A countermeasure device for negating a guidance seeking system is provided. The countermeasure device includes a membrane defining an internal chamber, a gas disposed in the chamber, and an illuminating device. The illuminating device includes a light source producing energy sufficient to provide a decoy signature detectable by the guidance seeking system and a power supply coupled to the light source. In one embodiment the light source is a light emitting diode. In another embodiment, the light source is a laser diode.
ILLUMINATED AIRCRAFT COUNTERMEASURES

FIELD OF THE INVENTION

This invention relates generally to selected decoys or countermeasure devices for negating or confusing tracking or guidance seeking devices of homing missiles so that they fail to lock on to their intended aircraft target.

BACKGROUND OF THE INVENTION

Anti-aircraft missiles have electro-optical guidance seeking devices for tracking an infrared or other wavelength radiation emitted from a targeted aircraft (e.g., heat radiating from an aircraft engine's tailpipe). Conventional military aircraft employ hydrocarbon jells, flares or pyrotechnic compositions to produce a thermal decoy signature to attract an approaching missile away from its intended target. While the duration and intensity of such thermal decoy signatures vary, the purpose is to provide enough cover so that the approaching missile loses its ability to accurately track the intended target at least temporarily as the targeted aircraft is flown out of the line of sight of the missile. One problem with the aforementioned thermal decoys is that as components fall to earth they may still radiate enough heat to ignite material such as, for example, grass, trees and buildings, in the area of impact.

Increasingly, concerns have been raised throughout the world about missile attacks against commercial and other non-military aircraft. Typically, such non-military aircraft do not employ any countermeasures to secure against such attack. Additionally, few commercial, non-military airfields employ any defensive measures to provide cover for aircraft taking off or landing at their facility.

Accordingly, that a need exists for countermeasures that employ safer means of forming thermal decoy signatures than those that have this same characteristic.

One aspect of the present invention is directed to a countermeasure device for negating a missile's guidance seeking system, comprising:

(a) a membrane defining an internal chamber;
(b) a gas disposed in said chamber, said gas having a lesser density than air; and
(c) an illuminating device including:

- a light source producing energy sufficient to provide a decoy signature detectable by said guidance seeking system; and
- a power source coupled to said light source.

Another aspect of the present invention is directed to, in the operation of an aircraft having one or more turbojet engines, a system for protecting that aircraft from infrared-seeking missiles; including:

- a means for detecting the approach of said missiles toward the aircraft;
- one or more of the above-noted countermeasures to reduce the infrared radiation in each engine;
- and
- a controller for releasing the countermeasures as described above from the aircraft; said controlling means coupled to detection means (a).

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows one embodiment of a countermeasure of the present invention.

FIGS. 2A and 2B illustrate how this countermeasure is inflated.

FIG. 3 shows the use of tethered countermeasures of the present invention at the end of an airport summary.

FIG. 4 shows the use the countermeasures of the present invention relieved from an aircraft.

DETAILED DESCRIPTION OF THE INVENTION

The terms “aircraft” and “aircraft having one or more turbojet engines” as used in the present specification and claims refer to any type of aircraft (including both commercial and military aircraft) that has an engine that has an exhaust of sufficient infrared radiation to be tracked by a heat-seeking missile. While turbojet engines are a common type of engine on both commercial and military aircraft, the present invention does not exclude other types of engines that have this same characteristic.

In the operation of a turbojet engine, the exhaust of the turbine in such engines is a source of heat (and thus infrared radiation). The exhaust also emits heated carbonaceous materials, which also carry heat in the infrared signature. Together, the pure heat of the exhaust, these heated carbonaceous materials, and the infrared radiation emitted from the heated engine material itself create an infrared signature of the aircraft. It is this signature that heat-seeking surface-to-air (and also heat-seeking air-to-air) missiles are able to detect and target.

With reference to FIG. 4, the present invention allows for the immediate release and activation of the countermeasure by controller 64 when an incoming missile 70 has been detected by detector means 62. Preferably, these countermeasures of the present invention provide an intense light source 30 that is either constant for a short period of time (e.g., up to several minutes or more) or will flash on and off in a regular manner (e.g. flashes about every second or so).

When a threat is detected, this system allows for the countermeasures to be released manually by the pilots or automatically by threat sensors coupled to the electronic controllers or other conventional electronic release means. Also, this system may be used in combination with other defense measures, such as flares or chaff. Moreover, the system can be activated during every take-off and landing automatically as the cost of these countermeasures is minimal. This automatic use of this system may eliminate the need for the extra (and very expensive electronics) to detect threatening missiles.

FIG. 1 illustrates one preferred embodiment of a countermeasure of the present invention, shown generally at 10,
A process for protecting an aircraft during airport takeoffs and landings from infrared-seeking missiles, the process comprising the step of: placing adjacent to an aircraft taking off or landing one or more countermeasures comprising a membrane defining an internal chamber, a gas having a lesser density than air disposed in said chamber, and an illuminating device, said illuminating device comprising (i) a light source effective to simulate an infrared radiation signature of an aircraft and (ii) a power supply coupled to said light source, wherein the countermeasures are used to provide a defensive decoy signature to protect the aircraft from infrared-seeking missiles.

2. The process of claim 1, wherein said one or more countermeasures includes a tether for positioning said countermeasure device about an area of interest.

3. The process of claim 1, wherein said one or more countermeasures include a container for storing said gas and a valve coupling said chamber and said container such that, when activated, said valve releases said gas from said container to fill said chamber.

4. The process of claim 1, wherein said light source is comprised of a light emitting diode.

5. The process of claim 1, wherein said light source is comprised of a laser diode.

6. The process of claim 1, wherein said illuminating device includes a control circuit for selectively coupling said light source to said power supply.

7. The process of claim 1, wherein said one or more countermeasures are tethered at a height positioning said one or more countermeasures above said aircraft.

8. The process of claim 1, wherein said illuminating device is located inside said chamber.