

# Decoys Used in Missile Defense Intercept Tests, 1999-2018

## SUMMARY

The 18 intercept flight tests of the Ground-based Missile Defense (GMD) system through 2018 have not included realistic decoys and other countermeasures that the system would be expected to face in a real attack—including an attack from North Korea. Contrary to some claims, these tests have therefore not demonstrated that the missile defense system would be successful in intercepting incoming warheads under realistic conditions.

The primary purpose of the tests has been to demonstrate “hit to kill,” that is, to test the ability of the interceptor to be guided toward an intercept point and for the kill vehicle to home on the target warhead and physically collide with it.

The sensors on the kill vehicle view the mock warhead, the decoy balloons, and any other objects, (such as the upper stage of the missile that launched the warhead) and measure the brightness of the objects in several wavelength bands, and the fluctuation of those signals. The kill vehicle attempts to use that information to tell which is the warhead and which objects it should ignore. However, the decoy balloons and other objects used in the tests have been designed to look very different than the warhead to the kill vehicle’s sensor, so they have been easy to distinguish. In addition, those decoys that were found in early tests to be difficult for the kill vehicle to distinguish from the warhead have not been used in subsequent tests.

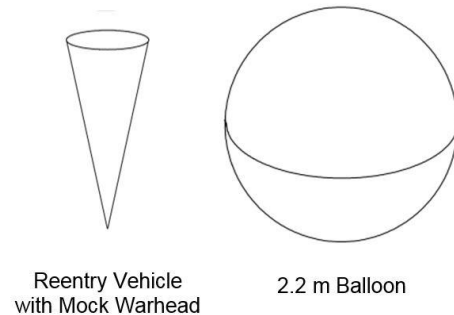
Moreover, the discrimination methodology used in the tests assumes the defense will have detailed information—in advance of an attack—about the appearance of the warheads and decoys used by the attacker. To discriminate, the defense would then compare what its sensors see with the information stored in its computer and attempt to find a unique match that will identify the warhead. In a real attack, the defense is unlikely to have *a priori* information about the appearance of the objects, which is under the control of the attacker.

The intercept tests therefore do not demonstrate the ability of the GMD system to successfully discriminate objects the kill vehicle might see in an actual attack.

### Decoys in GMD Tests

The tests listed below are the only ones that included decoy balloons and in which the balloons deployed properly and the kill vehicle operated as intended.

FIGURE 1. The Reentry Vehicle and Decoy Balloon Used in IFT-3, 4, and 5



#### TEST IFT-3 (1999)

The balloon decoy used in early tests appeared about six times brighter than the reentry vehicle to the kill vehicle’s sensor (Fig. 1) and was therefore easy to distinguish.

The other object the kill vehicle might see around the target is the upper stage of the target missile, which appeared about three times brighter than the mock warhead to the kill vehicle’s sensor.

#### TESTS IFT-6 AND IFT-7 (2001)

These two tests included a 1.7 meter diameter balloon, which likely appeared more than three times brighter than the mock warhead.

#### TEST IFT-8 (2002)

This test included two small additional balloons along with the large balloon used in the previous tests. These balloons were 0.6 meters in diameter and appeared one-half to one-third as bright as the mock warhead.

#### TEST IFT-9 (2002)

This test included the same three balloons as IFT-8, but a slightly smaller warhead. The large balloon and final missile stage appeared several times brighter than the mock warhead and the two small balloons were considerably less bright than the warhead.

### TEST FTG-06B (2014)

Few details are available about the decoys on this test, but the video from the kill vehicle's sensor appears to show two decoys and the final missile stage along with the mock warhead. The Missile Defense Agency's report on this test rates the "discrimination" task of this test as comparable to previous tests and near the "minimum" level.

More generally, a Pentagon report stated that none of the tests from 2010 to 2014 (including this one) involved complex countermeasures.

### TEST FTG-15 (2017)

Few details are available about the decoy used in this test, but information available from a video appears to show that the test included one decoy, which was significantly less bright than the mock warhead, along with the upper stage of the target booster, which was significantly brighter than the warhead.



For more information contact Dr. David Wright (617-301-8060).

FIND THIS DOCUMENT ONLINE: [www.ucsusa.org/decoypapersummary](http://www.ucsusa.org/decoypapersummary)

---

*The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with citizens across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.*

---

NATIONAL HEADQUARTERS  
Two Brattle Square  
Cambridge, MA 02138-3780  
Phone: (617) 547-5552  
Fax: (617) 864-9405

WASHINGTON, DC, OFFICE  
1825 K St. NW, Suite 800  
Washington, DC 20006-1232  
Phone: (202) 223-6133  
Fax: (202) 223-6162

WEST COAST OFFICE  
500 12th St., Suite 340  
Oakland, CA 94607-4087  
Phone: (510) 843-1872  
Fax: (510) 843-3785

MIDWEST OFFICE  
One N. LaSalle St., Suite 1904  
Chicago, IL 60602-4064  
Phone: (312) 578-1750  
Fax: (312) 578-1751