Abstract: A pylon device for suspending a payload beneath an aircraft wing or fuselage. The device comprises a main body with a top surface to face the aircraft and a bottom surface for engaging with the payload. At least one pneumatic release mechanism is provided adjacent the top surface and at least one load release mechanism is provided adjacent the bottom surface.
EJECTABLE PYLON FOR AIRBORNE PAYLOADS

FIELD OF THE INVENTION

[0001] The present invention relates pylons. More particularly it relates to an ejectable pylon for airborne payloads.

BACKGROUND OF THE INVENTION

[0002] The carrying of payloads such as fuel tanks and weapons suspended under wing surfaces or the fuselage of an aircraft is well known in the aviation industry. The payloads are typically attached to the wings by ejection pistons. External payloads substantially extend the versatility and range of missions an aircraft can carry out, but also increase drag of the aircraft, thus reducing to some extent its maneuverability. To reduce drag, especially in high-performance military aircrafts, after the payload has been released it may be desired that the pylon too be ejected from the aircraft.

[0003] Ejection of payloads from pylons and the ejection of pylons from the aircraft are typically done by activating pyrotechnical cartridges (by explosive forces). In addition to pyrotechnical cartridges the use of pneumatic suspension and release mechanism in aircraft pylons was introduced (for example the suspension and release mechanism commercially available from EDO corp. of NY, USA).

[0004] The available mechanisms for ejection of pylons and payloads are not always reliable and safe to use and include high G force experienced during ejection.

[0005] It is an object of the present invention to provide a novel pylon which incorporating more than one type of suspension and release mechanisms, and capable of being released with its payload or separately.

[0006] More objects and advantages of the present invention will become apparent after reading the present specification and reviewing the accompanying drawings.

SUMMARY OF THE INVENTION

[0007] There is thus provided, in accordance with some preferred embodiments of the present invention, a pylon device for suspending a payload under wing or fuselage, the
device comprising: a main body with a top surface to face the aircraft and a bottom surface for engaging with the payload; and
at least one pneumatic release mechanism adjacent the top surface and at least one load release mechanism adjacent the bottom surface.

[0008] Furthermore, in accordance with embodiments of the present invention, said at least one load release mechanism comprises pyrotechnical release mechanism.

[0009] Furthermore, in accordance with embodiments of the present invention, said at least one load release mechanism comprises two load release mechanisms.

[0010] Furthermore, in accordance with embodiments of the present invention, said at least one load release mechanism comprises at least one pneumatic release mechanism.

[0011] Furthermore, in accordance with embodiments of the present invention, wherein at least one of said at least one pneumatic release mechanism is located at a forward location on the top surface, whereas a sway-brace element is provided adjacent a rear end of the top surface.

[0012] Furthermore, in accordance with embodiments of the present invention, the device is designed to carry a fuel tank.

[0013] Furthermore, in accordance with embodiments of the present invention, the device is designed to carry a weapon.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] In order to better understand the present invention, and appreciate its practical applications, the following Figures are provided and referenced hereafter. It should be noted that the Figures are given as examples only and in no way limit the scope of the invention. Like components are denoted by like reference numerals.

[0015] Fig. 1 illustrates a pylon with a payload, according to embodiments of the present invention, suspended from under a wing of an aircraft in flight.

[0016] Fig. 2 illustrates a see-through view of a pylon with an ejection mechanism in accordance with embodiments of the present invention, suspended beneath a wing of an aircraft, and having a payload attached thereto.
[0017] Fig. 3 illustrates a see-through view of a pylon according to embodiments of the present invention, where the payload is ejected in flight together with the pylon.

[0018] Fig. 4 illustrates a see-through view of a pylon according to embodiments of the present invention, where the payload is ejected from the pylon in flight without ejecting the pylon itself.

[0019] Fig. 5 illustrates a pneumatic ejection-bar and base-plate of a pneumatic release device, which is incorporated in the pylon, according to embodiments of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0020] According to embodiments of the present invention a release mechanism for the ejection at will of a pylon from an aircraft with a payload attached thereto, and, alternatively, the ejection in sequence of the payload followed by the ejection of the pylon.

[0021] A pylon ejection mechanism according to embodiments of the present invention generally comprises a main body, which is designed to present an aerodynamic body so as to present minimal drag. The top surface of the pylon is attached to the bottom surface of a wing so that the pylon is suspended from beneath the wing.

[0022] The pylon also comprises two elements designed for disengagement from the wing of the aircraft:

[0023] An ejection-bar which can be ejected from a base-plate located on the upper surface of the pylon, for example, at a front location on that surface close to the front of the pylon, with respect to the direction of flight. The bar initially is engaged with the wing or body and locked inside the housing by a mechanism, either manually or remote controlled. When actuated the bar springs out of the base plate, pushing against the aircraft and causing the front of the pylon to disengage it from the wing.

[0024] A pivot element is provided at the top surface of the pylon, at the rear of the pylon with respect to the direction of flight. The sway-brace element wraps around a horizontal bar and is fixed in place as long as the pneumatic ejection bar in the frontal section of the pylon is not actuated.
The ejection of pylon from a flying aircraft in accordance with embodiments of the present invention is initiated by activating a pneumatic driver that ejects the ejection-bar. With the ejection-bar popped out, the force of the on rushing air acts to sway the pylon away from the surface of the advancing aircraft. The pivot, previously mentioned, enables the sway and the pylon becomes fully detached and the entire pylon is free to fall off the aircraft.

The payload connected to the pylon is ejected ("dropped") from the aircraft by a mechanism that activates at will pyrotechnical means (explosive repulsion force) or a pneumatic driving force that is activated by the pilot (or automatically by a controller, when predetermined conditions are met).

The pylon ejection mechanism in accordance with embodiments of the present invention can be employed in three alternative configurations:

A configuration in which the payload is firmly connected to the pylon. The ejection mechanism releases the pylon and thus the payload (together with the pylon) is released and dropped from the aircraft.

A configuration in which either a pneumatic or an explosive driven mechanism ejects the payload from the pylon. Following the ejection of the payload, the pylon ejection mechanism is activated.

A configuration in which the time interval between the injection of the payload and the ejection of the pylon is controlled and is activated at will. Following the ejection of the payload the ejection of the pylon itself is activated when it is so desired (when circumstances dictate, such as in cases of shortage of fuel or the necessity for increase in maneuverability of the aircraft, or at the pilot's discretion).

Reference is now made to the figures:

Fig. 1 illustrates a pylon 10 with payload 12, according to embodiments of the present invention, connected to wing 14 of aircraft 16 in flight. Typical payload comprises fuel tanks, weapons, but may also comprise other devices and loads of different kinds (for example, sensors, photographic equipment).

Fig. 2 illustrates a see-through view of a pylon 10 with an ejection mechanism in accordance with embodiments of the present invention, attached to wing 14 and having
a payload 12 attached thereto. Illustrated in the figure, the frontal section of pylon 10 attaches to the external surface of wing 14 by an ejection-bar 18 that protrudes from a base-plate 20 attached vertically to the upper surface 22 of pylon 10 near the front of the pylon, in respect to the direction of flight. A detailed illustration of bar 18 and plate 20 at positioned on surface 22 is given in Fig. 5. Bar 18 is inserted and locked in place in a housing 24 that penetrates into wing 14. The lock of bar 18 in housing 24 has a release mechanism, operated either manually or by remote-control. The aft section of pylon 10 connects to the wing 14 by a pivot 26 that wraps around a perpendicular horizontal bar 28 that protrudes from wing 14. As long as bar 18 remains in housing 24 the Pivot can not freely sway.

[0034] During the flight of aircraft 16, the ejection-bar 18 is pushed up from the pylons housing 24 by a controlled jettison explosive repulsion force and or the activation of a pneumatic driving force. The drag force acts to draw the pylon away from the aircraft. Pivot 26 causes the pylon 10 to sway from the surface of wing 14 and fully detach and be ejected from the aircraft, as illustrated in Fig. 3. The sway direction is designated by an arrow numbered 30 in the Figure.

[0035] Shown in Fig. 2 and Fig. 3 are electrical wirings 32 that run through pylon 10. The wirings connect to a controllable ejector-mechanism 34 at the top of pylon 10 (or alternately at the bottom, where payload 12 is attached to) that activates pyrotechnical explosive force (alternatively initiates a pneumatic driving force) that detaches payload 12 from pylon 10. From ejector-mechanism 34 wirings 32 connect to contact-elements 36 on surface 22. Contact-elements 36 are in contact with contact-elements 38 in wing 14 when pylon 10 is attached to wing 14, so as to provide continuous electrical link between the aircraft controller (automatically or manually operated) and the pylon release mechanism. The activation of ejector-mechanism 34, by an electric signal through contact-elements 36 and 38, without the activation of the release mechanism of ejection-bar 18 ejects (only) payload 12 without ejecting pylon 10. Activation of (only) the release mechanism of ejection-bar 18 ejects pylon with payload 12 connected to it.

[0036] Fig. 3 illustrates a see-through view of pylon 10 where the payload 12 is ejected in flight together with the pylon 10 from wing 14.
[0037] Fig. 4 illustrates a see-through view of pylon 10, where the payload 12 is ejected from the pylon in flight without ejecting the pylon itself.

[0038] Fig. 5 illustrates ejection-bar 18 and base-plate 20 of pylon 10. Base plate 20 is positioned on the frontal upper section of pylon 10 and is embedded into surface 22 of pylon 10.

[0039] It should be clear that the description of the embodiments and attached Figures set forth in this specification serves only for a better understanding of the invention, without limiting its scope.

[0040] It should also be clear that a person skilled in the art, after reading the present specification could make adjustments or amendments to the attached Figures and above described embodiments that would still be covered by the present invention.
CLAIMS

1. A pylon device for suspending a payload beneath an aircraft wing or fuselage, the device comprising:
   a main body with a top surface to face the aircraft and a bottom surface for engaging with the payload; and
   at least one pneumatic release mechanism adjacent the top surface and at least one load release mechanism adjacent the bottom surface.

2. The device as claimed in claim 1, wherein said at least one load release mechanism comprises pyrotechnical release mechanism.

3. The device as claimed in claim 1, wherein said at least one load release mechanism comprises two load release mechanisms.

4. The device as claimed in claim 1, wherein said at least one load release mechanism comprises at least one pneumatic release mechanism.

5. The device as claimed in claim 1, wherein at least one of said at least one pneumatic release mechanism is located at a forward location on the top surface, whereas a sway-brace element is provided adjacent a rear end of the top surface.

6. The device as claimed in claim 1, adapted to carry a fuel tank.

7. The device as claimed in claim 1, adapted to carry a weapon.

8. A method for reducing drag in an aircraft carrying a payload suspended from a pylon under the aircraft, the method comprising:
   providing a pylon device comprising a main body with a top surface to face the aircraft and a bottom surface for engaging with the payload and at least one pneumatic
release mechanism adjacent the top surface and at least one load release mechanism adjacent the bottom surface;
releasing the payload by activating the release mechanism.

9. The method as claimed in claim 8, further comprising releasing the pylon device from the aircraft by activating said at least one pneumatic release mechanism.

10. The method as claimed in claim 8, wherein said at least one load release mechanism comprises pyrotechnical release mechanism.

11. The method as claimed in claim 8, wherein said at least one load release mechanism comprises two load release mechanisms.

12. The method as claimed in claim 8, wherein said at least one load release mechanism comprises at least one pneumatic release mechanism.

13. The method as claimed in claim 8, wherein at least one of said at least one pneumatic release mechanism is located at a forward location on the top surface, whereas a sway-brace element is provided adjacent a rear end of the top surface.

14. The method as claimed in claim 8, wherein the pylon device is adapted to carry a fuel tank.

15. The method as claimed in claim 8, wherein the pylon device is adapted to carry a weapon.