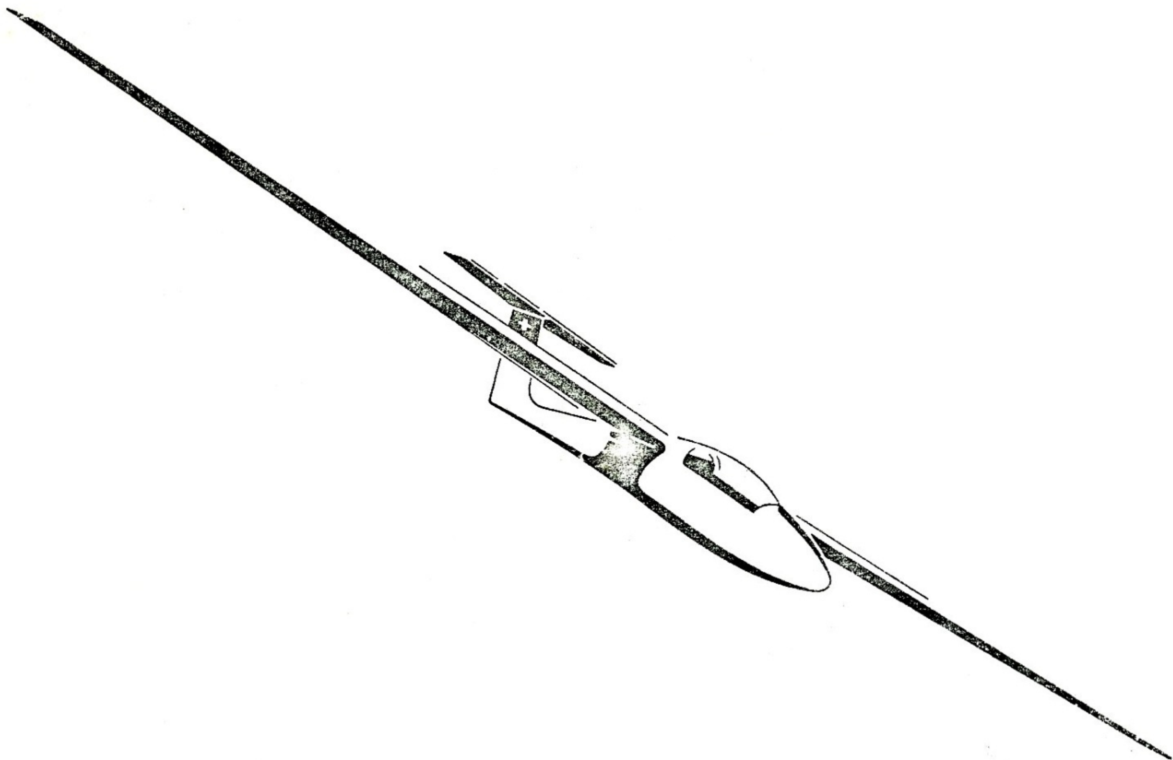
PILATUS B4



MAINTENANCE AND REPAIR MANUAL

DOC.NO. 23-11-00-01482

I N T R O D U C T I O N

The present Manual for the glider

PILATUS B4-PC11

contains information and instructions not included in the Flight and Operating Manual, but is required for inspection, overhaul and repair.

Work sequences are described to provide a skilled amateur" to carry out the works in a glider club workshop. Tools and some auxiliary material necessary for sheet metal and paint work are listed herein some of these items are available from PILATUS.

For repair work it may be helpful to have the illustrated Parts Catalogue at hand. It show the details of the sailplane structure, and all parts to be replaced can be identified.

Stans, January 1973 PILATUS AIRCRAFT LTD.

Ru/js Technical Publications

Log of Revisions

Any revision to this manual will be recorded in the following table. The new or amended text in the revised page will be indicated by a black vertical line in the left or right-hand margin, and Revision Number will be entered on the bottom of the page.

Rev. No.	Date	Revised Pages	Rev. No.	Date	Revised Pages

I N D E X

1. Maintenance

Preflight inspection and servicing of the glider are described in the Operating Manual, section 5.

Before and/or after hangarage, or at the decision of the respective air authority, the following inspections and work should be carried out.

1.1 Structure

(a) With the wings and empennage removed inspect all skin panels and visible structural parts for cracks, dents, bulges, loose or shifted rivets.

(b) Check that all steel bushes in the wing and stabilizer attachment fittings, bulkheads and control rods are fixed. If loose, proceed in accordance with pan 4.8.14.

(c) Inspect the interior as far as possible for signs of corrosion, particularly in the main and tail wheel boxes, wheels removed. See para 3.4.

(d) Examine for play at the wing to fuselage and stabilizer to fin attachments. Wear limits as described in section 5.

(e) Inspect wheels for condition, rough operation, bearing play, tyres for wear retracting mechanism for proper operation and play.

1.2 Instruments

(a) Air speed indicating system:
Check with calibration test equipment (every two years at least).

(b) Altimeter:
Check reading against a tested altimeter with known error.

(c) Rate of sink indicator:
Check zero position. Errors up to half the pointer breadth they be tolerated. Errors up to 5% of the scale range should be corrected by turning the adjustment screw. Bench test and repair at errors beyond the above limit.

(d) Turn and bank indicator:
Check for leaks (loss of fluid, air bubbles).

(e) Compass:
Check fluid for discoloration and leaks, Check deviation card in place. Compensate every two years or as necessary, e.g. after change of my instrument.

(f) Electric turn and bank indicator:
To be removed every two years. Bench test in accordance with the manufacturer’s handbook.

(g) Accelerometer:
To be removed every five years for bench test.

(h) Artificial horizon (attitude gyro):
Ensure caging mechanism operates smoothly. If bearing damaged, indicated by rough operation or every 2 years, remove it for bench test in accordance with manufacturer’s handbook.

1.3 (i) Battery
charge as required. Observe indicator on battery case; signal in radio.

Flight Controls (Pilot's seat and access covers on fuselage and wings removed if necessary)

- Check play in control systems. Limits are shown in section 5.1.
- Inspect rudder control cables for condition, worn or broken strands and corrosion. If more than 4 strands are broken, replace cable.
- Check pedal adjustment mechanism for proper function, play in bearings, sufficient tension and corrosion of the springs.
- Inspect all maximum travel stops for condition and security.
- Check pretension in air brake control system in accordance with para 2.5/bb. (See also Flight Manual Part 1, para 5.4, and part 2, par. 5.6.)
- Following replacement or regulation of any components, the control system must be readjusted in accordance with section 2 of this manual. Control surface deflection limits are shown in the Flight Manual, part 1, section 5.
- Check wheel brake and tow coupling Bowden cables for condition. Lubricate, if necessary, with penetrating oil or replace them.
- Examine springs for elevator trim according to pars 2.4 check for corrosion.

1.4 Rivets

During preflight inspection, the external surface of the glider has to be inspected for damages and loose rivets as described in the Operating Manual. In this connection, the following may be considered, when the term “loose rivet” is being used, and a certain case is investigated:

Thin sheets of an aircraft structure will deform elastically while under high stress condition, and, as a result, rivet heads will slightly be moved, If the outside paint has become brittle during ageing, it is possible that the paint around the rivet heads will break or crack.

This indication, however, does not prove that the rivet is loose, as long as the rivet head cannot be moved in the hole.

Cracks in the outside paint should be touched—up as soon as possible, using a car wax to avoid water ingress.

During the next repair or paint work procedure, the area involved should be repainted. The existing paint must be sanded down to the metal and the rivet head grooves thoroughly cleaned.

In case of loose rivets proceed as per para. 4.4.

2. Rigging of Controls

Tools Required

- Rigging pin for control stick blockage in neutral position. The cross pin of the rigging pin can be used as a feeler gauge when adjusting the aileron control. The rigging pin is stowed in the cockpit bag.

- Set of open—end wrench

- Screw driver

Note

All screws, bolts and bell bearings used in the control system are of MS or M standards, i.e. dimensions in inches.

2.1 Rigging of Elevator Control

(a) Neutral Position

- Lock the control stick in neutral position by installing the rigging pin in hole (1). See Detail C.

- Turn control rod head (2) to achieve neutral position of the control surface.

- Remove rigging pin.

(b) Control Surface Deflection

- Check travel in accordance with the Flight Manual (Part 1) section 5.

- If necessary, correct by readjusting the travel stop screws (3) on the control stick bearing (Detail A).

2.2 Rigging of Aileron Control (see Fig. 1)

(a) Neutral Position

- Disconnect control rods (10) in the wings from differential bellcrank (4).

- With the ailerons in neutral position, adjust control rod head (5) so as to achieve a distance of 54 mm (2.13 in.) between control rod (7) and bellcrank eye (6) as shown in Detail 0, Fig. 1. The rigging pin can be used as a feeler gauge.

- Lock the control stick by installing the rigging pin in hole (8) • Detail B.

- Set the differential bellcrank (4) in a symme—trical attitude by adjusting the control rod (9) at the differential bellcrank attachment.

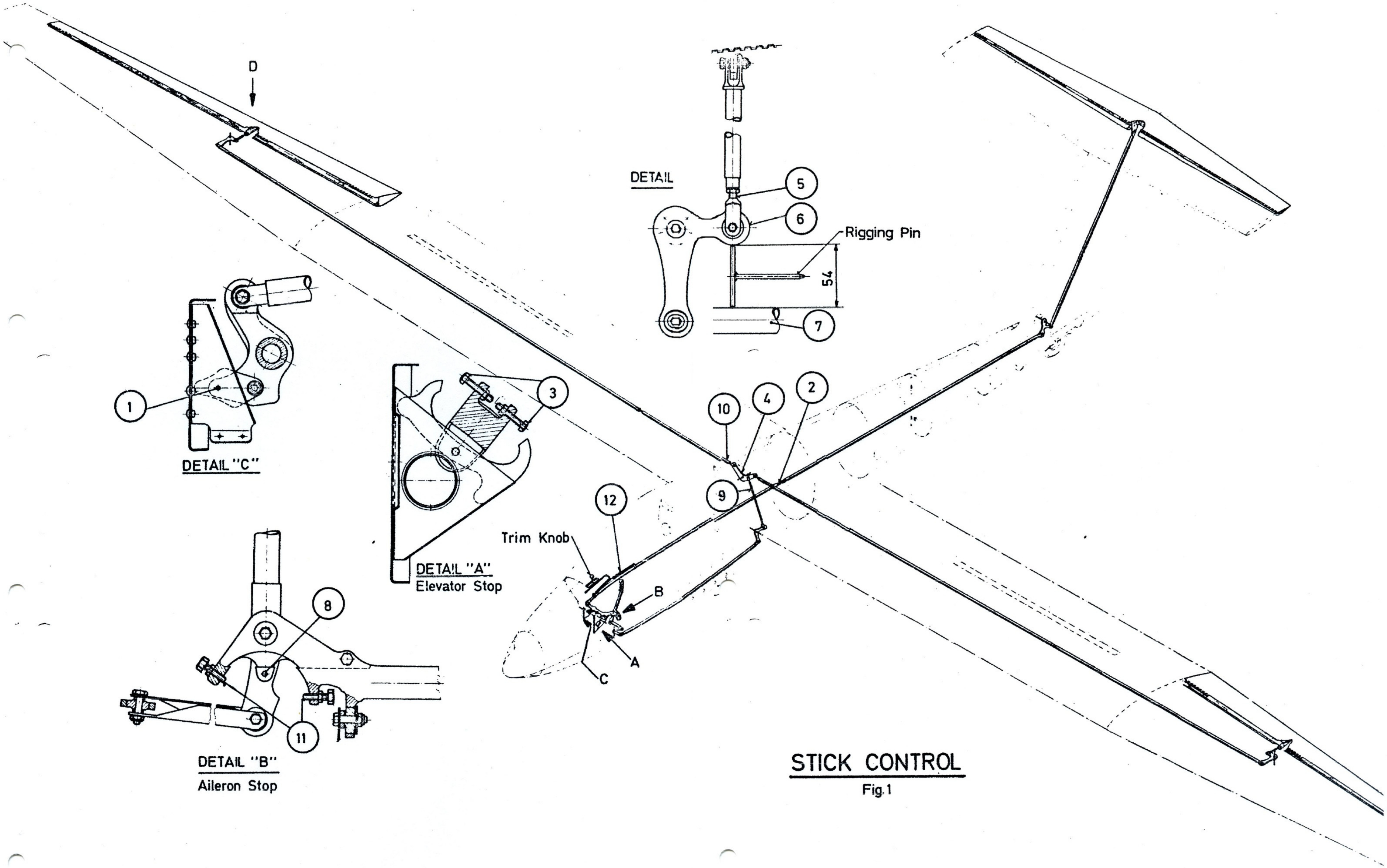
- Adjust control rod heads (10) as to achieve tension—free attachments to the differential bellcrank.

- Remove rigging pin.

(b) Aileron Deflection

- Check travel in accordance with the Flight Manual. (Part 1) section 5.

- Adjust travel stop screws (11) if necessary (Detail B)



STICK CONTROL

Fig. 1

2.3 Rigging of Rudder Control (see Fig. 2)

(a) Neutral Position

With the pedals aligned set the control surface in neutral position by adjusting the control rod head (1) attached to the bellcrank (3).

(b) Rudder Deflection

- Check level in accordance with the Flight Manual (Part 1) section 5.
- Adjust travel stop (2) if necessary.

(c) Position of Pedals

With the adjustment (5 notches) in mid position, the distance between pedal foot rest and bulkhead 2 should be 515 mm (20.25 ins) as shown in detail A, Fig 2

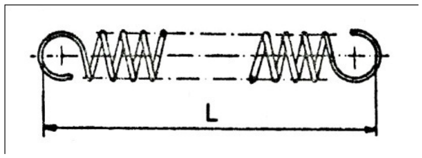
Warning

Be sure that the control travels are limited by the respective stops in the control mechanism, and the control surfaces are free from any limit stops to avoid damage.

2.4 Adjustment of Elevator Trim System

The spring characteristics (12), Fig. 1, are specified
in the following data:

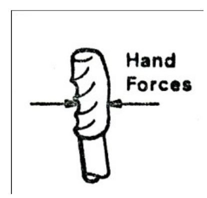
-	Free length:	L_o	=	141 mm (5.55 in.)	Force =	0
-	Extended length:	L_1	=	185 mm (7.28 in.)	Force =	6.6 kg (14.6 lbs)



(Both springs are identical)

The condition of the springs installed may be examined by ascertaining the stick forces on the control stick at the extreme trim positions.

With the elevator control rod on the elevator attachment fitting disconnected, the following stick forces should apply, if the springs are in proper condition:



- Trim control knob in most forward position:

  1.3 kg (2.78 lbs) pulled

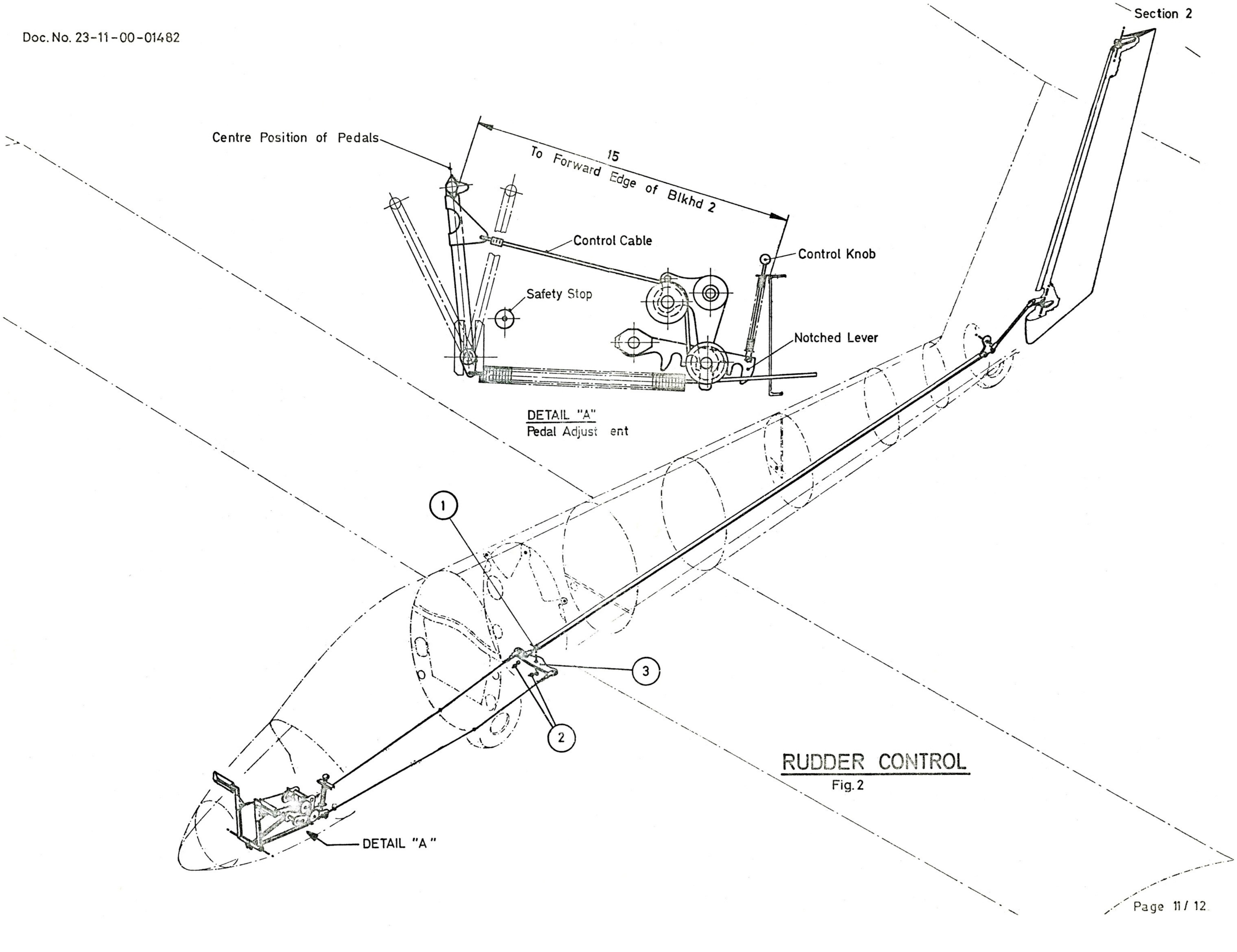
- Trim control knob in most rearward position:

  1.75 kg (3.86 lbs) pushed

If deviations from the above values should be found, remove the springs and test them individually. It may then be necessary to examine the elevator control system for abnormal friction.

<u>Note</u>

The above spring force characteristic provides optimal trim conditions at a mid C.G. location. With the extreme C.G. positions, trim efficiency is still sufficient.



RUDDER CONTROL
Fig. 2

2.5 Air Brakes (see Fig. 3)

(a) Stops

- Position OUT: Pin (1) through control rod guide in bulkhead 3.
- Position IN: Lever (2) in over-dead centre on eccentric stop (3)

(b) Adjustment

- Position OUT: No adjustment possible. Pin (1) is set during assembly.
- Position IN:

(ba) The over-dead centre position may be regulated by adjusting the eccentric stop (3).

Note

The position of the eccentric stop is selected during assembly to compensate deviations in manufacture. Readjustment will only be required following repair of the system components.

(bb) The pretension of the air brakes in the retracted position must be individually adjusted by turning the control rod heads (4) on the bellcrank as to obtain a hand force of

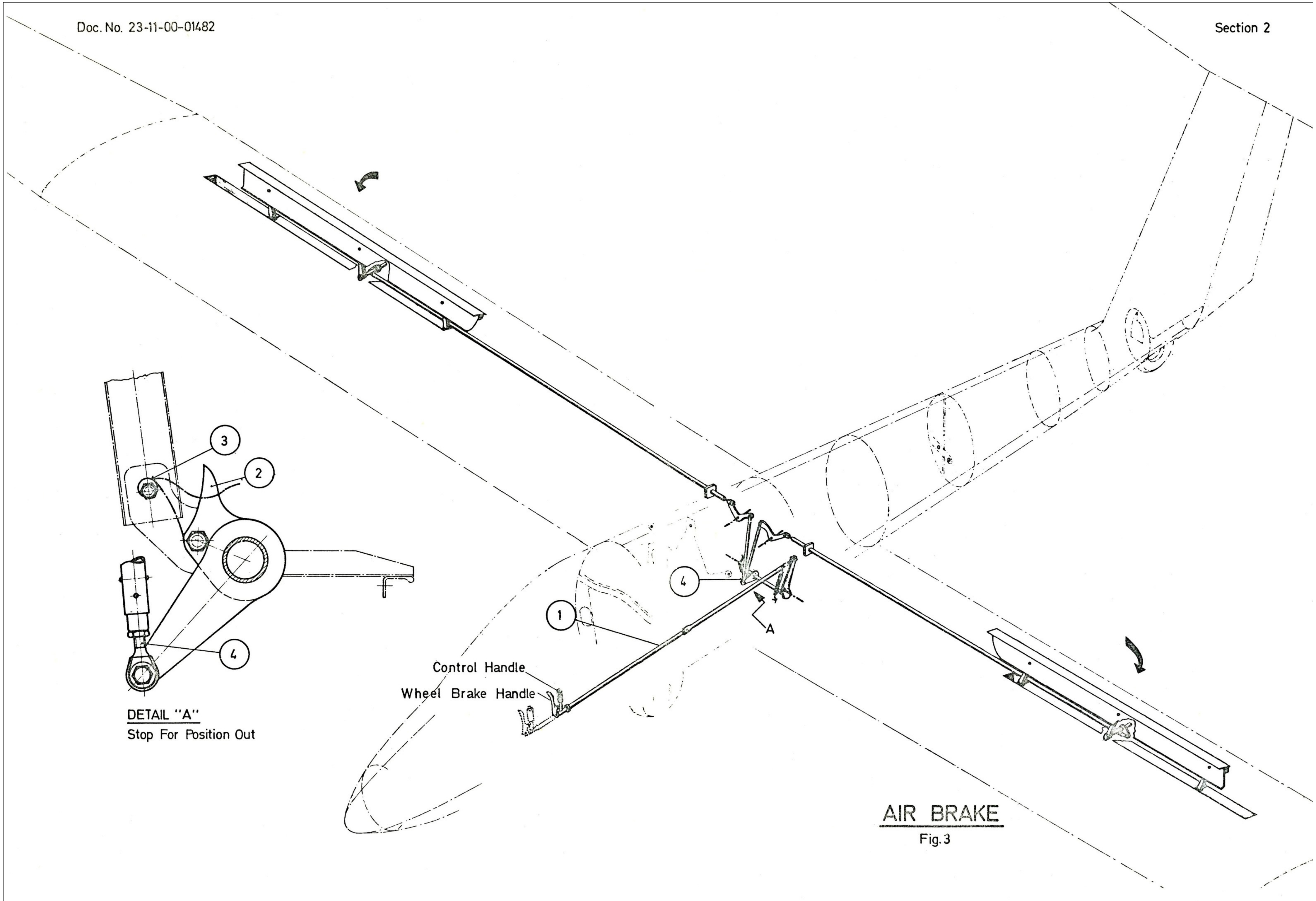
$$3.5 \begin{smallmatrix}+0.25\\-0\end{smallmatrix}\ \text{kg} \quad (7.7 \begin{smallmatrix}+0.5\\-0\end{smallmatrix}\ \text{lbs})$$

to unlock the mechanism each side. To extend both air brakes simultaneously, a hand force of approximately twice the above value will be required.

Warning

Whenever components of any control system have been readjusted,

- Ensure that all control rod heads are positioned so that their threaded ends are visible through the inspection holes.
- Check that all connections in the control systems are properly secured.



AIR BRAKE

Fig. 3

3. Corrosion Protection and Repainting

3.1 General Information

Provision has been made during the manufacturing process to protect all components of the glider individually against corrosion.

All aluminum alloy parts are chromized (Alodine process) and coated with a water and solvent resistant primer. The exterior surface is additionally coated with a tough and weatherproof paint of the two component Polyurethane basis.

Steel parts are cadmium-plated, except some visible screws in the cockpit which are chrome-plated.

Bare steel areas of moving parts are coated with a thin dry film of molybdenum disulphide.

Magnesium castings (control stick bearer and air brake support levers) are protected by chemical treatment and coated with a stoving type Epoxy enamel.

Control cables are of zinc-plated steel and they are treated with preservative compound prior to assembly.

The flight control rods, composed of the corrosion resistant alloy Al-Si-Mg are not primed. To minimize the friction in the guides, the sliding areas are coated with a thin dry film of molybdenum disulphide and then polished.

The material for the hinged pins on the elevator and ailerons, as well as for the control system connecting bolts, is stainless steel.

3.2 Original Paint Products

The paint products listed below are used in manufacturing. It is recommended that the same paint types be used for touch-up and repainting although satisfactory results may be obtained by the use of other products, provided that the substitute is compatible with the ground.

(a) Primer: Two component Epoxy-Polyamide combination, zinc chromate pigmented. Trade name: "Etokat-Zinkchromat".

(b) Top Coat exterior: Two component Polyurethane resin, hardened with aliphate polyisocyanate. Trade name: "Nuvovern LW".

(c) Top Coat interior: Alkyd enamel. Trade name: "Luxoral".

(d) Putty: Two component Polyester resin. Trade name: "Glassit". (To be applied particularly in the area between fiber glass fuselage nose and fuselage metal skin.)

(e) Fluorescent Paint: Available in one or two component systems. Two component paint provides increased quality and is therefore recommended.

One component product: Nitrocellulose based system, consisting of surfacer, fluorescent paint and clear varnish. Trade name: "Hi-Visibility Fluorescent Finishes" Nos. 8541/8534/8542. Manufacturer: W.D. Fuller.

Two component product: Acrylic based system, consisting of surfacer, fluorescent paint and clear varnish.
Trade name: "Bonacryl" Nos. 543-1108/ 543-0101/544-0101.
Manufacturer: Bonnaval-Werk GmbH, Bonn, West-Germany.

3.3 Touching-Up and Repainting

3.3.1 General Notes

Successful paint work is accomplished only by observing the following recommendations:

(a) Surfaces to be treated must be completely cleaned from oil/ dirt, dust and signs of corrosion or moisture.

(b) Surfaces which are expected to have been treated with a silicone product, e.g. car wax, must be additionally cleaned with silicone remover.

(c) An existing coat always must be sanded prior to any paint work, and the dust be removed.

(d) A primer always must be applied on bare metal surface as well as on an existing (sanded) paint or putty.

(e) No moisture (condensed water) on the surface to be treated. Coating a cold metal surface at high air humidity results in failure. In these conditions heat the area prior to paint work, using an electric radiator or adequate equipment.

3.3.2 Primer Application

A damaged primer coat inside the sailplane may be renewed or touched-up as follows:

- Clean the area involved thoroughly with a solvent, e.g. Chlorothene NU.

Note

The existing primer is resistant against most solvents, and the surface can therefore be cleaned with the mentioned product, without the risk of dissolving; but the solvent should be completely evaporated before repainting.

- Sand the surface using fine sand-paper.
- Apply a new primer coat (item 3.2/a) by spraying or brushing.

Note

The protective effect of the primer is based on passivating, not on sealing the aluminum surface. The primer should, therefore, be applied as a thin layer, especially where top coat application is intended.

Warning

Damages to the metal surface, such as scratches, bulges, nicks and cracks must be repaired prior to repainting. Refer to section 4.

3.3.3 Refinishing of Exterior Top Coat

Sand down the area involved with emery paper, preferably wet.

- Successful paint work is accomplished only by observing the following recommendations:
- Clean with solvent
- Apply primer (para 3.2/a) to the grinded surface, and allow to dry for at least 8 hours.
- Apply top coat (para 3.2/b).
- After drying, remove spray dust on the margins and polish.

<u>Note</u>

The paint type listed under para 3.2/b provides optimal weather and abrasion resistance and finish quality. However, an alkyd resin paint may also be used in lieu of this product, while the use of nitrocellulose enamel is not recommended. The Polyurethane type paint (para 3.2/b) should not be exposed to any mechanical stress during the first two days and should not be polished within this time.

3.3.4 <u>Refinishing of Fluorescent Coat</u>

The areas coated with fluorescent finish should be entirely renewed. Touch-up would be markedly. If the paint coat is not damaged and the paint is intended to be renewed, proceed as follows:

- Sand the surface (wet) and clean.
- Apply white surfacer
- Apply fluorescent finish of desired colour.
- Apply clear varnish.

If the surface is damaged, sand down to the ground of the scratch and apply then first a primer coat (para 3.2/a).

Note

Nitro-based fluorescent finish may be renewed by applying a two component acrylic type. In this case, the nitro coat must be sanded down to the white surfacer, and the new acrylic surfacer must be sprayed upon.

Vice versa, nitrocellulose based fluorescent paint applied to Bonacryl is not recommended.

To find out, whether the existing coat is of the nitro or acryl type, dab with thinner: nitrocellulose will easily be dissolved.

3.3.5 Refinishing of Interior Top Coat

The top coat applied in the cockpit area is of the Alkyde type. Repainting can be accomplished with any of this paint product. Bare metal must be primed prior to top coating.

The instrument panel is painted with a baked enamel. To touch-up, use a nitrocellulose or alkyde enamel.

3.3.6 Protection of Steel Parts

All steel parts, except the screws visible in the cockpit, are cadmium-plated.

Corrosion on these parts should be removed mechanically and treated with preservative oil until they can be replated or replaced during overhaul. Corroded springs and control cables should generally be replaced.

3.3.7 Finish Care

The exterior finish of the sailplane is of extreme high quality regarding weather resistance, and it remains glossy during long periods.

Nevertheless, periodic treatment with a care product is recommended, particularly the surfaces exposed to the sun.

For this purpose, a car wax without any abrasive additive should be used. Only if the glossiness of the paint should disappear, a polish product may be applied.

3.4 Aluminum Corrosion

3.4.1 Types and Causes of Corrosion

Metal corrosion, primarily an electrochemical (galvanic) process, is initiated only at the presence of a conductive medium, i.e. contaminated water or humidity.

Dependent upon the metal composition and the micro-structural condition, different types of corrosion may develop, and its intensity may vary with the efficiency of the electrolyte.

(a) The most common type of corrosion on aluminum alloys is referred to as pitting. It is first noticed as a white, powdery deposit, blotching the surface. When the deposit is removed, tiny pits or holes appear in the surface.

This corrosion may be caused by a local anodic process between contamination deposits, e.g. mineral particles and the metal surface, or by direct chemical attack (wharein the anodic and cathodic changes take place at the same point), caused by acid, or humidity in maritime or industrial atmosphere.

Normally, the progress of this action is slow because of the low capacity of the cathodic material involved, and this type of corrosion can be tolerated over a certain period, but protective treatment is recommended at first opportunity.

3.4.1 Cont'd

(b) Contact corrosion occurs where metals are located close together in a structure, especially dissimilar metals. In the presence of an electrolyte, the material having the lower electrochemical potential will suffer anodic erosion.

Since the capillarity of contact surfaces favours the ingress of water, such areas are particularly susceptible to this corrosion.

Where the contact of dissimilar metals is localized to a small area, e.g. adjacent to a screw head, a "spot attack" will result. Damages of this sort should be stopped immediately.

Note

Dissimilar metal parts in the B4 structure are protected and isolated by a paint coat or sealing compound. Severe contact corrosion denoted above must therefore not be expected, except when the protective coat of a 'component is damaged.

(c) The most critical corrosion is the intercrystalline or intergranular type. It is originated by incorrect thermal treatment, during which process alloy elements, such as Cu, Mg, etc. are separated from the Al-crystal, thus forming a small "battery" together. In the presence of water, the reaction will start on the wet surface and will progress rapidly along the grain boundaries, leading, in an extreme case, to general destruction of the material

This type of corrosion has never been experienced on PILATUS aircraft and should not be considered.

3.4.1 Cont'd

(d) Exfoliation or selective corrosion is defined by "lifting-up" the surface grains of the metal by the force of expanding corrosion products.

It has only been observed on extruded sections of Al-Cu-Mg type alloys and originates during the extrusion process, when alloy elements have locally been separated in the highly stretched crystals.

These separated and locally accumulated elements, such as Cu and Mg, are then the basis for the inter-crystalline corrosion denoted above, however, with the difference that the exfoliation type is localized to a limited area while intercrystalline corrosion, as a result of incorrect thermal treatment, may develop through the entire structure of a metal part.

Susceptible to exfoliation corrosion are also faying surfaces, and corrosion of this sort may therefore be discovered only when the affected surface has "bursted", forming a bulge in the sheet riveted to the respective section.

Under the worst condition, failures of this nature may occur on a B4 glider, whereby the wing spar flanges and fuselage stringers could be affected. Symptoms of such a failure are explained above: Bulges in the skin over the extruded sections. Immediate repair would be required in these cases.

3.4.2 Corrosion Prevention and Treatment

As previously explained, water and humidity in conjunction with salt and industrial air contamination are factors progressive to metal corrosion.

In the B4 glider, all aluminum parts are protected against corrosion by Alodine treatment and primer application. The effect of rain and condensed water (which can leave the airplane structure through the water drain holes provided) will not cause any serious corrosion.

If, however, any liquid accumulates internally for longer periods, the danger of corrosive action may arise. During operation, transportation and hangarage, care must be taken to provide water drain and/or ventilation possibilities.

In the event of existing corrosion, the following procedures are recommended:

(a) Pitting Corrosion

If accessible, clean the affected surface with a solvent, preferably White Spirit, and brush to remove all corrosion products. After drying and dust removal, apply a primer coat.

If the area concerned is not accessible for the above treatment and the corrosion is considered to be not in an advanced stage, this treatment may be carried out at the next overhaul. As a preventive measure spray the corroded surface with a water displacing penetrating oil, e.g. "Bux DRI SLIDE" or "Molykote OMNIGLISS" or "Moly Slip COMBAT", using a spray gun, with an extension piece, if necessary. This oil penetrates the corrosion products, thus 'excluding any humidity, and stops the corrosion process for a certain time.

3.4.2 Cont'd

If the corrosion is found to be excessive, cut access holes into the skin as described in para 4.8.8 and treat as previously explained

(b) Etching

Heavily etched surfaces caused by battery acid, lye or urine must be thoroughly washed and the area treated with a corrosion remover using a stiff brush.

After rinsing and drying apply a primer coat, followed by a top paint coat to the surface

(c) Spot Attack

Parts showing severe topical corrosion, initiated by electrochemical reaction in the region of dissimilar metal contacts, should be examined for weakening.

Clean and treat the surface affected as per para (b) above, and remedy the cause of the failure, e.g. by applying a sealing compound between the contact surfaces in order to interrupt the conductive interconnection.

(d) Exfoliation Corrosion

When evidence of exfoliation corrosion exists (see para 3.4.1/d), proceed as follows:

- Cut an access hole in the suspect skin area (see Fig. 10 and 11, para 4.8.7).

3.4.2 Cont'd

- Work out mechanically all corroded material, taking care that all grooves and nicks are smoothed out to the best possible radii and to the highest surface quality.

- Examine the remaining cross section of the part involved. The following limits apply as permissible values for cross section reduction:

  - on the wing spar flanges:

    between rib 1 and 4 : 5%

    between rib 4 and 12 : 10%

  - on any fuselage stringer: 10%

  - Should, however, the cavity result in a reduction of more than the above limits, reinforce the spar flange or stringer section as outlined under para 4.8.7.

In questionable cases consult the sailplane manufacturer

4. Repair Schemes

This section contains instructions about working methods/ material and tool requirements, and shows a number of general and specific repair schemes. The damages concerned can occur as a result o£ a collision on ground, hard landing, corrosion, excessive wear or exceeding the flight limitations.

4.1 General Notes

- For marking-off on aluminum alloy sheet only use a pencil, never mark with any ink, ball-point, coloured pencil, and on no account use a sariber, unless the markings are completely removed during the final shaping of the repair material.

- Edges on metal sheet cuts and drilled holes should always be deburred. Blend out all scores and dents, and eliminate sharp corners with limited contours in order to minimize local stress concentration, which may be liable to initiate fatigue cracks.

- Swarf,- rivet heads and other foreign matter must be removed from the repair area before the completion of each repair to eliminate the danger of fouling control systems or contributing to corrosion.

- Do not use any steel brush or steel wool for corrosion removal or cleaning.

4.2 Material Required

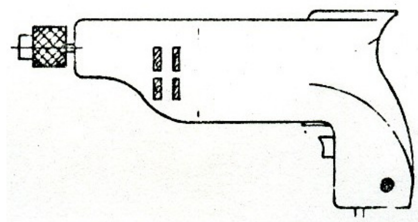
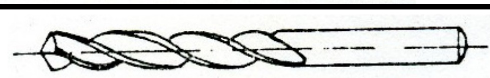
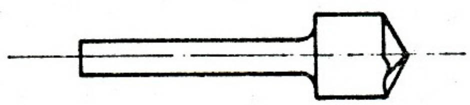
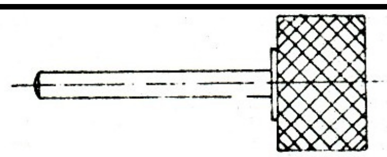
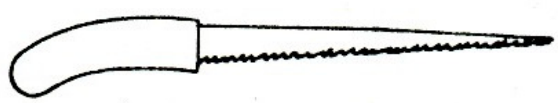
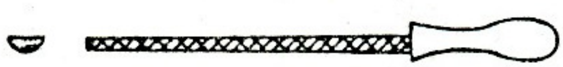
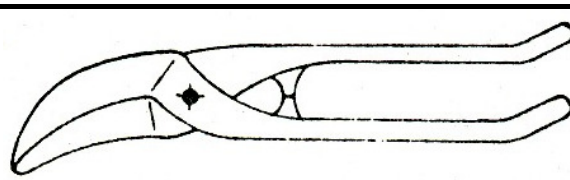
The material listed in the following table may be used in conjunction with repair work. The Swiss standards are herein opposed to the German and U.S. equivalents. (AA = Aluminum Association of America).

4.2 Cont'd

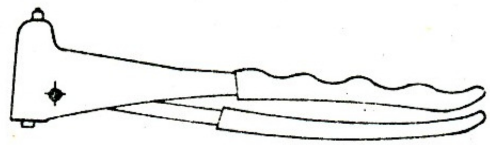
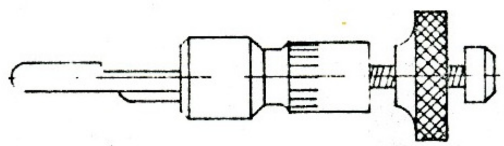
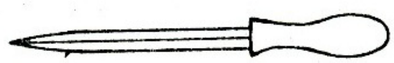
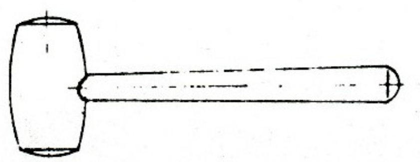
Item No.	Part	Material			
		Swiss Standard		DIN	AA
		Type	SNV-L		
1	Fuselage skin between stations 1 and 4	Al-ZnMgl = 32 kp/mm2 = 19 kp/mm2	-	-	7005
2	Other skin panels and spar webs	Al-Cu4Mgl,2	743.5	3.1355.51	2024-T4
3	Extruded sections, such as stringers and spar booms				
4	Ribs and bulkheads	Al-Cu3,5Mg0,5	742.5	3.1325.51	2117
5	Chafing protection ledge on fuselage, keel ledge on rear fuselage , air brake cover plate, canopy frame, fuselage-wing fairing, seat back	Al-MgSil	730.68	3.2315.72	6351-T6
6	Rivets	Al-CuMg0,5	741.4	-	2117
7	Supporting ribs in wing and empennage	PVC Foam "Klegecell 40" 25 mm thick	-	-	-
8	Fuselage nose and pilot seat	Glassf iber-reinforced Polyester	-	-	-
9	Wing tip rubbing plate	Nylon-Akulon 5 mm thick	-	-	-
10	Control surface slot sealing tape	Teflon adhesive tape PILATUS P/N 917.40.70.009	-	-	-

4.3 Tools and Auxiliary Material

The following list shows the tools and auxiliary material mainly used for repair works described under section 4.8. Items identified by a PILATUS part number are available from this company. The other items may be procured from a tool shop.

Item No.	T o o l	PILATUS P/N Or type
1	Drill Gun 	-
2	Drills of varied dia. Drill dia. 3.25 mm  (for 1/8" Avdel or Cherry rivets)	901.61.01.162
3	Countersink 120° 	901.68.04.506
4	Grinding wheel with emery cloth Of two different grains 	902.49.19.309
5	Metal saw 	-
6	Half-round file, medium 	-
7	Tin snips 	-

4.3 Cont'd

Item No.	T o o l	PILATUS P/N Or type
8	Hand riveter 	Avdel Type J.A.
9	Screw type sheet fastener 	901.36.11.105
10	Scraper 	-
11	Mallet 	-
12	Epoxy resin ARALDIT blue, in tubes 300 g 40g (see section 4.6)	910.42.62.001 910.42.62.002
13	Acryl Adhesive TENSOL CEMENT No. 6 (Imperial Chemical Industries Ltd. Welwyn, Garden City, Herts, G.B.)	910.42.22.393
14	Cleaning and degreasing agent CHLOROTHENE NU	910.21.21.011
15	Glass fabric VETROTEX	917.18.12.123
16	Emery cloth of varied grain	
17	Masking tape	
18	Avdel Rivets 1/8", 120° C'sunk, Al-Alloy for sheet thickness joined 1.2 to 3.6 mm for sheet thickness joined 2.8 to 5.1 mm	939.35.80.903 939.35.80.905

4.4 Riveting

The normal (solid) rivets used in the airplane structure are of the "ready for use" type, alloy 2117, internally with brazier head, externally with flush head.

Figures 1 a to c show these 120° flush head rivets in the skin. Fig. la is a countersunk example provided for skin panels above 0,5 mm thickness; Figures Ib and Ic show dimplings provided for skin panels of 0.5 mm or less thickness.

At points inaccessible for rivet bucking, parts are joined together by blind rivets of the 100° flush head Cherry type. Figures 2a to 2c show countersunk and dimpling examples.

To replace both the normal and Cherry rivets, the use of

AVDEL Rivets (item 4.3/13) is

recommended.

This rivet type can be procured from a tool shop with both 100° and 120° flush heads. At PILATUS, however, only the 120° type is available. For this reason, the examples Figures 3a to 3d are based on the 120° Avdel rivet type. However, 100° Avdel, or 100° Cherry rivets may also be used for repair work, if the required tool is available; Fig. 3c would then be inapplicable.

When accessible for bucking (see example Fig. 9c), the use of solid rivets is recommended.

The following details the application of the above Avdel rivets, preferably with 120° flush head.

(a) In lieu of solid rivets with 120° flush head, use 120° Avdel rivets as outlined under Fig, 3.

(b) In lieu of 100° flush head Cherry rivets in countersunk sheet (Fig. 2a), use 100° Avdel rivets. If only the 120° Avdel type is available, the countersunk should be reworked to 120° (Fig. 3a).

(c) In lieu of the same Cherry rivets in dimpled surface (Fig. 2b and 2c)/ use 100° Avdel rivets. When the 120° Avdel type is being used, this rivets must be set by applying Epoxy resin as shown in Fig. 3c. See also para 4.6. After curing of the resin, mill down the protruded part of the rivet heads.

(d) Riveting being newly applied during repair work is shown in Figures 3a to 3d.

<u>Note</u>

Pop rivets may be used in lieu of Avdel rivets where the driven head necessitates a minimum height, as shown in example Fig. 8b. The extremely hard shank pin must then be grinded flush with the rivet head.

(e) When replacing loose rivets, or if sheets below 0,8 mm thickness are being countersunk in the absence of a dimpling tool, the new rivets should be set by Epoxy resin application as shown in Fig. 3d.

The minimum edge distance for any rivet is 2 times the diameter of the rivet shank; the minimum spacing is 3 times the diameter.

Fig 1 Solid Rivets, 120° Flush Head

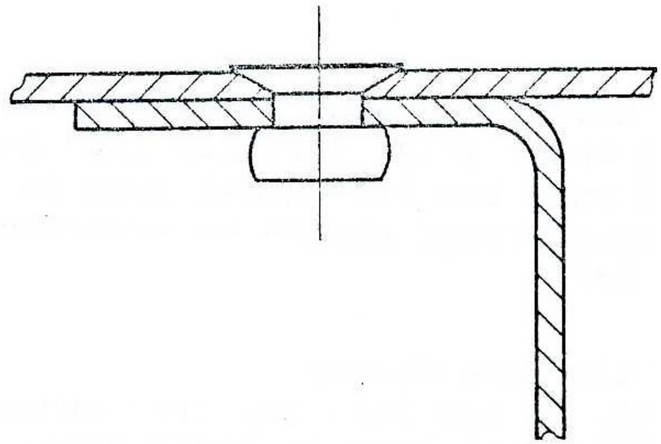


Fig 1a Skin panel 0.8 mm countersunk surface

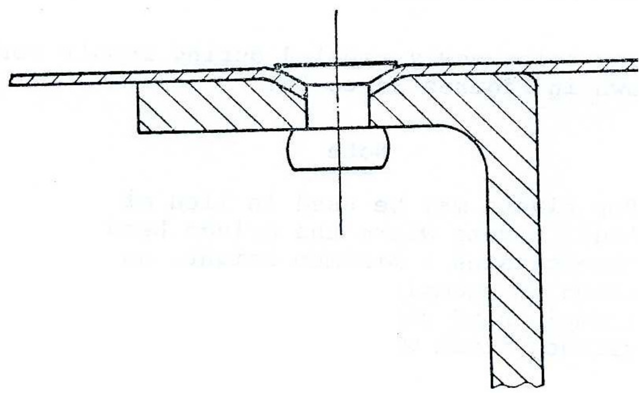


Fig. 1b Skin panel 0.5 mm dimpled surface, sub-surface countersunk

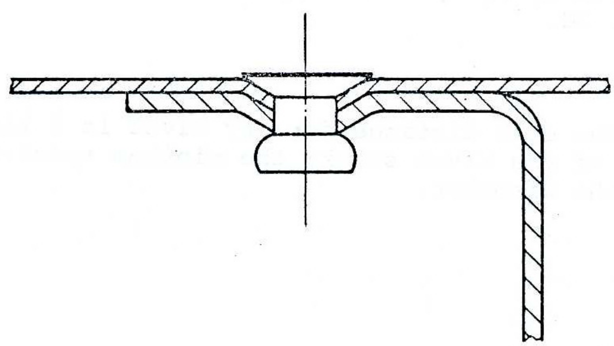


Fig. 1c Skin panel 0.5 mm dimpled surface, subsurface dimpled

Fig 2 Solid Rivets, 120° Flush Head

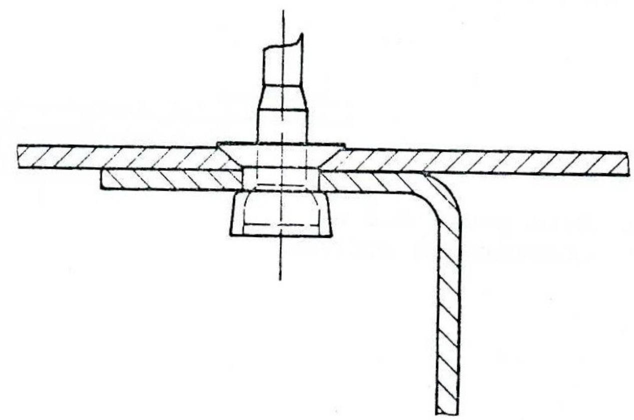


Fig 2a Skin panel 0.8 mm countersunk surface

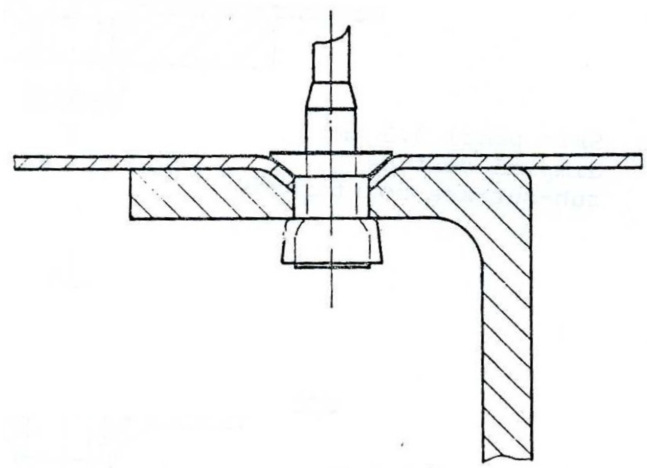


Fig. 2b Skin panel 0.5 mm dimpled surface, sub-surface countersunk

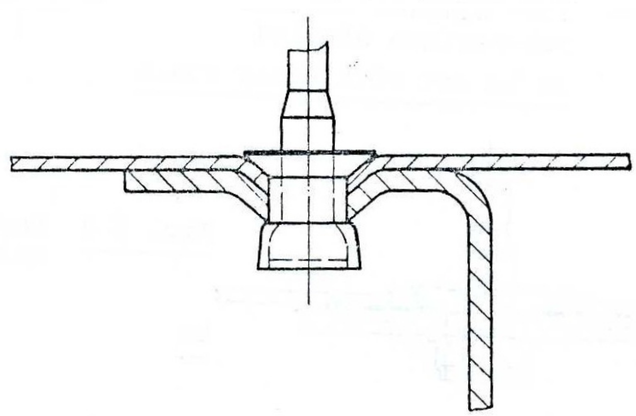


Fig. 2c Skin panel 0.5 mm dimpled surface, subsurface dimpled

Fig 3 AVDEL Rivets, 1200 Flush Head For Repair

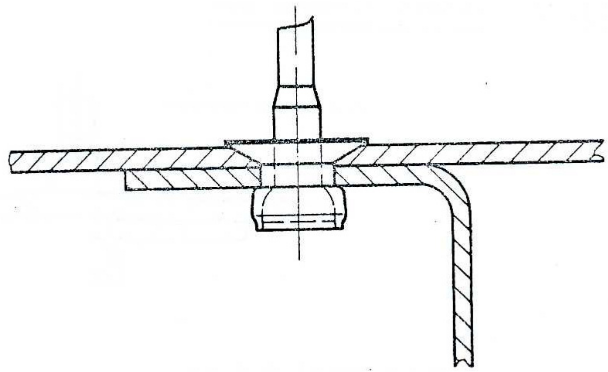


Fig 3a Skin panel 0.8 mm countersunk surface

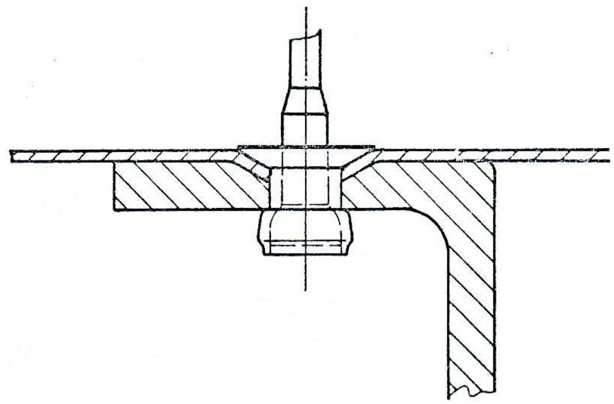


Fig. 3b Skin panel 0.5 mm dimpled surface, sub-surface countersunk

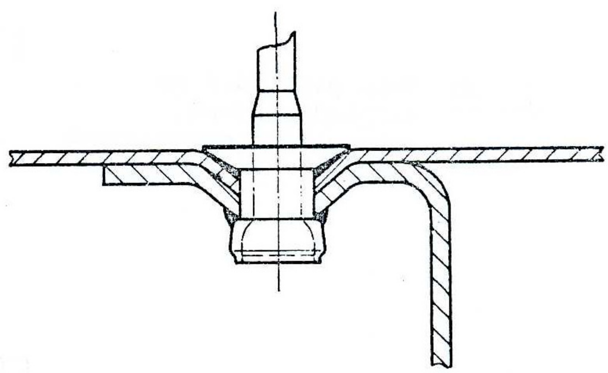


Fig. 3c Skin panel 0.5 mm dimpled surface, subsurface dimpled
To be set with Epoxy resin

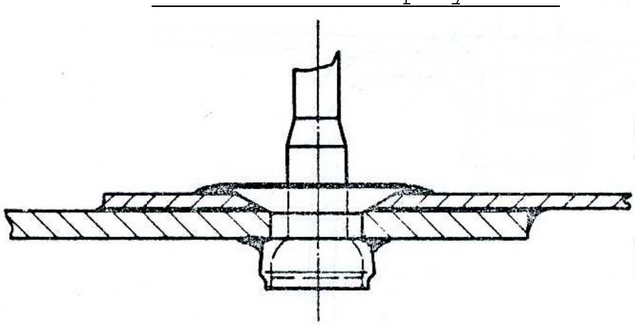


Fig. 3d Repair version: Skin panel 0.5 mm countersunk surface
To be set with Epoxy resin

4.5 Welding

The aluminum alloy Al-Mg Si 1 can be welded with either the oxyhydrogen or the oxyacetylene flame, or by the TIG welding process. The items listed under para 4.2/5 are composed of this material; they could be repaired, if necessary, in this way. Since, however, they are in a heat-treated (hard) condition, the parts must be reheat-treated after welding.

All other structural aluminum parts are not weldable, and they should not be heated higher than 100° C in order to maintain the required strength and corrosion resistance.

The few welded steel parts installed, such as rudder pedals, air brake control handle and canopy hinges, are composed from CrMo. These components may be repaired by welding or reshaped at high temperature. Paint or cadmium should be removed prior to welding.

All other steel parts, such as attachment bolts, bushes etc., should in no account be welded, soldered, nor heated.

Only licenced welders are allowed to weld aircraft components.

4.6 Bonding

The foam ribs in the wing and empennage are bonded to the structure with Epoxy resin

ARALDIT AW 134 B / HV 997.

3M EC-1614 is used to fix steel bushes in the respective light alloy casings, e.g. at the wing and horizontal tail attachment points, control rods, etc.

In lieu of these products the Epoxy resin

ARALDIT BLUE

available in tubes from any drug store, may be used. This resin can also be applied in connection with glass fabric laminates bonded to the metal skin, as shown on repair scheme para. 4.8.1. EC-1614 may also be used for that purpose.

Before any resin application, the contact surfaces must thoroughly be cleaned from any dirt, dust, oil and grease, and existing paint, resin residues or corrosion products must be removed.

Chlorothene NU, listed in para. 4.3/14, is an approved all purpose cleanser and degreasing agent.

After sanding and cleaning, the bonding surfaces should not be touched with unprotected fingers.

The Epoxy resin used has to be applied in accordance with the instruction supplied with each kit. It should be considered that the resin will cure to the required strength only at temperatures above 20° C. It is recommended therefore, to heat the bonding area by means of an infra-red radiator or other equipment. This will also shorten the curing time.

The reason for adhesive resin application during repair is to improve the strength of all riveted joints by eliminating any stress concentration, especially in view of the fact that any repair work may result in a weakness of the airplane structure if marginally conducted.

4.7 Fiber Glass Repair

The fuselage nose and also the pilot seat are moulded from a Polyester glass fiber laminate. Both components are not integrated in the airplane structure, and repair work will therefore not involve any problem,

Small injuries in the fuselage nose, for instance, may be filled out with putty (item 3.2/d). Damages such as deep scratches, cracks or holes must be repaired by laminating, using glass fiber and Polyester or Epoxy resin (item 4.3/12) in a conventional way.

If the nose should be severely damaged, it may be replaced as described in para. 4.8.9.

4.8 Repair Schemes

4.8.1 Dent in Wing or Stabilizer Noses {Fig. 4)

Material Required

(a) Glass fiber of medium weight, item 4.3/15

(b) Epoxy resin, type ARALDIT BLUE, in tubes, item 4.3/12.

Note

Polyester is not recommended as laminating resin for this purpose because of its marginal adherence on the metal.

(c) Tools as illustrated in Pig. 4b.

Work Sequence

- Drill a hole of approx. 6 mm dia. into the dented nose section (Fig. 4a).
- With the aid of a hook pull out the dent, while hammering down the bulges (Fig. 4b).
- Remove the paint coat around the repair area using paint remover or by sanding down to bare metal. Residual primer may remain.
- Smooth out the hole in the nose section which has been enlarged during repair, using a round file or emery cloth. Enlarge the hole to approx. 1/2" if necessary, round or oval shaped.

Fig. 4

Dent in wing or stabilizer nose

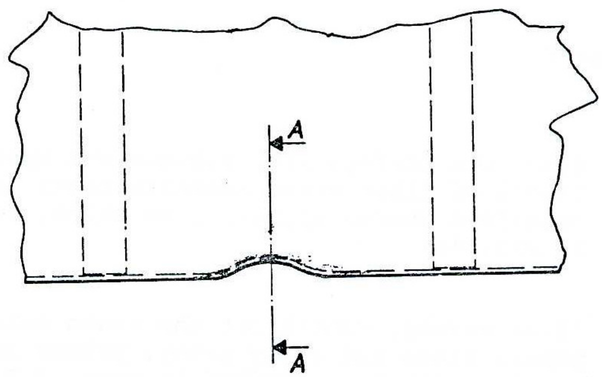
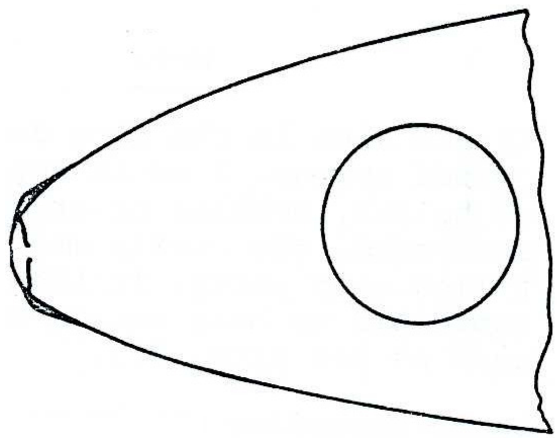
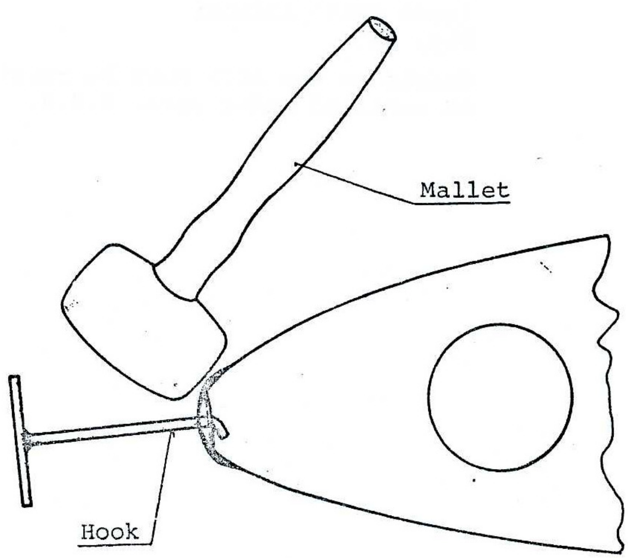


Fig. 4a Hole 6 mm dia. in nose section



Section A-A

Fig. 4b Rework



4.8.1 Cont'd

- Clean the surface with solvent and apply three layers of fiber glass laminate using material specified above, approx. 1 mm thick, as shown in Fig. 4c.

- After curing, smooth out the resin using sand paper, clean and apply putty, primer and finally the top coat as described in para. 3.3.

Note

If the dent in the skin does not exceed approx. 3 mm in depth and no bulges, buckles or cracks are presented, the cavity may be filled with putty. In this case, sand down to bare metal, and proceed as per para. 3.3.

Dents exceeding the above limit, in absence of any bulges or cracks, should be filled and coated with fiber glass laminate as shown in Fig. 4c.

Cracks in the skin must be repaired as outlined under para. 4.8.2.

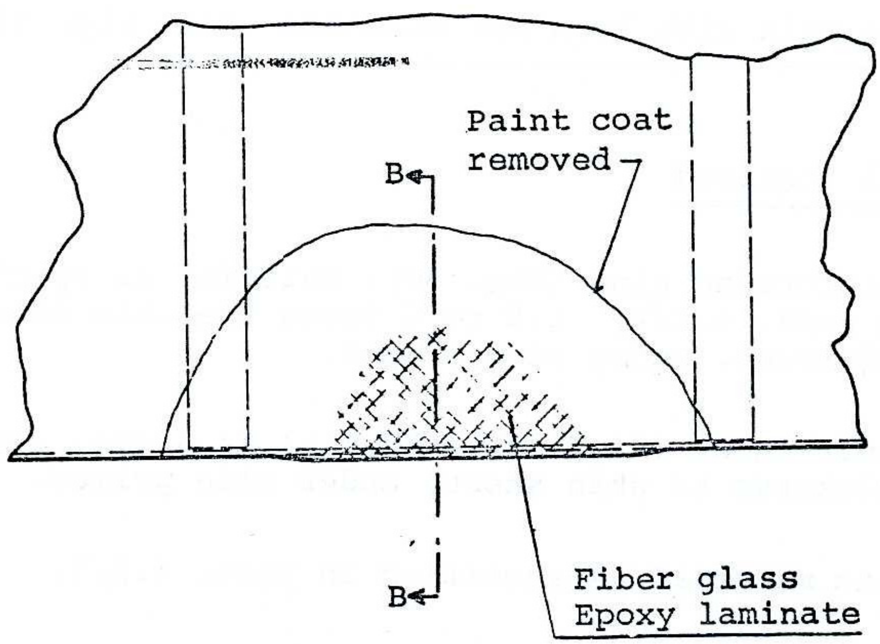
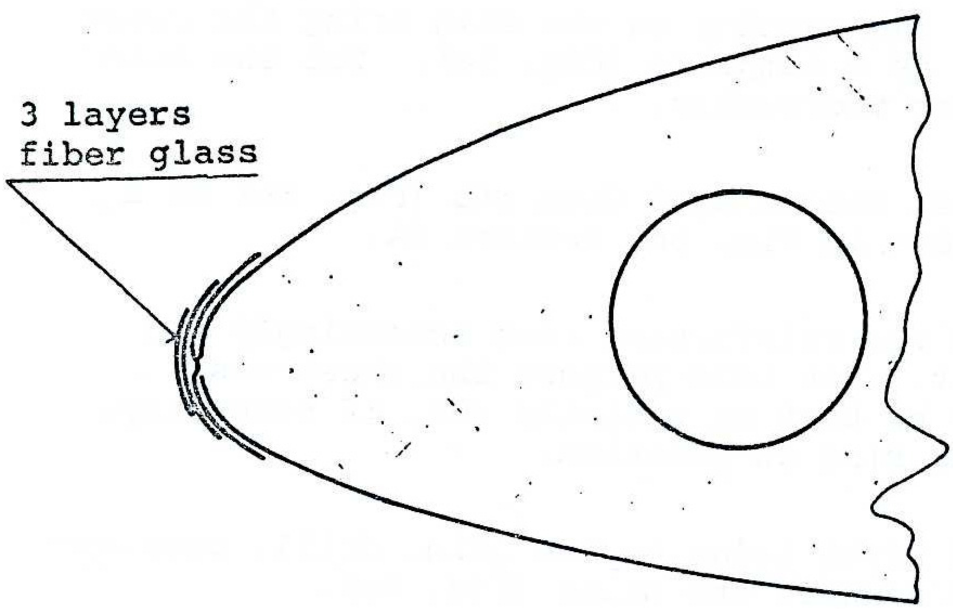


Fig. 4c Laminating



Section B-B

4.8.2 <u>Crack in Skin with Foam Rib affected</u> (see Fig. 5)

Material Required

(a) Reinforcing ring (Pig. 5c), material as specified in para. 4.2/2, 1.5 to 2 times the skin sheet thickness, under side primed.

(b) Cover sheet (Fig. 5d), material as above, same thickness as skin sheet, under side primed.

(c) Foam material as specified in para. 4.2/7.

(d) Avdel rivets as specified in para. 4.3/18.

(e) Adhesive (Epoxy resin) as specified in para. 4.3/12

<u>Work Sequence</u>

- Mark-off the opening on the skin using the cover (item b) as a template (Fig. 5a). Cut the hole and deburr thoroughly.

- Smooth out the damaged foam rib (Fig. 5b) to a shape shown in Fig. 5c, Section AA.

- Pre-form the reinforcing ring accordingly and insert it. For this purpose the sheet must slightly be bent or radially cut, if necessary. Clamp the ring in position.

- Mark-off rivet holes on the skin, drill, counter-bore and de-burr the holes (Fig. 5c).

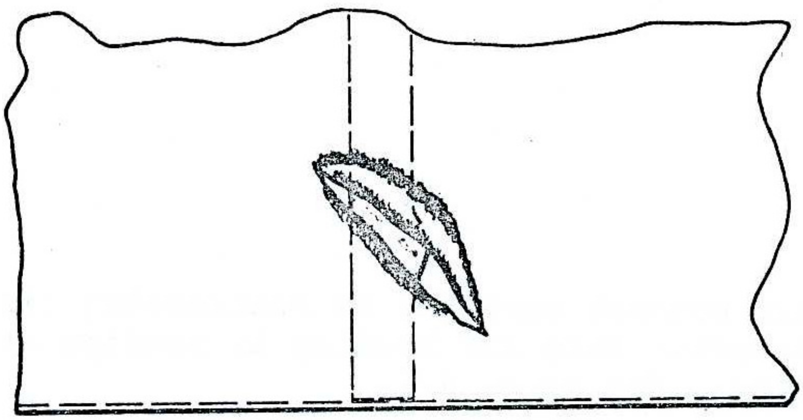
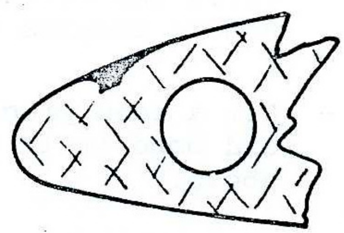


Fig. 5 Crack in skin,
foam rib damaged

Section



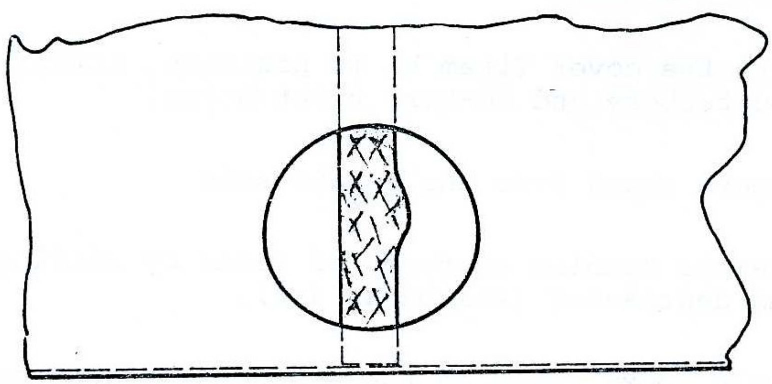
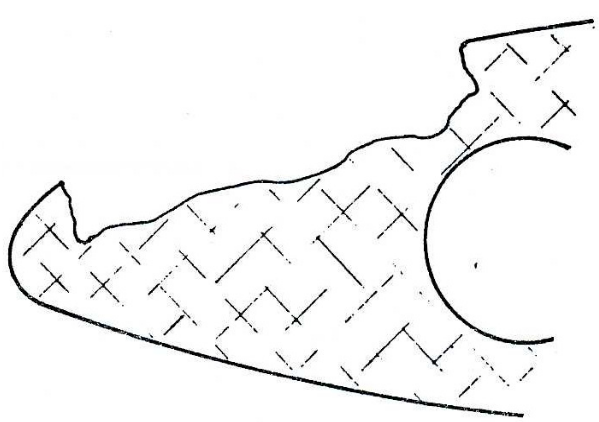


Fig. 5a Circular or oval
hole in skin

Fig.5 Foam rib



4.8.2 Cont'd

- Prepare contact surfaces of reinforcing ring and interior skin for bonding by sanding and cleaning. See para. 4.6.

- Apply Epoxy resin to the contact surfaces and rivet the reinforcing ring in place (Fig. 5c). Remove surplus resin.

- Fit a foam piece to complete the damaged rib and bond it in position using Epoxy resin as above.

- After curing of the resin, rework the foam rib upper contour to align with the cover sheet inner contour.

- With the cover (item b) in position, drill, counterbore and de-burr rivet holes.

- Remove swarf from the repair area.

- Prepare bonding surfaces of cover by sanding and degreasing (see para. 4.6).

- Apply Epoxy resin to the contact surfaces and rivet the cover in place (Fig. 5d).
- Apply outside paint, proceeding as per para. 3.3

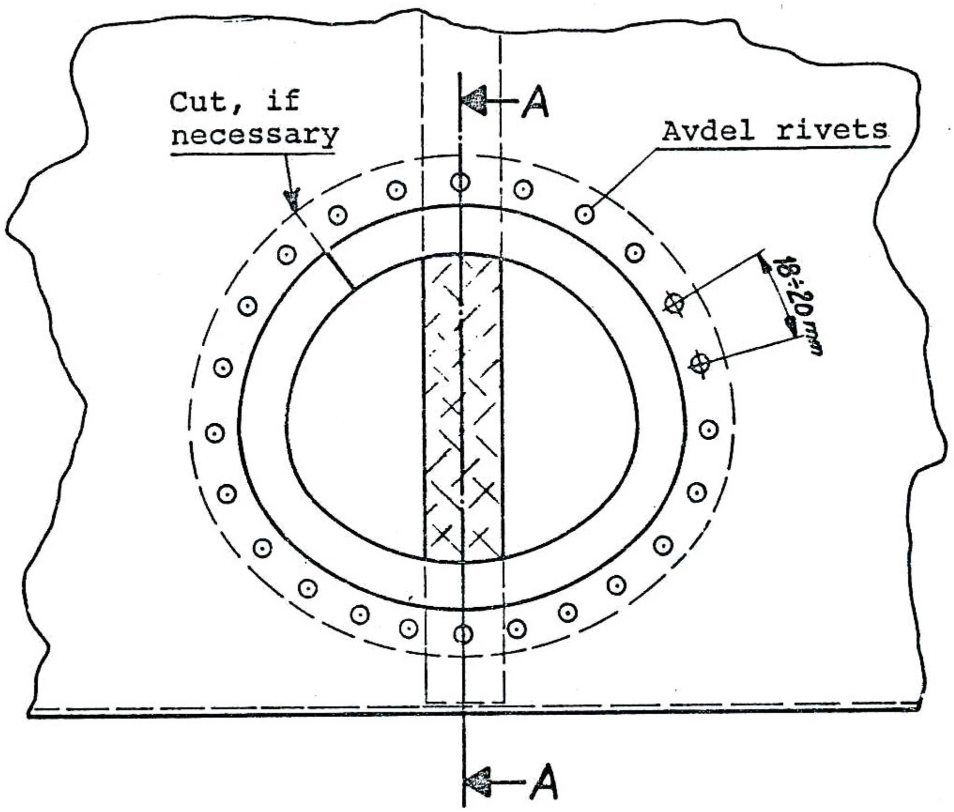
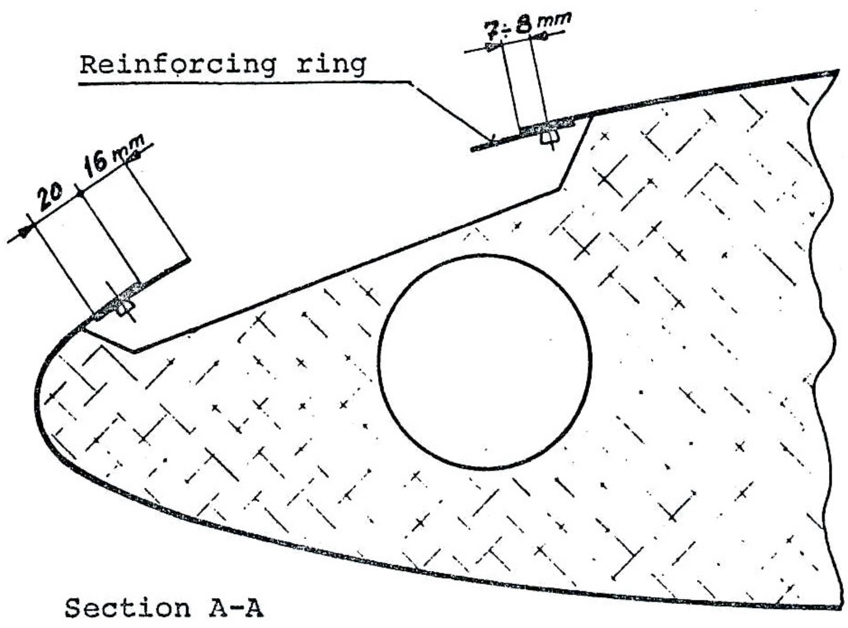


Fig. 5c Smoothing of foam rib and installation of reinforcing ring



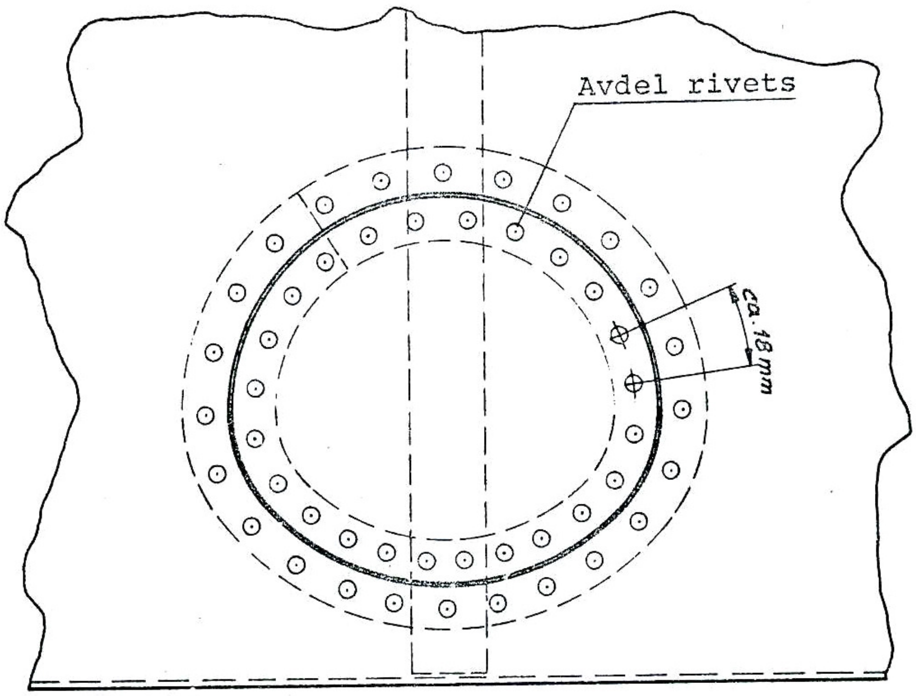
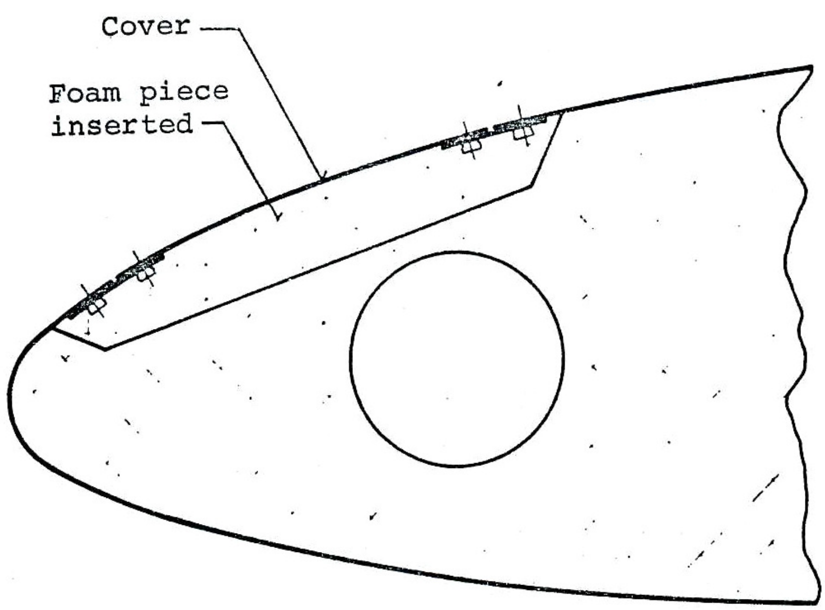


Fig. 5d Foam rib repair
installation of cover sheet



4.8.2 Crack in Skin with Metal Rib affected (see Fig. 6)

Material Required

(a) Reinforcing ring (Fig. 6c), material as specified in para. 4.2/2, 1.5 to 2 times the skin sheet thickness, under side primed.

(b) Cover sheet (Fig. 6d), material as above, same thickness as skin sheet, under side primed.

(c) Metal rib reinforcing sheet (Fig. 6b). Material: Al-Mg-Si 1 (6351 T4), 1 mm thickness.

(d) Lining sheet (Fig. 6c). Material and thickness same as item (a).

(e) Avdel rivets as specified in para. 4.3/18.

(f) Adhesive (Epoxy resin) as specified in para. 4.3/12.

Work Sequence

- Mark-off the opening on the skin using the cover (item b) as template. Cut the hole and de-burr thoroughly (Fig. 6a).

- Cut away the damaged part of the metal rib as illustrated in Fig. 6a. De-burr cut edges.

- Pre-form the reinforcing ring accordingly and insert it. For this purpose the sheet must slightly be bent or radially cut, if necessary. Clamp the ring in position.

Fig 6

Crack in skin,
metal rib damaged

Fig 6a

Opening in the skin,
damaged part of the
rib cut away

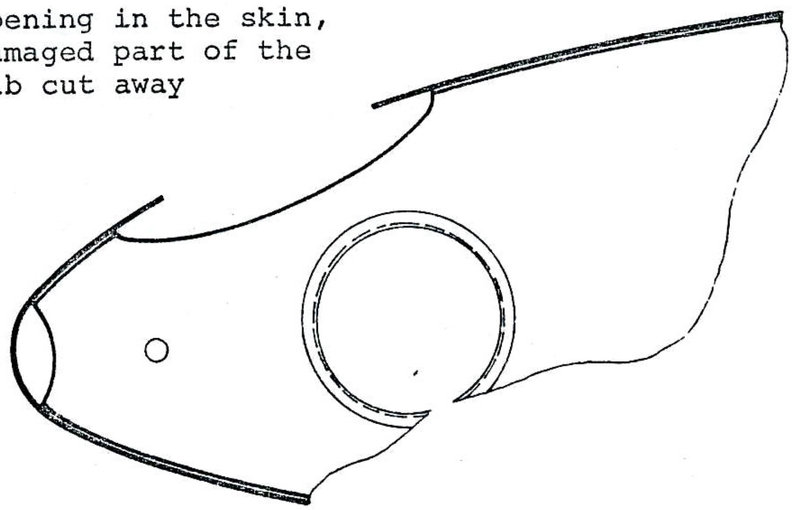
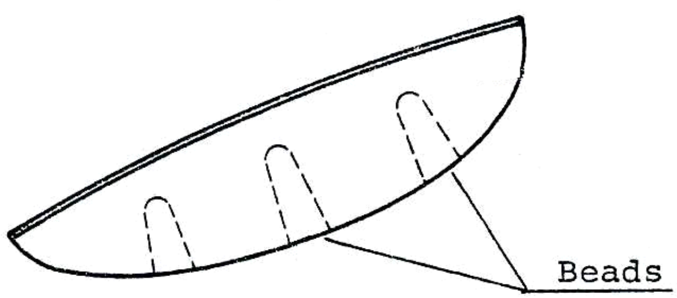


Fig 6b

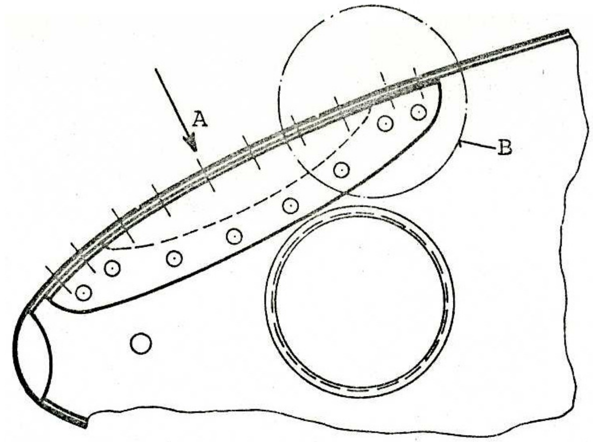
Metal rib
reinforcing angle

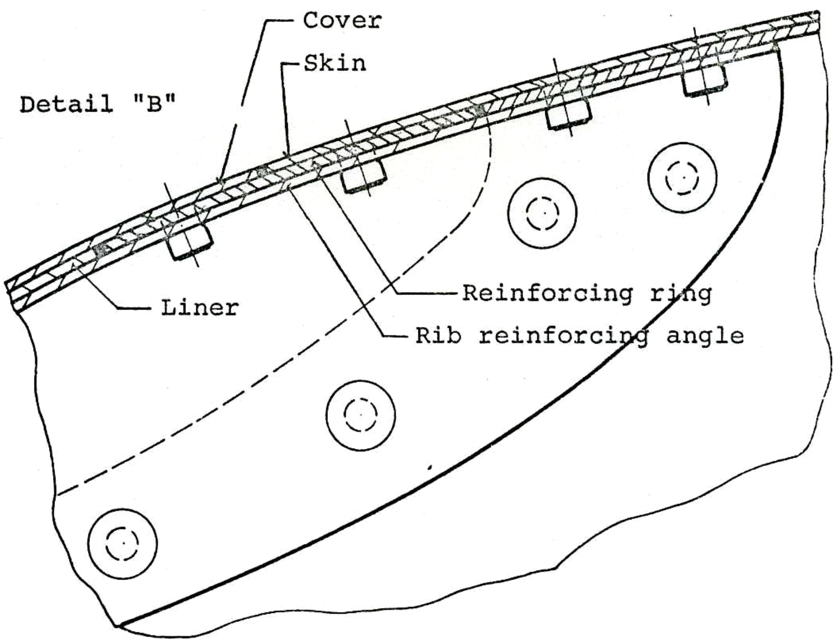


4.8.3 Cont'd

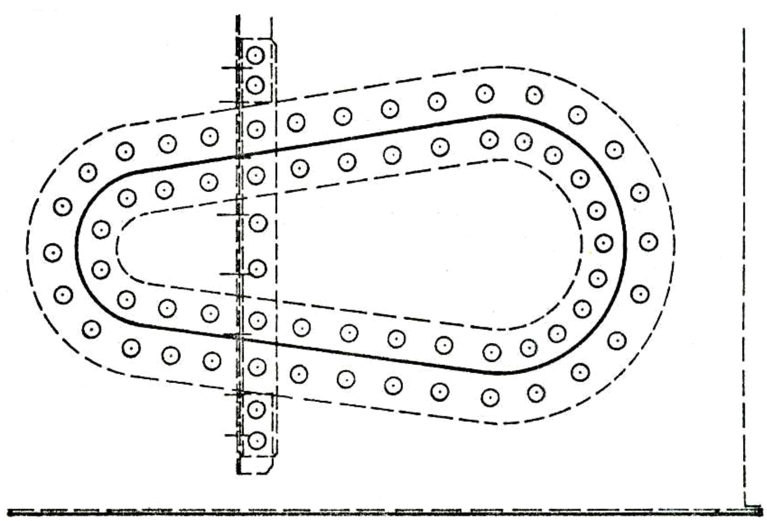
- Form a metal rib reinforcing sheet (item c) as illustrated in Pig. 6b, fit it and drill rivet holes with minimum edge distance: 7 mm.
- Insert the liner, fit the cover and drill rivet holes (Fig. 6c),
- De-burr all rivet holes and remove the swarf from the repair area.
- Prepare all bonding surfaces by sanding and degreasing (see para. 4.6).
- Apply Epoxy resin to the contact surfaces, join parts together and rivet.
- Apply outside paint, proceeding as per para. 3.3

Fig. 6c


A
B


Detail "B"
Cover
Skin
Liner
Reinforcing ring
Rib reinforcing angle

View A



4.8.4 Dent in Fuselage Skin (Fig. 7)

A dent in the fuselage forward section may be eliminated by hammering as illustrated in Fig. 7

The mallet head radius should be less than those of the fuselage shape. The hard wooden bucking bar with rounded edges is flat.

Where the use of a bucking bar is not possible, for instance in the rear fuselage section, the repair scheme shown in Fig. 4 would be applicable

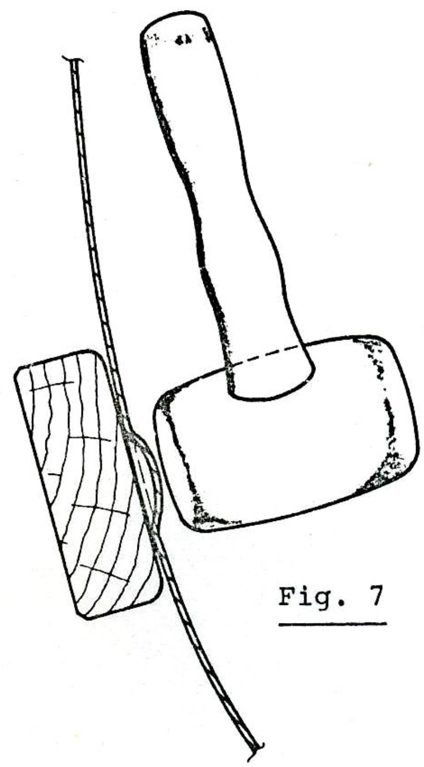


Fig. 7

4.8.5 Crack in Skin with Metal Rib affected (see Fig. 6)

Material Required

(a) Foam piece, material as specified in para. 4.2/7.

(b) Patch sheet, material as specified in para. 4.2/2, 0.5 nun thick.

(c) Pop rivets.

(d) Adhesive (Epoxy resin) as specified in para. 4.3/12.

Work Sequence

- Cut out dented section on the control surface trailing edge, and prepare and fit a foam piece (item a) as illustrated in Fig. 8a.

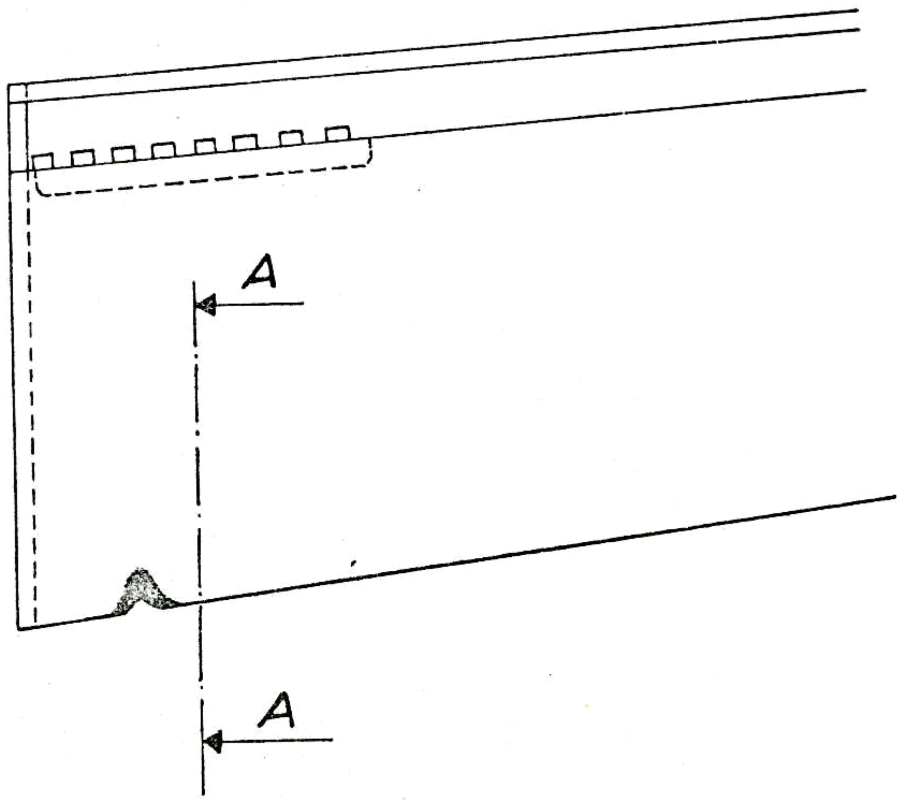
- Degrease contact surfaces and bond the above foam piece in position, using Epoxy resin. Fix the foam piece inserted during curing process.

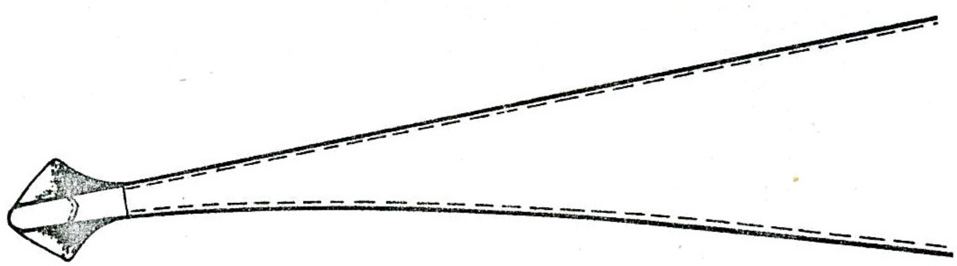
- Form the patch sheet (item b), fit it as illustrated in Fig. 8b, and drill holes for Pop rivets.

- Remove the paint around the repair area and sand and degrease bonding surfaces.

- Apply Epoxy resin to the contact surfaces and rivet the patch in position. Remove remaining resin.

- After curing of the resin, grind flush the hard rivet stems.
- Renew outside paint, proceeding as per para. 3.3.





Section A-A

Fig. 8 Dent in Control Surface Trailing Edge

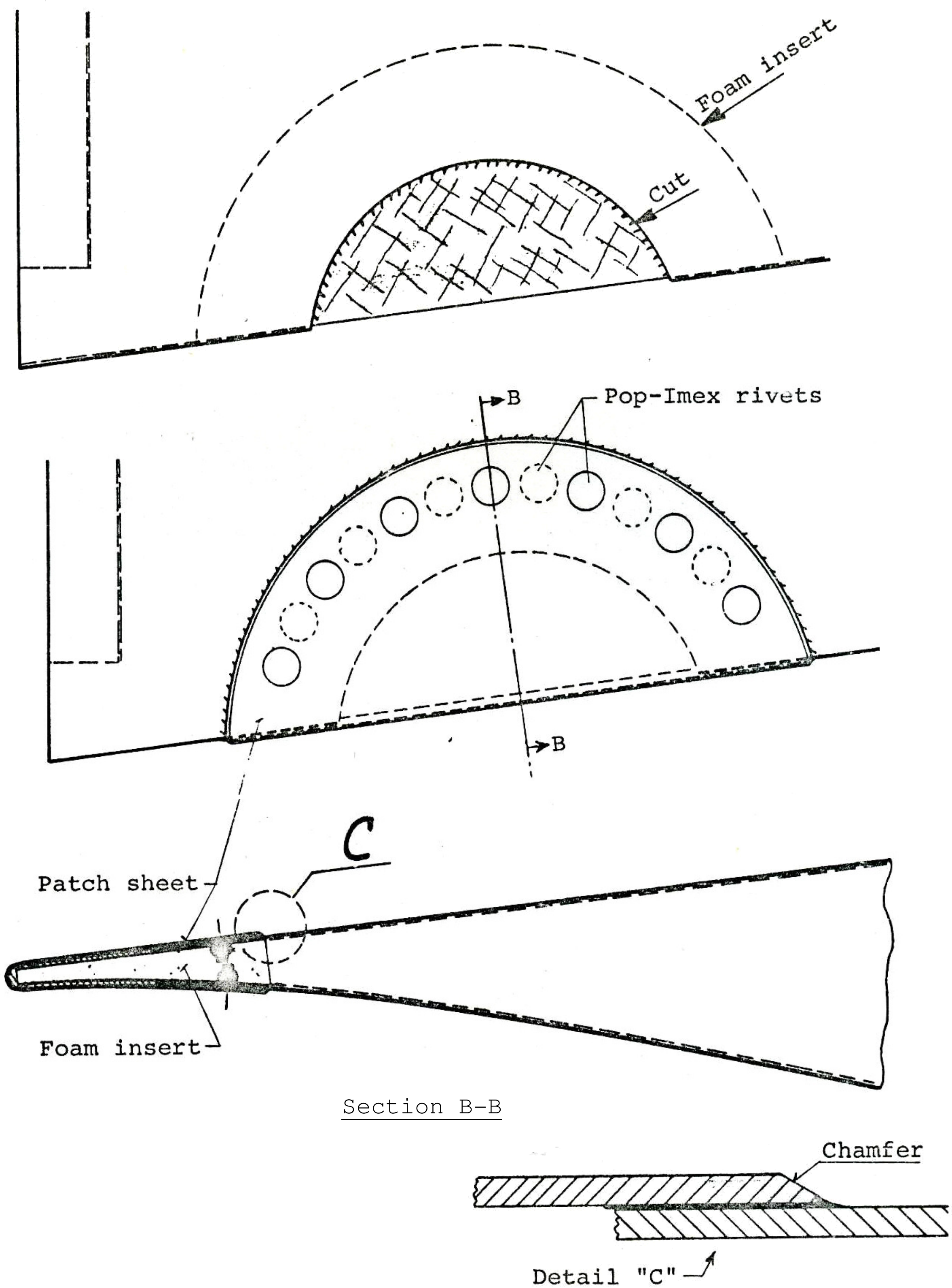

Foam insert
Cut
Pop-Imex rivets
B
B
C
Patch sheet
Foam insert
Section B-B
Chamfer
Detail "C"

Fig. 8b

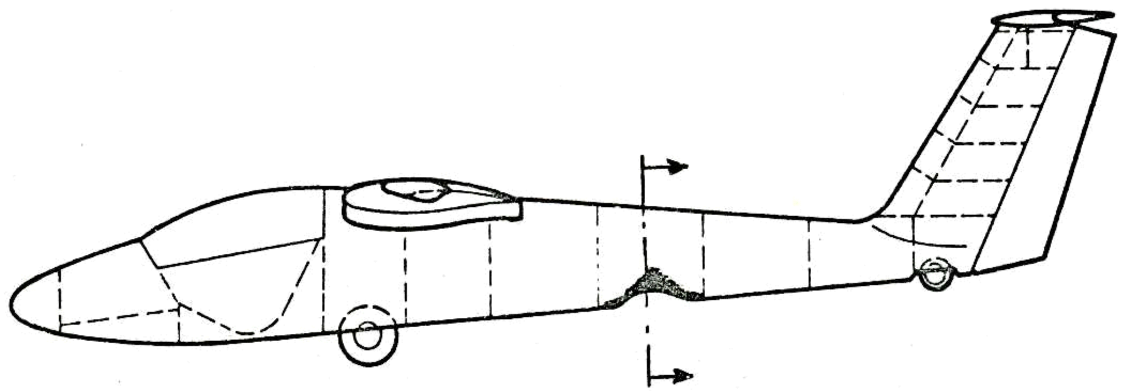
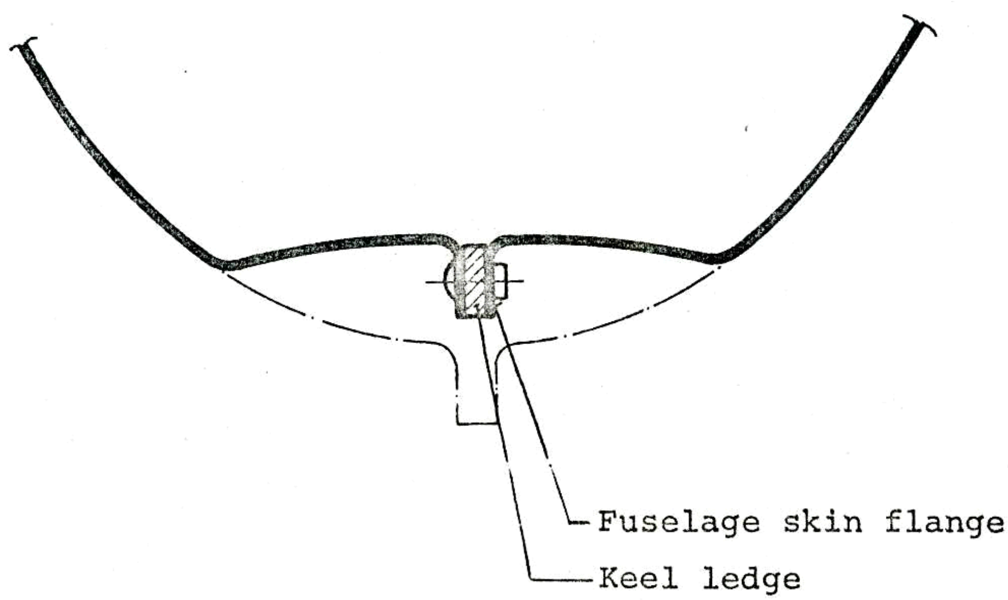


Fig. 9 Dented Fuselage Keel

Section



4.8.6 Dented Fuselage Keel (see Fig. 9)

Material Required

(a) Two-splice angles, sheet material as specified in para. 4.2/2, 0.8 x 50 mm, length as required

(b) Keel ledge, extruded section material as specified in para. 4.2/5, 3 x 15 mm, length as required.

(c) Solid rivets, 3 mm diameter, P/N 939.16.81.281.

(d) Avdel rivets specified in para. 4.3/18.

Tools as illustrated in Fig. 9a/9b

Work Sequence

- Thoroughly drill out the affected portion of the keel ledge. Take care not to damage the fuselage skin flanges

- Insert the special bucking bar shown in Fig. 9a between the flanges and pull out the dents while hammering to the existing bulges to restore the original contour.

- Fit the new keel ledge.

- Form and fit the splice angles illustrated in Fig. 9b.

- Prepare all contact surfaces by sanding and degreasing (para. 4.6),

- Apply Epoxy resin to the bonding surfaces, join parts together and rivet.

- Renew outside paint as per para. 3.3.

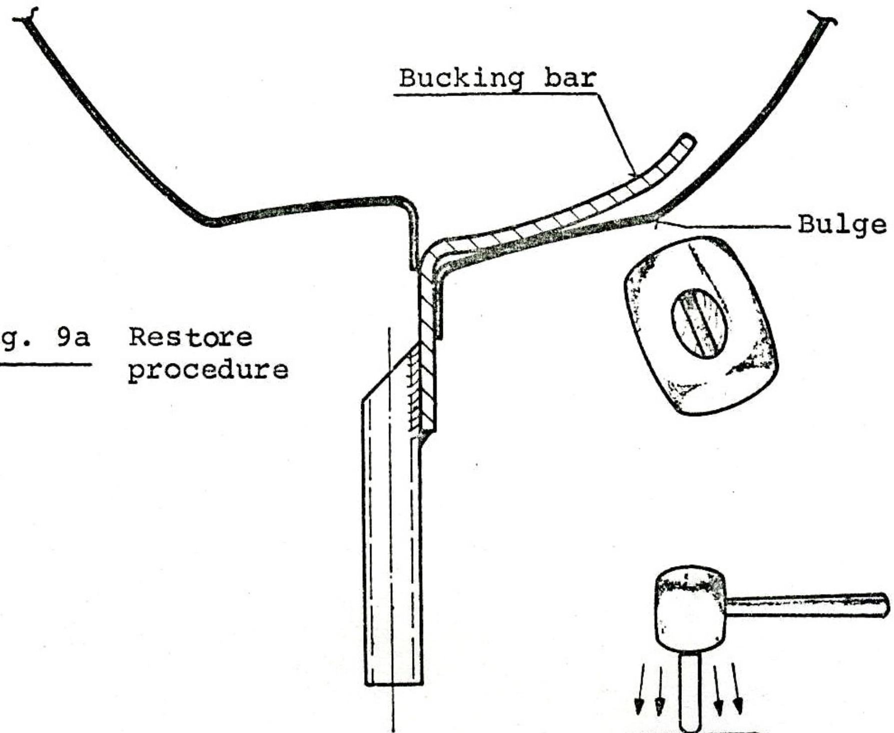


Fig. 9a Restore procedure

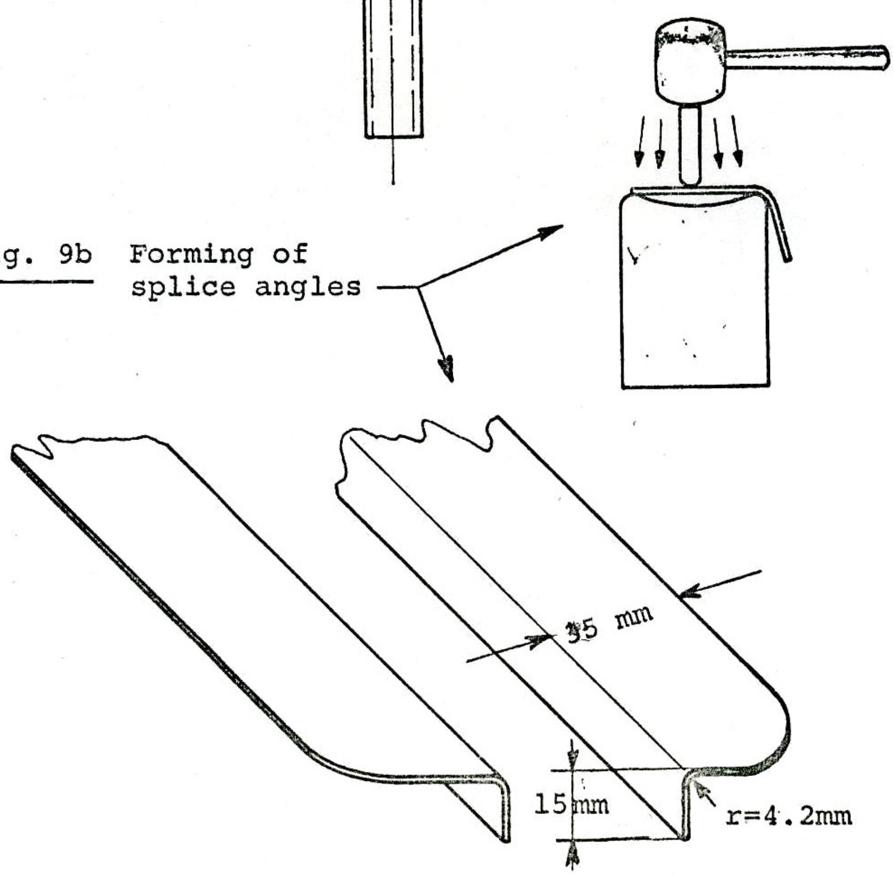


Fig. 9b Forming of splice angles

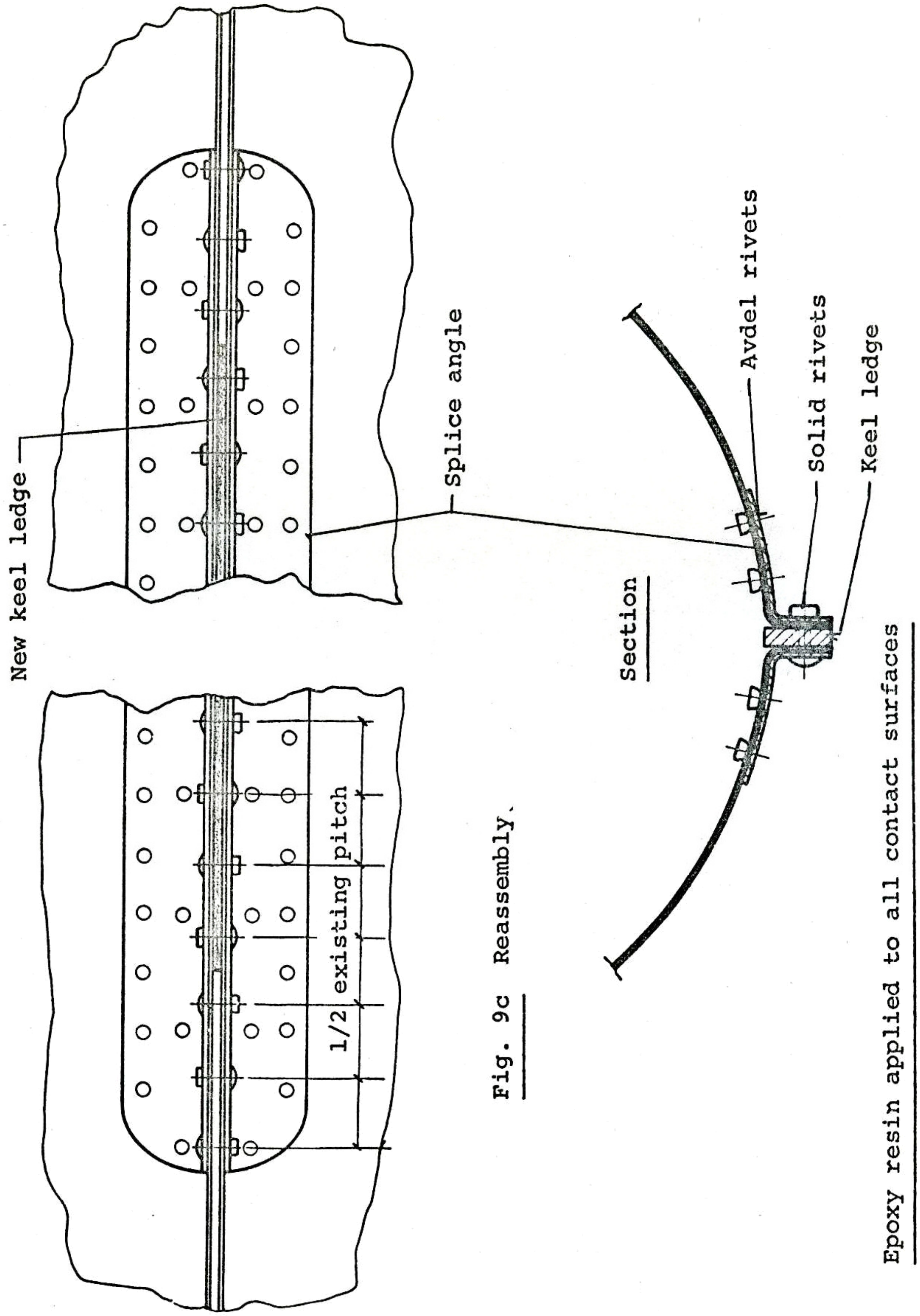


Fig. 9c Reassembly.

4.8.7 Splicing of Spar Flange and Stringer Sections

Wing spar flanges or fuselage stringers, weakened by corrosion, dent, score etc. must be reinforced by splicing.

For this purpose an access hole must be provided on a suitable place. In case of corrosion, evidenced between a section and the skin, the access hole should be located above the affected area in order to allow corrosion removal.

Note

> The wing spar boom inner portion, where tapered doublers are provided, may not be subject to the repair scheme Fig. 11. Failures within this area should be reported to the manufacturer for advice.

Figures 10 and 11 illustrate splice samples for a fuselage stringer and wing spar flange respectively. These repair schemes are applicable if the cross section reduction of the respective profile is found to be not more than 20 % (see also para. 3.4.2/d).

If the reduction exceeds this limit, the reinforcement shown in Fig. 11 will be insufficient, and the manufacturer should be consulted, who will provide a specific repair scheme.

Fig. 10 Splice of Fuselage Stringer

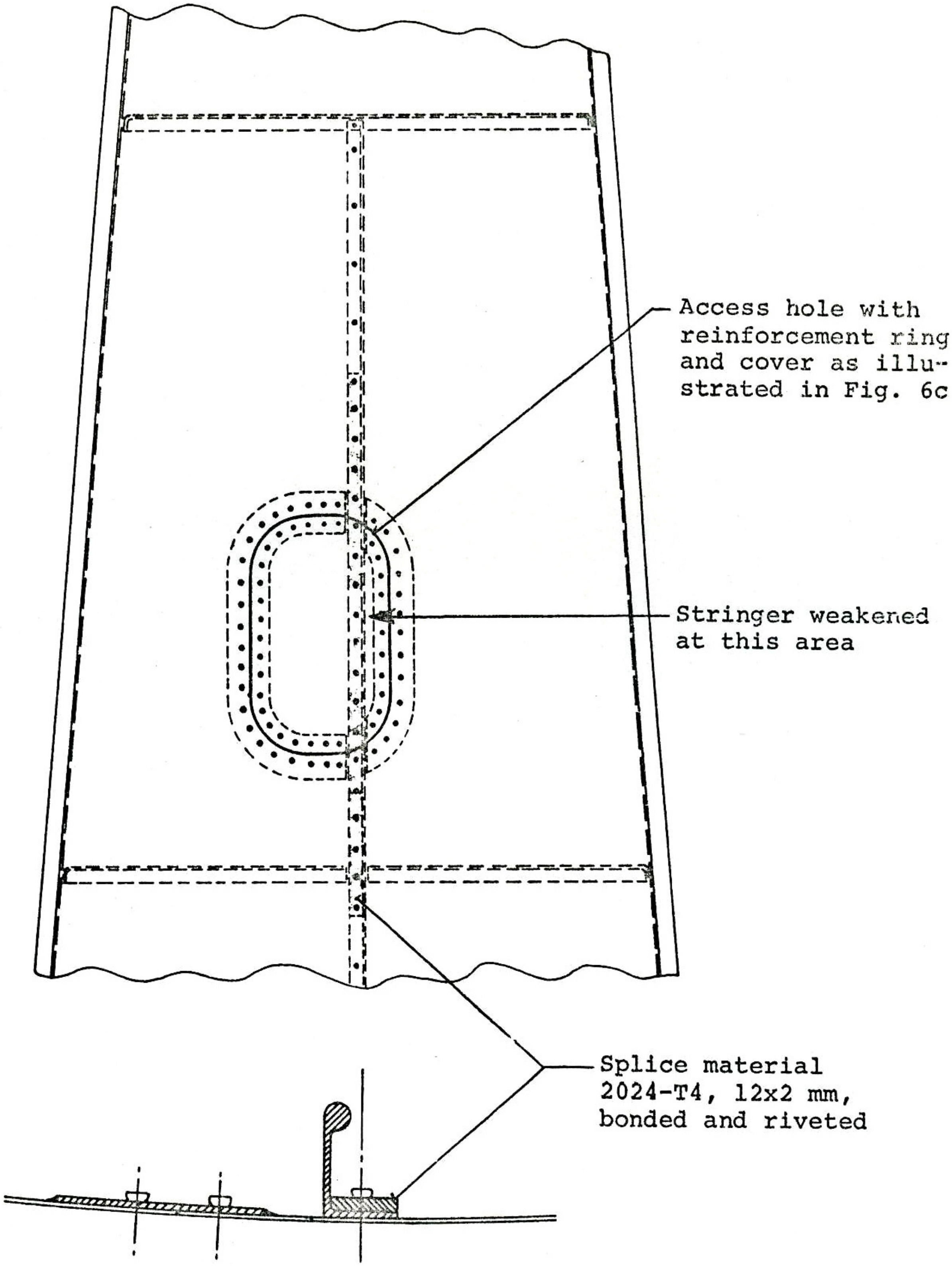
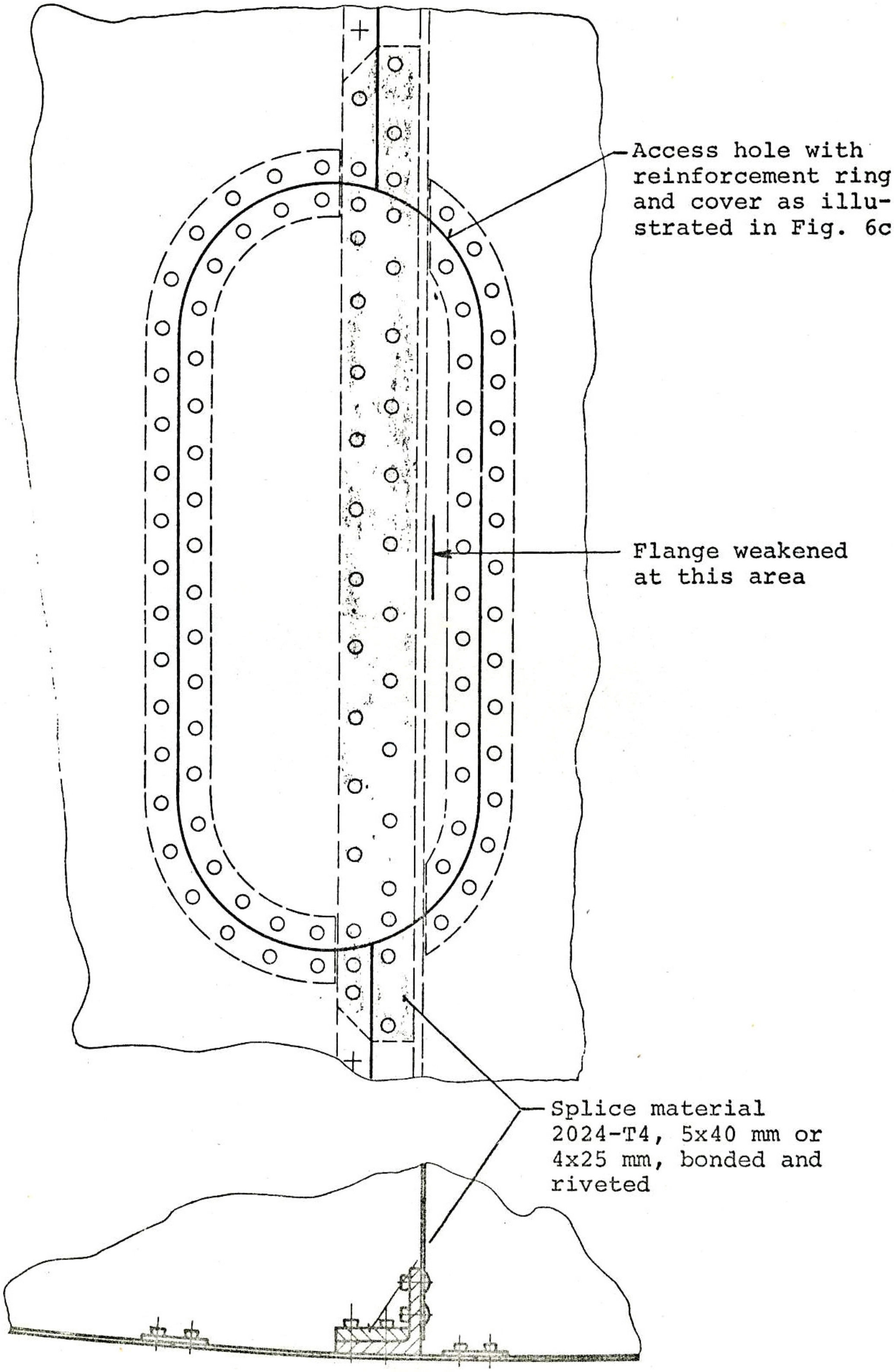


Fig. 11 Splice of Spar Flange



4.8.8 Introduction of access Holes

Where permanent accessibility is required to any part inside the fuselage, wing or empennage due to the necessity of periodic inspection or treatment, access holes with screwed covers may be provided in the structural skin.

These holes should be located between structural members such as metal and foam ribs, spars, stringers and bulkheads, which can be localized by consulting the station diagram in the Annex of this Manual. Foam ribs may also be localized by knocking on the skin.

The parts listed below are available from this company

Material Required

(a) Cover, P/N 110.65.11.009.

(b) Reinforcing ring with rivet nuts installed, P/N 111.35.11.195.

(c) 6 flush head screws, P/N 933.45.16.126.

(d) 15 Avdel rivets, P/N 939.35.80.903.

(e) Adhesive (Epoxy resin), item 4.3/12.

Note

An access cover of the same type is installed on the wing under side, below the aileron control bellcrank.

4.8.8 Cont'd

Work Sequence

- Mark-off the circular opening on the skin, using the cover item "a" as a template. De-burr cut edges thoroughly and prime bare metal surface.

- Using the reinforcing ring item "b" as a template, transfer the rivet holes to the skin, drill and de-burr.

- Preclean and sand the upper surface of the reinforcing ring and inside contact surface of the skin.

- Insert the reinforcing ring: bend as necessary and restore when inserted.

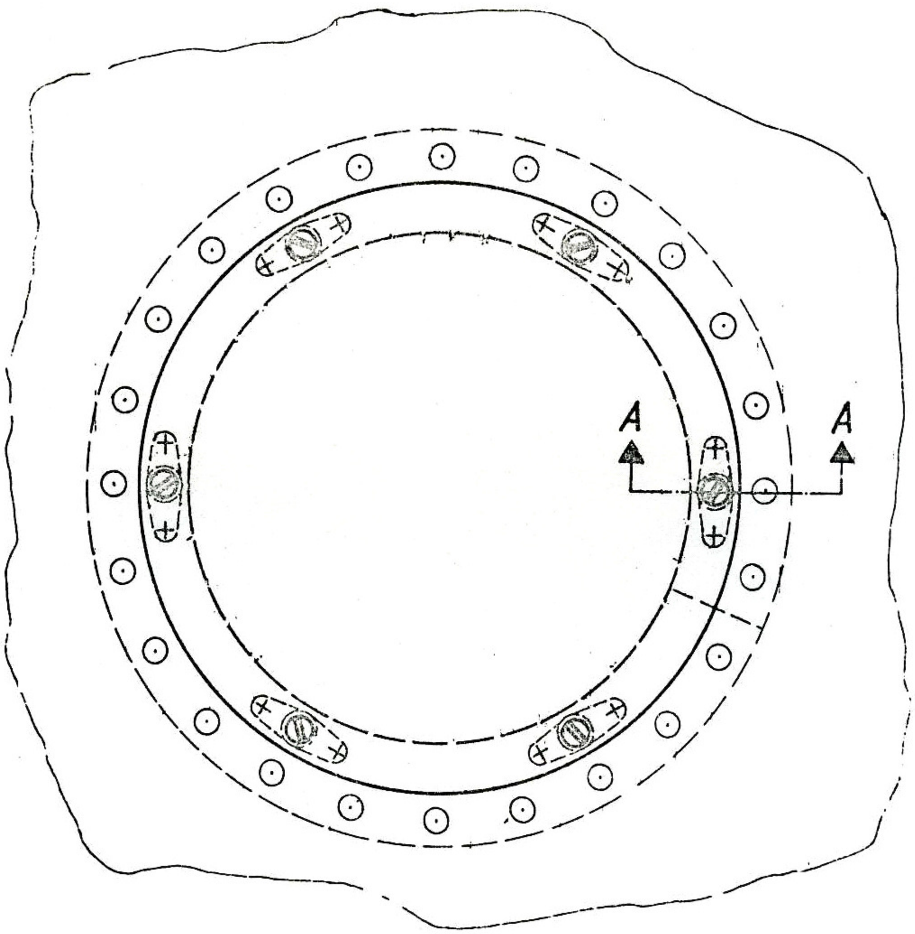
- Remove all swarf from the repair area.

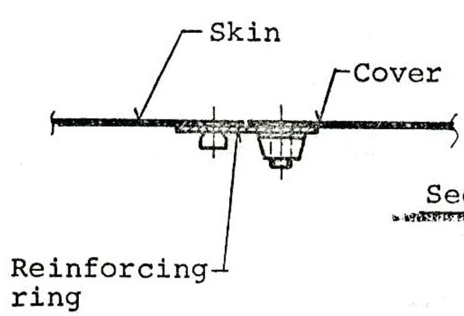
- Again degrease the bonding surfaces of the reinforcing ring and skin.

- Remove the Epoxy resin from the surface provided for the cover rest.

- After curing of the resin install the cover and repaint in accordance with para 3.3.

Fig. 12 Access Hole in Structural Skin





Section A-A

4.8.9 Replacement of Fuselage Nose

If the fuselage nose, moulded from fiber glass, should be severely damaged, it may be replaced by a new one. The part is available from this company and includes the pitot tube support and the compensation bottle support. See Parts Catalogue.

Work Sequence

- Cut off the existing nose approx. 2 cm in front of bulkhead 1 with the aid of a wood saw.
- Drill out the rivets and remove the remaining fiber glass ring thoroughly.
- Remove residual resin from the bulkhead flange, sand and degrease the surface thoroughly.
- Sand the joining surface of the new nose. Remove the dust.
- Transfer rivet holes from the bulkhead to the new nose.
- Apply Epoxy resin (item 4.3/12) to the bonding surfaces, join and rivet the new nose in place, using Pop or Avdel rivets.
- Fill out all cavities between nose and metal skin with putty (item 3.2/d).
- Renew outside paint, proceeding as per para. 3.3.

4.8.10 Crack in Canopy

The following repair procedure is recommended:

- Stop-drill the crack. This can be accomplished by melting out a hole by a hot wire at either end of the crack. When drilled, thoroughly de-burr the hole edges on both sides.
- Enlarge the crack to a V-shaped seam using a scraper or file.
- Fix a masking tape on the under side of the V-seam along the crack.
- Apply Plexiglass cement (item 4.3/13) in several layers into the V-seam> allow to dry between the layers.
- After curing of the cement, smooth out and polish the seam.

4.8.11 Control Surfaces - Slot Sealing Tape

To replace the tapes, which seal the slots on the aileron and elevator leading edges, proceed as follows:

- Clean and degrease the contact surface using solvent.
- With the control surface completely down, apply the Teflon adhesive tape (item 4.2/10) in position.
- While lifting the control surface slowly, rabbet the Teflon tape into the groove, using a finger-nail. This procedure ensures that the tape will buckle into the groove when the control surface is deflected to the up position.

Note

On the occasion of replacement of the above slot sealing tapes, relubricate the hinge pins using oil of low viscosity.

When degreasing the contact sur-face, avoid entering of cleaning agent into the hinges.

4.8.12 Wing Tip Rubbing Plates

The wing tip rubbing plates on new sailplanes are fastened either by Parker screws or blind rivets.

Replacement parts may be refastened in the same way, using oversize rivets or Parker screws respectively.

Note

Heads of drilled out rivets must be removed from the wing interior An access hole should be provided for that purpose, as shown in Fig. 12.

4.8.13 Nicks in Structural Members

The light alloy wing and stabilizer attachment fittings are susceptible to damage during assembly and disassembly when handled without care.

Nicks, scratches or dents or. these highly stressed components however/ may cause fatigue failure.

It is important, therefore, that the daily inspection of the glider includes a view to these parts with emphasis toward existing nicks or scratches.

Damages of this sort must immediately be eliminated by smoothing out the affected area to the highest possible radii and surface quality, in order to prevent any stress concentration.

After rework, the cross section reduction of the part involved must be checked. Generally, a reduction of 5 % of any section is tolerated. If the reduction is found to be beyond the above limit, the case has to be reported to the manufacturer.

The reworked surface has finally to be repainted.

4.8.14 Bonding of Bushes and Bearings

Steel bushes and ball bearings are secured in their light alloy casings by Epoxy resin.

If one of these elements should loosen, the following repair procedure is recommended:

- Clean thoroughly the bonding surfaces? remove residual adhesive and degrease again.

Warning

Take care not to allow any solvent entering a ball bearing.

- Apply Epoxy resin (item 4.3/12) to the contact surfaces, and insert the bush or bearing.
- Fix the bonded part in position by installing the appropriate bolt to provide proper aligning.
- Remove surplus resin.
- At room temperature below 20° C, heat the assembly suitably during a certain time. This will benefit the strength of the resin and reduce the curing time.
- Prior to reassembly observe a curing time of 48 hrs. If the bonded area has been heated for approximately 3 hours to at least 40° C, the parts involved may be reused after 24 hours.

5. Wear Limits

5.1 Wear Limits in Flight Control System

5.1.1 Aileron Control

With blocked aileron, free travel of the control stick should not exceed 10 mm, measured on the top of the control stick

5.1.2 Elevator Control

With blocked elevator, free travel of the control stick should not exceed 5 mm, measured on the top of the control stick.

5.1.3 Rudder Control

With blocked rudder-pedals, free travel of the rudder should nob exceed 10 mm. Measure point on the rudder as indicated in the Flight Manual para. 5.3.

5.1.4 Instruction for Repair

If the above limits are exceeded, check through the entire control system and re-place all parts revealing measurable play.

Rigging of the respective control system must be accomplished as per para. 2 of this manual.

5.2 Wear Limits of Attachment Points

The table in the following page shows manufacturing tolerances and max. permissible wear limits of the wing and horizontal stabiliser attachment points. The item numbers refer to the sketches Fig. 13 and 14. The play values are referenced to the extreme eccentric diameter.

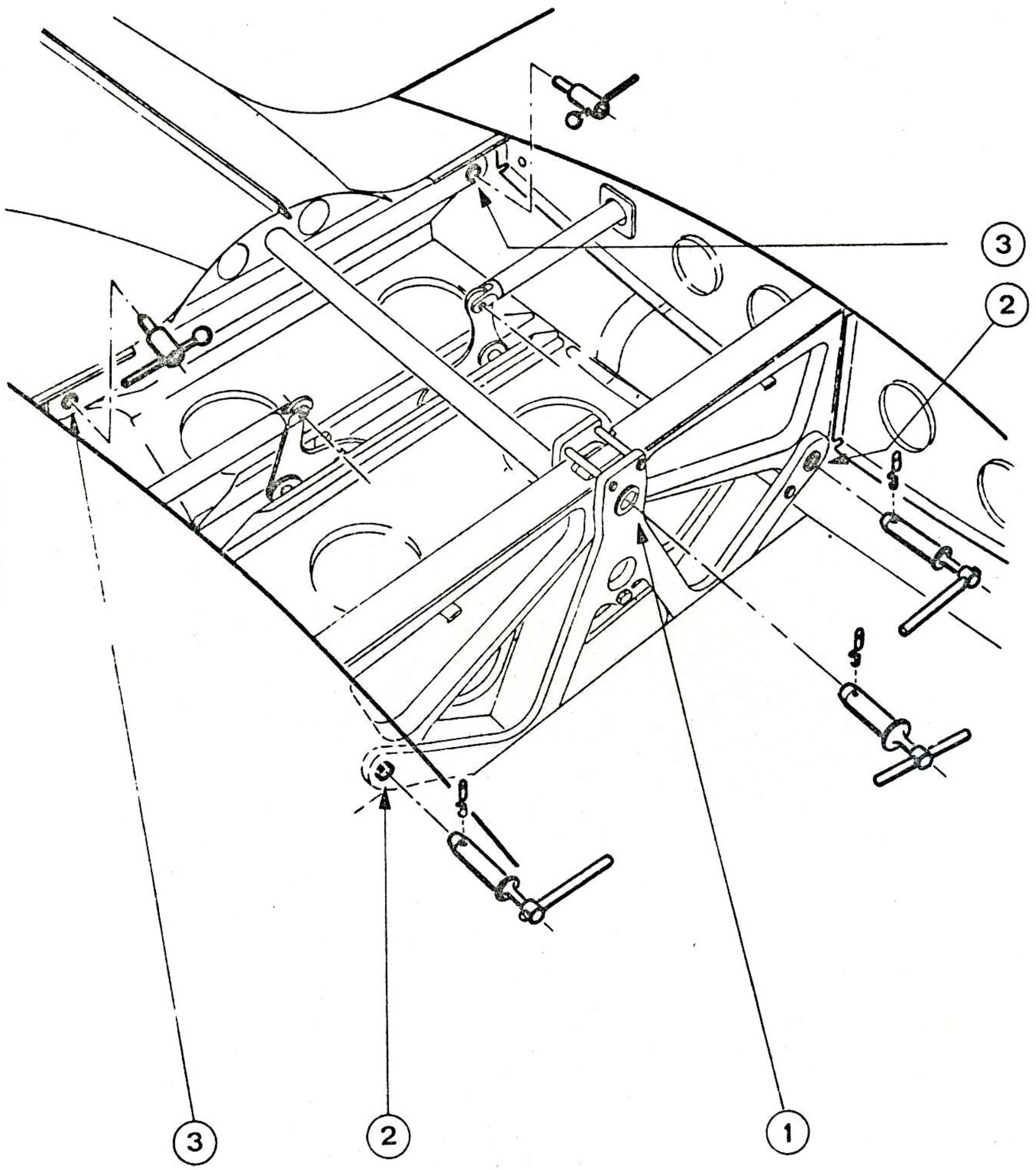
If the permissible play of any component is found to be exceeded, it is recommended to replace the bushing or the bushing together with the respective bolt.

Parts showing any deformation or signs of stress should also be replaced.

Reinstallation of loosened bushes is described in para. 4.8.14.

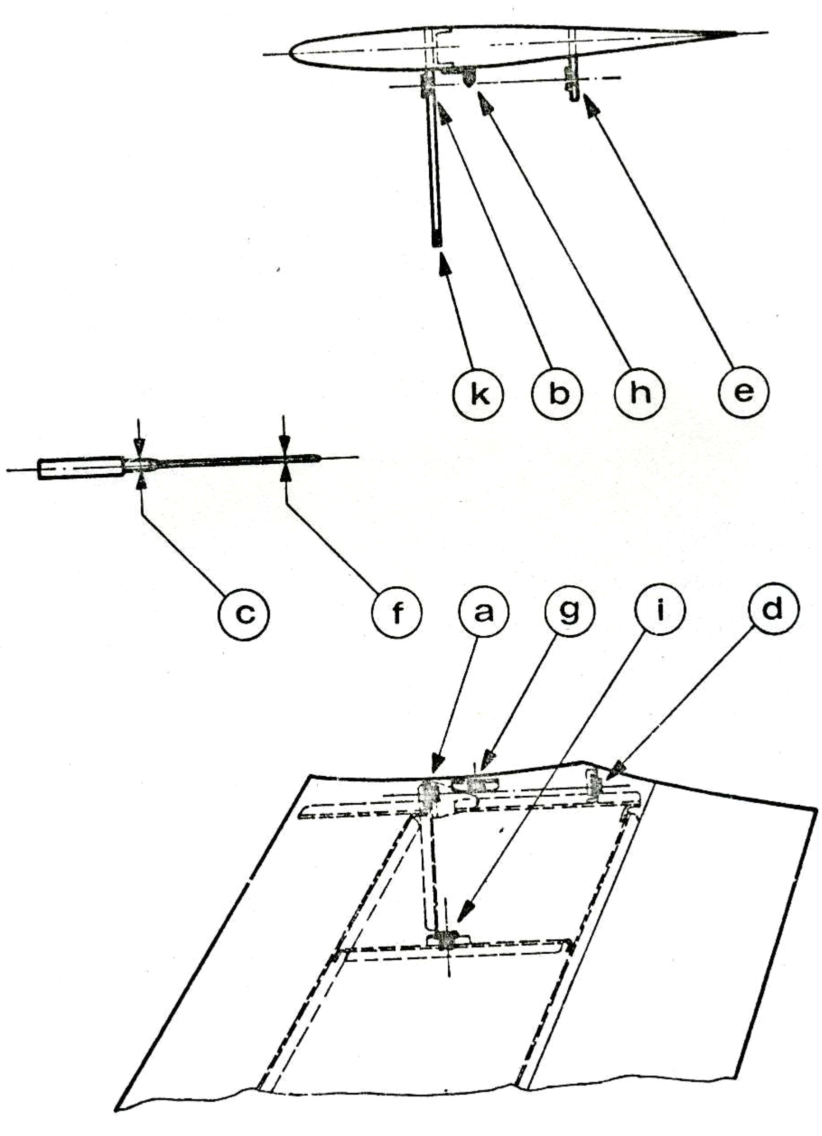
5.2 Cont'd

Item No.	P a r t	Diameter (mm)		
		Manuf. Tolerance		Repair at total play of
		Min.	Max.	
1	Wing attachment, Bulkhead 4:			
	Bushing in spar fitting, I.D.	24,000	24,021	
	Bushing in bulkhead, I.D.	24,000	24,021	0,250
	Bolt	23,959	23,980	
2	Wing attachment, Bulkhead 4:			
	Bushing in spar fitting, I.D.	18,000	18,018	
	Bushing in bulkhead, I.D.	18,000	18,018	0,200
	Bolt	17,966	17,984	
3	Wing attachment, Bulkhead 4:			
	Bushing in spar fitting, I.D.	12,000	12,018	
	Bushing in bulkhead, I.D.	12,000	12,018	0,150
	Bolt	11,966	11,981	
4	Horizontal stabilizer attachment:			
a.	Forward bushing on fin	14,000	14,018	
b.	Bushing on horizontal stabilizer main spar	14,000	14,018	0,15
c.	Attachment bolt	13,966	13,984	
d.	Rear bushing on fin	8,000	8,015	
e.	Bushing on horizontal stabilizer rear spar	8,000	8,015	0,15
f.	Attachment bolt	7,972	7,987	
g.	Centering flange	8,000	8,015	
h.	Centering pin	7,972	7,987	0,200
i.	Centering hole in fin	15,000	15,018	
k.	Centering pin	14,966	14,984	0,200



Wing Attachement Points

Fig. 13



Tail Plane Attachement Points

Fig. 14

6. Action Required after Exceeding "g" and "V" Limits

6.1 Determination of Effective Load Factor

The stress analysis of the sailplane is based on the max. gross weight of 350 kg (770 Ibs) and the load factors +6.32 and -4.32.

At any indicated acceleration in flight, the real stress rating of the sailplane depends on its gross weight, and the applicable load factor is, therefore, directly related to this value in accordance with the following formula:

$$n_E = n_I \cdot \frac{W}{350\ (770)}$$

n_E = effective load factor, real stress rating

n_I = indicated acceleration in flight sailplane

W = gross weight (kg or Ibs)

Whenever the acceleration limits are established to be exceeded during flight, nE should be calculated as substantiated above, and is then considered as the effectively occurred acceleration value.

Note

Acceleration indicated during landing can be neglected in this connection, and the above formula is not applicable. Following a hard landing, the sailplane structure within the main and tail wheel attachments must be inspected for signs of stress and damages.

6.2 Exceeding Positive Acceleration Limits

The sailplane structure is designed as to provide sufficient strength for a positive load factor of n = 7 at maximum gross weight. No damages may therefore be expected up to + 7g recorded acceleration.

Nevertheless, when the approved + 6.32g limit has been exceeded, the wing skin upper panels should be inspected for wrinkles and shifted rivets.

Acceleration values above + 7g (nE), however, may result in structural damages in the form of wrinkles, buckles or warpage, incipient at the wing upper skin above the main spar between station 2 and 3, followed possibly by the upper spar flange.

Other critical points are: wing attachment bolts at bulkhead 4, root rib of the wing, and rear skin panel on wing under side between station 1 and 2, and bulkhead 4 flange rivets.

If the positive acceleration limit has been exceeded, proceed as follows:

(a) Inspect the entire sailplane skin, the bulkheads 4 and 5, and the wing root ribs for wrinkles, buckles, warpage and loose or shifted rivets, particularly at the wing upper sides and within bulkhead 4 areas.

(b) With the wings and empennage installed, carry out a symmetry check as indicated in form page 87, and compare the recorded valu^TOT^rThe "original record, included in the technical log.

(c) With the control stick in central position (pilot pin installed), check whether the aileron and elevator are neutral.

(d) While disassembling the wings, check whether all attachment bolts can easily be moved in their bores, particularly the central bolt on bulkhead 4, and inspect all components (bolts and bushes) for signs of stress.

(e) Inspect in the same way during removal of horizon-tal tail.

6.3 Exceeding Negative Acceleration Limits

The sailplane structure is designed as to provide suf-ficient strength for a negative load factor of n = 4.7 at maximum gross weight. No damages may therefore be expected up to - 4.7g recorded acceleration.

Nevertheless, when the approved - 4.32g limit has been exceeded, the skin panels on the wing under side should be inspected for wrinkles and shifted or loose rivets.

Negative acceleration values above - 4.7g (nE), however, may result in structural damage in the form of wrinkles, buckles or warpage. The most critical point is the skin and spar flange on the wing under side.

If the above limit has been exceeded, inspect the entire sailplane skin for damages of this nature and, in addition, proceed as per para. 6.2/b through 6.2/e.

6.4 Exceeding Maximum Speed Limit

If the maximum air speed has been exceeded, the following components may be affected:

(a) The skin on rear fuselage between station 8a and 9 where the forces from the empennage are led into the fuselage structure (wrinkles);

(b) The skin panels on the wing under side rear section between station 1 and 2 (warpage of the 0.5 mm skin; peeling of foam ribs from the skin).

(c) Wing root ribs (buckling).

Note

Deformation of the fuselage rear skin may also occur as a result of a hard touch-down of the tail wheel during landing.

If Vmax has been exceeded during a flight manoeuvre, inspect through the above points (a) to (c) and carry out a Symmetry Check mentioned in para. 6.2/b.

6.5 Conclusion

If the above inspection does not show any irregularity, it may be assumed that the sailplane is not damaged and can be cleared.

Damages as a result of exceeded "g" or "V" values may be critical to repair, especially if a spar flange profile should be buckled.

Failures of this nature should be reported to the manufacturer for advice.

PILATUS | Inspection
Sailplane B4-PC11 | Rep.No. 01496 E
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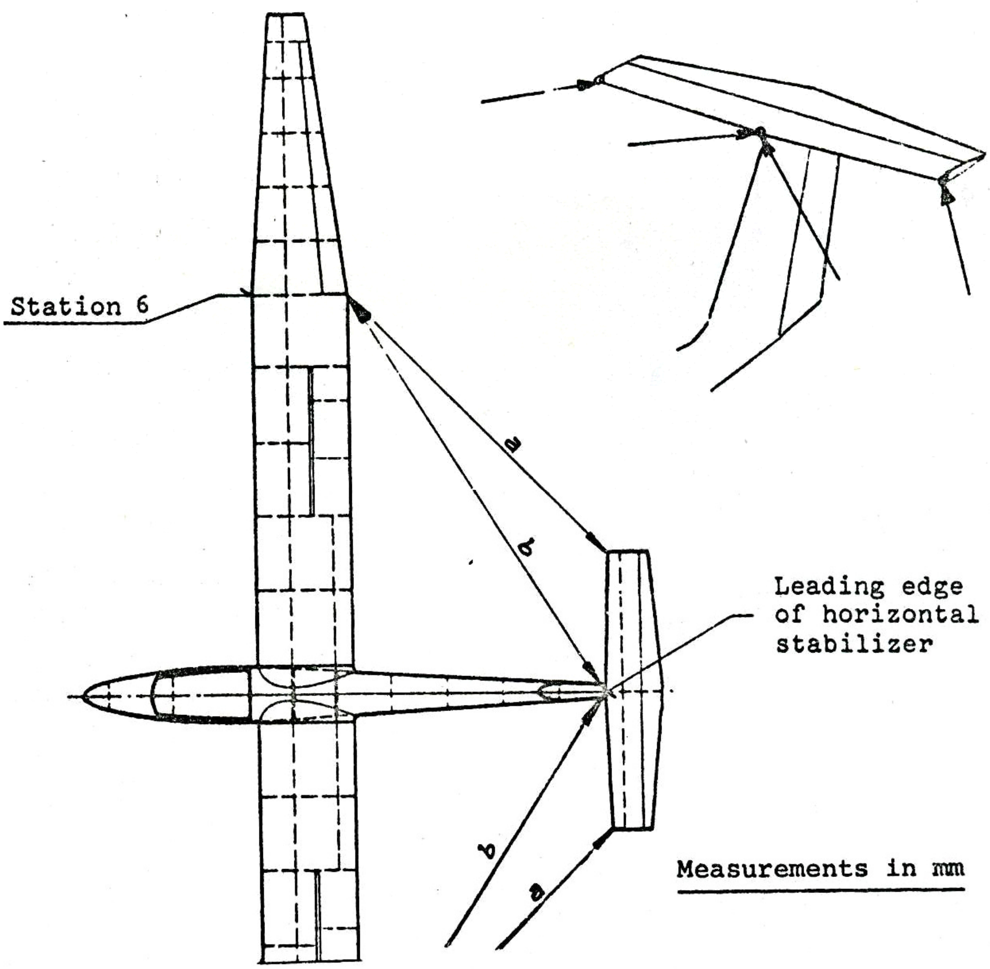
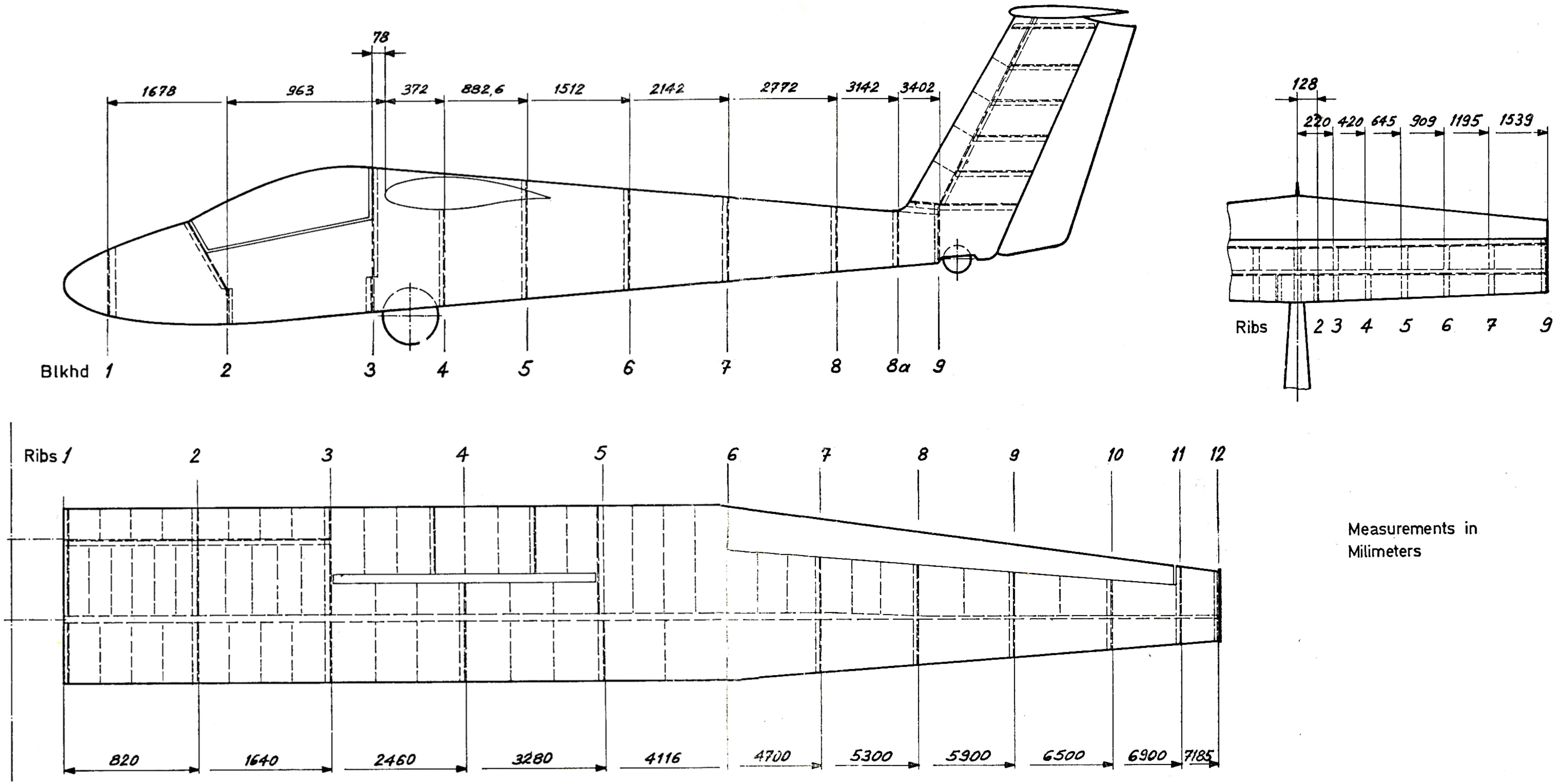
Symmetry Check

S/N ____________

Reg.No. ________



Left-hand		Right-hand			
a	b	a	b	Date	Signature



STATION DIAGRAM