes is highly abrasion resistant as was shown in M-1827.

Signed R. J. Biagiotti  
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