



FFA

FLUG- UND FAHRZEUGWERKE AG  
Altenrhein  
9422 STAAD/SG SWITZERLAND

Report No.: FV - 816

Issue: February 1968

66

R E P A I R M A N U A L

Approved by the Swiss Federal Air Office

for

Sailplanes DIAMANT HBV, 16.5 and 18

Overhaul and repair of the sailplanes are to be performed only according to the directions of this manual.

Prepared by: F. F. A

Date : 2-29-1968

*Weichelt*

Approved by: Swiss Federal Air Office

Date : May 27, 1968

(Weber)




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REPAIR MANUAL  
 Approved by the Federal Air Office  
 Type DIAMANT

Report No.: FV- 816  
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 Date: Febr. 19, 1968

REVISIONS OF THE REPAIR MANUAL

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1	7	2	27. 8.1968	12.9.1968	LtA <i>[Signature]</i>	2.9.68	FFA/ We.
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Changes on the revised pages are marked with | at the right



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1. GENERAL

All major repairs as well as general overhauls should be done by the manufacturer if possible. Repairs may be done by workshops with fiberglass production experience after consulting the manufacturer.

It is recommended that a few photos and a description of the damage should be sent to the manufacturer before starting large repairs.

Repairs on fiberglass parts are neither difficult nor expensive; they only require experience and care.

For raw materials and replacement parts write to

FLUG- UND FAHRZEUGWERKE AG  
ALTENRHEIN  
9422 STAAD/SG SWITZERLAND

(hereafter described as "FFA")



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## 2. WORKING CONDITIONS FOR REPAIRS OF THE FIBERGLASS SHELL

### 2.1 General

Utmost cleanliness is of prime importance!

The area to be repaired must be absolutely dry and free of grease. This can be accomplished by washing with soap suds and sanding smooth. The smallest grease spots prevent bonding of the resin.

NOTE: Acetone and trichlor are allowed for degreasing of cured resin.

### 2.2 Environment

The relative humidity in the work room should not exceed 65%. The room temperature should be at least 20°C (68°F) during 24 hours. For accelerated drying the temperature can be raised by using an infra red lamp or an electric oven.

NOTE: The repair area must not be heated to more than 50°C (122°F), as higher temperatures may damage the foam core material.



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Date: Febr. 19, 19682.3 Raw materials for the wing, fuselage and tailplaneSource of supply

Araldit Resin LY 554	CIBA, Basel, Switzerland
Hardener LY 554 or HY 956	
Foam, 8mm, 6mm, 3mm, (0,31; 0,24; 0,12 inch)	FFA
Glastex fabrics no. 119, 130, 140 and 143 with finish A 1100	FFA
Roving Araton 810 with finish A 1100	FFA
Polyper spatula	FFA
Microballon	FFA
Primer Component, white	FFA
Hardener Component, colorless	FFA
Diluter	FFA
Varnish Color Component, white	FFA
Hardener Component, colorless	FFA
Diluter	FFA
Soft-PVC-parting film 0,2 mm (0,008 inch)	FFA
Adhesive resin AW 106	CIBA
Hardener HV 953	





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The raw materials to be used for repairs shall be in perfect state and within the specified storage time. In order to avoid failures due to quality difference, it is advisable to purchase the raw materials from us.

#### 2.4 Storing of the raw materials

Glassfabrics and foam must be kept in a dry place.

Resin and hardener must be kept cool, i.e. not above  $20^{\circ}\text{C}$  ( $68^{\circ}\text{F}$ ). In this way a storage life of about 1 year can be expected; at higher temperatures the storage life will be reduced.

The same applies to varnish and primer; they also must be kept cool.

Resin, hardener and colors should always be kept well covered.

The durability of the resin is guaranteed for two years in unopened containers and at cool storage.

Before starting the repair, however, it is strongly recommended to test the curing of the resin which has been stored for more than a year.



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## 2.5 Resin and Varnish mixtures for wing, fuselage, and tail plane

2.5.1 Resin mixture: 100 parts by weight of resin LY 554  
20 parts by weight hardener LY 554 or HY 956

(The hardeners are identical; HY 956 is only a different packaging designation.)

The repair kit contains the working components, consisting of the hardener LY 554 (70 gr) which has to be poured into the resin LY 554 (350 gr), and stirred thoroughly. The mixture must be clearly transparent and without streaks.

This mixture remains usable for 50 minutes at a temperature of 20°C (68°F), but less time at higher temperatures.

Mixture for adhesive resin: 100 parts by weight resin AW 106  
80 parts by weight hardener HV 953U

**NOTE:** Never forget the hardener!

### Control of resin mixture:

To test the resin mixture which has been used for a repair, put a drop of about 20 mm (3/4 inch)  $\emptyset$  on a piece of paper.

If the drop has not hardened within 6 to 24 hours under the advised working conditions, the mixture was not in order and the repair must be repeated.



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2.5.2 Varnish mixture:

## 2.5.2.1 Two component primer:

10 parts by weight component, white, 19870/Die  
1,4 parts by weight component, colorless, 19870/Gel (hardener)  
2 parts by weight diluter 1803

Mix well and use at once.

## 2.5.2.2 Two component varnish mixture:

4 parts by weight component, white, 17832/Die  
3 parts by weight component, colorless, 17832/Gel (hardener)  
1 part by weight diluter 17612 a

Mix well and use at once.



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### 3. REPAIRS OF DAMAGE TO THE FIBERGLASS SHELL

A repair kit may be purchased from FFA for repairs of small damage to the shell, such as: holes from gravel, short cracks, local compression etc. This kit contains all the necessary materials and tools.

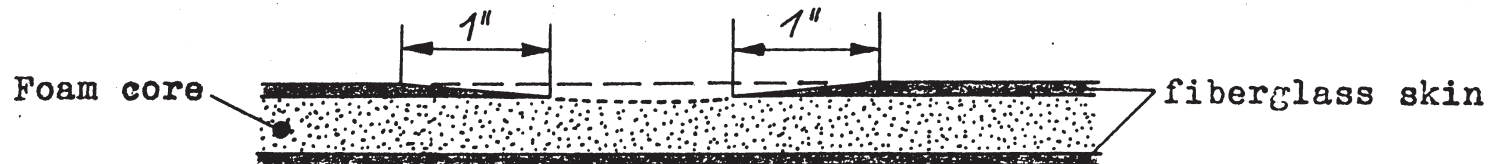
There are two kinds of damage to be distinguished:

- Only the outside sandwich skin is damaged.
- The outside and the inside sandwich skins are both damaged.

#### 3.1 Only the outside sandwich skin is damaged

##### 3.1.1 Preparation

- Clean damaged spots and grind off varnish.
- Tap sandwich skin around the damaged spot with pencil to locate loose parts.
- Mark the defect area with a small allowance with a pencil.
- Cut out with knife or grind off the damaged fiberglass layer.
- Grind edge taper of about 1 inch width (see figure below)





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### 3.1.2 Actual repair procedure

- Repair of the slightly damaged foam core.

Small holes may easily be smoothed out with a mixture of resin and microballon.

If the foam core is deformed very much, it must be cut out. A new piece shall be fitted neatly and resin-bonded.

- The matching glass fabric is to be cut with scissors, somewhat larger in size than the place to be repaired. The quantity, type and direction of weave is shown in the fabric plan, section 4.

NOTE: When determining the direction of the weave the external appearance may be misleading. Be sure to find the orientation by looking through the fabric. For the unidirectional fabric no. 143 the prevailing direction of the weave is valid.

- The various fabrics are to be cut to different sizes, so that the fabric layers start gradually.
- See preparation of resin mixture, section 2.5, page 4. When preparing this mixture be careful to use the correct mixture ratio of the components (section 2.5, page 4).

NOTE: Never forget the hardener!



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- The resin mixture must be applied with a clean brush, and pushed into the foam so that the air can escape from the pores.
- First the core is coated with resin, then the first fabric layer is to be laid on it. The fabric must be soaked very well. If necessary repeat the coating with resin, then put on the second layer of fabric.

Fabric joints must be prepared very neatly and as clean as possible.

- Cover the prepared spot with soft-PVC-parting film, and, while stretching it, fix it with adhesive tape.
- The prepared spot should be left to harden for at least 24 hours at 20° C (68° F) or about 3 hours at the maximum of 50° C (122° F), so that a sufficient solidity is obtained. The maximum strength will be obtained only after about 8 days. This, however, is unimportant for small repairs, as the shells have enough strength reserve factors.

The necessary times for hardening are depending on the ambient temperatures. By raising the temperature the time can be reduced considerably.

But never warm up higher than 50° C (122° F)

- When the hardening process is finished the parting film is to be removed.
- The joints shall be filed flush and the whole surface shall be smoothed with abrasive paper (grain 40 to 60) and sanding board. Board possibly bigger than 12 x 12 inches.





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NOTE: When sanding off surplus fiberglass do not weaken the original laminate.

NOTE: If the laminate (e.g. the resin soaked fiberglass fabric) at the repair spot is still soft and sticky after 6 hours, the proportions of the resin mixtures were wrong. In this case the repair must be repeated.

### 3.1.3 Varnishing

After repair of the fiberglass skin apply varnish finish as described in section 5.

### 3.2 Outside and inside sandwich skins are both damaged

There are two possibilities to be distinguished:

- The damaged spot is accessible from the outer side only.  
(Valid for wing, horizontal tail, and rudder)
- The damaged spot is accessible from both sides.  
(Valid for the main part of the fuselage)

#### 3.2.1 Preparation

- The same preparation as described in section 3.1.1 must be followed.
- In addition the damaged foam core material is to be cut out.



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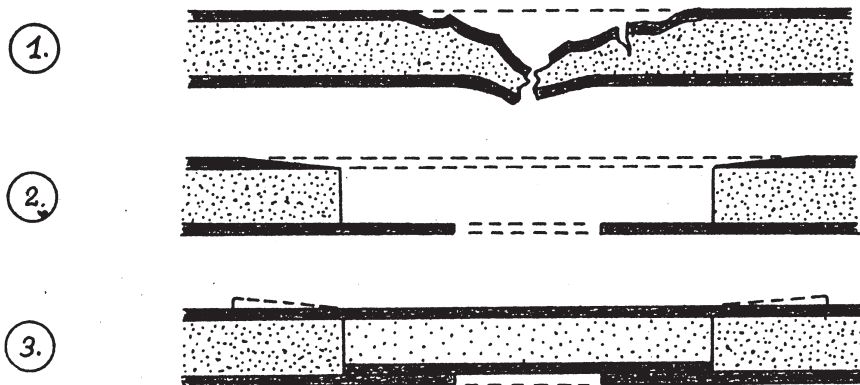
### 3.2.2 Actual repair procedure

The repair method used, depends on the size and the accessibility of the damaged spot.

#### a) Repair of a small local damage

If the damage is smaller than about 3 sq.in., e.g. small enough that, after fitting in, the soaked fabrics do not hang through by their own weight,

- cut out the foam core with oversize, so that the inner sandwich skin protudes all around about 3/4 in. (see figure 2).
- Grind edge taper of about 1 inch width at the borders of the outside fiberglass skin (see figure of section 3.1.1).







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- Cut out the matching fiberglass fabric with scissors and fit in.  
(For number, type and direction of weave see fabric plan, section 4)
- Put in the inner fabrics.
- Mix the resin according to section 2.5
- For working method with resin see section 3.1.2.
- Fit in foam core material and resin-bond.
- Put on cover fabrics and laminate with resin in accordance to section 3.1.2.
- Finish repair as described in section 3.1.2 and 3.1.3.

b) Repair of a larger local damage accessible from the outer side only.

If the damage is so large that the soaked fabrics would hang through by their own weight, a prefabricated resin-laminated fiberglass panel has to be used to repair the inside sandwich skin.

- Prepare on a PVC-film a laminated fiberglass panel somewhat bigger than the place to be repaired, using the matching fabrics and resin mixture.
- After curing fit in this panel exactly.
- Sand the bonding area cleanly and do not touch this area afterwards.



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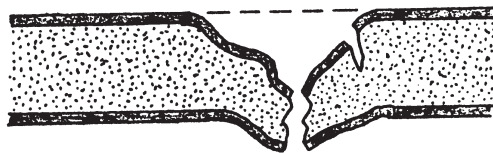
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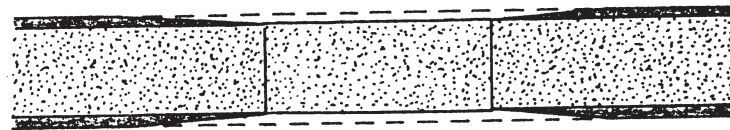
- Coat the bonding area with resin and place the so prepared panel into the prepared repair spot (see figures 2 and 3).
- Fit in foam core material and resin-bond.
- Continue as described in section 3.1.2 and 3.1.3.

c) Repair of a larger local damage accessible from both sides

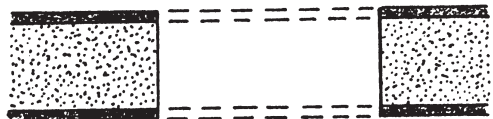
- Perform the same preparations as described in section 3.1.1.
- Cut out the whole sandwich straight through (see figure 5).
- Grind edge taper of about 1 inch width at the borders of the outside and inside fiberglass skins (see figure 6).
- Fit in and resin-bond the foam first (see figure 6).
- Resin-laminate from both sides the matching fiberglass fabrics as described in section 3.1.2 (see figure 7).
- Finish repair as described in section 3.1.2 and 3.1.3.



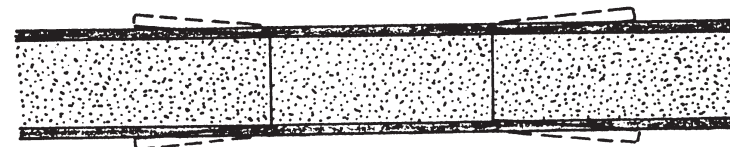
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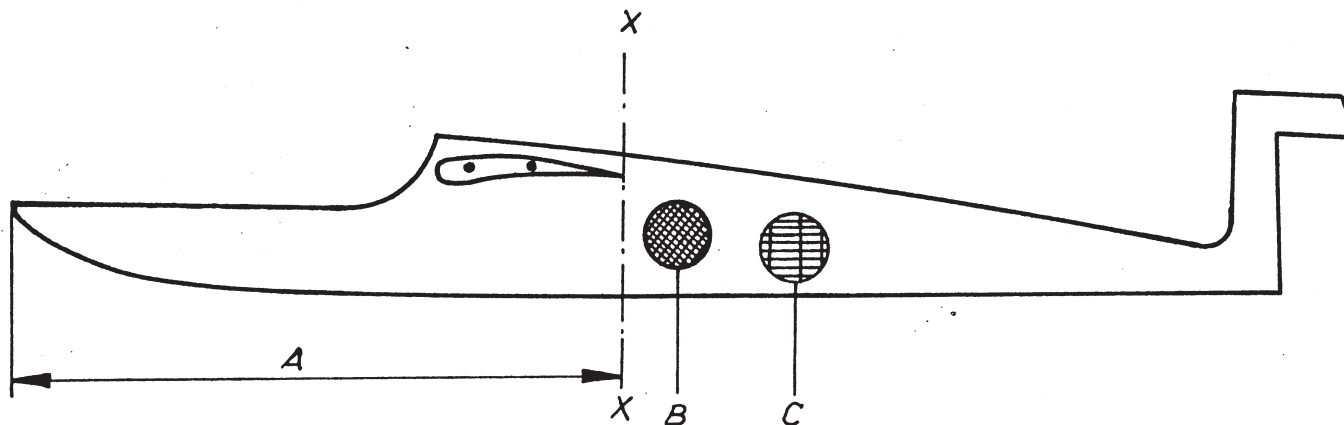
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4. FABRIC PLAN

4.1 Fuselage



- For repairs to the outer sandwich skin on the outside of the fuselage: First 1 layer of fabric no. 140 diagonally (B), and then 1 layer of fabric no. 143 lengthwise (C), are to be laminated onto the foam core.

This is valid for the whole length of the fuselage.



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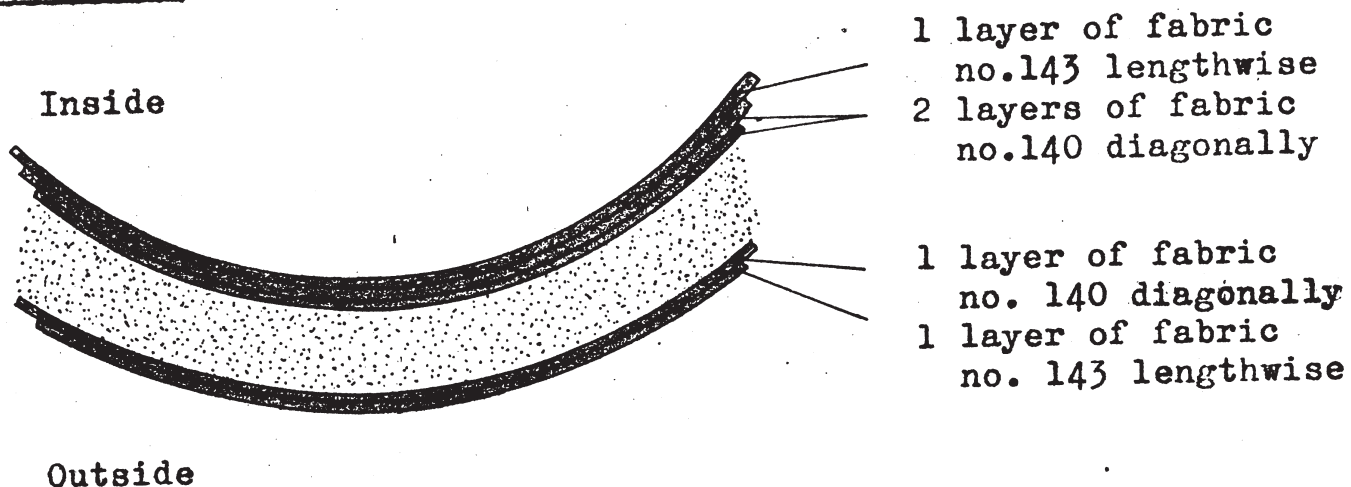
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- For repairs to the inside of the fuselage within the area of the fuselage nose to the end of the wing trailing-edge (place X) 2 layers of fabric no. 140 diagonally and, on top of that, 1 layer of fabric no. 143 lengthwise are to be laminated onto the foam core.

In the area from spot X to the fuselage end only 1 layer of fabric no. 140 diagonally, and, on top of that, 1 layer of fabric no. 143 lengthwise, are to be laminated onto the foam core.

Example for area A:





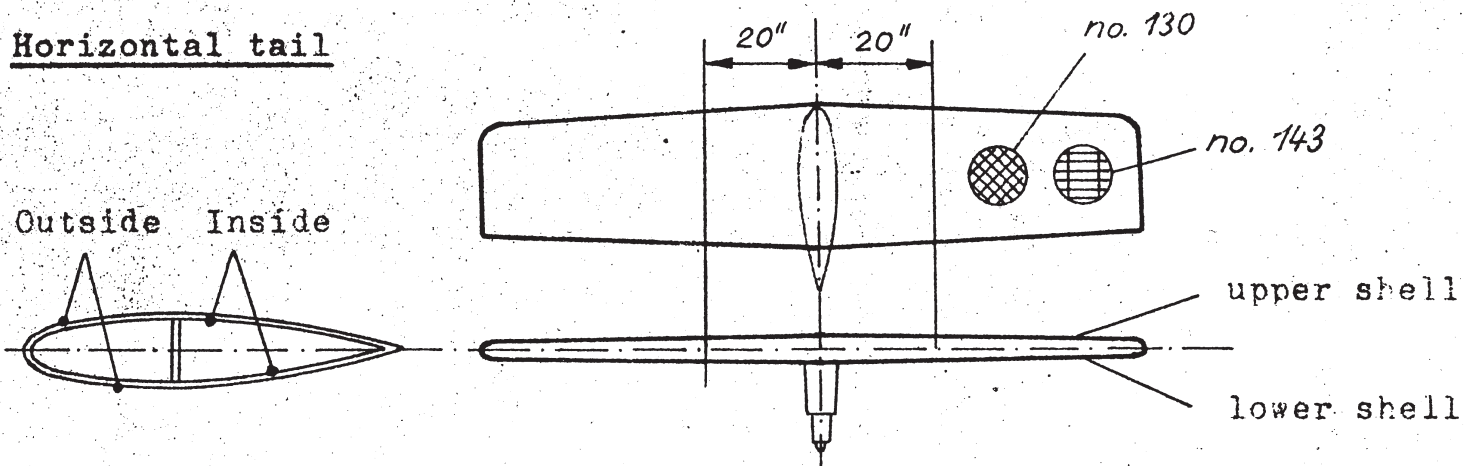
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## 4.2 Horizontal tail and rudder

### 4.2.1 Horizontal tail



For repairs of the horizontal tail, use for the outside sandwich skin in the area from the centerline to a line 20 inches outward 3 layers of fabric no. 143 in span-wise direction, on top of these 1 layer of fabric no. 130 diagonally, and as cover 1 layer of fabric no. 143 in span-wise direction. Laminate these layers onto the foam core.

Use for the outside sandwich skin outward of 20 inches from the centerline as well as for the whole inside sandwich skin 1 layer of fabric no. 130 diagonally, and as cover 1 layer of fabric no. 143 in span-wise direction.

These indications are valid for the upper and lower half-shell of the horizontal tail.



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#### 4.2.2 Rudder

One layer of fabric no. 130 diagonally is to be used on the inner and outer sandwich skins of the rudder.

#### 4.3 WING (model HBV only)

For repairs to the wing (with exception of those mentioned in section 7) contact

GLASFLUEGEL, Ing. Eugen Hänle

D-7311 Schlattstall / Würthemberg

West Germany

Phone 07026/618

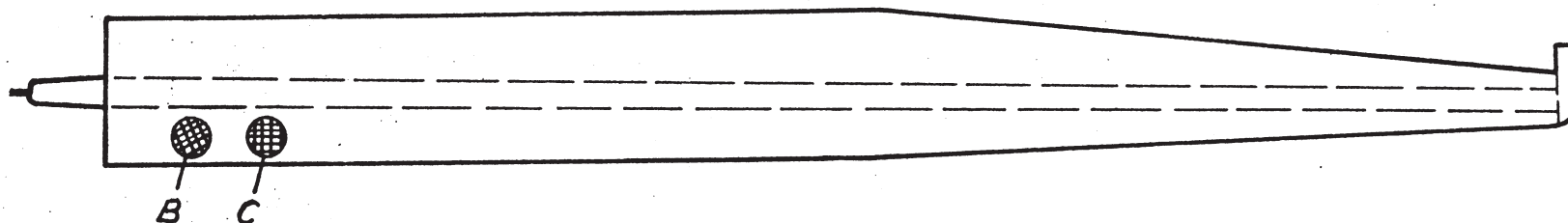


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#### 4.4 WING (model 16.5 and 18 only)



For repairs to the outer sandwich skin of the wing 1 layer of fabric no. 140 diagonally (B) is to be placed onto the foam core and 1 layer of fabric no. 119 lengthwise (C) is to be laminated over it.

This is valid for the whole length of the wing.

For repairs of the inner sandwich skin 1 layer of fabric no. 140 diagonally is to be laminated onto the inside of the wing.

Repairs to the wing spar and the wing root may only be done by FFA or a licensed work shop after consulting FFA.

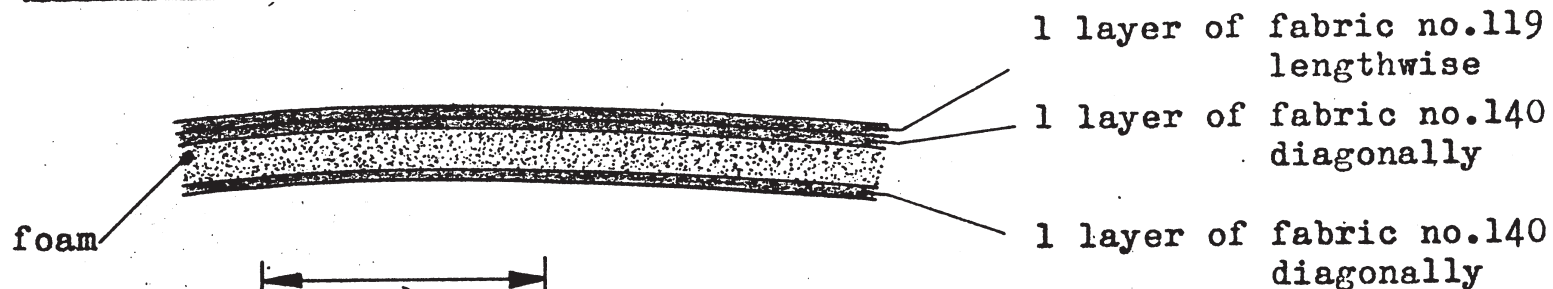




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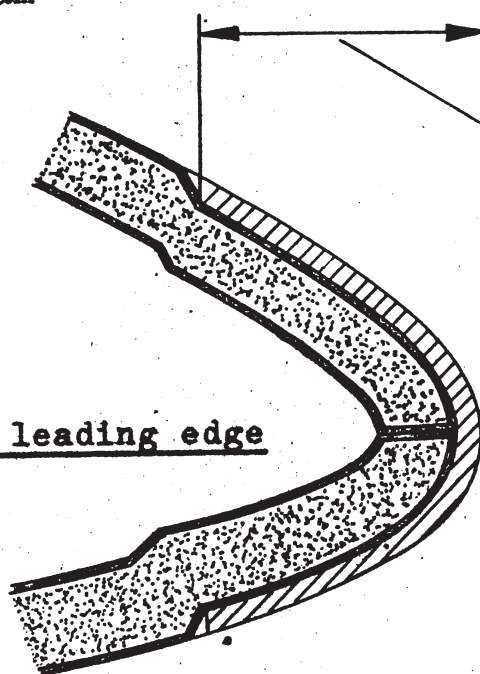
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Wing shell



1 3/8 in. in the parallel part of wing,  
decreasing to 1/2 in. at the wing tip.

Wing leading edge



The reinforcement of the wing leading edge  
consists of fabric no. 140 diagonally only.

Damaged spots may be filled up with the  
matching fabric and resin that much that  
the shape of the airfoil section is regained

For repair of larger damage to the leading  
edge prefabricated reinforcements may be  
purchased from FFA.





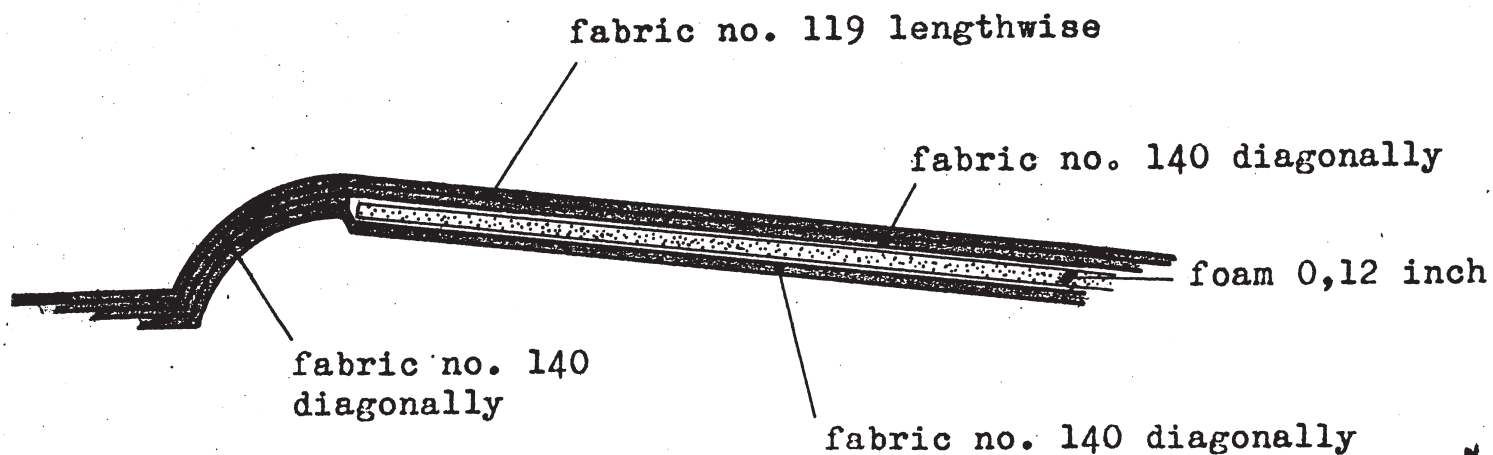
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#### 4.5 AILERONS (model 16.5 and 18 only)

##### Aileron upper shell



##### Aileron lower shell (as upper shell)

#### 4.6 WING CAMBER FLAPS (model 16.5 and 18 only)

as 4.5 ailerons



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## 5. REPAIR OF DAMAGED VARNISH, SPRAYING AND POLISHING OF REPAIRED SPOTS

5.1 To repair damaged varnish, only the original Polyester-plastic varnish should be used, and for spraying the whole ship again, only white varnish shall be used.

### 5.2 Working operations

- Sand off damaged varnish.  
Carefully avoid damaging the fiberglass fabrics of the sandwich skin.
- Before spraying clean the surface perfectly and if possible roughen with abrasive paper (grain 100 to 180)
- Apply primer with paint brush, or preferably by spraying (mixture see section 2.5.2.1)
- After at least 6 hours drying time at 20 to 25°C (68° to 77°F) (better after 24 hours) wet-sand until surface is clean and smooth.
- Apply the varnish (mixture see section 2.5.2.2)
- Drying time is 24 to 36 hours at a temperature of 20° to 25°C (68° to 77°F).



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### 5.3 Polishing

- Wax and polish following the familiar methods.
- Polish by hand only, not with the polishing machine, because of the heat generated.

#### NOTE:

- The letters and numbers of the registration marks are to be made in light colours only (e.g. light blue or light grey).
- The recommended colour (approved by the Swiss Federal Air Office) is blue-grey.
- To avoid local overheating by sun radiation, additional lettering or coloured ornaments should not be applied to external surfaces.

If in doubt, contact the manufacturer, "Flug- & Fahrzeugwerke A.G., Altenrhein, Switzerland".



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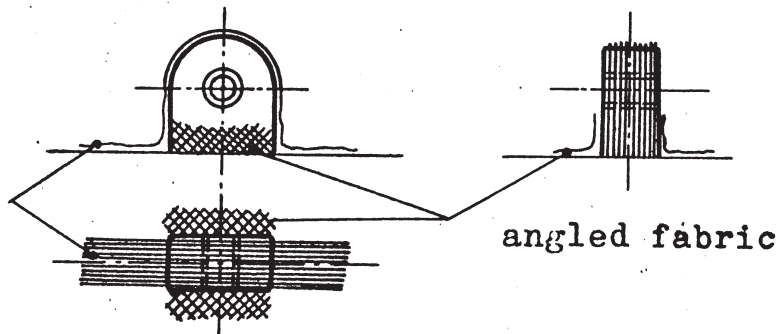
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6. REPAIR AND REPLACEMENT OF PARTS WHICH ARE MOUNTED ON OR RESIN-BONDED TO THE SANDWICH SHELL.

6.1 Example: A bearing block breaks out

- The bearing block must be located and its position marked according to the repair drawings delivered by the manufacturer.
- The place where the bearing block is to be attached shall be cleaned and hand sanded.
- Glue the bearing block on with adhesive resin.
- Prepare resin mixture according to section 2.5.1
- Cut two roving strings and place according to sketch, across bearing block and resin-bond.
- Cut 1 fabric no. 140 on the diagonal and resin-bond into both sides of corners.

Rovings



angled fabric



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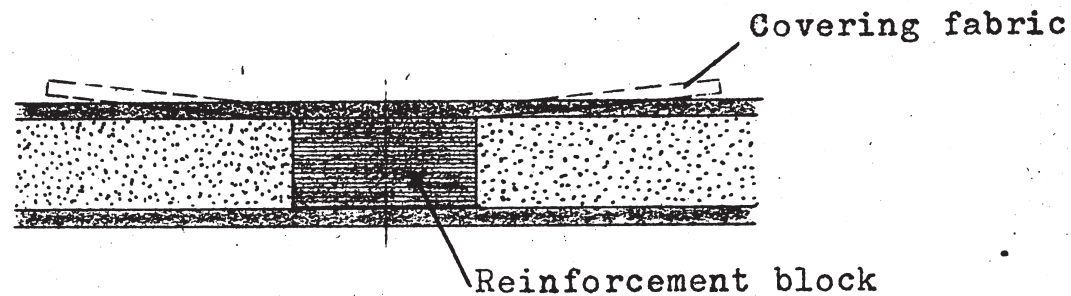
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## 6.2 Reinforcement blocks

Prefabricated sandwich core reinforcement blocks can be purchased from the manufacturer or fabricated by oneself, batching fabrics no. 140 with different direction of weave, and laminating resin.

If a reinforcement block should break out, it must be replaced and bonded like a foam core repair.

Remark: Reinforcement blocks are reinforcements of the sandwich shell as mounting attachment for metal fittings. The foam core is replaced by a solid piece, prepared with layers of fabric and resin.





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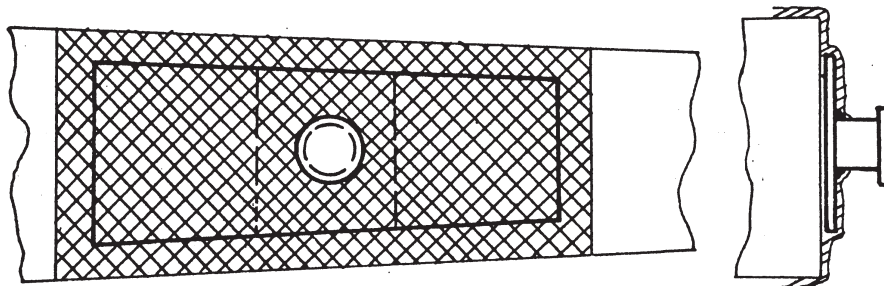
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## 7. SPECIAL REPAIRS ON THE WINGS

### 7.1 Mounting pin at the wing broken off

- Clean repair spot well and grind, without damaging the fiberglass.
- Clean mounting pin by hand sanding or sand blasting.
- Prepare mixture according to section 2.5.1
- Place mounting pin.
- Resin-bond, with 2 layers of glass fabric no. 140 on the diagonal, to spar. Cut small hole into glass fabric through which the pin will pass.



- Leave to cure for at least 24 hours (see section 3.1.2).



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## 7.2 Exchange of skid at wing tip

To prevent abrasion of the wing tips, half-round skids are attached. These skids are exchangeable. Remove frayed skids by unscrewing the two Parker screws and exchange by new ones.

The skids may easily be made from an adequate steel material or ordered from FFA.

## 7.3 Removal and repair of a seized wing king pin

### Removal of wing king pin

Knock out king pin using a bent rod through the right-hand upper fuselage inspection lid (aileron control access panel). The wings will need lifting to relieve the pressure on the king pin shank.

### Repair of king pin and bore

Remove all burrs until pin and bore are of a good sliding fit.

Checking of the king pin in each wing spar stub should be carried out separately.





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## 8. ADJUSTING OF CONTROLS

### 8.1 General

When adjusting the primary flight controls and the controls for wing flaps, dive brakes, trim system etc. the RIGGING SPECIFICATIONS given in the FLIGHT AND MAINTENANCE MANUAL must be met.

The logical procedure is to start with adjusting the control stick, rudder pedals or actuating lever. At first they must be brought to their neutral position.

Before adjusting the ailerons, the wing flaps must be in their correct position. Otherwise, depending on the kinematics, the setting of the ailerons will be changed again when the wing flaps are adjusted.

The control rods have at one end a right-hand and at the other end a left-hand thread. After loosening the lock-nuts, the length of the rods can easily be changed by turning the rod to the right or left. However, it must be observed, that the clevises are not turned out too far. There is a check-hole at each end of the rods. After the adjustment of the rod, check by means of a pin that the thread of the clevis still reaches this hole. If this is not the case, the clevis must be screwed back in; the difference must be equalized with the adjacent rod.

The push rod ends with left-hand threads are marked by a groove.





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**IMPORTANT:** Check carefully, after every adjustment, that there is no interference or binding of the clevis ends of the push rods, and that the lockwashers and lock-nuts are fixed again.

### 8.2 Adjustment of wing camber flap actuating linkage

- Fix the actuating lever in the neutral position, e.g. in the 6th detent counted from the front position.
- Remove the left-hand arm rest, which covers the control rods.
- Loosen the lock-nuts on the wing flap actuating rods.
- The rods have one right-hand and one left-hand thread each. Change the length of the rods by simply twisting them, thus the wing flap position is changed also.
- The wing flap position is correct when the wing flaps correspond with the attachment profile at the fuselage.

### **IMPORTANT:**

- Observe that the clevises are not turned out too far.
- Check through the check holes at each end of the push rods, by means of a pin, to see whether the thread of the clevis still reaches this hole (see also section 8.1)
- Fix all lockwashers and lock nuts.



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### 8.3 Adjustment of the dive brake actuating linkage

The dive brake actuation may be adjusted by independent adjustment of the long push-rods in each wing.

The torque required to lock the dive brakes in their retracted position is provided by an over-center mechanism. There is no lock in the extended position: the air-loads will normally draw the dive brakes to their outermost position. The torque required to completely retract the dive brakes should be between 1,0 and 1,2 mkg (85 and 105 in.lbs); this may be measured by a torque-wrench applied at the drive-couplings at the root of each wing.

The connection rod between both dive brake levers (accessible through 2 lids behind the dive brakes) should not be disarranged if at all possible; if this cannot be avoided, it must be observed that the rod is readjusted without tension.

#### Remark:

As a rule the lids behind the dive brakes are smoothed with filler and varnished. If they are not visible at all, their position may be found by tapping the surface with a pencil. To open the lids, the varnish and filler around the edge and over the screws must be removed.

After remounting the lids, smooth them with filler, spray with varnish and sand.



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## 8.4 Adjustment of the aileron control system

### 8.4.1 Adjustment of the aileron control in the fuselage

- Remove left-hand arm rest and the cover over the control stick bearing.
- Fix the wing flaps in their neutral position. (IMPORTANT)  
(See also section 8.2)
- Fix control stick at its center position.  
For this purpose, a piece of wood cut to size, may be squeezed into the fuselage and the control stick fixed to it in its center position.
- Adjust the short push rods (see fig., pos. 1), between the aileron wing flap superimposing mechanism and the two bell cranks, to exactly the same length.
- Adjust the distance of 326 mm (12,835 in.) between the two bell cranks (see fig., pos. 2) by lengthening or shortning the two mentioned push rods by exactly the same rate. A similar change in length will be obtained by screwing in or out the clevises at each push rod by the same number of turns.
- Center the aileron drive by adjusting the push rods at the left-hand cabin wall. The exact centering of the aileron drive is then achieved, when the distance between the bell cranks (see fig., pos. 2) and the root rib in the fuselage (see fig., pos. 3) is the same at both sides.



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**IMPORTANT:** The distance of 326 mm (12,835 in.) between the two bell cranks and the equal distance from the root ribs must be maintained in all cases.

- In neutral position the forward bell crank in the cabin should be rectangular to the short push rod leading to the control stick. This may be achieved by adjusting the short push rod, leading to the control stick, and the long push rod at the left-hand cabin wall.
- Connect the aileron push rods in the wings with the bell crank in the fuselage with self-locking pins.
- The adjustment of the ailerons is done by independent adjustment of the long push rods in each wing. This is done by twisting the clevis protruding out of the wing root.
- Remove the fixation of the control stick.
- Check max. aileron deflections at different wing flap settings. The max. aileron deflections must be within the tolerance given in the **FLIGHT AND MAINTENANCE MANUAL**, section RIGGING SPECIFICATIONS.
- Adjust limit stops at the control stick.

**IMPORTANT:** Check that all clevises are screwed in far enough (see section 8.1).

Fix all lockwashers and lock-nuts.



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If it should be necessary to adjust the aileron control in the wing after a repair, proceed in the following manner:

- Open the lids at the lower side of the wing near the three drive bearings of the aileron.

As a rule these lids are smoothed with filler and varnished. If they are not visible at all, their position may be found by tapping the surface with a pencil. To open the lids the varnish and filler around the edge and over the screws must be removed.

- Loosen the lock-nuts at the connection rods.
- Adjust the connection rods in such a manner that there is no tension or twist in the aileron, and that the aileron travels freely.
- Connect the aileron push rods in the wings with the bell cranks in the fuselage with self-locking pins.
- Adjust the ailerons by independent adjustment of the long push rods in each wing. When the lock-nut at the inner aileron drive bearing is loose, the adjustment can be done by twisting the push rod without pulling out the self-locking pin.

IMPORTANT:

- Check that all clevises are screwed in far enough (see section 8.1).
- Fix all lockwashers and lock-nuts.

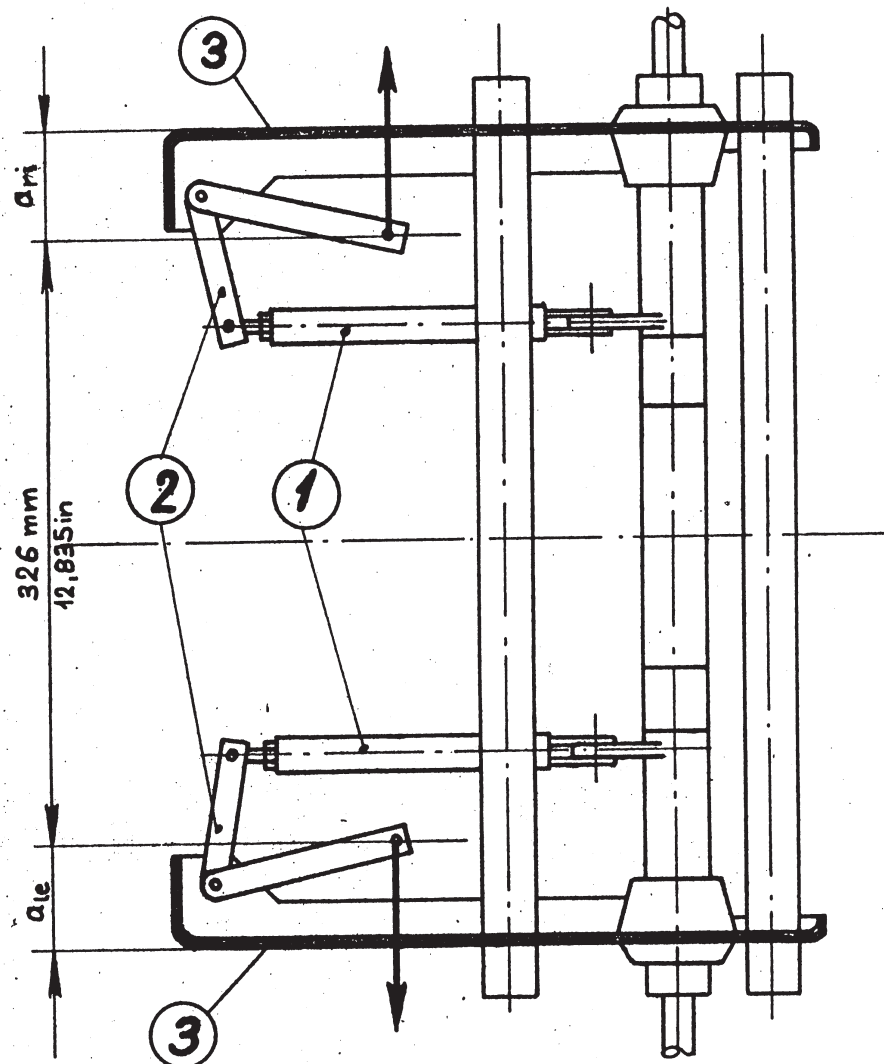


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Figure to  
section 8.4



$a_{le} = a_{ri}$





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8.5 Adjustment of elevator control system

- Remove right-hand arm rest and the cover over the control stick bearing.
- Open lid in fairing of landing gear actuating lever.
- Adjust trim in neutral position.
- Check that control stick is in neutral position too.

If this is not the case, a small inaccuracy may be corrected by simply adjusting the push rod to which the trim springs are attached. To adjust the push rod loosen the lock nuts and twist the rod to the right or left.

Bigger errors must be corrected by exchange of the trim springs. Adjust the new trim springs to the required length.

- Fix control stick in neutral position.
- Adjust elevator by adjusting connection hook at the upper end of the vertical push rod in the fin.
- The elevator must be parallel in neutral position to the "fuselage reference plane". The definition of the "fuselage reference plane" is given in the FLIGHT AND MAINTENANCE MANUAL, section LIMITS.
- Check max. elevator deflections.  
The max. elevator deflections must be within the tolerance given in the FLIGHT AND MAINTENANCE MANUAL, section RIGGING SPECIFICATIONS.
- Adjust limit stops at the control stick.



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IMPORTANT:

- Check that all clevises, especially the connection hook, are screwed in far enough (see section 8.1).
- Fix all lockwashers and lock-nuts.

8.6 Adjustment of the rudder control system

- Unlike to the afore mentioned procedure (see section 8.1) it is easier to adjust first the rudder in its center position.
- Center the rudder pedals by adjusting the adjacent push rods by twisting as described before.

IMPORTANT:

- The parallelogram mechanism, holding the rudder pedals, must have some back lash.
- Check that all clevises are screwed in far enough (see section 8.1).
- Fix all lockwashers and the lock-nuts.