

# MANDATORY SERVICE BULLETIN

## MSB 42-092

## MSB 42NG-022

### **I TECHNICAL DETAILS**

#### **I.1 Category**

Mandatory.

#### **I.2 Airplanes affected**

Type: DA 42, DA 42 M, DA 42 NG, DA 42 M-NG

Serial numbers: 42.006 through 42.008; 42.010; 42.012 through 42.014; 42.016 through 42.033; 42.035 through 42.043; 42.045, 42.046, 42.048 through 42.051; 42.053, 42.055 through 42.059, 42.061 through 42.081; 42.083 through 42.093; 42.096 through 42.097; 42.099 through 42.120; 42.122 through 42.125; 42.127 through 42.148; 42.150 through 42.170, 42.172 through 42.176; 42.178, 42.179, 42.181 through 42.200; 42.202 through 42.224;  
42.AC001 through 42.AC028; 42.AC030 through 42.AC052;

#### **I.3 Date of Effectivity**

20-May-2011

#### **I.4 Time of Compliance**

Within the next 100 flight hours or 3 months, whichever occurs first after the date of effectivity

#### **I.5 Subject**

Center Wing – Skin to Spar Bond

ATA-Code: 57-00

#### **I.6 Reason**

During a conversion of a DA 42 to a DA 42 NG, voids were detected in the adhesive joint between the center wing spars and the upper center wing skins between the fuselage wall

and the engine nacelle. Review of the manufacturing process identified the above mentioned possibly affected airplanes.

Analysis and test evidence have shown that center wings with voids as large as the inspection criteria referenced herein continue to meet the certification design limits and that safety of flight is not affected. The subject MSB requires inspection of all possibly affected airplanes to verify if there are any center wings that have voids that exceed the inspection criteria and require repair. Airplanes meeting the inspection criteria may continue to operate without restriction.

#### **I.7 Concurrent Documents**

None.

#### **I.8 Approval**

The technical content of this document has been approved under the authority of DOA ref. EASA.21J.052.

#### **I.9 Accomplishments / Instructions**

Comply with WI-MSB 42-092/WI-MSB 42NG-022, latest effective issue.

#### **I.10 Mass (Weight) and CG**

Not affected.

## **II PLANNING INFORMATION**

#### **II.1 Material and Availability**

See WI-MSB 42-092/WI-MSB 42NG-022, latest effective issue.

Materials including drawings are available from Diamond Aircraft Industries.

#### **II.2 Special Tools**

- Equipment for tap testing of composite structure (Refer to AMM Section 51-10-00).
- Drill Stop, if repair is required.

#### **II.3 Labour Effort**

Approx. 2 hours for inspection.

## **II.4 Credit**

2 hours of labour for inspection, if the work is carried out by a Diamond Service Center and a void map is filed with DAI.

Up to 10 hours of labour for repair, depending on void area, if the work is carried out by a Diamond Service Center and a void map is filed with DAI.

## **II.5 Reference Documents**

Diamond Aircraft 42 Series Airplane Maintenance Manual, Doc. No. 7.02.01, latest effective issue.

Diamond Aircraft 42 NG Airplane Maintenance Manual, Doc. No. 7.02.15, latest effective issue.

## **III REMARKS**

1. All measures must be carried out by a certified aircraft service station or a certified aircraft maintenance mechanic.
2. All works, particular those that are not especially described in this Service Bulletin, must be carried out in accordance with the referenced Maintenance Manual.
3. Accomplishment of the measures must be confirmed in the log book.
4. If material and/or labour hours are subject to be credited through Diamond Aircraft Industries, the Service Bulletin must be carried out by an authorized Diamond Service Center and the Warranty Application incl. Work Report and Void Map must be sent not later than 30 days after the end of time of compliance.
5. In case of doubt contact Diamond Aircraft Industries GmbH.

## WORK INSTRUCTION

WI-MSB 42-092

WI-MSB 42NG-22

„Center Wing: Skin to Spar Bond“

### **I GENERAL INFORMATION**

#### **I.1 Subject**

Detection of possible bonding paste voids between center wing skin and spars and determination if repair is required, and repair process.

#### **I.2 Reference Documents**

Diamond Aircraft DA 42 Series Airplane Maintenance Manual, Doc. No. 7.02.01, latest effective issue.

Diamond Aircraft DA 42 NG Airplane Maintenance Manual, Doc. No. 7.02.15, latest effective issue.

#### **I.3 Remarks**

- a) The work must be carried out by a certified aircraft service station or a certified aircraft maintenance mechanic.
- b) All works, in particular those that are not especially described in this work instruction, must be carried out in accordance with the referenced maintenance manual.
- c) In case of doubt, contact Diamond Aircraft Industries GmbH.

### **II DRAWINGS, SPECIAL TOOLS & MATERIALS**

#### **II.1 Drawings**

None.

## **II.2 Special Tools**

- Equipment for tap testing of composite structure (Refer to AMM Section 51-10-00).
- Drill Stop, if repair is required.

## **II.3 Material**

If repair is required: Henkel Hysol 9359.3 adhesive.

### III INSTRUCTIONS

#### III.1 Inspection

1.	<p>Mark both main spar locations on center-wing skins (LH and RH sides, area between fuselage and nacelle) using masking tape.</p> <p><b>NOTE:</b> Refer to Appendix A for reference dimensions.</p>
2.	<p>Examine the complete surface of the center-wing skins.</p> <ol style="list-style-type: none"> <li>Look carefully for signs of damage (dents, cracks, holes and delamination).</li> <li>Do a tap test for voids between the center-wing skins and spars. Refer to AMM sections 51-10 and 53-10.</li> </ol> <p><b>NOTE:</b> The inspection should be performed at a time and/or location devoid of interfering background noise.</p> <p><b>NOTE:</b> In case of doubt, remove safety walk and adhesive residue. Refer to AMM sections 11-20 and 51-20.</p> <p><b>NOTE:</b> The area between the aft spar and the brace rib may be used as a reference sound for a void (see Appendix A).</p>
3.	<p>Mark voids, fill in Void Map (Appendix A) and file with DAI (Fax: +43 - 2622 - 26700 - 1369, Email: <a href="mailto:airworthiness@diamond-air.at">airworthiness@diamond-air.at</a>).</p> <p>The Void Map is attached to this WI. A sample Void Map which explains how to use the form is also attached.</p> <p><b>NOTE:</b> Keep records of voids (copy of void map, pictures, ...) to find back for repair.</p>
4.	<p>If the voids exceed the following limits, repair in accordance with Section III.2. The aircraft may only be operated for one further flight to a suitable repair shop. The flight must be conducted under VMC, in calm air and without exceeding <math>v_{NO}</math>.</p> <p>Minimum width of bond line chordwise (i. e. in flight direction) on a single center wing skin to spar bond:</p> <ul style="list-style-type: none"> <li>- For the forward spar to skin bond: 32 mm ( 1.25 inches).</li> <li>- For aft spar to skin bond: 25 mm ( 1 inch).</li> </ul>
5.	<p>If the voids do not exceed the criteria stated in Item 4, the airplane may be operated within the limits stated in the current AFM. No repair is necessary.</p>
6.	<p>Clean working area and check for foreign objects.</p>
7.	<p>If removed during inspection, re-apply safety walk. Refer to AMM Section 11-20 and 51-20.</p>

8.	Perform functional check of altered, repaired and new parts.
9.	Test all systems in working area for function.
10.	Make necessary entries into aircraft logs.

### III.2 Repair:

#### Preconditions:

The repair must be performed in an appropriately furnished clean and dry workshop.

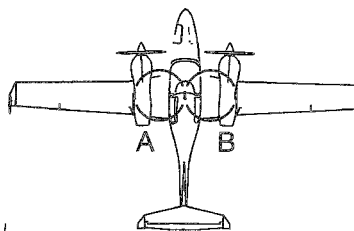
#### Instruction

1	Remove safety walk and adhesive residue. Refer to AMM sections 11-20 and 51-20.
2	Remove all access covers from the center wing.
3	<p>Using a 2 mm (0.08 in) drill bit with <b><u>drill stop (depth set to 4 mm / 0.16 inches)</u></b> carefully drill 2 holes into each void at opposite edges (or one hole every 100 mm / 4 inches into each void).</p> <p><b>CAUTION:</b> DO NOT DRILL PAST THE VOID INTO THE SPAR. DRILLING INTO THE SPAR CAN DAMAGE THE CENTER WING BEYOND REPAIR.</p>
4	Remove loose particles with a vacuum cleaner.
5	Clean working area and check for foreign objects.
6	<p>Calculate the expected maximum injection volume according to the following scheme for each void:</p> $(\text{Length of void}) * (\text{Width of void}) * 2 \text{ mm} = (\text{injection volume})$ $(\text{Length of void}) * (\text{Width of void}) * 0.08 \text{ inches} = (\text{injection volume})$ <p><b>CAUTION:</b> IF EXCESSIVE ADHESIVE IS INJECTED THERE MIGHT BE A LEAK IN THE VOID AND THE ADHESIVE CAN FLOW INTO AND ACCUMULATE IN ONE OF THE CHAMBERS OF THE CENTER WING. THIS MIGHT LEAD TO A PERMANENT BONDING OF MOVABLE OR REMOVABLE PARTS.</p>
7	<p>To fill the voids use Henkel Hysol 9359.3 adhesive.</p> <p><b>CAUTION:</b> ALWAYS OBSERVE THE APPLICABLE HEALTH AND SAFETY REGULATIONS GIVEN BY THE MANUFACTURER OF THE ADHESIVE.</p>
8	Using a syringe, inject adhesive into voids until voids are completely filled. (Inject from one

	<p>hole until adhesive flows from opposite hole). If necessary seal void with sealant tape and bagging material to create a localized vacuum to ensure adhesive fills each void.</p> <p><b>NOTE:</b> Always be cautious to inject the adhesive gently and at a steady rate. Injecting too fast will plug the holes.</p>												
9	<p>If you reach the expected maximum injection volume for the void and it is not filled completely, inspect main landing gear bay and center wing chambers for excessive adhesive accumulation. Remove excessive adhesive.</p> <p><b>CAUTION:</b> IF EXCESSIVE ADHESIVE IS INJECTED THERE MIGHT BE A LEAK IN THE VOID AND THE ADHESIVE CAN FLOW INTO AND ACCUMULATE IN ONE OF THE CHAMBERS OF THE CENTER WING. THIS MIGHT LEAD TO A PERMANENT BONDING OF MOVABLE OR REMOVABLE PARTS.</p>												
10	<p>Pre-cure for at least 2 hours at 25 °C / 77 °F before post-curing.</p> <p><b>CAUTION:</b> Do NOT apply higher temperatures within 2 hours after injection.</p>												
11	<p>Inspect main landing gear bay and center wing chambers through inspection holes for excessive adhesive accumulation. Remove excessive adhesive.</p>												
12	<p>Perform local post-cure according to datasheet and one of the following configurations:</p> <table border="1"> <tbody> <tr> <td>25 °C / 77 °F</td><td>6 days</td></tr> <tr> <td>30 °C / 86 °F</td><td>4 days</td></tr> <tr> <td>38 °C / 100 °F</td><td>2 days</td></tr> <tr> <td>46 °C / 115 °F</td><td>24 hours</td></tr> <tr> <td>54 °C / 129 °F</td><td>12 hours</td></tr> <tr> <td>60 °C / 140 °F</td><td>7 hours</td></tr> </tbody> </table> <p><b>CAUTION:</b> Do NOT exceed a temperature of 60 °C / 140 °F.</p>	25 °C / 77 °F	6 days	30 °C / 86 °F	4 days	38 °C / 100 °F	2 days	46 °C / 115 °F	24 hours	54 °C / 129 °F	12 hours	60 °C / 140 °F	7 hours
25 °C / 77 °F	6 days												
30 °C / 86 °F	4 days												
38 °C / 100 °F	2 days												
46 °C / 115 °F	24 hours												
54 °C / 129 °F	12 hours												
60 °C / 140 °F	7 hours												
13	<p>When post cure is complete, remove clamps, bagging material, sealing material, etc. Lightly sand each area with 220 grit, or finer, sandpaper to remove excess adhesive and to blend the area into adjoining surfaces.</p>												
14	<p>Inspect by tap test to ensure all voids are filled.</p>												
15	<p>Close all inspection holes.</p>												
16	<p>Paint touch up per AMM Chapter 51.</p>												
17	<p>Re-apply safety walk. Refer to AMM Section 11-20 and 51-20.</p>												
18	<p>Test all systems in working area for function.</p>												
19	<p>Make necessary entries into aircraft logs.</p>												



Void Map, Airplane S/N: \_\_\_\_\_

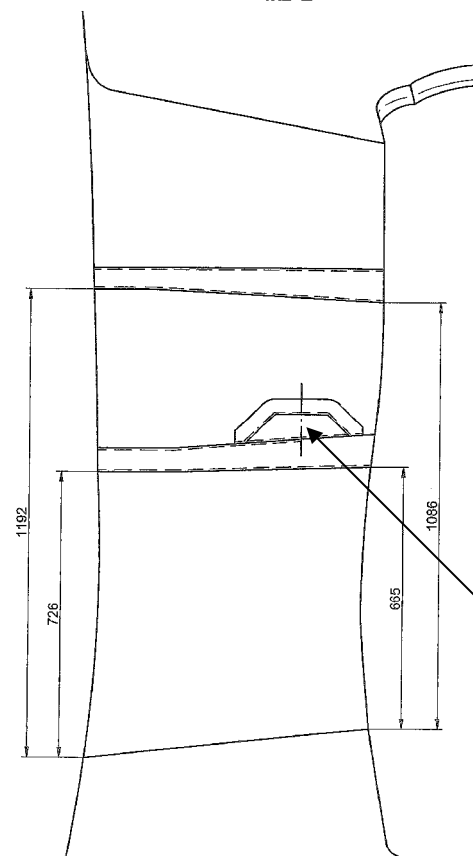
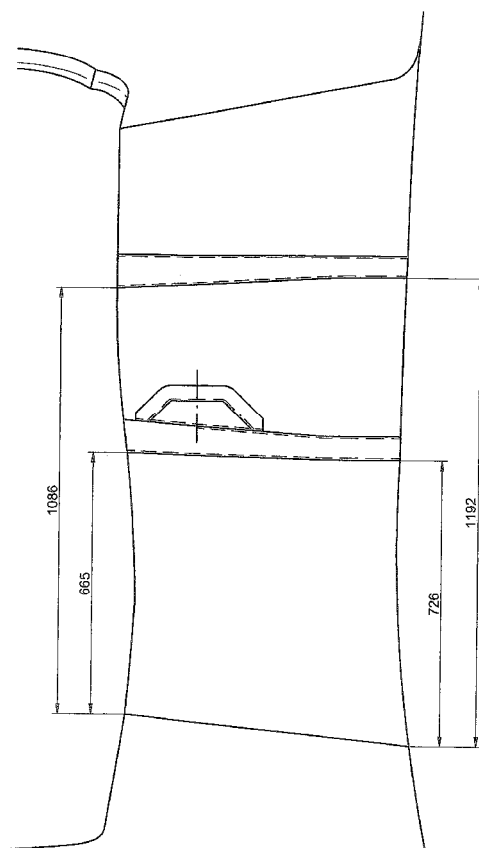


DETAIL A

DETAIL B

**NOTE:** Dimensions are for reference only. Determine exact location of spars by tap testing.

**NOTE:** Dimensions are specified in millimeters. Refer to AMM for conversion to inches.



Chordwise

Spanwise

**NOTE:** Reference area for sound of a void

- ☐ Dimensions in inches  
☐ Dimensions in millimeters

**Void Map, Airplane S/N:** \_\_\_\_\_

LH FWD Center Wing Spar				RH FWD Center Wing Spar			
Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)	Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)
1				1			
2				2			
3				3			
4				4			

LH AFT Center Wing Spar				RH AFT Center Wing Spar			
Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)	Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)
1				1			
2				2			
3				3			
4				4			

**NOTE:** The minimum remaining Bond Line width in case of voids in the center of a spar is the sum of the remaining bond line forward and aft of the void.

File Void Map with DAI: Fax: +43 - 2622 - 26700 - 1369 or e-mail: [airworthiness@diamond-air.at](mailto:airworthiness@diamond-air.at)

☐ Dimensions in inches  
☐ Dimensions in millimeters

Void Map, Airplane S/N: \_\_\_\_\_

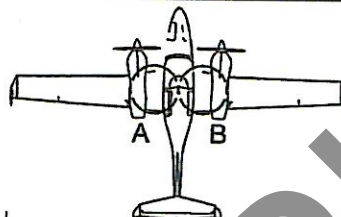
**Results:**

	LH Center Wing				RH Center Wing			
	Total Min. remaining Bond Line width (chord wise)	Criteria	Yes	No	Total Min. remaining Bond Line width (chord wise)	Criteria	Yes	No
FWD Spar		32 mm (1.25 inches) or more				32 mm (1.25 inches) or more		
AFT Spar		25 mm (1 inch) or more				25 mm (1 inch) or more		
	Passed (further operation permitted)				Passed (further operation permitted)			

Test performed on (Date) \_\_\_\_\_

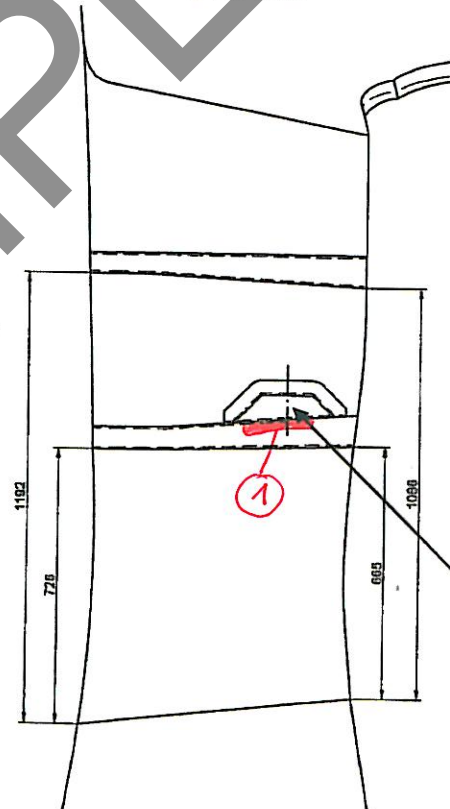
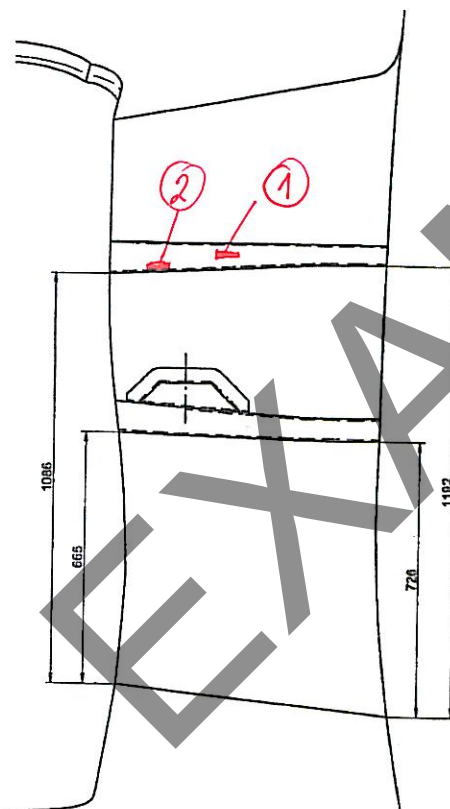
Test performed by \_\_\_\_\_

Void Map, Airplane S/N: 42. xxx



DETAIL A

DETAIL B



Chordwise

Spanwise

**NOTE:** Dimensions are for reference only. Determine exact location of spars by tap testing.

**NOTE:** Dimensions are specified in millimeters. Refer to AMM for conversion to inches.

**NOTE:** Reference area for sound of a void

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Void Map, Airplane S/N: 42.xxx
☐ Dimensions in inches  
☒ Dimensions in millimeters

LH FWD Center Wing Spar				RH FWD Center Wing Spar			
Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)	Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)
1	20 mm	80 mm	60 mm	1			
2	25 mm	70 mm	75 mm	2			
3				3			
4				4			

LH AFT Center Wing Spar				RH AFT Center Wing Spar			
Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)	Item	Width (chord wise)	Length (span wise)	Min. remaining Bond Line width (chord wise)
1				1	55 mm	200 mm	45 mm
2				2			
3				3			
4				4			

**NOTE:** The minimum remaining Bond Line width in case of voids in the center of a spar is the sum of the remaining bond line forward and aft of the void.

 File Void Map with DAI: Fax: +43 - 2622 - 26700 - 1369 or e-mail: [airworthiness@diamond-air.at](mailto:airworthiness@diamond-air.at)

☐ Dimensions in inches  
☒ Dimensions in millimeters

Void Map, Airplane S/N: 42.xxx

Results:

	LH Center Wing				RH Center Wing			
	Total Min. remaining Bond Line width (chord wise)	Criteria	Yes	No	Total Min. remaining Bond Line width (chord wise)	Criteria	Yes	No
FWD Spar	<u>60 mm</u>	32 mm (1.25 inches) or more				32 mm (1.25 inches) or more		
AFT Spar		25 mm (1 inch) or more	<u>X</u>		<u>45 mm</u>	25 mm (1 inch) or more	<u>X</u>	
	Passed (further operation permitted)		<u>X</u>		Passed (further operation permitted)		<u>X</u>	

Test performed on (Date) 20-May-2011

Test performed by Max Mustermann