Copyright © 2011
All rights reserved. The information contained herein is proprietary to Liberty Aerospace, Incorporated. It is prohibited to reproduce or transmit in any form or by any means, electronic or mechanical, including photocopying, recording, or use of any information storage and retrieval system, any portion of this document without express written permission of Liberty Aerospace Incorporated.
Table of Contents

SECTION 53-00  GENERAL  5
SECTION 00-01  FUSELAGE INSPECTION AND MAINTENANCE  6
SECTION 53-10  FUSELAGE SECTIONS  9
SECTION 10-01  AFT FIREWALL (CABIN AREA)  9
SECTION 10-02  INSTRUMENT PANEL CONSOLE  10
SECTION 10-03  INSTRUMENT PANEL PROCEDURES  10
     INSTRUMENT PANEL CONSOLE REMOVAL  11
     INSTRUMENT PANEL CONSOLE ASSEMBLY INSTALLATION  15
SECTION 10-04  AFT CABIN AREA AND FWD BAGGAGE BAY CLOSEOUT  19
SECTION 10-05  BAGGAGE BAY FLOOR ACCESS PANEL  19
SECTION 10-06  BAGGAGE BAY CLOSEOUT  20
SECTION 10-07  AFT BULKHEAD MID FUSELAGE  20
SECTION 53-20  EXTERIOR FUSELAGE ACCESS PANEL  23
SECTION 53-30  REMOVABLE PANELS  25
SECTION 30-01  ENGINE COWLINGS  25
SECTION 30-02  BELLY PANEL ASSEMBLY  25
SECTION 30-03  BELLY PANEL PROCEDURES  26
     BELLY PANEL REMOVAL  27
     BELLY PANEL INSTALLATION  28
     BELLY PANEL INSPECTION  29
SECTION 53-31  FOOTSTEP  31
SECTION 31-01  FOOTSTEP PROCEDURES  31
     FOOTSTEP REMOVAL  32
     FOOTSTEP INSTALLATION  33
     FOOTSTEP INSPECTION  34
Section 53-00 General

The Liberty XL-2 fuselage is a load bearing monocoque structure composed of structural composite materials (solid and sandwich laminates). The fabrication of the fuselage is from carbon fiber reinforced fabrics used as a facing plies that adhere to core materials to form a structural sandwich. There are different thicknesses of core material used to form the structural sandwich in order to support the distribution of stresses through the structure.

The composite airframe (fuselage) includes the engine compartment firewall, the cabin area, the baggage compartment, aft baggage bay closeout, and aft bulkhead mid fuselage, which supports the empennage. Internal fuselage components (bulkheads, stiffeners, cockpit center console, seatbacks, baggage bay floor, etc.) are bonded in position during manufacture. The composite airframe (fuselage) is secured to the space frame assembly (chassis) by attachment fittings. The space frame assembly is made of welded steel tubing as shown in Figure 53-1. The space frame assembly carries all the weights and receives all the forces from aircraft movement or operation.

Note

Removal and replacement of the fuselage to the rolling chassis is not anticipated during routine maintenance. In the event that the fuselage needs to be removed from the rolling chassis contact Liberty Aerospace, Inc. Customer Support for the recommended procedure.

Figure 53-1 Composite Airframe (fuselage) and Space Frame Assembly (rolling chassis)
Section 00-01  Fuselage Inspection And Maintenance

Inspect the composite laminate structure (fuselage and bonded laminates) in accordance with inspection techniques delineated in Chapter 51 – Standard Practices – Structures of this service manual. Inspect the composite laminate structures in the Liberty XL-2 aircraft per Chapter 04 – Airworthiness at the inspection intervals shown in Chapter 05 - Time Limits/Maintenance Checks/Inspection Intervals. The inspections, intervals, and maintenance procedures are mandatory to support the continued airworthiness of the Liberty XL-2.

In addition to the inspections and maintenance practices outlined within Chapter 04 – Airworthiness and Chapter 05 - Time Limits, Maintenance Checks, and Inspection Intervals, on the composite laminate (fuselage and bonded laminates), the following inspections are recommended when performing other schedule and unscheduled maintenance for regions of high stress.

Figure 53-2 shows the Inspection location that is between the bonded section of upper and lower fuselage just aft of the doorsill. The tap test and/or other Non Destructive Inspection (NDI) test prescribed within Chapter 51 – Standard Practices – Structures, must be performed from outside on both Port and STBD sides of the fuselage.

![Figure 53-2 Location for Inspection](image)

Figure 53-2 Location for Inspection

Figure 53-3 shows the inspection location between the bonded sections of the support for the baggage bay floor and the lower fuselage. The tap test and/or other non-destructive inspection test must be performed from outside on both port and starboard. Access to the supports for the baggage bay floor (port and starboard) and laminate structures is by removing the access panel in the baggage bay floor, refer Section 10-06 - Baggage Bay Closeout on page 20 of this chapter.
Figure 53-3 Inspection Location Between The Bonded Sections Of The Baggage Bay Floor

Figure 53-4 shows the inspection location between the bonded section of the baggage bay closeout and the upper fuselage. The tap test and/or other non-destructive inspection test prescribed within chapter 51 – Standard Practices – Structures, must be performed from outside on both port and starboard.

Figure 53-4 Inspection Location Between The Bonded Section Of The Baggage Bay Closeout

Figure 53-5 shows the location is just upward of the flange and at butt-line (BL 9.15, approximately). This is typical on both port and starboard side of the forward bulkhead. The tap test and/or other non-destructive inspection test must be performed to probe any possible delamination (facing plies separation) from outside during inspection. This inspection requires the removal of the upper engine cowl.
Figure 53-6 shows the location of the windshield attachment with the fuselage. Perform the tap test and/or other non-destructive inspection test all around the periphery of the attachment of windshield with the fuselage. Inspect the windshield to probe for any damage such as surface cracks (within close proximity of its attachment to the fuselage).

Figure 53-5 Location: Just Upward Of The Flange And At Butt-Line

Figure 53-6 Location Of The Windshield Attachment With The Fuselage
Section 53-10 Fuselage Sections

This section deals with the different fuselage sections.

Section 10-01 Aft Firewall (Cabin Area)

The cabin area houses all the avionics and flight control panels to operate the Liberty XL-2 aircraft. The seat cushions are installed into the seat back and seat base of the fuselage at both port and starboard side.

The seats in the Liberty XL-2 aircraft are integral to the composite fuselage. There are recesses on the inside faces of both seat backs as shown in Figure 53-7 Figure 53-8 and Figure 53-9. The starboard section of the seat back recess is a storage compartment that carries the airplane flight manual and safety hammer.

Figure 53-7 Composite Fuselage Sections

Figure 53-8 Seat Back Closeout Access Panels
Located in the cabin area is the instrument panel console. This console houses the instrument panel, avionics panel, and the circuit breaker panel. Behind these panels, the instrument panel console also houses the altitude encoder, the engine data interface, air ventilation for the forward windscreen (windshield), and access to the airplane's main electrical harness and mounting hardware for the rudder pedal assembly.

Section 10-03 Instrument Panel procedures

This section contains the procedures to remove and install the instrument panel console.
INSTRUMENT PANEL CONSOLE REMOVAL

Perform the following procedure to remove the instrument panel console assembly from the airplane.

CAUTION

Before starting this procedure, the tail of the airplane requires support. Failure to support tail of airplane may cause damage to tail section while accessing any area aft of passenger compartment.

CAUTION

Failure to disconnect batteries may cause damage to airplane electrical circuitry.

NOTE

1. Cover forward windscreen internally to protect from scratching. Liberty recommends using Shrink-Wrap plastic.

1. Position aircraft master switch to OFF.

2. Install a tail stand underneath tail section of airplane.

3. Remove cabin aft bulkhead access panel, by removing securing screw hardware.

4. Disconnect negative then positive leads from both primary battery and secondary battery. Isolate terminals on batteries to prevent accidental connection.

5. Remove instrument panel from airplane (see Chapter 31 – Indicators and Recording Systems).

6. Remove circuit breaker (CB) panel from airplane (see Chapter 24 – Electrical Power).

7. Remove avionics panel from airplane (see Chapter 23 – Communications).

8. Start on the starboard side of the instrument panel console. Remove the battery wire from the lower terminal of Terminal 2 on the terminal strip. See Figure 53-10 for the location of the battery wire.

9. Remove the Alternator wire from the lower terminal of Terminal 3 on the terminal strip.
10. Remove the four screws that hold P41 to the bracket on the power distribution harness.

11. Remove any tie-wraps that hold the wires going to the connector P41.

12. Disconnect the single wire connector P68 on wire P30C22.

13. Carefully pull the push-on terminal on wire P31A22N to disconnect the terminal from the ground plate that forms the base of the power distribution harness.

14. Disconnect the Engine Data Interface, EDI, at the connector EDIJ1. See Figure 53-11 for the location of the EDI and its associated connector.

15. Move to the pilot’s seat. Fine the in-line fuse connected to relay K003. Disconnect the fuse from the wiring harness. You do not need to disconnect the connector P66. See Figure 53-12 for the location of the fuse associated with K003.

16. Disconnect magnetic compass at the connector P/J06. Secure the cable leading to the compass using a small sealable plastic bag.
17. Disconnect P08, P09, and P40 from their connectors on the left hand bracket on the power distribution harness. See Figure 53-12 for the location of P/J08, P/J09, and P/J40.

18. Remove the wire P25A10 from the connector P03. The connector shell holds the wire in. Gently pull the connector apart to release the wire.

19. Remove the static line (green tube) that comes up from the space frame and goes to the alternate air valve on the under surface of the instrument panel console assembly. See Figure 53-13 for the location of the alternate air valve and the static line.

20. Disconnect the air vent tube from the air vents mounted in the top of the instrument panel console.

21. Bundle all of the cables, tubes and other items together. Insert this bundle into a plastic bag, sealing the bag with tape to protect the items in the bundle from damage and/or contamination.

22. Remove the top engine cowling.

23. From the engine compartment, remove the four screws that secure the instrument panel console assembly. See Figure 53-14 for the location of the four screws.
24. Remove the two screws that hold the instrument panel console assembly to the center console. See Figure 53-15 for the location of the two screws.

25. Carefully remove the instrument panel console assembly from the airplane while threading the bundle of cables and tubes through the opening in the bottom of the instrument panel console assembly.

Figure 53-14 Location of the Four Screws that Secure the Instrument Panel Console to the Firewall of the Airplane

Figure 53-15 Location of the Two Screws that Secure the Instrument Panel Console to the Center Console
INSTRUMENT PANEL CONSOLE ASSEMBLY INSTALLATION

Perform the following procedure to install the instrument panel console assembly.

**CAUTION**

Before starting this procedure, the tail of airplane requires support. Failure to support tail of airplane may cause damage to tail section while accessing any area aft of passenger compartment.

**CAUTION**

Failure to disconnect batteries may cause damage to airplane electrical circuitry.

1. Install a tail stand underneath tail section of airplane.
2. Disconnect negative then positive leads from both primary battery and secondary battery. Isolate terminals on batteries to prevent accidental connection.
3. Carefully insert the bundle of cables and tubes through the opening in the instrument panel console assembly while installing the instrument panel console assembly from the airplane.
4. Install the two screws that hold the instrument panel console assembly to the center console. See Figure 53-16 for the location of the two screws.

![Figure 53-16 Location of the Two Screws that Secure the Instrument Panel Console to the Center Console](image)

5. From the engine compartment, install the four screws that secure the instrument panel console assembly. See Figure 53-17 for the location of the four screws.
6. Install the top engine cowling.

7. Remove the protective covering from the bundle of cables and tubes.

8. Connect the air vent tube to the air vents mounted on the top surface of the instrument panel console.

9. Connect the static line (green tube) that comes up from the space frame and goes to the alternate air valve on the under surface of the instrument panel console assembly. See Figure 53-18 for the location of the alternate air valve and the static line.

10. While sitting in the pilot’s seat, connect the wire leading to the magnetic compass at the connector P/J06.

11. Insert the wire P25A10 into the connector for P03. Push the connector shell together to seat and capture the wire in to the connector.
12. Connect P08, P09, and P40 from their connectors on the left hand bracket on the power distribution harness. See Figure 53-19 for the location of P/J08, P/J09, and P/J40.

13. Find the in-line fuse connected to relay K003. Connect the fuse from the wiring harness. See Figure 53-19 for the location of the fuse associated with K003.

14. Move to the passenger’s seat. Connect the Engine Data Interface, EDI, at the connector EDIJ1. See Figure 53-20 for the location of the EDI and its associated connector.

15. Carefully push the push-on terminal on wire P31A22N on to a terminal on the ground plate that forms the base of the power distribution harness.

16. Connect the single wire connector P68 on wire P30C22.

17. Install P41 into the bracket on the power distribution harness. Secure P41 with the four screws removed in step 10 of the procedure to Instrument Panel Console.

18. Install tie-wraps as required to hold the wires going to the connector P41.

19. Connect the battery wire, P33A2, to the lower terminal of Terminal 2 on the terminal strip. See Figure 53-21 for the location of the battery wire.
20. Connect the Alternator wire, P10A6, to the lower terminal of Terminal 3 on the terminal strip.

![Diagram of the Power Distribution Harness showing the location of the battery and alternator wires and connector P41.]

**Figure 53-21 Starboard Side of the Power Distribution Harness Showing the Location of the Battery and Alternator Wires and Connector P41**

21. Install avionics panel in accordance with Chapter 23 – *Communications*.

22. Install the circuit breaker panel in accordance with Chapter 24 – *Electrical Power*.

23. Install instrument panel in accordance with Chapter 31 – *Indicators and Recording Systems*.

24. Connect negative then positive leads to both primary battery and secondary battery.

25. Install cabin aft bulkhead access panel using securing screw hardware.
Section 10-04  Aft Cabin Area And Fwd Baggage Bay Closeout

This fuselage section gives access to the baggage bay compartment and fuel filler hose. The Baggage Bay Floor Access Panel is located in the floor under the carpet. Be careful, do not damage interior fabric and/or carpet (if applicable) when accessing floor panel.

NOTE

To view the forward Horizontal Stabilizer Pushrod and/or Rudder Push-Rod Intermediate remove carpet, remove access panel by removing hardware. Retain hardware for access panel install.

This area is designated for storage of items limited by weight. This area houses two (2) access panels as shown in Figure 53-22:

- 1. Baggage Bay Floor Access Panel
- 2. Baggage Bay Closeout

Figure 53-22 Baggage Bay Closeout

Section 10-05  Baggage Bay Floor Access Panel

The access panel in the floor of the baggage bay compartment allows access to the view: floor supports, electrical cabling, stabilizer, rudder pushrod, bell-cranks, and their bearings as shown in Figure 53-23.
Section 10-06  Baggage Bay Closeout

Access panels are provided as internal structural elements to facilitate maintenance. The Baggage Bay Closeout is a removable component to allow access to the interior of the AFT fuselage and components. To access the interiors of the aft fuselage, temporarily remove the baggage bay closeout. To remove the baggage bay closeout remove and retain the mounting hardware. See Figure 53-22

Section 10-07  Aft Bulkhead Mid Fuselage

The access panel in the aft mid fuselage bulkhead, allows access to the aft most section of the fuselage and to access other installed items such as the primary battery, secondary batteries, emergency locator transmitter (ELT), electrical system components, tail plane drive torque assembly, stabilizer, and rudder pushrod.

The fuselage aft most tail section houses fin spar, ribs which is bonded to the fuselage structure. Figure 53-25 below shows items installed at the tail of the fuselage. The fuselage tail structure is a permanent adhesive composite laminate structure consisting of fin spar, ribs and upper & lower fuselage. Noted below are the tail structure bondlines.
Figure 53-25 Tail of Fuselage
**Section 53-20 Exterior Fuselage Access Panel**

An access panel on the starboard side of the upper aft fuselage allows access to the bearings for the stabilator torque tube and mass balance. See Figure 53-26 for the location of the access panel.

Two access panels on the starboard side of the lower aft fuselage. These panels allow maintenance of the pitch trim servo, bell-cranks, and pushrods of the elevator and rudder control systems. See Figure 53-26 for the location of these panels.

![Empennage Diagram]

**Figure 53-26 Starboard Access Panels**

The fuel tank filler access or gas cap is on the Port side upper fuselage. See Figure 53-27. The gas cap has a locking lever that locks the cap in place for flight. To open the gas cap, pull the lever our and give it a quarter to the left, and pull the cap away from the airplane. To install the gas cap, put the cap in to the filler opening, press in on the cap while turn the lever a quarter turn to the right.

![Fuel Tank Filler Access]

**Figure 53-27 Fuel Tank Filler Access or Gas Cap**
Section 53-30 Removable Panels
This section details information about removable panels that attach to the fuselage.

Section 30-01 Engine Cowlings
Although the engine cowlings on the XL-2 airplane attach to the fuselage and are an integral part of the fuselage, they are part of the engine. Therefore, information concerning the engine cowlings is in Chapter 71 - Power Plant.

Section 30-02 Belly Panel Assembly
The Belly Panel or Fairing Assembly is an access panel, which is a cover for the space frame assembly. The belly panel is also an aerodynamic structure for increase flying efficiency. The belly panel allows maintenance and inspection of other installed units/components.

NOTE
The term fairing and panel are used interchangeably and have the same meaning.

The belly panel attaches to the fuselage under the space frame assembly (rolling chassis) by means of a series of CAMLOC® fasteners. The belly panel has three (3) access holes for the gascolator, fuel boost pump assembly and fuel tank assembly (see Figure 53-28). Two (2) vapor zone hoods are integral design features of the current belly fairing assembly. Two cutouts on port and starboard side of the belly fairing are for the installation of under carriage cover for main gear legs as shown in Figure 53-29.

Figure 53-28 Underside of Airplane Showing the Belly Panel
Two added cutout are match drilled to the middle-sides port and starboard main leg AFT bolts in the belly. Remove the belly panel to gain access to the main and nose gear jack points.

Figure 53-29 Belly Panel

Section 30-03 Belly Panel Procedures

This section contains the procedures to remove and install the belly panel.
**Belly Panel Removal**

Perform this procedure to remove the belly panel. A small padded stand capable of supporting the weight of the belly panel is the recommended equipment. A stand with adjustable height is also a desirable utility.

---

**CAUTION**

No person, their hands or extremities should be near the wing flaps during operation, due to the extreme power of closing/opening the wing flap units.

1. First, extend (deploy) the wing flaps to gain access to the belly panel fasteners.
2. Remove and retain hardware.
3. Remove the Cover Plate Upper under carriage leg (both port and starboard).
4. Place a padded support under the approximate center of the belly panel.
5. Except for the four (4) fasteners at the four corners of the fuselage belly panel, disengage all CAMLOC® fasteners.
6. While ensuring that the belly panel remains supported, unfasten the remaining four cam loc fasteners.
7. Remove belly panel.

This completes the Belly Panel Removal procedure.
BELLY PANEL INSTALLATION

Perform this procedure to install the belly panel

CAUTION

Failure to install the belly panel properly can result in the buckling of the belly panel, which will damage the panel and may cause it to separate from the airplane during flight.

When installing belly panel assembly, it is important to place the belly panel properly, and secure it loosely with the four (4) cam loc fasteners at the corners, then loosely insert the remaining CAMLOC® fasteners. Begin tightening each fastener, insuring that the belly panel is seating properly and flush with the fuselage face.

1. Place a padded support under the approximate center of the fuselage opening.
2. Place belly panel on the support. (Be careful when reassembling: do not inadvertently open the fuel line cock).
3. Align the belly panel with all the opening.
4. Insert and fasten the four (4) CAMLOC® fasteners at corners of the fuselage belly panel.
5. Fasten the remaining fasteners.
6. Retract the flaps.

This completes the Belly Panel Installation procedure.
BELLY PANEL INSPECTION

Perform this procedure to inspect the belly panel after installation.

1. Inspect each of the 26 CamLoc fasteners. All of the fasteners must be flush with the surface and tight.

2. Inspect along the interface between the fuselage and the belly panel. Look for any buckling or separation between the surfaces.

3. Check the belly panel is being held tight to the surface of the fuselage.

4. Check the fuel system drains. They should be coming through the belly panel.

5. Check the ventilation ports. They should be clear of any foreign matter.

This completes the Belly Panel Inspection procedure.
Section 53-31 Footstep

An optional accessory installs a footstep on the port and starboard sides of the fuselage just ahead of the wings of the airplane. If the footstep is installed, it installs to a hard-point that is glued to the interior surface of the fuselage. Figure 53-30 shows a typical installation of the footstep.

Figure 53-30 Footstep Installation

Section 31-01 Footstep Procedures

This section contains the procedures to remove, install, and inspect the footstep.
FOOTSTEP REMOVAL

Perform this procedure to remove the footstep from the fuselage.

1. Remove four screws securing the footstep to the fuselage.
2. Remove the footstep.

**CAUTION**

*Do not use any type of pry to remove the footstep. It may damage the composite in the fuselage.*

3. Use a small die grinder to remove any remaining Epi-Bond adhesive left behind on the fuselage.
4. Do not grind in to the finish of the fuselage.
5. If installing a footstep later, insert the screws back into the holes and tighten enough to hold. Then cover the area with VAC-PAK® A6200, ETFE/Fluoro-polymer Release Film to keep any contaminants from entering the holes in the fuselage.

This completes the Footstep Removal procedure.
FOOTSTEP INSTALLATION

Perform this procedure to install the footstep on to the fuselage.

1. If installing the footstep immediately after removal, go to step 3 below.

2. Remove the footstep as instructed in the Footstep Removal procedure; omitting the final step. Then go to step 4 below.

3. If the four footstep screws are mounted in the fuselage, remove the four screws.

4. Use 120-220 grit sandpaper or Scotch-Brite™ 7447 (maroon) Hand Pads to scuff the inner surface of the footstep plate.

5. Apply a small amount of release film around the area of the footstep installation.

6. Mix a small batch of Epibond 1590 adhesive.

7. Apply the Epibond to the inner surface of the footstep plate.

8. Install the footstep on the fuselage.

9. Insert the four screws and tighten sufficiently to secure the footstep to the fuselage.

10. Let the Epibond cure for a minimum of 6 hours, before using the foot control.

11. Remove the release film and clean any excess Epibond adhesive.

This completes the Footstep Installation procedure.

NOTE

*Epibond 1590 for this purpose is used as a gap-filler and not as an adhesive between fuselage and footstep.*
FOOTSTEP INSPECTION

Perform this procedure to inspect the footstep installation.

1. Check each of the screws to make sure they are not loose.
2. Check the footstep weldment for any cracks.
3. Check the footstep anti-skid tape that it is not peeling.
4. Check the acorn nuts (cap nuts) on the inside of the fuselage to make sure the nuts present and not loose.
5. Check the composite hardpoint for any cracks or other signs of stress (such as delamination).

This completes the Footstep Inspection procedure.