SCHEIBE AIRCRAFT GMBH

D - 73540 Heubach, Am Flugplatz 5
Tel.: (0)7173 / 184 286 Fax: (0)7173 / 185 587
e-mail: info@scheibe-aircraft.de

FLIGHT MANUAL and Maintenance Manual

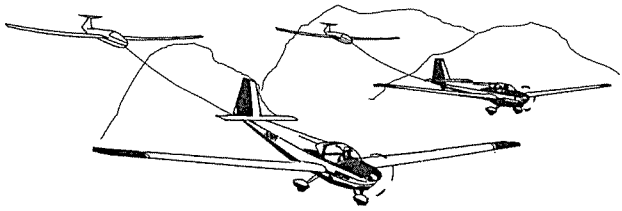
SF 25 C - FALKE

motorglider

ROTAX 912 **A** ( )
or
ROTAX 912 **S** (2)

maximum all-up weight ~~580 kg (604 kg with Folding Wings)~~
~~610 kg (634 kg with Folding Wings)~~
650 kg (674 kg with Folding Wings)
~~690 kg (714 kg with Folding Wings)~~

MARCH 1997



Serial no: 44714
Registration no: D-KAGN
Owner:

European Aviation Safety Agency
Paul HATTON
Project Certification Manager

Edition March 1997 Rev.9, 10.04.2014

Pages 1-30 of this Flight manual are EASA approved
EASA.A.C.10048806
This manual is to be keet on board at all times.

This SF 25 C Serial N°: 44714
Call Sign: D-KAGN has following Equipment:

1. Engine:

Not for max. Take-off-masses 580/ 610 kg	ROTAX 912 A(2)		ROTAX 912 A(3)		ROTAX 912 A(4)	
	ROTAX 912 S(2)	x	ROTAX 912 S(3)		ROTAX 912 S(4)	

2. Propeller:

Only for ROTAX 912 **A(1)** , **A(2)** or **A(4)**	HO 11 A HM- 165 130	
Only for ROTAX 912 **A(1)** , **A(2)** or **A(4)**	MT 165 R 130- 2A	
Only for ROTAX 912 **S(2)** or **S(4)**	MT 170 R 135- 2A	
Only for max. Take-off mass 650/ 690 kg (674 kg/714 kg).	MT 175 R 130- 2A	x
Only for ROTAX 912 **A(2)** and **A(4)** or 912 **S(2)** and **S(4)** not for max. Take-off mass 580 kg (604 kg).	MTV 1A/ 175- 05	
Only for ROTAX 912 **A(3)** or 912 **S(3)** not for max. Take-off mass 580 kg (604 kg).	MTV 21A- C- F/(CF)175-05	

3. Spacer for fixed pitch Propeller:

SF 653 C- 71- S1.4 E1	
MT A 548	x
Limbach 201. 032. 070	

4. Propellerdome for fixed pitch Propeller:

MT B- 030 (ALU)	
MT B- 030/1 (GFK)	x
Hoffmann- Propeller: VP 30-63 Together with VP 30- 64	

5. Take-off mass:

*) Delete as appropriate	~~580 kg *)~~ ~~(604 kg)~~	~~610 kg *)~~ ~~(634 kg)~~	650 kg *) (674 kg)	~~690 kg *)~~ ~~(714 kg)~~

6. Max. Mass of nonlifting parts:

*) Delete as appropriate	~~430 kg~~	~~450 kg~~	490 kg	~~530 kg *)~~ ~~(525 kg)~~

7. Version of landing gear:

Single Main wheel (fixed)	8.00x 4	
Single Main wheel (sprung)	6.00 x 6	
Two wheel main landing gear with tailwheel	5.00x 5 210x 65	x
Two wheel main landing gear with nose wheel	5.00x 5 330x 130	
360°- tailwheel	210x 65	

8. Wings:

Folding at beginning of ailerions	
Complete folding	

9. Fuel capacity:

not together with ROTAX 912 S ( )	44 l	
	55 l	x
Not for max. Take-off mass 580/ 610 kg	80 l	

10. Aerotow equipment

not for max. Take-off mass 580 kg	Towrope retraction and cutting device, TOST	
	Fixed Aerotow device with TOST- Noselaunching hook	x

Contents

	page
Contents	2
Revision status of manual	4
1. Specifications and limitations	**5**
1.1. Engines	5
1.2. Fuel	5
1.3. Lubricants	6
1.4. Cooling system	7
1.5. Propeller	7
1.6. Engine instrumentation and markings	7
1.7. Master switch	8
1.8. Circuit breakers	8
1.9. Ammeter	8
1.10. Antenna connection	8
1.11. Connecting other consumers.	9
1.12. Airspeed limitations and load factors	9
1.13. Weights	11
1.14. Centre of Gravity at flying weights	12
1.15. Placards	12
1.16 Approved operation	14
2. Operating instructions	**15**
2.1. General	15
2.2. Daily inspection	15
2.2.1. Airframe	15
2.2.2. Engine (see also Engine Manual)	16
2.2.3. Propeller (see also Propeller Handbook)	17
2.2.3.1. Electric Constant-Speed-Prop MTV1A/175-05 and Hydraulic Constant-Speed-Prop MTV21A-C-F/(CF)175-05.	17
2.2.3.2. Fixed pitch propeller	17
2.3. Pre take-off checks	17
2.4. Starting the Motorglider	17
2.4.1. Starting the engine (see also Engine Manual)	18
2.4.2. Hand starting the engine	19
2.4.3. Warming up, static rpm check (see also Engine Manual)	19
2.4.4. Taxiing	19
2.5. Take off and climb	19
2.5.1. Winch start	20
2.5.2. Aerotow	20
2.6. Cruise	20
2.7. Landing	20
2.8. Stopping and starting the engine in flight	21
Flying with the engine stopped	21

2.10. Slow flying and stall characteristics 23
2.11. Spinning 23
2.12. Wet wings – warning 24
2.13. Cold weather flying and risk of carburettor icing 24
2.14. Operating without outriggers 24
(only applies to single mainwheel undercarriage version) 24
2.15. Safety factors and engine reliability 24
2.16. Attachment points for parachute static release 24
2.17. Emergency canopy release 25
2.18. Type familiarisation 25
2.19. Crosswind 25
2.20. Field landings 25

3. Performance data **26**

3.1. Take-off performance 26
3.2. Rate of climb 27
3.3. Airspeeds 27
3.4. Range and endurance (zero wind conditions) 27
3.5. Gliding performance 28

4. Centre of gravity and weight limits **28**

4.1. Empty weight centre of gravity 28
4.2. Centre of gravity at flying weights 28
4.3. Weight placard 29

5. Minimum equipment **29**

6. Optional auxiliary equipment **29**

7. Additional electrical fuel pump **30**

8. Noise reduction requirements **30**

30

Revision status of manual

Serial no.	Title	Pages affected	Date	Signature
1	Version of manual - valid for all weight versions. Instructions for use of vacuum pump	Title page, insert, 4, 5, 7, 10, 12, 13, 15,16,18, 25, 26, 27, 28	22.01.1998	
2	Correction to propeller drawing for MTV21A-C-F/(CF)175-05	Title page, 4, 7, 20, 21, 25, 26	31.10.1998	
3	Additional engine ROTAX 912 S ( ) and editing change	Title page, insert, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 29	31.01.1999	
4	Following ROTAX SB 912-36R1, modification of procedure of power-setting for electr. Constant speed prop; Voltmeter instead of Ammeter	FM: Title page, 4, 8, 13, 16, 19, 26 MM: Title page, 10, 18, 19	15.01.2003	
5	New Cockpit canopy Electric Trim Servo with Position indication	FM: Title page, 4, 8, 11, 15, 24 MM: Title page, 2, 4, 15, 19, 21, 27, 28	20.05.2004	
6	Junction change of the push button switch with one piece canopy	FM: Title page, 4, 8, 16 MM: Title page, 18, 19	13.10.2005	
7	Increase of the MTOW and the max. weight of non-lifting parts	FM: Title page, 3, 4, 5, 6, 7, 9, 10, 23, 25, 27, 29, 30 MM: Title page, 2, 22, 23, 24, 25, 26, 27, 28, 29	20.01.2009	
8	Increase the manoeuvring speed and the max. speed	FM: Title page, 4, 9, 10 MM: Title page	10.12.2009	
9	Increase of the MTOW with Folding Wings	FM: Title page, insert, 2, 4, 9, 9a, 10, 12, 19, 25, 27, 29, 30 MM: Title page, 22, 23, 24	07.04.2013	

The pilot is responsible for ensuring that the aircraft is operated in accordance with the Flight Manual.
The SF25C is authorised to carry a maximum of two adults.

The seating is side by side: the pilot sits on the port side.
The SF25C is ideal for training. For training purposes the instructor (P1) may sit on either side. All regulations must be observed.
The starboard control column may be removed for passenger flying.

1. Specifications and limitations

1.1. Engines

SF 25 C Engines	*ROTAX* 912 **A**(1)(2)(3)(4),	ROTAX 912 **S**(2)(3)(4)
Max. revs	5800 rpm	5800 rpm
Take off (full power) (max. 5 min)	Max. 5800 rpm 59.6 kW (82 PS/80bhp)	Max 5800 rpm 73.5 kW (100 PS/98bhp)
Cruise at	Max. 4800 rpm (63 PS/62bhp)	Max. 4800 rpm (72 PS/71bhp)
and additionally	22 ins manifold pressure (only for variable pitch propellers)	
Static rpm at full power	Min. 5000 rpm ± 100 rpm (Fixed pitch)	Min. 5600 rpm ± 100 rpm (Fixed pitch)
	5600 rpm ± 100 rpm (Variable pitch, fine pitch)	5600 rpm ± 100 rpm
Cylinder head temperature	max. 120°C	max. 120°C

1.2. Fuel

ROTAX 912 **A** ( )	ROTAX 912 **S** ( )
Min. **ROZ 90**	Min. **ROZ 95**
EN 228 Normal	----
EN 228 SUPER	EN 228 SUPER
EN 228 Super-Plus or	EN 228 Super-Plus or
AVGAS 100 LL	AVGAS 100 LL

Because of the higher lead content of AVGAS the valve seats are subjected to higher loads and there is increased carbon formation. Consequently AVGAS should only be used if there are vapour formation problems or if other types of fuel are not available. (see also Operating Manual for Rotax 912, section 10.2.2)

Fuel tank capacity
44 l (usable) or
55 l (usable) or
80 l (79 l usable)

1.3. Lubricants

Branded engine oils with gear additive

Never use unblended aviation engine oil.

Approved oils:

Use only API rated SF or SG oils. [Further details in Section 10.2.3) Lubricants in ROTAX 912 Operating Manual].

Synthetic & semi-synthetic oils should be used in preference as they are more temperature resistant and produce less residues.

- NB: If AVGAS 100LL is used, the oil must be changed more frequently. See Service Information 18 UL 97.

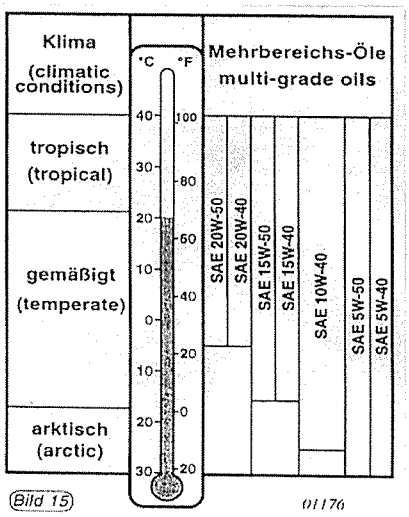


Bild 15

Oil capacity	3.0 l (minimum 2.0 l)
Oil consumption	max. 0.1 l/hr

Oil pressure	ROTAX 912 **A**( )	ROTAX 912 **S**( )
min.	0.8 bar (< 3500 rpm) [1.5 bar up to engine serial no. 4,410.266]	0.8 bar (< 3500 rpm)
normal	2.0 – 5,0 bar > 3500 rpm [1.5-5.0 bar up to engine serial no. 4,410.266]	2.0 – 5,0 bar > 3500 rpm
max.	maximum 7.0 bar Δ Warning: Permissible for short duration on cold starting.	

Oil temperature	ROTAX 912 **A** ( )		ROTAX 912 **S** ( )	
	min.	50°C	min.	50°C
	max.	140°C	max.	130°C
	best operating temperature approx. 90°C - 110°C			

1.4. Cooling system

Sealed cooling system with expansion and overflow vessel. The expansion vessel is sealed with a pressure cap (with excess pressure and blow valve).

Coolant: 50% antifreeze with anti-corrosion additives and 50% water, for all year round operation.
(see also ROTAX 912 Operating Manual, Section 10.2.1.)

1.5. Propeller

1) 2 blade fixed pitch
   a) Hoffmann *HO11AHM-165130* for ROTAX 912 **A(1), A(2)** and **A(4)**
   b) MT-Propeller *MT165R130-2A* for ROTAX 912 **A(1), A(2)** and **A(4)**
   c) MT-Propeller *MT170R135-2A* for ROTAX 912 **S(2)** and **S(4)**
   d) MT-Propeller *MT175R130-2A* for ROTAX 912 **S(2)** and **S(4)**

2) 2 blade variable pitch
   a) MT-Propeller *MTV1A/175-05* for ROTAX 912**A(2), A(4), S(2), S(4)**
   b) MT-Propeller *MTV21A-C-F/(CF)175-05* for ROTAX 912**A(3), S(3)**
   (factory setting of fine pitch for 912 **A** = 12°± 0.2°
   for 912 **S** = 14°± 0.2°, see propeller card)

Δ ROTAX 912 A + variable pitch propeller: Not for max. AUW of 580 kg Δ

Δ ROTAX 912 S + fixed or variable pitch propeller: Only for max AUW of 650/ 690 kg Δ

1.6. Engine instrumentation and markings

Rev counter

Starting range	0 – 1400 rpm	(yellow arc)
Normal operating range	1400 - 4800 rpm	**(green arc)**
Caution range	4800 -5800 rpm	(yellow arc)
Max. revs	5800 rpm	**(red line)**

Engine hours counter

The engine hours counter is a revolution counter. Irrespective of the actual rpm it counts 5000 revolutions as 1 minute of operation. The first three digits represent completed hours and the last two digits show values for 1/10 and 1/100 of an hour respectively. If an electronic rev counter without engine hours counter is in use, then there must be a separate engine hours counter.

Oil pressure gauge

Minimal operating range	0.8 - 2.0 bar	(yellow arc)
	0.8 – 1.5 bar	(for ROTAX 912 A, up to engine serial no. 4,410.266)
Normal operating range	2.0 - 5.0 bar	**(green arc)**
	1.5 – 5.0 bar	(for ROTAX 912 A, up to engine serial no. 4,410.266)
Permissible for short duration on cold starting	5.0 – 7.0 bar	(yellow arc)
Maximum oil pressure	7.0 bar	**(red line)**

Oil temperature gauge		ROTAX 912 **A**( )	ROTAX 912 **S**( )
Normal operating range	**(green arc)**	50°- 140°C	50°- 130°C
Minimum temperature	**(red line)**	50°C	50°C
Maximum oil temperature	**(red line)**	140°C	130°C

Cylinder head temperature

Maximum cylinder head temperature	ROTAX 912 A	ROTAX 912 S
(red line)	120°C	120°C

1.7. Master switch

The master switch isolates the battery from the aircraft wiring. It is switched on at the start of the flight 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 or similar).
With the option "one piece cockpit canopy": (up to factory S/N 44709) If canopy lock mechanism is open, master switch is out of function. Engine is not to start, electric equipment doesn't work.

1.8. Circuit breakers

Except for the starter circuit the aircraft wiring system is protected from overload and short circuit by automatic circuit breakers.

Circuit breakers	Battery	25A
	Generator	20A

A short circuit or overload will trip the button of the circuit breaker affected, causing it to protrude. After correction of the fault the button is pressed in again to restore the circuit. As the circuit breakers get hot when they trip, they should not be pushed in again immediately.
If the battery is subject to heavy discharge (e.g. lengthy starting attempts in the winter) the alternator trip may pop out when the engine is running (e.g. in flight). If this occurs, push it in again after about 2 minutes or the battery will not be charged.

The 20 A generator fuse is in the form of a fuse switch and located next to the master switch (which isolates the battery from the aircraft wiring system, so that it can be isolated from all power sources in case of emergency. This means the alternator can be isolated from the aircraft wiring system in case of emergency by tripping the fuse switch.

1.9. Ammeter

When the engine is running, it does not usually indicate a charging current, which means that the battery is fully charged. If the battery charge is low it will indicate the battery charge (the pointer will indicate + or –).
If a large number of consumers are in operation or if there are no consumers in operation, but the engine is not running, the ammeter will indicate battery discharge (the pointer will indicate -). A continuous reading of over + 10 A indicates that the battery is no longer able to hold a charge or that the generator regulator is faulty.
Instead of this ammeter a Voltage indicator can be used together with a low voltage lamp (see MM, wiring diagram)

1.10. Antenna connection

A radio antenna is incorporated inside the fin. The antenna coax cable is routed from the fin to a position under the luggage compartment where the remaining length is coiled and secured. From there it can be routed to the radio. The appropriate regulations must be observed when fitting the radio.

1.11. Connecting other consumers.

Further circuit breakers may be added to the terminal bar for additional consumers This applies to ACL, nav lights, VOR, transponder, encoder etc. It is important to ensure that the additional equipment is using the correct fuse rating.

The aircraft wiring system is 12 V DC, negative ground.
The appropriate regulations must be observed when fitting additional equipment.
The fuses on the firewall can be replaced with state of the art circuit breakers.
There is then no need for spare fuses and a visual check can be made to see which system has tripped out.

The appropriate regulations must be observed when fitting additional equipment.

1.12. 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	All weights	190	102	Never exceed this speed. Control surface movements must be limited to one third travel.
		max. weight **650/ 690 kg** (674/714 kg with Folding Wing) **With change 195**	212	114	
V_{RA}	Maximum speed Rough air	max. weight **580/ 610 kg** (604/634 kg with Folding Wing)	150	80	Do not exceed this speed except in calm air conditions and then only with caution. See Note 1.
		max. weight **650/ 690 kg** (674/714 kg with Folding Wing)	160	86	
		max. weight **650/ 690 kg** (674/714 kg with Folding Wing) **With change 195**	165	89	
V_A	Manoeuvring speed	max. weight **580/ 610 kg** (604/634 kg with Folding Wing)	150	80	See Note 2
		max. weight **650/ 690 kg** (674/714 kg with Folding Wing)	160	86	
		max. weight **650/ 690 kg** (674/714 kg with Folding Wing) **With change 195**	165	89	
V_W	Winch launch speeds	max. weight **580/ 610 kg** (604/634 kg with Folding Wing)	100	54	Only permissible with engine stopped
		max. weight **650 kg** (674 kg with Folding Wing)	110	59	

Note 1: Rough air means conditions which may be encountered in wave rotor, cumulus 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	max. weight 580/ 610 kg (604/634 kg with Folding Wing)	*80 -150*	**43-80**	Normal operating range, see Note 3
	max. weight 650/ 690 kg (674/714 kg with Folding Wing)	*80 -160*	**43-86**	
	max. weight 650/ 690 kg (674/714 kg with Folding Wing) **With change 195**	*80 -165*	**43-89**	
yellow arc	max. weight 580/ 610 kg (604/634 kg with Folding Wing)	*150 -190*	**80-102**	Caution range see Note 4
	max. weight 650/ 690 kg (674/714 kg with Folding Wing)	*160 -190*	**86-102**	
	max. weight 650/ 690 kg (674/714 kg with Folding Wing) **With change 195**	*165 -212*	**89-114**	
red line	All weights	*190*	**102**	Maximum permissible speed for all operating modes
	max. weight 650/ 690 kg (674/714 kg with Folding Wing) **With change 195**	*212*	**114**	
blue line	ROTAX **912 A**	*90*	**49**	Best rate of climb
	ROTAX **912 S**	*95*	**51**	
yellow triangle		*90*	**49**	Minimum approach speed at maximum weight

Note 3: The lower limit applies to maximum weight and most forward CG position. (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:	**+5.3g**
at maximum speed	**+4.0g**
With spoilers extended	**+3.5g**

1.13. Weights

Empty weight (dependent on type of undercarriage and equipment)	approx. 400kg–450kg
Permissible load including fuel	approx. 200kg
Maximum permissible AUW (all up weight)	*) 580 kg (with Folding Wings 604 kg) 610 kg (with Folding Wings 634 kg) 650 kg (with Folding Wings 674 kg) 690 kg (with Folding Wings 714 kg)
Maximum weight of non-lifting components	*) 430kg/ 450kg/ 490kg/ 530 kg (with Folding Wings 525 kg)

*) Delete as appropriate

See Maintenance Manual pp. 24 and 25

1.14. Centre of Gravity at flying weights

Aircraft position:	Wing chord rib 6 (2.2 m = 86.61" from centre line (horizontal)
Datum:	2.0 m in front of leading edge of rib 0 (0.52 m = 20.47" from the centre line)
Forward limit of CG:	2.143 m = 84.35" aft of datum
Rearward limit of CG	2.334 m = 91.89" aft of datum

1.15. Placards

The following placards are in addition to the fireproof Nameplate and Dataplate:

1. On the port side of the cockpit by the control lever:

Spoilers full travel operates wheel brake

2. On the instrument panel, by the controls:

Choke - pull for rich	Fuel
Ignition - on – off	Ventilation
Fuel - on – off	Starter
Master switch - on – off	Heater - pull - open
open – Cowl flap – closed or	Cowl flap pull to open
Carburettor heat Pull - on	

3. By the canopy emergency jettison handle:

Emergency canopy release: Pull on front and top handles, throw clear to the right

or by the upper knob with canopy lock

Emergency canopy release: Open the top canopy lock by turning, pull the emergency jettison handle, lift canopy and throw off to the right

4. On the rear wall of the luggage compartment

Luggage - max. 10 Kg (22 lbs.)

5. Between the seats by the trimmer lever:

nose down – Trimmer – tail down

or on the port side of the cockpit

tail down – Trimmer – nose down

or near by the Rocker switch for the Trimservo and near by the Trim position indication

6. On the fuselage near the fuel tank filler cap

for ROTAX 912 **A**	for ROTAX 912 **S**
Unleaded petrol - MOGAS Minimum ROZ **90,** SUPER unleaded SUPER-Plus-unleaded or aviation fuel AVGAS 100 LL Tank capacity: 44 l, 55 l or 80 l	SUPER unleaded MOGAS Minimum ROZ **95,** SUPER-Plus-unleaded or aviation fuel AVGAS 100 LL Tank capacity: 44 l, 55 l or 80 l

7. On the fuselage by the mainwheels if 2 wheel undercarriage or by the sprung mainwheel

2.1 bar

By the main wheel (sprung single mainwheel undercarriage)

1.8 bar

8. By the tailwheel:

2.5 bar

By the nosewheel:

1.5 bar

9. By the oil filler cap

Oil capacity 2.3 l

10 On the instrument panel:

Caution Switch off all sensitive electrical equipment before starting or stopping the engine	Caution Wet wings – see Flight Manual

Engine running = cowl flap open	COWL FLAP: PULL = OPEN

NO SMOKING

11. Near the CG hook release:

Cable release

12. On the fabric covering above the CG hook release:

for G_F = 650 kg and 610 kg
with Folding Wings 674 kg and 634 kg)

Weak link max: 850 daN

for G_F = 580 kg
(with Folding Wings 604 kg)

Weak link max: 500 daN

13. On the instrument panel:

PRE TAKE-OFF CHECKS	
Folding wings secured	(if applicable)
Harness fastened	
Trimmer set	
Spoilers closed	
Tailwheel locked	(if castoring tailwheel)
Canopy locked	
Controls: full & free movement	
Fuel shut-off valve: open	
Fuel gauge: check	
Cowl flap open	
Propeller set for take-off	(if variable pitch)

14. By the electric fuel gauge:

44 l usable

or

55 l usable

or

79 l usable

15. On the top of the engine cowling behind the propeller:

Δ WARNING Δ
Never turn the
propeller backwards

1.16 Approved operation

The SF 25 C „Falke" motor glider is approved for **VFR daytime operation only.**

Δ Warning Δ

Not permitted: **IFR** flying, flying in **icing conditions, aerobatics and spinning.**

2. Operating instructions

2.1. General

The Falke is a self launching motor glider. It may be flown with an MGPPL (Motor Glider Private Pilot's Licence).

It is of course necessary for the pilot to have a thorough understanding of motor gliders and operating the engine.

It is obligatory to study the documentation and to gain a thorough knowledge of the motor glider and its engine.

2.2. Daily inspection

It is necessary to examine the airframe, the engine and the propeller for airworthiness before flying, especially if it has been rigged since the last flight. Essential checks:

2.2.1. Airframe

Check in particular for correct functioning, security and condition (no cracks or deformations); also check bearings and drives for lack of play.

1. Check the 4 wing attachment points, the seating and security of the main pin and check that the two rear wing attachment points are secured (only in case of folding wing).
2. Check that the aileron controls in the fuselage are connected and secured
3. Check that the spoiler controls in the fuselage are connected
4. Check the controls from the cockpit for full and free movement Check that the starboard control column is secured
5. Check rudder pedals (and nosewheel steering if applicable). Check for correct adjustment and locking of rudder pedals
6. Check pulleys, fairleads and cables for wear and kinking
7. Check operation of spoilers from the cockpit.
8. Check correct operation and effectiveness of the wheel brakes.
9. Check the instruments and check the radio with a test transmission.
10. Pitot. There is a drain facility in the pitot. which is accessible through the handhole under the tailplane. Check especially after exposure to rain or after road transport and drain as necessary.
11. Check that the safety harness and their fittings are in proper condition and secure.
12. Any luggage must be secured by the straps provided
13. Check for foreign objects
14. Check the canopy, canopy lock, canopy jettison system and direct vision window
15. Check that the spar cover plates at the wing/fuselage interface on both sides of the fuselage are in position and secure.
16. Check that both outriggers are in good order and correctly attached (only applies in the case of single mainwheel under-carriage).
17. Check both pushrods at the ailerons
18. Check the wing folding attachments & the aileron drives at the folding points (if applicable) are secured; check that the wing joint fairings are secure
19. Check that both ailerons are attached and secured

20. Is the tailplane forward attachment tightened down and secure?
21. Check the elevator connection is locked.
22. a) Check the trimmer connection by Bowden cable at the elevator or
    b) electric plug for Trim servo fitted (Diod plug)
    ground function test of Trim system
23. Rudder:- Check rudder bearings and cable connections. Check the tailwheel pushrod at the rudder drive lever (with castoring tailwheel) and the tailskid, check all locking arrangements and that the rudder movement is in the correct direction.
24. Check that the tailwheel and the steering pivot are clear to rotate and do so freely.
25. Check the underside of the front of the fuselage and the fuselage underside for damage (risk of exhaust gas penetration).
26. Check the general condition of the mainwheel(s), the tailwheel or nosewheel and the outriggers (if applicable) and also all tyre pressures.
27. Check the planking, fabric covering and paintwork for damage.
28. Caution: Remove the towbar from the nosewheel (if applicable).
29. Check the operation of the CG release hook.

2.2.2. Engine (see also Engine Manual)

1. Check the engine thoroughly for missing or loose nuts, screws, bolts and locking arrangements. Check cooling ducts, ignition leads for security and condition. Look out for chafing.
2. Check that the following operate freely: throttle, choke, heating, ventilation and carburettor heating flap and engine cooling flap.
3. Check that the rubber flanges on the carburettor are undamaged (no cracks).
4. Check the oil level and top up if necessary. ✪ Caution. Run the engine for about half a minute before checking the oil. (Before a long flight the oil level should be at least halfway up between marks on the dipstick.)
5. Check the coolant and top up if necessary. The fluid level in the overflow reservoir should be at least 2 – 3 cm when the engine is cold (see Engine Manual).
6. Check oil, fuel supply and cooling systems to ensure freedom from leaks and abrasion.
7. Operate the tank drainer before moving the motorglider.
8. Check the engine mountings and their locking arrangements.
9. Check the exhaust system for damage, leaks and general condition.
10. Check the engine compartment for foreign bodies.
11. Check the cowling for cracks, reassemble and check the patent fasteners are correctly seated.
12. Check the fuel tank level
13. Check the tank vent. Use only the original filler cap with vent (bearing the words *"Patent blau"*).

2.2.3. Propeller (see also Propeller Handbook)

2.2.3.1. Electric Constant-Speed-Propeller MTV1A/175-05 and Hydraulic Constant-Speed-Propeller MTV21A-C-F/(CF)175-05.

1. Check the condition of the blades and the spinner (no cracks).
2. Check for play at the propeller tips (up to 3 mm is permissible).
3. Check for play in pitch at the propeller tips (up to 2° is permissible).
4. Check propeller blades for cracks and that the leading edge protective tape is intact.
5. Propeller hydraulics: operating pressure 125 psi (9.0 bar). Check every 50 hours and top up as necessary (using nitrogen if possible). Only for MTV 1A
6. Check propeller pitch movement with master switch on and engine off.
7. Check the commutators and brushes together with the electrical wiring.

2.2.3.2. Fixed pitch propeller

1. Check condition of the blades. (no indentations or splintering)
2. Check the spinner for cracks.
3. Is the leading edge protection intact?

2.3. Pre take-off checks

1. Folding wings secured (if applicable)
2. Canopy closed and locked
3. Safety harness secure
4. Trimmer set for take off
5. 360° tailwheel locked (if applicable)
6. Spoilers closed and locked
7. Check for full and free movement of the controls
8. Fuel shut-off valve open
9. Sufficient fuel in tank
10. Cowl flap open
11. Propeller set to take-off pitch (if applicable)

2.4. Starting the Motorglider

Has the pre-flight inspection been completed? Move the throttle to full power, check for freedom of movement and full travel and return to idle position.

Δ Caution: **Wheelbrake on, ignition off**

In cold weather conditions turn the propeller several times by hand before starting* and check for unusual noises and stiffness in the motor and also for even compression. (See also Engine Manual: Check the mechanical components) Before starting the engine, close the canopy. Before starting, check that all the electrical trips (but not those of sensitive electronic equipment such as radio, transponder, Avionics master switch etc.) are pressed home. After the pilot has confirmed that the propeller area is clear, start the engine.
With the option "one piece cockpit canopy" (starting from factory serial number 44710): If canopy lock mechanism is open, the push button for the engine starter is out of function. Engine is not to start

NEVER turn the propeller backwards Δ Also if there is a vacuum pump for gyroscopic instruments (or damage to the pump blades will result).

2.4.1. Starting the engine (see also Engine Manual)

Before starting, ensure that someone is standing to the left at the front of the machine to make sure that no-one is near the propellers.
It is essential to keep warning people about the dangers and possible fatal results of coming into contact with the propeller – especially spectators.

Starting the engine:

Parking brake:	Apply
Engine cowl flap:	Open
Fuel cock:	Open
Additional fuel pump:	On (if fitted as an option)
Choke:	Pull (no choke if engine already warm)
Carburettor heat:	Off (if fitted as an option)
Propeller setting:	Fine pitch (electric propeller set to Auto)
Throttle:	Idle (if engine cold)
Master switch:	Sensitive electrical equipment (radio etc.): Off
Ignition switch:	On (both)
Propeller clear?	Shout: "Clear prop!"
Starter button:	Press

Δ Caution: Do not press the starter button for more than ten seconds. Before trying again allow 2 minutes for cooling off.

As soon as the engine starts release the starter button and set the throttle so that the engine runs at about 2,500 rpm. Check that the oil pressure rises within 10 seconds of starting and continue to monitor it. Do not increase engine revs until the oil pressure has settled down above 2 bar. Push the choke in fully.
If the engine does not start after several attempts, refer to Section 12 of the Engine Manual (Troubleshooting).

Δ Caution: As the propeller has a reduction gear it is important to adhere to the following procedures.
To avoid a sudden load the throttle should be set to idle before starting the engine. Do not open the throttle more than 10% of its travel. For the same reason, after throttling back the engine, the engine revs should not be increased for about 3 seconds to allow the engine speed to stabilise.

When testing magneto circuits, only one circuit should be switched on or off at any one time.

Δ Caution: Never operate the starter when the engine is still turning. Wait until the engine has stopped turning.

2.4.2. Hand starting the engine

Not applicable. This would be extremely difficult in view of the reduction gearing. The risk of injury would be too great.

2.4.3. Warming up, static rpm check (see also Engine Manual)

Warming up: Parking brake: set. Elevator: up.

During warming up: Monitor the engine instruments, let the engine run at 2,000 rpm for about 2 minutes, then continue warming up at 2,500 rpm until the oil temperature reaches 50°C. The time required will vary according to the air temperature.

Check fuel supply: brief running at maximum rpm

min 5,000 ± 100 rpm for the MT165R130-2A fixed pitch propeller

min 5600 ± 100 rpm for the MT170R135-2A fixed pitch propeller

MT175R130-2A

or: min 5,600 ± 100 rpm for variable pitch propellers

✪ Caution: After running at maximum rpm the engine should be allowed to cool off somewhat to avoid vapour formation in the cylinder head.

The engine can also be warmed up whilst taxiing to the take-off point. The magneto test is carried out at 4,000 rpm. The maximum rpm drop for each circuit is 300 rpm. The maximum rpm difference between the two circuits must not exceed 120 rpm

Check the carburettor heat at 4,000 rpm. The speed reduction must be minimum 30 rpm. (optional)

2.4.4. Taxiing

The Falke can taxi unaided and is steered on the ground with the tailwheel which is linked to the rudder (or nosewheel). Minimum turning circle about 15m with tailwheel, about 5m with nosewheel, The wheelbrake on the mainwheel is effective and will always stop the motor glider quickly. The two wheel undercarriage version of the Falke (with non adjustable pedals) is also equipped with heelbrakes for the pilot (left seat). The taxiing turning circle can be reduced by applying one heelbrake. During ground handling it is helpful for an assistant to go to the rudder and turn it to control the tailwheel. The tricycle undercarriage version can also be steered with a towing bar attached to the nosewheel.

One version of the Falke has an unlockable 360° pivot tailwheel for maximum manoeuvrability on the ground. This means the aircraft can be rotated around one mainwheel (two wheel version only). The tailwheel must be locked before take off.

2.5. Take off and climb

(✪ Caution: See also 2.12 Wet wings - warning)

Pre-flight check list (see 2.3 or the placard in the cockpit), trim neutral, spoilers closed and locked, control column central (do not push the column forwards)

Climb power (5 minutes only) **max 5,800 rpm, throttle fully open**

(available for take off and climb for up to five minutes)

Allow the speed to build up to 49 – 51 knots, then climb at not less than 49 knots (ROTAX 912 A) or not less than 51 knots (ROTAX 912 S).

At the longest after 5 minutes reduce to max. Continious power and/ or rpm

For fixed pitch propeller: n_{max} = 4800 rpm

for Constant-Speed-Propeller: n_{max} = 4800 rpm and 22 inHg manifold

Continue climbing to about 1,000ft, ensuring that the airfield remains within gliding range at all times.
To avoid excessive noise, the prop speed can be reduced by about 150 rpm as soon as a safe altitude is reached (175 – 250 ft).
The engine power is not reduced in the case of variable pitch props (full power, maximum 5 minutes) but the prop speed can be reduced to 5,000 – 5,500 using the propeller speed control lever. Check the rpm, oil pressure, oil temperature and cylinder head temperature. Check they are all in the permitted green arc. A faster climb speed is preferable as the engine is cooled better at higher flying speeds, especially during hot weather. Monitor the engine temperature especially closely during a long climb and in hot weather. If the engine temperature is approaching the limit, there are two options, and both reduce the rate of climb: fly faster or reduce engine power. The cowl flap must be fully open. During cruise the optional additional fuel pump can be switched off.

2.5.1. Winch start

The SF 25 C can also be fitted with a winch launch hook. Winch launches are permitted only with the engine stopped and the propeller horizontal. The winch launch is similar to that of any other glider.

Max. winch launch speed: for	G_F= 580 kg = 54 knots	G_F= 650kg / 610 kg = 59 knots
	(with Folding Wings 604 kg)	(with Folding Wings 674 kg or 634 kg)
Weak link:	500 daN	850 daN.

The trimmer should be set slightly nose heavy.

2.5.2. Aerotow

The SF 25 C is **not** approved for being aerotowed by a tug. The SF 25 C can only be winch launched using the CG hook.

2.6. Cruise

Cruise is possible from 43 knots upwards (very low engine power). Best cruise: approx. 65 knots at approx. 4,400 rpm, but do not exceed max cruise rpm of 4,800 rpm.

2.7. Landing

Before starting the approach, complete the following prop adjustments:

⇒ hydraulic variable pitch prop: set to fine pitch (grey knob fully forwards);
⇒ electric variable pitch prop: turn speed control knob on control unit to:
23 ≅ 2300 rpm (Prop)= 5230 rpm (engine) (P120A for ROTAX **912 A**) or
22 ≅ 2200 rpm (Prop)= 5340 rpm (engine)(P120/2400 for ROTAX **912 S**).

Engine cowl flap:	Open
electric fuel pump:	On.
Carburettor heat (optional):	Pull.

The SF 25 C can be landed with the engine running or stopped. Approach speed: approx. 49 knots. Control the approach angle with the spoilers. The approach can also be corrected by side slipping, though this is rarely necessary as the spoilers are effective. With spoilers fully extended the rate of sink is about 780 ft/min at 49 knots.

When landing at minimum speed (about 38 knots) the Falke will touch down tailwheel first (tricycle undercarriage version: mainwheels first). The ground run can be reduced effectively by using the mainwheel brakes and is about 100 m. The wheelbrake is operated by the last part of the travel of the spoiler lever.

Δ **Caution:** Never land with the spoilers fully extended at touchdown.

The two wheel undercarriage version of the Falke (with non adjustable pedals) is also equipped with wheelbrakes for the pilot (left seat). If the wheelbrakes are used to reduce the ground run, they must be used evenly to avoid swerving.

2.8. Stopping and starting the engine in flight

Before switching off the engine, allow it to run cooler at about 3,000 rpm for about 30 seconds, then close the throttle to idle, turn off sensitive electrical equipment and only then switch off the ignition. Speed for switching off engine in flight:
43 – 46 knots. Keep the airspeed low whilst the engine is stopping, to avoid prolonged run-on. After it has stopped the propeller can be turned to a horizontal parked position by blipping the starter motor. Switch off as many electrical consumers as possible.

Glide setting for **MTV21A-C-F**/(CF)175-05:
At reduced power (about 21 inches manifold pressure) set the rpm to >4,200 rpm using the prop speed control lever (grey knob on instrument panel).
Reduce to about 3,500 rpm using the throttle. Move the grey prop control knob to maximum pitch.
Ignition: switch off.
Throttle: Idle.

Glide setting for **MTV1A**/175-05: The lever of the electric prop pitch control unit (Take-off – Auto – Glide) should be set to glide.

Fixed pitch propeller:	Engine:	Idle.
	Ignition:	Off.
	Engine cowl flap:	Close.

Before starting the engine in flight:

Engine cowl flap:	Open
Ignition:	On (BOTH).
Electric fuel pump:	On (if fitted).
Sensitive electrical equipment (radio etc.):	Off

Δ **CAUTION** Δ

The ***MTV1A***/175-05 electric variable pitch propeller requires about **1 minute** to change from feathered glide setting to power pitch.

Operating setting for **MTV1A**/175-05:
Move selector lever on electric constant speed prop control unit to ***Auto*** and check that the green light comes on.
Turn the speed setting knob to about 21 (912**A**) or 20 (912**S**) which equates to about 4800 rpm.
Move the throttle control lever to about 10% power.
Operate the starter.
If the engine is cold, throttle on idle, choke pulled fully out.
Operating setting for MTV 21 A-C-F/(CF) 175/ 05: Push the prop speed control knob fully forward to fine pitch and then pull it out again about 2 cm (setting for about 5,000 rpm).

△ **Caution:** △
Check that the engine does not overspeed on start up
(see Section 5.15 of the Propeller Handbook).

The rpm of the MTV 21A-C-F/(CF)175-05 hydraulic variable pitch propeller should be left at about 5,000 rpm. After starting the engine, do not use much power whilst it is warming up. Flying speed should be at least 44 – 49 knots. Do not use full power until the engine temperatures are in the green arc. The height loss during restarting is usually about 500 - 600 ft.

◆ *Warning:* If there are variations in rpm or uncontrolled pitch changes when using the MTV1A in AUTO setting:
Immediately trip the prop pitch circuit breaker.
(See also Propeller Handbook)

2.9. Flying with the engine stopped

The Falke flies well at 44–52 knots, with a sink rate of about 1.2 m/s in straight and level flight. When the engine is off, close the cowl flap to reduce drag. The engine cowl flap **must** be opened again before restarting the engine.

As the SF 25 C is a low wing aircraft, the airflow around the wing/fuselage transition becomes turbulent if the aircraft is not flown accurately or if it is flown slowly (less than 44 knots) - the result is reduced performance. When flying the aircraft as a glider, and especially in turns, always ensure that you are flying as accurately as possible. The most practical instrument for this purpose is still a thread, mounted in front of each cockpit seat, about 20 cm ahead of the canopy on a piano wire mast about 10 cm high. Use a thread and with a little practice the Falke can be flown cleanly with performance comparable with gliders.

2.10. Slow flying and stall characteristics

The stall speed (at max weight) is the same whether the engine is running or not: it is about 38 knots (when flown single seat about 35 knots). At this speed the airflow begins to break away at the wing roots, but the ailerons and rudder are still fully effective. With a forward CG the SF 25 C reacts to further reduction in airspeed by stalling. With rearward CG positions it is possible to continue flying in calm air in a semi-stalled state with the stick hard back and with ailerons and rudder still fully effective. In both cases, simply releasing the back pressure on the stick will restore the normal flying attitude. In rough air the SF 25 C will drop a wing on stalling. If you approach the stall with the engine running fast and continue to bring the stick back, the pitot on the fin will be in the propeller slipstream and give a spurious reading suggesting a higher airspeed than is actually the case. In this condition the ASI will oscillate violently between about 27 and 54 knots, so the stalled condition is still easy to identify.
When stalled with a 30° angle of bank the SF 25 C drops the outer wing fairly gently, such that normal flying can be resumed as the wings come level. Stall characteristics are identical whether the engine is running or stopped.

2.11. Spinning

With CG in forward and mid positions it is very difficult to make the SF 25 C spin. Even without any action on the part of the pilot, other than releasing the back pressure on the stick, the stall becomes a spiral dive. Recovery from the spiral dive presents no problems. It is not recommended that the spoilers be used in this context.
Even with rearward CG positions a fully developed spin is not possible. It is possible, however, to make it spin by bringing the stick back gradually and then crossing the controls: it will recover of its own accord from the spin after a maximum of 5 rotations, even if the controls continue to be held crossed. The SF 25 C will then yaw and it is easy to restore the normal flying attitude. If the SF 25 C pilot moves the stick in the direction of the spin, it will develop into a spiral dive from which the pilot should recover as quickly as possible to avoid excessive airspeeds. Normal recovery measures will result in recovery after half a rotation. Gently recover from the resulting dive without delay. At this stage we recommend that the spoilers be extended to avoid excessive airspeeds.

The Falke is not approved for aerobatics or spinning

2.12. Wet wings – warning

The SF 25 C uses a modern glider wing section so it is sensitive to rain on the wings. The airflow over the wings is disturbed by the rain drops, which reduces the lift available. With dry wings the minimum speed is 38 knots, but with wet wings it is about 44 – 46 knots. The stall characteristics are also affected. With dry wings, the SF 25 C is good-natured in a stall, but with wet wings it can drop a wing. When flying in rain, always fly at speeds greater than 46 knots. When taking off with wet wings, never lift off at less than 46 knots. Climb and approach at about 57 knots. Avoid steep turns and other high g force manoeuvres. Any snow or ice/ white ice on the wings must always be removed before take-off. Don't forget to clean off the tailplane too.

2.13. Cold weather flying and risk of carburettor icing

At all times of the year and especially during the cooler seasons it is important to monitor that the engine oil temperature never drops below 70° C. Intermediate settings on the cowl flap (infinitely adjustable) are effective in controlling the cooling air reaching the engine. Always ensure that the maximum cylinder head temperature **never** exceeds 120°C (ROTAX 912 **A** and ROTAX 912 **S**).

2.14. Operating without outriggers

(only applies to single mainwheel undercarriage version)

The SF 25 C can also be operated without the outriggers fitted. You can taxi with a wing tip holder. At take-off an assistant must run with the wing tip until the ailerons become effective. When landing the SF 25 C can be held level with ailerons virtually until it has stopped.

2.15. Safety factors and engine reliability

Never forget that any motor glider engine is designed to simpler approval specifications than other aero engines. Consequently motor glider engines are simpler and cheaper, so always plan your route with safety in mind and maintain the necessary safety heights. You should always fly within gliding reach of a good field landing opportunity.

2.16. Attachment points for parachute static release

The static release cords for automatic parachutes are hooked on to the tubular member above the seat back near the red mark, port for the port seat and starboard for the starboard seat.

2.17. Emergency canopy release

Pull the top canopy knob forwards or turn anti-clockwise, pull the front emergency release knob and throw off the canopy to the right. The emergency release knobs are colour coded red. Before opening the canopy release pull off the head sets and open the seat belts.
With the optional new one piece canopy:

1. Pull off the head sets, open the seat belts.
2. Pull the canopy release handle
3. Lift off the canopy by the to red knobs on each side of the canopy frame.

2.18. Type familiarisation

It is essential to read the Manuals/Handbooks for the SF 25 C, the engine, the propeller and the equipment.
Before flying this aircraft solo, the new pilot must have type familiarisation flights with a motorglider pilot who is familiar with the type.
The new pilot must complete a number of solo flights before starting to fly passengers. Particular attention must be paid to operation of the engine and the variable pitch propeller.

2.19. Crosswind

The Falke has been flight-tested for take-offs and landings in crosswinds up to 13 knots.

2.20. Field landings

Flight testing of the SF 25 C (tricycle undercarriage version) included proving its capability to land on unprepared soft ground by landing in a potato field along the furrows. This should be taken into account in addition to other factors such as size, slope, surface, wind, length of landing run, clear approach, etc. The procedure for landing on soft ground is the same as for a normal landing on a runway.

3. Performance data

The specifications in this section refer to the following propellers:
HO11AHM-165 130, MT165R130-2A, MT170R135-2A or MT175R130-2A
MTV1A/175-05 and MTV21A-C-F/(CF)175-05.

3.1. Take-off performance

These performance figures were obtained from type test results and can be reproduced provided that the motor glider and engine are in good condition and that the pilot is of average ability and skill

Maximum permissible AUW *)	580 kg (with Folding Wings 604 kg)	610 kg (with Folding Wings 634 kg)	650 kg (with Folding Wings 674 kg)	690 kg (with Folding Wings 714 kg)

*) Delete as appropriate

Level airfield with short grass in normal condition. Dry wings with a smooth surface. No wind conditions. Air pressure corresponding to normal pressure at airfield height.

Lift off speed approx. 38 knots,
Climb speed 49 – 51 knots.

For take-off from a hard surfaced runway all values may be reduced by about 5%	Airfield height above sea level		Air temperature at ground level in °C			
			-15	0°C	+15°C	+30°C
	m	ft	m	m	m	m
Take-off run in m up to lift off	*0*	**0**	105	122	***141***	160
	250	**820**	113	132	152	174
	500	**1640**	123	143	165	189
	750	**2460**	133	155	178	205
	1000	**3280**	145	168	193	221
Total take-off distance in m to clear 15 m obstruction	*0*	**0**	216	241	***268***	297
	250	**820**	229	255	285	315
	500	**1640**	242	271	303	334
	750	**2460**	257	288	320	362
	1000	**3280**	273	306	342	391

This table applies to all previously quoted engine/propeller combinations and to all aircraft weights. Values for ground run and take-off over a 15 m obstacle are the same as or better than those in the table for the variable pitch propeller and /or the ROTAX 912 **S** engine.

3.2. Rate of climb

At maximum weight, at sea level and take-off performance for the specific engine/propeller combination and:

	Take off power	max. Continious power/ rpm
ROTAX 912 **A** and		
MT 165 R 130 - 2A, HO11A HM - 165 130	3.5 m/s	
MTV1A/ 175- 05, MTV21A- C- F/(CF)175- 05	4.8 m/s.	
ROTAX 912 **S**		
MT 170R135-2A, MT 175R130-2A	5.0 m/s	4,0 m/s
MTV1A/175-05, MTV21A-C-F/(CF)175-05	5.5 m/s	4,2 m/s
Rate of climb at	49 – 51 knots.	

3.3. Airspeeds

	ROTAX 912 **A**	ROTAX 912 **S**
Level flight (throttled back)	>43 knots	>43 knots
Max cruising speed at 4,800 rpm	81 knots	89 knots
Best cruise at 4,200 rpm	65 knots	70 knots
Approach speed	49 knots	49 knots
Touch down speed	38 knots	38 knots

3.4. Range and endurance (zero wind conditions) excluding reserve

Engine ROTAX 912 A			Fuel 44 l usable		Fuel 55 l usable		Fuel 79 l usable	
rpm	Fuel Consumption l/hr	Airspeed knots	Duration hrs/mins.	Range nm	Duration hrs/mins.	Range nm	duration hrs/mins.	Range nm
4200	8.9	65	4:57	320	6:10	400	8:52	575
4450	11.7	73	3:46	274	4:42	342	6:45	492
4800	14.4	80	3:03	247	3:49	309	5:29	444

Engine ROTAX 912 S			Fuel 55 l usable		Fuel 79 l usable	
Rpm	Fuel Consumption l/hr	Airspeed knots	Duration hrs/mins.	Range nm	duration hrs/mins.	Range nm
4200	11.8	67	4:39	314	6:41	451
4450	14.6	75	3:46	285	5:24	409
4800	18.0	89	3:03	272	4:23	391

Fuel consumption at take-off	ROTAX 912 **A**	ROTAX 912 **S**
	approx. 24.0 l/h	approx. 27.0 l/h
Manifold pressure at cruise setting	**P = n/220** inHg	**P = n/240** inHg

Power setting for cruise

General rule:

to reduce power:	**first reduce manifold pressure, then reduce rpm**
to increase power: (MTV21A-C-F)	**first increase rpm and then manifold pressure**
(MTV1A)	**first increase manifold pressure and then rpm**

3.5. Glide performance

With engine stopped, cowl flap closed, clean wings and (if fitted) Variable pitch prop in glide configuration

Minimum rate of sink at 43 knots (single mainwheel undercarriage)	1.12 m/sec
Minimum rate of sink at 43 knots (two wheel undercarriage)	1.18 m/sec
Minimum rate of sink at 43 knots (tricycle undercarriage)	1.17 m/sec

Best glide at 49 knots (single mainwheel undercarriage) 1: 22
The values are improved somewhat when the variable pitch propeller is set to glide configuration.

4. Centre of gravity and weight limits

✪ Caution It is the responsibility of the pilot (P1) to ensure that the weight limits are observed.

4.1. Empty weight centre of gravity

Always ensure that the empty weight CG remains within the permitted limits, for example after major repairs, the installation of additional equipment or repainting. If necessary, ballast weights must be fitted. Should this occur, a suitably qualified inspector must be called in. Permitted empty weight CG range (see Maintenance Manual, pp 23-24).

Aircraft position:	Wing chord at rib 6 (2.2 m / 86.61" from the centre line) = horizontal.
Datum:	2.0 m / 78.74" ahead of the leading edge of rib 0 (root rib), 0.52m / 20.47" from centre line.

If the empty weight CG is kept within the approved empty weight CG range, compliance with the loading chart will ensure that the flying weight CG will automatically remain within its permitted range.

4.2. Centre of gravity at flying weights

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

The following limits of CG flying weights have been tested and approved:

Applicable to: Flying weights of 580 kg (with Folding Wings 604 kg)
610 kg (with Folding Wings 634 kg)
650 kg (with Folding Wings 674 kg)
and 690 kg (with Folding Wings 714 kg).

max forward CG	**2,143 m / 84.37" aft of datum**
max. aft position of CG:	**2.334 m / 91.87" aft of datum**

4.3. Weight placard

Cockpit weight limits (including parachutes)

both seats combined	Max. 180 kg
	Min. 60 kg
Luggage	max. 10 kg

It is essential to ensure that the combined weight including fuel and any luggage does not exceed the maximum approved AUW (all up weight) on the placard.

Assume 0.73kg/l for the mass (weight) of fuel, which means

full 44 l tank = 32 kg.
full 55 l tank = 40 kg
full 80 l tank = 58 kg.

The effect of permitted luggage on the centre of gravity may be disregarded.

5. Minimum equipment

Airspeed indicator (reading up to 200 kph / 108 knots or more)
Altimeter
Magnetic compass
Rev counter
Oil temperature gauge
Oil pressure gauge
Cylinder head temperature gauge
Ammeter
Fuel gauge
Engine hours counter
Four-element safety harness
2x back support cushion, to be used in the absence of parachutes,
2x Flight Manual, approved by the LBA, to be carried on board
When equipped with variable pitch propeller (electric or hydraulic) also:
Manifold pressure gauge

6. Optional auxiliary equipment

Electric fuel pump	(as in TM 653- 51 Version 2)
Centre of gravity winch hook	(as in TM 653- 63)
Outboard socket	(as in TM 653- 9/ 76)

Avionic equipment (various: COM, VOR, GPS, XPDR, ENCODER etc.)
ELBA electronic fuel gauge

7. Additional electrical fuel pump

(Optional version TM 653-51/ 2)
An additional electric fuel pump can be installed in the motor glider as an option. This can be used for added safety:

a) before starting the motor
b) for take-off
c) for the approach and the possibility of a touch and go
d) in flight when the fuel supply may be less reliable e.g. through vapour formation at altitude, during very hot weather and in particular when climbing steeply. In normal cruise the optional electric fuel pump can be switched off. When the additional fuel pump is switched on a special warning light comes on. Please note however that this does not give any indication of the actual fuel pressure.

8. Noise reduction requirements

Only German national noise limits for: SF 25 C with the following engine / propeller combinations	Max. flying weight	Section X			Section: VI		
		Noise limit for enhanced noise abatement		Calculated noise level	Noise limit for enhanced noise abatement		Calculated noise level
		Up to build date 31.12 1999	From build date 2000		Up to build date 31.12 1999	From build date 2000	
ROTAX **912 A(1), A(2)** or **A(4)** MT165R130-2A HO11AHM-165 130	580 kg (604 kg)	XXX	XXX	XXX	60.0 dB(A)	58.0 dB(A)	**50.4** dB(A)
	610 kg (634 kg)	XXX	XXX	XXX	60.1 dB(A)	58.1 dB(A)	**50.8** dB(A)
	650 kg (674 kg)	65.6 dB(A)	63.6 dB(A)	**60.7** dB(A)	60.7 dB(A)	58.7 dB(A)	**52.1** dB(A)
	690 kg (714 kg)	XXX	64,2 dB(A)	**63,3** dB(A)			
ROTAX 912 **A(2)** or **A(4)** MTV1A/175-05	610 kg (634 kg)	64.9 dB(A)	62,9 dB(A)	**55,3** dB(A)			
	650 kg (674 kg)	65.6 dB(A)	63,6 dB(A)	**55,3** dB(A)			
	690 kg (714 kg)	XXX	64,2 dB(A)	**62,4** dB(A)			
ROTAX 912 **A(3)** MTV21A-C-F/(CF)175-05	610 kg (634 kg)	64.9 dB(A)	62,9 dB(A)	**55,3** dB(A)			
	650 kg (674 kg)	65.6 dB(A)	63,6 dB(A)	**55,3** dB(A)			
	690 kg (714 kg)	XXX	64,2 dB(A)	**62,4** dB(A)			

Only German national noise limits for: SF 25 C with the following engine / propeller combinations	Section X			
	Max. flying weight	Noise limit for enhanced noise abatement		Calcula-ted noise level
		Up to build date 31.12 1999	From build date 2000	
ROTAX 912 **S(2)** oder **S(4)** MT170R135-2A	650 kg (674 kg)	65,6 dB(A)	63,6 dB(A)	**55,4** dB(A)
	690 kg (714 kg)	XXX	64,2 dB(A)	
ROTAX 912 **S(2)** oder **S(4)** MT175R130-2A	650 kg (674 kg)	65,6 dB(A)	63,6 dB(A)	**55,6** dB(A)
	690 kg (714 kg)	XXX	64,2 dB(A)	**62,4** dB(A)
ROTAX 912 **S(2)** oder A(4) MTV1A/175-05	650 kg (674 kg)	65,6 dB(A)	63,6 dB(A)	**57,5** dB(A)
	690 kg (714 kg)	XXX	64,2 dB(A)	**62,4** dB(A)
ROTAX 912 **S(3)** MTV21A-C-F/(CF)175-05	650 kg (674 kg)	65,6 dB(A)	63,6 dB(A)	**57,5** dB(A)
	690 kg (714 kg)	XXX	64,2 dB(A)	**62,4** dB(A)

Enhanced German national noise abatement requirements will be met if the measured noise level is within the maximum values prescribed in Annex 2 of the airfield noise abatement regulation by the following amounts:

		in Section VI	in Section X
	for build date before 1 January 2000 by:	min. 4 dB(A)	min. 5 dB(A)
and	for build dates from 1 January 2000 by:	min. 6 dB(A)	min. 7 dB(A)

These values have been incorporated in the table above.

Appendix: electric actuator system for trim tab actuating.

Optional an electric trim tab actuator system can be used against the previous bowden cable actuating the trim tab. For that SB 653-78 is to carry out.

Connecting other electric consumers.

Further circuit breakers may be added to the terminal bar for additional electric consumers. This applies to ACL, NAV-lights, VOR, transponder, encoder etc. as well as the electric Trim Tab actuator systems. It is important to ensure that the additional equipment is using the correct fuse rating (See SB 653-78, SF 25C).

The aircraft wiring system is 12 V C, negative to ground. The appropriate regulations must be observed when fitting additional equipment. The fuses on the firewall ca be replaced with state of the art circuit breakers. There is then no need for spare fuses and a visual check can be made to see which system has tripped out.

The installation of the electric trim actuator system is to perform according to the installation instructions of the electric trim system manufacturer RAY ALLAN Comp. and the SB 653-78 of Scheibe-Flugzeugbau GmbH. At installation take care that needle position indicator and rocker switch works together logical. Both (rocker switch and needle position indicator) must signed logical with the following pictogram:

Additional to the normal **PRE FLIGHT CHECK** the bowden cable driven trim tab is to check for:

a) Connection of the bowden cable to the trim tab on the elevator.

or with the electric trim tab actuator system:

b) correct electric connection to the trim tab servo (multipoint plug) Function check on the ground for proper travel in the correct direction and for correct trim tab deflection.

This page is an appendix to the correct flight- and maintenance manual and is to add into the AFM. An entry about this added appendix page is to made on the page "revision status of the manual".

issue 20.05.2004
Scheibe-Flugzeugbau GmbH

SCHEIBE-AIRCRAFT-GMBH Am Flugplatz 5, D-73540 Heubach
EASA-anerk. Herstellungsbetrieb DE.21G-0205

Supplement
to Motorglider Flight Manual

SF 25 C

S/N:.44714

only for Category Glidertowing

a) in combination with a towrope retraction and cutting device or
b) with fixed aerotow device with TOST- nose launchimg hook

Edition 15.11.1999
Change 3, 07.04.2013

EASA-anerkannt Nr. EASA.A.C10048806

European Aviation Safety Agency
Paul HATTON
Project Certification Manager

0.1 Table of contents

Abschnitt	Change	Page	Datum
Cover sheet	3	1	07.04.2013
Tabel of contents	3	2	07.04.2013
Index	2 2	3 4	07.04.2013 07.04.2013
General	2	5	30.05.2001
Operation limitations	2	6	07.04.2013
Emergency procedure	1	7	15.11.1999
Operation instructions	2	8	30.05.2001
Performances	1 1 1 1	9 10 11 12	15.11.1999 15.11.1999 15.11.1999 07.04.2013
Loading diagram and centre of gravity, Equipmentlist	2	13	07.04.2013
Description of the motorglider and the systems	1	14	15.11.1999
Handling and Maintenance	1 1	15 16	15.11.1999 15.11.1999
Remarks	1	17	15.11.1999

0.2 Index

		Page
1.	General	4
1.1	Introduction	4
1.2	Certification	4
1.3	Description and Technical Data's	4
2.	Operation Limitations	5
2.1	Towing Speeds	5
2.2	Masses	5
2.3	Flight Crew	5
3.	Emergency Procedures	6
3.1	Engine Failure	6
3.2	Other Emergency Situations	6
3.3	Failure of Cutting Device, nose launching hook on fixed aerotow device of the motorglider or on Nose launching hook of the Glider	6
4.	Operation Instructions	7
4.1	Daily Inspection	7
4.2	Normal Procedures and recommended Speeds	7
4.2.1	Take Off and Climb	7
4.2.2	Approach and Landing	7
4.2.3	End of Aerotowing Procedure	7
5.	Performances	8
5.1	LBA-approved Datas	8
5.1.1	Take Off Distances ROTAX 912 A with Constant-Speed-Prop.	8
5.1.2	Additional Informations	8
5.1.2.1	Climb speed	8
5.2	LBA-approved Datas	8
5.2.1	Take off Distances ROTAX 912 S with Fixed Pitch Prop.	9
5.2.2	Additional Informations	9
5.2.2.1	Climb speed	9
5.3	LBA-approved Datas	10
5.3.1	Take Off Distances ROTAX 912 S with Constant-Speed-Prop.	10
5.3.2	Additionla Informations	10
5.3.2.1	Climb Speed	
5.4	EASA-approved Datas	11
5.4.1	Take Off Distances ROTAX 914 F with Constant-Speed-Prop.	11
5.4.2	Additionla Informations	11
5.4.2.1	Climb Speed	11
6.	Loading Diagram and Centre of Gravity/ Equipmentlist	12
6.1	Loading Diagram	12
6.2	Equipmentlist for Aerotowing	12
7.	Description of the Motorglider and the Systems	13
7.1	Cockpit	13
7.2	Placards and Warnings	13

8. Handling and Maintenance 13
8.1 Maintenance Schedul for the Motorglider 13
8.1.1 Maintenance Schedul for Towrope Winch and Cutting Device 13
8.1.2 Rigging and De- Rigging of the Towrope Retraction and Cutting Device 13
8.1.2.1 Installation of the Towrope Retraction and Cutting Device 13
8.1.2.2 Deinstallation of the Towrope Retraction and Cutting Device 14
8.2 Maintenance Schedul for Nose Launching hook 14
8.2.1 Installation of Fixed Aerotow Device 14
9. Remarks 15

1. General

1.1 Introduction

This manual is a supplement to the „Flight Manual SF 25 C" and is valid only for category „Glidertowing"

1.2 Certification

Glidertowing with motorglider SF 25 C is certificated in accordance with Joint Aviation Requirements JAR 22, Change 5, vom 28.10.1995 with (D) Appendix J, additional requirements for aerotowing.

1.3 Description and technical Data's

a) Towrope retraction device „System Feuerstein" from TOST Fluggerätebau is attached to the fuselage of the SF 25 C with special constructed mountings below the right seat and on the fuselage tail.
Emergency cutting of the towrope is possible by bowden cable with T-handle, located in the cockpit between the seats or in the console below the Instrument panel. After glider has disengaged the electric winch retracts the towrope. The winch switch is located in the console between the seats below the instrument panel. The electric winch switches off automatical if towrope is retracted complete.
•Caution• If a burl rises in towrope (if glider disengage under great tension) towrope can only partial pulled in. Check with mirrows that towrope is pulled in complete(see also 4.2.

b) Fixed Aerotow device with TOST nose launching hook is attached to the fuselage with special constructed mountings on the fuselage tail. Glider release is possible by bowdwn cable with T-handle, located in the cockpit below the Instrument panel, between the seats or in the console between the Instrument panel. After towing towrope is to release at an overflight before the landing.
Check towrope release with the mirrow.

Approved length of towrope: **40m to 60m (130 to 196 ft).**
For aerotowing with SF 25 C two mirrows are to attach:
One outside the cabin on the L/H canopy frame
One inside the canopy above the magnetic compass.

2. Operation limitations

2.1 Towing speed

Remark

All speeds in this appendix are IAS.
Max. approved speed for aerotowing with SF 25 C :
V_T =130 $^{km}/_h$ (70 kts/ 81 mph).
But: Don't override max. towing speed of the ***glider***.
Minimum towing speed = 90 $^{km}/_h$ (49 kts/ 56 mph),
but not less than 1,3 x V_{S1} of the towed glider.
V_{S1} is the Stalling speed at which the glider is controlable at determind condition.

2.2 Masses

Condition for aerotowing

Max. permissible all up weight of motorglider for aerotowing: **(600 kg) 1323 lbs**
Cockpit weight limit minimum for aerotowing at the pilot seat is:
(aerotow device installed at full fuel tank (55/ 80 ltr.) **(60 kg) 132 lbs**
Max. all up weight of all motorglider/ engine/ propeller combinations together with glider max. mass.

Engine	Propeller	max. Glider take off mass	Max. motorglider mass at take off (with Folding Wing)	Max. mass of glider and motorglider together
ROTAX 912 **A**	MTV1A/175 - 05 MTV21A-C-F/(CF)175 - 05	1253 lbs [560 kg]	1344 lbs / 1433 lbs (1397 lbs / 1485 lbs) [610 kg / 650 kg] (634 kg / 674 kg)	2469 lbs [1120 kg]
ROTAX 912 **S**	MT 175 R 130 - 2A MT 170 R 135 - 2A	1323 lbs [600 kg]	1433 lbs (1485 lbs) [650 kg (674 kg)]	2557 lbs [1160 kg]
ROTAX 912 **S**	MTV1A/175-05 MTV21A-C-F/(CF)175 - 05	1344 lbs [610 kg]	1433 lbs (1485 lbs) [650 kg (674 kg)]	2579 lbs [1170 kg]
ROTAX 914 **F**	MTV21A-C-F/(CF)175 –05 HO-V352 F/170FQ+10	1807 lbs [820 kg]	1521 lbs (1574 lbs) [690 kg (714 kg)]	3172 lbs [1440 kg]

Table 1

2.3 Flight crew

For Aerotowing only the pilot is on bord of the motorglider.
Instruction flights for aerotowing with two pilots in the cockpit of the motorglider are possible if:
Max. all up weight (AUW) of the motorglider not exceeds (with Folding Wing)
[610 kg (634 kg) / 650 kg (674 kg) / 690 kg (714 kg)]
1344 lbs (1397 lbs) / 1433 lbs (1485 lbs) / 1521 lbs (1574 lbs)

Max. AUW of glider and motorglider together not exceeds:
(1120 kg/ 1160 kg/ 1170 kg or 1440 kg) 2469 lbs/ 2557 lbs/ 2579 lbs/ 3172 lbs

See also table 1 above.

3. Emergency procedures

3.1 Engine failure

a) With tow rope retracting and cutting device
If engine failure happens during tow flight, contact glider pilot by radio or other signals to to release towrope immediatly or cut the towrope by cutting device.

b) If engine failure happens during tow flight, contact glider pilot by radio or other signals to to release towrope immediately or release towrope by T-handle in the cockpit.

After that see motorglider Flight manual: Emergencies.

3.2 Other emergency situations

Abnormal horizontal position of the glider relativ to the motorglider

If motorglider is unsteerable through an abnormal position of the glider relativ to the motorglider towrope is

a) to cut immediately with towrope retracting and cutting device or

b) to release towrope immideately by T-Handle in the motorglider cockpit.

If the glider is out of the 60°- cone (especially the angle between the towrope and the longitudinal axis is >20° with glider below or >40° with glider above the motorglider),

a) to cut immediately with towrope retracting and cutting device or

b) to release towrope immideately by T-Handle in the motorglider cockpit.

3.3 Failure of cutting device, launching hook on the motorglider aerotow device or on the nose launching hook of the glider

Landings as an airtrain are possible, if the glider uses the spoilers and the glide angle is controlled by powersetting of the motorglider.

WARNING

During glidertowing operation with spoilers of the motorglider extended is not permitted.

4. Normal Operation Instructions

4.1 Daily Inspection:

a) with towrope retracting and cutting device:

b) See Operation instruction for towrope winch with cutting device of TOST-Fluggerätebau.

c) Bowden cable connected to the cutting device and secured?

b) with fixed aerotow device with TOST nose launching hook

- Release cable connected to Launching hook lever?
- Tow rope release test.
- Launching hook clean?

4.2 Normal Operation Procedures and recommended Speeds

4.2.1 Take off and Climb

Motorglider should not take off before the glider.

Different to the Flight Manual of the motorglider the max. continuous power setting for the whole aerotow flight is:

5500 rpm and throttle fully open

(5800 rpm are avialable for only 5 minutes = take off power)

Check that engine temperatures are in the green sector of the gauges (oil- and cylindertemp.) all the time (see colour markings). If not, speed up or reduce power.

Caution

For aerotowing additional electric Fuel pump must be used all the time.

Important indication

Aerotowing gliders with high wing loading motorglider has to speed up near the ground, because take off speed for gliders with high wing loading can be higher than of the motorglider.

Speed for best climb angle **95 $^{km}/_{h}$ (51 kts/ 59 mph).**

Speed for best climbing **105 $^{km}/_{h}$ (65 kts/ 75 mph).**

For towing gliders with high wing loading and/ or in turbulent air speed up to **120 $^{km}/_{h}$ (65 kts/ 75 mph).**

4.2.2. Approach and Landing

a) Towrope retract and cutting device:

After glider has released towrope the rope is to retract with the electric winch. If towrope retraction is completed, winch will stop automatically and winch switch turns to the **„off"-** position.

d) Fixed Aerotow device with TOST nose launching hook:

After towrope is released by the glider it is to release from the motorglider at an overflight.

Approach and landing with towrope outside are only possible as an emergency landing with higher approach speed and with no obstacles in the approach sector.

4.2.3 End of tow procedure

Gliderpilot has to pay attention that there is no high tension on the towrope in the moment of disconnection from the glider. (Possibility of knots in the rope ⇒ tow rope retraction not more possible.

5. Performances

5.1 LBA- approved datas for SF 25 C with ROTAX 912 A and Constant-Speed-Propeller (MTV1A/175-05 or MTV21A-C-F/(CF)175-05

5.1.1 Take off distances

Take off distances with max. tow train mass = **(1120 kg) 2469 lbs** are stated in the following table:

Take off distance over 15m (50ft) obstacle from concret runways
Grey parts: Take off distance over 15m (50ft) obstacle from gras runways

take off distance in	Field elevation NN m	ft	Air temperature °C (OAT) -15°C m.....ft	m.....ft	0°C m.....ft	m.....ft	+15°C m.....ft	m.....ft	+30°C m.....ft	m.....ft
m or ft	0	*0*	360...*1180*		419...*1374*		***484...1587***		554...*1817*	
				414...*1357*		482...*1581*		***557 1827***		637...*2089*
for overflight of	250	*820*	390...*1279*		454...*1489*		524...*1719*		600...*1968*	
15 m (50 ft)				449...*1473*		522...*1712*		603...*1978*		690...*2263*
obstacle	500	*1640*	423...*1387*		492...*1614*		567...*1860*		649...*2129*	
				486...*1594*		566...*1856*		652...*2138*		746...*2447*
	750	*2460*	458...*1502*		533...*1748*		615...*2017*		703...*2306*	
				527...*1728*		613...*2011*		707...*2319*		808...*2650*
	1000	*3280*	497...*1630*		578...*1896*		666...*2184*		762...*2499*	
				572...*1876*		665...*2181*		766...*2512*		876...*2873*

•Important Notice•

Δ Wet wing take off is not permitted.Δ
Avoid take off with dirty wings.
The above values are without additional safety.
For a safe take off runway length should be the same like the take off distance over the 15 m (50ft) obstacle.

Δ Warning Δ

Dirty wings increases the take off distance important. Through this a take off can be impossible. The same through long gras and/ or soft, wet runway and tailwind. These points are to check carefully by the motorglider pilot.

Δ If you have doubts, don't take off Δ

Remarks: As an explanation: If the glider is not in the air at half of the runway, glider pilot should disconnect the towrope and give a message to the motorglider pilot.
For this decission the obstacle clearance in the departure sector is to check.

5.1.2 Additional Informations

5.1.2.1 Climb performance

Max. climbe rate with glider and motorglider together up to (1120 kg) 2469 lbs at mean sea level and Standard temperature: 315 $^{ft}/_{min}$

5.2 LBA- approved datas for SF 25 C with ROTAX 912 S and Fixed Pitch Propeller (MT175R130-2A or MT170R135-2A

5.2.1 Take off distances

Take off distances with max. tow train mass = (1160 kg) **2557 lbs**
are stated in the following table:

Take off distance over 15m (50ft) obstacle from concret runways
Grey parts: Take off distance over 15m (50ft) obstacle from gras runways

take off distance in	Field elevation NN m	ft	Air temperature °C (OAT) -15°C m.....ft	m.....ft	0°C m.....ft	m.....ft	+15°C m.....ft	m.....ft	+30°C m.....ft	m.....ft
m or ft	0	*0*	395...*1296*		445...*1560*		***494...1620***		548...*1797*	
				466...*1528*		525...*1722*		***583...1912***		647...*2122*
for overflight of	250	*820*	420...*1378*		470...*1542*		524...*1719*		583...*1912*	
15 m (50 ft)				496...*1627*		554...*1817*		618...*2027*		688...*2256*
obstacle	500	*1640*	445...*1560*		499...*1637*		558...*1830*		618...*2026*	
				525...*1722*		589...*1932*		659...*2161*		729...*2391*
	750	*2460*	475...*1558*		534...*1751*		593...*1945*		662...*2171*	
				560...*1837*		630...*2066*		700...*2296*		781...*2562*
	1000	*3280*	504...*1653*		564...*1850*		627...*2056*		707...*2318*	
				595...*1952*		665...*2181*		740...*2427*		834...*2735*

•Important Notice•

Δ Wet wing take off is not permitted.Δ
Avoid take off with dirty wings.
The above values are without additional safety.
For a safe take off runway length should be the same like the take off distance over the 15 m (50ft) obstacle.

Δ Warning Δ

Dirty wings increases the take off distance important. Through this a take off can be impossible. The same through long gras and/ or soft, wet runway and tailwind. These points are to check carefully by the motorglider pilot.

Δ If you have doubts, don't take off Δ

Remarks: As an explanation: If the glider is not in the air at half of the runway, glider pilot should disconnect the towrope and give a message to the motorglider pilot.
For this decission the obstacle clearance in the departure sector is to check.

5.2.2 Additional Informations

5.2.2.1 Climb performance

Max. climbe rate with glider and motorglider together up to (1160 kg) 2557 lbs
at mean sea level and Standard temperature: 350 $^{ft}/_{min}$

5.3 LBA- approved datas for SF 25 C with ROTAX 912 S and Constant-Speed-Propeller (MTV1A/175-05 or MTV21A-C-F/(CF)175-05

5.3.1 Take off distances

Take off distances with max. tow train mass = (1170 kg) **2579 lbs**
are stated in the following table:

Take off distance over 15m (50ft) obstacle from concret runways
Grey parts: Take off distance over 15m (50ft) obstacle from gras runways

take off distance in	Field elevation NN m	ft	Air temperature °C (OAT) -15°C m.....ft	m.....ft	0°C m.....ft	m.....ft	+15°C m.....ft	m.....ft	+30°C m.....ft	m.....ft
m or ft	0	0	357...1171		399...1309		***444...1456***		491...1610	
				422...1384		472...1548		***525...1722***		581...1906
for overflight of	250	820	379...1243		422 1384		472...1548		522...1712	
15 m (50 ft)				448...1469		499...1637		558...1830		617...2024
obstacle	500	1640	402...1318		449...1473		502...1646		554...1817	
				475...1558		531...1742		593...1945		655...2148
	750	2460	426...1397		478...1568		531...1742		593...1945	
				503...1650		565...1853		627...2056		702...2302
	1000	3280	452...1482		507...1663		564...1850		636...2086	
				534...1751		599...1965		667...2188		752...2466

•Important Notice•

Δ Wet wing take off is not permitted.Δ
Avoid take off with dirty wings.
The above values are without additional safety.
For a safe take off runway length should be the same like the take off distance over the 15 m (50ft) obstacle.

Δ Warning Δ

Dirty wings increases the take off distance important. Through this a take off can be impossible. The same through long gras and/ or soft, wet runway and tailwind. These points are to check carefully by the motorglider pilot.

Δ If you have doubts, don't take off Δ

Remarks: As an explanation: If the glider is not in the air at half of the runway, glider pilot should disconnect the towrope and give a message to the motorglider pilot.
For this decission the obstacle clearance in the departure sector is to check.

5.3.2 Additional Informations

5.3.2.1 Climb performance

Max. climbe rate with glider and motorglider together up to (1170 kg) 2579 lbs
at mean sea level and Standard temperature: 350 $^{ft}/_{min}$

5.4 EASA- approved datas for SF 25 C with ROTAX 914 F and Constant-Speed-Propeller (MTV1A-C-F/(CF)175-05 or HO-V352 F/170FQ+10

5.4.1 Take off distances

Take off distances with max. tow train mass = (1440 kg) **3172 lbs**
are stated in the following table:

Take off distance over 15m (50ft) obstacle from concret runways
Grey parts: Take off distance over 15m (50ft) obstacle from gras runways

take off distance in	Field elevation NN m	ft	Air temperature °C (OAT) -15°C m	ft	0°C m	ft	+15°C m	ft	+30°C m	ft
m or ft	0	*0*	368	*1207*	440	*1443*	***487***	***1597***	541	*1775*
			435	*1427*	520	*1706*	***576***	***1889***	639	*2096*
for overflight of 15 m (50 ft) obstacle	250	*820*	416	*1365*	464	*1522*	517	*1696*	576	*1889*
			492	*1614*	548	*1797*	611	*2004*	681	*2234*
	500	*1640*	441	*1447*	494	*1620*	552	*1811*	612	*2007*
			521	*1709*	584	*1916*	652	*2139*	722	*2369*
	750	*2460*	470	*1542*	528	*1732*	586	*1922*	654	*2145*
			555	*1820*	624	*2047*	692	*2270*	773	*2536*
	1000	*3280*	499	*1637*	557	*1827*	620	*2034*	699	*2293*
			589	*1932*	658	*2158*	733	*2404*	826	*2709*

•Important Notice•

Δ Wet wing take off is not permitted.Δ
Avoid take off with dirty wings.
The above values are without additional safety.
For a safe take off runway length should be the same like the take off distance over the 15 m (50ft) obstacle.

Δ Warning Δ

Dirty wings increases the take off distance important. Through this a take off can be impossible. The same through long gras and/ or soft, wet runway and tailwind. These points are to check carefully by the motorglider pilot.

Δ If you have doubts, don't take off Δ

Remarks: As an explanation: If the glider is not in the air at half of the runway, glider pilot should disconnect the towrope and give a message to the motorglider pilot.
For this decission the obstacle clearance in the departure sector is to check.

5.4.2 Additional Informations

5.4.2.1 Climb performance

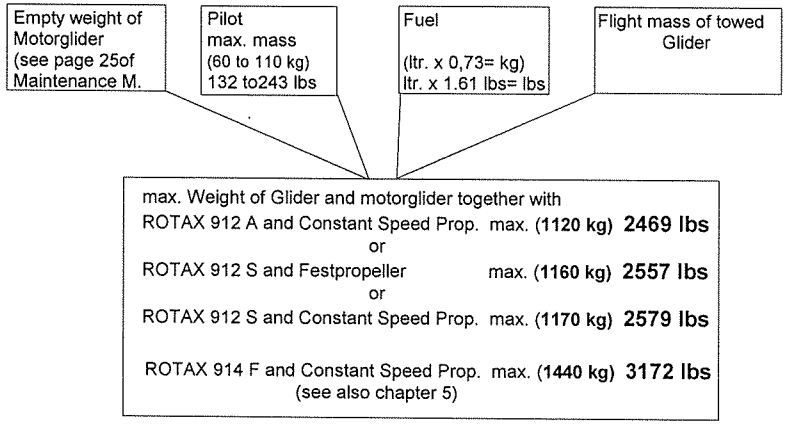
Max. climbe rate with glider and motorglider together up to (1400 kg) 3172 lbs
at mean sea level and Standard temperature: 430 $^{ft}/_{min}$

6. Loading diagram and centre of gravity/ equipmentlist

6.1 Loading diagram and center of gravity

The usual empty and flight C.G. of the motorglider are still valid for category aerotow.

For the payload see chapter 2.2 and 2.3 of this supplement Flight manual.



6.2 Equipmentlist

Additional equipment for aerotowing

a) with Towrope retraction and cutting device:
   1 electric tow rope winch with cutting device System TOST
   1 yellow/ red marked T- handle in the cockpit for cutting device
   1 Control switch for the tow rope winch (red, illuminated)

b) with fixed device for TOST nose launching hook:
   1 Fixed aerotow device for the fuselage tail of SCHEIBE-Flugzeugbau GmbH with TOST nose launching hook E 85, E 72 or E 75
   1 Towrope release T-handle (yellow)

And additional

1 Outside mirrow Cycle star, Busch & Müller, Auf dem Bamberg 1, 58540 Meinerzhagen
1 Inside cockpit mirrow SUPER Vario Convex Weitsichtspiegel No. 187/ 97, HR Autocomfort, POB 1713, 75117 Pforzheim
1 additional electric fuel pump HARDI SZ 8812-3 with installation kit.
1 Weak link max. **500 daN** or less.

7. Description of the motorglider and the systems

7.1 Cockpit

a) Towrope retraction and cutting device

Yellow/ red cutting device T- Handle is positioned between the seats or in the console below the instrument panel. This T- handle should have a backlash of min. .4 inches (10 mm).

There is a control switch for retraction of the towrope in the instrument panel or in the console below the panel. This control switch is red illuminated if the winch is working. This T- handle should have a backlash of min. .4 inches (10 mm).

b) Fixed aerotow device:

Release mechanism has a yellow T-handle in the middle and below of the instrument panel or in the console below the panel.

7.2 Placards and Warnings

a) For towrope retraction and cutting device:

Following placards are necessary, if motorglider is used for aerotowing:

Weight placard especially for aerotowing

near by the illuminated switch for the towrope winch

Tow rope retracting device

next to the yellow-red T- handle for the cutting device:

Cutting device: Only for emergency

near by the Airspeed indicator:

Caution! Before aerotowing: Check that the cutting knife bowden cable is connected!!

b) For fixed aerotow device:

Near by the release T-handle:

Towrope release

8. Operation and maintenance

8.1 Maintenance schedul for the motorglider.

8.1.1 Maintenance schedul for the towrope winch and cutting device
see point 2 of the flight manual of Towrope retract and cutting device.

8.1.2 Rigging and derigging of the towrope retraction and cutting device.
Towrope retract and cutting device for motorglider SF 25 C is constructed as a Quick-release and Quick-connect system if you like to tow.

8.1.2.1 Installation

8.1.2.1.1 For installation of the towrope retraction and cutting device only a screw driver is necessary.

8.1.2.1.2 Remove glass fibre cover of the winch below the fuselage behind the main undercarriage by opening the Camlocks.

8.1.2.1.3 Slide on the winch in wing direction from left to right to the two bolts behind the main undercarriage.

8.1.2.1.4 Connect the electric connector for the winch.

8.1.2.1.5 Turn up and secure the winch with the safety bolt.

8.1.2.1.6 Slide in the front part of the aluminium- pipe into the open ring below the fuselage, behind the winch.

8.1.2.1.7 •Caution•
Take care that the towrope is on the winch **without** a loop.
Install the below cover of the winch and secure it by Camlocks.

8.1.2.1.8 Slide on the Cutting device to the two bolts behind the tail wheel (against flight direction)

8.1.2.1.9 Secure the cutting device by the safety bolt in the front part of the cutting device.

8.1.2.1.10 Secure the aliminium pipe under the fuselage by two Camlocks.

8.1.2.1.11 Connect and secure the bowden cable on the cutting device lever (secure the bolt with a cotter pin).

8.1.2.1.12 Pull out the towrope round about 33 ft (10 m).

8.1.2.1.13 Retract towrope completely by the winch.

If the towrope winch and cutting device is installed and you don't want to tow, disconnect the bowdencable from the cutting device lever. Tighten the bowden cable to the fuselage. With that unusual towrope cutting is not possible.

CAUTION: Before towing a glider check that bowdencable is connected at the cutting device lever.
See placard below airspeed indicator.

8.1.2.2 Deinstallation of towrope retract and cutting device

8.1.2.2.1 Pull out towrope 13 to 16 ft (4 to 5 m).

8.1.2.2.2 Remove bowdencable from cutting device lever and secure it to the fuselage.

8.1.2.2.3 Open 2 Camlocks below the fuselage (for the aluminium pipe).

8.1.2.2.4 Open secure and safety pin in the front part of the cutting device.

8.1.2.2.5 Pull cutting device in flight direction round about .6 to .8 inches (15 to 20mm) from the two bolts behind the tailwheel.

8.1.2.2.6 Pull cutting device and aluminium pipe round about 2 inches (50 mm) against flight direction out the the open ring below the fuselage and lay it down.

8.1.2.2.7 Remove glas fibre cover of towrope winch by opening the Camlocks.

8.1.2.2.8 Remove secure and safety pin of the winch and turn it down.

8.1.2.2.9 Disconnect electric wiring connector on the winch.

8.1.2.2.10 Slide off the winch to the left (in flight direction) from the bolts and lay it on the ground.

8.1.2.2.11 Close the glas fibre cover of the winch with the Camlocks.

8.2 Maintenance schedul for nose launching hook:
See maintenance and operation instruction of TOST Fluggerätebau for launching hook E 85, E 72, E 75.

8.2.1 Installation of fixed aerotow device on the fuselage tail:
The tow device is fixed on the fuselage connecting points with for screwws, washers and self confidential nuts.
Additional the release bowden cable is to secure on the launching hook lever.

9. Remarks

For category glider towing there is a special determining for in flight centre of gravity.
See Type placard in the cockpit.

Important notice

Pilot has to pay attention that the correct **WEAK LINK** is installed in the towrope. If not structur of the motorglider can be **overloaded**.

Approved WEAK LINKS:

300 daN (green)

400 daN (yellow)

500 daN (white) = max. permitted WEAK LINK

SCHEIBE AIRCRAFT GMBH

D - 73540 Heubach, Am Flugplatz 5

Tel.: (0)7173 / 184 286 Fax: (0)7173 / 185 587

e-mail: info@scheibe-aircraft.de

MAINTENANCE MANUAL

for the

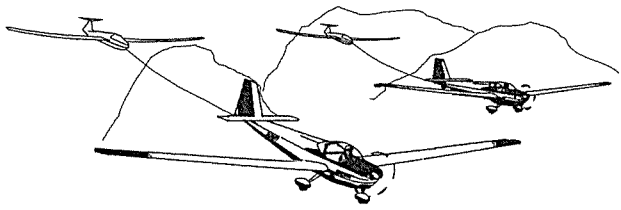
SF 25 C - FALKE

motorglider

ROTAX 912 **A** ( )
ROTAX 912 **S** (2)

max. weight ~~580 kg (604 kg with Folding wings)~~
~~610 kg (634 kg with Folding wings)~~
650 kg (674 kg with Folding wings)
~~690 kg (714 kg with Folding wings)~~

Edition: **March 1997**



It belongs to SF 25 C – Falke:

Serial no: 44714

Registration no: D-KAGN

Owner:

Rev. 9: 07.04.2013
WHBER9.DOC

This manual is to be kept on board at all times.

1 Rigging and De-rigging 3
1.1 Rigging 3
1.2 De-rigging 3
1.3 Transporting the motor glider 3
1.4 Supports 3
Foldback wings 3
1.5 Folding back – general 3
1.6 Folding the wings 3
1.7 Unfolding the wings 3
1.8 Maintaining the folding mechanism 3
1.9 Rigging and derigging with folding mechanism 3
1.10 Folding wing tips 3
1.10.1 Rigging the wings 3
1.10.2 Folding the wing tips 3
2. Fuelling up etc. 3
2.1 Fuelling up 3
2.2. Topping up with oil 3
2.3 Checking coolant level 3
2.4 Engine compartment 3
3. Maintenance, Inspection and Repairs 3
3.1 Cleaning the aircraft 3
3.2 Periodic maintenance and inspection 3
3.2.1 Daily Inspection 3
3.2.2 Engine and Propeller Inspections 3
3.2.3 Airframe Inspection 3
3.3 Battery Servicing 3
3.4 Undercarriage and brake 3
a) Two wheel undercarriage 3
c) Unsprung single mainwheel version – 8.00 x 4 3
d) Tricycle undercarriage version 3
3.4.1 One piece Cockpit canopy. 3
3.5 Changing the Propeller 3
3.6 Annual Inspection 3
3.7 Non-periodic inspections, repairs 3
4. Equipment 3
5. Electrical Wiring Diagram 3
Diagram Details 3
6. Wing/fuselage/tailplane arrangement, adjustment of control deflections, cable tension 3
6.1 Cable tension 3
6.2 Manuals/handbooks 3
7. Procedure for determining C of G for single & two wheel u/c versions 3
Procedure for determining C of G for single & two wheel u/c versions 23
8. Procedure for determining Centre of Gravity for tricycle undercarriage version 3
9. Weight and Centre of Gravity Chart 3
10. Weight and Centre of Gravity Chart 3
X Instructions for rigging and derigging wings (mainspar) X 3

Appendix 1 to Chapter 3.4.1 (Only for Modification 174) 28
Appendix 2 to Chapter 3.4.1 (Only for Modification 174) 29

1 Rigging and De-rigging

If the Falke is to be rigged and de-rigged often, it is worthwhile obtaining support wheels for the fuselage so that it can be moved easily The attachment points for the fuselage support wheels are standard. Supports without wheels are also available for parking the fuselage. (Not required in the case of two wheel and tricycle undercarriage versions.)

1.1 Rigging

Before rigging, always clean and grease all fittings, especially after an open trailer journey:

1) Clean & grease wing front fittings (2 points)
2) Clean & grease wing rear fittings (2 points)
3) Clean & grease mainpins
4) Clean & grease tailplane fittings (3 points)
5) Clean & grease the pins at the wing folding point (if applicable), 3 pins per wing
6) Clean and grease the aileron drive at the wing fold position (if applicable).

First apply the parking brake. 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 and harness straps. Engage the rear fitting on 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 (single mainwheel version only)

Bring the starboard wing tip forwards, correcting the height of the tips to allow the main spar fittings to slide into each other easily. It works best if one person climbs into the fuselage and gives instructions to the helpers at the tips, so the fittings are in line and the mainpin can be pushed home. The mainpin is secured under the upper part of the main spar fittings with the large safety pin provided. The outrigger wheels (marked left and right) are pushed into the fittings under the wings and screwed tight (not applicable for two wheel and tricycle undercarriage versions).

The two aileron connections are made inside the fuselage and secured and the spoiler control cables are connected by the carabiners.

This is the opportunity to connect navigation lights and VOR antenna connectors at the root rib adjacent to the spar. Then the wing root/fuselage undersurface 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 an M10 castellated nut or M10 Allen screw which is secured with a safety pin. The tailplane fairing (if applicable) is hooked under the fin and fixed with two patent fasteners.

The elevator horn and pushrod are connected by inserting the pin and are secured. Finally connect the Bowden cable to the fittings on the elevator and trimmer, having first moved the cockpit trimmer lever fully forwards.
With the optional equipment electric Trim servo connect the plug in the area of the opening for elevator connection and pull them tight.
After rigging, the aircraft will require a full Daily Inspection (Flight Manual, p 14).

1.2 De-rigging

First apply the parking brake.

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 and spoilers) have been disconnected and that the underwing/fuselage fairing plates have been removed. And that the connectors for navigation lights and VOR antenna have been disconnected (if appolicable). Let the wing tip helpers take the weight off the main pin by gently raising the tips so that there is no load on the mainpin. Then the wing tip holders ease gently tailwards to disengage the forward lug before moving the whole wing forward to free it from the rear lug. During this operation avoid tilting the wings and fuselage and do not bring the wing tips too far back.

1.3 Transporting the motor glider

The Falke can be transported using a suitable glider trailer. The distance between the supports for the wings must not exceed 4.5 metres. Otherwise the length of the overhanging wing section may result in damage during road transport and when travelling off road. In the case of the folding wing version the outer wing sections must be removed and mounted on the trailer separately. It is only possible to trailer the Falke with the tip sections mounted on the wings over short distances and on good roads. The propeller should be horizontal and tied to the fuselage or trailer such that it cannot rotate in the slipstream whilst being towed.

The canopy should be locked and, preferably held closed by the harness straps. The rudder and ailerons must be locked in position.

If the aircraft is being towed on an open trailer without waterproof covers, ensure that rain and spray cannot enter through the spoiler gaps, pushrod openings, fuselage etc. If the wings do get wet en route dry them out immediately in a warm environment with the leading edge uppermost.

When moving the rigged motor glider across the airfield, especially over rough ground, it is important to ensure that the control column is held fast by the harness straps to prevent the elevator bouncing.

1.4 Supports

a) Two wheel undercarriage version

The Falke can be chocked directly under the GRP undercarriage leg housings or supported using the threaded holes provided at the side of the fuselage at the front (the bolt thread is M10). On no account is the Falke to be chocked up on the fairing tubes in the undercarriage area. This also applies to the tricycle undercarriage version.

b) Single mainwheel undercarriage version

The Falke can be chocked at the stub tubes provided for the purpose (marked with a triangle) and in the older version at the steps or using the threaded holes provided in the side of the fuselage (the thread is M10). On no account is the Falke to be chocked up on the fairing tubes in the undercarriage area.

c) Raising the tail

The tail end of the fuselage may be supported only on the underside of 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 wings are supported correctly as described. This is particularly important in the case of the folding wing version.

At the very least the wing must be supported at the root and at about rib 19 (about 1.10 m / 43.30" 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 to be left in an enclosed space for a period of time it is essential to ensure adequate ventilation.

Foldback wings

1.5 Folding back – general

On the SF 25 C Falke (single wheel undercarriage) first put the dolly under the fuselage so that the motor glider with its folded wings remains upright (in the case of the two wheel undercarriage this is not necessary of course). After release of the control connections, the main pins and the wing rear connection on the fuselage, the wings are withdrawn from the fuselage on a guide. One person holds the wing at the trailing edge and one person holds the wing at the tip and pulls to withdraw it. Then the wing is rotated to vertical and is swung round towards the tail and put into a locator on the rudder. To keep the wing vertical a cable is connected from the trailing edge of the wing to the fuselage. The aircraft can then be moved, the tailwheel retaining approximately 30° steerability in each direction.. For greater manoeuvrability a 360° steerable dolly can be used. A mounting is available as an option.

To move the motor glider greater distances use a tail dolly with a car towbar connector so the motor glider can be towed gently. With practice two people can fold the wings. Initially it is safer with three.

1.6 Folding the wings

With two people, (1) and (2), the procedure is as follows:-

1. Fit fuselage support dolly (only applies to single mainwheel undercarriage).

2. Fit wing locator on the fin (insert and secure on the other side with a safety pin).

3. Helper 1 releases the small fairing plates under the wing roots and disconnects any electrical connections, aileron and spoiler connections in the fuselage and removes the safety pins from the main pin.

4. Helper 2 takes the weight of the **starboard** wing tip. Helper 1 withdraws the main pin, goes to the starboard trailing edge at the wing root and releases the rear wingpin (release and move backwards).

5. Helper 2 withdraws the wing on its guide right up to the stop. Helper 1 holds the trailing edge horizontal.

6. Helper 1 rotates the wing to the vertical position by lifting the trailing edge and goes around the wing to the cockpit. Helper 2 swings the wing tip towards the tail whilst Helper 1 ensures that the wing root is free at the fuselage.

7. Helper 2 pushes the wing on its guide forwards right up to the stop, Helper 1 checks that the wing root is not touching the fuselage. Helper 2 locates the wing hook in the eye on the fin, Helper 1 secures the wing on the fuselage with the cable. With one wing folded the Falke is stable and will not tip.

8. The port wing is now folded in the same way. The wing is held horizontal initially by a strut in the fuselage and the wingtip is lifted to withdraw the wing from under the strut. The motor glider is now ready for parking in the hangar.
If space is at a premium it is also possible to remove the tailplane.

1.7 Unfolding the wings

The procedure for unfolding the wings is the reverse:

1. Helper 1 stands at the **port** wing root, unhooks the retaining cable from the fuselage and holds the wing vertical. Helper 2 goes to the port wing tip, unhooks the wing from the fin and pulls the wing back against the stops. Then Helper 2 walks forward with the wing, Helper 1 goes behind the wing to the root and rotates the wing to horizontal.

2. Now Helper 2 pushes the wing into the fuselage and inserts the spar root under the diagonal strut in the fuselage. Helper 1 inserts the wing at the trailing edge into the rear wing connection, pushes the pin in from the rear and secures it with the safety pin. The wing is now secure in this position and can be released. A third person, if available, can watch whilst the wing is pushed into the fuselage to ensure that the spar root ends are fed into the centre of the fuselage correctly, the port spar under diagonal strut and the starboard spar into the fittings of the port spar.

3. Similarly the starboard wing is rotated forwards in the same way and inserted in the fuselage. The spar end is inserted in its mating opposite. Helper 1 inserts the rear wingpin as in paragraph 2 above, secures it and inserts the mainpin in the fuselage.
Helper 1 may find it convenient to kneel in the fuselage in order to push home the pin as soon as the holes are in line. Inserting the pin is easier if Helper 2 waggles the wing tip gently.

4. Helper 1 secures the main pin, connects the ailerons and spoilers and also any electrical connections, and then fits the small fairings under the wing roots. Helper 2 removes the wing locator from the fin.

5. In the case of single wheel undercarriage the fuselage supporting dolly is also removed.

6. Remove steerable tail dolly (if used).

7. Checks after unfolding the wing:
Seating and security of main pin
Seating and security of the rear wing/fuselage connections
Ailerons connected and secured
Spoilers connected
Any electrical connections restored
Wing locator removed from the fin
Supporting dolly removed (only applicable in the case of single wheel undercarriage)
Insertable steerable tailwheel removed (if applicable)
Check for full and free movement of the ailerons and spoilers and check the operation of the electrical circuits.

1.8 Maintaining the folding mechanism

When the wings are folded, part of the folding mechanism is exposed, so the motor glider should not be left out of doors in that configuration. To ensure that the folding wing mechanism gives long service, it is vital that it is greased frequently and not abused. We recommend that the mechanism be greased after **every 20 folding operations** but in any case **not less than once a month** during the flying season and also at the start and finish of the season.
Lubrication routine when wings folded:

1. Grease front & rear wing/fuselage attachment points (4)
2. Grease front & rear fuselage/wing attachment points (4)
3. Grease mainpins and mainpin bores
4. Grease the two guide rods in the fuselage
5. Grease the guide rods in the wings (one on each)
6. Oil the two swivel joints on the guide rods

1.9 Rigging and derigging with folding mechanism

Before de-rigging the Falke with folding wings, release the swivel joints at the wing end (remove one locknut in each case). The wings can then be withdrawn totally from the guide rod and lifted from the swivel joint. For rigging, the wings are placed on the swivel joints again. Ensure that the swivel joints are in the correct position (match up colour codings). Secure the swivel joints with two new M8 locking nuts. Then the wings can be inserted in the fuselage or folded back (see section on folding/unfolding). If the folding mechanism parts are removed, the Falke can be rigged and de-rigged as described in Section 1.

1.10 Folding wing tips

The Falke is also available with optional folding wingtips for improved hangaring. When the tips are folded the wingspan is reduced from 15.3 to about 10 metres.

1.10.1 Rigging the wings

If the outer wings have been separated totally from the inner wing (e.g. on a glider trailer) then first the upper fittings at the folding joint must be lined up and the top pin inserted from the front of the aircraft. Secure with a washer and split pin. It is essential to clean and grease the mating parts in advance. Then connect the aileron drive at the point of wing fold with a bolt, washer & lock nut.

1.10.2 Folding the wing tips

The wingtips fold about the upper bolt (the centre line of the upper bolt is the fulcrum of the outer wing). The outer wings should be folded somewhere sheltered from the wind e.g. in the windshadow of the hangar. The folding operation is easier with the outrigger wheels attached to the inner wings.

The control column and ailerons must be approximately in mid position.

To open up the outer wing section, one person slowly rotates it about the fulcrum and gradually lowers it to the extended position. A second person stands at the fulcrum and presses the inner wing down to prevent it tipping suddenly. If a second person is not available for this operation, then an outrigger should be used to prevent the wing tipping and loss of control of the operation. Then, using the main pin handle, the lever for the pin separation drive is pushed fully from the front to the back. This inserts the lower front and rear pins. The securing pin locates automatically. Then check for correct operation of the aileron drive at the wing fold point. Replace the fairing and secure with the patent fasteners.

Closing the outer wings is the same procedure as opening them out, but in the reverse order. To operate the pin separation drive, the spring-loaded securing pin should be raised briefly.

2. Fuelling up etc.

2.1 Fuelling up

The engine runs on unleaded normal petrol with a minimum ROZ of 90 for the ROTAX 912 A and unleaded super grade with a minimum ROZ of 95 for the ROTAX 912 S, or AVGAS 100LL. The following petrol types can be used: those meeting the EN228 specification, (from unleaded normal for the ROTAX 912 A and from unleaded Super for ROTAX 912 S, unleaded Super-Plus and all leaded petrols.

Δ Warning:

Before fuelling up at a fuel pump
there must be a ground connection
between the petrol pump & the aircraft
(clip the grounding lead to the exhaust bracket).

The same applies when filling up with fuel from metal or plastic containers. Before pouring the fuel, ensure that any potential between the container and the aircraft is grounded.

Δ This procedure is essential as it reduces the risk of fire or explosion Δ

The fuel should be filtered through a leather filter. Ensure absolute cleanliness. If you have to fuel up when it is raining, protect the fuel inlet with an umbrella. Cover the fuel filler inlet. Never smoke or allow a naked flame near the open fuel tank. Use only the original vented filler cap. (The filler cap is labelled "*Patent blau*" or "*mit Lüftung*").

2.2. Topping up with oil

The oil level is to be checked (under the inspection panel on the right hand side of the top cowling) every one or two engine hours and before every long flight. The oil should be topped up to the upper dipstick mark. The oil filler position is accessible after removal of the upper cowling section and is marked yellow. For approved oils see p. 6 of the Flight Manual.
Prior to oil check, turn the propeller by hand several times to pump oil from the engine into the oil tank, or let the engine idle for 1 minute.
This process is finished, when air is returning back to the oil tank and can be noticed by a murmur from the open oil tank.

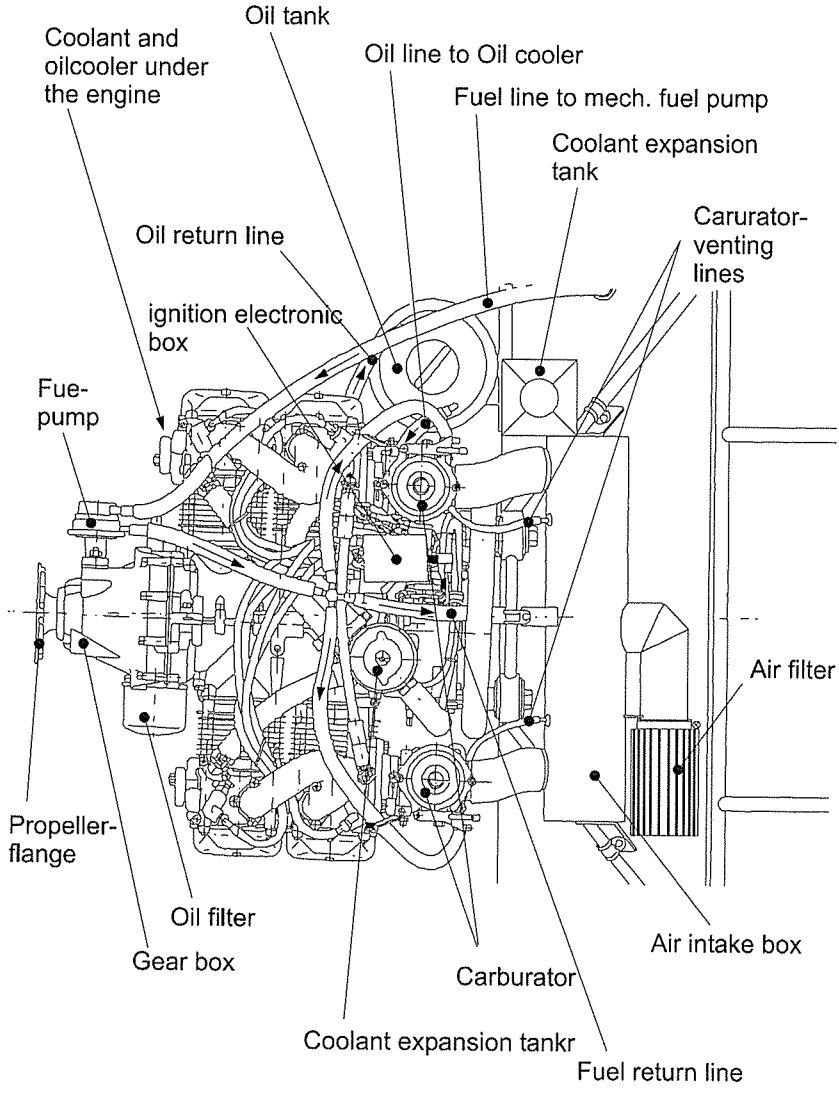
Difference between max. and min.- mark = 0,75 litre (1,6 liq pt)

2.3 Checking coolant level

The coolant level must be checked daily. This can be done through the inspection panel on the right hand side of the top cowling. The coolant in the overflow reservoir must be between the two marks when the engine is cold. The filler cap on the coolant overflow reservoir is marked red. Remove the top cowling section before topping up.

The coolant is 50% antifreeze with anticorrosion additives and 50% water.

2.4 Engine compartment



3. Maintenance, Inspection and Repairs

3.1 Cleaning the aircraft

For maximum reliability a motorglider must be clean and cared for. This applies especially to the engine and propeller. The level of attention required will vary according to usage and weather conditions. The aircraft is best cleaned with water or with soapy water. Never clean painted surfaces with petrol (gasoline) or similar solvents as they attack the finish. The canopy should be washed carefully with fresh clean water and a sponge or washleather (float the dirt off or it will produce scratches). It can be given a final polish with perspex cleaner. The aircraft finish should be waxed regularly (every few months). Only use waxes or polishes which do not contain silicones. Afterwards the aircraft should be rinsed off with water containing washing-up liquid to prevent the formation of water droplets on the wings in rain. Whenever the aircraft gets wet it should be leathered off. Even the best finish deteriorates over time but care and protection can considerably prolong its life and also the smoothness of the wing surface. If the motor glider is to be left in an enclosed space for a period of time it is essential to ensure adequate ventilation.

3.2 Periodic maintenance and inspection

3.2.1 Daily Inspection

The normal Daily Inspection (including a check for foreign objects) is of course required after work has been carried out and before the start of each day's flying. For details of the Daily Inspection see the Flight Manual, p. 14.

3.2.2 Engine and Propeller Inspections

For all maintenance work on the engine and propeller, please consult the appropriate maintenance manuals from the respective manufacturers. Pay particular attention to the engine cowling, exhaust, cabin heating, coolant pipes, radiator and its attachment to the engine as they are subject to cracks resulting from vibration.

See also the Maitenance Manual for the ROTAX 912 A( ) and the Operating and Installation Instructions for the Constant Speed E-118 propeller and also the E-112 fixed pitch propeller.

The engine must be inspected and maintained after the first 25 hours running - see ROTAX Type 912 Maintenance Manual, latest edition.

Then the engine and propeller must be checked and serviced after every 100 engine hours. Additional inspection is required after 200 hours. This work must be carried out in accordance with the Inspection and Maintenance List and recorded in the manufacturer's Motor Glider Log Book supplied with the aircraft or with the ROTAX Maintenance Manual as mentioned above.

3.2.3 Airframe Inspection

Maintenance work must be carried out after every 100 hours flying time and in any case at least once a year. This work must be carried out in accordance with the Inspection and Maintenance List which is contained in the Motor Glider Log Book supplied by the Manufacturer.

3.3 Battery Servicing

Check the electrolyte level at least once a month and top up with distilled water as necessary. The correct level in individual cells is checked with a battery hydrometer.

Specific gravity of electrolyte at	20°C (68°F)
State of battery charge:	
fully charged	1.28 kg/litre
half discharged	1.19 - 1.21 kg/litre
discharged	1.09 - 1.14 kg/litre

If necessary, charge the battery (charge rate 1.5 amps). If the battery is not in use it must be given a top up charge every month and every three months it must be discharged and then recharged.

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 duct any inflammable battery gases safely out into the slipstream.

3.4 Undercarriage and brake

a) Two wheel undercarriage

The Falke has a maintenance-free GRP sprung two wheel undercarriage with 5.00 x 5 tyres, tyre pressure 2.1 bar (31 psi).

The tailwheel is 210 x 65 mm, tyre pressure 2.5 bar (37 psi).All the wheel hubs have sealed-for-life ball bearings. The two mainwheel brakes are heel operated from the left pilot seat (only on the version with non-adjustable pedals) and they are also operated by the spoiler control lever on the last part of its travel - so it is not advisable to land with spoilers fully extended.

The Falke also has a parking brake which should always be applied before starting the engine and for parking. To apply the parking brake pull the spoiler lever sideways at the first stop, raise the parking brake lever and then release the spoiler control lever. You need both hands for this operation, but the brake may then be released with one hand by pulling the spoiler lever: the parking brake lever drops and releases the spoiler lever.

The parking brake can also be operated using the swing grip on the left airbrake lever: rotate it upwards, pull the airbrake lever fully back and then turn the lever down into the parking position. To release the parking brake, simply reverse the process. Adjust for wear as necessary. Adjust the length of the brake cables at the two turnbuckles between the fuselage and the wheels. The turnbuckles should be adjusted such that when the aircraft is chocked up the wheels can just be turned using both hands when the left spoiler lever is applied to the limit, just before the parking position. Remember to lock the turnbuckles afterwards (with locking wire or locknuts). This setting will produce an even braking effect and adequate braking for parking. The brake shoes must be replaced at the very latest when the brake lining is down to 1.5 mm (1/16") at its thinnest point. If the brake bearings are taken apart when the aircraft is dismantled, the position of the brake lever at the wheel must be marked for reassembly. The torque wrench setting for the spline brake lever attachment is 18-22 Nm (13-16 ft lbs). The GRP sprung undercarriage should always be painted **white** to protect it from UV and high temperatures.

b) Sprung mainwheel undercarriage

This Falke has a single sprung mainwheel, with maintenance-free rubber cavity suspension. The tyre is 6.00 x 6 tyre, recommended pressure 2.1 bar (31 psi). The tailwheel is 210 x 65 mm, recommended pressure 2.5 bar (37 psi). The wing tip outrigger wheels have 200 x 50 mm tyres, tyre pressure 2.5 bar (37 psi). All wheels run on sealed-for-life ball bearings. The wheel brake on the single mainwheel brake is connected to the spoiler lever and is applied in the final part of spoiler extension. For this reason it is important not to land with full spoiler. The Falke also has a parking brake which should always be applied before starting the engine. The procedure for applying the parking brake is as follows: pull the spoiler lever sideways at the first stop, raise the parking brake lever, release the spoiler control lever. You need both hands for this operation, but the brake may then be released with one hand only by pulling the spoiler lever. The parking brake lever drops and releases the spoiler lever.

A second version of the parking brake uses a swing grip on the left hand airbrake lever. Raise it fully, pull the airbrakes fully open and hold them in position by dropping the swinging grip into the parkling position. The reverse procedure will release the parking brake.

As the brake lining wears, the brake will need adjusting as necessary. To adjust first remove floor of cockpit (port side) and then adjust the cable length at the adjuster with the locknut arrangement. The brake shoes must be replaced at the very latest when the brake lining is down to 1.5 mm (1/16") at its thinnest point. If the brake bearings are taken apart when the aircraft is dismantled the position of the brake lever at the wheel must be marked for reassembly. The torque wrench setting for the splined brake lever attachment is 18-22 Nm (13-16 ft lbs).

c) Unsprung single mainwheel version – 8.00 x 4

The unsprung mainwheel version of the Falke has an 8.00 x 4 mainwheel, tyre pressure 1.8 bar (26 psi). In all other respects this version is the same as the one with a single sprung mainwheel (see above).

d) Tricycle undercarriage version

Nosewheel 5.00 x 4 (or 330 x 130), tyre pressure 1.5 bar (22 psi). Nosewheel suspension is provided by maintenance-free rubber cavity suspension arrangement. The nosewheel steering and drive should be greased at least once every 50 hours flying time (see Maintenance List). In other respects the tricycle version undercarriage is identical with the two wheel version. See Section 3.4 in the Maintenance Manual.

3.4.1 One piece Cockpit canopy.

Cockpit release and opening mechanism is shown in the drawing of Appendix 1 and 2 on pages 27 and 28.

Most important parts is the knee joint left hand between the parts 4, 6, 7, 9-l and right hand 5, 6, 7, 9-r.

The canopy release T-handle needs 8 to 10 daN for closing and opening.

3.5 Changing the Propeller

see also Propeller Manual
When a propeller is removed the flange should always be marked before removal to facilitate subsequent refitting. The propeller is bolted through the pressure plate to the propeller flange (6 bolts). To remove the propeller, remove the spinner, undo the six hexagonal bolts and withdraw the propeller from the hub.
To reassemble, tighten the 6 bolts opposite to opposite using a torque wrench. The reassembly torque setting for these nuts is 15 -17 Nm (11 - 12 ft/lbs). NB: The propeller tips have a maximum permitted discrepancy of 2 mm. This discrepancy can be corrected by tightening individual bolts. All six bolts must be wired up in pairs. Finally replace the spinner and secure.

When fitting a constant speed propeller always follow the manufacturer's instructions in the Propeller Manual. Never use grease or oil on the propeller flange and propeller shaft flange as the power is transmitted through friction on the flange. The propeller bolts must be tightened in accordance with the torque setting given in the E-118 Propeller Manual.

3.6 Annual Inspection

As is the case with all gliders and aircraft, a motor glider requires annual inspection for renewal of its Certificate of Airworthiness. This must be carried out at the appropriate time by an authorised inspector. The whole aircraft must be thoroughly overhauled before this annual inspection. The work is detailed in the Inspection and Maintenance List in the Log Book supplied by the manufacturer. Fabric and paintwork defects must be made good. Control circuit bearings are to be checked and replaced if worn. All control circuits are to be checked for adjustment and the control surface deflections 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. Worn pulleys and control cable guide bushes must be replaced. Bushes must sit tightly in their fittings; a missing bush causes rapid cable wear. Keep cables with sliding contact clean and free from grit and dirt. Use oil but no 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 also renew the brake linings if necessary. The Propeller Manual should be consulted regarding any necessary overhaul work on the propeller.

3.7 Non-periodic inspections, repairs

After any incident such as a trailer accident, a heavy landing or a field landing on a difficult surface, the critical components of the motor glider should be checked thoroughly for damage. In particular check all vital fittings for paint cracks which might indicate that the aircraft has been overloaded. Minor repairs can be carried out after discussion with an approved inspector. Any such work must be carried out completely in accordance with manufacturer's drawings and other documentation and specifications. Spare parts (consumables) and materials are stocked by the manufacturer and are available. Special spare parts which might be required during repair work will be manufactured and delivered as quickly as possible when the manufacturer is contacted. If the propeller is damaged through contact with the ground or during transport it is to be returned to the manufacturer. In the case of contact with the ground, the gearbox must replaced and the manufacturer's instructions must be followed. Measuring distortion of the shaft or flange in situ is not sufficiently accurate and is not approved. If major repairs to the structure of the motor glider are required (undercarriage, load carrying parts of the fuselage, wing fittings, spars) then they must be carried out by the manufacturer.

4. Equipment

Minimum equipment is listed on page 28 of the Flight Manual. The complete set of equipment is listed in the Equipment List which is supplied in the Log Book with each SF 25 C.
If you change equipment or add to it, then all work must be in accordance with the drawings and documentation of the manufacturer. It may be necessary to establish the new centre of gravity. All regulations must be observed.

5. Electrical Wiring Diagram

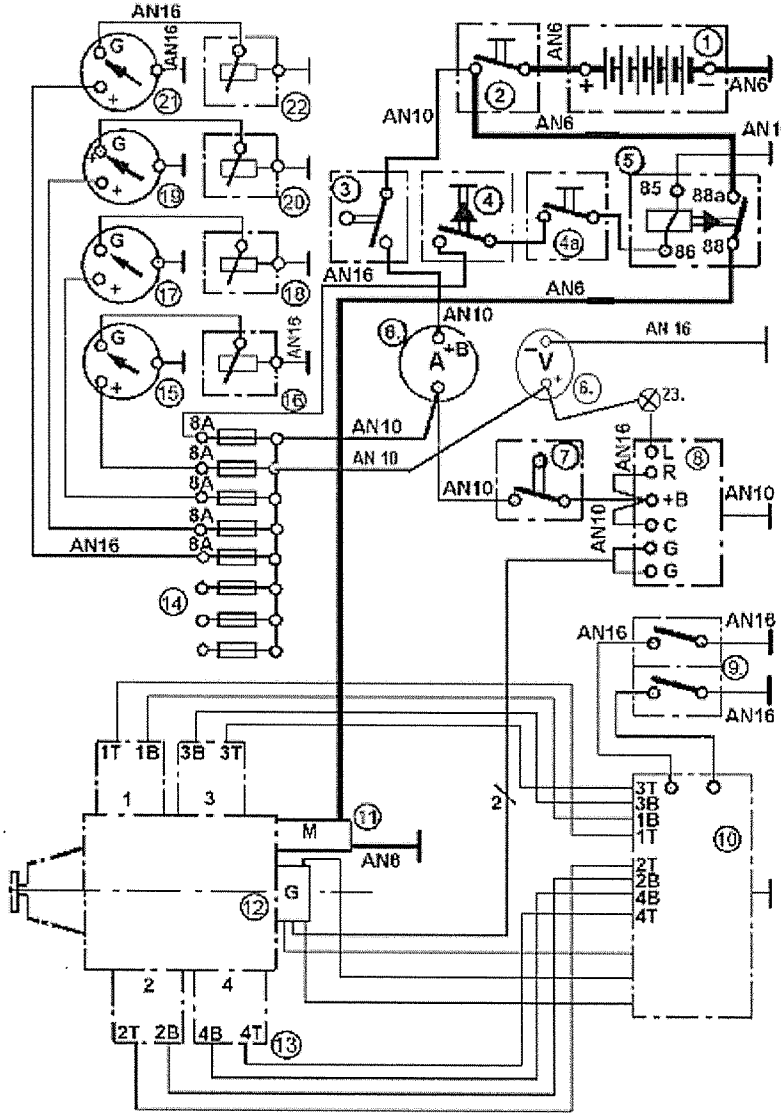
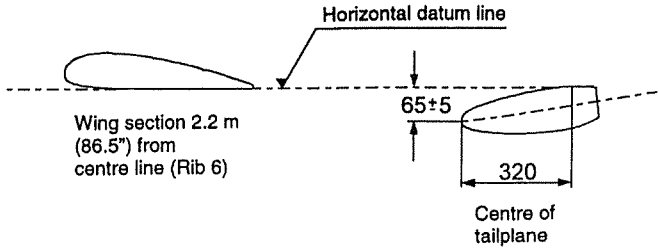


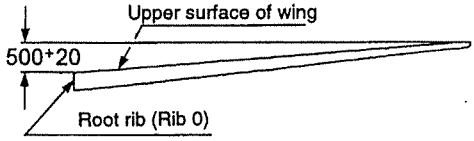
Diagram Details

1) Battery: Battery: Varta (or other make) 51814
2) Master switch: Bosch 0 341 001 001 or Merit 29 00 00 or
Cessna S1579 A2 remote cut-out with APR Schaltronic 6-631 N toggle switch or
2 Cessna S 1579A2 remote cut-outs with Split Master Switch Cessna S 1994- 1- 1
3) Safety cutout (battery): ETA 2-5700-K12 25A.
4) Starter button: Bosch 0 343 004 003.
4a) Press switch: Bosch 0 343 101 003 (only one piece cockpit canopy)
5) Starter relay: Denso 182800- 1950 12V.
6) Ammeter: Motometer 615.052.1011 or optional Voltmeter:
Motometer 685.002.1002.
7) Safety cutout (generator): ETA 2-5700-K12 20 A
or 2- 5700- IG 2 K 10- DD- 20A.
8) Regulator/rectifier: Ducati E34 32 92 (12VDC 28A)
9) Ignition switch: APR Schaltronic 6-631N or Bendix P/N 10-357290-1
or ACS-Prod. A-510-5.
10) Ignition system: Rotax/Ducati MHKZ contactless (dual circuit)
11) Starter: Nippondenso 820 - 12V/0.6 KW.
12) Generator: Rotax/Ducati 10P/250W (permanent magnet, single phase)
13) Spark plugs: EYQUEM AD 800L or DC PR 7E.
14) Fuse box: Hella 8JD 002 290-051 or Merit 145370 with
fuses 5A and above: Bosch DIN 72581.A,
Fuses less than 5A: 6 x 25 mm Stand.1 (G144.300) _A, or individual fuses:
Fuse holder: Wickmann 19595/583 (G 146.600) with
fuses: 5 x 20 mm IEC 127 ...A e.g. Wickmann 19193 (G143.980) or
automatic circuit breakers: ETA 2-5700-IG2-K10; 1 A to 10 A or 2-5700- IG2-K10- DD.
15) Fuel gauge: Motometer 609.003.1012.
16) Fuel sensor: Motometer 608.001.1055.
17) Oil temperature gauge: VDO 310.274.082.001.
18) Oil ltemperature sensor: VDO 323.801.010.001.
19) Oil pressure gauge: VDO 350.271.031.007.
20) Oil pressure sensor: VDO 360.081.029.012.
21) Cylinder head temperature gauge: VDO 310.274.101.001 [912 **A** ( )].
Cylinder head temperature gauge: VDO 310.274.082.001 [912 **S** ( )].
22) Cylinder head temperature sensor: VDO 323.801.003.001 [912 **A** ( )].
Cylinder head temperature sensor: VDO 323.801.010.001 [912 **S** ( )].
23) Low Voltage Lamp red Hella 2AA 003 257-041
Cable to LN 9251 (equivalent to MIL - W - 5086/2):
FYGP AN 6 14 mm²
FYGP AN 10 5 mm²
FYGP AN 16 1.2 mm²
24) Trim servo RAY ALLEN T3 – 12 A (wahlweise)
Rocker switch RAY ALLEN RS 2
Trimer Needle Type Position Indicator RP 2

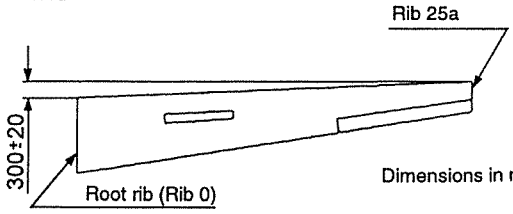
6. Wing/fuselage/tailplane arrangement, adjustment of control deflections, cable tension



Dihedral

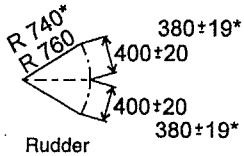


Sweepforward

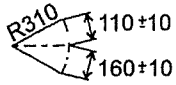


Control surface deflections

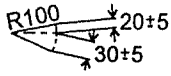
*) applies to swept fin
on aerotowing version



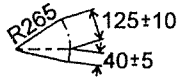
Rudder



Elevator



Trimmer



Ailerons

The deflection stops for the elevator and the ailerons are under the pilots' seats. Adjustment is via a screw with a lock nut.
Trimmer deflection is adjusted by means of a stop at the very end of the trimmer cable.
Trim flap deflection by electric Servo can be adjusted by extension or shortening the stainless steel pushrod. After that the pushrod must be secured against the Clevis forks by the safety nuts.
The rudder deflection stops are on the fuselage near the rudder horn. They are not adjustable as we have not found adjustment to be necessary. The spoiler opening angles can be balanced by means of two turnbuckles on the spoiler cables under the port seat. Don't forget the locking wire.

6.1 Cable tension

Modification 158 (nosewheel steering with adjustable rudder pedals) concerns steering of the nosewheel with a closed circuit cable system. This closed cable circuit requires a specific cable tension of:

25 lbs ± 5 lbs

In nosewheel steering with adjustable pedals the rudder and the nosewheel steering are linked by a mixing lever, to which the four pedals are linked individually with open cable circuits.
Consequently there is a closed circuit between the mixing lever and the nosewheel. This cable closed circuit requires a specific cable tension of:

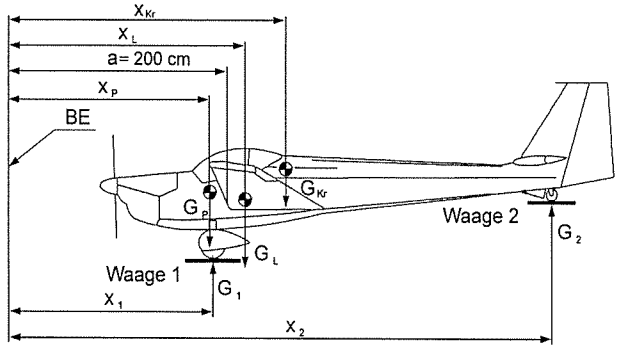
20 lbs ± 5 lbs.

This value also applies in the case of nosewheel steering with non-adjustable pedals (closed circuit).

6.2 Manuals/handbooks

1. Betriebs- und Einbauanweisung Nr. E-124 für hydraulischen Verstell-propeller MTV21A-C-F (Operating and Installation Instructions E-124 for hydraulic constant speed propellers MTV21A-C-F), latest edition.
2. Betriebs- und Einbauanweisung Nr. E-118 für hydraulischen Verstell-propeller MTV1A (Operating and Installtion Instructions E-118 for hydraulic constant speed propellers MTV1A) latest edition.
3. Betriebs- und Einbauanweisung Nr. E-112 für MT-Holz-Composite Festpropeller (Operating and Installation Instructions E-112 for MT wood/composite fixed pitch propellers) latest edition.
4. Betriebs- und Wartungshandbuch Nr. 0207.71 für feste Hoffmann- Holz- Composite- Propeller (Operating and maintenance manual No. 0207.71 for Hoffmann fixed pitch wooden composite propellers) latest edition.
5. Betriebshandbuch für Motor ROTAX 912 Serie (ROTAX 912 operator's engine manual) latest edition, in conjunction with Wartungshandbuch ROTAX 912 Serie (ROTAX 912 series maintenance manual).

7. Procedure for determining C of G for single & two wheel u/c versions



To weigh the aircraft 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 (2.2 metres = 86.5" from the centre line) is horizontal. With the aircraft in this attitude a plumb line is dropped from the leading edge of the wing at Rib 0 (0.52 metres = 20.46 inches from the centre line). Two metres (78.72 inches) in front of this point is the CG datum plane from which are measured X_1 and X_2, the distance of the undercarriage axles. The wheels are supported on scales which are used to determine weights W_1 and W_2. This formula determines the distance of the empty weight CG from the datum plane:

$$X_L = \frac{W_1 \cdot X_1 + W_2 \cdot X_2 - W_F \cdot X_F}{W_1 + W_2 - W_F}$$

Weights in kg, distances in cm.

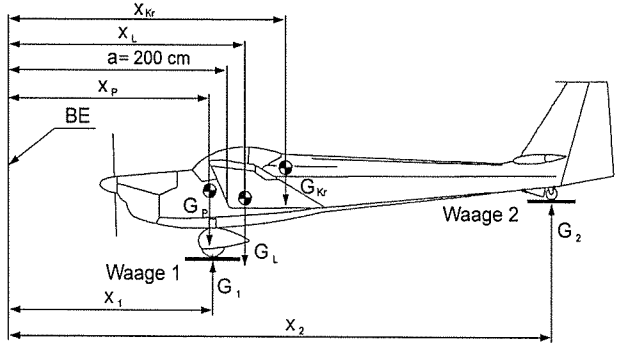
X_P = moment arm of Pilot = 188 cm
X_B = moment arm, Baggage = 245 cm
X_F = moment arm Fuel = 291 cm (with **80 l**-Tank) / 285 cm (with **55 l**- tank)
W_F = Weight of Fuel = Fuel contents in litres multiplied by 0.73 kg/Ltr

Empty weight W_E in kg Max AUW: 580 kg (604 kg with Folding Wing)	380	390	400	410	420	430
Position of CG X_E in cm - 44 l tank	226.8 – 235.9	226.4 – 235.8	226.1 – 235.7	225.2 – 235.7	224.3 – 235.6	223.4 – 235.5
Position of CG X_E in cm – 55 l tank	226.8 – 234.8	226.4 – 234.7	226.1 – 234.7	225.2 – 234.7	224.3 – 234.6	223.4 – 234.6

Empty weight W_E in kg Max AUW: 610 kg (634 kg with Folding Wing)	410	420	430	440	450	460
Position of CG X_E in cm - 44 l tank	225.8 – 235.7	225.6 – 235.6	225.3 – 235.5	224.5 – 235.5	223.7 – 235.4	222.9 – 235.4
Position of CG X_E in cm – 55 l tank	225.8 – 234.6	225.6 – 234.6	225.3 – 234.6	224.5 – 234.5	223.7 – 234.5	222.9 – 234.5
Position of CG X_E in cm - 80 l tank	225.8 – 231.6	225.6 – 231.6	225.3 – 231.7	224.5 – 231.7	223.7 – 231.7	222.9 – 231.7

The values given in the table for X_E CG apply to motor gliders with an empty tank as calculated from the above formula for X_E CG. Empty weight and Centre of Gravity should be determined excluding outrigger wheels (if fitted).

7. Procedure for determining C of G for single & two wheel u/c versions



To weigh the aircraft 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 (2.2 metres = 86.5" from the centre line) is horizontal. With the aircraft in this attitude a plumb line is dropped from the leading edge of the wing at Rib 0 (0.52 metres = 20.46 inches from the centre line). Two metres (78.72 inches) in front of this point is the CG datum plane from which are measured X_1 and X_2, the distance of the undercarriage axles. The wheels are supported on scales which are used to determine weights W_1 and W_2. This formula determines the distance of the empty weight CG from the datum plane:

$$X_L = \frac{W_1 \cdot X_1 + W_2 \cdot X_2 - W_F \cdot X_F}{W_1 + W_2 - W_F}$$

Weights in kg, distances in cm.

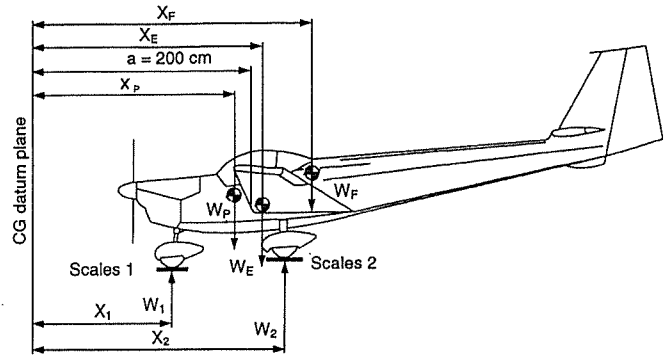
X_P = moment arm of Pilot = 188 cm
X_B = moment arm, Baggage = 245 cm
X_F = moment arm Fuel = 291 cm (with **80 l**-Tank) / 285 cm (with **55 l**- tank)
W_F = Weight of Fuel = Fuel contents in litres multiplied by 0.73 kg/Ltr

Empty weight W_E in kg Max AUW: **650 kg** (674 kg with Folding Wing)	*430*	*440*	*450*	*460*	*470*	*480*	*490*	*500*
Position of CG X_E in cm - **55 l** tank	225.3 – 234.6	225.1 – 234.5	224.8 – 234.5	224.6 – 234.5	224.4 – 234.4	223.6 – 234.4	222.9 – 234.4	222.2 – 234.4
Position of CG X_E in cm - **80 l** tank	225.3 – 231.7	225.1 – 231.7	224.8 – 231.7	224.6 – 231.7	224.4 – 231.7	223.6 – 231.8	222.9 – 231.8	222.2 – 231.9

Empty weight W_E in kg Max AUW: **690 kg** (714 kg with Folding Wing)	*450*	*455*	*460*	*465*	*470*	*475*	*480*	*500*
Position of CG X_E in cm - **55 l** tank	224.8 – 234.1	224.7 – 234.0	224.6 – 234.0	224.5 – 234.0	224.4 – 234.0	224.3 – 234.0	224.2 – 234.0	223.8 – 234.0
Position of CG X_E in cm - **80 l** tank	224.8 – 231.7	224.7 – 231.7	224.6 – 231.8	224.5 – 231.8	224.4 – 231.8	224.3 – 231.8	224.2 – 231.8	223.8 – 231.9

The values given in the table for X_E CG apply to motor gliders with an empty tank as calculated from the above formula for X_E CG. Empty weight and Centre of Gravity should be determined excluding outrigger wheels (if fitted).

8. Procedure for determining Centre of Gravity for tricycle undercarriage version



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 (2.2 metres = 86.5" from the centre line) is horizontal. With the aircraft in this attitude a plumb line is dropped from the leading edge of the wing at Rib 0 (0.52 metres = 20.46 inches from the centre line). Two metres (78.72 inches) in front of this point is the CG datum plane from which are measured X_1 and X_2, the distance of the undercarriage axles. The wheels are supported on the scales which are used to determine weights W_1 and W_2. This formula determines the distance of the empty weight CG from the datum plane:

$$X_L = \frac{W_1 \cdot X_1 + W_2 \cdot X_2 - W_F \cdot X_F}{W_1 + W_2 - W_F}$$

Weights in kg, distances in cm.

X_P = moment arm of Pilot = 188 cm
X_F = moment arm Fuel = 285 cm (with **55 l**- tank)
= 291 cm (with **80 l**-Tank)
W_F = Weight of Fuel = Fuel contents in litres multiplied by 0.73 kg/litre
X_B = moment arm of Baggage = 245 cm
If the tank is empty, then the factors W_F and $W_F \cdot X_F$ are redundant

Empty weight W_E in kg Max AUW: 650kg (674 kg with Folding Wing)	440	450	460	470	480	490	500
Position of CG X_E in cm - 55 l tank	225.1-234.5	224.8-234.5	224.6-234.5	224.4-234.4	223.6-234.4	222.9-234.4	222.2-234.4
Position of CG X_E in cm - 80 l tank	225.1-231.7	224.8-231.7	224.6-231.7	224.4-231.7	223.6-231.8	222.9-231.8	222.2-231.9

Empty weight W_E in kg Max AUW: 690kg (714 kg with Folding Wing)	445	460	465	470	475	480	500
Position of CG X_E in cm - 55 l tank	224.7-234.0	224.6-234.0	224.5-234.0	224.4-234.0	224.3-234.0	224.2-234.0	223.8-234.0
Position of CG X_E in cm - 80 l tank	224.7-231.7	224.6-231.8	224.5-231.8	224.4-231.8	224.3-231.8	224.2-231.8	223.8-231.9

The values given in the table for X_E CG apply to a motorglider with an empty tank (80 l or 55 l capacity) as calculated from the above formula for X_E CG.

9. Weight and Centre of Gravity Chart

Date	Empty weight	Max. permissible load	Empty weight CG	Inspector

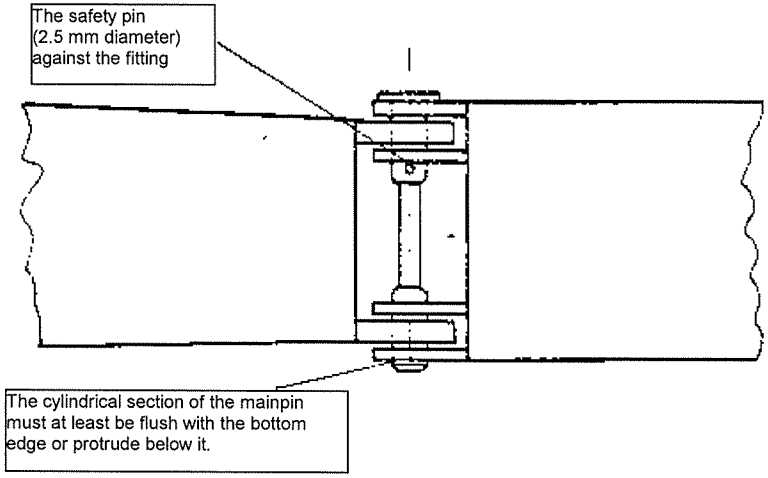
10. Weight and Centre of Gravity Chart

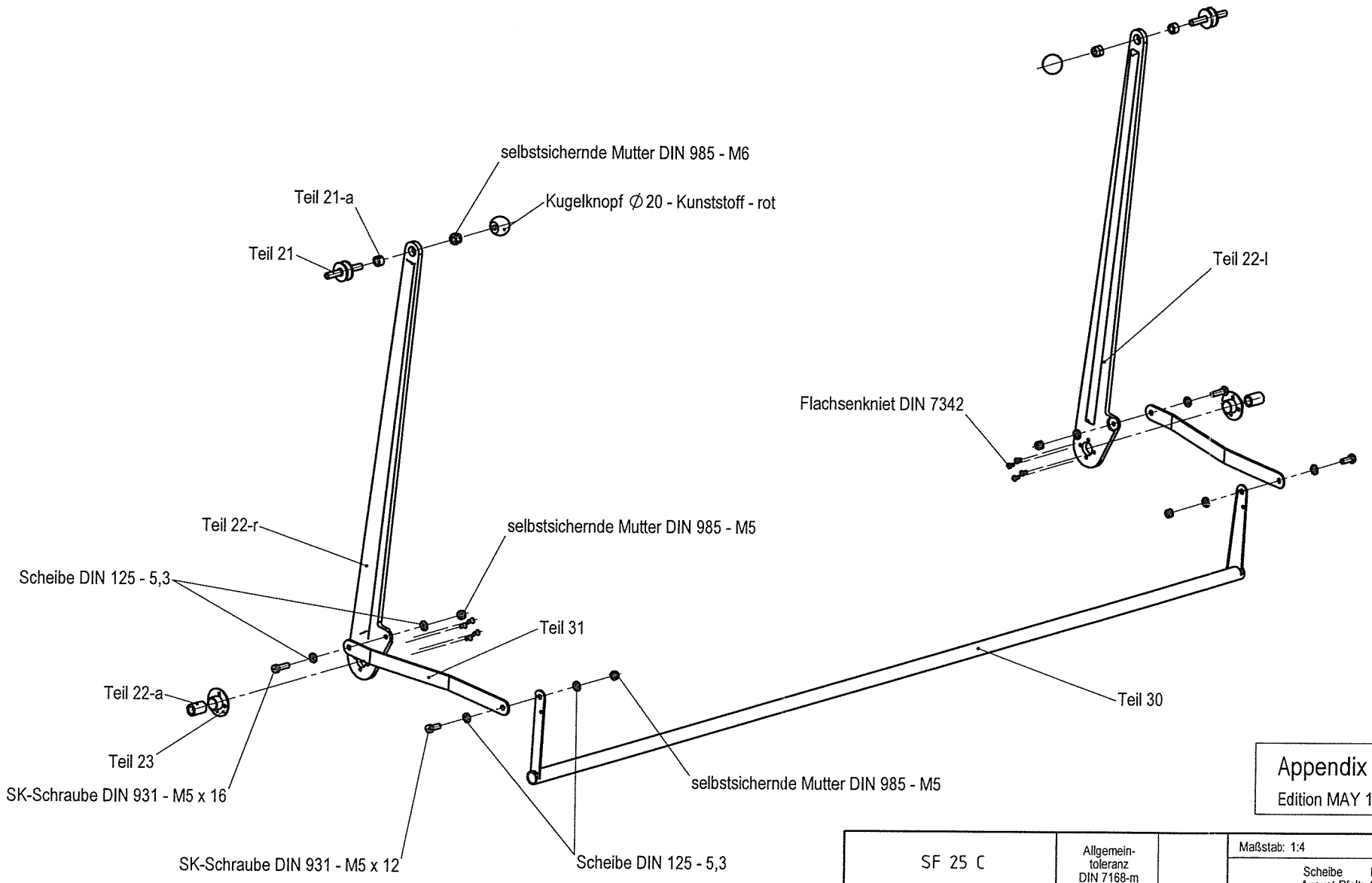
Date	Empty weight	Max. permissible load	Empty weght CG	Inspector
	Without aerotow hook arrangement, **with** no ballast in tail			
	With aerotow hook arrangement, **without** ballast in tail			

X Instructions for rigging and derigging wings (mainspar) X

When rigging and derigging it is **essential to ensure** that the spar fittings of the port wing (yoke) are not subjected to vertical distortion. Never force the mainpin into place (e.g. never drive it in with a hammer) but gently insert it with the weight taken off the wing tips.

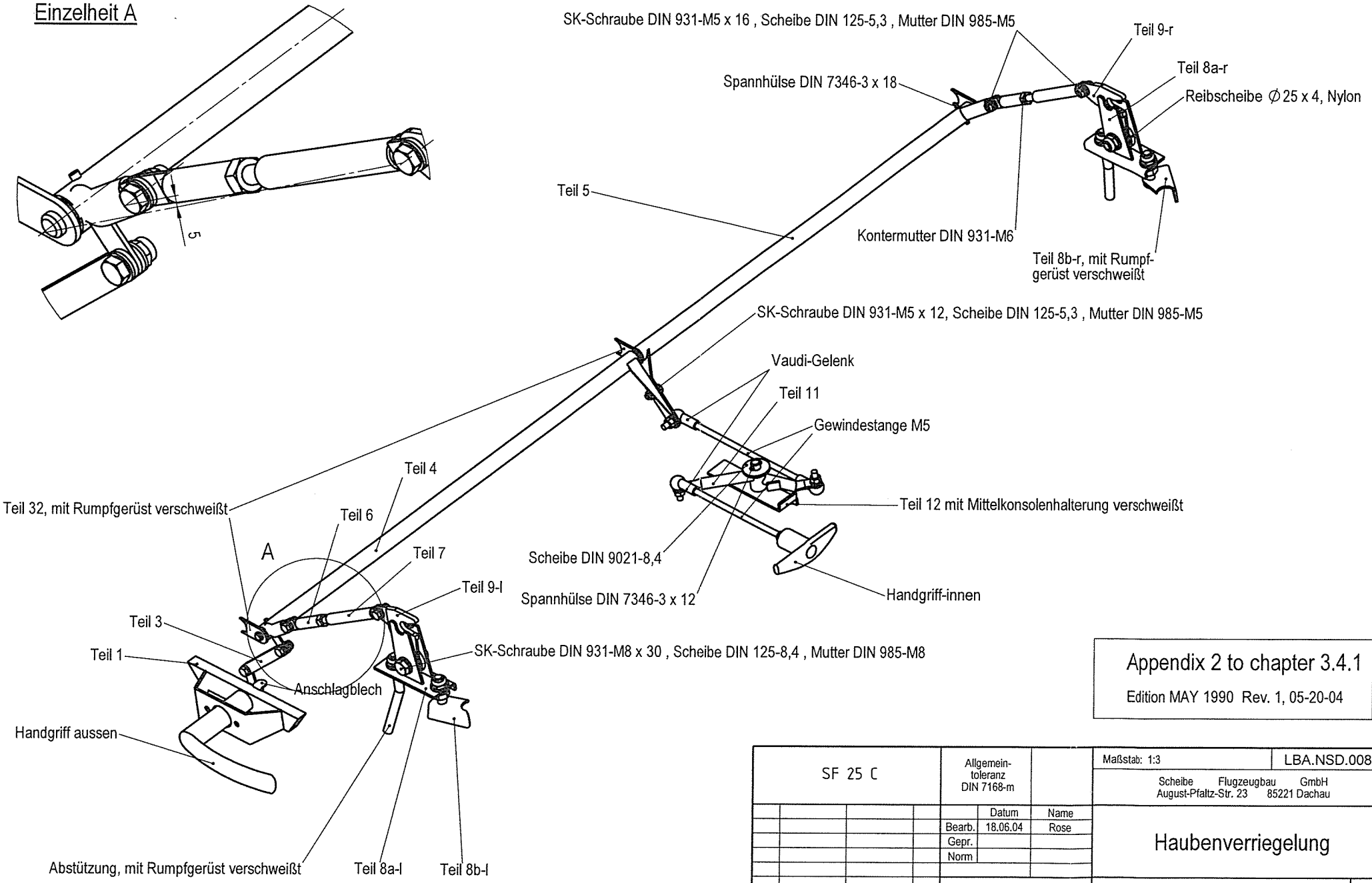
When the mainpin has been inserted, check that it is correctly seated. Check carefully, using a mirror and torch if necessary, that the mainpin is fully inserted into the bottom arm of the lower yoke. The cylindrical section of the mainpin must at least be flush with the bottom edge of the yoke, or protrude below it (see drawing) below). When checking, the mainpin must be pulled upwards (with the weight taken off the wingtips) such that the 2.5mm safety pin is up against the upper fitting.





Appendix 1 to chapter 3.4.1
Edition MAY 1990 Rev. 1, 05-20-2004

SF 25 C				Allgemein-toleranz DIN 7168-m			Maßstab: 1:4 LBA.NSD.008
					Datum	Name	Scheibe Flugzeugbau GmbH August-Pfaltz-Str. 23 85221 Dachau
				Bearb.	17.06.04	Rose	Haubenarme mit Hilfswelle
				Gepr.			
				Norm			
							653C-11-S10.27 Blatt 1 / 1 Bl
Zust.	Änderung	Datum	Name				Ersatz für: Ersatz durch:

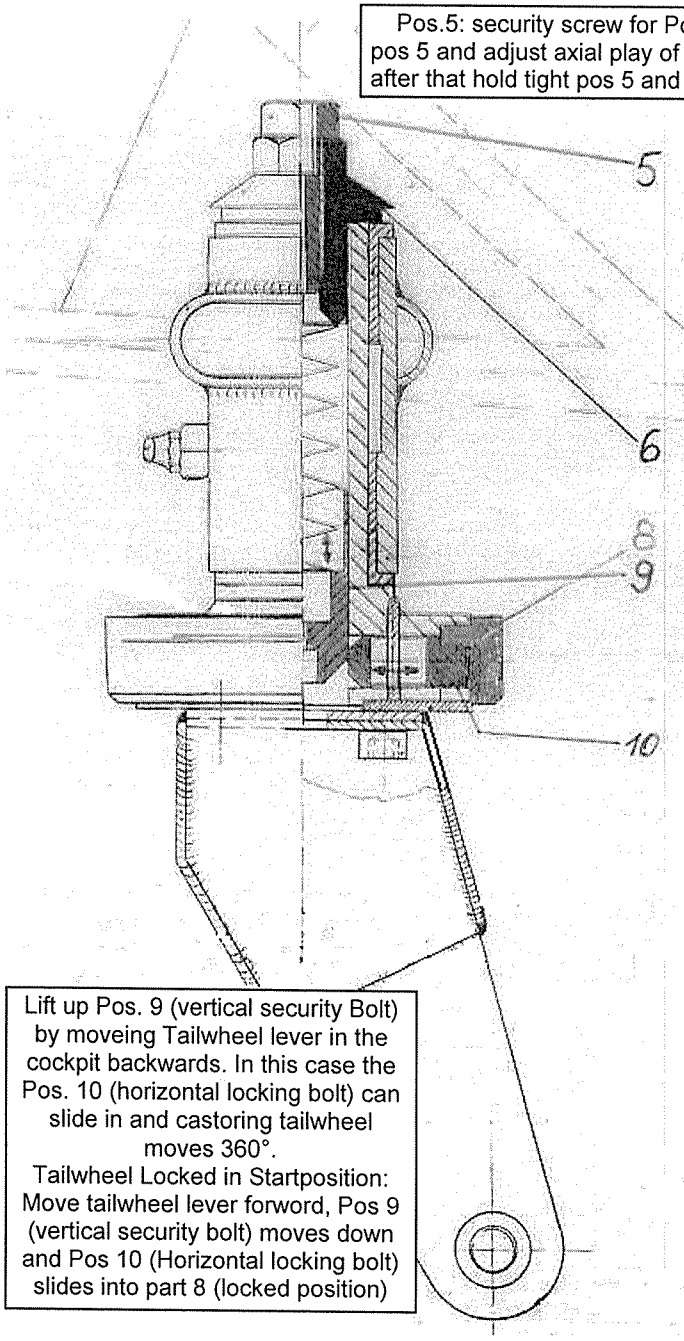


Appendix 2 to chapter 3.4.1

Edition MAY 1990 Rev. 1, 05-20-04

SF 25 C				Allgemein-toleranz DIN 7168-m			Maßstab: 1:3 LBA.NSD.008
							Scheibe Flugzeugbau GmbH August-Pfaltz-Str. 23 85221 Dachau
					Datum	Name	
				Bearb.	18.06.04	Rose	Haubenverriegelung
				Gepr.			
				Norm			
							653C-11-S10.28 Blatt 1 / 1 Bl
Zust.	Änderung	Datum	Name				Ersatz für: Ersatz durch:

Pos.5: security screw for Pos. 6; open pos 5 and adjust axial play of the turn axle, after that hold tight pos 5 and tighten pos 6



Lift up Pos. 9 (vertical security Bolt) by moveing Tailwheel lever in the cockpit backwards. In this case the Pos. 10 (horizontal locking bolt) can slide in and castoring tailwheel moves 360°.
Tailwheel Locked in Startposition: Move tailwheel lever forword, Pos 9 (vertical security bolt) moves down and Pos 10 (Horizontal locking bolt) slides into part 8 (locked position)

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 Zeitpunk 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, rips, 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, corrision 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 Motorsegler, 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 wodden 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 Längsgurte 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 acurately. 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 framefork 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 Kronenmuttern 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!