Military aircraft bomb arming system

A military aircraft bomb arming system suitable for use with an aircraft that is provided with a Lead Electrical Fuze Arming (LEFA) pulse generator that is configured for use with a bomb fuze of the kind having both electrical and mechanical fuze arming means is provided. The system comprises a signal conditioning unit adapted to be connected between said pulse generator and a bomb fuze of a second kind that is intended to be armed by an air driven turbine alternator. The signal conditioning unit is adapted to convert, in use, a LEFA pulse from the pulse generator into a modified pulse suitable for providing a first arming environment to the bomb fuze of the second kind.

The system thus enables UK military aircraft to benefit from the utility offered by some of these international fuzes by providing additional arming safey.
Description

[0001] This invention relates to a military aircraft bomb arming system, and to a bomb fuze adapter.

[0002] Current UK military aircraft bomb fuzes are required to provide safety through the inclusion of multiple arming environments. Typically these require both mechanical and electrical/electronic means to ensure weapons are not armed whilst the bomb is in carried flight. These are known as the first and second arming environments.

[0003] The current UK bomb fuze has both electrical arming, provided by a Lead Electrical Fuze Arming (LEFA) electrical pulse, and mechanical arming by the rotation of an arming vane on the rear of the bomb tail.

[0004] The majority of other bomb fuzes manufactured internationally are electronic in nature and do not provide the same mechanical safety.

[0005] The invention stems from some work aimed at enabling UK military aircraft to benefit from the utility offered by some of these international fuzes by providing additional arming safety.

[0006] Most internationally available fuzes utilise an air driven turbine alternator to provide electrical power to arm the fuze of the bomb after release of the bomb from the aircraft, but do not provide an additional means of safety up to the moment of release.

[0007] On UK military aircraft, an electrical signal, the LEFA pulse, is generated by the aircraft at the moment of bomb release that is conditional upon the mechanical unlocking of the aircraft’s bomb release unit and hence the separation of the bomb from the aircraft.

[0008] This signal is directed from the aircraft to the fuze via a LEFA Cable and provides the first arming environment; the second arming environment being produced by the rotation of the arming vane.

[0009] We have realised that this LEFA pulse can be harnessed and modified through the medium of a signal conditioning unit to provide the first arming environment for bombs provided with international fuzes, with the second arming environment being provided after release by the air driven turbine alternator of the international fuze.

[0010] According to one aspect of the invention we provide a military aircraft bomb arming system suitable for use with an aircraft that is provided with a Lead Electrical Fuze Arming (LEFA) pulse generator that is configured for use with a bomb fuze of the kind having both electrical and mechanical fuze arming means, the system comprising a signal conditioning unit adapted to be connected between said pulse generator and a bomb fuze of a second kind that is intended to be armed by an air driven turbine alternator, the signal conditioning unit being adapted to convert, in use, a LEFA pulse from the pulse generator into a modified pulse suitable for providing a first arming environment to the bomb fuze of the second kind.

[0011] Thus the signal conditioning unit is preferably so configured to take the aircraft’s LEFA pulse (of “X” voltage, current and pulse length), generated at bomb release, and modify it electronically to provide the first arming environment for the bomb fuze of the second kind (of “Y” voltage, current and pulse length). After a short delay, the air driven turbine alternator will run up to speed, driven by the airflow over the bomb, and provide the second arming environment that then allows the fuze to arm.

[0012] Preferably the signal conditioning unit requires no independent power supply since it need only modify the existing LEFA pulse generated at bond release. The signal conditioning unit may conveniently be incorporated within the fuze’s own electrical cable harness.

[0013] One embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a schematic side elevation of a bomb that has just been released from the bomb release unit of a UK military aircraft, the bomb fuze being connected to a signal conditioning unit in accordance with the invention.

Figure 2 is a flow chart showing the stages in releasing the bomb and providing the first arming environment of the bomb fuze, and

Figure 3 is a functional block diagram of the signal conditioning unit in accordance with the invention.

[0014] In use, when the bomb is mechanically released from the bomb release unit of the aircraft, the LEFA pulse generator sends a standard LEFA pulse to the signal conditioning unit on the bomb.

[0015] The signal conditioning unit comprises power supply electronics that convert the LEFA pulse to a power suitable to supply a generator for modifying the pulse to a power and duration required for the international bomb fuze of the second kind.

[0016] The signal conditioning unit may include pulse isolation electronics that, where necessary, isolate the modified pulse from the initial LEFA input by means of a pulse transformer or the like.

[0017] The modified pulse is then fed to the international bomb fuze of the second kind to provide a first arming environment, the second arming environment being provided subsequently by air flow through an air driven turbine or the like on the bomb.

[0018] It will be appreciated that the second arming environment may be mechanical as described, or electrical.

Claims

1. A military aircraft bomb arming system suitable for use with an aircraft that is provided with a Lead Electrical Fuze Arming (LEFA) pulse generator that is configured for use with a bomb fuze of the kind hav-
ing both electrical and mechanical fuze arming means, the system comprising a signal conditioning unit adapted to be connected between said pulse generator and a bomb fuze of a second kind that is intended to be armed by an air driven turbine alternator, the signal conditioning unit being adapted to convert, in use, a LEFA pulse from the pulse generator into a modified pulse suitable for providing a first arming environment to the bomb fuze of the second kind.

2. The military aircraft bomb arming system of claim 1 wherein the signal conditioning unit is so configured to take the aircraft’s LEFA pulse (of "X" voltage, current and pulse length), generated at bomb release, and modify it electronically to provide the first arming environment for the bomb fuze of the second kind (of "Y" voltage, current and pulse length).

3. The military aircraft bomb arming system of claim 2 configured such that, in use, after a short delay, the air driven turbine alternator will run up to speed, driven by the airflow over the bomb, to provide the second arming environment that then allows the fuze to arm.

4. The military aircraft bomb arming system of claim 2 or claim 3 wherein the signal conditioning unit requires no independent power supply.

5. The military aircraft bomb arming system of claim 2, claim 3 or claim 4 wherein the signal conditioning unit is incorporated within the fuze’s own electrical cable harness.
Bomb On Aircraft

LEFA Connected

Bomb Released

LEFA Disconnect

LEFA Connector

LEFA Plug

Pulse On Disconnect / Weapon Release

LEFA Pulse

"X" voltage, Current, Pulse Length

Signal Conditioning

"Y" voltage, Current, Pulse Length

Fuze

First Arming Environment

FIGURE 2
Signal Conditioning Unit – Functional Block Diagram

- Aircraft
- LEFA Pulse
- Power Supply Electronics
- Generator For Modifying Pulse
- Pulse Isolation Electronics
- Modified Pulse
- International Fuze

**Aircraft LEFA Pulse - Delivered From The Aircraft At The Time Of Weapon Release**

**Converts The LEFA Pulse Through A Short-Duration Power Supply To A Suitable Power For The Pulse Generator**

**As Power Is Made Available From The Power Supply The Pulse Generator Produces A Modified Pulse Of The Power And Duration Required For The International Fuze**

**Where Necessary, Isolates The Modified Pulse From The LEFA Input By Means Of A Pulse Transformer Or Other Suitable Device**

**Giving Correct Power And Pulse Duration For International Fuzes As Required**

**FIGURE 3**