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AN-104
APPLICATION NOTE

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FAA - MAGNETIC INSPECTION OF PACKAGES USING THE MEDA FM300

INTRODUCTION

This application note describes how to use the FM300 three axis magnetometer to determine if a package exceeds the Federal Aviation Administration's (FAA) stray magnetic field regulations.

BACKGROUND

The FAA regulations require that "no package is to be accepted with a magnetic field greater than 0.00525 Gauss measured from 4.5 meters (15 feet) from any surface of the package."

A package which contains magnetic material must be inspected to make sure that it meets the FAA regulation. The FM300 with its 0.01 milligauss (mG) sensitivity and 0.25% accuracy is an ideal instrument for performing this inspection.

The FM300 CONTROLS

Figure 1 shows the front panel controls of the FM300. The FM300 can detect a field change as small as 0.01 mG (0.00001 Gauss) in the presence of Earth's magnetic field (approximately 0.6 Gauss) without any range change.

Only the Rel and the Units functions are used to perform the package test. The following paragraphs describe how these keys work.

When the FM300 is first turned on, the meter displays the value of the X axis magnetic field vector. This is the vector that corresponds to the arrow pointing the length of the FM300 probe. If the Rel key is pressed, the FM300 stores the currently displayed field value and, thereafter, displays only the changes from this value caused by changes in the local magnetic field (or the package under test). Pressing the key a second time causes the FM300 to again display the actual value of the magnetic field.

The Units key is used to choose the magnetic field units in which the measured field is displayed. The default units is nanotesla (nT). In our tests we will want the display to read in milligauss (0.001 Gauss). This can be accomplished by pressing the ALT key followed by the Units key until mG is displayed after the field value.

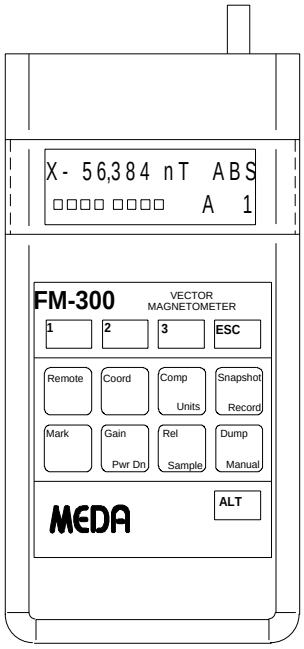

FIG 1 - FM300 FRONT PANEL CONTROLS

TEST AREA REQUIREMENTS

The package tests should be carried out in an area which is relatively free from external magnetic disturbances that may influence the measurements. You should also remove your belt, keys and any other ferromagnetic material that you may be carrying. The test area should

be at least 30 feet from elevators, parking lots or any area where large moving objects, such as warehouse material movers may be operating.

INITIAL SETUP

These steps should be taken before testing any packages. The packages to be tested should be at least 30 feet away from the FM300 probe.

1. Set up two non-magnetic (e.g., wooden) tables of the same height in line with one another and spaced 15 feet apart as shown in Fig. 2.
2. Secure (e.g., with tape) the FM300 probe near the edge of one of the tables. The X axis arrow on top of the probe should be pointing toward the center of the second table and on the line joining the centers of the two tables.
3. Turn the FM300 on and wait 5 seconds for the displayed value to settle.
4. Press the Rel key. The displayed value will collapse to about zero.
5. Press the ALT key followed by the Units key. This will cause the units to change in the upper right-hand corner of the display. Repeat this procedure until the units displayed is mG.

You are now ready to test the magnetic properties of packages.

TEST PROCEDURE

The following procedure assumes that there are two people performing the test, and the initial setup described above has been performed. It also assumes that the package under test is at least 30 feet away from the test site.

1. Before testing a package, note the FM300 meter reading (write it down on a piece of paper).
2. Bring the package to be tested into the site. Place it on the table opposite the table containing the probe so that one of its sides is facing the FM300 probe and is 15 feet from the front edge of the probe (see Fig. 2).
3. While one person slowly rotates the package under test clockwise, the other person observes the reading on the FM300 meter and notes its maximum change from the reading recorded in step 1 (current reading – step 1 reading).
4. Return the package to its original starting position.
5. Flip the package up so that the original side facing the FM300 probe is now facing up and the face that was down is facing the FM300 probe (see Fig. 3).
6. Repeat step 3.
7. Remove the package under test from the

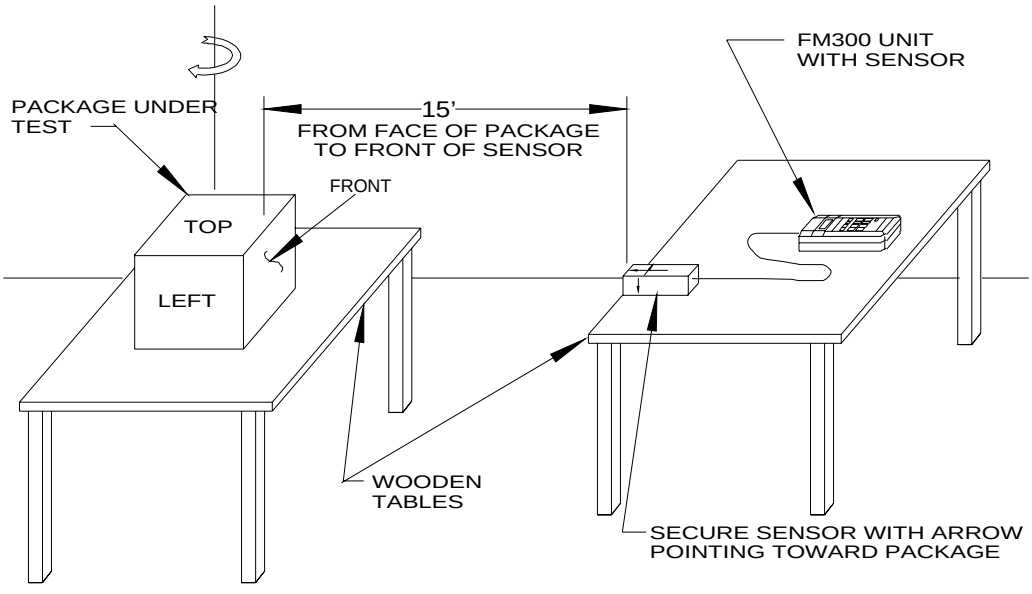

FIG 2 - STARTING POSITION

table and place it at lease 30 feet from the test site.

8. Note the FM300 meter reading. If it has changed by more than 0.10 from the reading in step 1, the local field has changed too much and the test must be repeated.

If the maximum change recorded in steps 3 or 6 exceeds 5.25, the package has failed the FAA regulation.

COMMENTS

Although this procedure calls for two separate non-magnetic tables, the test could be performed on one long table as long as the distance from the front edge of the FM300 probe and the face of the package under test is 15 feet. Placing the package on the table or rotating the package must not disturb the FM300 probe.

If the test is performed in a warehouse, be sure to avoid areas where warehouse personnel are moving objects or trucks are picking up and delivering packages.

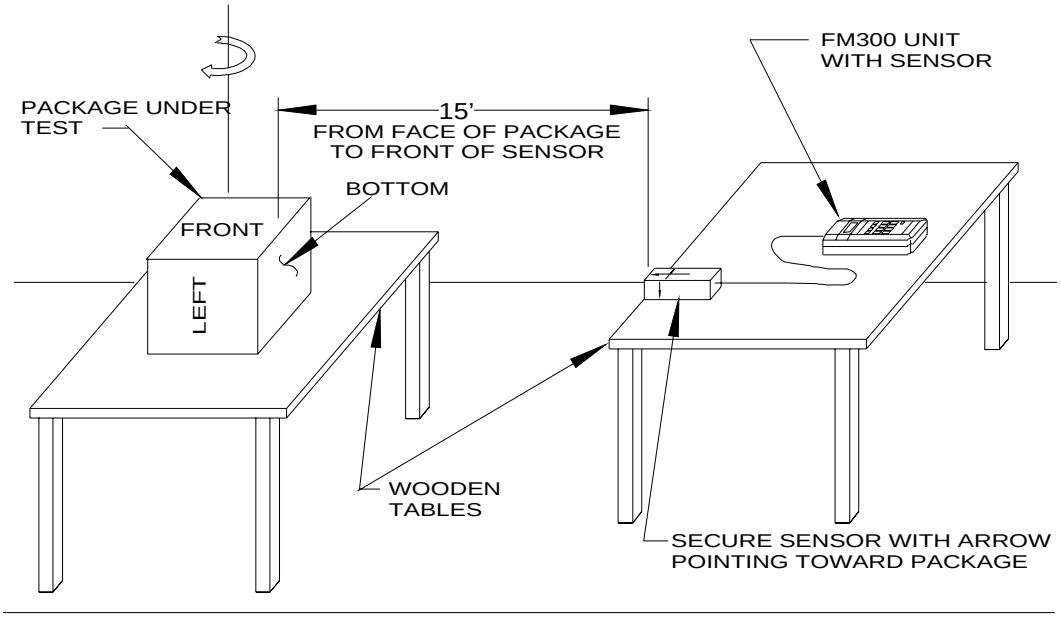

FIG 3 - SECOND POSITION