

**Magnetic Field Test Report
for the
Applied Innovative Technologies, Inc.
NightStar
Magnetic Force Flashlight
Pallet Lot**

August 20, 2003

Prepared for:

Applied Innovative Technologies, Inc.
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Fort Lupton, CO 80621

Prepared by:

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for the
Applied Innovative Technologies, Inc.
NightStar
Magnetic Force Flashlight
Pallet Lot**

August 20, 2003

WLL Job # 7717

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Table of Contents

1 Administrative 1
1.1 Customer 1
1.2 Test Specimen Identification 1
1.3 Manufacturer..... 1
1.4 Requirements Summary 1
1.5 References 1
1.6 Test Equipment and Instrumentation..... 1
1.7 Test Date 1
2 Test Procedure 2
3 Test Limit 3
4 Test Results 3
5 Conclusions 3

List of Tables

Table 1: Test Equipment List 2

List Of Figures

Figure 1: Test Orientation 1 4
Figure 2: Test Orientation 2 4
Figure 3: Test Orientation 3 5
Figure 4: Test Data, EUT Orientation 1, 1 to 10 feet 6
Figure 5: Test Data, EUT Orientation 2, 1 to 10 feet 7
Figure 6: Test Data, Single EUT Configuration 3, 1 to 10 feet..... 8

1 ADMINISTRATIVE

1.1 Customer

Applied Innovative Technologies, Inc.

PO Box 754

Fort Lupton, CO 80621

1.2 Test Specimen Identification

NightStar Magnetic Force Flashlight, Pallet Lot with 45 cases of flashlights. The Pallet Lot test specimen may be referred to as the Equipment Under Test (EUT) in this report.

1.3 Manufacturer

Applied Innovative Technologies, Inc.

PO Box 754

Fort Lupton, CO 80621

1.4 Requirements Summary

Evaluate the magnetic field strength of the EUT and compare findings to the requirements of United States Postal Service Publication 52, July 1999, section 349.24. The requirements provide for a magnetic field strength of less than 0.002 gauss at a distance of seven feet. In addition, magnetic field strength greater than 0.00525 gauss at a distance of 15 feet is nonmailable under any conditions.

Provide magnetic field intensity curve of the EUTs at one-foot increments from one foot to ten feet from the pallet on all three orthogonal planes. If measurements at 10 feet exceed the limit for 15 feet, extend the measurement distance to 15 feet to confirm compliance to the limit for the 15 feet distance.

1.5 References

- Washington Laboratories, Ltd. Quotation No. 60914
- Washington Laboratories, Ltd. Quality Assurance Manual
- Washington Laboratories, Ltd. Quality Assurance Program
- ISO 10012-1 Quality Assurance Requirements for Measuring Equipment, dated 1 May 1993

1.6 Test Equipment and Instrumentation

All instrumentation, measuring, and test equipment used in the performance of this test program were calibrated in accordance with ISO 10012-1. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards or the basis for calibration is otherwise documented. Table 1 lists the test equipment and calibration information for this test.

1.7 Test Date

August 19, 2003

Table 1: Test Equipment List

Test Instrument	Asset #	Cal Due
Suunto KB-14/360 Compass	N/A	Cal-in-test
Kikisui PCR2000L Programmable Power Supply	00093	8/6/04
WLL 1.5-m Field Coil	N/A	Cal-in-test

2 TEST PROCEDURE

An analog magnetic field compass with 0.1-degree resolution was placed on a non-metallic cart in a magnetic field oriented 90-degrees from the compass North-South axis. A direct current was supplied to the coil and the magnetic field strength, determined from the coil parameters and current using Equation 1 and Equation 2, was calculated to be 0.7432 gauss. The established field from the coil provided a 74-degree deflection on the compass dial. Reducing this angular change (Equation 3) established a 0.2131 gauss North-South alignment field. This alignment magnetic field strength of 0.2131 gauss is the reference field strength for the test location; including, all other magnetic field influences.

Equation 1: Coil Field Calculation

$$H_{A/m} = \frac{NI}{2R}$$

where:

N = number of coil turns (120)

I = current in amps (0.69)

R = coil radius in meters (0.7)

Equation 2: A/m - Gauss Conversion

$$H_{gauss} = H_{A/m} * 79.58$$

Equation 3: Alignment Field Calculation

$$H_A = \frac{H_R}{\tan \theta}$$

where:

HA = North-South alignment field in gauss

HR = Coil reference field strength in gauss

θ = Compass angle in degrees

After establishing the North-South alignment magnetic field strength, the EUT was set on a non-metallic (wooden) shipping pallet and positioned at 90-degrees from the compass alignment. The compass angular deflection caused by the magnetic moment of the EUT was measured at one-foot increments (1 – 10 feet) by repositioning the EUT (see Note below) and measured on all three EUT orthogonal planes. The compass deflection measured at each test point was translated to the measured field strength of the EUT by rearranging Equation 3.

Note: the mechanical device for moving the pallet was removed for each measurement.

The EUT was tested in three orthogonal planes defined as: 1) Pallet oriented with the un-labeled side (side without handling markings) of each case toward the compass; 2) the labeled side (side with handling markings) of each case toward the compass as shown in Figure 2; and 3) Pallet re-stacked to orient the top of each case toward the compass as shown in Figure 3.

3 TEST LIMIT

The test limits from United States Postal Service Publication 52, July 1999, section 349.24 requires the field strength to be less than 0.002 gauss at 7-feet for any magnetic package with approved handling instructions. Additionally, Publication 52 requires that if the magnetic field strength is greater than 0.00525 gauss at 15 feet, the package is nonmailable.

4 TEST RESULTS

The EUT complies with the requirements for a field strength less than 0.002 gauss at 7-feet. The highest levels at the 7-foot point were measured with EUT oriented in configuration 3 with the level at 0.0019 gauss. Figure 4 through Figure 6 show plots of the test results from 1 to 10 feet.

Because the 15 feet field strength limit of 0.00525 gauss showed compliance at distance less than 10 feet, measurements at the 15 feet distance were not performed or required.

5 CONCLUSIONS

The Pallet Lot configuration of the NightStar Magnetic Force Flashlight complies with the United States Postal Service Publication 52, July 1999 requirements for the shipment of magnetic material. The test configuration complies with the magnetic field strength requirements at the 7 feet and 15 feet test distances.

Photo not available

Figure 1: Test Orientation 1



Figure 2: Test Orientation 2



Figure 3: Test Orientation 3

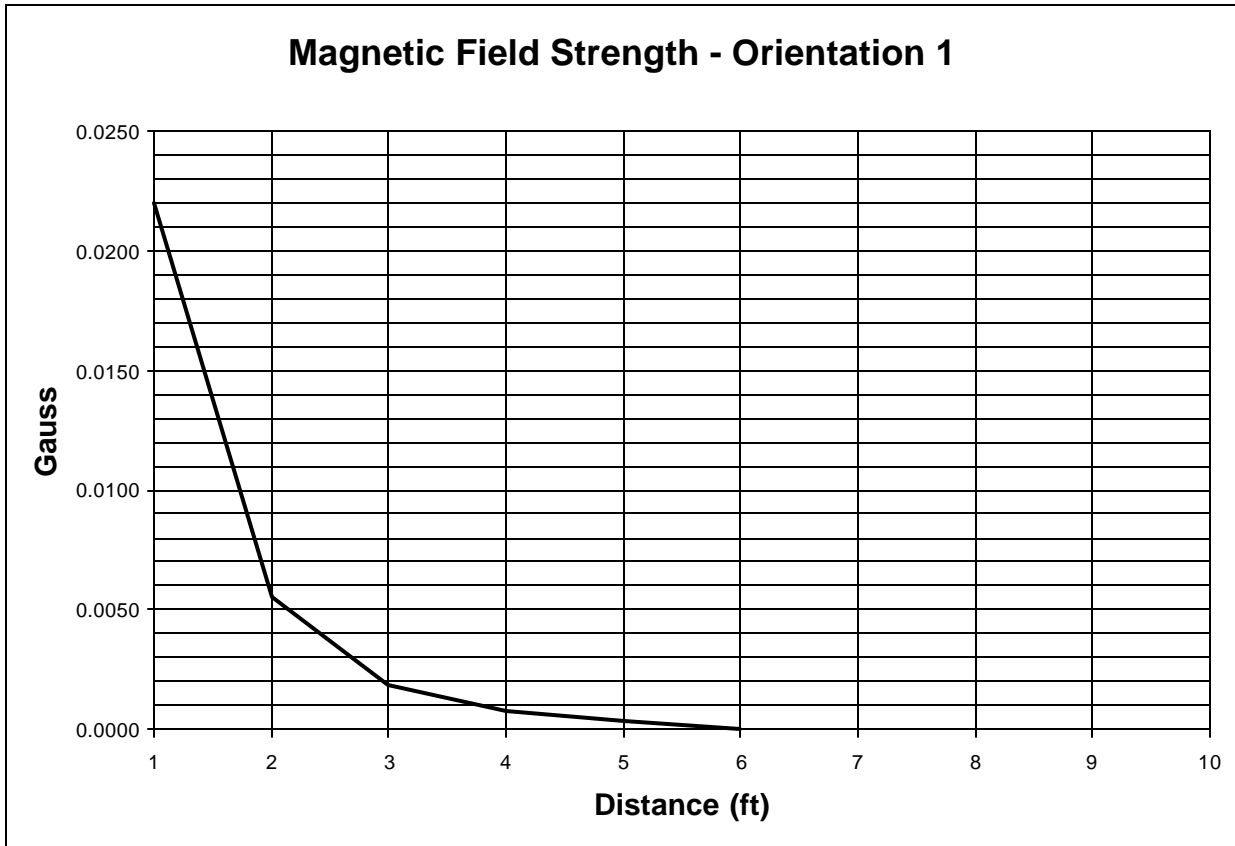


Figure 4: Test Data, EUT Orientation 1, 1 to 10 feet

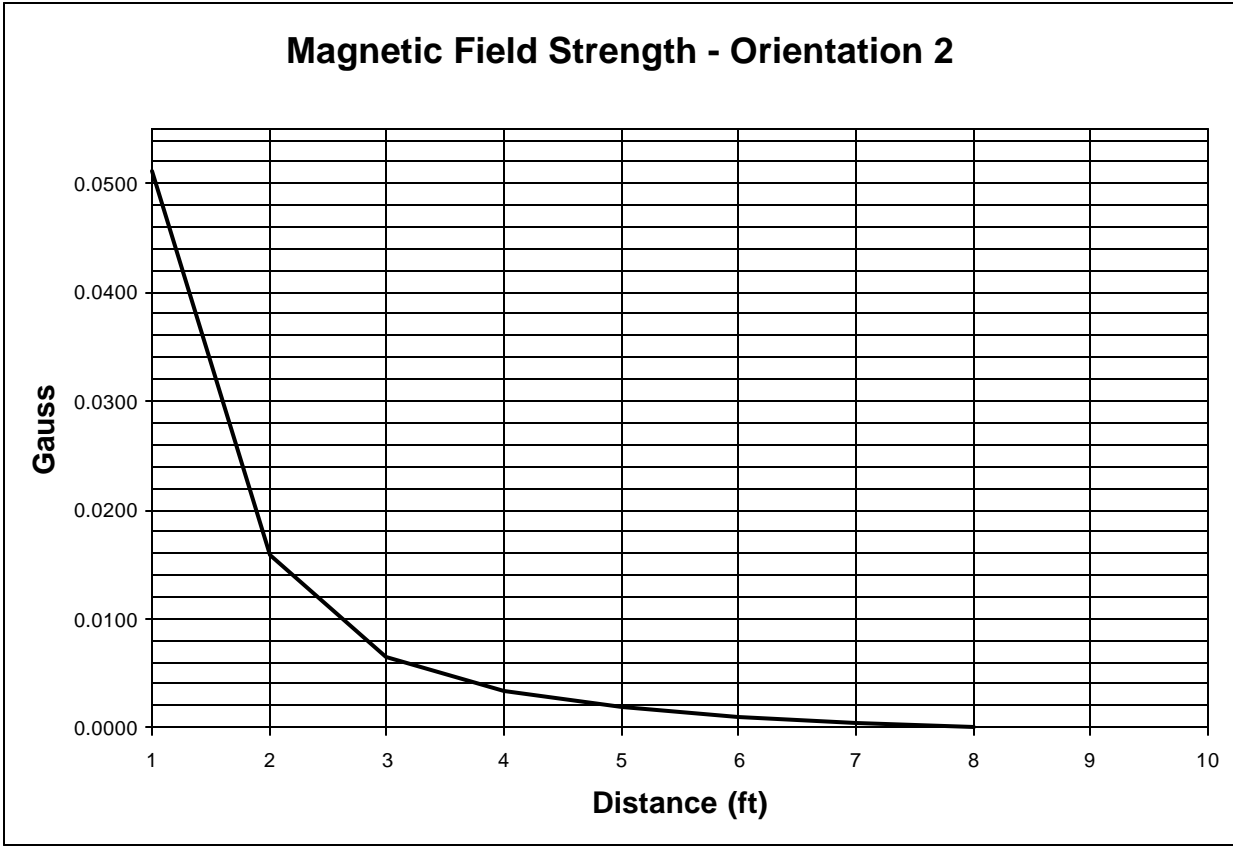


Figure 5: Test Data, EUT Orientation 2, 1 to 10 feet

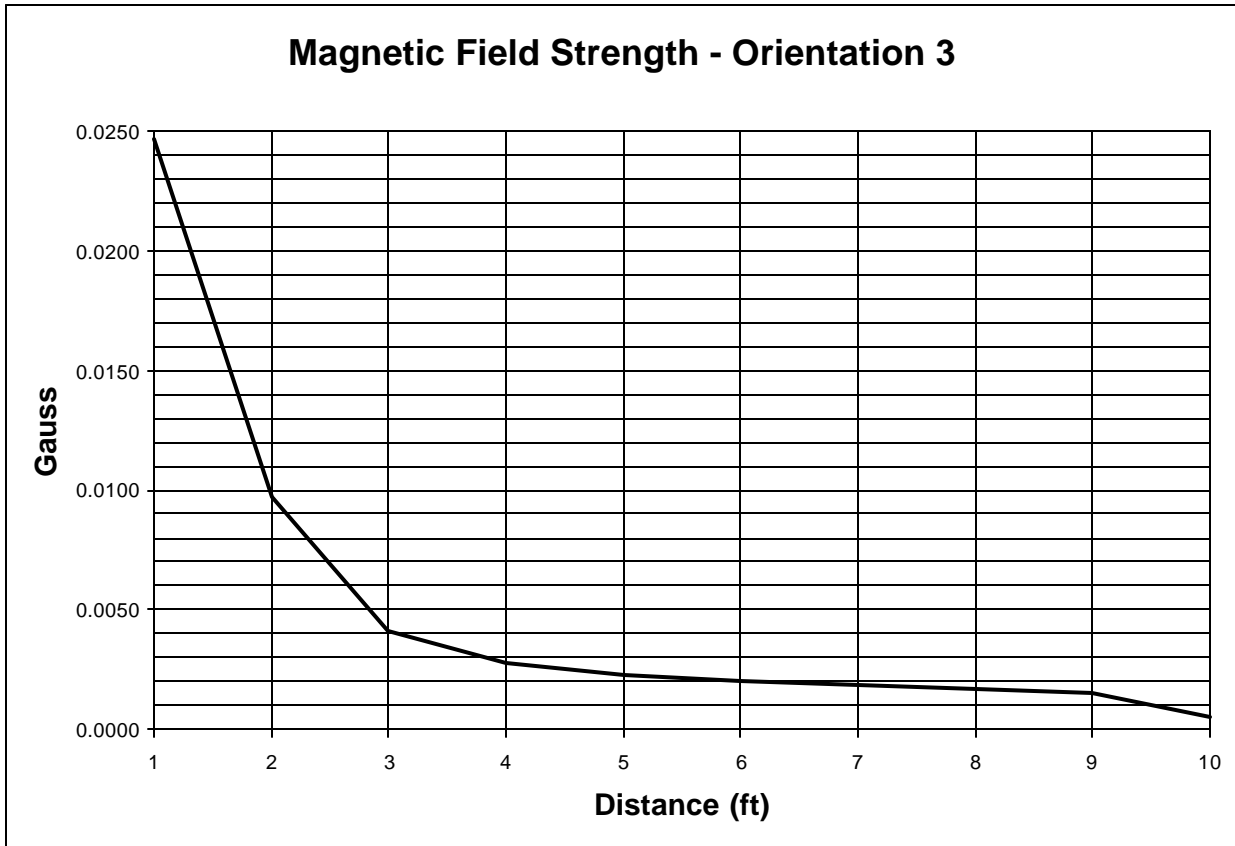


Figure 6: Test Data, Single EUT Configuration 3, 1 to 10 feet