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S E R V I C E B U L L E T I N

No. **030906**

CAP10B - Wings - Inspection and service life	ATA : 050
Supersedes : SB 16 all revs	

This English version is a courtesy translation of its original French version.
In case of any difficulty, reference should be made to the French original issue.

EFFECTIVITY

Models	Serial numbers affected
CAP10B with wood-only wing spar.	**01-04, 1 to 282 <u>except</u> with modification 000302 ("CAP10C" wing)**

Instruction described in the original French version of this Service bulletin are mandatory as stated in an EASA Airworthiness Directive (AD).

COMPLIANCE

MANDATORY

TIME OF COMPLIANCE

<u>Immediately</u>

- **For snap (flick) maneuvers, positive or inverted, the speed not to exceed is 86 kts (160 km/h or 99 mph).**
- **For each flight, begin logging take-off mass and +/- maximum load factors.**
- **Update CAP10B flight manual and CAP10B maintenance schedule.**

Load limit factors of +5/-3.5 solo, +4.3/-3.5 dual, are maintained until any of the two choices described hereafter is performed.

<u>Within 24 months</u>

- **Apply one of the two following choices.**

Applying one of these two choices allows to come back to the load factor limits +6 and -4.5 solo and dual.

Choice alpha:

- **replace the wings with carbon-wood spar wings (SB000302).**
- **apply documents pertinent to CAP10C (Flight manual, maintenance schedule).**

Choice bravo:

- **perform a major maintenance of the spar,**
- **install a recording G-meter PGM1212 (if not already installed),**
- **then apply the instruction related to the spar potential limits described in § "Description - 4. Wings".**

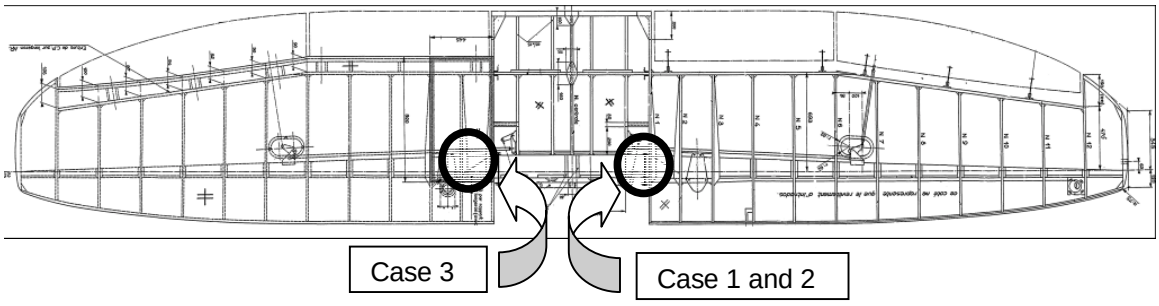
REASON

Although repetitive spar inspections have detected over-stress cracks and resulted in repairs and replacements, there is new evidence that some overstress damage cannot be discovered by current inspections.

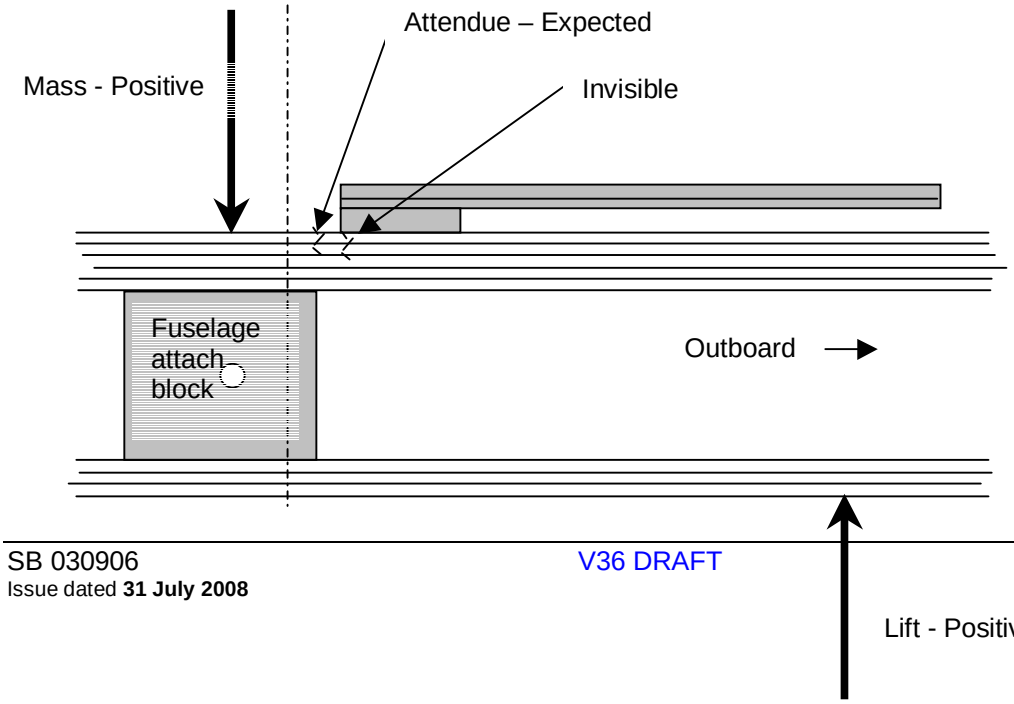
CASE 1: A fatal wing failure in Texas in June of 2003, was not prevented.In the Texas case, the wing failed at a pre-existing crack which was not in the Rib 1 inspection area. The crack was offset outboard slightly, possibly due to improper woodworking technique in the execution of SB 16, in 1992. When the skin and wingwalk support were routed to expose the likely area of compression cracks, the router cut some fibers of the spar cap. This 0.6 mm cutting of the spar may be commonplace, and only becomes an issue at overstress, when cracks begin. Such cracks are not visible because they start in the very corner of the inspection area.

The left spar failed at the edge of the inspection area, where a compression crack had failed the top one of five laminates completely, and progressed into the second laminate. This failure appears to pre-date the accident by some time.

On the right spar root, which did not fail, there was a visible compression crack. Also, there existed a larger compression crack in the right wing root hidden in the corner of the inspection area. The NTSB has recorded digital images.



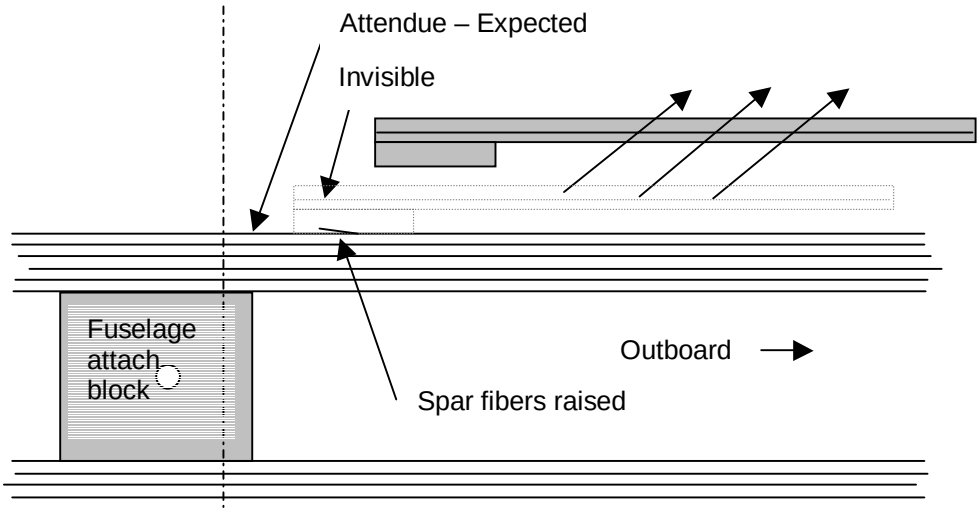
CAP10B wing section showing compression crack locations when overstressed.



CASE 2: New Hampshire, USA, Inspections – No incident or accident
Shallow splits in the upper spar cap have been recently found between Rib 1 and 2 in two other CAP10B. The first became evident from detachment of the inboard forward end of the wing walk reinforcement. More significantly, the second of these had no evidence until the spar was uncovered. While these aircraft have previously been inspected for overloads, records were not kept of the load factor or masses involved. In both cases, the splits were less than 5 mm deep.

It is not certain that these splits are the result of tension from heavy negative flight loads, but this is the most likely reason. Preliminary experiments at Apex indicate that shear loads can create such splits. These could result from the wing-walk reinforcement, reacted by the wing-walk itself, shearing from the spar during heavy flexing loads.

This case causes the uncovering of the spar for all wooden spars



CASE 3:
Germany accident D-EXXY, #275, Summer 2001
In December 2003, the German accident investigation agency, the BFU, published its report on the fatal accident of 17 July 2001. The right wing failed during a 4.4 G roll, killing two. The airplane was used for intensive landing practice on a rough field.

There is a good chance, but no certainty, that before this accident, damage to this spar would have shown on the spar cap in the vicinity of the landing gear attachment ; that is, near rib 2 and rib 3. It is this case which extends the inspection to the rib bay outboard of the landing gear.

TEST DATA REVIEW:
Apex Aircraft has reviewed the original fatigue test of the CAP10B wooden spar, (Proces verbaux de l'essai no S2 6644 partiels no 1 a 6, CEAT, 1982-1987), with special attention to field history since these tests. Judgements are made within the limits of this data to LIMIT the LIFE of the wooden spar.
When the load limits (mass x load factor) have been exceeded more than 60 times, a major maintenance of the wings must be performed.

Load limits: +4000 kg (760 kg x 5.2G) or –2700 kg (760 kg x -3.5G)

SUMMARY CONCLUSION
In all cases, the data is not complete or certain. Some have aspects not reported previously. The BFU made extensive comment on wood grain alignment in the spar, how this effects shock loads, and also suggested that microcracking had begun. Apex continues research and data collection. Apex requests owners to contribute data of their findings.

These cases have caused Apex to lose confidence that existing required inspections will prevent wing failures eventually after an over-stress, when load factors of +6/-4.5 G are allowed, because such damage may exist.

DESCRIPTION

Load limit factors of +5/-3.5 solo, +4.3/-3.5 dual, are maintained until replacement of the wings with carbon-wood spar wings or major maintenance of the spar is performed.

Important: From now on, for snap maneuvers, positive or inverted, the speed not to exceed is 86 kts (160 km/h or 99 mph).

1. AIRPLANE FLIGHT MANUAL

The **Airplane Flight Manual** is amended by adding to the LIMITATIONS paragraph:
"Wing loads of every flight must be logged in the Route Log. Note that the wing spar has a LIFE LIMIT. When the load, mass x G, exceeds +4000 kg or –2700 kg more than 60 times, a major maintenance of the wings must be performed".

2. MAINTENANCE PROGRAM

An amendment to the **Maintenance Program**, under Maintenance Operations (Chapter 6), 57-10-00 WINGS, directs the responsible engineer to inspect the route log.

3. ROUTE LOG OR SIMILAR

Apex Aircraft now adds the operational requirement that every CAP10 user log:

- maximum load factors, positive and negative,
- approximate take-off mass,
- and remaining event allowance

in a log EVERY FLIGHT.

Create such columns in a logbook, and insist users complete them. All values exceeding limits between each maintenance check will be copied to the maintenance log.

Note that a logging G-meter does NOT log mass.

SAMPLE ROUTE LOG or similar (See also **LOAD TABLES** at end of this SB)

Incidents – Observations eventuelles Incidents – Observations, if any Use **Load tables** (SB 030906)

YYMMDD (+HHMM)	Mass kg Cat A max 760	+G Mass x G < 4000 kg ?	-G Mass x (-G) > -2700 kg ?	Life Remaining From Allowed 60
060410	760	+4.8 ok	-3.1 ok	60
060413	660 - SOLO	+5.9 ok	-4.1 ok	60
060415	740	+5.5, +5.7, +5.4	-3.6, -3.3, -3.5	58 !!! (Debit 2 from 60)
060418	810 - VFR	+2 ok	-0 ok	58

SAMPLE LOAD TABLE for example, (+G only):
(Sample log on following page)
SAMPLE ROUTE LOG or similar (See also **LOAD TABLES** at end of this SB)

CAP10B Mass x G Limits

kg * G	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6	>6 G
600	3060	3120	3180	3240	3300	3360	3420	3480	3540	3600	
610	3111	3172	3233	3294	3355	3416	3477	3538	3599	3660	
620	3162	3224	3286	3348	3410	3472	3534	3596	3658	3720	
630	3213	3276	***SOLO***	3402	3465	3528	3591	3654	3717	3780	
640	3264	3328	3392	3456	3520	3584	3648	3712	3776	3840	
650	3315	3380	3445	3510	3575	3640	3705	3770	3835	3900	
660	3366	3432	3498	3564	3630	3696	3762	3828	3894	3960	
670	3417	3484	3551	3618	3685	3752	3819	3886	3953	4020	
680	3468	3536	3604	3672	3740	3808	3876	3944	4012	4080	
690	3519	3588	3657	3726	3795	3864	3933	4002	4071	4140	
700	3570	3640	3710	3780	3850	3920	3990	4060	4130	4200	
710	3621	3692	3763	3834	3905	3976	4047	4118	4189	4260	
720	3672	3744	3816	3888	3960	4032	4104	4176	4248	4320	
730	3723	3796	3869	3942	4015	4088	4161	4234	4307	4380	
740	3774	3848	3922	3996	4070	DEBIT LIFE LIMIT				4440	
750	3825	3900	3975	4050	4125	4200	4275	4350	4425	4500	
760	3876	3952	4028	4104	4180	4256	4332	4408	4484	4560	
770	3927	4004	4081	4158	4235	4312	4389	4466	4543		
780	3978	4056	Overstepping of airframe limitations					4524			
790	4029	4108	4187	4266	4345	4424	4503				

Overstepping of airframe limitation

4. WINGS

Apex Aircraft offers a choice of actions:

Choice **ALPHA**:
Replace the wooden-only wing with Apex Aircraft design change 000302, “CAP10C” wing. This wing has a spar containing pre-cured carbon-fibre laminate. This wing installation always requires the installation of an approved data-logging G-meter. No repetitive special spar inspections are required, and there are flight performance benefits, and maintenance benefits regarding the landing gear.

Or

Choice **BRAVO**:
This choice initiates a life limit on the spar and a major maintenance.

The spar is given major maintenance once now (refer to Accomplishment instructions § Structural modifications).
then

1) The spar cap will require recurring major maintenance: after every 60 occurences greater than 4000 kg load or less than –2700 kg

Note: Contact Apex-Aircraft before performing major maintenance once more.

2) If +6g or –4.5g is exceeded (any mass): contact Apex Aircraft.

FINDING OF COMPLIANCE for pre-SB work will be on a case-by-case basis if load factors have been logged since. Contact Apex Aircraft for further instructions.

MANPOWER

Choice ALPHA: new CAP10C wing – Refer to Apex Aircraft SB 000302.
Any experienced airframe mechanics can make this change. Logging G-meter is to be installed. Wood router expertise is required.

Choice BRAVO: only a skilled woodworker with proper tools must perform this task. This task must be done at a highly-experienced wooden airplane maintenance shop. Wood router expertise is required.

Apex Aircraft has determined that the potential for further damage is very high. A second person is required to check the work in this SB before the spar cap repair, doublers/reinforcements, and skin are replaced. Regarding the work environment, a good guide is the human factors checklist in FAA AC 43.13-1, Chapter 13-2, as described in EASA 145.A.65 b3.

Preparation: Removal of the wing: 18 hours.
Remove skins over spars: 6 hours.
Inspect: 3 hours
Woodwork:

- 60 hours for the spar
- 31 hours for the filler

91 hours total
Replace wing: 30 hours
G-meter installation: 3 to 8 hours depending on panel modification required.

MATERIAL

Material (supplies) consist of old and/or new parts as listed in section “Material information” of this SB.
Spare parts are to be procured from Apex Aircraft:
Fax: +33 380 35 60 58, Email: parts@apex-aircraft.com

TOOLING

Standard woodworking, mechanic tools.
Magnifier of 10 power minimum.
A digital camera of moderate or high quality, equal to or greater than 600x800 pixel resolution.

WEIGHT AND BALANCE

Choice Alpha requires new weighing. Note that choice Alpha may increase useful load due to lighter structure and increased allowable MTOW. New data-logging G-meter instrument will add less than 2 kg.

ELECTRICAL LOAD DATA

Data-logging G-meter instruments require little power to maintain charge of internal batteries, and to power simple LCD displays.

REFERENCES

- 1000916GB Maintenance Guide (CD-ROM)
- 1000915 GB Main spar undersurface inspection
- FAA Advisory Circular AC 43.13-1, Chapter 1 “Wood structure”
- “Wood inspection guidance” from Transport Canada in French : RAC, Part V Airworthiness, Standard 571 appendix E.
- Wood repair guidance from DGAC : P-62-10 (available on F-AST CD-ROM)

PUBLICATIONS AFFECTED

- Service Letter 990813: SB/SL list.
- CAP10B Aircraft Flight Manual (Pilot Operating Handbook) 1000977GB
- CAP10B Maintenance Program 1000923 GB

APPENDIX

- Load tables.
- Revision 9 to CAP10B flight manual (Doc 1000977 GB)
- Amendment to CAP10B Maintenance Program (Doc 1000923 GB)

FEEDBACK

To report and send spar images as required to Apex Aircraft Airworthiness Office,
you may use:

- e-mail: airworthiness@apex-aircraft.com,
- postal mail: address on the first page of this Service Bulletin,
- fax : (+33) (0) 380 356 515,

ACCOMPLISHMENT INSTRUCTIONS

Choice Alpha – Install new Cap10C wing – Refer to Apex Aircraft SB 000302.

Choice Bravo -

Perform following instructions I, II and III.
Read completely before performing.
The wings life must be considered before any repair decision.
Have the work checked, step by step, by a second person with check registration.

I - STRUCTURAL MODIFICATIONS

1. Preparation

a) Make label (template below, Illustration A) for photographs with aircraft serial number, registration, date, Left or Right.

Illustration A: Sample label to be placed in photo area:

Gauche Left <-Fwd	CAP10 Serial No. (BS 030906)	Registration	200_- An-Mois-Jour(Year – Month – Day)	Droite Right Fwd->
Optional: Email address of owner, service organization				

b) Remove the wing

Cut off magnetos.

Outdoor

- Remove engine cowlings
- Remove under fusele fairing
- Remove the wing root fairing (karman)
- Remove the cockpit canopy
- Disconnect the battery

Inside cabin

- Remove the floor covering
- Remove the seats and seats tracks.
- Remove centre console
- Disconnect the mechanical elevator trim control
- Remove the flooring
- Uncouple the elevator control
- Remove the control sticks (disconnect the radio push-to-talk wires)
- Remove the control stick base cover

Wing root

- Disconnect the brake lines.
- Disconnect the position light wires.
- Disconnect the Pitot heater wires.
- Disconnect the Pitot tube line

Supporting the aircraft

- Set the aircraft straight and level (adjustable stand or trestle at rear).
- Raise the front of the aircraft with the hoist. Use the engine attachment.
- Maintain the aircraft high enough to slide and position a padded trestle beneath the wing root rib on each side of the aircraft.
- Place the wing supports in line with the no. 1 ribs (wing roots) and rest the wing on the trestles. The weight of the aircraft must be supported by the hoist and not by the trestles.

Removing the wing

- Remove the cotter pins and the nuts from the forward wing attachment bolts.
- Retract the flaps.
- Remove the aft wing attachment bolts raising the aircraft slightly with the hoist to take the weight off the bolts.
  Attention: Note the position of the aft wing fastenings (the front and rear bolts are of different lengths).
- Remove the forward wing attachment bolts using the hoist to take the weight off them.
- Raise the rear of the fuselage moving it slightly forward at the same time until the fuselage and wing are separated. Keep an eye on the inside of the cockpit while doing so.
- Set down the wing with its landing gear on the padded trestles (flaps retracted).

2. Wing upper surface: inspection of main spar cap

a) Measure and record the slope of the wing-walkway bevel (for instance by keeping part of it) to allow preparing the replacement part (refer to following photo).

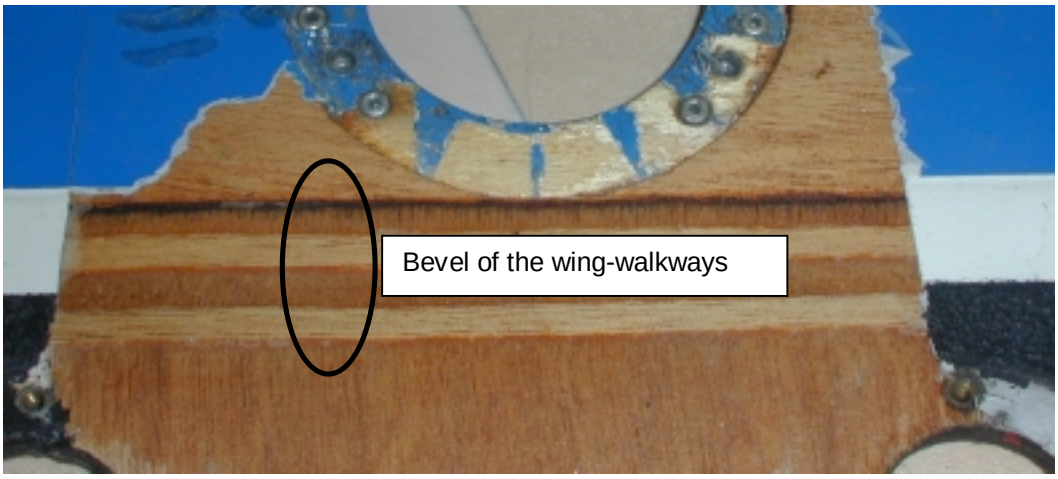


Photo 1 : part of wing-walkway bevel kept to trace the slope.

Remove the wing upper surface skin from leading edge to trailing edge, from inboard of rib 4 to the fuselage on left and right, per illustration b. to do so, cut first between the ribs, then carefully remove the remaining skin from the ribs using chisel, scraper and sander. **Make sure not to damage the ribs.**

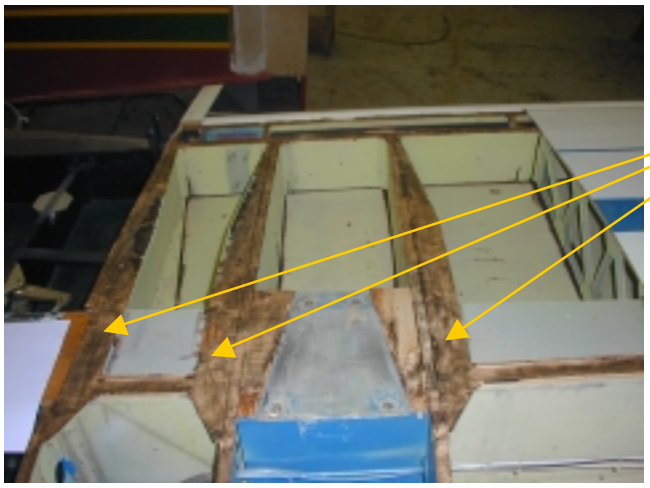


Photo 2 : with skin removed.

b) Tap test, and gently pull-test, all of the wingwalk reinforcements which are glued to spar. Log any locations where bond failure are suspected.

c) Remove the reinforcements if any damage shown. If no damage shown, only cut and remove the parts of the reinforcements and the top of the ribs covering the main spar (refer to following example).

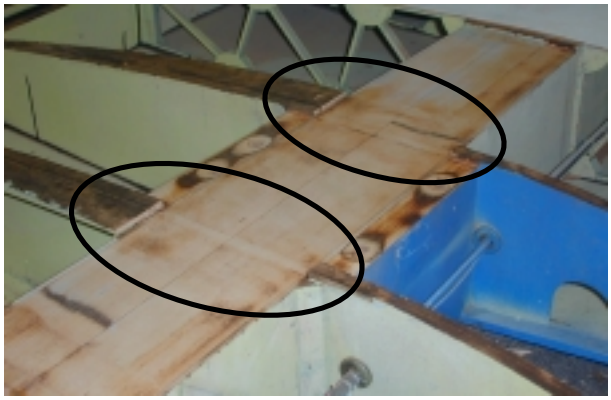


Photo 3: example of airplane with reinforcements in good condition. Therefore the only parts removed were covering the main spar.

d) With side lighting and magnifier, inspect spar surfaces for compression cracks, tension cracks, and broken or cut fibers from previous and current modifications.

e) Photograph area over rib 1 left and rib 1 right, with label. Additionally, photograph any damage, labelling location relative to rib number and left or right. Include a scale (millimeter preferred) in the image.

f) Remove the first strip (layer) of the spar cap and continue beyond the joint of glue (approximately 5/10 in the 2nd strip of the spar cap). Respect the 1:20 slope at each end for scarf joint. Smooth the surface in order to be able to later glue spruce strips. Sand the glue located on the front and rear spar webs **without damaging them.**

g) Inspect the resulting surface as already done at step d. If cracks are shown, remove wood up to 15 mm deep. If cracks deeper than 15 mm are found, Apex recommends retiring the wing. If deeper repair is attempted, the owner of the aircraft must submit a repair file.

3. Wing upper surface: major maintenance of main spar cap

§ read completely before applying (schematics included)

a) Provide for 2 or 3 spruce strips, top quality 1 (mini 3,91kg/mm² i.e. 383 daN/cm², 7 to 8 mm thick) depending on the thickness of the removed part of spar cap.

b) Carefully position and adjust each strip, making one or more marks to avoid any moving during gluing.

c) During gluing, make sure glue is overflowing all along the periphery and particularly that it flows into the joints “spar caps/spar webs” while applying pressure.

d) The scarf joints of each repair strip are staggered, leaving a 40 to 50 mm flat area.

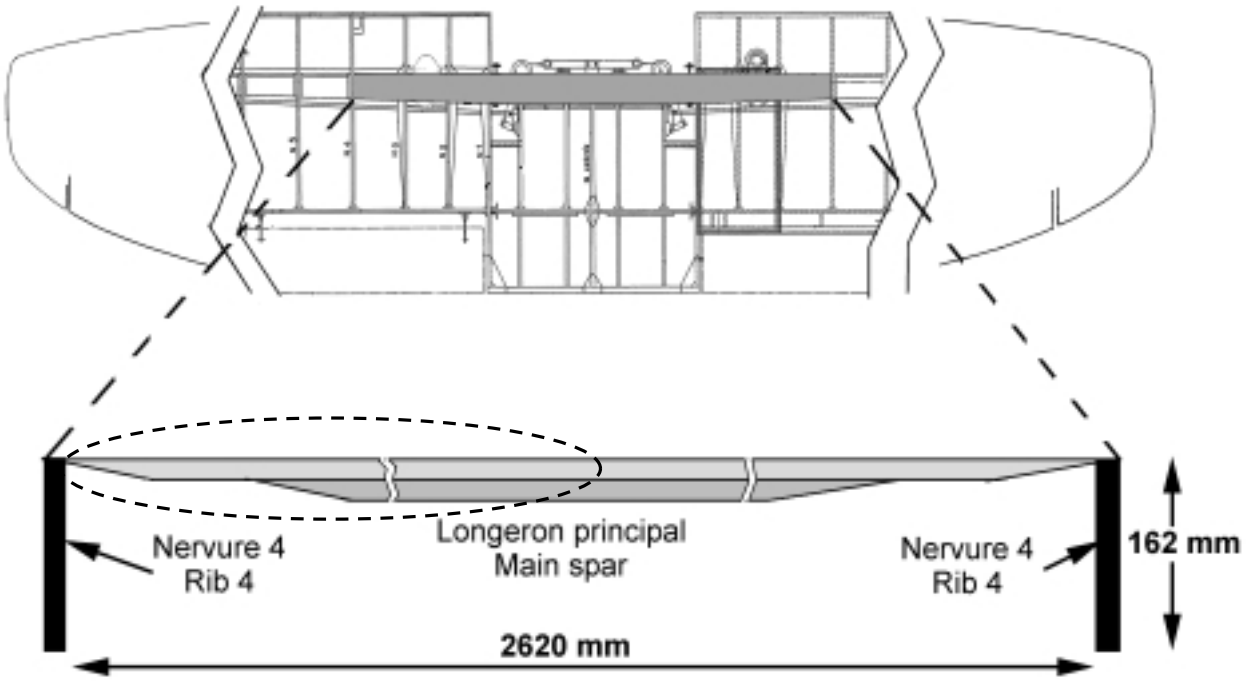
e) Refer to following step schematics.

f) Do not reinstall the wing upper surface skin plywood yet.

CASE WITH TWO SPRUCE STRIPS

The symetrical repair concerns the LH rib nr4 till RH rib nr4 area, with strips in one piece if possible. If not, scarf joints are allowed only between the wings-to-fuselage attachment fittings (*). The scarf joints must be distant by at least 3 times the length of the longer scarf joint, even for 2 scarf joints located on 2 neighboring strips.

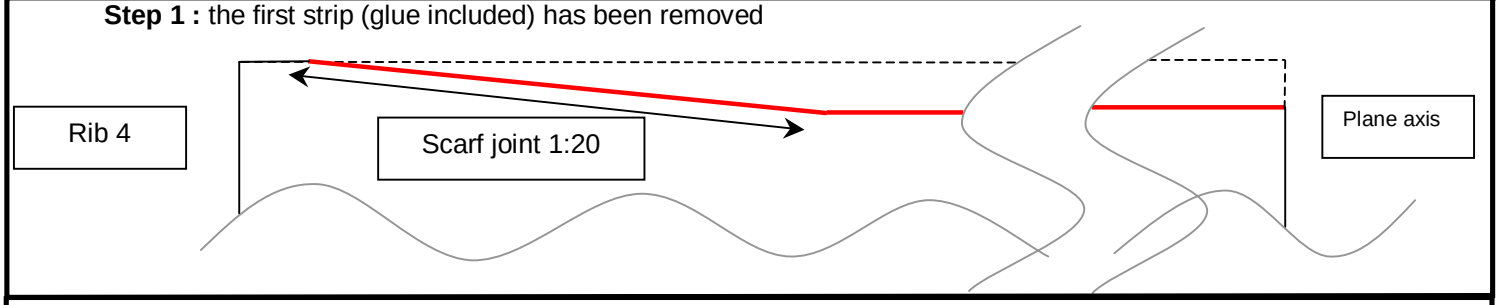
(*) The wings-to-fuselage attachment fittings may not overlap any part of the scarf joint.



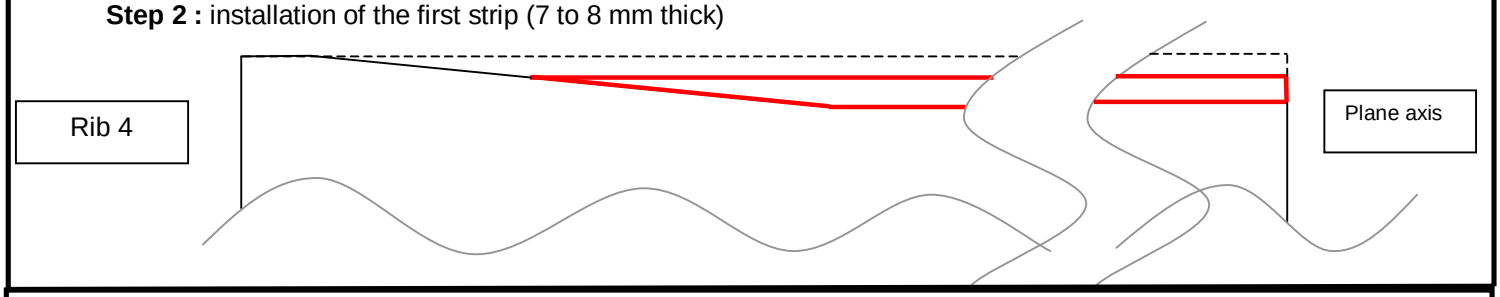
“After repair” overview schematic

The different steps are the following (only the oval area is shown below) :

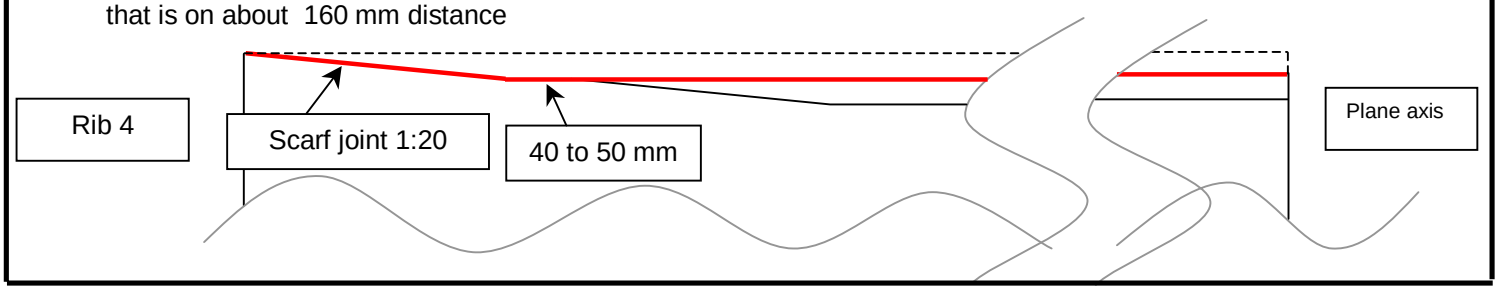
Step 1 : the first strip (glue included) has been removed



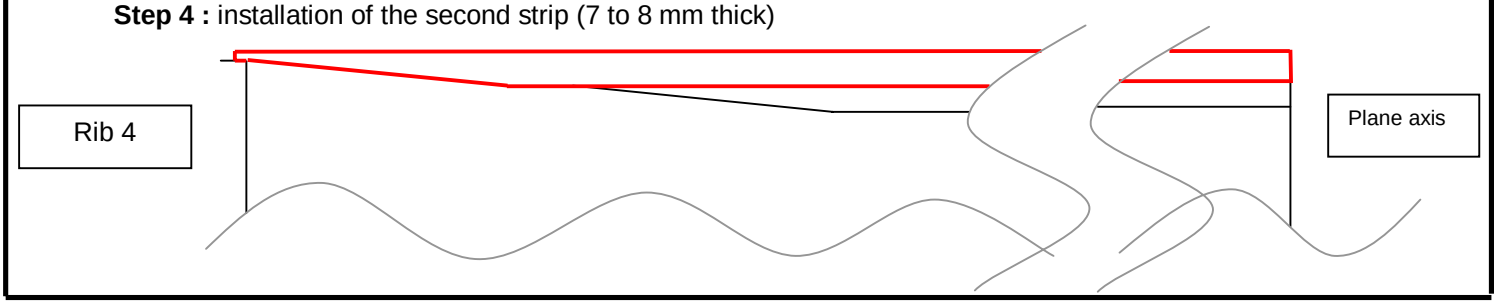
Step 2 : installation of the first strip (7 to 8 mm thick)



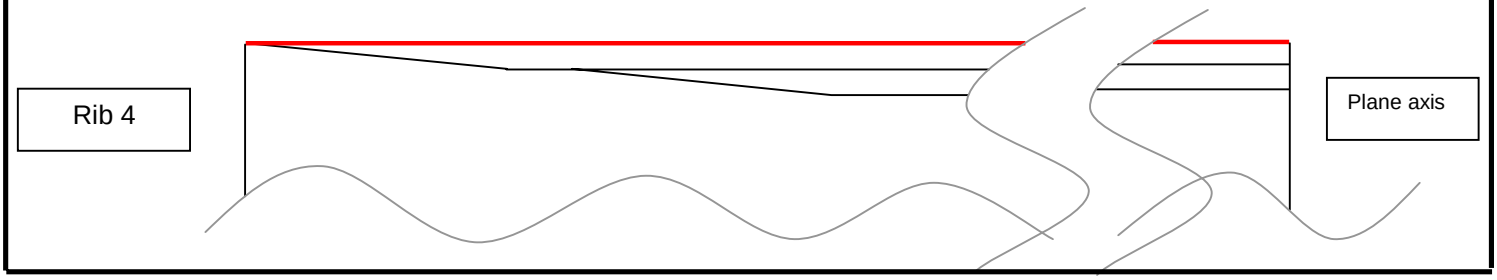
Step 3 : sanding to get a flat (level) surface. Extension of flat surface by 40 to 50 mm then scarf joint 1:2 slope that is on about 160 mm distance



Step 4 : installation of the second strip (7 to 8 mm thick)



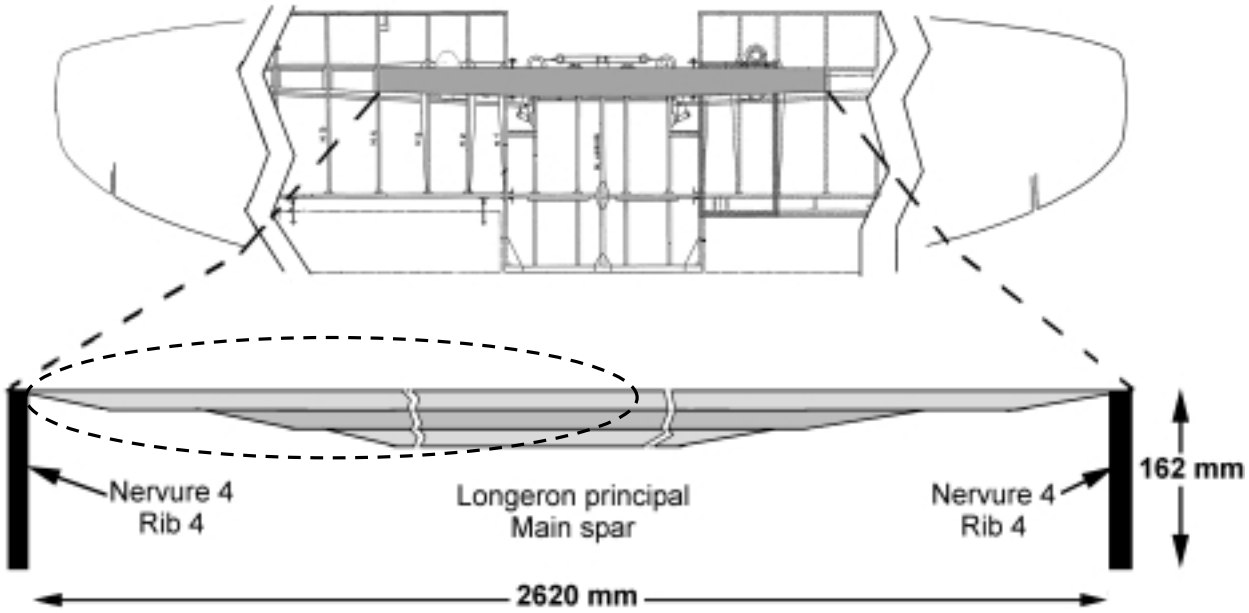
Step 5 : sanding to get a flat (level) surface adjusted to the thickness of the spar webs and of the main spar.



CASE WITH THREE SPRUCE STRIPS

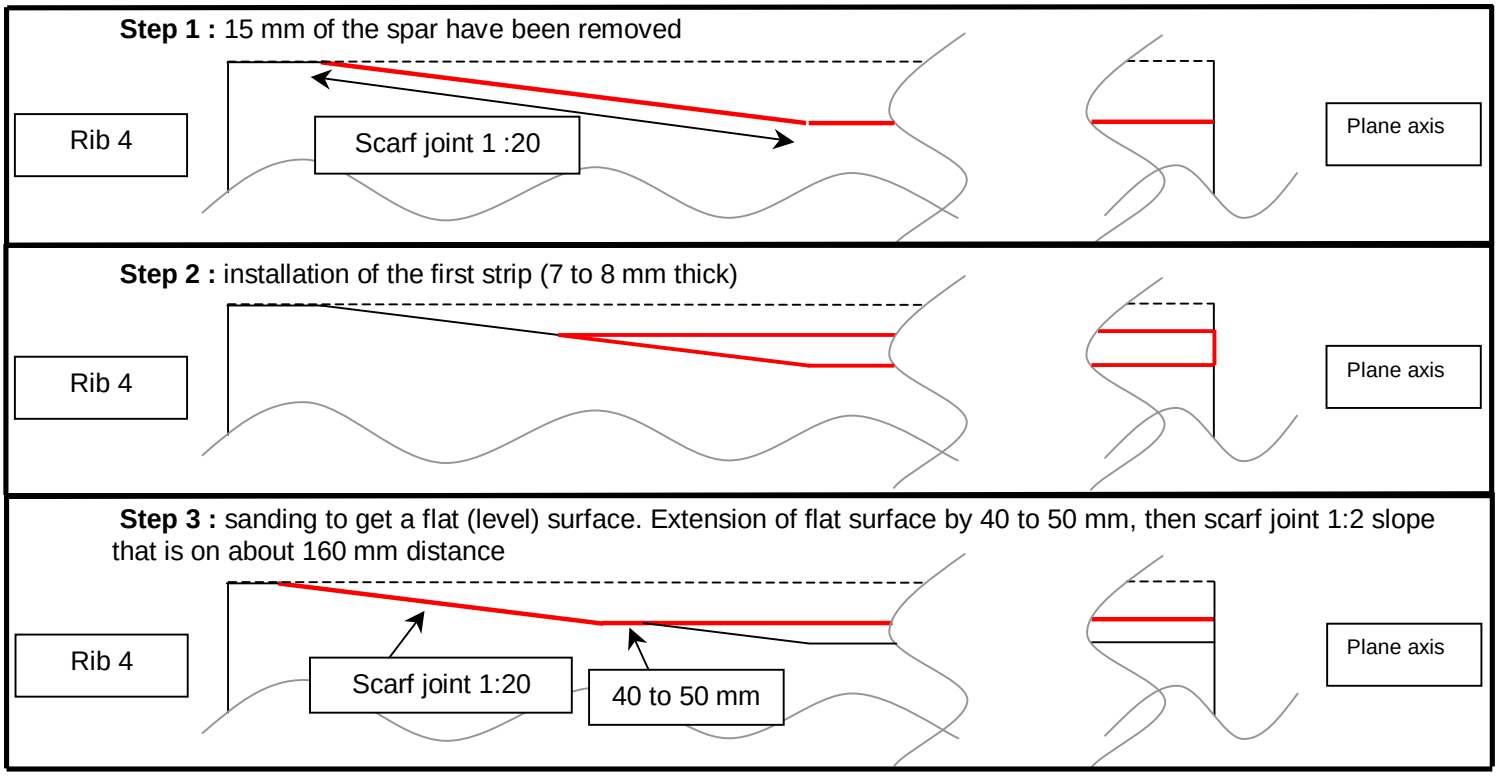
The symetrical repair concerns the LH rib nr4 till RH rib nr4 area, with strips in one piece if possible. If not, scarf joints are allowed only between the wings-to-fuselage attachment fittings (*). The scarf joints must be distant by at least 3 times the length of the longer scarf joint, even for 2 scarf joints located on 2 neighboring strips.

(*) The wings-to-fuselage attachment fittings may not overlap any part of the scarf joint.

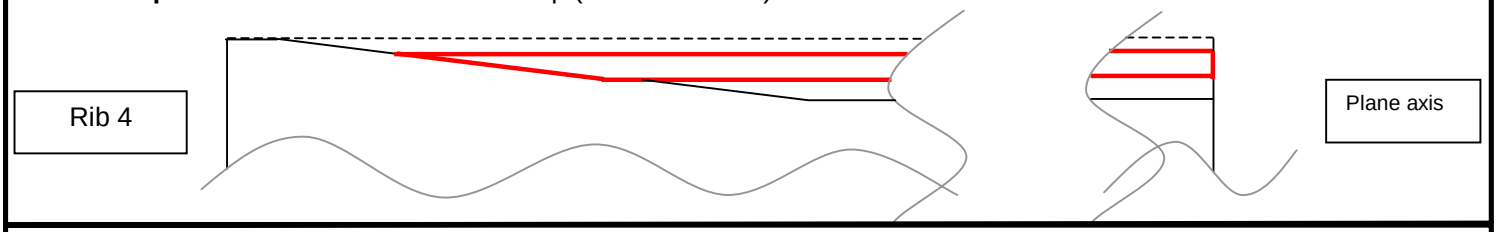


"After repair" overview schematic

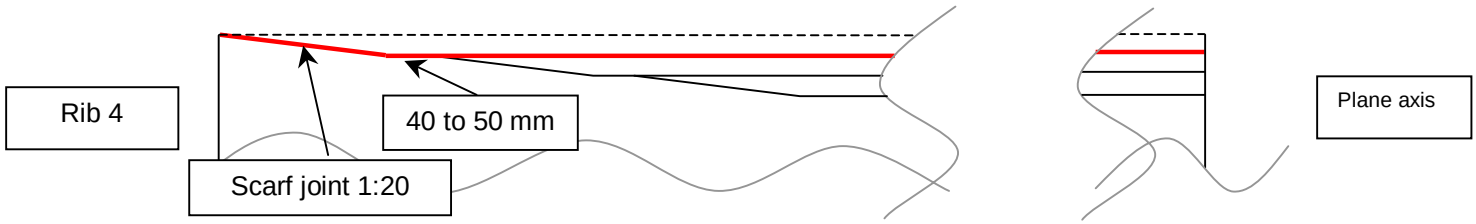
<u>The different steps are the following (only the oval area is shown below) :</u>



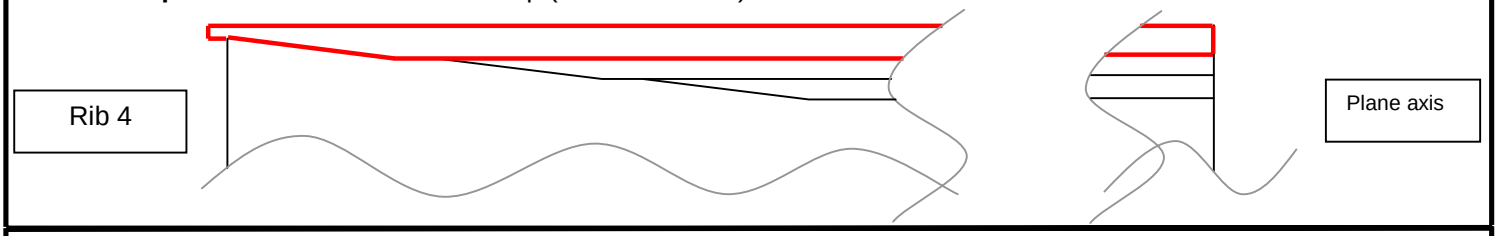
Step 4 : installation of the second strip (7 to 8 mm thick)



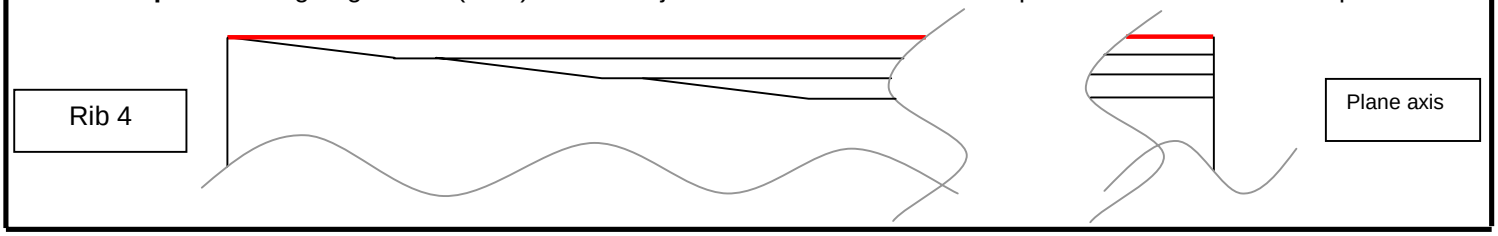
Step 5 : sanding to get a flat (level) surface. Extension of flat surface by 40 to 50 mm, then scarf joint 1:2 slope that is on about 160 mm distance



Step 6 : installation of the third strip (7 to 8 mm thick)



Step 7 : sanding to get a flat (level) surface adjusted to the thickness of the spar webs and of the main spar.



Do not reinstall the wing upper surface skin plywood yet.

4. Wing under surface: inspection of main spar cap

a) Put the wings upside down.

b) Identify the type of filler using the CD-ROM guidance 1000915GB, Main spar undersurface inspection.

c) Three cases:

I. If type 1 or 3, make a template or a print to be able later to remake the wing lower surface filler profile, then carefully remove the filler and inspect the spar visually. Document any damage with photos.

II. If type 2 and cracks on the upper spar cap shown during step d of §2, make a template or a print to be able later to remake the wing under surface filler profile, then remove filler and inspect the spar.

III. If type 2 and no cracks shown during step d of §2 on the upper spar cap, perform tap test of wing under surface between the gear legs to identify de-lamination.

d) Photograph inspection area over rib 1 left and rib 1 right, with label.

5 Wing under surface: renewal of filler and reinstallation of skin

a) If wing under surface filler has been removed (because of filler type - type 1 or 3 - or because of cracks on the upper spar cap - type 2 -), install a new type 2 filler (spruce top quality 1, mini 3,91kg/mm² i.e. 383 daN/cm²) taking into consideration the measurements done at latter § before removing the filler.

b) Reinstall the plywood skin (Gaboon 2 mm) taking advantage of the wing upper surface plywood missing which allows to use clamps (cramps) with blocks to ensure the position of scarf joint parts during drying.

Note: the plywood must be installed with fibers in the same direction as originally.

6. Wing upper surface: installation of wingwalk reinforcement and skin

a) Put the wings upside down.

b) Install the wingwalk reinforcement along rib 1, 2 and 3, completely or over spar as required.

c) Leave an inspection area at rib 1. To do so, do not install the N1 rib top filler across the top spar cap. Make blending radius at skin plywood angles (see illustration B). Glue (making scaft joints 1:15) the top fillers on the other ribs.

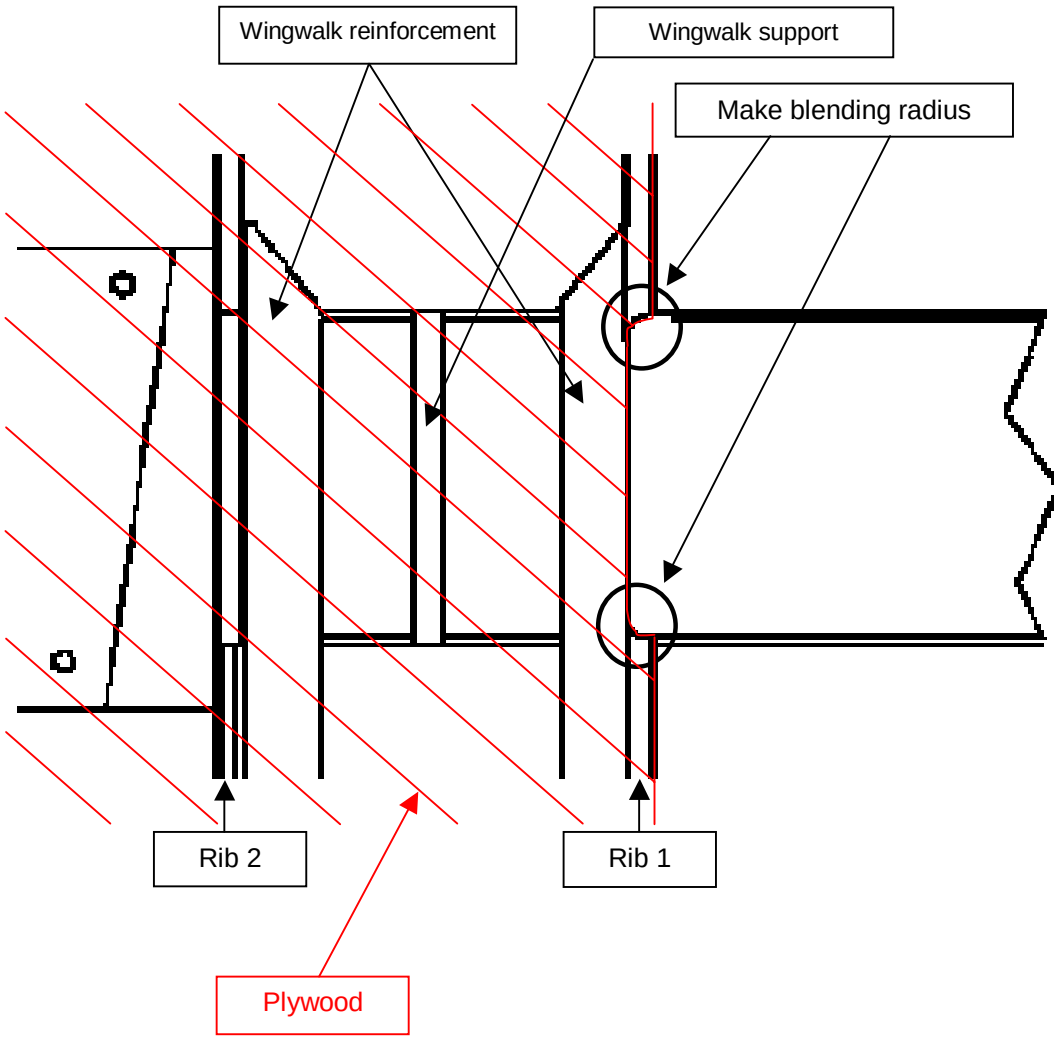
d) Glue the two wingwalk supports (one support per wing) 15 x 160 x 6 to be sanded to match the rib profile (see also illustration B).

e) Seal any naked spar wood with protection colorless varnish per maker's instructions ; leaving any planned bonding surface unsealed.

f) Re-skin the openings per illustrations B and AC 43.13-1 § 1-47. Follow rules of AC 43.13 for scarf joints (slope, mating surface). Add wing walk, per measure in § 2.a, above.

Note: the plywood must be installed with fibers in the same direction as originally.

Illustration B :



7. Finishing wing upper surface and wing under surface

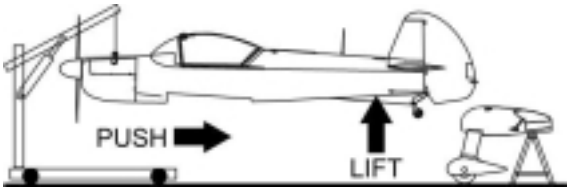
a) Repair fabric covering (taping).

b) Paint to match.

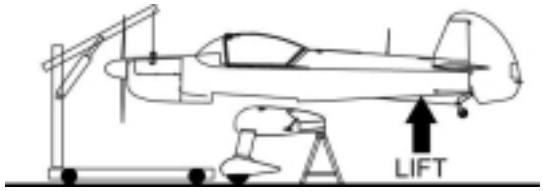
c) Apply traction surface on wingwalk.

d) Reinstall wings.

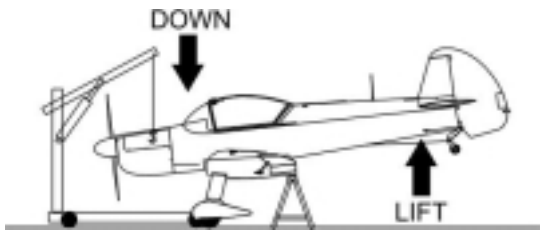
- Hook up the fuselage to the hoist with the engine attachments.



- Move the fuselage, held at the rear by two or three people, over the wing.

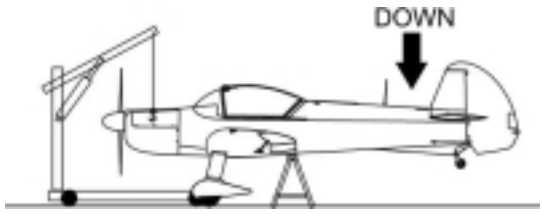


- Slowly move the fuselage into place (keeping an eye on the inside of the cockpit while doing so).
- Move the fuselage backwards while raising the rear (lower the front as necessary to move the no. 1 former under the control stick base.)



- Slowly lower the rear to position the fuselage sides between the aft attachment brackets.

  Attention: The aft attachment brackets must not be tightened so as not to damage the fuselage.



- Rest the tail wheel on an adjustable stand.
- Insert the forward wing attachment bolts and their washers. Use the guide piece (screwed to the bolt being fitted) so as not to damage the inside of the spar.
- Screw the nuts on the bolts but do not tighten.
- Fit the aft wing attachment bolts and nuts but do not tighten.
- Set down the fuselage and stabilize it.
- Tighten the aft attachment brackets to 1.5 daN.m (11.06 lbf.ft).
- Tighten the forward attachment bolts to 5 daN.m (36.88 lbf.ft) and then fit the cotter pins.

- Tighten the aft attachment bolts to 1.5 daN.m (11.06 lbf.ft).
- Set the aircraft down on its wheels.
- Connect the elevator control.
- Fit the control sticks.
- Connect the radio push-to-talk wires to the aircraft circuit.
- Fit the control stick base covers.
- Fit the flooring, seat tracks, and seats.
- At the wing root, connect the brake lines, the position light wires (as necessary), the Pitot heater wires, the Pitot line.
- Remove the supports from under the wing.
- Refit the wing root fairing (karman).
- Connect the navigation lights if necessary.
- Install the center console.
- Bleed the brake system.
- Check that the navigation lights (if fitted) work.
- Check that the flap control works (direction, deflection).
- Check that the elevator control works (direction, deflection).
- Check that the ailerons work (direction, deflection).

II – RECORDING G-METER

a) Install recording G-meter per maker's instructions. Set audio warning (Apex Aircraft suggests limits of +5G, -3.5G).

Note: for CAP10, the recording G-meter from MEV maker is the PGM 1212 designed for a vertical instrument panel not inclined.

In case there is no room enough on the instrument panel, the recording G-meter can be installed without the G-indicator.

b) Reinstall fairings.

c) If newly installed, test logging G-meter per maker's instructions.

III – LOGGING OF information

a) Send photos and description of inspection findings to Apex Aircraft and to airplane registration relevant country Authorities (DCS/NO for France).

b) Perform airplane weight and balance.

c) Complete airplane log entries with these data and changes made.

d) Add "Take-off mass (approx)", "+G" , "-G", "Life Remaining" columns to Airplane Route Logbook. Insert LOAD TABLES from this SB into Logbook. Educate users to record data.

e) Amend Aircraft Flight Manual with changes attached.

f) Amend Maintenance Schedule with changes available attached.

IV – CONDITIONS TO RELEASE AIRCRAFT TO FLIGHT AFTER EXCEEDING LOAD FACTOR

<table>
<tr><th>Exceeding G</th><th>reached load (kg)
multiply load factor by total mass. Absolute value for negative load factor</th><th>BEFORE replacement of the top spar cap according to BS030906</th><th>AFTER replacement of the top spar cap according to BS030906</th></tr>
<tr><td rowspan="2">Positive limit imposed by § “Time of compliance” of this SB
with 2 persons on board:
+4.3 < n <+6
with 1 person on board:
+5 < n <+6</td><td>load < 4000</td><td>Perform inspections 1000913 and 1000915 (refer to maintenance program) (4)</td><td></td></tr>
<tr><td>load > 4000</td><td>Replace top spar cap (1)</td><td>Remind that over 4000 kg, it must be accounted for 1 occurrence according to § “Description” of this SB</td></tr>
<tr><td>Negative limit imposed by § “Time of compliance” of this SB:
-4,5 < n < -3,5</td><td>Whatever be the load</td><td>Perform inspections 1000913 and 1000915 (refer to maintenance program) (4)</td><td>Remind that over 2700 kg, it must be accounted for 1 occurrence according to § “Description” of this SB</td></tr>
<tr><td rowspan="3">n > +6
Certification limits</td><td>load < 4000</td><td>• Perform inspections described in §4.5 of Apex Aircraft maintenance program (4)</td><td>Perform inspections described in §4.5 of Apex Aircraft maintenance program</td></tr>
<tr><td>4000 < load < 4560</td><td>• Replace top spar cap (1)
• Perform inspections described in §4.5 of Apex Aircraft maintenance program</td><td>Perform inspections described in §4.5 of APEX Aircraft maintenance program (2)</td></tr>
<tr><td>load > 4560</td><td>• Replace top spar cap (1)
• Perform inspections described in §4.5 of Apex Aircraft maintenance program</td><td>• Replace top spar cap (3)
• Perform inspections described in §4.5 of Apex Aircraft maintenance program</td></tr>
<tr><td>n < -4.5
Certification limits</td><td>load < 2700</td><td>Perform inspections described in §4.5 of Apex Aircraft maintenance program (4)</td><td>Perform inspections described in §4.5 of Apex Aircraft maintenance program</td></tr>
<tr><td></td><td>load > 2700</td><td>Perform inspections described in §4.5 of Apex Aircraft maintenance program (4)</td><td>Perform inspections described in §4.5 of Apex Aircraft maintenance program (2)</td></tr>
</table>

(1) According to SB030906 instructions.
(2) Must be accounted for 1 occurrence according to § “Description” of this SB
(3) Caution: Apex Aircraft must be contacted before replacing the top spar cap for the second and next times.
(4) As long as the top spar cap has not been replaced, the airplane must still be flown within limits -3.5 to +5 solo and -3.5 to +4.3 dual.

If any limits are exceeded, up to +6.5G or –5G, one flight is allowed for relocation to workshop, in calm atmosphere, with essential crew only (ferry flight, pilot only), no aerobatic maneuver.

Exceeding +6.5 or –5G disallows any further flight.

MATERIAL INFORMATION

Remark: The materials and harware listed below must be approved for this kind of airplane.

Reference / Dimensions	Quantity	Description	Instructions
WING UPPER SURFACE			
Case 2 strips 2200 x 170 x 8 2620 x 170 x 8 1250 x 740 x 2	 1 1 2	 1st spruce* strip 2nd spruce* strip Birch plywood for skin	
Case 3 strips 2200 x 170 x 8 2620 x 170 x 8 3040 x 170 x 8 1600 x 740 x 2	 1 1 1 2	 1st spruce* strip 2nd spruce* strip 3rd spruce* strip Birch plywood for skin	
790 x 55 x 6	6	Spruce* Rib reinforcement	
160 x 15 x 6	2	Spruce* Wingwalk reinforcement	See illustration B
1250 x 340 x 3	2	Gaboon plywood for wingwalk	
		Traction surface	Covers the wingwalk, except the blending slopes, along the 4 sides
WING UNDER SURFACE			
Drawing CAP10 20-02-01 B	1	Type 2 reinforcement kit	
1800 x 300 x 2	1	Gaboon plywood for skin	
COMMON WING UPPER SURFACE – WING UNDER SURFACE			
	As needed	Abrasive paper	
	4	Paint brush	
	250ml	Glue Cascophen or Sadermarine	Cascophen glue is to be applied per instruction 1000852 Sadermarine glue is to be applied per SADER PROFESSIONNEL specification sheet
	250ml	Colorless protection varnish	
		Fabric	
		Paint	
Contact Apex Aircraft for current prices and delivery time			

* spruce top quality 1: mini 3,91 kg/mm² i.e. 383 daN/cm².

LOAD TABLE - **MASS IN KG (kilogram)** and **POSITIVE LOAD FACTOR**

kg	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6	>6
600	3060	3120	3180	3240	3300	3360	3420	3480	3540	3600	Overstepping of airframe limitations
610	3111	3172	3233	3294	3355	3416	3477	3538	3599	3660	
620	3162	3224	3286	3348	3410	3472	3534	3596	3658	3720	
630	3213	3276	3339	3402	3465	3528	3591	3654	3717	3780	
640	3264	3328	3392	3456	3520	3584	3648	3712	3776	3840	
650	3315	3380	3445	3510	3575	3640	3705	3770	3835	3900	
660	3366	3432	3498	3564	3630	3696	3762	3828	3894	3960	
670	3417	3484	3551	3618	3685	3752	3819	3886	3953	4020	
680	3468	3536	3604	3672	3740	3808	3876	3944	4012	4080	
690	3519	3588	3657	3726	3795	3864	3933	4002	4071	4140	
700	3570	3640	3710	3780	3850	3920	3990	4060	4130	4200	
710	3621	3692	3763	3834	3905	3976	4047	4118	4189	4260	
720	3672	3744	3816	3888	3960	4032	4104	4176	4248	4320	
730	3723	3796	3869	3942	4015	4088	Debit life limit			4380	
740	3774	3848	3922	3996	4070	4144	4218	4292	4366	4440	
750	3825	3900	3975	4050	4125	4200	4275	4350	4425	4500	
760	3876	3952	4028	4104	4180	4256	4332	4408	4484	4560	
770	3927	4004	4081	4158	4235	4312	4389	4466	4543	4620	
780	Overstepping of airframe limitations							4524	4602		

CAP10B - Mass (kg) x Load factor (+G)

LOAD TABLES - **MASS IN LB (pounds)** and **POSITIVE LOAD FACTOR**

lb	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6	>6
1323	6746	6878	7011	7143	7275	7408	7540	7672	7804	7937	Overstepping of airframe limitations
1345	6859	6993	7128	7262	7397	7531	7665	7800	7934	8069	
1367	6971	7108	7244	7381	7518	7654	7791	7928	8064	8201	
1389	7083	7222	7361	7500	7639	7778	7917	8056	8195	8333	
1411	7196	7337	7478	7619	7760	7901	8042	8184	8325	8466	
1433	7308	7452	7595	7738	7882	8025	8168	8311	8455	8598	
1455	7421	7566	7712	7857	8003	8148	8294	8439	8585	8730	
1477	7533	7681	7829	7976	8124	8272	8419	8567	8715	8863	
1499	7646	7796	7945	8095	8245	8395	8545	8695	8845	8995	
1521	7758	7910	8062	8214	8367	8519	8671	8823	8975	9127	
1543	7870	8025	8179	8333	8488	8642	8796	8951	9105	9259	
1565	7983	8139	8296	8453	8609	8766	8922	9079	9235	9392	
1587	8095	8254	8413	8572	8730	8889	9048	9207	9365	9524	
1609	8208	8369	8530	8691	8852	9012	9	Debit life limit		9656	
1631	8320	8483	8647	8810	8973	9136	9299	9462	9625	9789	
1653	8433	8598	8763	8929	9094	9259	9425	9590	9755	9921	
1676	8545	8713	8880	9048	9215	9383	9550	9718	9886	10053	
1698	8658	8827	8997	9167	9337	9506	9676	9846	10016	10185	
1720	Overstepping of airframe limitations							9974	10146	10318	

CAP10B - Mass (lb) x Load factor (+G)

LOAD TABLES - **MASS IN KG (kilogram)** and **NEGATIVE LOAD FACTOR**

kg	-3.5	-3.6	-3.7	-3.8	-3.9	-4	-4.1	-4.2	-4.3	-4.4	-4.5	<-4.5
600	-2100	-2160	-2220	-2280	-2340	-2400	-2460	-2520	-2580	-2640	-2700	
610	-2135	-2196	-2257	-2318	-2379	-2440	-2501	-2562	-2623	-2684	-2745	
620	-2170	-2232	-2294	-2356	-2418	-2480	-2542	-2604	-2666	-2728	-2790	
630	-2205	-2268	-2331	-2394	-2457	-2520	-2583	-2646	-2709	-2772	-2835	
640	-2240	-2304	-2368	-2432	-2496	-2560	-2624	-2688	-2752	-2816	-2880	
650	-2275	-2340	-2405	-2470	-2535	-2600	-2665	-2730	-2795	-2860	-2925	
660	-2310	-2376	-2442	-2508	-2574	-2640	-2706	-2772	-2838	-2904	-2970	
670	-2345	-2412	-2479	-2546	-2613	-2680	-2747	-2814	-2881	-2948	-3015	
680	-2380	-2448	-2516	-2584	-2652	-2720	-2788	-2856	-2924	-2992	-3060	
690	-2415	-2484	-2553	-2622	-2691	-2760	-2829	-2898	-2967	-3036	-3105	
700	-2450	-2520	-2590	-2660	-2730	-2800	-2870	-2940	-3010	-3080	-3150	
710	-2485	-2556	-2627	-2698	-2769	-2840				-3124	-3195	
720	-2520	-2592	-2664	-2736	-2808	-28	**Debit life limit**			-3168	-3240	
730	-2555	-2628	-2701	-2774	-2847	-2920	-2993	-3066	-3139	-3212	-3285	
740	-2590	-2664	-2738	-2812	-2886	-2960	-3034	-3108	-3182	-3256	-3330	
750	-2625	-2700	-2775	-2850	-2925	-3000	-3075	-3150	-3225	-3300	-3375	
760	-2660	-2736	-2812	-2888	-2964	-3040	-3116	-3192	-3268	-3344	-3420	
770	-2695	-2772	-2849	-2926	-3003	-3080	-3157	-3234	-3311	-3388	-3465	
780	-2730	-2808	**Overstepping of airframe limitations**					-3276	-3354	-3432		

Overstepping of airframe limitations

CAP10B - Mass (kg) x Load factor (-G)

LOAD TABLE - **MASS IN LB (pounds)** and **NEGATIVE LOAD FACTOR**

lb	-3.5	-3.6	-3.7	-3.8	-3.9	-4	-4.1	-4.2	-4.3	-4.4	-4.5	<-4.5
1323	-4630	-4762	-4894	-5027	-5159	-5291	-5423	-5556	-5688	-5820	-5952	Overstepping of airframe limitations
1345	-4707	-4841	-4976	-5110	-5245	-5379	-5514	-5648	-5783	-5917	-6052	
1367	-4784	-4921	-5057	-5194	-5331	-5467	-5604	-5741	-5877	-6014	-6151	
1389	-4861	-5000	-5139	-5278	-5417	-5556	-5695	-5833	-5972	-6111	-6250	
1411	-4938	-5079	-5221	-5362	-5503	-5644	-5785	-5926	-6067	-6208	-6349	
1433	-5016	-5159	-5302	-5445	-5589	-5732	-5875	-6019	-6162	-6305	-6449	
1455	-5093	-5238	-5384	-5529	-5675	-5820	-5966	-6111	-6257	-6402	-6548	
1477	-5170	-5318	-5465	-5613	-5761	-5908	-6056	-6204	-6352	-6499	-6647	
1499	-5247	-5397	-5547	-5697	-5847	-5997	-6146	-6296	-6446	-6596	-6746	
1521	-5324	-5476	-5628	-5781	-5933	-6085	-6237	-6389	-6541	-6693	-6845	
1543	-5401	-5556	-5710	-5864	-6019	-6173	-6327	-6482	-6636	-6790	-6945	
1565	-5478	-5635	-5792	-5948	-6105	-6261	-6418	-6574	-6731	-6887	-7044	
1587	-5556	-5714	-5873	-6032	-6191	-6349	Debit life limit			-6984	-7143	
1609	-5633	-5794	-5955	-6116	-6277	-6437				-7081	-7242	
1631	-5710	-5873	-6036	-6199	-6363	-6526	-6689	-6852	-7015	-7178	-7341	
1653	-5787	-5952	-6118	-6283	-6448	-6614	-6779	-6945	-7110	-7275	-7441	
1676	-5864	-6032	-6199	-6367	-6534	-6702	-6870	-7037	-7205	-7372	-7540	
1698	-5941	-6111	-6281	-6451	-6620	-6790	-6960	-7130	-7300	-7469	-7639	
1720	-6019	-6	Overstepping of airframe limitations				050	-7222	-7394	-7566		

CAP10B - Mass (lb) x Load factor (-G)