

Kind : Repair Instruction

Subject : Skin - Spar delamination at port wing root

Effectivity : ASW 15 - B ( Serial Numbers 15 184 to 15 356 )

Accomplishment : After observation of a damage

Reason : On some ASW 15 - B delamination has been observed between skin and spar below the port wing root ribs due to hard structural load. Exposure of the sailplane to hot and dry climate seems to favour this kind of damage.

Instruction : 1. Inspection

Suspicious cracks in this area need to be investigated. Contrary to unceritcal cracks in paint or filler, which smooth the corner between spar and lower wing sandwich, real damage is determined by knocking with a small piece of metal ( very small hammer, key, or pocket knife ) against the surface of the sandwich.

If the joint of sandwich and spar is delaminated, a rattling sound is heard; if the joint is o.k., a nearly metal like clear sound can be heard.

By the way of knocking, the whole area of delamination is easy to determine.

2. Repair

If a delamination is observed, the following repair instruction is recommended which should improve the original design by use of a better glue mixture and a modified load transition from skin to spar.

Lateron, a wedge of the lower wing surface near the wing root is made for easier work ( sketch no. 1 ). According to sketches 2a and 2b the repair area is prepared with special notice to the fact, that all the damaged glue joint is removed.

Now a plain piece of balsa of the specific gravity in the range of 0.14 to 0.16 kg per litre ( water is 1.00 kg per litre ), thickness 8 mm, and grain spanwise is to be fitted.

This balsa is covered ( on the lower side ) with 1 layer 92105 or 92110 fibreglass cloth and 1 layer 92115 or 92125 both with fibres 45° ( diagonal ) to the flight direction. These two layers correspond to position (9) and (11) of the " Laminierplan " ( layer scheme ) drawing 151.51/52 S 17 of the ASW 15-B; the position (10) 1 layer 92145 ( undirectional cloth spanwise ) will not be replaced by this repair, as the sandwich should no more be so stiff.

Immediately after lamination, the fibreglass reinforced balsa is glued to spar and sandwich. The following glue mixture should be used :

Glue mixture :

100 parts Epikote 162  
 38 parts Epikure 113  
 about  
 20 parts Aerosil  
 10 parts Cotton  
 ( parts by weight )

Epoxy glue joints do not need high pressure. Some heavy things ( sandbags, pieces of lead, stones for weighing, etc. ) are sufficient.

With a temperature of 20 to 25°C, a hardening of more than 12 hours is requested.

Now the balsa should be prepared for making the outer skin according to the sketches 3a, 3b, and 3c.

With the use of the wing root wedge it has to be made sure that there will be sufficient space for the glass layers of the outer skin.

Near the root are about 1.5 to 2 mm necessary, more inside at least 1 to 1.5 mm are necessary.

As the outer skin is directly glued to the spar on the root, better transition of forces between spar and sandwich is expected.

The outer skin layers consist of 2 layers 92145 which are orientated 45° from the flight direction with their main fibre direction but crossed under 90° themselves.

Along the root rib there is one layer 92146, 150 mm wide and one layer 92146, 100 mm wide with the main fibre direction in flight direction.

Also in the outer skin laminate the layers (5) and (6)-undirectional cloth 92145 - of the " Laminierplan " drawing no. 151.51/52 S 17 are not replaced.

A curing time of at least 12 hours at 20 to 25°C must be maintained after the laminate job of the outer skin.

Afterwards, the repair area is well sanded and a Microballoon Filler is applied.

Mixture : ( parts by weight )

100 parts Epikote 162  
 38 parts Epikure 113  
 25 parts Microballoons

( this filler is known as Epelyth - Spachtel )

A Polyester Filler-as used for auto body work ( Ferro Elastic )-can be used alternatively.

Now the advantages of the wing root wedge are evident, as the whole surface sanding can be done without rigging the glider.

When the filler job is finished, the repair area is to paint with Polyester PE - Hochglanzlack and sanded after 12 hours hardening.

Mixture :( parts by weight )

100 parts PE - Hochglanzlack  
 10 parts PE - Härter ( hardener )

Sheet : 3

Number of sheets : 3

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Material : 0,5 kg Epikote 162  
0,2 kg Epikure 113  
  
0,5 m<sup>2</sup> glass 92110 ( or 92105 )  
0,5 m<sup>2</sup> glass 92125 ( or 92115 )  
1,0 m<sup>2</sup> glass 92145  
0,5 m<sup>2</sup> glass 92146  
  
0,15 m<sup>2</sup> Balsa, 8 mm wide,  
specific gravity,  
each of 0.14 to 0.16 ( t/m<sup>3</sup> )  
= 0.14 to 0.16 ( kg/l )  
  
0,1 kg Aerosil  
0,05 kg Cotton ( cut to 3 mm length )  
  
0,5 kg Epolyth - Spachtel  
0,2 kg Epikure 113  
or  
1,0 kg Ferro - Elastic - Spachtel  
1 tube Hardener ( 0,05 kg )

Weight and Balance : If a correct job has been done, the sailplane will only be a very little heavier due to this repair. A weight and balance will not be necessary, as the change of weight is close to the Centre of Gravity.

Remarks : With regard to the repair the general guidelines of the ASW 12 / ASW 15 Repair Manual should be taken into consideration. The repair should be done in or with the assistance of a licenced repair station.

Drawings : Drawing 151.51. S 17 and 151.51 S 17 a as well as the ASW 12 and ASW 15 Repair Manual belongs to this repair instruction.

Poppenhausen, 29th October, 1974

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