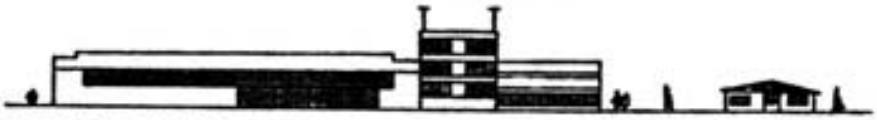
SPORTAVIA–
POTZER GMBH & CO. KG



D-5377 DAHLEM-SCHMIDTHEIM, FLUGPLATZ DAHLEMER BINZ
Telefon Schmidtheim (02447) 277 / 278; Telex 833602 spkg

Maintenance Manual

for the Aircraft

RF 5B - SPERBER

Edition 15-9-72

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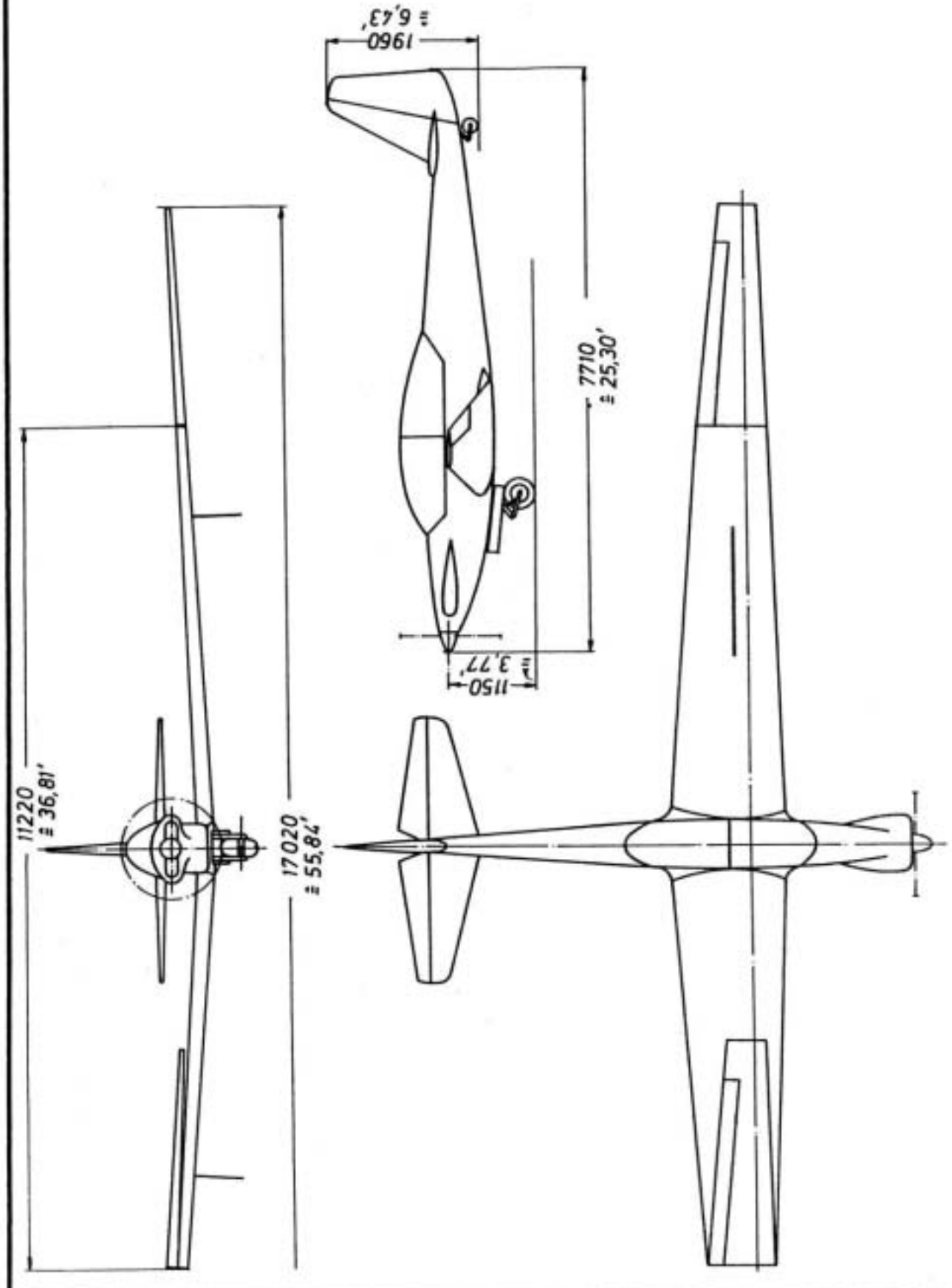
1.2 Revisions

Rev.No.	Page	Contents of revision	Date	Signed

1.3 Modifications

All modifications, Airworthiness Directives and Service Bulletins concerning the RF 5 B - SPERBER should be added following this page.

1.4 Three - View Drawing



2. Specification

2.1 Technical Data

Engine	:	SPORTAVIA - Limbach SL 1700 E
Bore	:	88 mm (3,46 in)
Stroke	:	69 mm (2,72 in)
Capacity	:	1680 cm^3 (102,52 in^3)
Compression ratio	:	8 : 1
Direction of rotation of crankshaft (viewed from cockpit)	:	anticlockwise
Max. power	:	68 hp at 3600 rpm
Weight	:	73 kp (160.94 lbs) cpl. with accessories, with exhaust system and baffles

Dimensions

Span	:	17,02 m (55,84 ft)
outer wings folded	:	11,22 m (36,81 ft)
Length	:	7,71 m (25,30 ft)
Height, flying attitude	:	2,60 m (8,53 ft)
landing attitude	:	1,96 m_2 (6,43 ft)
Wing area	:	19,00 m^2 (204,52 ft^2)
Mean wing chord	:	1,18 m (3,87 ft)
Aspect ratio	:	15,26
Dihedral	:	3,0°
Twist	:	4,0°
Sweep back	:	0°
Incidence	:	4,0°
Aileron area	:	0,775 m^2 (8,34 ft^2)
deflection upwards	:	100 ± 10 mm (3,94 ± 0,4 in)
downwards	:	60 ± 5 mm (2,36 ± 0,2 in)
measurement taken	:	235 mm rad. (9,25 in)
Spoiler area	:	0,185 m^2 (1,99 ft^2)
Horizontal tail span	:	3,720 m_2 (12,20 ft_2)
area	:	2,595 m^2 (27,93 ft^2)

Elevator area	:	0,406 m^2 (4,37 ft^2)
deflection		
upwards	:	115 ± 10 mm (4,53 ± 0,4 in)
downwards	:	115 ± 10 mm (4,53 ± 0,4 in)
measurement taken	:	335 mm rad. (13,19 in)
Incidence	:	+ 1°
Trim tab deflection		
upwards	:	47 ± 3 mm (1,85 ± 0,12 in)
downwards	:	47 ± 3 mm (1,85 ± 0,12 in)
measurement taken	:	90 mm rad.(3,54 in)
Vertical tail area	:	1,278 m^2 (13,76 ft^2)
Rudder area	:	0,708 m^2 (7,62 ft^2)
Rudder deflection		
each side	:	225 ± 10 mm (8,86 ± 0,4 in)
measurement taken	:	590 mm rad. (23,23 in)

Propeller ground clearance

- under static load	:	0,62 m (2,03 ft)
- tyre and spring fully deflected	:	0,42 m (1,38 ft)

Control stops

Rudder	:	stop of rear rudder pedals against spoiler torsion tube
Elevator	:	stops behind the back rest of the rear seat
Ailerons	:	adjustable stop in the wing center to be checked through opening under wing center additionally stops at aileron control levers in the outer wings

Weight

Empty weight (standard equipped)	:	475 kp (1047 lbs)
max. T.O. weight	:	680 kp (1499 lbs)

2.2 Specification of Airframe

The RF 5 B - SPERBER is a tandem, two-seat, low-wing monoplane. The airframe is of conventional wooden construction, but all cowlings and fairings are of glass fibre. The engine bulkhead is metal-asbestos lined and painted with fire resistant paint. The outer section of the wings fold at approximately the two thirds span point, where there are fitted small outriggers which balance the aircraft on the monowheel retractable undercarriage and the steerable, non-retractable tailwheel.

The entire aircraft is covered in fabric and finished with high-gloss epoxy paint.

Fig. 1 The SPERBER

2.2.1 The wing structure consists of a rectangular section mainspar with laminated upper and lower beams, and a stressed plywood leading edge forming a torsionally stiff D-section box. The wing is fitted with spoilers on the top surface only. The rear section of the wing is fabric covered (Fig. 2). The outer wings follow the same construction as the main inner wing and ailerons, and are attached to the main wing by means of metal fittings incorporating quick release locks (Fig. 3).
The wing section is N.A.C.A. 23012 outboard and N.A.C.A. 23015 inboard.

Fig. 2: Wing structure

Fig. 3: Folding outer wing

2.2.2 The fuselage construction is based on four rigid stringers which form a rectangular box section on which are mounted upper and lower D-formers, the entire structure being skinned with plywood.

There are drain holes on the lower side of the fuselage.

Through openings controls inside the fuselage can be undergone maintenance.

2.2.3 The tailplane, which is plywood covered, is fitted to the upper surface of the rear fuselage by means of three attachment bolts. The elevator, which is fabric covered, is in two sections and is operated by a single horn on the centre line of the fuselage. The fin is mounted on the stern of the fuselage and carries the fabric covered rudder. (Fig. 4 and 5)
All bearings are ball-bearing, covered against dirt and dust, low maintenance.

Fig. 4: Vertical tailplane

Fig. 5: Horizontal tailplane

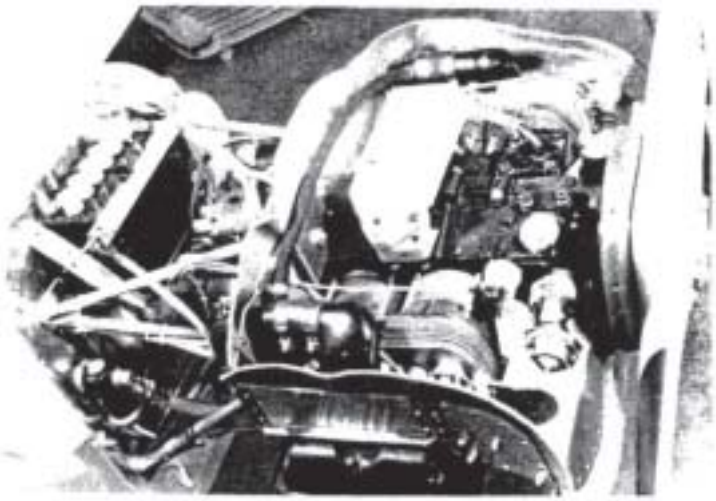
2.3 Specification of Engine

The engine is a SPORTAVIA - Limbach SL 1700 E, four cylinder horizontally opposed, air cooled, four stroke engine.
Most of the main components are specially inspected Volkswagen engine parts.
Lubrication is wet sump and an oil cooler is fitted.

The fixed pitch wooden propellor is mounted directly onto the crankshaft. The electric starter, magneto and alternator are mounted on a light alloy casting at the rear of the engine.
The engine driven fuel pump feeds the Stromberg CD 150 carburettor, which is mounted beneath the crankcase.

The electric system is powered by a 12 Volt/25 Ah Aviation - Type battery and alternator.

For further details see Engine Manual for SPORTAVIA - Limbach SL 1700 E and this Manual Section 4.2.



2.4 Specification of Landing Gear

The landing gear consists of a single retractable mainwheel, a steerable non-retractable tail wheel, and light weight fixed outriggers beneath each wing.

2.4.1 The main wheel is fitted with a 6.00 - 6 type III tyre inflated to 2,5 atü (≙ 35,55 psi) and two spring-assisted pneumatic suspension units. (Fig. 7.)

The shoe brake of the wheel is operated mechanically by bowden cable.

For retraction of the main wheel first unlock the lock lever right in front of the front seat by pressing the top button and pulling back the lever. Then the main wheel can be retracted by pulling back the main wheel lever on the right cabin wall.

The weight of the main wheel is balanced by a tension spring fitted on the main wheel lever. Locking happens automatically at the full retracted position of the main wheel.

The main wheel is covered by a plastic cover in front of the instrument panel. The wheel well is sealed by spring loaded doors.

Extending the main wheel follows same procedure as mentioned before: First unlock the lock lever and pull back, then main wheel lever to be pushed forward into extended position. The green lamp in the instrument panel shows landing gear extended and locked.

On the right of the rear instrument panel there is a landing gear emergency release. By pulling the release knob the lock lever becomes unlocked and pulled back by a bowden cable. By applying positive g's (pull stick slightly backwards) the main wheel will extend into the extended and locked position. However this procedure is an emergency procedure only to be applied when the front pilot by any reason can not proceed the normal way.

Fig. 7: Main wheel

2.4.2 The non-retractable tailwheel is fitted with a solid rubber tyre of 160 mm (6.3 in) diameter and is mounted on rubber spring trailing arm. It can be steered through 60° by means of spring links to the rudder. (Fig. 8)

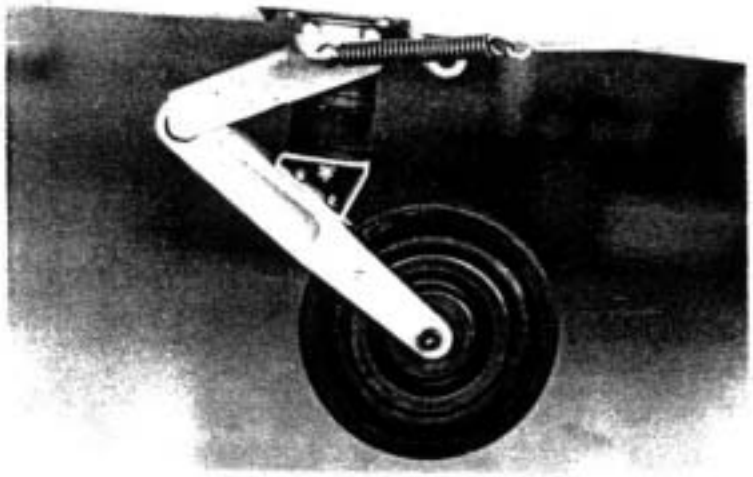
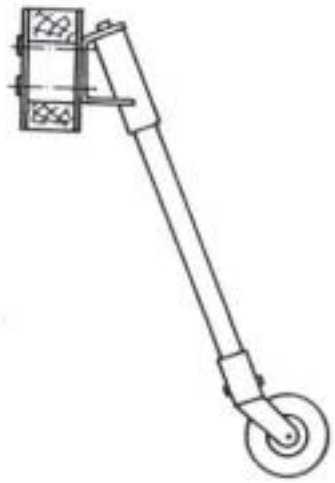


Fig. 8 Tail wheel

2.4.3 The outriggers are mounted on the main spar: Nylon-sticks of 26 mm (1.02 in) diameter with each one 120 mm (4.72 in) diameter wheel at the end.



2.5 Specification of Cabin

Seating of RF 5 B - SPERBER is tandem. Rudder pedals of front seat can be adjusted by turning the small wheel left in front of the seat. Seat comfort can easily be achieved by use of cushions.

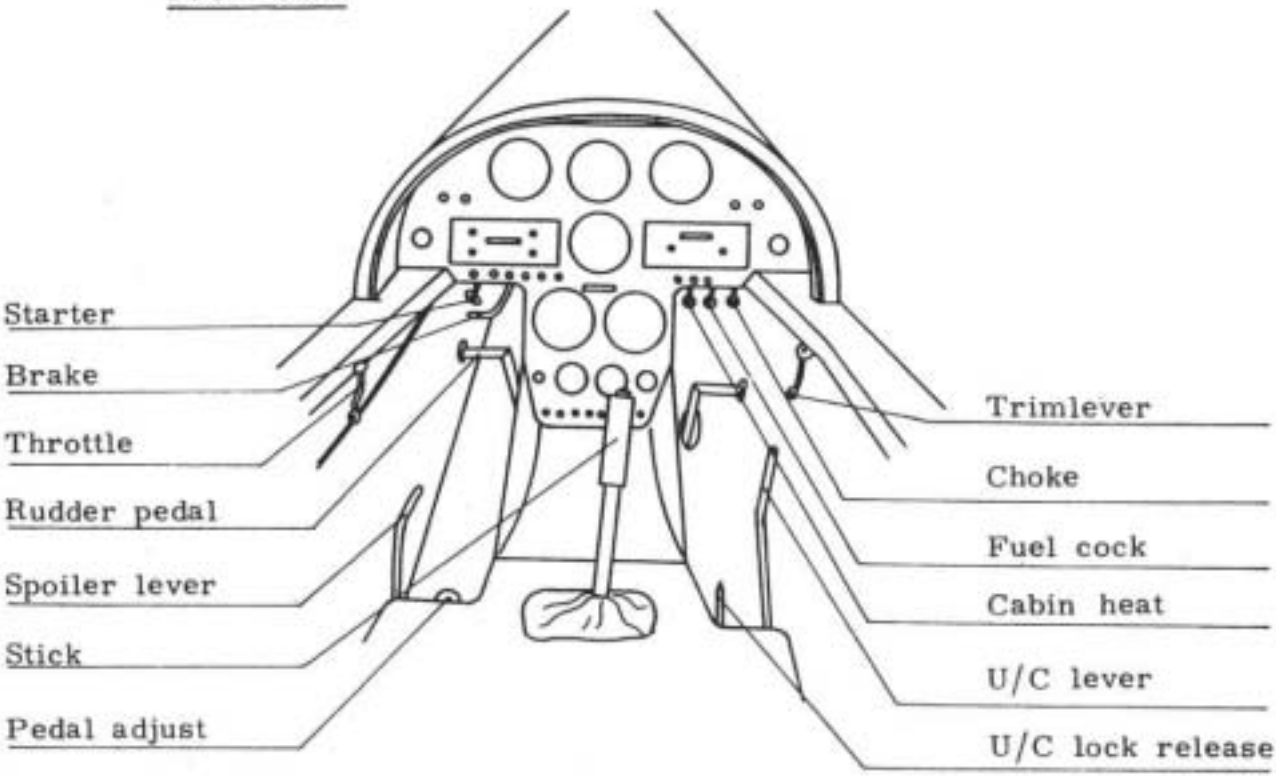
Behind the rear seat there is a small baggage compartment, inside there is a plug for engine time recorder. Baggage may also be stored between the rudder pedals of the rear seat.

2.5.1 The two-piece canopy is locked on the port side by two independent operating excentric catches, on the starbord hinges there is each one lever for emergence release.

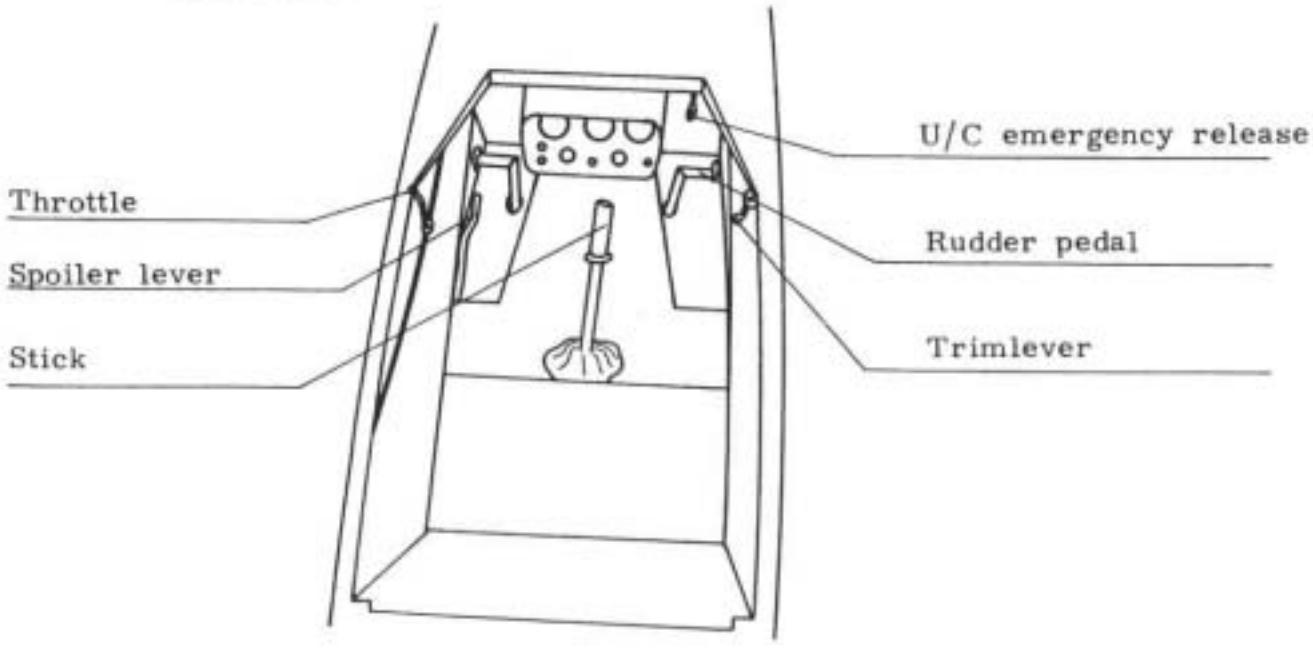
According to the canopy design the rear canopy cannot be opened unintentionally, it will be kept closed by the front canopy.

2.5.2 Controls

Front seat:

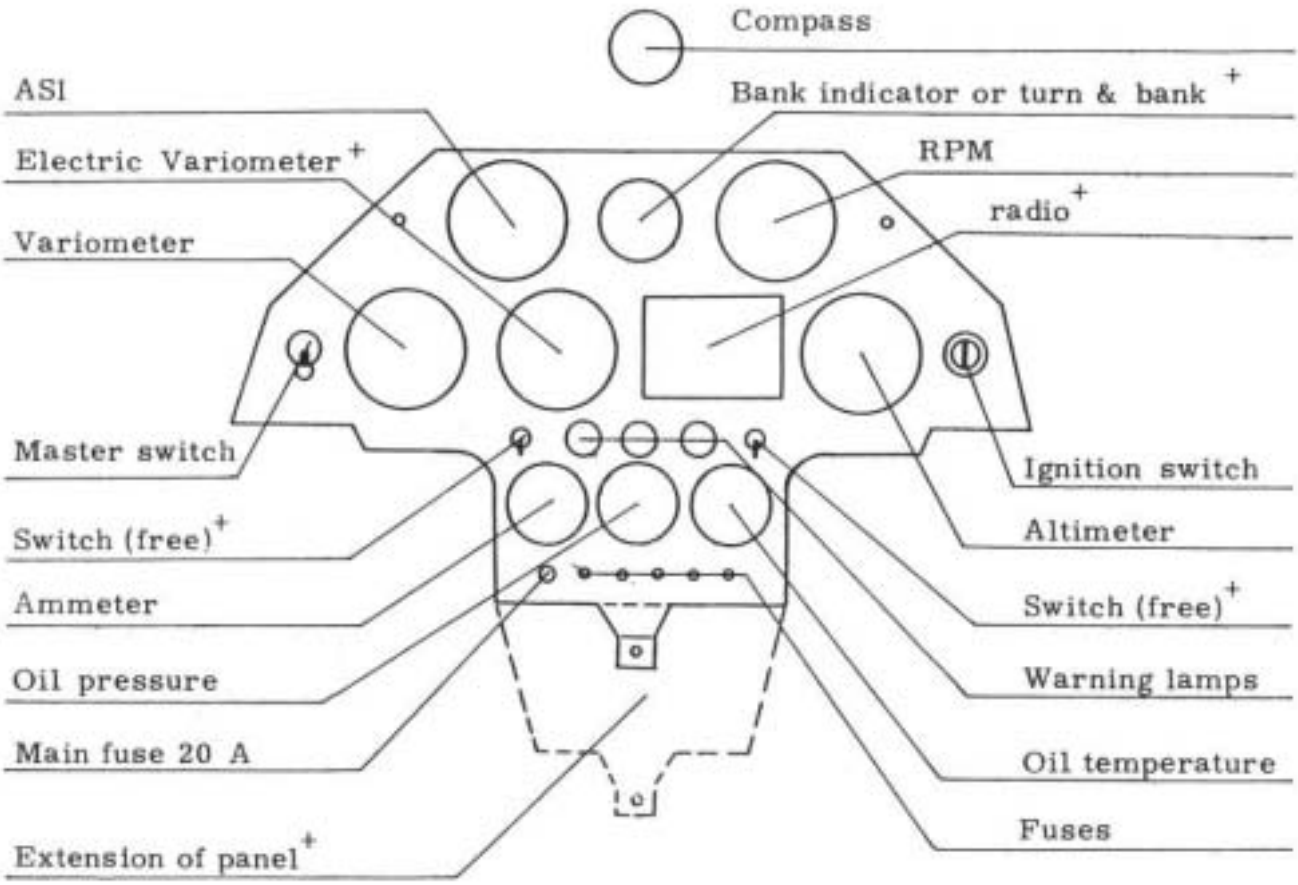


Rear seat:

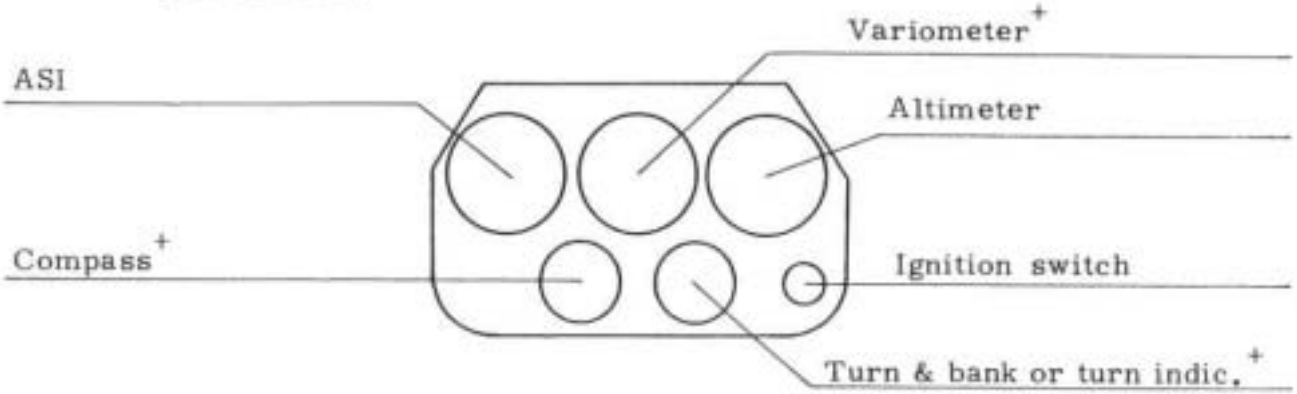


2.5.3 Instrumentation

Front Seat:



Rear seat:



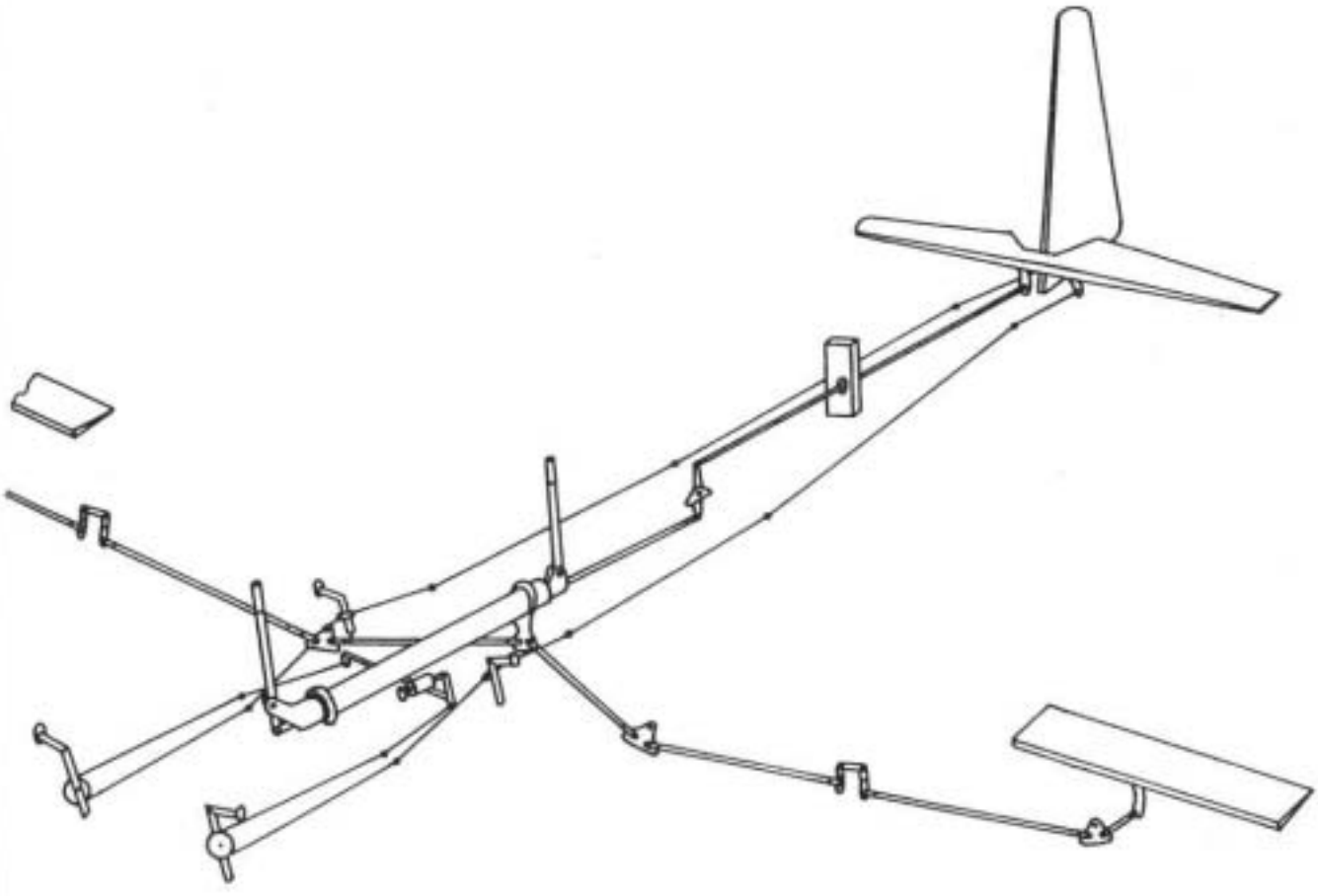
+ Optional equipment

2.6 Specification of Control System

All bearings of the control system are ball-bearings. Elevator and aileron controls are push rods. The aileron is mass balanced.

Rudder control by cable, rudder pedals of front seat can be adjusted. The stick for the rear seat can be removed. Trim control by bowdencable.

Spoiler extend on the upper side of the wing with 1,85 m span. Spoiler control by a lever and torsion tube.



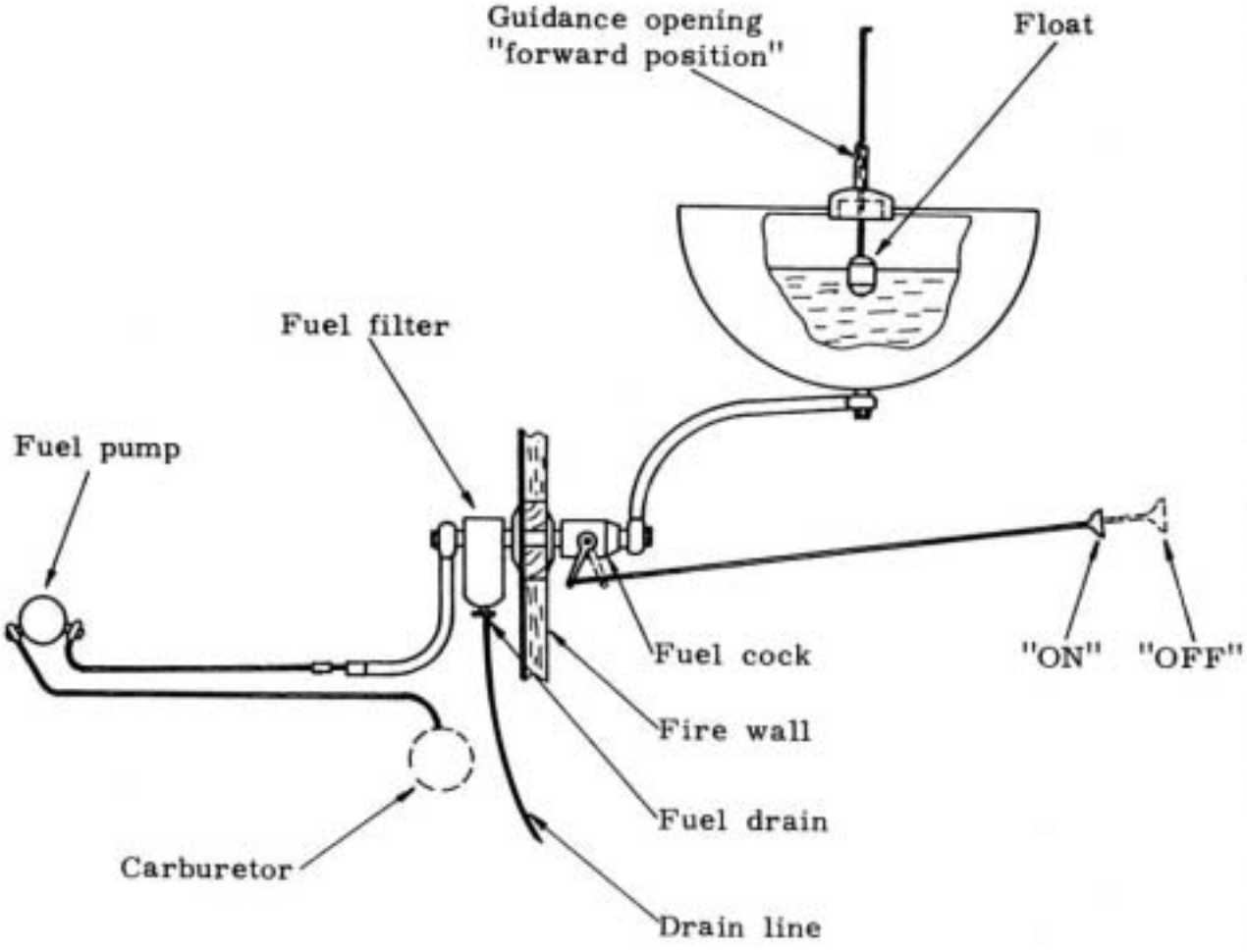
2.7 Specification of Fuel system

The fuel tank of 38 l (≙ 8.36 Imp.Gall) capacity is installed in front of the front seat.

Fuel storage is indicated by a float with pin. When the pin indicates "0" there is a rest of fuel of 7 l (≙ 1.54 Imp.Gall), which represents about half an hour endurance.

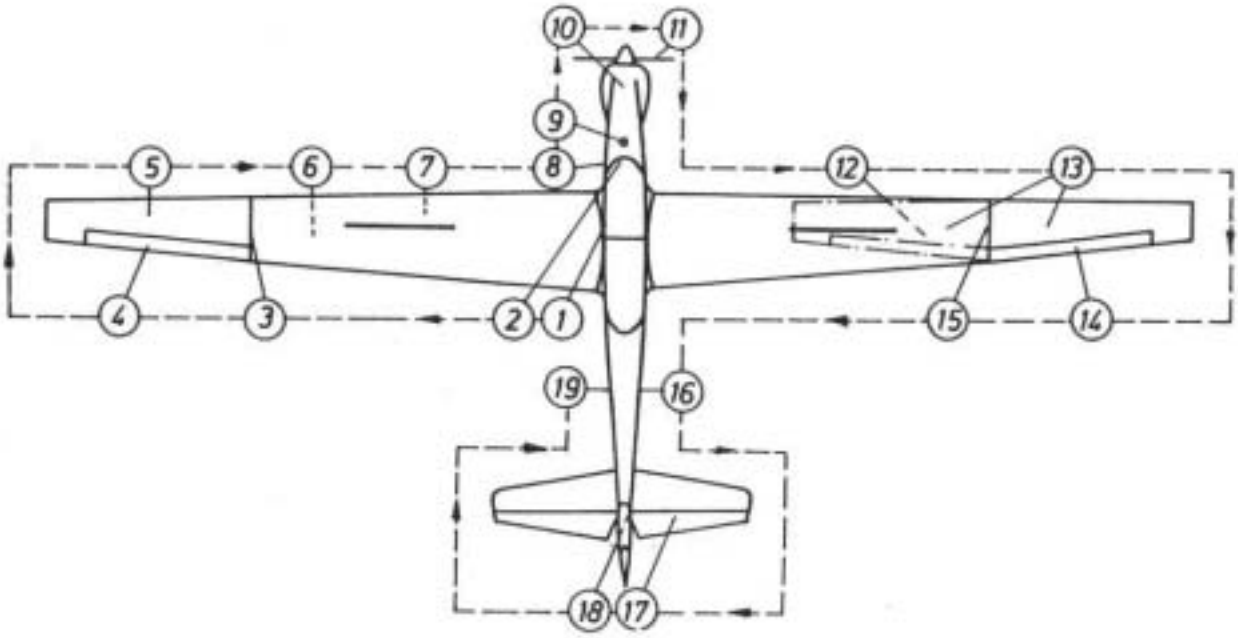
The guidance of the pin on top of the filler cap shows an opening, which exactly must be in the forward position, in order to allow trouble-free fuel supply. To avoid overflow of fuel one shall keep max. fuel level about one inch below filler level.

During drainage of fuel system wings shall be kept level.



3. Inspections

3.1 Pre - flight check



The sketch shows an easy course for the pre-flight check.

1. Open canopy
2. Check master switch and ignition "OFF", throttle "idle position" and fuel cock "OFF".
3. Unfold outer wing, lock, check securance, fasten fairing and secure.
4. Check ailerons free movement and play, hinges secure.
5. Check general condition of fabric, paint etc., no damage, no cracks.
6. Check outrigger stick, bracket and wheel
7. Check pitot opening.
8. Check main landing gear: shock absorber, tyre pressure, skid mark, tyre condition, bowden cable of brake, gear doors.

9. Check fuel filler cap, ventilation opening must show forward position. Check free movement of float stick.

10. Remove engine cowling. Check oil storage (min. 1,5 l ≙ 0,33 Imp.Gall, max. 2,5 l ≙ 0,55 Imp. Gall,) with tail down position. Upper level is marked, lower level is 1 mm ≙ 0,04 inch above end of stick.

    Check engine mounts, spark plugs and linings. Check wear of alternator V - belt, exhaust system for cracks.

11. Check propeller and spinner for cracks or damage.

12. same as 6.

13. same as 5.

14. same as 4.

15. same as 3.

16. Check static pressure openings clearance.

17. Check elevator and rudder free movement and secure.

18. Check tail wheel and connecting springs.

19. same as 16.

3.2 Post - flight check

- all switches "OFF"
- check aircraft for external damage.
- in case of damage record into log book.
- unlock spoiler, when hangared extend spoiler for better ventilation of spoiler housing.

3.3 Periodical checks

Periodical checks shall be done each 25 hours of operation. Every second check shall be a 50 hrs check, every fourth check a 100 hrs check, whereas extent of the 50 hrs and 100 hrs check is increased adequately.

The following list shows with marking 0, which checks have to be done during which check package.

Item	25 hrs	50 hrs	100 hrs
1. Engine			
- clean engine cowling		0	0
- check engine cowling for cracks, deformation and loose or lost fasteners	0	0	0
- check compression rate (differential flow method preferred)		0	0
- empty oil with warm engine	0	0	0
- check oil filter for foreign bodies and clean			0
- check actuators of oil temperature and oil pressure for leakage and secure	0	0	0
- check oil tubes and connections for leakage, secure, wear and cracks	0	0	0
- clean oil cooler and check for damage			0
- Fill up oil according to lubrication table	0	0	0
- clean engine		0	0
- check condition of spark plugs, clean and adjust distance of electrodes (0,4 mm ≙ 0,016 in)		0	0
- check ignition cables		0	0
- check ignition timing and adjust if necessary			0
- check magneto points and adjust if necessary			0
- check tappet clearance with cold engine	0	0	0
- remove intake filter and clean or replace			0
- check carburetor connections and controls	0	0	0
- check carburetor diaphragm and add damper oil if necessary			0
- remove fuel filter cap and clean	0	0	0
- clean fuel filter	0	0	0
- check conditions of fuel lines and secure	0	0	0
- check controls for easy and free movement	0	0	0
- check exhaust pipes and sealing		0	0
- check silencer and heater	0	0	0
- remove heater and check	0	0	0
- check crankcase ventilation	0	0	0

Item	25 hrs	50 hrs	100 hrs
- check crankcase for leakage			0
- check baffels for damage, cracks, sealing and mounting		0	0
- check engine mounts, especially silent blocks			0
- check condition of fire wall openings and sealing		0	0
- check condition and tension of alternator v-belt		0	0
- check alternator and starter mounts			0
- check intake tubes and clamps	0	0	0
- check battery mounts and acid level	0	0	0
- check charging and capacity of battery			0
- check electric installation	0	0	0
- check placards for oil, fuel and drain	0	0	0
- run up the engine (idling 700 rpm, full throttle 2800 ± 100 rpm)	0	0	0
2. Propeller			
- check spinner and spinner disk for cracks, buckles and oscillation		0	0
- check propeller for track and damage	0	0	0
- remove propeller and check the boss for cracks and wear		0	0
- check propeller flange for corrosion and check right torque of nut			0
- check torque and secure of propeller bolts and nuts (1.5 to 1.8 mkp ≙ 10.85 to 13.01 ft.lbs)			0
3. Cabin			
- check canopy for damage, function of latch and emergency release		0	0
- check general condition of cushions and fairings			0
- check safety harness and mounts		0	0
- check trim control and fastener			0
- check rudder pedal adjust, stops and deflection			0
- check stick deflection, stops, neutral position and free movement			0

Item	25 hrs	50 hrs	100 hrs
- check spoiler control adjust, lock and deflection			0
- check controls for easy and free movement and play	0	0	0
- check nav-lights, cabin and instrument lights		0	0
- check right capacity of fuses and circuit breaker		0	0
- check markings on instruments			0
- check colour marking of controls			0
4. Airframe			
- remove fairings of wing, fuselage and tailplane and inspection cover			0
- check general condition of fabric and paint		0	0
- check general condition of electric installation			0
- check aerial mount			0
- check fuel tank, fuel lines and connections for leakage			0
- check rudder, elevator, trim tab, aileron, turnbuckles bearings, push-rods and their guidance for safe operation, damage, corrosion and function			0
- check general condition of wing, fuselage and tailplane and their parts, especially for deterioration and deformation		0	0
- check wing and tailplane connections being fixed and without play		0	0
- check drain and ventilation openings		0	0
- check placards and markings	0	0	0
- check wing quick release system for play, easy movement and secure			0
- grease wing quick release system following lubrication scheme	0	0	0
5. Undercarriage			
- clean U/C		0	0
- check function of U/C check bearings and locking system for play, adjustment of brake, operation of warning system, close operation of U/C doors.		0	0

Item	25 hrs	50 hrs	100 hrs
- check shock absorbers and connections		0	0
- check tyre for carvings, wear and skid		0	0
- check brake linings			0
- check wheel and brake housing for cracks			0
- check tyre pressure (2,5 kp/cm^2 ≙ 35 psi)	0	0	0
- check brake cable for wear			0
- check tailwheel connection		0	0
- check tailwheel fork and axle for deformation		0	0
- check tailwheel for wear		0	0
- check tailwheel control system	0	0	0
- grease undercarriage following lubrication scheme	0	0	0
- check general condition and connection of outriggers	0	0	0
6. Controls			
- check function of fuel cock		0	0
- check fuel storage indication		0	0
- check oil pressure and temperature	0	0	0
- check alternator function	0	0	0
- check parking brake		0	0
- check function flight instruments		0	0
- check ignition switch	0	0	0
- check function of throttle and choke	0	0	0
- check function of cabin heat		0	0
- check propeller run (unbalance)		0	0
- check electronic equipment		0	0
- check engine run	0	0	0
7. General			
- Service Bulletins and Airworthiness Directives are carried out	0	0	0
- Check being recorded into aircraft logbook	0	0	0
- Test flight carried out		0	0

3.4 Major Overhaul

Extent of major overhaul will be fixed in detail by the inspector's report.

Any modifications shall be recorded in the aircraft's technical file.

- complete disassembly of the aircraft
- inspection report for each part
- all unservicable parts to be replaced
- all damaged parts to be repaired
- assembly and check
- final check, weight and balance, run up, test flight & report, final inspection by the inspector.

4. Service Instructions

4.1 General

Safe operation and airworthiness of your aircraft mainly depend on carefull service of all parts.
Airworthiness may be touched, if operation and maintenance will not be carried out according to the manufacturer's manuals.

Periods for maintenance - besides periodical checks - depend on activity of operation, climate, condition of the airfield, possibility of hangarage and similar factors.

The engine of the RF 5 B has been test run for four to six hours, when the plane leaves the factory. In spite of that within the first 25 hours you should not overstrain the engine. Do not run more than 3200 rpm for a longer time and let oil temperature not extend 90°C. Check tappet clearance and oil consumption every 10 hours of operation up to 75 hours total.

Do not use aggressive cleanser, which may affect material, paint and protective wax. You best use warm water and a mild washing powder, with sponge and leather.

To avoid scratches on the canopy you should use a leather for this purpose only, do not use this leather for cleaning the aircraft also. Cleaning the canopy you should use either a weak soapy water, or a special cleaner (e.g. PLEXIPOL or PLEXIKLAR).

The painted surfaces of the aircraft will require polishing from time to time, and this should be done with a polishing wax, which does not contain any SILICONE!
Damage to paint should be made good as soon as possible.

Metal parts used in the aircraft need protection with paint and surface preservatives.

Oil or grease should not be allowed to come into contact with the tyres, to avoid attack of the rubber.

When doing any work on the aeroplane please follow general work shops safety rules.

4.2 Engine

4.2.1 Propellor

- Before fitting the propellor it should be checked for any signs of surface damage (scratches, nicks, etc.).
- Then the propellor flange, locking washer, spinner disk, washer and fastening disk, should be cleaned, to ensure the mating is clean and even.
- Following the order locking washer - spinner disk - washer these parts are then mounted. The correct position of the spinner disk is found as follows: with a suitable tool the flange is turned until the ignition mark is in horizontal position. The spinner disk is then fitted so that two M 5 threads for attaching the spinner to the disk are in line with the centering on the flange and are horizontal.
- The propellor is then pushed on in a horizontal position, until the fixing studs locate the propellor in the mounting holes.
- The mounting disk is then put on and with six M 8 bolts the propellor and disk should be pulled evenly on to the flange. If the fixing studs begin to jam inside the propellor DO NOT FORCE the propellor on, as this could cause cracks. The propellor should be taken off and any excessive paint in the mounting holes should be removed. The propellor bolts should be tightened to 1,5 mkp ≙ 10,85 ft-lbs always ensuring that opposing bolts are tightened. The swash and eccentricity of the propellor should then be measured (see photo). If these are more than 3 mm ≙1/8" this may be eliminated by turning the propellor through 180° on its flange. Smaller deviations should be corrected by retightening the mounting bolts, but the tightening torque of 1,5 mkp ≙ 10,85 ft-lbs should still be observed. Never try to correct with shims.
- The fixing bolts are then secured in pairs as shown in the photo.
- The propellor spinner is then mounted with M 5 countersunk screws and tapered washers. Please note that the clearance between spinner and propellor should be at least 5 mm ≙ 3/16". If the spinner does not run true, it should be rotated through 180° and refitted.

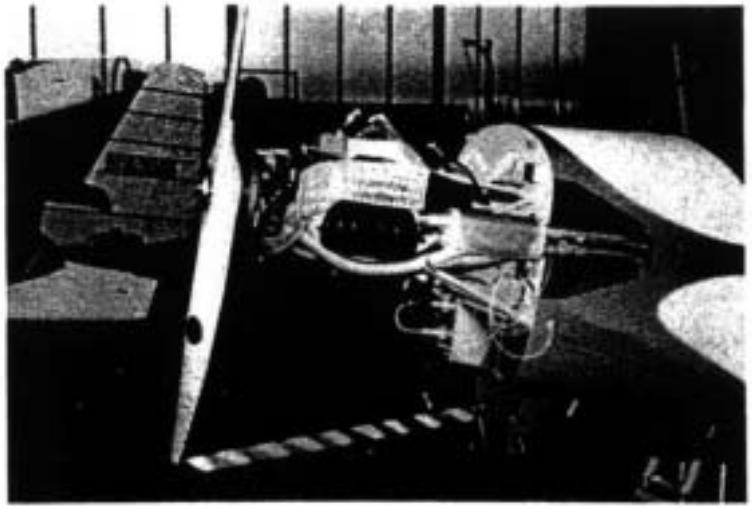


Fig. 9: Checking swash and eccentricity

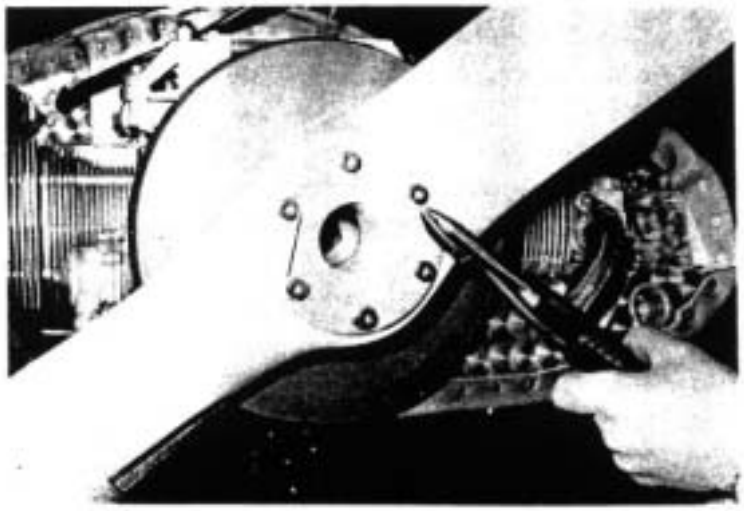


Fig. 10: Securing propellor bolts

4.2.2 Oil change

The engine should be run for a few minutes before draining the oil to ensure quick draining. The locking wire of the drain plug should then be removed, the drain plug taken out and the oil drained. After all the oil has been drained replace the plug with a new sealing washer, and relock.
Fill the oil tank with 2,5 l ≙ 4,2 pints of engine oil as specified in the table below and check oil level.

Lubricant	Outside Temp.	Specification	
Good quality Engine oil Shell-BP-Esso etc.	higher than +20°C	normal oil SAE 40	multigrade oil SAE 20W/40
	0° C...+ 20°C	SAE 20W/40 or SAE 10W/30	
(no aviation oil)	below 0°C	SAE 10W/30	

Cleaning the oil filter

For the 100 hrs-check the oil filter must be cleaned.
First the oil must be drained, as described in 2.2 above, then the oil filter must be removed from the sump. To do this 6 Nylock nuts must be undone. The filter should then be cleaned thoroughly in petrol and replaced with a new gasket.

4.2.3 Adjusting Tappet clearances

This should only be done by skilled personel since the life and power of the engine are greatly influenced by maintaining correct tappet clearances.
On new engines the clearances should be checked every ten hours for the first 50 hours, after which every 25 hours is sufficient.
On the COLD ENGINE the clearance should be 0,2 mm ≙ 0.008" on both inlet and exhaust valves.
The cylinders are marked 1 - 4 on the crankcase above each cylinder.
Adjusting the clearances is best done in the order 1-3-2-4.
First remove the rocker boxes. The piston of the cylinder to be adjusted should be positioned in upper dead center of the compression stroke. Starting with cylinder No. 1 the propellor should be turned until both valves of the opposed cylinder are just operating, i.e. inlet valve is opening, exhaust valve is closing. The locknuts on the tappet adjusting screws should then be loosened and the tappet clearances adjusted with the

aid of a feeler gauge. The screws and locknuts should be secured again and the clearances re-checked after tightening. The process is repeated for the other cylinders.

4.2.4 Checking the compression

There are to procedures in use:

(a) The direct pressure test:
To check the compression all four sparking plugs are first removed. The warm engine is then turned over by the starter, with the main fuel cock closed and the throttle fully opened. The compression pressure is then measured in each cylinder using a pressure gauge which seals in the sparking plug seat.

Result: 8.0 - 9.0 kp/cm^2	(113,76 - 127.98 psi)	Good
7.0 - 8.0 "	(99,54 - 113.76 ")	Sufficient
Below 7.0 "	(99.54 ")	Insufficient

(b) The differential flow measure test:
a standard pressure of 5,6 kp/cm^2 ≙ 80 psi is to be pressed into the cylinder in question. Leakage will cause a pressure loss, which may not extend a certain value. This procedure is easy to handle under always same conditions and by the escaping air the leakage can be localized (inlet valve - outlet valve - piston ring).

For both tests

- the engine must have normal operating temperature.
- all four spark plugs must be removed
- the test shall be conducted according to the instructions for the test instruments
- the test shall be repeated if the result is unsatisfactorily. If then the result is still unsatisfactorily, the engine must be checked by a specialist or be repaired.

4.2.5 Ignition

Timing Adjustment

- With the Bendix magneto fitted adjustment of the timing is scarcely necessary, but a check every 100 hours is important since faulty ignition timing may result in loss of power, high fuel consumption or even in breakdown of the engine. Checking and adjustment of the timing should be carried out as follows:
- First remove plug leads and sparking plugs. Position cylinder No. 1 30° before TDC of Compression stroke.

In this position the mark on the propellor flange should be in line with the crankcase joint.

- The timing adjustment indicator (Buzzer) should then be connected to earth, and to the short circuit lead of the magneto.
- Turn the engine in the normal running direction until the impulse coupling of the magneto is released.
- Turn engine in the reverse direction until the timing mark on the propellor flange is once more in line with the crank case joint.
- Switch on "buzzer" and turn the mark towards the crank case joint.

  When the mark is opposite the joint the points should just be opening.
- If the deviation of the mark from the joint is greater than ± 2 mm ≙ 0.080" it should be corrected by rotating the magneto. To do this the magneto fixing screws must be loosened.
- If correct timing cannot be achieved by rotating the magneto the points must be adjusted.

Adjusting the points

This should be done after 100 operating hours, or if adjustment of the timing is not otherwise possible.

- Take off cover plate on the back of the magneto.
- Adjust points until gap is 0,4 - 0,5 mm (0.016" - 0.020") by turning adjustment screw.
- Clean, or, better, renew dirty or greasy contacts.
- Replace cover plate and adjust timing as described above.

Checking of Sparking Plugs

Remove the plugs and check the colour of the ignition head. Form the apperance of the electrodes and ceramic insulation the engine condition can be judged.
Medium grey - good carburettor adjustment and correct sparking plug operation.
Black - Fuel air ratio too rich.
light grey - Fuel air ratio too poor.
Oily - misfiring, or badly fitting piston rings.

Clean plugs thoroughly, the outside as well as the electrodes to avoid leakage currents.
Check spark gap. This should be 0.4 mm ≙ 0.016", if necessary adjust by bending the earth electrode. The condition of the plug sealing washers should also be checked; the average life of the plugs is 250 hrs.

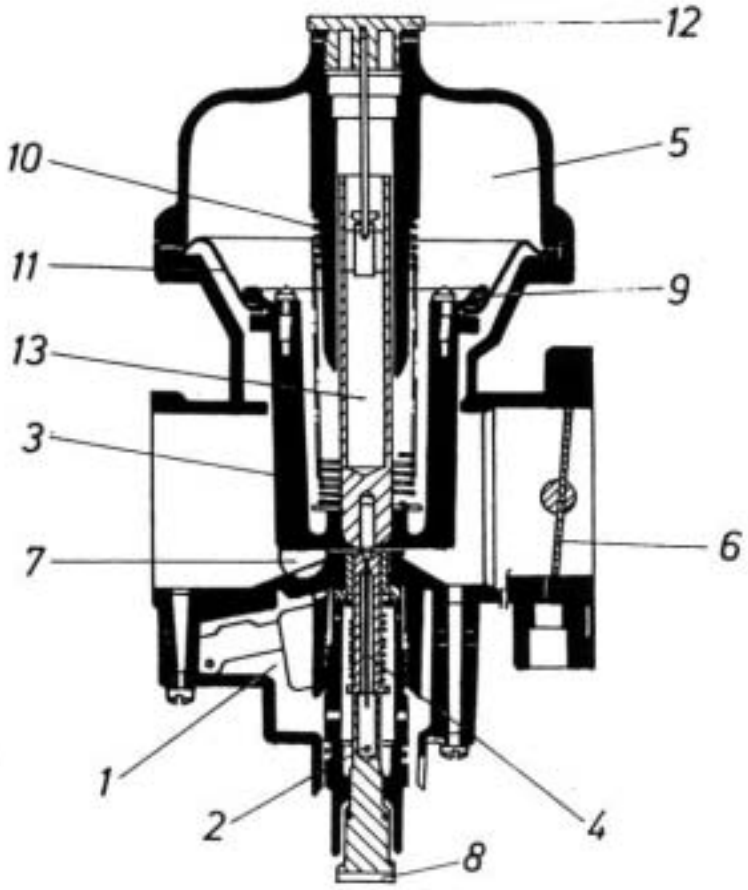
4.2.6 Tensioning and Replacement of Alternator Drive belt

During every 50 hrs-check the tension of the alternator drive belt (V-Belt) should be checked, and adjusted if necessary. It is inadvisable to operate the aircraft with the belt too slack or too tight .
To adjust the V-Belt the upper mountings screw of the alternator and a nut on the magneto must be loosened.
If the belt is to be replaced the procedure is as follows:

- Remove battery, magneto, alternator and fuel line.
- Loosen the four M 8 fixing bolts of the auxiliary mounting bracket, and the M 8 screw holding the carburettor bracket beneath the engine, so that the auxiliary mounting can be displaced by about 15 mm - 5/8".
- Feed in the V - Belt between the auxiliary mountings and the magneto dog.
- Reposition the auxiliary mounting and replace the magneto on the magneto dog, so that when piston 1 is 30° before TDC of the compression stroke (timing mark in line with crankcase joint), red marking point is visible through hole in magneto. Further adjustment of the ignition is described in 4.2.5
- Reassemble battery and alternator taking care that the alternator is connected correctly. Failure to do this will result in damage to the rectifier diodes.
- Reconnect fuel line.

4.2.7 Carburettor

The engine SPORTAVIA - Limbach SL 1700 E is equipped with a constant depression carburettor STROMBERG 150 CD.



Principle of operation

The petrol inlet, a parallel tube to accommodate a flexible fuel pipe, is at the side of the main body. From here fuel passes into the floatchamber (1) via the needle seating (2) where the flow is controlled by the needle and the twin floats on a common arm. As the petrol level rises the float lifts and, by means of the float arm and tag, closes the needle on its seating when the correct level has been attained. With the engine running, petrol is drawn from the floatchamber, the float descends and more fuel is then admitted through the needle seating.
In this manner, the correct level is automatically maintained the whole of the time the carburettor is in action.

The fuel from the floatchamber will rise in the jet orifice in the jet assembly, the fuel in the jet orifice being maintained at the same level as that in the floatchamber.

With the opening of the butterfly throttle (6) manifold depression is transferred to the chamber (5) which is sealed from the main body by the diaphragm (11).

The pressure difference between chamber (5) and that existing in the bore causes the air valve to lift, thus any increase in engine speed or load will enlarge the effective choke area since the air valve lift is proportional to the weight of air passing the throttle (6). By this means air velocity and pressure drop across the jet orifice remain approximately constant ensuring good fuel atomisation at all speeds.

As the air valve (3) rises it withdraws a tapered metering needle (4) held in the base of the air valve by a screw from the jet orifice so that fuel flow is increased relative to the greater air flow.

The metering needle is a variable and is machined to very close limits tp provide a mixture ratio for all speeds and loads in line with engine requirements as determined by exhaustive tests on bench by carburettor specialists working in collaboration with the engine manufacturers.

When the choke control on the instrument panel is pulled out it operates the lever at the side of the carburettor; this rotates the starter bar(7)to lift the air valve in which is fitted the metering needle (4) from the jet orifice to increase the area of the annulus between needle and orifice. In this manner the enriched mixture necessary to ensure cold starting is provided. Simultaneously, the cam on the lever will open the throttle beyond the normal idle position according to the setting of the fast-idle stop screw to provide the fast-idle speed when the motor is cold.

At any point in the throttle range a temporarily richer mixture is needed at the moment the throttle is suddenly opened. To provide this, a dashpot or hydraulic damper is arranged inside the hollow guide rod (13) of the air valve.

The rod itself is filled with suitable oil to within a 1/4"of the end of the rod in which the damper operates. When the throttle is opened, the immediate upward motion of the air valve is resisted by this plunger. For that short time the suction or depression at the jet orifice is increased and the mixture is enriched.

Adjustments

The carburettor STROMBERG 150 CD has been exactly adjusted with the engine during test bench run. Normally it needs no further adjusting. However, if adjusting is necessary, one should work very carefully and exact, since the carburettor is of high precision.

The metering needle is No. 6 A.

Setting the idle

Two adjustments are employed when regulating the idle speed and mixture, and the following procedure should be adopted in setting the throttle stop screw which controls the speed, and jet adjusting screw (8) which determines the quality of air-fuel mixture entering the cylinders.

Remove the air cleaner and damper and hold the air valve (3) down on to the bridge in the throttle bore. Now screw up the jet adjustment screw (8) (a coin is ideal for this purpose) until the jet is felt to come into contact with the underside of the air valve. From this position turn down the jet adjusting screw three turns. This establishes an approximate jet position from which to work.

Run the engine until it is thoroughly warm, and obtain by means of the stop screw an idle speed of some 600/650 r.p.m.

The idle mixture will be correct when the engine beat is smooth and regular, and by careful and gradual adjustment of the jet adjustment screw (8) the correct position will be determined.

As a check, lift the air valve a very small amount with a long thin screw-driver and listen to the effect on the engine. If the engine speed rises appreciably, the mixture is too rich and conversely, if the engine stops, the mixture is too weak. Properly adjusted, the engine speed will either remain constant or fall slightly on lifting the air valve.

Checking the Diaphragm (11)

With every 100 hrs - check the diaphragm (11) shall be inspected for cracks or wear and if necessary be replaced. This shall be done as follows:

- remove the carburettor
- remove cover of chamber (5) by untightening 4 screws and put away

- be carefull when pulling out the air valve (3) and the spring (10)
- remove diaphragm (11) from air valve (3) by untightening 4 screws and take away the ring (9)
- check diaphragm (11) for cracks and wear, especially near the air valve (3).
- assembly follows vice versa. Please take care that hoses of diaphragm fit into the notches of the air valve and of the housing.
- when airvalve, spring and cover has been assembled, damping oil must be filled in.
  For this untighten the screw (12).
- Filling up to 6 mm ≙ 0.23 in below upper brim of hollow guide rod (13).
- Tighten screw (12) and mount the carburettor on the engine.
- Run up the engine and check idle, max. power and transition.

4.2.8 Cleaning the Fuel Filter

- Set fuel valve OFF
- remove securing wire at the nut of the drain valve
- unscrew the bottom of the filter (44 mm wrench) and take away, pour off the fuel.
- pull out the filter and carefully wash filter and bottom with fuel
- assembly follows vice versa. Check filter for being tight and free of leakage.

4.2.9 Battery

Setting to work

The new battery of 12 Volts/25 Amperehours is dry but charged already. Within 20 minutes after being filled with sulphuric acid the battery is ready for operation.

- unscrew the plugs and fill cells with pure battery sulphuric acid of 1.28 kg/Liter ≙ 12.8 lbs/Gall.Imp. density up to the level marking.

Level marking is lower edge of grating below plugs or 15 mm ≙ 0.59" in above upper edge of battery plates.

- leave battery for 15 minutes with open plugs, then shake it slightly and correct acid level. Never extend the max. acid level, because otherwise acid will overflow during operation.

- Put on the plugs, clean battery and fit on to the aircraft. Contact points to be protected with special battery grease.

Please take care of safety rules when handling the acid!

Maintenance

During normal operation of the aircraft the battery needs no maintenance other than given in the periodical checks.

If however the aircraft has been operated very few hours only or even not for some time (i.e. during the winter), one shall care for

- every month check the capacity of the battery (density of acid) and charge if necessary. Never leave a flat battery uncharged.

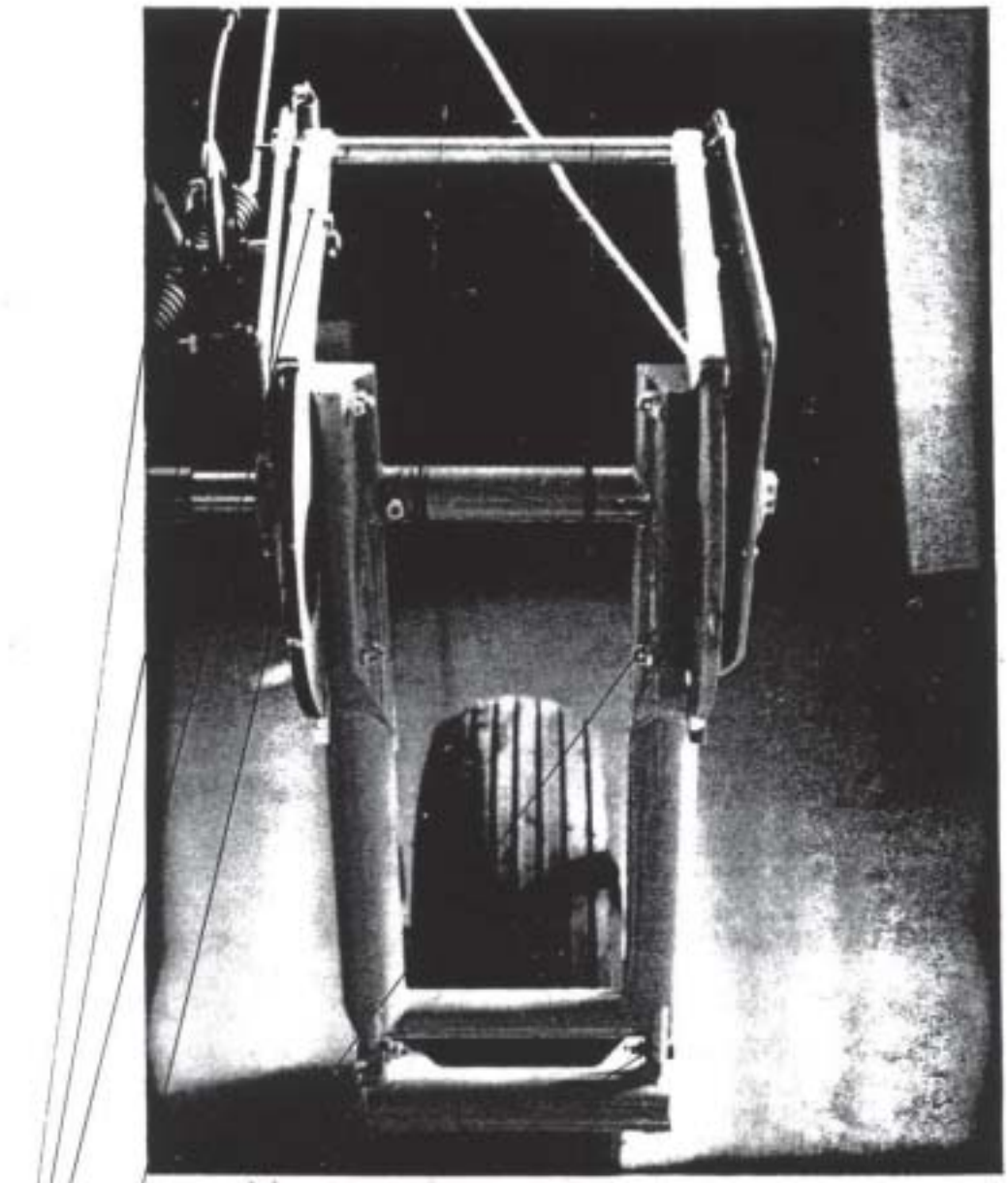
Charge power about 2.5 Amperes. After charging refill destillated water up to the markings.

- every third month discharge the battery and charge again.

4.3 Undercarriage

4.3.1 Lubrication Instructions

The undercarriage should be lubricated every 25 hours of operation:



4.3.4 U/C Shock Absorber

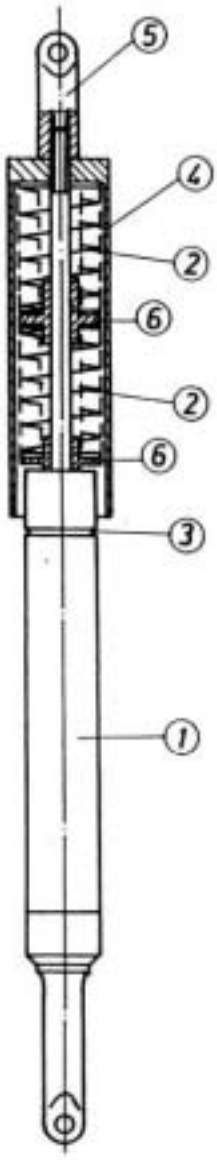
The shock absorber contents a pneumatic element (1) and two springs (2).

Check with every 50 hrs-check the shock absorbers.

Being new the notch (3) of the pneumatic element is level with the lower end of the cover (4) with the aircraft empty.

After a longer time of operation the shock absorber may get shorter either by gas leakage of the pneumatic element or by fatigue of the springs.
If shock absorber's fatigue is such as to allow the U/C main support and the wheel fork to build an angle of less that 90°, remove shock absorbers and inspect their condition.

- jack the aircraft as described in 4.5.1
- remove connecting bolts and shock absorbers
- unscrew the upper joint (5) and cover (4).
- inspect springs and replace if necessary. When springs are in order the pneumatic elements may be flat and must be replaced.
- assembly of the shock absorber vice versa. Take care of the correct position of plastic bushes (6).



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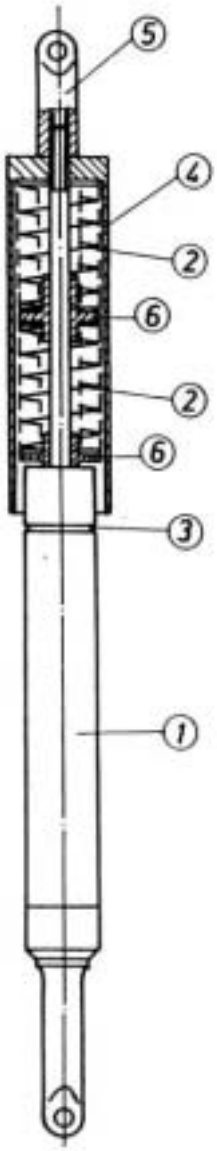


4.4. CONTROL SYSTEM

4.4.1 Adjustment of Controls

The adjustment of the controls should always be done under the supervision of an official inspector. The figures given below are intended as guides (see Appendix 6).

Aileron:

Radius of Measurement		235 mm	≙ 9.25 in	
Upward movement	25° ± 3°	≙ 100 ± 10	≙ 4.33 in	± 0.4 in
Downward movement	15° ± 1,5°	≙ 60 ± 5 mm	≙ 2.16 in	± 0.2 in

The outer stops (outer wing) shall be reached first.

Elevator

Radius of Measurement		335 mm	≙ 13.2 in	
Upward movement	20° ± 1°	≙ 115 ± 10 mm	≙ 4.5 in	± 0.4 in
Downward movement	20° ± 1°	≙ 115 ± 10 mm	≙ 4.5 in	± 0.4 in

Trim tab

Radius of Measurement		90 mm	≙ 3.54 in	
Upward movement	31.5° ± 2.0°	≙ 47 ± 3 mm	≙ 1.85 in	± 0.1 in
Downward movement	31.5° ± 2.0°	≙ 47 ± 3 mm	≙ 1.85 in	± 0.1 in

Rudder

Radius of Measurement		590 mm	≙ 23.22 in	
Rudder Movement to both sides	22.5° ± 1°	≙ 225 ± 10 mm	≙ 8.86 in	± 0.4 in

4.4.2 Trimming

If the aircraft tends to bank or turn it should be trimmed as follows:
If the aircraft banks and turns to one side a trim tab should be fitted to the underside of the opposite aileron.

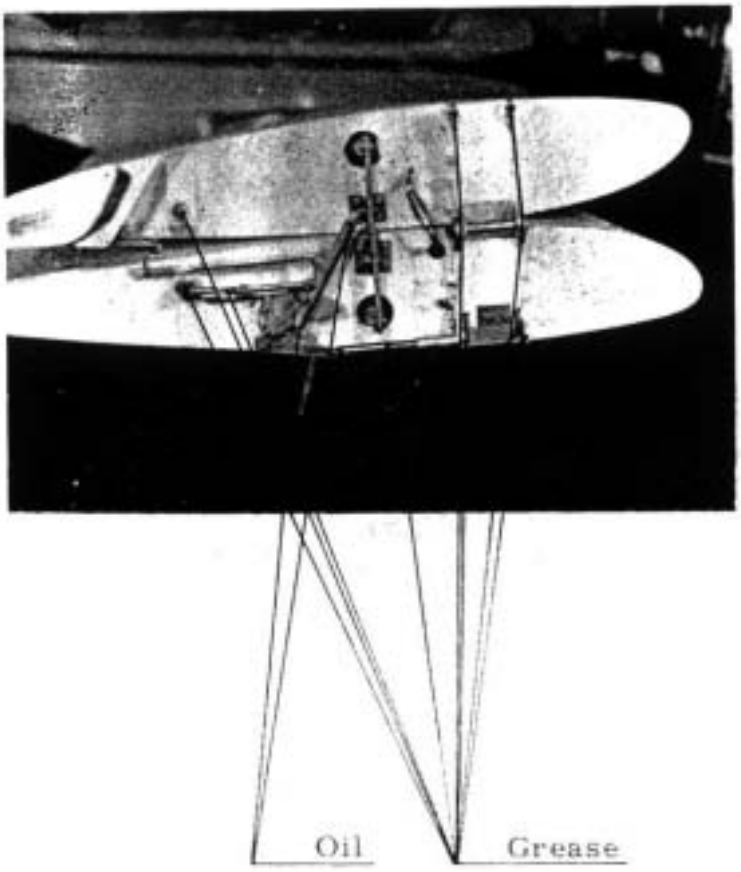
If the aircraft turns the tension of the rudder springs beneath the rudder pedals should be checked, and tightened or replaced.

4.5 AIRFRAME

4.5.1 Jacking the aircraft

If there is a crane or block and tackle available the aircraft may be lifted by the engine using a strong rope passed around the engine, or the lifting point on the engine crankcase. Alternatively the aircraft can be lifted by two hydraulic jacks placed beneath the under - fuselage strakes or the tail can be lifted and a 500 - 560 mm (19.7 - 22 in) trestle placed under the fuselage. Pushing down on the rear carrying handles will then raise the nose and unload the undercarriage. Care must be taken to ensure that the aircraft is securely supported on the trestle or the hydraulic jacks and that these are prevented from slipping or tilting.
The rear carrying handles should be weighed down and/or another trestle should be placed under the nose to prevent the aircraft tilting forward.

4.5.2 Lubrication of wing locking mechanism



4.5.3 Covering and Painting the Aircraft

- Clean and sand down the part to be covered.
- Apply adhesive three times, with an hour drying between
- Lay on fabric tightly and rub down with thinner
- Sprinkle fabric with water and allow to dry for 2 hours
- Apply first layer of dope diluted with an equal volume of thinner
- Apply 3 - 4 coats of undiluted dope
- Fill uneven areas with mastic and sand
- Spray with filler 2 - 3 times
- Sand wet
- Spray on top coat

5. ASSEMBLY

5.1 Assembly of Wings

- Place the wing as delivered on the floor supporting the trailing edge on a soft pad. Remove the locating bushes from the main mounting pins.

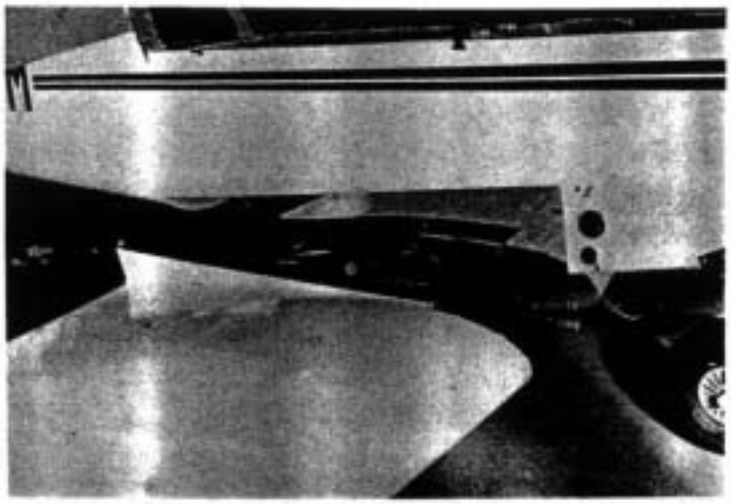


Fig. 11 Starting position

- Remove canopy and engine cowlings and position fuselage over wing centre section. Put the handbrake on.
- Unfold the wings and secure by rotating the lever of the wing locks.
- Lift wing at wing tips (2 persons per tip), at the trailing edge near wing centre (2 persons), and on the leading edge (2 persons).

Fig. 12: Lifting the wing

- Slide torsion control tubes into the holes in the fuselage former. Taking care to keep the trailing edge well down, to prevent damage to the fuselage skin, push wing forward until main wing attachment bolts are also located in fuselage former.

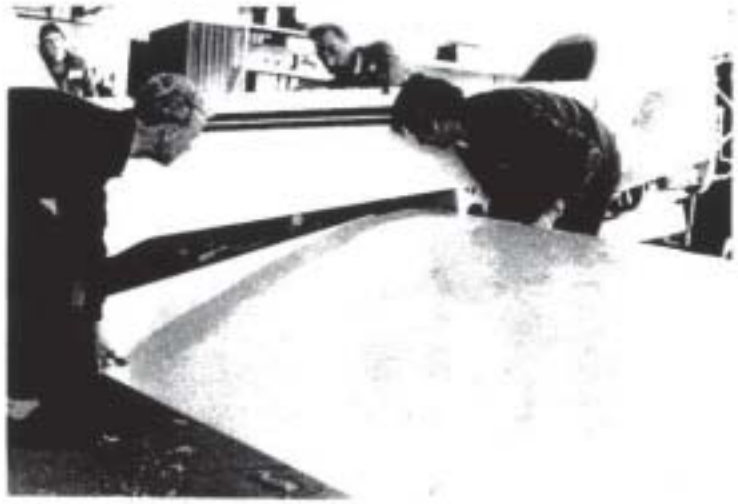
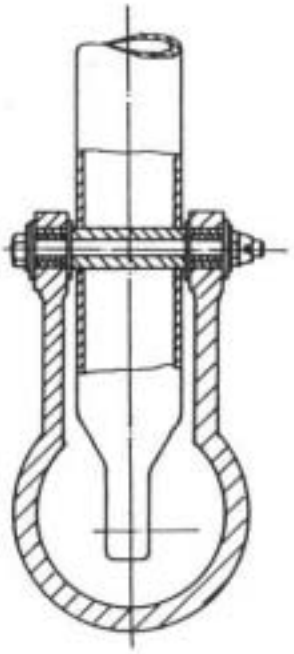
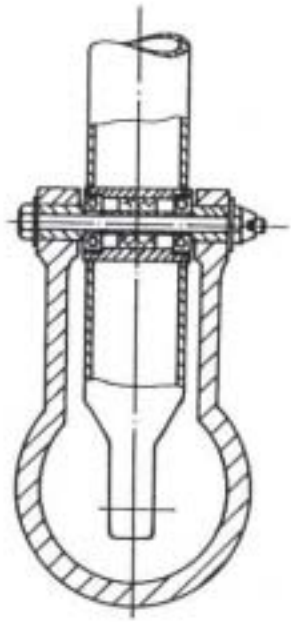


Fig. 13: Introducing the wing

- Raise trailing edge, push locating bushes over the main attachment bolts and into the former. Place washers and nuts onto the main bolts and tighten securely.
- Lift trailing edge up firmly and bolt with M 6 x 45 bolts washers and nylock nuts to rear mounting.
- Fit the outriggers (see page 49)
- Place flange bearing on torsion control tube and fasten with M 5 x 45 screws.
- Mount the control column holder. This casted part should be positioned so that the bolt holes are in line, the control column holder is vertical and both ailerons are in the neutral position. M 4 x 15 bolts are to be put in from the inside and screwed down in position with nylock nuts, making sure the stick bearing assembly is similar to that in the rear seat.
- Slide elevator push rod from the front through the wheel well and into the torsion tube. Attach it to the front stick and secure it with split pins. The stick should be mounted in the stick holder as shwon and secured with split pins.
- The rear control column should first be connected with the push rod from the front stick and then with the rear pushrod, connecting it with the reversing crank. It should then be mounted in its stick holder as described above.





- The elevator should then be connected to the bell crank beneath the luggage compartment.
- The spoiler push rod should then be pushed from the front through the hole in the former and should be connected to both spoiler levers. Attach rear spoiler lever and secure.
- Slide the cables through their guide holes and connect to turnbuckles which are attached to the cable coming from the pedal adjustment tube. Hook compensating springs to rudder pedals, adjust rudder and secure turnbuckles.
- Connect pipe from pitot tube to airspeed indicator tube under rear seat.
- After rechecking cable connections and making sure no tools, screws, etc. have been left inside, the seat may be screwed down.
- The leather stick cover of the rear cockpit should be fastened with self-tapping screws.
- The side-panels in the front cockpit should be mounted with wood screws.
- Front and rear wing-fuselage fairings should be fitted with self-tapping screws.

5.2 Assembly of Vertical Tail

- Separate fin and rudder.
- Place fin on fuselage, put navigation light, aerial and anti-collision light cables into fuselage and screw fin down with four M 8 x 65 screws, using four large diameter washers with 8,4 mm internal diameter as spacers.
- Fasten metal fin support in front of fin leading edge with M 5 x 35 bolts. Washers and nuts can be placed on the bolts through the fuselage access hole.
- Mount rudder by sliding M 6 bolts into control arm on fin. Ensure that two washers are fitted above control arm to line up the upper hinge.
- Upper hinge should be fixed on with M 5 x 25 bolts. Fasten also lower bolts with nylock nuts.
- Attach control cables.
- Connect tail wheel steering springs.

5.3 Assembly of Horizontal Tail

- Place trim control cable in slot in left hand side of fuselage.
- Put tailplane and elevator assembly in position on the fuselage and push backwards until bolts fit into the brackets and front mounting is aligned.
- Attach at the front M 8 bolt and secure with Fokker pin.
- Join elevator push rod and control arm, fastening with M 5 x 23 bolts, reaching the connection via the fuselage access hole.
- Fit access hole cover.
- Fix trim cable to elevator and connect control rod to trim tab.

5.4 Assembly of Engine

- Lift engine by the lifting point provided, using a block and tackle.
- Support engine by upper bolts (M 5 x 30)
- Fit lower bearer bolts. Tighten bolts and lock with cotter pins. Refer to table in engine manual for torque moments.
- Fit upper bearer bolts. Tighten bolts and lock with cotter pins.
- Connect fuel pipe to carburettor and secure.
- Fit air intake filter.
- Fit rev. counter drive cable and secure with locking wire.
- Connect throttle, choke, heater control and starter cables.
- Connect magneto switch wire to magneto.
- Connect the spark plug leads.
- Clip on the crankcase breather pipe.
- Fit heater duct.
- Connect the following electric cables:

  Microswitch on throttle linkage
  Oil temperature thermo couple
  Oil pressure transducer
  Starter
  Connect battery
  Earth cables.

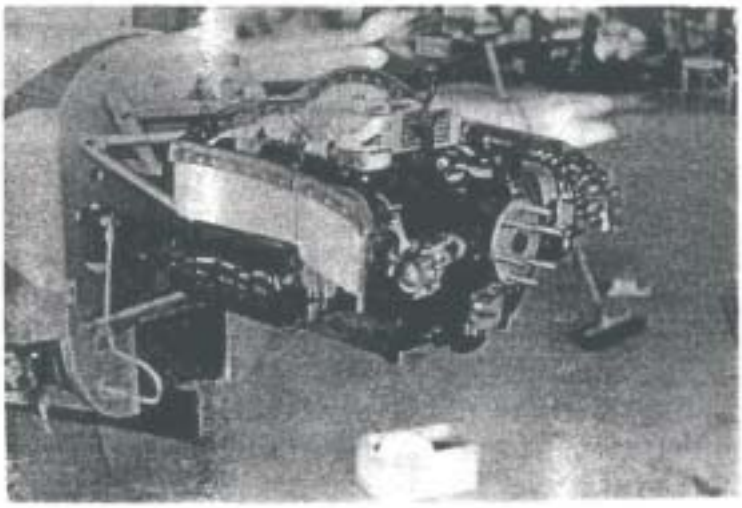


Fig. 14: Engine assembly

5.5 Assembly of Undercarriage

- First jack the aircraft up as described in 4.5.1
- Place undercarriage in wheel well and position with the long pivot axle stub to the right and the shorter on to the left.
- The undercarriage lever and the right-hand stub axle should be bolted together with M 6 x 60 bolts.
- Bolt both stub axles to the undercarriage with two M 6 x 50 bolts.
- Retract undercarriage. Pre-tension spring and attach to fixing bracket.
- Check operation of undercarriage warning system. Check the microswitch on the catch and the torsion tube.
- Screw down the seat.
- Lower undercarriage and fit brake cable.

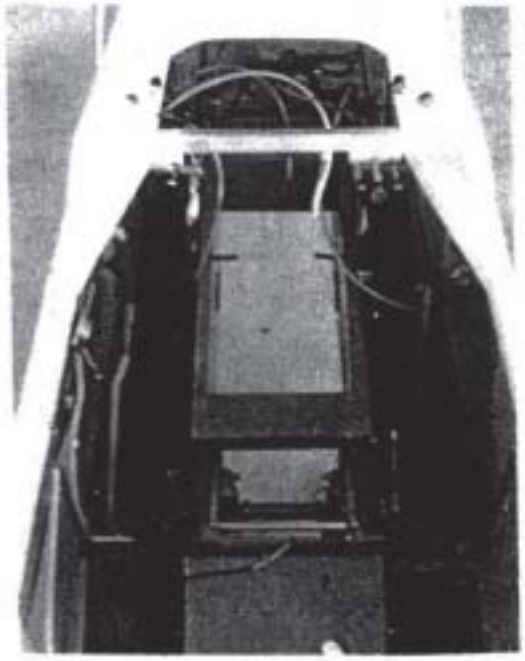


Fig. 15: U/C assembly

5.6 Assembly of Tailwheel

- Position tailwheel and attach to mounting plate in the fuselage, using four M 5 x 80 bolts.
- Hook on tailwheel steering springs and extensions.

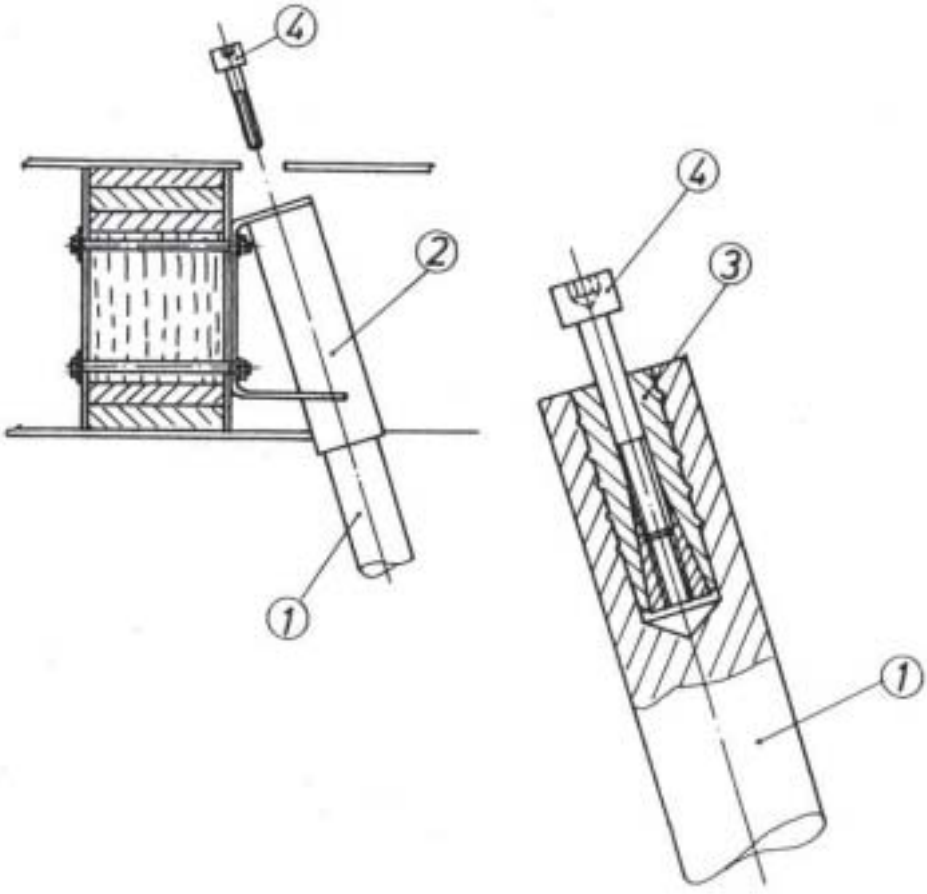
5.7 Assembly of Outriggers

The Nylon-rod (1) is connected with the bracket (2) by a spreader dowel (3).

The spreader dowel is fixed by a M 8 - bolt (4), which can be reached via an opening in the upper skin of the wing.

For disassembly remove tape over opening, loosen M 8 - bolt until rod can be pulled out. If spreader dowel is still locked and rod cannot be pulled out screw bolt two or three turns again and knock at the bolts head to loosen the spreader dowel.

The opening in the skin shall always be taped carefully using usual tape.



5.8 Assembly of Instrument Panel

- Plug in instrument plug, observing the colour coding on any special equipment.
- If aircraft is so equipped, plug in radio and aerial.
- Connect rev. counter drive shaft and fit rev. counter. When dismantling it is best to take out the rev. counter first, and then disconnect the drive shaft)
- Connect pitot, total head, compensating flask and static head tubes.
- Fit instrument panel to its rubber mountings using M 6 nuts and washers.
- Fit instrument hood.

Appendix 1 - Materials List

Material	French Specification	Tensile Stress kp/mm^2	German Specification	Tensile Stress kp/mm^2
1. Aluminium				
Unplated Sheet	A - U4G 1	40	3.1354.5	45
Plated Sheet	A - U4G 1/A5		3.1364.4	44
Standard Sheet				
Semi-cured	A - G 3		3.3334.1	18...23
Profiles	A - U4G 1		W 3125.6	48
Bars	A - U4G 1		W 3125.5	46
Cast Aluminium	A - U5Gt	30	G-AlCu 4 TiMg GK-AlSiLo Mg Wg	30...40
2. Steel				
Sheet	XC 18 S	50	1.7734.4	70
Sheet	25 CD 4 S	68	1.7734.4	70
Hexagon Bar	XC 18 S	50	1.7734.4	70
Round Bar	XC 38 F	68	1.7734.4	70
Round Bar	35 NC 6	90	1.7734.6	110
Tubes			1.7734.4	70
3. Wood				
Birch plywood, first class aviation			6.1013.0	
Pine			6.1002.0	
Ash				
Poplar				
Balsa				
Gaboon plywood				
TBu 7 (pressed beech wood, 7 layers per cm)				
4. Adhesives				
Glue Aerodux 185 with hardener HRP 150, Protection Aerodux 185 with hardener HRP 151				

5. Other Materials

Fabric - FRANKE ZK 100 B DIN L 21

Silk fabric for lining the wooden parts, Art No. 6150

Fabric adhesive - RHODIUS Fuldocell 18.724/F or WIEDERHOLD N 39/549

dope - RHODIUS Fuldocell 22.816/F or WIEDERHOLD N 53/526

Interior protective paint	WÜLFING No. 23564
Filler	WIEDERHOLD N 59 300/508
Hardener	WIEDERHOLD N 39/1840
Polyurethane paint white	WIEDERHOLD N 53 641
Polyurethane hardener	WIEDERHOLD N 39/1327
Coloured resin paint	WIEDERHOLD 7174/
Washprimer	WIEDOFLUGAT N 54 628
Washprimer hardener	WIEDOFLUGAT N 37 678

Glassfiber - parts:

Glass INTERGLAS - Ulm

Resin EPIKOTE 162

Hardener LAROMIN C 260

Appendix 2

List of Equipment

2.1 Engine

Engine	SPORTAVIA-Limbach SL 1700 E, 68 hp at 3600 rpm
Carburettor	STROMBERG 150 CD
Alternator	DUCELLIER 7522, 12 V
Starter	FIAT 76-0,5/12 S, 12 V/130 A
Magneto	BENDIX S 4 RN - 21
Sparking Plugs	BOSCH WB 240 ERT 1 0,5
Fuel Pump	PIERBURG VW 3 - 8256
Propeller	HOFFMANN HO 11 - 145 B 80 L

2.2 Flight and engine instruments

Airspeed indicator	WINTER 6 FMS 3,
Altimeter	WINTER 4 HM 6 or WINTER 4 FGH 10
Variometer	WINTER STV 5
Compass	VION Type 112 or LUDOLPH FK 16 or AIRPATH C 2300
Bank indicator	WINTER QM I or QM II
Rev. Counter & Engine hours recorder	MOTOMETER 120.17.033.02
Oil pressure gauge	VDO 350.251/2/21
Oil pressure transducer	VDO 360.81/29/1
Oil temperature gauge	VDO 310.254/75/1
Oil temperature thermocouple	VDO 323.801/4/12
Ammeter	VDO 190.04/27/29

2.3 Electrical equipment

Battery	EXIDE type AC-54 Cat. No. 62439, 12 V/25 Ah or REBATE 12 V,/ 25 Ah
Ignition Switch	MARQUARDT 0140.0201, 2A/250 V
Master Switch	ETA 412 - K 14 - LN 2, 20 A
Microswitches	MARQUARDT 10 A/250 V
Test Button	2 A/250 V
Buzzer	SIEMENS U 23303/ W 0102
Multipole Plug	SOCAPEX 315 K, 15 poles with screwlock
Lamps	green, yellow, 12 V
Toggle Switches	KNITTER MST 6 A/ 125 V
Fuses	5 mm x 20 mm, 2 A, 10 A
Cable	FYGP AN 4 B, 22,0 mm^2, LN 9251
	FYGP AN 14 B, 2,0 mm^2, LN 9251
	FYGP CP AN 16B, 1,2 mm^2, LN 9251
	FYGP AN 22 B, 0,4 mm^2, LN 9251

Terminal blocks, cable shoes..

4. Safety equipment

Straps	GADRINGER BAGU 14, L-40.070/16
	SCHUGU 11, L-40.071/05
	or EFA 602 (for France)

5. Special Equipment (optional)

5.1 Radio and Navigation Aids

Radio	DITTEL FSG 15, 12 V, 12 channels, 2 W output, incl. accessories
	Dittel FSG 16, 12 V, 12 channels, 6 W output, incl. accessories
	BECKER AR 7, 12 V, channels W output, incl. accessories
	BECKER AR 400, 12 V, 360 channels, W output, incl. accessories
	ARC - NT 532 A, 12 V, 360 channels, 6 W output, incl. accessories
Navigation Aids:	BECKER NR 200, VOR/LOC incl. accessories
	ARC - R 542 A, VOR, incl. accessories
	BECKER HOMING ZVG 2, incl. accessories
	KING ADF 80 G, incl. accessories
	BENDIX T 12, Cg, ADF, incl. accessories
Combined Sets	ARC NT 522 A, NAV/COM
	KING KX 175, NAV/COM

5.2 Other Instruments

Sensitive Variometer WINTER STV 5 (rear panel)
Electrical variometer VW 3 C 1, 12 V, ± 3 m/s
Electrical variometer VW 5 KB, 12 V, ± 5 m/s
Computer PIROL 17, 12 V, ± 5/10 m/s
Compass AIRPATH C 2300 or LUDOLPH FK 16 or
VION Typé 112 (rear panel)
Remote compass DITTEL MC 1428, 14 V
Turn and bank indicator GAUTING WZ 402/30, 12 V
Horizon BENDIX J 8 with converter, 12 V
GAUTING KH 6532, 12 V

Bank indicator WINTER QM I or QM II (rear panel)

Engine hours recorder VDO 331.809/007/070

Flight hours recorder FZM indicator and actuator

G-meter BENDIX MS - 28 025 - I

Sensitive altimeter WINTER 4 FGH 10

Clock JUNGHANS Bo UK 1

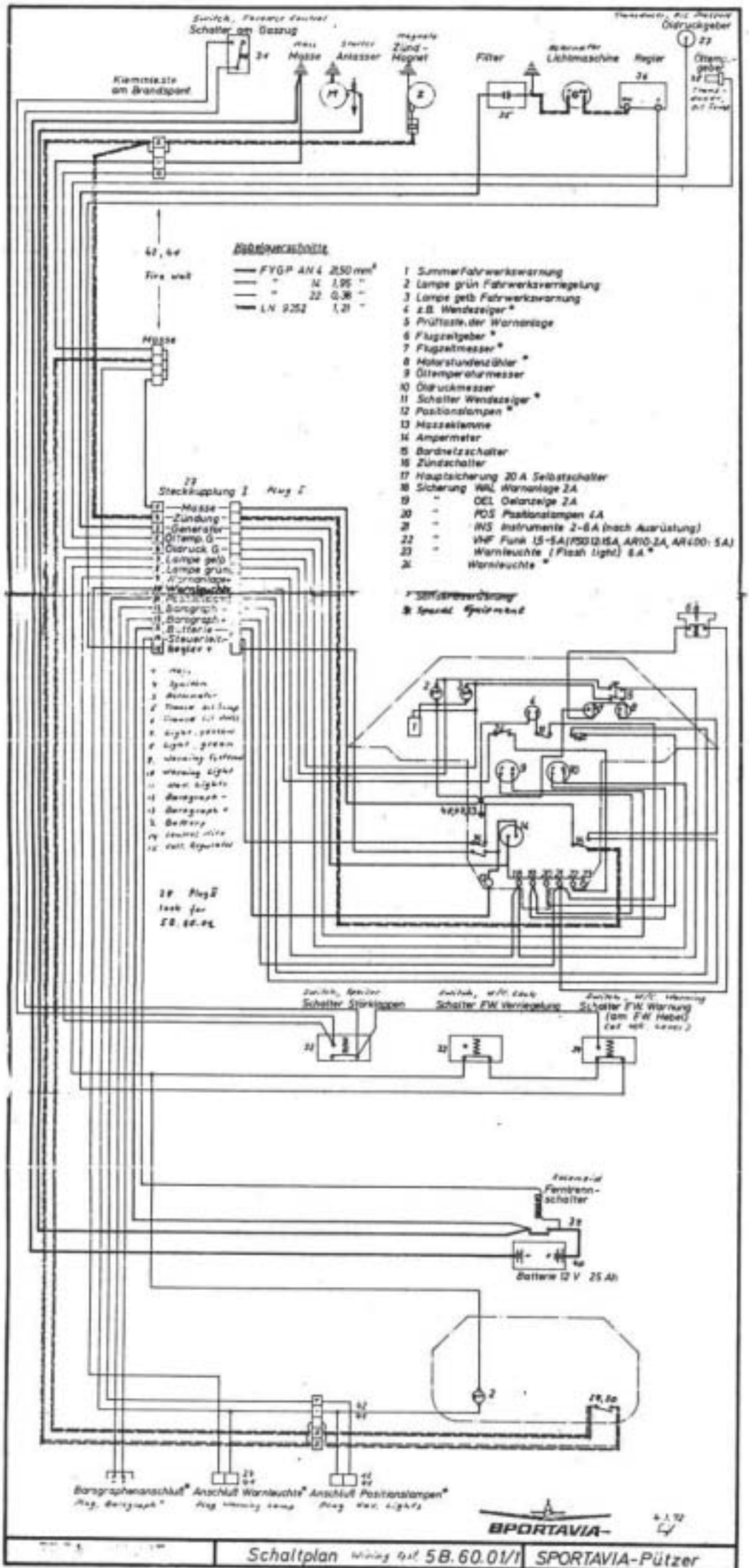
REVUE Type B 6

5.3 Other Equipment

Navigation lights HELLA

Anti - collision light DITTEL ACL 4 or HELLA

Ignition switch with key BENDIX 10.357 290


Schalter am Gaszug
Klemmleiste am Brandspant
Masse
Anlasser
Zünd-Magnet
Filter
Lichtmaschine
Regler
Öldruckgeber
Ölthermometergeber
42,64
Fire wall
Masse
Kabelquerschnitte
FVGP AN 4 2,50 mm²
" N 1,95 "
" 22 0,38 "
LN 9252 1,21 "
1 Summer Fahrwerkswarnung
2 Lampe grün Fahrwerksverriegelung
3 Lampe gelb Fahrwerkswarnung
4 z.B. Wendezeiger *
5 Prüftaste der Warnanlage
6 Flugzeitgeber *
7 Flugzeitmesser *
8 Motorstundenzähler *
9 Öltemperaturmesser
10 Öldruckmesser
11 Schalter Wendezeiger *
12 Positionslampen *
13 Hosseklemme
14 Amperemeter
15 Bordnetzschalter
16 Zündschalter
17 Hauptsicherung 20 A Selbstschalter
18 Sicherung WAL Warnanlage 2A
19 " OEL Oeldruckanzeige 2A
20 " POS Positionslampen 4A
21 " INS Instrumente 2-8A (nach Ausrüstung)
22 " VHF Funk 15-5A (FS 013 15A, AR 10-2A, AR 400-5A)
23 " Warnleuchte (Flash light) 8A *
24 Warnleuchte *
Steckkupplung
Masse
Zündung
Generator
Öltemp. G
Öldruck G
Lampe gelb
Lampe grün
Warnanlage
Warnleuchte
Batterie
Steuergerät -
Regler +
Schalter Klappen
Schalter FW Verriegelung
Schalter FW Warnung (am FW Hebel)
Fernbrennschalter
Batterie 12 V 25 Ah
Bargraphenanschluß*
Anschluß Warnleuchte*
Anschluß Positionslampen*
BPORTAVIA
Schaltplan Wiring dgl. SB.60.01/1
SPORTAVIA-Pützer

Appendix 4: Placards

Other than registration number and flag the following placards must be on the aircraft:

4.1 Placards outside the cabin

- near the fuel filler cap:

  8.4 Imp. Gall. AVGAS 100/130

  Vent opening must be forward

- near the oil filler cap:

  0.55 Imp. Gall. HD-oil according to Flight Manual

- near the fuel filter drain:

  While draining keep wings level

- over main wheel on the wheel well door:

  36 PSI

- over tail wheel, if pneumatic tyre is installed

  36 PSI

4.2 Placards inside the cabin

- left side wall:

  SPOILER IN

  SPOILER OUT

- near the pedal adjustment wheel:

  PEDAL ADJUSTMENT

- near the undercarriage lock

  UNDERCARRIAGE LOCK

- right sidewall

UNDERCARRIAGE RETRACTED

UNDERCARRIAGE EXTENDED

NOSE DOWN - TRIM - TAIL DOWN

This aircraft is built in accordance with the German Normal - Powered - Glider regulations.

The limits given by placards, markings and manuals must not be exceeded.

Airspeeds:

V_{NE} - maximum speed - 140 mph (122 kts)
V_A - manoeuvring speed - 103 mph (90 kts)
V_{LO} - max. U/C operating speed - 80 mph (70kts)

Weights:

Max. all-up weight - 1500 lbs
Min. load front seat - lbs

(see weight and balance in Flight Manual)

Aerobatics and Cloud-flying not allowed.

- near the canopy emergency release

EMERGENCY RELEASE

- near the U/C emergency release (rear panel):

U/C EMERGENCY RELEASE

- instrument panel

IGNITION ON / OFF

NO SMOKING

- baggage compartment

BAGGAGE MAX. 10 lbs

TYPE:	RF 5 B - SPERBER
Serial No.	Year:
Manufacturer:	SPORTAVIA - Pützer GmbH & Co KG 5377 Dahlem-Schmidtheim Flugplatz

Appendix 5: Markings

The following instruments have markings:

5.1 Front Panel

- rpm gauge:

green arc from	700	to	3200 rpm
yellow arc from	3200	to	3600 rpm
red line at			3600 rpm

- oil temperature gauge:

red line at		50° C
green arc from	50° C	to 120° C
red line at		120° C

- oil pressure gauge:

red line at		1.0 kp/cm^2
green arc from	1.0	to 4.0 kp/cm^2
red line at		4.0 kp/cm^2

- airspeed indicator:

green arc from	47	to 103 mph
yellow arc from	103	to 140 mph
white arc from	53+	to 140 mph
red line at		140 mph

5.2 Rear Panel

- airspeed indicator marked same as before

5.3 General note

If markings are put on the cover glass there must be a blue check marking between cover glass and housing.

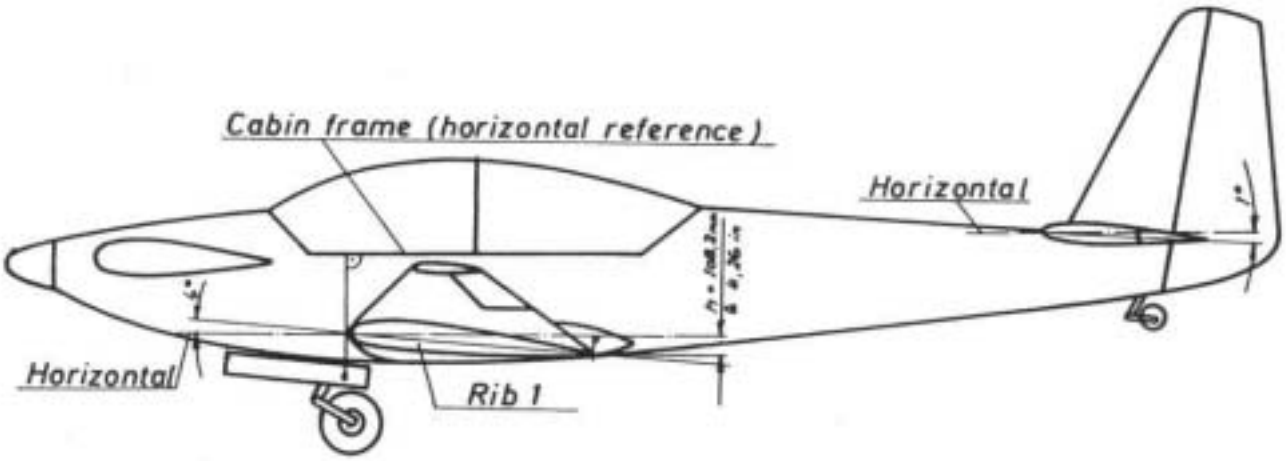
5.4 Control Lever

The following levers have colour markings:

- spoiler	blue
- trim	green
- canopy lock	white
- canopy emergency release	red
- undercarriage	yellow

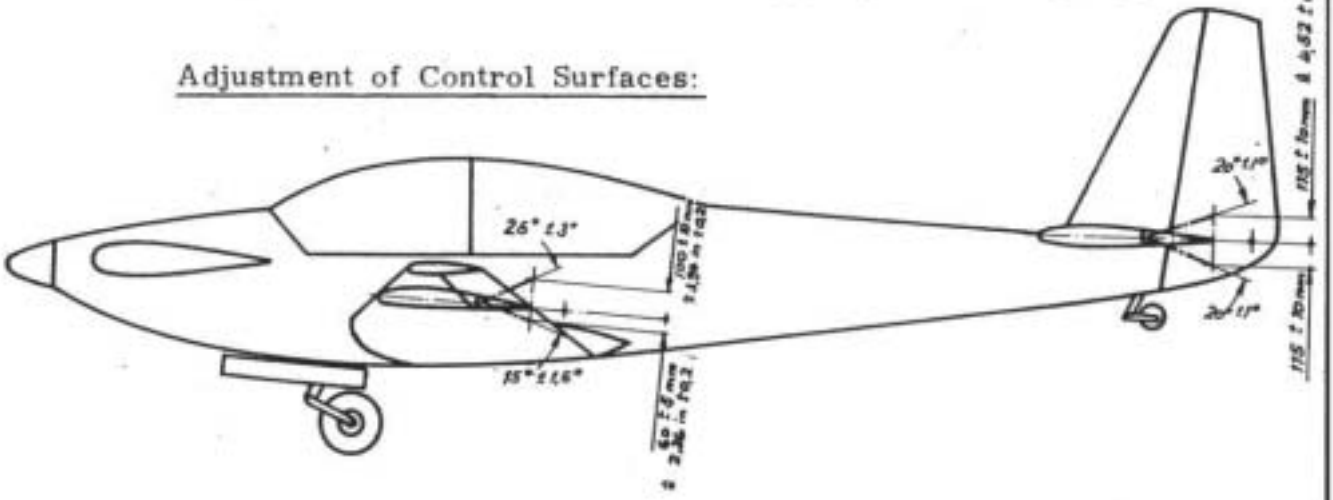
Appendix 6: Adjustment Data

Adjustment of Wing - Fuselage - Stabilizer



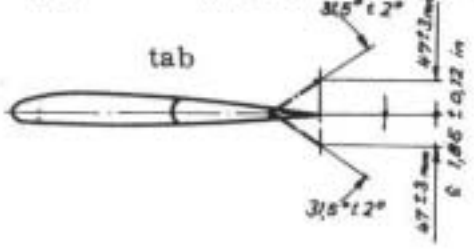
Wing section center line from leading edge to trailing edge

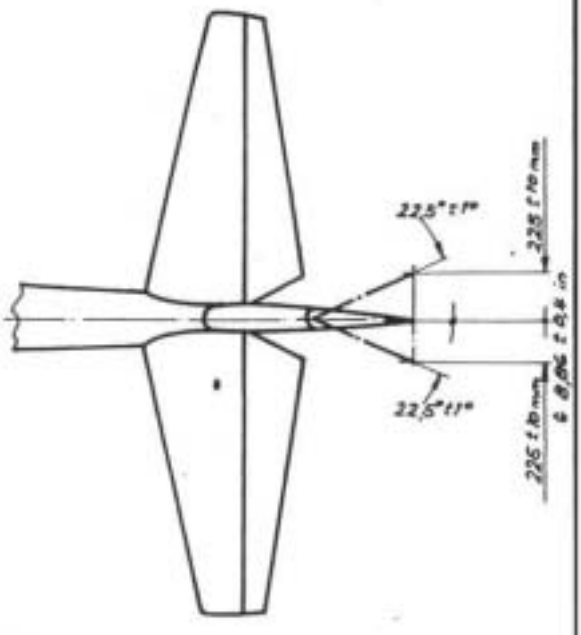
Adjustment of Control Surfaces:



Measurement taken from axis

Aileron	235 mm	≙	9.25 in
Elevator	335 mm	≙	13.18 in
Rudder	590 mm	≙	23.23 in
tab	90 mm	≙	3.54 in





Instructions for Measurement of Angle of Incidence

Angle of incidence between wing and fuselage is + 4°

Method:

- balance cabine frame horizontal
- mark front point of leading edge perpendicular to horizontal cabin frame
- find the difference in height between front point of leading edge and trailing edge using a vinyl tube filled with water. Difference shall be about 108 mm ≙ 4.26 in
- compare by same method the angle of incidence of right wing to left wing at sections rib 1, 11, 18 and 28.

Control Surface Movements

Aileron up	25°	± 3°	≙	3.94 ±	0.4 inch
down	15°	± 1,5°	≙	2.36 ±	0.2 inch
Elevator up	20°	± 1°	≙	4.52 ±	0.4 inch
down	20°	± 1°	≙	4.52 ±	0.4 inch
Trim tab up	31,5	± 2°	≙	1.85 ±	0.12 inch
down	31,5	± 2°	≙	1.85 ±	0.12 inch
Rudder left	22.5	± 1°	≙	8.86 ±	0.4 inch
right	22.5	± 1°	≙	8.86 ±	0.4 inch

SPORTAVIA– PÜTZER
D-5377 Dahlem - Schmidtheim
Luftfahrttechnischer Betrieb Lizenz LBA II-A-41
Herstellungsbetrieb Lizenz LBA I-B 8

Prüfbericht

Datum:

Muster: RF 5 B - Sperber | Werk-Nr.: | D- ./.

Kennblatt-Nr.: | Ausgabe: | Baujahr:

Halter:

Betriebszeiten	Muster	Werknummern	Betriebsstunden Gesamt	Betriebsstunden seit letzter Grundüberh.
Luftfahrzeug				
Motor				
Propeller				

Das vorgenannte Luftfahrzeug wurde nach den Vorschriften des dritten Abschnittes der Prüfordnung für Luftfahrtgerät geprüft.

☐ in einer Stückprüfung
☐ in einer Prüfung für die Erteilung einer Vorläufigen Verkehrszul.

Das Luftfahrzeug ist ausgerüstet für die Verwendung in der Kategorie:

☐ nichtgewerblicher Verkehr ☐ Luftarbeit ☐ Schleppen von Segelflugzeugen ☐ Anhängern ☐ Lasten
☐ Personenbeförderung 3 ☐ Absetzen von Personen und Sachen ☐ Luftbild
☐ Personenbeförderung 2 ☐ Zwecke der Land- und Forstwirtschaft ☐ Reklame

Bordfunkanlage: ja ☐ nein ☐ Die Genehmigungsurkunde zum Betrieb der Bordfunkanlage liegt vor: ja ☐ nein ☐
IFR-Ausrüstung: ja ☐ nein ☐ Die Daten stimmen mit der eingebauten Bordfunkanlage überein: ja ☐ nein ☐

Lfd. Nr.	Bericht oder Befund

Zu diesem Prüfbericht gehören folgende zur Zeit gültigen Prüfaufzeichnungen und -Unterlagen:

Flugbericht	vom	Einstellbericht	vom
Gewichtsübersicht	vom	Prüfbericht für Bordfunkanlage	vom
Ausrüstungsverzeichnis	vom		vom
	vom		vom
	vom		vom

Verteiler:
Halter
Betrieb

Das Luftfahrzeug ist lufttüchtig und stimmt mit den Angaben des Kennblattes überein.

(Ort und Datum) (Stempel) (Unterschrift)

Flugbericht

Stück
zum Nachprüfbericht vom:

Motorseglermuster: RF 5 B - SPERBER | Werk-Nr.: | D-K -

Beanstandungen:

ja	nein		ja	nein	
		Sitze			Startverhalten
		Gurtzeug			Zündschalter
		Haube			Ladekontrolle
		Belüftung			Vergaservorwärmung
		Bedienhebel			Übergang
		Steuerung			Radbremse
		Hinweisschilder			Kabinenheizung
		Brandhahn			Bordfunkanlage

	Uhr Startzeit
	Uhr Landezeit
	min. Flugzeit

	Eigenstart
	Windenstart
	Flugzeugschleppstart

kg		Fallschirm mit	Fallschirm ohne
	Leergewicht		
	Pilot		
	Begleiter		
	Kraftstoff		
	Gepäck		
	Fluggewicht		

Höhenmesser-Kontrolle	Anzeige	Platzhöhe
QFE		
QNH		

Steigflug Zeit	Höhe	Geschw.	Vario
min.			
0			
Reiseflug			0
max. Geschwindigkeit im Horizontalflug			0

Standlauf	Drehzahl U/min.	Schmierstoff Druck atü	Schmierstoff Temperatur °C	Kraftstoff Druck	Zylinderkopf Temperatur
Vollast					
Leerlauf					
Stellung der Höhenruder-Trimmung T_{St}					
T_R					

Flugeigenschaften:

	Motor	K + F	Flugabschnitt		Bemerkungen	Beanstandungen ja	nein
1	Reisedrehzahl	EIN	Geradeausflug	T_R			
2	Reisedrehzahl	EIN	Kreisflug				
3	abgestellt	EIN	Geradeausflug	T_{St}			
4	abgestellt	EIN	Kreisflug				
5	abgestellt	EIN	Langsamflug	T_{St}	Art der Warnung:		
6	abgestellt	AUS			Überziehgeschw.		
7	Leerlauf	AUS					
8	Vollastdrehzahl	AUS					
9	Vollastdrehzahl	EIN					
10	höchstzul. Drehzahl	EIN	Schnellflug		höchste geflogene Geschwindigkeit		
11	Leerlauf	AUS	Landung	T_L	Aufsetzgeschwindigkeit		

Hinweise, Beanstandungen:

		Prüfvermerk

- ☐ fliegerisch einwandfrei
- ☐ nochmals nachfliegen
- ☐ nach Behebung der Beanstandungen ohne Nachflug einwandfrei

Ort und Datum

Unterschrift des Piloten

Stempel

Unterschrift des Prüfers

SPORTAVIA– PÜTZER
D-5377 Dahlem - Schmidtheim
Luftfahrttechnischer Betrieb Lizenz LBA II-A-41
Herstellungsbetrieb Lizenz LBA I-B 8

Ausrüstungsliste

Datum: | Blatt 1

Muster: RF 5 B SPERBER | Werk-Nr.: | D- ./.

An-zahl	Gegenstand und Musterbezeichnung	Werk Nr.:	Bestätigung des Ein- oder Ausbaues
1	Motor SPORTAVIA-Limbach SL 1700 E		
	Propeller Hoffmann HO 11*-145 B 80 L		
	Verstellpropeller HO V 62 R/L 150 A		
1	Batterie Rabat 12 V 25 Ah		
1	Generator Ducellier 7522 12 V 280 W		
1	Regler Ducellier		
1	Anlasser Fiat 76-0,5/12 S, 12 V/130 A		
1	Zündmagnet		
1	Vergaser Stromberg 150 CD		
1	mech. Kraftstoffpumpe Pierburg VW 3 - 8256		
4	Zündkerzen Bosch WB 250 ERT 1 0,5		
1	Hauptschalter MARQUARDT 2 A 250 V		
1	Zündschalter MARQUARDT 2 A 250 V		
	Zündschloß Bendix Type GM umgebaut		
1	Hauptschalterrelais RBM 111-131 S 1579-2		
1	Sicherungsschalter ETA 20 A		
6	Sicherungshalter 20 x 5		
4	Endschalter MARQUARDT 10 A 250 V		
3	Mikroschalter AC 6 A 125 V 3 A 250 V		
1	Testknopf 2 A/250 V		
1	Summer Simens U 23303 / W 0102		
1	Kontrollampe grün 12 V		
1	Kontrollampe gelb 12 V		
-	Positionslichter HELLA		
-	Zusammenstoßwarnlichter		
1	Bauchgurt		
1	Bauchgurt		
1	Schultergurt		
1	Schultergurt		
4	Kissen		
1	Fahrtmesser		
1	Fahrtmesser		
1	Höhenmesser		
1	Höhnemesser		
1	Variometer		
-	Variometer		
-	Variometer		
1	Querneigungsmesser		
1	Magnetkompaß		
1	Magnetkompaß		
1	Drehzahlmesser GRUBER		
1	Öldruckmesser VDO 350.251/002/021		
1	Öltemperaturmesser VDO 310.254/075/001		
1	Amperemeter VDO 190.004/027/029		
1	Kraftstoffvorratsmesser Peilstab mit Schw.		
1	Öldruckgeber VDO 360.001/029/001		
1	Öltemperaturgeber VDO 323.801/004/12		

Verteiler:
Halter
Betrieb

9.5.73 Mö

(Unterschrift)

SPURNAVIA — PÜTZER
D-5377 Dahlem - Schmidtheim
Luftfahrttechnischer Betrieb Lizenz LBA II-A-41
Herstellungsbetrieb Lizenz LBA I-B 8

Ausrüstungsliste

Datum:

Blatt 2

Muster: RF 5 B SPERBER

Werk-Nr.:

D- ./.

An-zahl	Gegenstand und Musterbezeichnung	Werk Nr.:	Bestätigung des Ein- oder Ausbaues
	Kabinenheizungsanlage nach Zeichn.		
1	Zusatzbelüftung nach Zeichn.		
1	Luftbereiftes Spornrad nach Zeichn.		
	Sprechfunkgerät Dittel FSG 12		
	Dittel FSG 15		
	Dittel FSG 16		
	Becker AR 7		
	Becker AR 400		
	ARC NT 532 A		
	Navigationsgerät Becker NR 200		
	IN 522		
	ARC R 542 A		
	KING ADF 806		
	Bendix T 12 G		
	NAV-COMM-Geräte ARC NT 522 A		
	KING KX 175		
1	Antennen Sperrtopfantenne		
	Stabantenne		
	VOR-Antenne		
	Lup-Antenne		
	Sense-Antenne		
	Zusatzgeräte Becker Homing ZVG 2		
	Lautsprecher		
	Mikrophon		
	Hörsprechgarnitur		

Verteiler:
Halter
Betrieb

9. 5. 73 Mö.

(Unterschrift)

Einstellbericht

Datum:

Muster: RF 5 B SPERBER

Werk-Nr.: D- --

Einstellung	Bezugslinien	Soll	Ist
Tragflächen-Einstellwinkel	Rumpfobergurt (Kabinenrahmen)	+ 4°	
Tragflächen-Pfeilung	Holmhinterkante (30 %)	0°	
Tragflächen-V-Form	Holmunterseite	3°	
Höhenflossen-Einstellwinkel	Rumpfobergurt	+1°	
Schränkung	Flügelsehne der Wurzelrippe	-4°	

Ruderausschläge	nach oben Soll	nach oben Ist	nach unten Soll	nach unten Ist	Meßpunktentfernung vom Drehpunkt
Querruder links	100±10		60±5		235 mm
Querruder rechts	100±10		60±5		
Höhenruder	20°		20°		mm
Trimmruder	47±3		47±3		90 mm
					mm
					mm
Seitenruder	nach links 225±10		nach rechts 225±10		590 mm
					mm

Klappenausschläge	Soll	Ist links	Ist rechts	
Flügeleinstellung gemessen				
bei Rippe 1				
bei Rippe 11				mm
bei Rippe 18				
bei Rippe 28				

Hinweise und Anmerkungen: .....

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.....

.....

Die ermittelten Einstellwerte liegen innerhalb der vom Hersteller als zulässig angegebenen Toleranzen

(Stempel) (Unterschrift)

Verteiler:
Halter
Betrieb

Nr. S - 16/70

A. Gottlieba + J. Oeswalds Buchdruckereien Kirchheim unter Te