

- SF 25 E "SUPER-FALKE" -

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West Germany

FLIGHT MANUAL AND OPERATING HANDBOOK

for the SF 25. Series E, "SUPER-FALKE"
motorglider.
from Serial No 4301 onwards.

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The pilot is responsible for ensuring that the aircraft is operated in accordance with the Flight Manual. The Super-Falke is authorized to carry a maximum of two adults. The seating is side by side; the pilot seat is on the port side. The Super-Falke is authorized for training and the instructor may seat port or starboard. The starboard control stick may be removed for passenger flying.

1. Specifications and Limitations

1.1 Engine

Type: Limbach L 2000 EA I

Max. permissible rpm 3400 rpm, (max 5 minutes) (59 kW)

Max. continuous rpm 2800 rpm; (48 kW)

Min. continuous RPM: 2300 rpm

Static rpm at least 2600 rpm

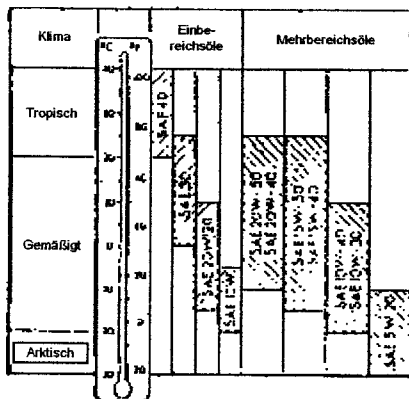
Max. cylinder head temperature at hottest cylinder: 250°C°

Avoid RPM's over 3100rpm, see SB 4C from Propeller Hoffmann

1.2 Fuel see LIMBACH SB 53.1 AVGAS 100LL or 4 star petrol (leaded auto gasoline).

Fuel Tank capacity 44 litres (11.6 Us/galls, 9.68 Imp/gall) wholly consumable)

1.3 Lubricants see LIMBACH SB 48. Do not use detergent or non-detergent aircraft engine oils. Use only a good quality API-classified (API SE/CC) motor oil:



Oil capacity: 2.5 litres (0.55 Imp galls/0.66 US galls)

Oil pressure range: 1 - 4 bar (15-60 lbs/sq in)

Minimum oil pressure at 2500 rpm 1 bar (15 lbsfsq in) Minimum oil

temperature before take-off: 50° C,

but not less than 70°C if carburettor icing conditions are likely Maximum oil temperature: 120°C

		US gal	Imp gal
Oil capacity in crankcase:	2.5 litres/	0.60	0.55
Minimum oil in crankcase:	1.5 litre/	0.40	0.33

1.4 Propellor:

2 blade wooden multi-pitch propellor:

HO - V 62 / L 160 T-10 or HO - V 62 R / L 160 T-10

LIMBACH Flugmotoren**Technical Bulletin****48****Subject:** Engine oils**Affected engine models:** All engines models

L 1700

L 2000

L 2400

Background information:

The engine oil specification released to date in accordance with API-SE or higher has repeatedly given cause for complaint. When inexpensive engine oils have been used, there has sometimes been cracking of the engine oil between valve shaft and valve guide of the exhaust valve. In extreme cases, this could lead to the valve sticking in the guide.

Priority: At next scheduled oil change

Compliance: Only quality engine oils mineral based or partially synthetic oils that comply at least with API-SG or API-SH specification may be used. These oils must also comply with Volkswagen standards VW 501 01 or VW 500 00. These modified specifications are to be entered by hand in operating manuals. These specifications will be integrated in the next revision of the operating manuals.

Remarks: Oils of the large mineral oil companies such as Agip, Aral, BP, Castrol, Dea, Elf, Esso, Mobil, Shell, Texaco and Veedel are to be understood as quality engine oils (Trademarks property of respective owners).

This document has been translated to the best of our knowledge. In case of doubt however only the German original shall be considered authoritative.

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LIMBACH Flugmotoren

Technical Bulletin

50

Subject: Fuel hoses**Affected engine models:** All engines models

L 1700

L 2000

L 2400

Background**Information:** The fuel hoses used to date are unsuitable for unleaded fuels**Priority:** When using leaded fuels, none; when using unleaded fuels, at the next 50-hour check.

Compliance: The fuel hoses mounted by the manufacturer are supplied as of now in a quality which permits the use of unleaded fuels. Already supplied fuel hoses on engines which are operated with a mixture of AVGAS 100 LL and unleaded fuels must be replaced. In the case of engines which are operated exclusively with leaded fuels, a change in the fuel lines is not necessary. In addition, we recommend that information is obtained from the manufacturer of the airframe regarding suitability of the fuel hoses installed for unleaded fuel.

Remarks: The new hoses can be recognized externally by a crimped sleeve (between hose and fire-protecting hose) at both ends of the hose.

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Technical Bulletin

53.1

Subject: Unleaded fuel**Affected engine models:** All engine models:

L 1700
L 2000
L 2400

Background information: Production stop of leaded automotive fuel.**Priority:** None**Compliance:** Series L 1700 and L 2400:

Engines of this series may be operated with immediate effect with unleaded fuel Super Plus unleaded, according to DIN EN 228. Other unleaded fuels may be used as long as they have a minimum octane rating of RON 98 and MON 88.

Series L 2000:

Engines of this series may be operated with immediate effect with unleaded fuel Super Plus unleaded according to DIN EN 228. Other unleaded fuels may be used as long as

- they have a minimum octane rating of RON 98 and MON 88 and
- the engines of this series have been adapted pursuant to Technical Bulletin 42

General Remarks (all engine models):

The following should be taken into account:

1. The engine's fuel lines must be suited for unleaded fuel. On this, please check Technical Bulletin 50.
2. The airplane's fuel lines and tank must be suited for unleaded fuel. On this matter, please contact the airplane manufacturer or follow his instructions in this context.
3. Use brand name fresh fuel only. Storage of unleaded fuel is limited. Prolonged storage of fuel in open tanks may cause evaporation of light volatile components and a change in the fuel's properties. On addition, fuel properties are affected by seasonal changes.
4. The engine's temperature should be kept at the lowest possible level. Ideal is less than 180 °C in a climb. In this context see Technical Bulletin 44.
5. Use of additional additives is not permitted.
6. Mixing of lead and unleaded fuels is not advisable.
7. References in the manuals are to be added in handwriting.

Note: Technical Bulletin 40 is herewith invalid.**Remarks:** This document has been translated to the best of our knowledge. In case of doubt however only the German original shall be considered authoritative.**Approval:** This Technical Bulletin is approved in accordance with the procedures of the LBA approved development organization I-EC 27.

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LIMBACH Flugmotoren



Technical Bulletin

54

Subject: Oil- and Fuel hose assemblies**Affected engine models:** All engine models:

L 1700

L 2000

L 2400

Background information: Change of material specification, improved quality of hoses.**Priority:** None**Compliance:** Fuel- and Oil hoses manufactured by Limbach Flugmotoren GmbH & Co. KG have an extended service life of 5 years. The expiration date is inscribed on the crimp-on clamp at the end of the hose. The markings have the format MM/YY. As an example the marking 04/02 would mean that the hose must be replaced until April 2002.**Note:** Only the expiration date engraved on the clamp is valid. Old hoses are not affected by this bulletin. Correct the operating manual accordingly in handwriting.

This document has been translated to the best of our knowledge. In case of doubt however only the German original shall be considered authoritative.

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1.5 Engine instrumentationRev counter

Normal operating range:	700 - 2800 rpm (green arc)
Caution range: max. 5 minutes	2800 - 3400 rpm (yellow arc)
Max. rpms permitted:	3400 rpm (red line)
Static rpms:	2600 - 2800 rpm (white arc)

Engine-hours indicator

This counts 2800 revolutions of the engine as one minute of engine time & gives a 5 digit reading: the first three digits represent completed hours & the last two show 10ths and 100ths.

Oil pressure gauge

Operating Range: 1 - 4 bar (15-60 lbs/sq in)(green arc)

Maximum pressure: 4 bar (60 lbs/sq in) (red line)

Oil temperature gauge

Operating range: 50° - 120°C (green sector)

Minimum temperature 50°C (red line)

Maximum temperature 120°C (red line)

Cylinder head temperature

Max. Temperature 250° C (red line)

1.6 Master Switch

The master switch isolates the battery from the aircraft electrical system. It is switched on before flying and off after the flight is completed. It may also be switched off whilst soaring engine-off. With engine running, only switch off in case of emergency (e.g. short circuit, jammed starter relay).

1.7 Circuit breakers

The electrical system (excluding the starter circuit) is protected against overload & short circuit by circuit breakers.

	Ducellier gen	Ducati gen
circuit breaker for battery	25 A	20 A
circuit breaker for generator	20 A	17 A

A short circuit or overload will trip the red button of the circuit breaker affected. After correction of the fault the red button is pressed to restore the circuit. If the battery charge is low (e.g. repeated attempts at starting in winter) the button of circuit breaker 11 may trip whilst the engine is running (in flight) (see wiring diagram Operating Handbook p 14)

1.8 Ammeter

With a well-charged battery, the ammeter indicates no current flow with the engine running. With a discharged battery the ammeter will give a positive (+) reading as the battery is re-charged. With extra heavy auxiliary leads, or if the engine is stopped, the ammeter will register discharge from the battery (-). Continuous heavy charging when the engine is running indicates that the battery is no longer able to hold a charge (i.e. too old) or that the regulator is faulty.

1.9 Aerial connection

A top-loaded aerial is incorporated within the fin. The coaxial cable runs from the aerial to a point beneath the luggage locker where the remainder of

the cable is coiled and secured. From there it can be routed to a radio when installed. When fitting a radio the appropriate regulations are to observe.

1.10 Fused terminal strip for extra electrical equipment

Located on the fireproof bulkhead is a fused terminal strip for extra electrical equipment, such as radio, transponder & position lamps. The fuses should be appropriate to the current load of the specific equipment installed. Voltage 12 V DC, negative earth (ground).

When fitting additional equipment observe the relevant regulations.

1.11. Airspeed limitations and load factors

This table shows maximum airspeeds under different conditions:

	Speed	IAS		Comment
		Kph	knots	
V_{NE}	Maximum speed in calm conditions	190	102	Never exceed this speed. Control surface movements must be limited to one third travel.
V_{RA}	Maximum speed Rough air speed	160	86	Do not exceed this speed except in calm air conditions and then only with caution. See Note 1.
V_A	Manoeuvring speed	160	86	See Note 2

Note 1: Rough air means conditions which may be encountered in wave rotor, cumulo nimbus clouds, whirlwinds and when flying over mountain ridges.

Note 2: At speeds in excess of V_A do not make full or abrupt control movements, as they could overstress the aircraft.

Airspeed indicator markings.

Marking	Speeds		Explanation
	kph	knots	
green arc	75 - 150	43-80	Normal operating range, see Note 3
yellow arc	150 - 190	80-102	Caution range
red line	190	102	Maximum permissible speed for all operating modes
blue line	90	49	Best rate of climb
yellow triangle	90	49	Minimum approach speed at maximum weight

Note 3: The lower limit applies to maximum weight and most forward CG position, at 1,1 V_{S1}. (V_{S1} is the minimum speed with spoilers extended). The upper limit is the maximum rough air speed.

Note 4: In this range manoeuvres must be conducted with caution and only in calm air conditions.

Δ Warning: The following loads must not be exceeded when flying accurately:

With spoilers closed at manoeuvring speed: (160 kph = 86 knots) **+6.3g**
at maximum speed: (190 kph = 102 knots) **+4.0g**

1.13 Masses

Empty masses	992 lbs
Payload (incl. Fuel)	441 lbs
Max. take off mass	1433 lbs
Max. Mass of non lifting parts	992 lbs

1.14 Centre of gravity at flying weights

Aircraft attitude: Wing chord rib 6 (2.20m (86½" approx) from centre line) horizontal.
Datum point: 2.00m (78½") in front of the leading edge of the root rib 0. (0.52 (20½") from centre line).
Forward limit of C.G: 2.129m (83 13/16") aft of datum.
Rearward limit of C.G: 2.293m (90¼") aft of datum point.

1.15 Placards and warnings

Apart from the fireproof type-plate and the usual placards, the following signs must be appropriately displayed:

1. Port side of cockpit by the levers:
 - "SPOILERS - full travel operates wheel brake"
 - "Nose down - TRIMMER - nose up"
 - "Open - COWLING FLAP - close"
2. On the instrument panel, by the controls:
 - "CHOKE - pull rich"
 - "IGNITION - on - off"
 - "FUEL - off - on"
 - "MASTER SWITCH - on - off"
 - "COCKPIT HEATER - pull"
 - "STOP PROPELLOR BEFORE FULLY FEATHERING"
 - "THROTTLE"
 - "VENTILATION"
 - "STARTER"
 - "PROPELLOR BRAKE"
 - "CARBURETTOR HEAT"
3. By the canopy emergency jettison handle:
 - "CANOPY JETTISON"
 - 1. Propellor not feathered
 - 2. Pull on front & top handles and throw clear to right.
4. On the rear wall of luggage locker:
 - "LUGGAGE - MAX 10 kg" (US: "LUGGAGE - Max 22 lbs")
5. On the fuel gauge:
 - "LITRES FUEL - correct reading when tail on ground or flying at 40 knots" ("US GALLS FUEL at 47 mph)
6. On the fuselage near the fuel tank filler cap:
 - "AVGAS 100L or normal 4 star petrol (leaded gasoline)"
 - Fuel tank capacity: 44 litres (or 11½ US gallons)
7. On the fuselage above the main wheel:
 - "2.1 atm" (or "31 lbs/sq in")
 - Above the tail wheel:
 - "2.5 atm" (or "37 lbs/sq in")
8. By the oil filler: "Oil 2.5 litres" (or Oil .66 US gall)
9. On the instrument panel
 - "CAUTION! WET WINGS - see Flight Manual"
 - "ENGINE RUNNING = COWLING FLAP OPEN"
 - "NO SMOKING"
 - "PRE-TAKE-OFF CHECKS: Folding wings secured, canopy locked, safety straps securely fastened, trimmer set, spoilers locked, full & free movement of controls, fuel cock open, fuel level, cowling flap open, propellor pitch set for take-off".

see Lim-
bach SB 53.1

- 1.15 Aerobatic manoeuvres, cloud flying
Motorglider SF 25 E "SUPER-FALKE" is certified for DAY-VFR-Flights. Flights in IFR- and/or Icing conditions, Aerobatics and cloud flying are not permitted.

2. Operating Instructions

2.1 General

The Super Falke is a self-launching motor glider and may be flown with an MGPPL (Motor Glider Private Pilot's Lic.). It is of course necessary for the pilot to have a thorough understanding of motor gliders, and the operation of the engine and the propellor before flying the aircraft. He must become thoroughly acquainted with the Flight Manual & Operating Handbook and master the essential details of the airframe, engine and propellor.

2.2 Daily inspection

Before commencing the days flying or after rigging the aircraft, it is necessary to inspect the airframe, the engine and the propellor. The following checks should be made;

2.2.1 Airframe

During the inspection everything shall be checked carefully (no cracks or deformations), including safety pins, pulleys and cables, as well as play in the controls.

- 1) Check the four wing attachment points. Check that the main bolt is fully home and secured. (See AD 82-134/ SB 653-42)
- 2) Check that the aileron controls in the fuselage are connected and secured. (See AD 94-001/2 enclosure 1 and AD 93-001/3 enclosure 2)
- 3) Check that the spoiler control in the fuselage is connected.
- 4) Check the battery (electrolyte level), battery holder and the vents.
- 5) Check the controls from the cockpit for full and free movement & the starboard control column secure
- 6) Check rudder operates in correct sense (tailwheel prevents full & free movement on ground).
- 7) Check pulleys and fairleads, and cables for wear and kinking.
- 8) Check operation of spoilers from cockpit.
- 9) Check the effectiveness of the brake.
- 10) Check the instruments (and radio if fitted).
- 11) Remove pitot cover. If necessary, drain the pitot by removing the drain plug, accessible through the hand-hole under the tail plane. Check after exposure to rain and drain as necessary.
- 12) Check that the safety harnesses and their fittings are in proper condition and secure.
- 13) Luggage should be secured by the straps in the locker.
- 14) Check for foreign objects.
- 15) Check the canopy, canopy lock, canopy jettison system and direct vision window.
- 16) Check the spar/fuselage cover plates on the underside at both sides of the fuselage.

- 17) Are both outriggers in good order and correctly attached?
- 18) Are both the folding wings properly locked and secured?
- 19) Check that both wing fairings are securely attached.
- 20) Check both pushrods at the aileron.
- 21) Check that both ailerons are attached and secured.
- 22) Tailplane - check that the front connection is tight and secured.
- 23) Check that the elevator is connected to the pushrod and secured.
- 24) Check that the Bowden cable to the elevator trimmer is correctly connected.
- 25) Rudder: check lower rudder bearing, attachment of rudder and control cables. After rigging check that the rudder moves in the correct sense.
- 26) Check the rudder/tailplane fairing.
- 27) Check the tail-wheel assembly bearings for ease and freedom of movement.
- 28) On the main-wheel, tail-wheel and outriggers, check tyre condition and pressures.
- 29) Check the underside of the fuselage for damage or oil.
- 30) Check the general condition of the plywood and fabric painted surfaces of the aircraft.

2.2.2 Engine (see also the Engine Manual)

- 1) Check the engine thoroughly for missing or loose nuts, bolts, screws etc. Check the circuit breakers and fuses, cooling duct, ignition leads and V-belt for condition and beware of chafing.
- 2) Check that the following operate freely: throttle, choke, heating, ventilation, carburettor heating and cooling flap.
- 3) Check oil level and top up if necessary. The oil level should be checked after every hour or two and after every longer flight.
- 4) Check that there is no leakage or chafing in oil or fuel lines.
- 5) Examine fuel filter and clean if necessary.
- 6) Check the engine mounting for security.
- 7) Check cooling ducting for cracks and secure attachment.
- 8) Check the engine bay for foreign bodies.
- 9) Examine the cowling for cracks, replace, and ensure that all the fasteners function correctly.
- 10) Check the fuel tank level.
- 11) Check that the fuel tank vent is not blocked. Use only the original filler cap with vent (bearing the words "Patent blau").

2.2.3 Propellor (see also Propellor Handbook)

- 1) Check that the blades are secure and that there is no play at the tips (up to 1° permissible).
- 2) Examine the propellor for indentations, splits and other damage. The propellor should be cleaned frequently of insects and grass.

- 3) All bolts must be tight (nuts wire locked).
- 4) Check the spinner for cracks; make sure the nuts are tight.
- 5) Test the pitch mechanism. Except when feathered, the ball bearing of the pitch control lever must not touch the swash plate (pressure/thrust plate) of the prop. The clearance between the bearings & the plate must be identical in each case. The distance of the bearings from the axis of the propeller shaft must also be identical. Check finally that the depth of scoring made by the ball bearings where they contact the swashplate does not exceed a maximum of 0.2mm (.008")

2.3 Pre take-off checks

It is essential to check the following points before each flight:

- 1) Folding wings secured.
- 2) Canopy closed & locked.
- 3) Safety harness(es) on and secured.
- 4) Trimmer set.
- 5) Spoilers closed & locked.
- 6) Full & free movement of controls.
- 7) Fuel on.
- 8) Fuel in tank.
- 9) Cowling flap open.
- 10) Propeller pitch set for take-off.

2.4 Starting the motor glider

Before a cold start, especially in cool weather, switch off the ignition, then turn the propeller in the normal direction a few times. Check whether you can hear the click of the magneto (you must!) and listen for any abnormal sounds. Is any unusual resistance felt when turning the propeller? After these checks have been carried out, the motor glider is ready for service.

2.4.1 Starting the engine (see also Engine Handbook)

Before starting, ensure that someone stands to the left of the machine to make sure that no one is near the propeller. All club members and also any spectators must be made aware of the dangers of propellers. Before starting the engine, the pilot calls from the cockpit "CLEAR PROP" & the observer confirms by repeating "CLEAR PROP" that the area around the propeller is clear. Then, and only then, proceed to start the engine.

Starting procedure:

Apply the parking brake

Set the propeller pitch control to "CLIMB"

Open cowling flap

Fuel stopcock open

Pull choke (for cold engine only)

Push in the throttle about $\frac{1}{4}$ " from the fully out position

Master switch on

Switch off any sensitive electrical equipment

Ignition on

Is the propeller clear?

Press the starter button

As soon as the engine starts, release the starter button, push in the choke and set the throttle so that the motor ticks over at 1000 r.p.m. The oil pressure should increase within 10 seconds. (if not, SWITCH OFF)

When cold, the engine will usually start within 2 - 3 seconds. Then return the choke immediately or the engine will flood and stop. If the motor fails to start after two attempts, push in the choke and try again with the throttle closed or slightly open.

Failure to start after five attempts would probably indicate flooding. In this case, switch off the ignition, push in the choke, open the throttle completely & turn the engine over backwards by hand with the propeller between 8 & 12 times. Then try starting again with full throttle, reducing the throttle setting as soon as the engine starts.

A warm engine is best started with the choke pushed in and with the throttle at a tick-over setting.

2.4.2 Hand starting the engine

The engine can also be started by cranking the propeller, the pilot remaining in the cockpit. The same comments apply with regard to choke & throttle as when starting with the electric starter (2.4.1)

Never hand start without a chock in front of the mainwheel. Take up a good, firm position facing the propeller. Call "Switch off" to the person in the cockpit who checks that the ignition switch really is in the off position before answering "Off". Pull the propeller past the ignition point once or twice. Impulse click of magneto will be heard. Ensure that your hands are clear of the propeller when it starts.

First pull the propeller over several times with the ignition "OFF", only after confirmation from the cockpit that it is "OFF". Ignition "ON" followed by shouted confirmation from the cockpit of "ON". Continue as for starting with the electric starter.

2.4.3 Warming up, Static rpm (see also Engine Handbook)

Warm up the engine by first running it at 1000 rpm for about 2 minutes, then at 1500 rpm for 5 - 10 minutes until the oil reaches operating temperature of 50°C. If the take-off point is some distance away, the engine may be warmed up while taxiing. As soon as the operating temperature is reached, apply the brake, pull back on the control column to hold the tail down & run up the engine, after first confirming that it is clear behind the aircraft. Gradually open the throttle. Static test the engine by running at 2600 rpm for 20-30 seconds, whilst checking the oil pressure & temperature. Then return to tick-over.

Check of carburetor preheating function, decreasing rpm if carburetor preheating is working to 150 rpm. (Do not take off with Carburetor preheating is operating). After this check shut down Carburetor preheating, engine to ground idling.

2.4.4. Taxying

The outrigger wheels on the Super-Falke permit the

pilot to taxi unaided, and the steerable tailwheel (coupled to the rudder) gives a turning circle of 40-50 ft. The main-wheel brake will effectively stop the aircraft in a short distance. See also 2.14 Operating without the outrigger wheels.

During parking or hangar parking the Super-Falke may be steered by a helper holding the rudder.

2.5

Take off, climb

(Caution! See also 2.12 Wet wings - warning).

Preflight check list (see 2.3 or the placard in the cockpit).

Trim neutral, spoilers closed & locked, control stick central (do not push the stick forwards).

Apply full throttle.

Take off run normally about 240 metres (800 ft).

Whilst monitoring the revs, ease off the ground at 38 - 41 knots (44-47 mph) and hold level, letting the speed build up to 46-49 knots (53-56 mph) and then climb at 49-54 knots (56-62 mph) with the engine revs at about 2600 - 2800. Plan the climb to about 1000 ft. so that if necessary the airfield is within reach in case of engine failure. After reaching 150 - 250 feet the engine revs may be reduced. Check that the oil pressure & temperature readings are in the green sector.

To maintain adequate cooling of the engine whilst climbing, keep the airspeed high, especially in hot weather.

During a prolonged climb in hot weather monitor the oil temperature carefully: if it approaches the upper limit then fly faster & reduce engine revs, i.e. accept a shallower climb on reduced power.

2.6

Level flight

Level flight with propeller HO-V62/ L-160 T-10 (Propeller with feathering position) or HO-V62R/L-160 T-10 (Propeller with feathering-, climb- and cruising position)

Best cruising speed about 75-80 knots (87-93 mph) (2700- 2800 rpm),. Maximum continuous cruising speed is 81 knots (93 mph) at 2800 rpm.

The fuel gauge reads correctly at 41 knots (47 mph) with the engine stopped or ticking over.

2.7

Landing

The aircraft can be landed with the engine either running or stopped. Approach at about 49 knots (56 mph) maintaining the glide path with the spoilers. As the spoilers are effective, it is not usually necessary to slip the aircraft. The rate of sink at 46 knots (53 mph) is approx. 3.5 metres/second (11,5 ft/sec). At minimum touch-down speed (38 knots/44 mph) the Super-Falke touches down first with the tailwheel then with the main wheel. The landing run of about 300 ft can be effectively reduced with the aid of the mainwheel brake. The wheelbrake is operated by the spoiler control on the last part of its travel when it is pulled fully back, so do not attempt to touch down with the spoiler lever pulled fully back.

2.8 Stopping & starting the engine in flight

Before switching-off allow the engine to cool down by flying with the throttle closed or slightly open for 1 - 2 minutes. Reduce the air speed to about 43 - 46 knots (50-53 mph), throttle back, switch off all sensitive electronic equipment and then switch off the ignition. Whilst the propellor is still turning slow down the aircraft to reduce windmilling to the point where the propellor brake may be applied if desired. If the motor continues firing spasmodically through being switched off whilst still too warm, apply full throttle during the last phase of the engine turning. Should it be necessary, the propellor can be aligned horizontally with quick blips on the starter.

Before restarting in the air, open the cowl flap & select propellor blade pitch for power. Switch off all sensitive electronic equipment. Fly at about 43-49 knots (50-56 mph), switch on ignition, set choke & throttle settings for hot or cold engine as on the ground (2.4.1.) The engine is very easy to start if the pilot is thoroughly familiar with its operation.

If the engine is cold, do not use full throttle until the oil temperature is again in the green sector. At airspeeds of about 70-81 knots (80-93 mph) a quick blip on the starter will start the propellor turning & the engine will start immediately (depending on engine temperature). Choke in, about 1/3 throttle, ignition on. Height loss is in the order of 500 - 600 ft.

2.9 Flying with the engine stopped

The aircraft handles very well at 38-49 knots (43-55 mph) with a rate of sink of about 0.9m/s (2.9ft/s) in straight flight. When the engine is off, close the cowl flap to reduce drag (lever to port of port seat), but remember to open it again before restarting the engine. The Super-Falke, being a low wing monoplane, has to be flown cleanly. When skidding or flying at less than 41 knots (47 mph) the airflow breaks away from the wing/fuselage fillet area and performance is lost. When gliding & especially when turning, fly the aircraft as cleanly as possible & avoid skidding in turns. The old trick of fixing a length of string on or in front of the canopy is still an effective aid to accurate flying, and with a little practice the pilot will be flying accurately & climbing well in thermals compared with pure gliders.

2.9.1 Feathering the propellor

The Super-Falke is equipped with a feathering propellor. The blades are feathered for soaring by pulling the propellor pitch control handle which is self locking. Only feather the propellor when it is not turning.

Set the propellor pitch for power at an airspeed less than 54 knots (62 mph) before re-starting the engine. Set the pitch by turning the handle about 30° to left or right against the spring & then push it fully forward to the stop.

2.10 Slow flying & stall characteristics

At maximum flying weight the stalling speed is about 38 knots (44 mph) and 35 knots (41 mph) when flown solo. At this speed the airflow over the wing roots begins to break away; ailerons & rudder are still fully effective & with a forward C.G. position, the Super-Falke simply lowers its nose if the control stick is pulled right back. With rearward C.G. positions it is possible to fly on, fully stalled, in still air conditions, with the stick right back whilst retaining full aileron & rudder effectiveness. In both C.G. positions immediate recovery is effected by easing the stick gently forwards. Needless to say in rough air conditions stalling can cause a wing to drop.

Power stalls: When the aircraft is stalled with high revs the propellor slipstream tends to produce false ASI readings via the tail mounted pitot. When this happens the stalled condition is still recognizable by the fact that the ASI needle flicks vigorously between 27 knots (30 mph) & 54 knots (60 mph). If stalled in a 30° turn, the Super-Falke gradually drops the outer wing, such that when both wings are level, normal flying speed may be regained. Stall characteristics are the same, engine on or engine off.

2.11 Spinning

Except with aft C.G. positions it is very difficult, if not impossible, to make the Super-Falke spin. If no correcting action such as releasing the backward stick pressure is taken, the incipient spin becomes a spiral dive from which a transition to normal flight is easy. Use of spoilers is recommended in the spiral dive.

Even with aft C.G. positions a continuous spin is impossible. A spin may be induced by gradually easing back the stick & crossing the controls, but it will come out of the spin within 5 turns of its own accord even if the controls are held crossed: it becomes a slipping manoeuvre from which normal flight is easily resumed. Pro spin aileron will cause the spin to become a spiral dive, from which the pilot should pull out gradually but without delay to avoid overstressing the aircraft (see above).

A spin can of course be corrected in the normal manner after 1/2 turns. When rotation stops, pull out of the resulting dive gently; do not hesitate to use the spoilers to prevent the speed building up excessively.

Aerobatic manoeuvres are not permitted in the Super-Falke

2.12 Wet wings - warning

The Super-Falke wing has a glider airfoil which is sensitive to rain. Drops of rain on the wings disturb the airflow & reduce the lift which means that the stalling speed is increased by about 8 knots (10 mph), and the stalling characteristics are changed. Whereas with dry wings the Super-Falke is positively docile, it will drop a wing when wet. When flying in rain keep the airspeed above 46 knots (53 mph), don't leave the ground at less than 46 knots (53 mph), fly at about 57 knots (65 mph) when climbing and on the approach. Avoid steep turns and other manoeuvres involving loads.

If there is snow or ice on the wings it must be cleaned off to a smooth surface before take-off, not forgetting the tailplane.

2.13 Cold weather flying and risk of carburettor icing

Especially when flying in the winter it is important to check that the oil temperature does not fall below 70°C (158°F) whilst the engine is running. The carburettor & intake are warmed to some extent by the circulating engine oil.

By installing a cylinder head thermometer (optional extra) the supply of cooling air to the engine can be accurately regulated by controlling the cowl flap. The cylinder head temperature is to be carefully monitored: under no circumstances must it exceed the maximum of 250°C (480°F).

Carburettor icing can occur when humidity is high (especially near clouds and when the air temperature is between -10°C & +18°C (14°F - 65°F)). The pilot will recognize the rough engine note & reduced engine rpm. The carburettor heat control should be pulled immediately.

Carburettor icing can also occur when the engine is idling for long periods whilst flying. Pull "carburettor heat" therefore from the start, but remember that the engine cannot develop full power with carburettor heat applied.

Operation of the carburettor heater - results in an almost imperceptible decrease in rpm, unless the carburettor is already iced up.

In warm, dry air, carburettor heat should be fully off.

2.14 Operating without the outrigger wheels

The Super-Falke can also be operated without the outrigger wheels fitted. Taxying is possible with someone holding a wing. On take-off a helper runs with a wing until the wings can be held with the ailerons, as in the case of a normal glider launch. After touch-down the Super-Falke wings can be held level with the ailerons virtually until the aircraft stops.

The super Falke can be operated without either outriggers or a wing tip holder if small wheels are fitted to the wing tips as a modification; then it is possible to taxi or take off with one wing down. If flying solo, the starboard wing should be down.

It should be noted however that take-offs are feasible only when there is no appreciable cross wind. When flying without outriggers it is always preferable to have a wing-tip holder for the take-off.

2.15 Safety factors and engine reliability

It should always be borne in mind that the motor glider engine is not designed to such stringent specifications as that of a light aircraft (e.g. single ignition system instead of dual) and is simpler & cheaper. This must be taken into account when flying, by observing safety heights & planning the flight so that suitable fields are always at hand, should it be necessary to land out.

2.16 Attachment points for parachute static release

These are to be found marked red on the tubular member above the back-rest, port for the port seat & starboard for the starboard seat.

2.17 Emergency jettisoning of canopy

Set propellor blades to power setting, pull the canopy lock knob above & the emergency knob in front (painted red) and throw off the canopy to the right.

2.18 Type conversion

Before flying the Super-Falke, study the Manuals for the motor glider, the engine & the propellor, and have a few type conversion flights with someone who is thoroughly acquainted with the aircraft.

A good number of solo flights should be completed before taking off with a passenger. Glider pilots without previous experience of light aircraft should particularly study the servicing & maintenance of the engine & the propellor, also the take-off procedure.

2.19 Cross wind

Approved cross wind component at flight tests for take offs and landings is 25 km/h / 14 knots.

3. Performance data

3.1. Take-off Performance

These performance figures were obtained from the results obtained during the type testing with propellor HO-V62/ L160 T-10 and HO-V62R/ L160 T-10 in take off position and can be reproduced provided that the motor glider & engine are in good condition and that the pilot is of average ability and skill.

Maximum all up weight (AUW): 650 kg (1433 lbs)

Level airfield with short well kept grass. Dry wing with clean surface.

Zero wind: air pressure standard for height of airfield above sea-level.

Lift-off speed: approx. 38 knots (44 mph)

Climb speed: approx. 49 knots (56 mph)

Take-off run m (ft)	Airfield height asl m ft		Air Temperature							
			-15°C		0°C		+15°C		+30°C	
			+5°F		+32°F		+59°F		+86°F	
	0	0	207	680	220	722	232	760	244	800
	250	820	214	702	226	741	239	784	251	823
	500	1640	220	722	233	764	246	807	258	846
	750	2460	227	744	240	787	256	840	267	878
	1000	3280	234	768	248	813	261	856	275	902
Distance requested	0	0	380	1247	422	1384	462	1515	502	1647
	250	820	401	1316	441	1446	481	1578	521	1709
to clear of	500	1640	422	1385	463	1519	504	1653	544	1784
15 m (50 ft)	750	2460	443	1453	485	1591	541	1774	570	1870
obstacle	1000	3280	464	1522	509	1670	552	1811	597	1958

3.2

Rate of climb:

Max. Flying masses, at sea level

Rate of climb: 2.3 m/s (450 ft/min)

3.3

Absolute ceiling

approx. 4000m asl (13000 ft asl) at rate of climb of 0.5 m/s (approx 90 ft/min)

3.4

Air speeds

Speed for max endurance: V = 81 knots (93 mph), 2800 rpm

Speed on approach: V = 49 knots (56 mph)

Touch-down speed: V = 38 knots (44 mph)

3.5

Range and endurance (zero wind conditions)

rpm	Fuel consumption			Endurance		Air speed		Range	
	L/hr	Imp gal/hr	US gal/hr	Hrs	min	knots	mph	km	Statute miles
2500	10,5	2,31	2,77	4 ^h	10'	67	79	520	322
2700	11,6	2,56	3,05	3 ^h	45'	73	84	506	313
2800	12,7	2,79	3,36	3 ^h	35'	78	90	495	307

N.B. Endurance and range do not allow for any fuel reserve

11,6 USgal useable

Endurance and range with propellor HO-V62R/ L160 T-10 (with cruising position) see Chapter 6.6, page 22

3.6

Gliding performance

Engine off, propellor feathered, cowling flap closed.

Min sink: ca. 0.85 m/s (165ft/min) at 41 knots (47 mph)

Rate of sink: ca. 1m/s (195 ft/min) at 54 knots (62 mph)

Glide ratio: ca. 1:28/29 at 49 knots (56 rph)

4. Centre of gravity and weight limits

It is the responsibility of the pilot (P.I.) to see that the weight limits are not exceeded.

4.1. Empty weight centre of gravity (see also Operating Handbook p.16).

Make sure that the empty weight C.G. is still within the permitted limits after repairs, a respray or the installation of new equipment etc., by re-weighing; if necessary, add balance weights. This work has to have the approval of an authorized inspector.

The centre of gravity limits for various empty weights are as follows:

Empty Weight	kg lbs	430 948	440 970	450 992	460 1014	470 1036
C.G. position	mm	2225- 2300	2223- 2300	2221- 2300	2219- 2300	2217- 2300
Empty CG	ins	87.60- 90.55	87.52- 90.55	87.44- 90.55	87.36- 90.55	87.28- 90.55

Aircraft attitude: Underside of chord at Rib 6 (2.2m (7ft. 2½ins) from the centre line) is horizontal.

Datum point: 2m (6ft 6.72ins) in front of the leading edge at Rib 0 (root rib). 0.520m (1ft 8½ins) from the centre line.

If the empty weight C.G. position is within the limits prescribed in the table above, then the centre of gravity will be within the permitted limits.

4.2 Centre of Gravity at flying weights

In flight the centre of gravity position has a considerable influence on the handling qualities of the aircraft. For this reason it is of vital importance that the prescribed C.G. limits are observed.

The following limits for the C.G. at flying weights have been tested and are safe:

The centre of gravity at all flying weights must be within the limits 2.129 m (6ft 11.8ins) and 2.293m (7ft 6.25ins) aft of the datum point.

4.3 Weight placard

Cockpit weight limits (including parachute(s), both seats combined)

Max: 180 kg (397 lbs.)

Min: 60 kg (133 lbs.)

Luggage: 10 kg max. (22 lbs.)

It is important to ensure that the cockpit load (including fuel & possible luggage does not exceed the maximum cockpit load. (allow .73 kg per litre of fuel (7.35 lbs/imp.gall / 6.08 lbs US gall, i.e. a full tank of 44 litres (9.6 imp.galls / 11.6 US galls) weighs 32 kg (70.56 lbs.).

5. Minimum equipment
- 1) Air speed indicator (ASI) (up to 200 kph/108 knots/124 mph).
 - 2) Altimeter
 - 3) Compass
 - 4) Rev counter
 - 5) Oil temperature gauge
 - 6) Oil pressure gauge
 - 7) Cylinder head temperature gauge
 - 8) Ammeter
 - 9) Fuel gauge
 - 10) Engine operating hours counter
 - 11) 2 four-piece safety harnesses
 - 12) 2 back support cushions, to be used in the absence of parachutes.
 - 13) Flight Manual & Operating Handbook

Usually an engine hour counter is fitted, but if not, then the engine on times are to be entered next to the flying times in the log book.

6. Multi pitch propellor

6.1. General

The information given on pages 14 - 19 are applicable to motor gliders fitted with the HO - V 62 /L 160 T-10 propellor. This propellor has two settings: power & glide. The power setting is designed for best possible take-off and climb performance.

If the motor glider is fitted with the HO - V 62 R/L 160 T-10 propellor, there is a third pitch setting: cruise. This propellor should be operated according to the following procedures:

6.2. Take-off & climb

For take-off and climb always select CLIMB pitch setting (see pre-flight check list) as the take-off run is extended by approx. 20% if CRUISE setting is used.

It is not possible to change the pitch setting during take-off. Once in the cockpit it is essential to check before take-off that the pitch setting is correct as the difference between CLIMB & CRUISE is not easily recognized from outside the aircraft & it is not possible to change the setting during take-off. When the pitch setting is changed from fully feathered (GLIDE) the CLIMB setting is engaged automatically. Always do this before take-off. Static revs of 2600 - 2700 rpm (white arc on rev counter) provide a check that the CLIMB setting has been engaged.

6.3 Selecting cruise pitch

In flight cruise pitch may be selected, though only with the engine running:

- 1) Lift limit catch
- 2) Reduce air speed to 43 knots (50 mph)
- 3) Regulate engine revs to 2000 rpm'
- 4) Pull the pitch control lever to the stop & immediately push forward as far as it will go.

For a given throttle setting, there is a perceptible drop in engine revs of about 300 rpm indicating that CRUISE pitch has been engaged.

6.4 Selecting CLIMB Pitch

During powered flight the propellor pitch can be changed from CRUISE to CLIMB:

- 1) Lift limit catch
- 2) Reduce air speed to 43 knots (60 mph)
- 3) Reduce engine revs to 1000 rpm
- 4) Pull the pitch control lever to the stop and then forwards again as far as it will go.

For a given throttle setting, there is a perceptible increase in revs of about 300 rpm indicating that CLIMB pitch has been engaged. A more reliable method is to engage CLIMB via the fully feathered position (GLIDE) when the engine is stopped.

6.5 Flying at CRUISE Pitch

Level speed range: 40 knots (47 mph)

Economic cruise speed: 78 knots (90 mph) to 84 knots (96 mph) at 2700 - 2800 rpm.

Max. cruise speed: 86 knots (100 mph) at 2800 rpm

The fuel gauge reading is correct only at 40 knots (47 mph) with the engine off or at tickover.

6.6 Range & endurance at cruise pitch

rpm	Fuel consumption			Endurance		Air speed		Range	
	L/hr	Imp gal/hr	US gal/hr	Hrs	min	knots	mph	km	Statute miles
2500	11,5	2,55	3,01	3 ^h	45'	70	81	490	305
2700	12,8	2,84	3,40	3 ^h	25'	75	88	486	302
2800	14,1	3,13	3,76	3 ^h	05'	81	94	465	289

N.B. Endurance and range do not allow for any fuel reserve.

AIRWORTHINESS DIRECTIVE

B2-134 Scheibe-Flugzeugbau

Date of issue:

July 27, 1982

Affected motorglider:

Scheibe-Flugzeugbau SF25 B, C, D "Falke" and SF25 E "Super Falke".
All serial numbers.

Subject:

Main wing assembly.

Reason:

Inspection of proper engagement of the main rigging pin
in the main wing fittings.

Action and compliance:

Before next flight and upon each wing assembly action the
inspection in accordance with "Technische Mitteilung" has
to be accomplished.

Technical publications of the manufacturer:

Scheibe-Flugzeugbau "Technische Mitteilung" No. 653-42
of 7-12-1982,

which becomes herewith part of this AD and may be obtained
from Messrs.

Scheibe-Flugzeugbau, August-Pfalz-Straße, P.O. box 1829
D-8060 Dathau.

Accomplishment and log book entry:

Action to be accomplished by a skilled person.

TM and AD to be included in the flight and operating manual
until a final regulation has been made.

Subject: Main wing assembly (Fittings with main wing centre pin)

Effectivity: Motorglider SF 25 B "Falke" all serial numbers
Motorglider SF 25 C "Falke" all serial numbers
Motorglider SF 25 D "Falke" all serial numbers
Motorglider SF 25 E "Super-Falke" all serial numbers

Accomplishment: Before further flight, and upon each Wing assembly

Reason: Inspection of proper engagement of the main rigging pin in the main wing fittings

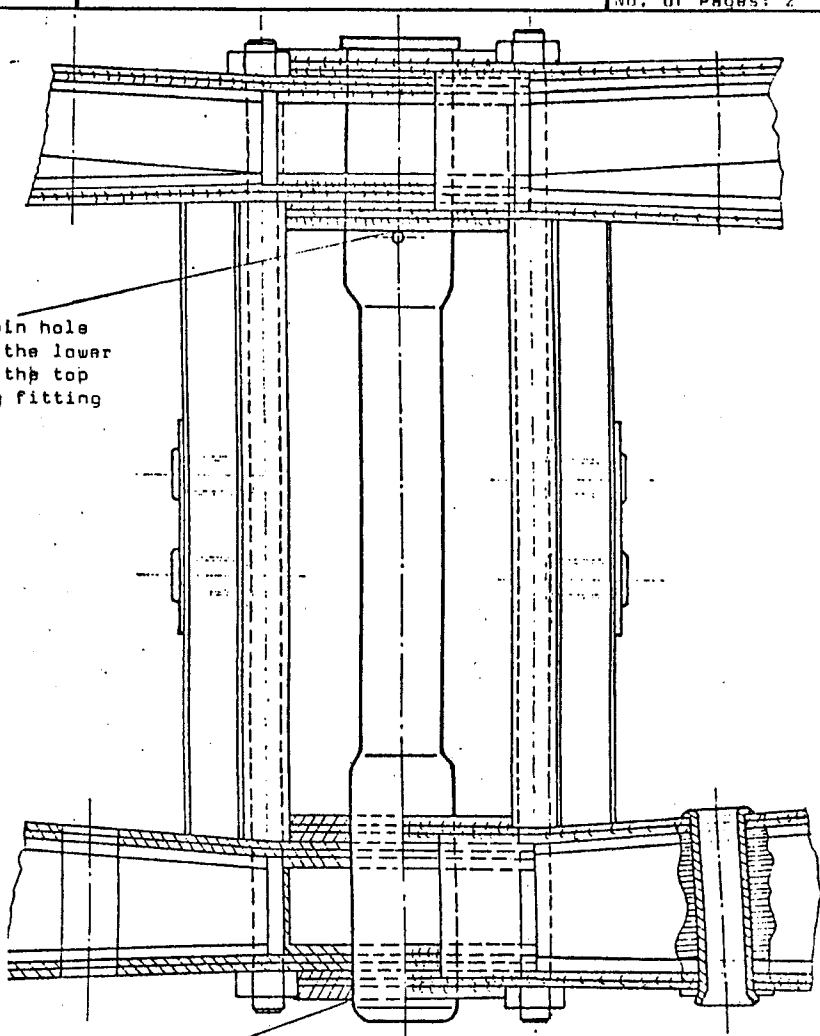
Instructions: Before further instructions the following must be checked:

1. It must be checked that the main rigging pin is fully through the bottom lug fitting. With the main rigging pin pulled fully upwards by means of the top handle, such that the 2,5 mm safety pin is hard against the lower face of the top boom lug fitting, inspect the amount of plain portion of main pin shank protruding below the port bottom boom lug fitting (Wings imburdened). If difficulty in the inspection is encountered when the Motorglider is assembled due to poor access, the wings must be removed and port wing inspected. Certainly upon the following assembly the inspection must be made again (when necessary, by help of a mirror and a handlamp). Should no plain shank be visible protruding below the port bottom lug fitting, according to 1., the aircraft shall not fly until the cause has been established, and rectified. For that, contact the manufacturer Fa. Scheibe Flugzeugbau.
2. Normally the main rigging pin has one safety pin hole. If more than one safety pin hole exists the aircraft must not be flown until the correct hole has been established, and the redundant hole made unusable (flush rivet)

If the inspection according to 1., shows that the main rigging pin is not fully through the bottom lug fitting with the plain portion, the first thing is to check that, with the main rigging pin fully down, another safety pin hole could be made, so that the plain portion is through the bottom lug fitting. Another thing to check is that the female lug fittings has not been splayed through a wrong assembly. In case the fittings must be straightened and a new inspection according to 1., must be made, contact Fa. Scheibe Flugzeugbau.

Important notice: Extreme care must be exercised when aligning the male/female lug fittings to ensure that female fittings are not splayed during mainplane rigging and derigging. Do not use force by bringing in the main rigging pin (for example by means of a hammer or similar), but carefully insert by hand with the wings imburdened.

When there is doubt about the correct assembly, or any damage is determined which is likely to have a detrimental effect upon the airworthiness of the aircraft, contact Fa. Scheibe Flugzeugbau.



Safety pin hole
against the lower
face of the top
boom lug fitting

Plain portion of the main
rigging pin must protrude below
part bottom boom lug fitting

SCHEIBE FLUGZEUGBAU GMBH
Dachau, Aug. Pfaltz-Str. 23
12. Juli 1982

Teil II

LBA-anerkannte Sicherungsverfahren

Das LBA hat folgende Sicherungsverfahren zur Sicherung von L'Hotellier Schnellverschlüssen anerkannt:

Uerlingshülse bzw. Hülsen nach dem Uerlingsprinzip (siehe Teil III), Sicherungsnadel (Abb. 2 und 2a), LS-Sicherungshülse (Abb. 3), Schempp-Hirth-Sicherungsfeder (Abb. 4) und Wedekind-Sicherung (Abb. 5).

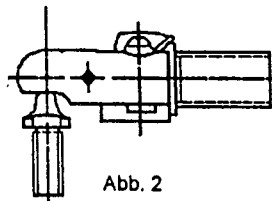


Abb. 2



Abb. 2a

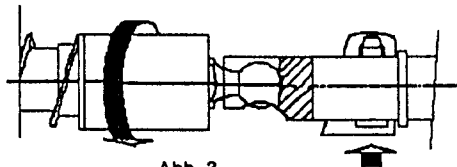


Abb. 3

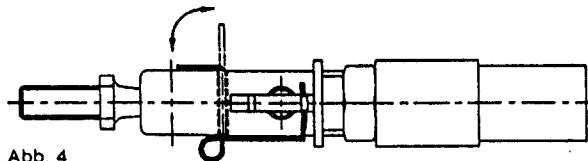


Abb. 4

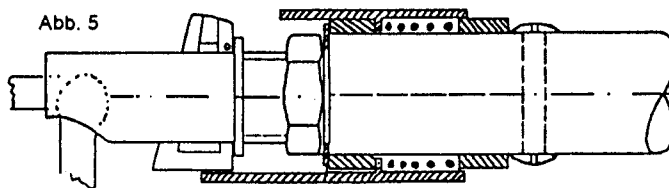


Abb. 5

Teil I

L'Hotellier Schnellverschlüsse

Mit der Funktion der Schnellverschlüsse sollte sich jeder schon vor der Montage vertraut machen.

Jeder Schnellverschluß wird mit zurückgezogenem Sicherungsexzenter vollständig über die Kugel an der Stoßstange geschoben. Beim Verriegeln geht der Sicherungsexzenter etwas zurück, so daß dann bei richtiger Verbindung die Bohrung auf der Kugel abgewandten Seite des Sicherungsexzenter sichtbar wird.

In diese Bohrung muß die Sicherungsnadel eingesteckt und damit der Schnellverschluß gesichert werden.

Achtung!
Durch nochmaliges Belasten der Steuerverbindung ist das vollständige Einkuppeln der Kugel zu überprüfen!



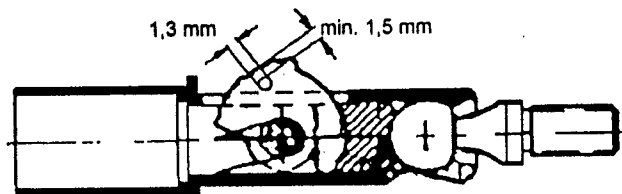
Warnung!
Nicht gesicherte Schnellverschlüsse können sich im Betrieb selbsttätig öffnen !!

Teil II

Arbeitsanleitung zur Anbringung der Bohrung

Beim Anbringen der Bohrung ist folgendermaßen vorzugehen:

Die Bohrung von 1,3 mm Durchmesser ist bei richtig eingesetzter Kugel so anzubringen, daß eine Seite der Bohrung am Hauptkörper des Verschlusses anliegt und auf der Rändel-Seite noch mindestens 1,5 mm Material stehen bleibt.



Warnung!
Beim Bohren ist darauf zu achten, daß keine Späne in den Verschluß bzw. zwischen Kugel und Pflanze gelangen.

1. Rigging & De-rigging etc.

If the Super-Falke is to be rigged & de-rigged often, it is worth while obtaining support wheels for the fuselage, so that the fuselage can be moved easily and if necessary, even on short road journeys. Every Super-Falke fuselage has attachment points for fuselage support wheels. Simple supports without wheels are also available.

1.1. Rigging ')

Before rigging always clean & grease all fittings, especially after a trailer journey. (See Lubrication Chart p.11).

It is best to begin with the port wing. A helper holds the fuselage on the starboard side, three further helpers offer up the port wing. Feed the spar through the fuselage carefully, being careful to avoid rudder cables, elevator pushrod & harness straps. Engage rear fitting on to the lug on the fuselage. Bring the wing tip forwards to engage the root rib fitting on the forward lug on the fuselage.

The procedure for fitting the starboard wing is the same. Be careful to ensure that the fuselage is held vertical and not at an angle.

Bring the starboard wing tip forwards, correcting the height of the tips to allow the mainspar fittings to slide into each other. It works best if one person climbs into the cockpit & gives instructions to the helpers at the tips, until the fittings are in line & the main pin can be pushed home. The mainpin is secured under the upper part of the mainspar fittings with the large safety pin provided. The Super-Falke may also be rigged with the inner wing sections first, in which case the outer wing sections must be attached, locked & secured. This method involves lifting lighter loads of course.

The outrigger wheels (marked LEFT & RIGHT) are pushed into the fittings under the wings & screwed tight.

Inside the fuselage the two aileron connections are made & secured with safety pins & the spoiler control cables are connected with the two carabiners. Then the lower surface wing/fuselage plates are added. Now fit the tailplane: preferably with two people to handle it. With the elevator in the up position, the tailplane is offered up to the fixed lugs on the fuselage. Then the front tailplane fitting is screwed down onto the fuselage with the castellated nut which is secured with the safety pin.

The tailplane fairing is hooked under the fin and fixed with two patent fasteners.

*) See also AD 82-134/SB 653-42 and AD 94-001/2 enclosure 1 and AD 93-001/3 enclosure 2.

The elevator horn & pushrod are connected by a pin, secured by a safety pin. Finally connect the Bowden cable to the fittings on the elevator & trimmer, having first moved the cockpit trimmer lever fully forwards.

After rigging, the aircraft will require a full D.I. (Daily inspection) for details of which see p. 10 of the Flight Manual.

1.2. De-rigging

The de-rigging procedure is simply the reverse of the rigging procedure.

Start by removing the tailplane. Before attempting to remove the wings, do ensure that controls (ailerons & spoilers) have been disconnected & that the underwing/ Fuselage fairing plates have been removed. Let the wing tip helpers take the weight off the main pin by gently raising the tips before withdrawing it. Then the wing tip holders move tailwards to disengage the forward lug before the whole wing is moved forward to free it from the rear lug.

During this operation avoid tilting the wings & fuselage excessively & do not bring the wing tips too far back.

1.3 Folding the wings

For improved hanging the Super-Falke has folding wings. The Super-Falke is also available to order with non-folding wings. When the wings are folded the span is reduced from 18 metres to about 10 metres.

Fitting the wing tips. If the outer wings have been completely detached from the root sections, (e.g. on the trailer) the upper fittings should be lined up first, the upper rigging pin is then inserted from the front (of the aircraft) and secured with a washer & split pin. It is essential that the sliding parts are cleaned & well greased. Then connect the aileron linkage with a screw, washer & self-locking nut.

The wings fold about the upper pin (the centre line of the upper pin is the fulcrum of the outer wing section). The outer wings should only be folded when the aircraft is in a sheltered position, such as in the shelter of the hanger. To facilitate folding the wings the outriggers should be fitted to the root sections of the wings. During this operation the control column & the ailerons must be approximately centred.

To unfold the outer wing, one person gradually raises the outer wing section about the hinge pin, changes hands and slowly lowers it to the full span position. A second person stands at the hinge position and presses down the inner wing half, preventing it from shooting up and suddenly bringing the two wing halves together. (If a second person is not available, this risk may be avoided by the use of a support placed under an outrigger, then the main-pin handle is lifted over from forward to aft position. This engages the front and rear lower pins and the spring loaded safety bolt engages automatically. Then check the correct operation of the

aileron circuit at the wing joint. position the fairing & secure it with the patent fasteners.

Folding the wings is a similar operation, but in reverse. To permit disengagement of the main pins, lift the safety bolt.

1.4 Re-fuelling

Use 4 star petrol (leaded gasoline) or aviation fuel 100L. **see Limbach SB 53.1**
 Fuel up, using a chamois leather filter. Scrupulous cleanliness is necessary. If you are fuelling up in the rain, hold an umbrella over the filler hole.
 No smoking or naked flames whilst the filler cap is off. Only use the original tank filler cap with breather. (Inside filler are the words "Patent blau"). The oil should be checked after every 1 - 2 engine hours or after every long flight & topped up to the top mark on the dipstick.

1.5 Trailer considerations

If the SF is to be moved on a trailer, the outer wing panels are to be detached and stowed separately on the trailer. The inner & outer panels should only be transported as a single unit over a short distance on very good roads. The distance between the support points for the wings must not be less than 5.5 metres (18 feet) under any circumstances as otherwise the overhanging wing tips & the folding fittings may be damaged by the inertia forces caused by driving over the road or airfield. The propellor should be fully feathered (GLIDE) or so secured that it cannot rotate in the wind whilst being towed. The canopy should be locked and also held closed by the harness straps.
 If the aircraft is being towed on an open trailer without waterproof covers, take care to see that no water can enter through the spoiler gap, pushrod openings, fuselage etc. If the wings have become wet en route dry them out immediately in a warm environment with the leading edge uppermost.
 If the aircraft is being towed rigged on the airfield, make sure that the control stick is held fast by the harness straps to prevent the elevator bouncing.

1.6 Supports

The Super-Falke may be chocked up on the two steps or supported using the threaded holes provided at the side (the thread is M10). On no account is the Super-Falke to be chocked up on the fairing tubes in the under-carriage area.

The tail end of the fuselage may be supported only under the fuselage at the appropriate fitting or at the triangular cable deflector in front of the tailwheel but not of course under the wooden stringer.

If the aircraft is to be left de-rigged, ensure that the wing halves, if left in one piece, are supported correctly as described. As a minimum the wing must

be supported at the root and at about rib 20 (i.e. about 1.10 metres (about 43 ins outboard of the start of the aileron). It is essential to observe this support spacing when the wing is left vertical, or distortion of the trailing edge will occur.

If the motor glider is left in a closed building for a period of time, adequate ventilation is required.

2. Maintenance, inspection, repairs

2.1. General

Reliability results from an aircraft being clean & well kept (this applies especially to the engine & propellor). The attention the aircraft requires will vary according to usage & weather conditions.

The aircraft is best cleaned with water or soapy water. Do not clean doped surfaces with petrol (gasoline) or solvents as they attack the finish. The canopy should be washed carefully with fresh clean water & a sponge or wash leather (float the dirt off or it will produce scratches). If desired it may be polished with perspex cleaner.

The aircraft has a synthetic finish which should be washed down regularly every few months as a minimum. Only use polishes which do not contain silicones. Afterwards the aircraft should be rinsed off with treated water to prevent the formation of water droplets on the wings when rain is encountered. Whenever the aircraft gets wet, it should be leathered off. Even the best finish deteriorates in time but care & attention can prolong the life of the finish and the wing surface smoothness. If the aircraft is left indoors for a long period it must have sufficient ventilation.

2.2. Periodic inspection & maintenance

2.2.1. Daily inspection

The normal daily inspection is of course to be carried out whenever the aircraft is inspected or after work on it. For details of the DI (daily inspection) see page 10.

2.2.2. Engine inspection:

- 1) The engine is to be inspected at the intervals specified in the Engine Handbook, and the inspection should be carried out in accordance with the instructions in it. In addition the following items should be attended to after every 50 engine hours:
- 2) Check the exhaust system, including cabin heater and the heat exchanger of the carburettor heater.
- 3) Check the condition of the starter pinion & gear. Lightly grease the starter pinion shaft.
- 4) Carry out a thorough DI
Engine: see Flight Manual p 11.

2.2.3. Propellor inspection

- 1) Follow the directions in the Propellor Handbook, carrying out the inspection at the interval specified. After every 50 engine hours the following work is to be carried out:
- 2) Remove the spinner. Clean & lightly grease the 4 swash plate guide bolts.
- 3) Clean the swash plate & lightly grease the bearings.
- 4) Check the 4 propellor pitch bearings & renew if necessary.
- 5) Oil the swivel axis of the pitch control.
- 6) Carry out a thorough DI
Propellor: see Flight Manual p 10

2.2.4. Airframe inspection

2.2.4.1 Airframe inspection at 50 hrs.

- 1) The aircraft should be serviced according to the lubricating chart (p 11) every 100 launches/50 hrs. flying time.
- 2) Thorough DI
Airframe: see Flight Manual p 10

2.2.4.2 Airframe inspection at 100 hrs

The following is to be carried out after every 200 launches/100 hrs flying time, and in any event at least twice a year:

- 1) Clean aircraft
- 2) Carry out lubrication as at 50 hrs (lubrication chart p 11)
- 3) Carry out lubrication for 100 hrs as specified (lubrication chart p 11). The control system bearings are to be cleaned externally and oiled. Keep a special watch on the lower rudder bearing which, according to the state of the airfield, is particularly exposed to contamination by dirt. All the fixed bearings are sealed for life & require no maintenance. The self-aligning bearings are greased & do not require any special attention. If they have accumulated dirt, de-grease with petrol and then grease.
- 4) The rudder cables are tensioned by the return springs on the pedals. If the tension is much reduced, renew the springs.
- 5) Check the installation of the instruments. Check the pipes for ageing and leaks and ensure that they are a tight fit on the instrument fittings.
- 6) Check all electrical equipment & leads for sound installation, reliable electrical connection and freedom from chafing.
- 7) Service the battery: see below
- 8) Check that the pitot is secure.
- 9) Check that placards & handbook are complete & intact.
- 10) Carry out a thorough DI
Airframe: see Flight Manual p 10.

2.2.5 Landing gear and brake

The Super-Falke has a single mainwheel undercarriage with rubber shock absorbers. Tyres: 6.00 x 6, pressure: 31 lbs/sq. in. Tailwheel: 210 x 65 mm tyre, pressure: 37 lbs/sq. in. The hub bearings of both wheels are sealed for life and require no maintenance.

The mainwheel drum type brake is operated by the spoiler control lever on the last part of its travel. It is inadvisable, therefore, to land with spoilers fully out. The Super-Falke brake also operates as a parking brake and should be applied before starting the engine.

The procedure for applying the parking brake is as follows:

Pull the spoiler lever sideways adjacent to the first stop

Raise the parking brake lever

Let go of the spoiler control lever.

You need both hands for this operation, but the brake may be released with one hand:

Pull the spoiler control lever

The parking brake lever swings down of its own accord, thus freeing the spoiler control lever.

As brake shoe wear takes place, the brake will require adjusting. Brake adjustment: Remove floor of cockpit (port side) and adjust the cable length with the lock nut at the adjuster. The brake shoes should be replaced when (or preferably before) the brake lining is 1.5 mm (1/16in) at its thinnest point.

If when the undercarriage is dismantled the brake bearings are taken apart, the position of the brake lever must be marked for re-assembly. Torque wrench setting for the splined brake lever attachment is 1.8 - 2.2 kpm (13 - 16 ft lbf)

2.2.6. Battery servicing

At least once a month check the level of the electrolyte in the battery and top up with distilled water if necessary. The correct level is midway between the two level-marks. Check the state of the individual cells with a battery hydrometer.

Specific gravity of
electrolyte at 20°C
(68°F)

State of battery charge

1.28 kg/l

fully charged

1.19 - 1.21 kg/l

half discharged

1.09 - 1.14 kg/l

discharged

If necessary, charge the battery (charge rate: 1.5Amps).

If the battery is not in use, it must be given a top-up charge every month and every three months it must be first discharged, then re-charged.

Keep the battery clean and dry. Lightly grease the

terminals with a non-acid, acid-resistant oil or grease e.g. vaseline. Oil and grease should not come into contact with the moulded top of the battery. Check the battery vents which are intended to safely duct any inflammable battery gases out into the slipstream.

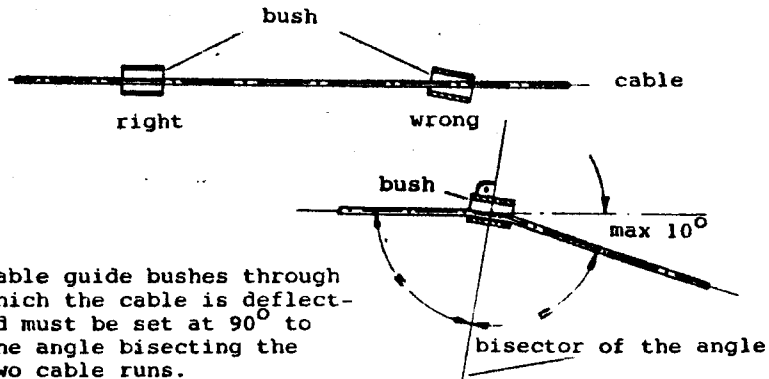
2.2.7 Annual inspection and overhaul

As is the case with gliders and light aircraft, a motor glider requires annual inspection for the renewal of its Certificate of Airworthiness. This must be carried out at the appropriate time by an authorized inspector. The whole aircraft must be thoroughly overhauled either before or at this annual inspection. During this overhaul the work attached to the inspection at 100 hrs and also the additional work detailed on the lubrication chart must be carried out.

Fabric and paintwork defects are to be made good.

The bearings in the control circuits are to be checked and replaced if worn. All control circuits are to be checked for adjustment and the control surface deflections are to be checked.

Pay particular attention to the cables and the cable runs. Frayed cables (finger check painful but effective!) are to be replaced, using only cable to specification LN 9374 or equivalent. Worn pulleys and control cable guide bushes are to be replaced. The bushes must sit tightly in their fittings: a missing bush causes rapid cable wear. Bushes on a straight run of cable must be aligned with the cable.



Cable guide bushes through which the cable is deflected must be set at 90° to the angle bisecting the two cable runs.

The maximum angle of cable deflection through a cable guide is 10° .

Keep cables with sliding contact clean and free from dirt. Oil, but do not grease. Check also at each overhaul that there are no slight kinks or wear in the free lengths of cable.

Apart from cleaning and greasing the undercarriage assembly, renew the brake linings.

The Propellor Handbook should be consulted regarding

any necessary overhaul work on the propellor.

The Engine Handbook should be consulted regarding any necessary overhaul work on the engine.

Check carefully the cowling, exhaust system, cabin heating, carburettor heating and ducts, since vibration can cause fractures in them.

A general note with regard to all screwed connections: If a thread is tight, check immediately that it has not been damaged or stripped. The threaded item should be freed off or, if necessary, replaced.

2.3 Non periodic inspections

The Super-Falke requires only a daily inspection (see page 10 of Flight Manual). After any unexpected incident such as a trailer accident, a heavy landing, or a field landing the motorglider should be checked thoroughly for damage. Check all vital fittings for paint cracks which might indicate that the aircraft has been overloaded.

2.4 Authorized repairs

The type sheet states: "Major repairs may only be undertaken by the manufacturer. In exceptional cases major repairs may be undertaken by suitably qualified bodies, but only with the express consent of the manufacturer."

Minor repairs may be carried out in consultation with an approved inspector.

All work must be in accordance with the drawings & specifications of the manufacturer. The usual spares are stocked by the manufacturer and are available on immediate delivery. Special spares, such as might be needed for repairs, will be produced and delivered by the manufacturer at the earliest possible date after the order is placed. If the propellor is damaged (trailer damage, ground contact etc) it is to be returned to the propellor manufacturer for repair. If the propellor is damaged there may also have been damage caused to the crankshaft or the propellor drive flange: the manufacturer will dismantle the engine to check for possible damage.

2.5 Changing the propellor

(See also Propellor Handbook)

The propellor is always to be fitted such that on the ground the blade is 15° before vertical in the normal sense of rotation. This is important for starting by hand and also for landing with the engine off.

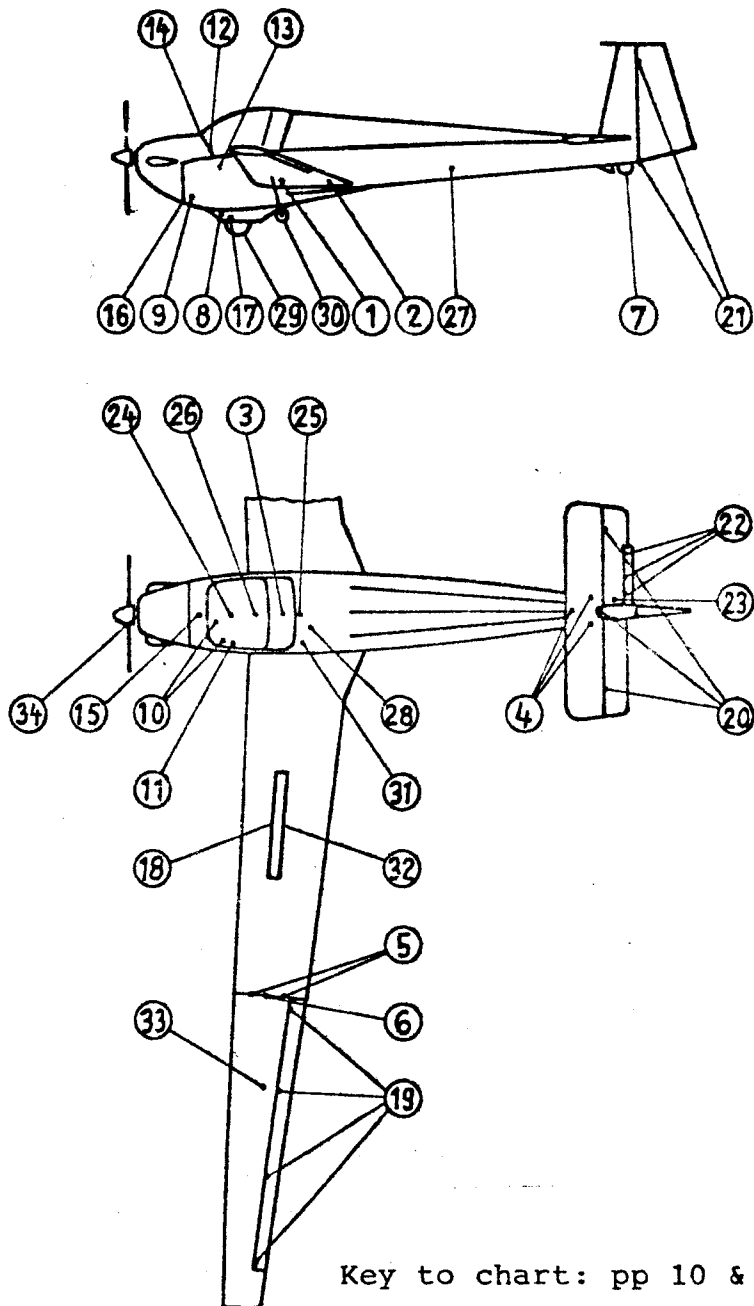
When a propellor is removed, the flange should always be marked for re-fitting in the future.

The multi-pitch propellor is bolted through the propellor flange to the intermediate flange (on the engine side) and secured by six self-locking nuts with washers. The intermediate flange is retained on the propellor shaft by a central nut and may only be removed by the engine manufacturer. To remove the propellor, remove the six wire-locked nuts and withdraw the propellor from the intermediate flange.

Re-assembly torque setting for these nuts is $32\frac{1}{2}$ -34ft f lbs. The propellor tips have a maximum permitted play of 2mm ($5/64$ in). When the propellor is not fully feathered the ball bearings of the propellor pitch lever must not be in contact with the swash plate. The clearance between the bearings and the swash plate must be identical and the bearings must be symmetrical to the rotating axis of the propellor.

Particular attention must be paid to the smooth vibration-free operation of the propellor throughout the operating range of rpm. Both the propellor and the engine are balanced by the manufacturers. It is possible, however, for the combined tolerances in their worst combination to produce some degree of unbalance when the propellor is fitted. To cure, take off the spinner: you will find four balance weights on the propellor hub. The engine/propellor combination may be balanced by adjusting these weights. First check for balance on the ground. then, if satisfactory, check the propellor throughout the operating range of rpm in the air. Needless to say, this work is to be carried out by a suitably qualified authorized specialist.

3. Lubrication Chart



Key to chart: pp 10 & 11

3. Lubrication chart

3.1 Lubrication when rigging

The following items are to be cleaned and greased at each rigging:

- 1) forward wing/fuselage attachment fittings (2)
- 2) rear wing/fuselage attachment fittings (2)
- 3) main rigging pin
- 4) tailplane attachment fittings (3)
- 5) wing folding pins (3 to each wing)
- 6) externally clean & grease the aileron connection at the wing fold position on each wing

3.2 Lubrication at the 50hr inspection

The following items should be greased every 100 flights/50hrs flying time:

- 5) wing folding pins (3 to each wing)
- 6) externally clean and grease the aileron connection at the wing fold position on each wing
- 7) grease the tail wheel pivot bearing nipple with a grease gun (access through handhole in rear fus.)
- 8) grease the bearings of the swinging arm of the mainwheel suspension (2 nipples accessible via wheelbox)

3.3 Lubrication at 100hr inspection

In addition to the items covered at the 50hr inspection, the following should be greased every 200 flights/100hrs flying time, and not less than twice a year:

- 5) oil the 5 bearing points of the pin mechanism at the wing fold position
- 6) oil the two intermediate bearings in the aileron control circuit at the wing fold position
- 9) oil rudder pedal assembly (6 lubrication points)
- 10) oil the spoiler control lever (5 lubrication points)
- 11) parking brake lever
- 12) grease propellor pitch control
- 13) grease trimmer lever mechanism
- 14) grease canopy hinge and locks (3 lubrication points)
grease the canopy stay mechanism
- 15) oil the hinge of the air vent
- 16) oil the bearing of the cowl flap (2 lubrication points) and the control cable to it
- 17) oil brake bearing (accessible via wheel box)
- 18) oil spoiler hinges
- 19) oil aileron hinges (4 to each wing)
- 20) oil elevator hinges (3) & elevator horn (1)
- 21) oil rudder hinges (2) & rudder horns (2)
- 22) oil trimmer hinges (3) and trimmer horn (1)
- 23) oil trimmer mechanism (accessible from below in the elevator)

3.4 Lubrication at annual inspection

In addition to the above, the following items are to be carried out in the course of the annual overhaul:

- Oil all accessible cables -
- 7) dismantle tailwheel (2 fixed bearings), tail wheel pivot & axle; clean and grease
- 24) control column bearings (2 plus 1 self-aligning)
- 25) rear bearing of control column assembly (1 self aligning)
- 26) short elevator pushrod (front) (1 self-aligning bearing)
- 27) long elevator pushrod (rear) (1 fixed bearing)
- 28) spoiler circuit in fuselage (2 cable pulleys with fixed bearings)
- 29) mainwheel assembly (2 fixed bearings) dismantle, clean & grease the axle
- 30) outrigger wheels (2 fixed bearings in each wheel) dismantle, clean & grease the axles
- 31) aileron pushrod, root section of wing (1 bearing each wing)
- 32) spoiler circuit in wing (1 cable pulley with fixed bearing & 4 linkages to be oiled in each wing)
- 33) aileron quadrant & aileron horn (3 self-aligning & 2 fixed bearings in each wing)
- 34) propellor pitch assembly (4 fixed bearings) dismantle, clean & grease the swivel spindle
- 6) aileron circuit at wing fold joint (2 bearing assemblies, 2 fixed bearings, 2 self-aligning bearings)
- 5) wing fold pin mechanism (5 linkages per wing)
- 19) aileron hinges (4 per wing)
- 20) elevator hinges (3)
- 21) rudder hinges (2) & rudder horns (2)
- 22) trimmer hinges (3)

Check bearings.
Externally clean & grease fixed bearings (sealed for life)
Clean self-aligning bearings & bushes with petrol & then grease with bearing grease

Dismantle, clean and grease.

4. Equipment

The minimum equipment is listed in the Flight Manual p. 21. A list of the equipment fitted will be found in the Super-Falke file which comes with the aircraft & also in the log book, as will also full details of dope & paint schemes. Operating manuals are delivered with the Super-Falke and all operation of the aircraft must be in accordance with them:

- 1) Operating Handbook, SF 25 E "SUPER-FALKE"
- 2) Operating Handbook, motor glider engines
Sportavia Limbach SL 1700 E, Limbach SL 1700 EA
& other series (Motor Handbook)
- 3) Propellor Handbook: Operating & maintenance instructions for propellers HO - V 62, HO - V 62 R

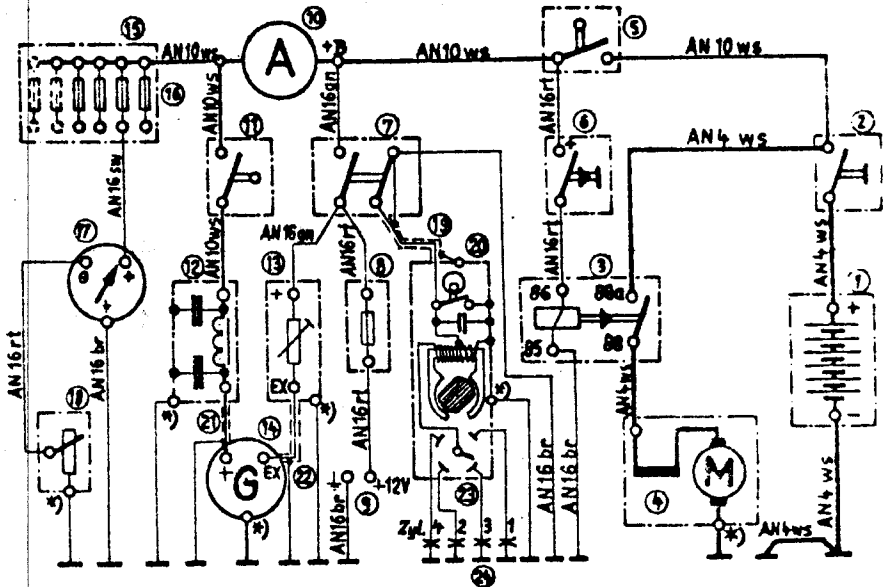
The Super-Falke can be fitted with further instruments and equipment, such as:

Cruise pitch propellor, total energy variometer, cylinder head temperature gauge, turn & slip, artificial horizon, chronometer, remote compass (magnetic), engine hours indicator, flying hours indicator, barograph (see also Flight Manual p 8), radio (see Flight Manual p 8), VOR, ADF, anti-collision light, navigation lights.

Although the Super-Falke is designed to incorporate an anti-collision light & navigation lights when installed during manufacture, it is difficult to add them as later modifications.

When the equipment is extended in any way, it is important to work in accordance with the manufacturer's drawings and recommendations. The aircraft may require re-weighing to establish that any change in the Centre of Gravity is within the permissible limits.

5. Electrical Wiring Diagram



*) Earth return (ground through mounting)

- 1 Battery: Varta 515 11 or Berga
- 2 Master switch: Bosch 0 341 001 001
- 3 Starter relay: Bosch 0 331 005 002 or 0 332 002 102
- 4 Starter motor: Bosch 0 001 160 001
- 5 Fuse (battery): ETA 2-5700-K25
- 6 Starter button: Bosch 0 343 004 003
- 7 Ignition switch: Amphenol T 215 N-S or APR Schaltronic
- 8 Fused lead to barograph 6-646 N
- 9 Barograph connection
- 10 Ammeter: Motometer 150.040.1008
- 11 Fuse (generator): ETA 2-5700-K20
- 12 Filter: Hisonic. Cessna S-1629-1
- 13 Voltage regulator: Ducellier 8347 or Wehrle DU506 14V
- 14 Generator: Ducellier 7522
- 15 Fuse box (for additional equipment): Bosch 0 354 041 001 with Bosch 1 351 090 000
- 16 Fuses 5A and above: Bosch DIN 72581 ...A
Fuses below 5A: Wickmann 35101 flink ...A
- 17 Oil pressure gauge: Motometer 644.001.1002
- 18 Oil pressure sensor: Motometer 675.002.1001
- 19 Short circuit line: RG 58 C/U or LN 9252 FYGPCP AN 16
- 20 Magneto: Bendix-Scintilla S4 RN-21 or Slick 4030
- 21 5mm cable, screened: to LN 9252 FYGPCP AN 10
- 22 1.2mm cable, screened: to LN 9252 FYGPCP AN 16
Cable to LN 9251 specs: Colour coding:
FYGP AN 16 1.2mm ws = white
FYGP AN 10 5mm rt = red
FYGP AN 4 22mva gn = green
br = brown
sw = black
- 23 Ignition harness: Slick High-Temperature-Harness
- 24 Sparking plugs: Bosch WB 240-ERT 1 see Limbach SB 51

LIMBACH Flugmotoren**Technical Bulletin****51****Subject:** Spark Plug BOSCH WB4A resp. WB 240 ERT 1**Affected engine models:** All engines models

L 1700 E0, EA, EB, EC, ED
L 2000 E0, EA, EB, EC
L 2400 EB

Background information: Simplified product support. The abovementioned type of spark plug is no longer distributed by us and therefore does not receive any kind of inspection.**Priority:** immediately**Compliance:** Spark plugs type BOSCH WB4a resp. shall not be used anymore and must be replaced by type EYQUEM A 755 spark plugs at next forthcoming spark plug change after release of this document. References in the manuals are to be changed in handwriting.**Remarks:** Engine specific data does not change. Technical Bulletin no. 41 becomes invalid.

This document has been translated to the best of our knowledge. In case of doubt however only the German original shall be considered authoritative.

Approval: This Technical Bulletin is approved in accordance with the procedures of the LBA approved development organization I-EC 27.

Bearb.: Stollinski

Replaces Edition from:

Page: 1 of 1 Pages

Gepr. + Freig:

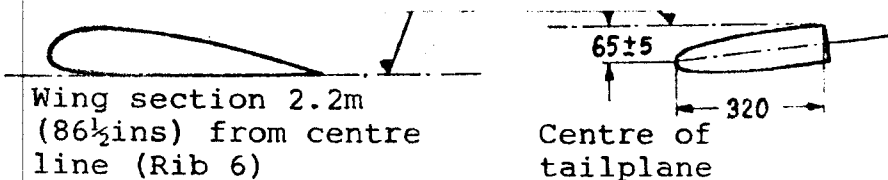
Edition: 01.07.96

Reg.-Nr.: 036 Datei: TB51.DOC

6. Adjustment data

6.1 Wing/fuselage/tailplane:

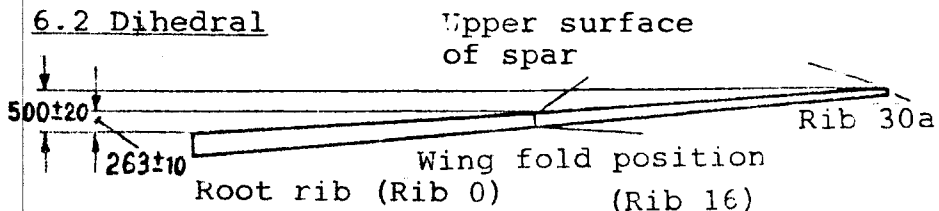
Horizontal datum line



Wing section 2.2m
(86½ins) from centre
line (Rib 6)

Centre of
tailplane

6.2 Dihedral



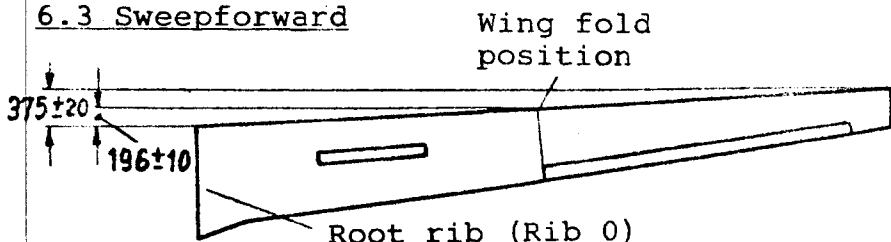
Upper surface
of spar

Rib 30a

Root rib (Rib 0)

(Rib 16)

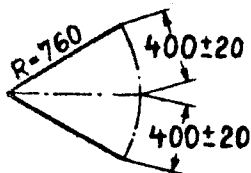
6.3 Sweepforward



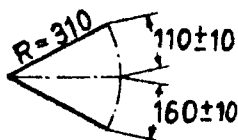
Wing fold
position

Root rib (Rib 0)

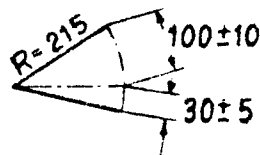
6.4 Control surface deflections



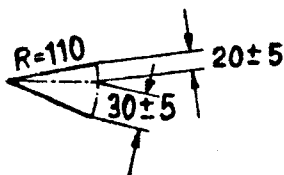
Rudder



Elevator



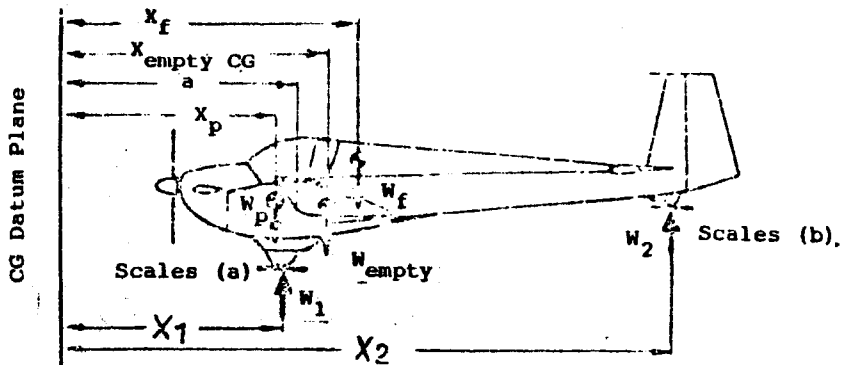
Ailerons



Trimmer

Dimensions in mm

7. Procedure for determining the Centre of Gravity



In order to weigh the motor glider to establish the empty weight Centre of Gravity position, set up the aircraft on the scales such that the underside of the wing at Rib 6 (2.2m = 86½ ins from the centre line) is horizontal. With the aircraft at this attitude a plumb line is dropped from the leading edge of the wing at Rib 0 (0.52m = 20½ ins from centre line). 2m (78½ ins) in front of this point is the C.G. datum plane, from which are measured x_1 & x_2 , the distance of the wheel axles. Both wheels are supported on scales, on which are registered weights w_1 & w_2 . The distance of the Empty Weight C.G. from the datum plane is determined by the formula:

$$x_{empty\ CG} = \frac{w_1 \times x_1 + w_2 \times x_2 - w_f \times x_f}{w_1 + w_2 - w_f}$$

x_p = pilot moment = 190cm (74.8 ins)

x_f = fuel moment = 287.5cm (113.2 ins)

w_f = weight of fuel = fuel tank contents in litres x 0.73kg/litre (7.35 lbs/Imp. gall; 6.08 lbs/US gallon)

If the tank is empty, the w_f & $w_f \times x_f$ are omitted. A slide rule would be insufficiently accurate for these calculations.

The Empty Weight C.G. must be within the following limits:

Empty Weight	kg	430	440	450	460	470
	lbs	948	970	992	1014	1036
C.G. position	mm	2225-	2223-	2221-	2219-	2217-
$x_{empty\ CG}$	ins	2300	2300	2300	2300	2300
		87.60-	87.52-	87.44-	87.36-	87.28-
		90.55	90.55	90.55	90.55	90.55

The values given in this table for $x_{empty\ CG}$ apply to the Super-Falke with empty fuel tank & are calculated from the above formula for $x_{empty\ CG}$. The empty weight & C.G. position should be determined with the outriggers detached.

Wartungsanweisung für Scheibe Flugzeuge in Gemischtbauweise

Maintenance instruction for Scheibe aircraft made of mixed fibre

Um einen sicheren Betrieb für Flugzeuge in Gemischtbauweise aus der Fertigung der
To guarantee safe operation (even in older age) of the mixed fibre aircraft manufactured by

**Fa. Scheibe Flugzeugbau GmbH
bzw. and
SCHEIBE AIRCRAFT GMBH**

(auch im fortgesetzten Alter) zu gewährleisten, wurde diese Wartungsanweisung als
Anhang zum Wartungshandbuch erstellt.

this maintenance instruction was issued as attachment to the maintenance manual.

Zur Aufrechterhaltung der Lufttüchtigkeit von Segelflugzeugen und Motorseglern gibt es
zwei Varianten der Wartung.

There are two ways to maintain the airworthiness of gliders and motor gliders.

Die erste Variante sind die Wartungsarbeiten, die gemäß der **Betriebsanleitung/
Betriebsanweisung**, oder dem **Flug- und Wartungshandbuch**, oder mindestens **einmal
im Jahr** durchzuführen sind. Diese Kontrollen sind sehr einfache Kontrollen, welche sich
auf das Schmieren der Lagerstellen sowie auf das Kontrollieren und Beseitigen kleinerer
Schäden an der Beplankung, Lackierung oder der Bespannung sowie auf Sichtprüfung der
Steuerung/Steuerseile usw. beschränkt (ist eine Kardele des Steuerseiles mehr als 50%
abgenutzt, muss dieses Steuerseil erneuert werden). Für diese Arbeiten werden die
Wartungslisten, die auch unter www.scheibe-aircraft.de herunter geladen werden können,
herangezogen. Auch für die Segelflugzeuge kann die Wartungsliste vom SF 25 C
(beschränkt auf die Zelle und auf die zutreffende Punkte) genutzt werden.

*The first option is the maintenance work, which has to be carried out according to the operational
manual or the flight and maintenance manual or at least once a year. These checks are very simple
and are limited to lubricate bearings, to check and repair smaller damages of the planking, paint
work or covering as well as to visually check the controls and control cables, etc. (shows one string
of the control cable wear and tear of at least 50%, the whole cable has to be replaced). Please
consult the maintenance checklists, which can be downloaded on www.scheibe-aircraft.de. The SF
25C checklists can also be consulted for gliders (limited to the fuselage and relevant items only).*

Die zweite Variante ist eine umfangreichere Wartung, die als „**Grundüberholung**“
bezeichnet wird. Auch dieses Wartungsereignis muss in bestimmten Zeitabständen
durchgeführt werden. Dabei kann **kein** exakter Zeitpunkt genannt werden, wann eine
Überholung stattzufinden hat. Denn je nach Einsatz des Segelflugzeuges / Motorseglers,
kann dieser Zeitraum zwischen 5 und 25 Jahren variieren.

*The second option is a more comprehensive maintenance, which is called a major overhaul. This
also must be carried out in certain intervals. An exact schedule for these overhauls **cannot** be given
because depending on the usage of the glider / motor glider the intervals can vary between 5 and 25
years.*

Eine Überholung muss auf jeden Fall immer durchgeführt werden, wenn

An overhaul has to be carried out if:

- die Bespannung eine Festigkeit unter 39 lbs/Zoll (die Festigkeit kann mit einem Maule-Tester festgestellt werden) erreicht hat,
- *the covering has reached a tensile strength of below 39lbs/inch (the strength can be measured with a Maule tester)*
- der Lack in einem so schlechten Zustand ist (Lackrisse), daß der Stoff oder die Holzteile nicht mehr ausreichend vor den Umwelteinflüssen geschützt werden kann,
- *the paint work is in such poor condition (cracks) that the covering and the wooden parts are no longer protected against environmental influences*
- sich die Verleimungen an den Beplankungen zum Holm, Rippen usw. abgelöst haben (Ablösungen können durch abklopfen mit einem geeigneten Gegenstand festgestellt werden).
- *the bonding has come off the planking and the spar, ribs, etc (this can be tested by tapping the surface with a suitable tool)*

Welche Maßnahmen bei einer Überholung durchgeführt werden sollen, ist nachstehend beschrieben.

Which overhaul procedures should be carried out is described hereafter.

Maßnahmen die bei einer Überholung durchgeführt werden sollen:

Procedures which should be carried out during the overhaul:

Flügel / wing:

- Die alten Lackschichten an den beplankten Teilen mit geeignetem Werkzeug entfernen. Darauf achten, daß dabei die Beplankung nicht beschädigt wird.
- *Remove the old paint work on the planking with a suitable tool. Be careful not to damage the planking.*
- Die alte Bespannung entfernen.
- *Remove the old covering*
- Alle Schubstangen ausbauen, entlacken, auf Beschädigungen überprüfen, auf Korrosion von innen und außen überprüfen ggf. erneuern.
- *Remove all push rods, remove paint from the rods and check for damage. Check also for corrosion inside and outside the rods, renew damaged rods if necessary.*
- Steuerseile (falls eingebaut) erneuern.
- *Renew control cables (if installed)*
- Bei Segelflugzeugen und Motorseglern, die älter als 30 Jahre sind, sind alle Beschläge (Querruderlager, Landeklappenlager, Schwinghebel für QR-Schubstange, Lagerbock für QR-Differenzierhebel, Diagonalrohr sowie ihre Befestigungsschrauben) auszubauen und auf ihren Zustand / Korrosion zu überprüfen ggf. zu erneuern (diese Überprüfung muss spätestens nach 30 Jahren wiederholt werden). Die Beschläge vor der Montage konservieren und mit neuen Schrauben und/oder neuen Rohrnieten montieren.
- *If the glider or motor glider is older than 30 years, all hinges have to be removed (aileron bearing, airbrake bearings, bell crank of aileron push rod, bearing mounting for bell crank, diagonal tube as well as its mounting bolts) and checked for damage and corrosion, renew if necessary. (This inspection has to be repeated at least every 30 years). Apply new primer and paint to bearings prior to re-installation and use new screws and/or tubular rivets.*

- Die Flügelnase durch die Öffnungen, die zum Ausbau der Schrauben für das Diagonalrohr bzw. für den Lagerbock angebracht wurden, auf Beschädigungen und Losleimungen prüfen. Sollte in der Nasenbeplankung oder am Holmkasten Wasserränder oder Wasserschäden (Sperrholzverfärbung, Fäulnis, Schimmel usw.) gefunden werden, so muss die Beplankung in diesem Bereich entfernt werden, damit die Holmverleimung sowie der Holmgurt genauer untersucht werden kann.
- *Check leading edge for damage and loose bonding through the holes for the deinstallation of the screws for the diagonal tube and the bearing mounting. If there are water marks or water damage in the nose planking or box spar (plywood discoloration, rot, mold, etc) the planking has to be removed in this area in order to further inspect the bonding on the spar and spar flange.*
- Bei Segelflugzeugen und Motorseglern, die vor 1965 gebaut wurden sind, empfiehlt es sich, auch die Hauptbeschläge auszubohren und diese an den Auflageflächen zum Holz auf Korrosion zu überprüfen. Wenn die Hauptbeschläge danach beim Aufnieten mit einem Spezialkleber verklebt werden (wie es bei den SF 25 B,C,D,E und SF 28 Typen schon bei der Herstellung gemacht wurde und wird) entfällt eine weitere Inspektion des Hauptbeschlages (wenn aber auch an verklebten Hauptbeschlägen im Randbereich Korrosion sichtbar ist, müssen auch diese abgenommen werden, damit sie genauer untersucht werden können).
- *If the glider or motor glider was built before 1965 it is advisable to take out the main hinges and check the sides which are attached to the wood for corrosion. A further inspection of the main hinges is not necessary if a special adhesive is used when the hinges are riveted back on (as it has been and still is done during the production of the SF 25 B, C, D, E and SF 28 series). If, however, corrosion is found on the border area of glued on hinges, these have to be taken out for further inspection.*
- Beim Abschleifen des Lackes auf den beplankten Teilen darauf achten, daß das Sperrholz nicht zu weit angeschliffen wird. Beplankungsfelder, bei denen mehr als 10% der Gesamtfläche der obersten Holzschicht durchgeschliffen wurde, so daß schon der Leimfilm oder sogar schon die zweite Lage Holz sichtbar ist, müssen komplett erneuert werden.
- *When stripping paint off the plankings make sure that the plywood is not sanded down too much. If more than 10% of the total area of the first wood layer is sanded down to that extend that the bonding shows or even the second layer of wood, the whole planking has to be renewed.*
- Wenn die Verleimungen der Sperrholzfahnen und Sperrholzecken an den Rippen und die Verleimungen des Sperrholzes von der Flügelnase zu den Endrippen in Ordnung ist, kann im Normalfall davon ausgegangen werden, dass auch die Verleimungen der Torsionsnase zum Holm in Ordnung ist. Zur besseren Beurteilung der Verleimung, kann die Verleimung abgeklopft werden (bei einer losen Verleimung wird das Klopfgeräusch dumpfer). Die Erfahrung hat gezeigt, das Segelflugzeuge und Motorseglern, die bei der Herstellung mit Aerodux verleimt wurden/werden, keine Probleme mit den Verleimungen haben. Dies sind in erster Linie Flugzeuge von **Scheibe Flugzeugbau GmbH** die nach 1961 und Flugzeuge die von **SCHEIBE AIRCRAFT-GMBH** gebaut wurden/werden.
- *Is the bonding of the plywood brackets (triangles and rim) on the ribs and the bonding of the plywood from the leading edge to the end ribs intact, the bonding from the torsion nose to the spar should normally be intact, too. It is advised to tap the bonding for a better assessment of the state of the bonding (if the bonding is coming loose the tapping sounds more dull). The experience has shown that gliders and motor gliders haven't got any problems with the bonding if Aerodux was used during production. These are mainly aircraft from Scheibe Flugzeugbau GmbH, which were built after 1961 and aircraft made by SCHEIBE-AIRCRAFT-GMBH.*

Achtung bei Segelflugzeugen, die Scheibe Flugzeugbau GmbH vor 1961 und im Amateurbau gefertigt wurden:

Please note for gliders made by Scheibe Flugzeugbau GmbH before 1961 and kit planes:

Hier wurde oft Kasein- oder Kauritleim verwendet! Die Leimverbindungen sind oft sehr schlecht und müssen dann erneuert werden. Dazu ist es oft erforderlich ein komplettes Beplankungsfeld oder komplette Leisten zu erneuern.

During production mainly casein glue or hot glue was used! The glue compound often is rather weak and has to be renewed. In this case it is necessary to renew a specific planking area or the complete slat.

- Alle Lager und Buchsen der Steuerung, sowie die Umlenkrollen müssen gereinigt und überprüft und ggf. erneuert werden.
- *All bearings and bushings of the control as well as the pulleys have to be cleaned and inspected and renewed if necessary.*
- Es ist zu empfehlen, daß alle Schrauben bei der Überholung erneuert werden.
- *It is advisable to renew all screws during the overhaul.*
- Beim Bespannen kann es von Vorteil sein, die Bespannung auf der Flügelunterseite zu vernähen, damit wird ein besserer Halt des Bespannstoffes zu den Rippen erreicht.
- *It can be of an advantage to sew the covering underwing to give the covering more tensile strength to the ribs.*
- Die Flügel-Rumpf-Bolzen, sowie den Hauptbolzen auf Spiel prüfen ggf. erneuern. Maximal zulässiges Spiel 0,1mm. Ist das Spiel größer, müssen die Bolzen durch Übermaßbolzen ersetzt werden. (das max. Übermaß von 1,0 mm darf man nicht überschreiten; müssen größere Bolzen eingebaut werden, muss der Beschlag erneuert werden).
- *Check the wing – fuselage bolts as well as the main bolts for play and renew if necessary. Maximum play permitted is 0.1mm. If the play is bigger, surplus bolts have to be used. (the maximum surplus play may not be more than 1.0mm. If bigger bolts have to be used, the whole hinge has to be renewed).*

Höhen- und Seitenleitwerk:

Elevator and fin:

- Die alte Bespannung entfernen.
- *Remove the old covering.*
- Die alten Lackschichten an den beplankten Teilen (Seiten- und Höhenflosse) mit geeignetem Werkzeug entfernen. Darauf achten, daß dabei die Beplankung nicht beschädigt wird.
- *Remove the old paint work on the planking (elevator and fin) with a suitable tool. Be careful not to damage the planking.*
- Alle Beschläge demontieren (auch die mit Rohrnieten montierten Beschläge) und auf Korrosion an den Auflageflächen zum Holz, sowie auf Beschädigungen oder Verschleiß überprüfen ggf. instandsetzen oder erneuern. Die Beschläge vor der Montage konservieren und mit neuen Schrauben und/oder neuen Rohrnieten montieren.
- *Remove all hinges (also the hinges mounted with tubular rivets) and check the sides which face the wood for corrosion as well as for damage and wear and tear, renew or repair if necessary. Apply new primer and paint to bearings prior to re-installation and use new screws and/or tubular rivets.*
- Buchsen und Lager auf Spiel überprüfen ggf. erneuern. Maximales Spiel 0,1 mm.
- *Check bushings and bearings for play and renew if necessary. Maximum play is 0.1mm.*
- Gesamte Verleimungen wie beim Flügel beschrieben überprüfen ggf. erneuern.
- *Check and renew all bonding as described for the wing.*
- Beim Bespannen der Ruder ist es sinnvoll, sie komplett zu bespannen, damit die Holzteile besser geschützt sind.
- *It is advisable to cover all rudders completely to protect all wooden parts.*

Rumpf:

Fuselage:

- Die alte Bespannung entfernen.
- *Remove the old covering.*
- Die alten Lackschichten an den beplankten Teilen (egal ob Holz, GFK oder Alu) mit geeignetem Werkzeug entfernen. Darauf achten, daß dabei die Beplankung nicht beschädigt wird.
- *Remove the old paint work on the planked parts (wooden, GRP or aluminium) with a suitable tool. Be careful not to damage the planking.*
- Alle Verkleidungsteile, Formleisten sowie die Steuerung ausbauen.
- *Remove all panelling and form slats as well as the controls.*
- Alle Lager und Buchsen der Steuerung, sowie die Umlenkrollen müssen gereinigt und überprüft und ggf. erneuert werden.
- *All bearings and bushings of the control as well as the pulleys have to be cleaned and inspected and renewed if necessary.*
- Die gesamte Steuerung entlacken und auf Beschädigungen überprüfen ggf. instand setzen oder erneuern. Schubstangen, die nicht vollständig zugeschweißt sind (wie z.B. Höhenruderschubstangen mit einstellbaren Anschlüssen), müssen auch von innen auf Korrosion überprüft werden.
- *Remove the paint off the complete control and check for damage. Repair or renew if necessary. Push rods which are not completely welded (e.g. elevator push rod with adjustable connections) have to be checked for corrosion inside and outside.*
- Es ist zu empfehlen, daß im Bereich des Hauptfahrwerkes und des Sporns die unteren Längsurte angebohrt werden, um mit einem Endoskop die Rohre von innen zu begutachten. Danach die angebrachten Löcher wieder zuschweißen. Ist kein Endoskop zur Hand oder kann nicht zweifelsfrei der Zustand des Rohres beurteilt werden, kann auch ein Stück Rohr herausgeschnitten werden, um den Zustand besser beurteilen zu können. Das herausgeschnittene Rohr anschließend durch ein neues Rohr ersetzen. Werden Rohre mit Korrosion festgestellt, müssen diese erneuert werden.
- *It is advisable to drill into the lower longerons in the area of the main gear and tail wheel to inspect the inside of the tubes using a boroscope. Weld the holes after inspection. If you haven't got a boroscope or the state of the tube can't be assessed satisfactory, a piece of tube can be cut out to assess the state more accurately. Renew the cut out tube by a new tube. If you detect corrosion, these tubes have to be renewed.*
- Um das Rumpfgerüst und die Schweißnähte besser untersuchen zu können, ist es zweckmäßig, das Rumpfgerüst sand zu strahlen.
- *It is advisable to sand blast the fuselage framework to inspect the framework and weld seams thoroughly.*

Achtung: Beim Strahlen darf das Material nicht geschwächt werden!

Note: the material must not be weakened during the sand blasting process!

Nach dem Strahlen können die Schweißnähte mit einer Lupe, die eine Vergrößerung 1:10 hat, auf Risse untersucht werden.

After sand blasting the surface the weld seams can be inspected for cracks using a magnifying glass with a magnification of 1:10.

- Nach den Untersuchungen muß das Rumpfgerüst geprimert und lackiert werden.
- *After the inspection the framework has to be coated with new primer and paint.*
- Beim Einbau der Steuerung alle Schrauben und Muttern erneuern.
- *Use new screws and nuts for the installation of the control.*

Achtung, bei allen Segelflugzeugen und Motorseglern:

Note for all gliders and motor gliders:

Sind in der Steuerung Messingbuchsen eingebaut oder Schrauben, die eine Drehbewegung ausüben, dürfen diese Schrauben nur mit Kronenmutter und Splint gesichert werden. Schrauben, die keine Drehbewegung ausführen (dazu gehören auch Schrauben und Muttern der Steuerung die durch einen U-Bügel fest mit einem Pendellager verschraubt sind und sich mit dem U-Bügel bewegen) können mit selbstsichernden Muttern gesichert werden.

If brass bushings or rotary screws are used with the control, you have to secure these screws only with crown nuts and splints. Non-rotary screws (eg. screws and nuts of the control which are screwed tightly to a self-aligning bearing by a u-stirrup and move with the u-stirrup) can be secured with self-locking nuts.

- Alle Steuerseile erneuern.
- *Renew all control cables.*
- Alle Spannschlösser auf Zustand und Funktion überprüfen ggf. erneuern.
- *Check all turnbuckles for state and function, renew if necessary.*
- Alle Seilführungen auf Beschädigungen und Verschleiß überprüfen ggf. erneuern.
- *Check all Bowden cable guides for damage and wear and tear, renew if necessary.*

Im Zweifelsfall gilt die deutsche Ausgabe dieser Anweisung!

In case of doubt is only the German issue significant!