CLAIMS

1. An airbag system for use with an aircraft seat, the airbag system comprising:

a housing having a cavity and an opening in communication with the cavity, wherein the housing is mounted forward of and offset to one side of the aircraft seat;

an airbag assembly positioned within the cavity, the airbag assembly having an airbag configured to deploy through the opening toward the aircraft seat to protect an occupant in the aircraft seat during a crash event;

an inflator operably coupled to the airbag; and

a door removably covering the opening, the door being configured to move away from the opening during airbag deployment.

2. The airbag system of claim 1, further comprising at least one lanyard fixedly attached between the door and the housing, wherein the lanyard is configured to retain the door to the housing during airbag deployment.

3. The airbag system of claim 1 wherein the airbag has an internal threshold pressure, and wherein the airbag includes an active vent configured to open at the internal threshold pressure.

4. The airbag system of claim 1 wherein the airbag includes a first portion and a second portion, the first portion extending in a generally vertical direction from the housing when the airbag is inflated, and the second portion extending from the first portion in a generally lateral direction with respect to the first portion when the airbag is inflated.

5. The airbag system of claim 1 wherein:

the inflator is spaced apart from the airbag and positioned outside of the cavity; and

the airbag system further comprises a gas delivery hose extending from the inflator through the housing and to the airbag, the gas delivery hose being configured to provide a fluid passageway from the inflator to the airbag.

6. The airbag system of claim 5 wherein the inflator is positioned under the housing.

7. The airbag system of claim 1 wherein the seat is attached to a floor of a commercial passenger adjacent to an aisle of the commercial passenger aircraft, and wherein the housing is attached to the floor of the commercial passenger aircraft proximate the aisle.

8. The airbag system of claim 1 wherein the airbag system includes a first zone positioned around the vehicle seat and a second zone positioned a distance in front of the vehicle seat, and wherein the airbag does not enter the first and second zone upon inflation.

9. The aircraft system of claim 1 wherein the airbag assembly comprises means for mounting the airbag assembly to the housing.

10. The aircraft system of claim 1 wherein the airbag assembly includes a mounting plate within the airbag and configured to attach the airbag assembly to the housing.

11. The aircraft system of claim 10 wherein the mounting plate is an interior mounting plate, and wherein the airbag assembly further includes an exterior mounting

plate attached to the interior mounting plate and configured to attach the airbag assembly across the opening of the housing.

12. An airbag system for a seat in an aircraft, the airbag system comprising:

an airbag assembly having an airbag and a mounting structure, wherein the mounting structure is configured to attach to a non-movable portion of the aircraft spaced forward of and laterally offset from the seat, and wherein the airbag is configured to deploy at an angle relative to the seat to protect an occupant seated in the seat;

an inflator in fluid communication with the airbag; and

an electronics module assembly having a crash sensor operably coupled to the inflator to initiate airbag deployment.

13. The airbag system of claim 12, further comprising a housing having a plurality of sidewalls that form a cavity, at least one of the sidewalls having an opening, wherein the airbag assembly is in the cavity and generally aligned with the opening.

14. The airbag system of claim 13, further comprising a door attached across the opening via a plurality of fasteners, wherein the fasteners are configured to release the door under the force of airbag inflation to allow the door to move away from the opening.

15. The airbag system claim 14, further comprising a moveable coupling between the door and the housing, wherein the coupling is configured to retain the door to the housing during and after airbag deployment.

16. The airbag system of claim 12 wherein the airbag includes a vent configured to at least partially open when a pressure within the airbag reaches a threshold pressure.

17. The airbag system of claim 12 wherein the airbag includes a first portion and a second portion, wherein the first portion extends in a generally vertical direction with respect to the seat when the airbag is inflated, and wherein the second portion extends in a generally lateral direction with respect to the first portion when the airbag is inflated, the second portion having a generally triangular cross-sectional shape.

18. The airbag system of claim 12 wherein the mounting structure comprises:

an internal mounting plate positioned within the airbag; and

an external mounting plate positioned outside of the airbag and attached to the internal mounting plate, wherein a peripheral portion of the external mounting plate is configured to fixedly attach to the non-movable portion of the aircraft within the aircraft.

19. The airbag system of claim 12 wherein the inflator is spaced apart from the airbag, and wherein the airbag system further comprises a gas delivery hose fluidly connecting the inflator to the airbag.

20. The airbag system of claim 12, further comprising:

the airbag includes a vent configured to open when a pressure of the airbag reaches a threshold pressure;

the mounting structure includes an internal mounting plate within the airbag and an external mounting plate outside of the airbag and attached to the internal mounting plate;

the airbag assembly further comprises –

a housing having a cavity and an opening, the airbag assembly being in the cavity generally aligned with the opening and mounted to a portion of the housing using the external mounting plate, the housing being configured to fixedly attach to an interior portion of the aircraft forward of and offset from the seat;

a door covering the opening, wherein the door is configured to move away from the opening during airbag deployment to release the airbag from the cavity; and

at least one lanyard releasably connecting the door to the housing during airbag deployment, wherein the at least one lanyard is configured to open the door to a position substantially flush with the housing during airbag inflation.

21. The airbag system of claim 20 wherein the inflator is outside of the cavity proximate the housing, and wherein the airbag system further comprises a gas delivery hose fluidly coupling the inflator to the airbag.

22. An airbag assembly for use with a seat mounted to a floor of an aircraft, the airbag assembly comprising:

an airbag;

a cover over the airbag, wherein the cover is configured to release the airbag upon airbag inflation;

an inflator operably coupled to the airbag via a gas delivery hose;

a housing mounted to the floor of the aircraft forward of and laterally offset from the seat, wherein the airbag is configured to project toward the seat at an angle relative to the seat to protect an occupant seated in the seat; and

means for mounting the airbag in the cover to the housing.

23. A method of deploying an airbag toward a seat in an aircraft, the method comprising:

detecting a crash event of the aircraft;

inflating the airbag in response to the detected crash event, the airbag beingstored within a portion of a housing and generally aligned with an opening in the housing, wherein the portion of the housing in which the airbag is stored is forward of and laterally offset from the aircraft seat, and

wherein, upon inflation, the airbag projects toward the seat at an angle relative to the aircraft seat; and

releasing the airbag from the housing via the opening.

24. The method of claim 23 wherein releasing the airbag from the housing via the opening comprises moving a door away from the opening by the force of the inflating airbag.

25. The method of claim 23 wherein the vehicle is an aircraft, and wherein releasing the airbag from the housing via the opening comprises releasing the airbag from a position forward of and offset from the aircraft seat.

26. The method of claim 23 wherein inflating the airbag comprises:

inflating a first portion of the airbag in a generally vertical direction from the housing; and

inflating a second portion of the airbag in a generally lateral direction toward the occupant, wherein the second portion extends from the first portion and has a generally triangular cross-sectional shape.

27. The method of claim 23 wherein releasing the airbag from the housing via the opening comprises:

projecting the airbag toward the aircraft seat, the aircraft seat having a two-point restraint; and

releasing gas from the airbag when an internal pressure within the airbag is above a predetermined threshold.

28. The method of claim 23 wherein inflating the airbag comprises inflating the airbag via a gas delivery hose connected between an inflator and the airbag, wherein the inflator is spaced apart from the airbag.

CLAIMS

1. An airbag system for use with an aircraft seat, the airbag system comprising:

a housing having a cavity and an opening in communication with the cavity, wherein the housing is mounted forward of and offset to one side of the aircraft seat;

an airbag assembly positioned within the cavity, the airbag assembly having an airbag configured to deploy through the opening toward the aircraft seat to protect an occupant in the aircraft seat during a crash event;

an inflator operably coupled to the airbag; and

a door removably covering the opening, the door being configured to move away from the opening during airbag deployment.

2. The airbag system of claim 1, further comprising at least one lanyard fixedly attached between the door and the housing, wherein the lanyard is configured to retain the door to the housing during airbag deployment.

3. The airbag system of claim 1 wherein the airbag has an internal threshold pressure, and wherein the airbag includes an active vent configured to open at the internal threshold pressure.

4. The airbag system of claim 1 wherein the airbag includes a first portion and a second portion, the first portion extending in a generally vertical direction from the housing when the airbag is inflated, and the second portion extending from the first portion in a generally lateral direction with respect to the first portion when the airbag is inflated.

5. The airbag system of claim 1 wherein:

the inflator is spaced apart from the airbag and positioned outside of the cavity; and

the airbag system further comprises a gas delivery hose extending from the inflator through the housing and to the airbag, the gas delivery hose being configured to provide a fluid passageway from the inflator to the airbag.

6. The airbag system of claim 5 wherein the inflator is positioned under the housing.

7. The airbag system of claim 1 wherein the seat is attached to a floor of a commercial passenger adjacent to an aisle of the commercial passenger aircraft, and wherein the housing is attached to the floor of the commercial passenger aircraft proximate the aisle.

8. The airbag system of claim 1 wherein the airbag system includes a first zone positioned around the vehicle seat and a second zone positioned a distance in front of the vehicle seat, and wherein the airbag does not enter the first and second zone upon inflation.

9. The aircraft system of claim 1 wherein the airbag assembly comprises means for mounting the airbag assembly to the housing.

10. The aircraft system of claim 1 wherein the airbag assembly includes a mounting plate within the airbag and configured to attach the airbag assembly to the housing.

11. The aircraft system of claim 10 wherein the mounting plate is an interior mounting plate, and wherein the airbag assembly further includes an exterior mounting

plate attached to the interior mounting plate and configured to attach the airbag assembly across the opening of the housing.

12. An airbag system for a seat in an aircraft, the airbag system comprising:

an airbag assembly having an airbag and a mounting structure, wherein the mounting structure is configured to attach to a non-movable portion of the aircraft spaced forward of and laterally offset from the seat, and wherein the airbag is configured to deploy at an angle relative to the seat to protect an occupant seated in the seat;

an inflator in fluid communication with the airbag; and

an electronics module assembly having a crash sensor operably coupled to the inflator to initiate airbag deployment.

13. The airbag system of claim 12, further comprising a housing having a plurality of sidewalls that form a cavity, at least one of the sidewalls having an opening, wherein the airbag assembly is in the cavity and generally aligned with the opening.

14. The airbag system of claim 13, further comprising a door attached across the opening via a plurality of fasteners, wherein the fasteners are configured to release the door under the force of airbag inflation to allow the door to move away from the opening.

15. The airbag system claim 14, further comprising a moveable coupling between the door and the housing, wherein the coupling is configured to retain the door to the housing during and after airbag deployment.

16. The airbag system of claim 12 wherein the airbag includes a vent configured to at least partially open when a pressure within the airbag reaches a threshold pressure.

17. The airbag system of claim 12 wherein the airbag includes a first portion and a second portion, wherein the first portion extends in a generally vertical direction with respect to the seat when the airbag is inflated, and wherein the second portion extends in a generally lateral direction with respect to the first portion when the airbag is inflated, the second portion having a generally triangular cross-sectional shape.

18. The airbag system of claim 12 wherein the mounting structure comprises:

an internal mounting plate positioned within the airbag; and

an external mounting plate positioned outside of the airbag and attached to the internal mounting plate, wherein a peripheral portion of the external mounting plate is configured to fixedly attach to the non-movable portion of the aircraft within the aircraft.

19. The airbag system of claim 12 wherein the inflator is spaced apart from the airbag, and wherein the airbag system further comprises a gas delivery hose fluidly connecting the inflator to the airbag.

20. The airbag system of claim 12, further comprising:

the airbag includes a vent configured to open when a pressure of the airbag reaches a threshold pressure;

the mounting structure includes an internal mounting plate within the airbag and an external mounting plate outside of the airbag and attached to the internal mounting plate;

the airbag assembly further comprises –

a housing having a cavity and an opening, the airbag assembly being in the cavity generally aligned with the opening and mounted to a portion of the housing using the external mounting plate, the housing being configured to fixedly attach to an interior portion of the aircraft forward of and offset from the seat;

a door covering the opening, wherein the door is configured to move away from the opening during airbag deployment to release the airbag from the cavity; and

at least one lanyard releasably connecting the door to the housing during airbag deployment, wherein the at least one lanyard is configured to open the door to a position substantially flush with the housing during airbag inflation.

21. The airbag system of claim 20 wherein the inflator is outside of the cavity proximate the housing, and wherein the airbag system further comprises a gas delivery hose fluidly coupling the inflator to the airbag.

22. An airbag assembly for use with a seat mounted to a floor of an aircraft, the airbag assembly comprising:

an airbag;

a cover over the airbag, wherein the cover is configured to release the airbag upon airbag inflation;

an inflator operably coupled to the airbag via a gas delivery hose;

a housing mounted to the floor of the aircraft forward of and laterally offset from the seat, wherein the airbag is configured to project toward the seat at an angle relative to the seat to protect an occupant seated in the seat; and

means for mounting the airbag in the cover to the housing.

23. A method of deploying an airbag toward a seat in an aircraft, the method comprising:

detecting a crash event of the aircraft;

inflating the airbag in response to the detected crash event, the airbag being stored within a portion of a housing and generally aligned with an opening in the housing, wherein the portion of the housing in which the airbag is

stored is forward of and laterally offset from the aircraft seat, and wherein, upon inflation, the airbag projects toward the seat at an angle relative to the aircraft seat; and

releasing the airbag from the housing via the opening.

24. The method of claim 23 wherein releasing the airbag from the housing via the opening comprises moving a door away from the opening by the force of the inflating airbag.

25. The method of claim 23 wherein the vehicle is an aircraft, and wherein releasing the airbag from the housing via the opening comprises releasing the airbag from a position forward of and offset from the aircraft seat.

26. The method of claim 23 wherein inflating the airbag comprises:

inflating a first portion of the airbag in a generally vertical direction from the housing; and

inflating a second portion of the airbag in a generally lateral direction toward the occupant, wherein the second portion extends from the first portion and has a generally triangular cross-sectional shape.

27. The method of claim 23 wherein releasing the airbag from the housing via the opening comprises:

projecting the airbag toward the aircraft seat, the aircraft seat having a two-point restraint; and

releasing gas from the airbag when an internal pressure within the airbag is above a predetermined threshold.

28. The method of claim 23 wherein inflating the airbag comprises inflating the airbag via a gas delivery hose connected between an inflator and the airbag, wherein the inflator is spaced apart from the airbag.