

## FAA - MAGNETIC INSPECTION OF PACKAGES USING THE MEDA $\mu$ MAG-01N

### INTRODUCTION

This application note describes how to use the  $\mu$ MAG-01N single axis magnetometer with neutralization controls 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  $\mu$ MAG-01N with its 0.01 milligauss (mG) sensitivity and 0.5% accuracy is an ideal instrument for performing this inspection.

### $\mu$ MAG-01N CONTROLS

Figure 1 shows the location of all the  $\mu$ MAG-01N controls. In addition to the standard ON/OFF Range control, the  $\mu$ MAG-01N also includes controls that can be used to cancel (neutralize) the local Earth's field and the fields produced by objects in the vicinity of the probe.

The Neutralization Polarity switch on the left side of the  $\mu$ MAG-01N determines the polarity of the field used to cancel the local field. It has three positions. In the OFF position the neutralizing field is not applied, and the  $\mu$ MAG-01N displays the value of the local magnetic field.

When the Polarity switch is placed in either the + or - position, the  $\mu$ MAG-01N produces a neutralization field in the sensor. The Neutralization Adjustment control on the right

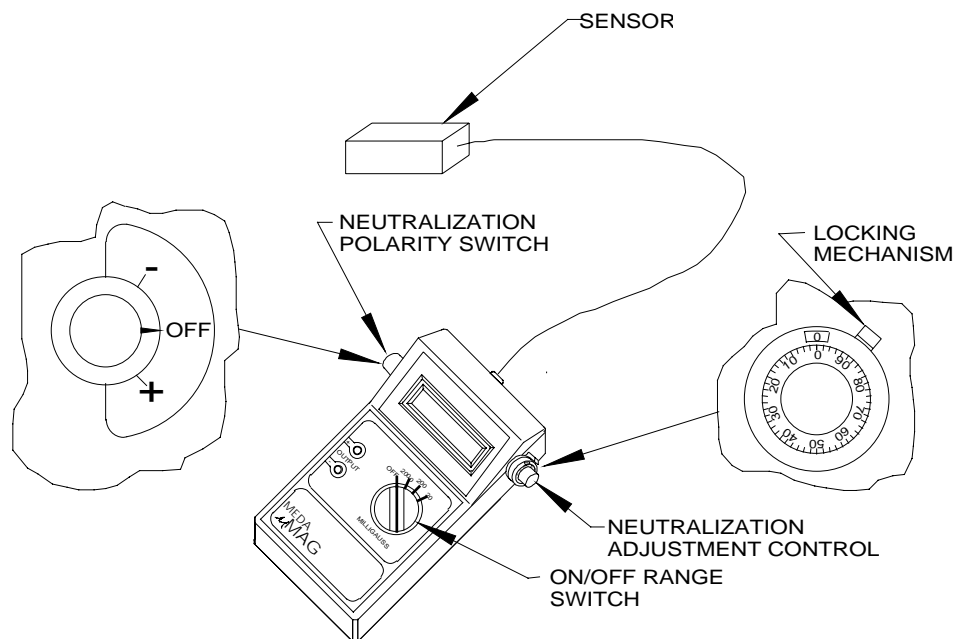


FIG 1 - MODEL  $\mu$ MAG-01N CONTROLS

determines the magnitude of this field and the Polarity switch determines its direction.

**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 package. The packages to be tested should be at least 30 feet away from the  $\mu$ MAG-01N 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  $\mu$ MAG-01N probe near the edge of one of the tables. The 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. Place the  $\mu$ MAG-01N Polarity switch in the

OFF position.

4. Unlatch the Neutralization Adjustment control on the right side by sliding the latch to the left. Rotate the Neutralization Adjustment control counterclockwise until it reaches a stop (the 0 on the dial will align with the 0 in the window).
5. Turn the Range switch on the front panel from OFF to 2000 and read the local field value displayed on the meter.
6. If the meter reading is positive, place the Polarity switch in the - position. If the meter reading is negative, place the Polarity switch in the + position.
7. Rotate the Neutralization Adjustment control clockwise until the meter reading is near 0.
8. Place the Range switch in the 200 position and rotate the Neutralization Adjustment control clockwise or counterclockwise until the meter reading is near 0.0.
9. Place the Range switch in the 20 position and rotate the Neutralization Adjustment control clockwise or counterclockwise until the meter reading is  $0.00 \pm 0.10$ .

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

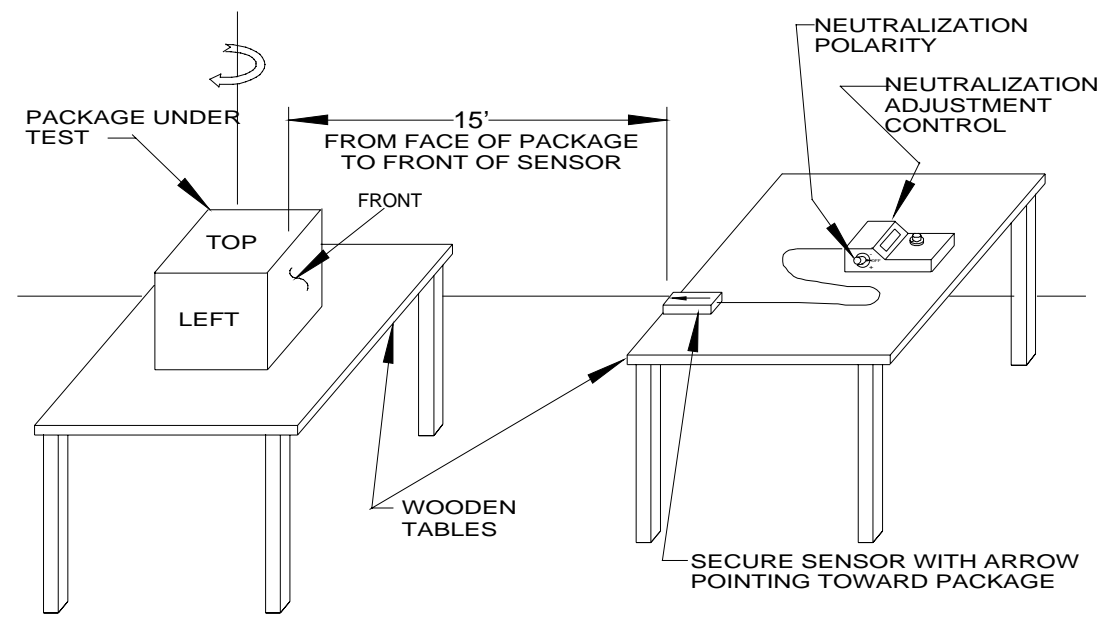


FIG 2 - STARTING POSITION

**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  $\mu$ MAG-01N meter reading (write it down on a piece of paper).
2. Bring the package to be tested into the site. Place the package on the table opposite the table containing the probe so that one of its sides is facing the  $\mu$ MAG-01N 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  $\mu$ MAG-01N 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  $\mu$ MAG-01N probe is now facing up and the face that was down is facing the

$\mu$ MAG-01N probe (see Fig. 3).

6. Repeat step 3.
7. Remove the package under test from the table and place it at least 30 feet from the test site.
8. Note the  $\mu$ MAG-01N 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  $\mu$ MAG-01N 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  $\mu$ MAG-01N 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.

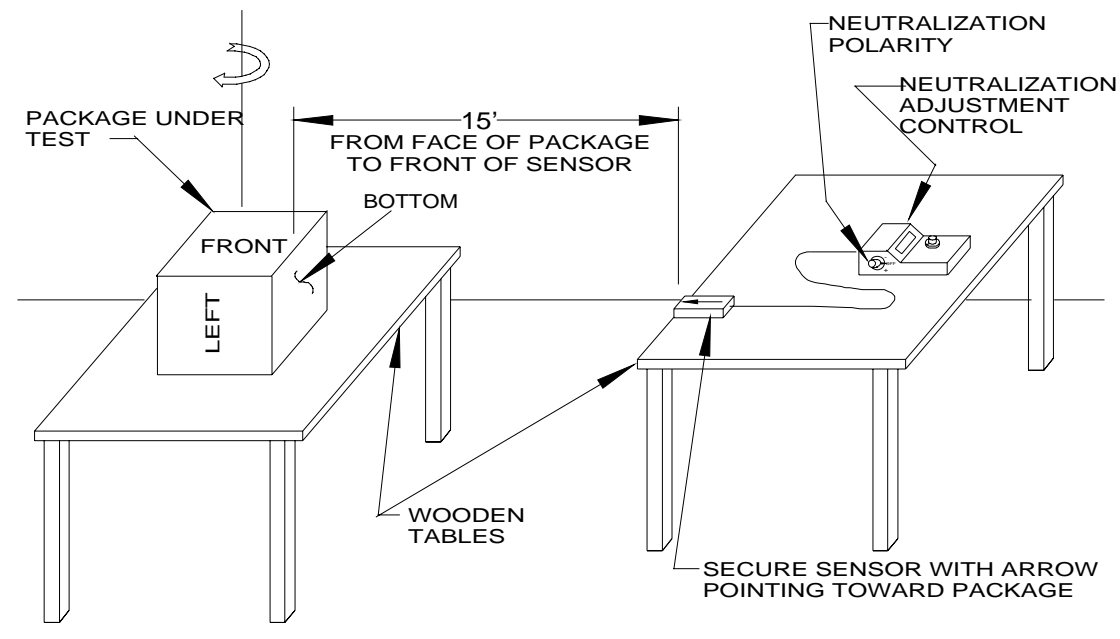


FIG 3 - SECOND POSITION