SECTION 1

1.1 Introduction

This Flight Manual has been compiled in order to give pilots and instructors all the information they need for operating the ASH 26 E powered sailplane safely and appropriately, and for getting the full benefit from the performance it offers. This Manual includes all data required to be available to the pilot as laid down in the Design Standards JAR-22. In addition, we have provided a number of data and notes on operation which, our experience as manufacturers suggests, may be of use to the pilot.

1.2 Type Certification Basis

This powered sailplane of the type designation ASH 26 E is type approved by the German Federal Civil Aviation Authority (LBA) in accordance with the Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes JAR-22 incl. amendments up to June 27, 1989 and supplementary Amendments 22/90/1, 22/91/1 and 22/92/1. The Joint Airworthiness Requirements so updated correspond with the more recent Change 4 of the original edition in English dated 7th May, 1987.

The Type Approval Certificate issued uses the Data Sheet No. 883, under Airworthiness Category "U". U stands for Utility and refers to sailplanes and powered sailplanes used in normal gliding activities.

The noise emission measurements were carried out in accordance with the currently valid "Noise Abatement Requirements for Aircraft" (German: Lärmschutzforderungen für Luftfahrzeuge [LSL]), and in accordance with ICAO, Annex 16, Chapter 10. The measurements established a noise level of 62.4 dB(A).

2.4 Power-Plant

Engine Model:	AE50R	
Max. power,		
- take-off:	37 kW (5 minute limit)	7500 rpm
- continuous:	34.6 kW	6900 rpm
Max. take-off revs:		7500 rpm
Max. continuous revs:		6900 rpm
Max. overspeed revs (20 sec.)		7800 rpm
Max. coolant temperature:	107 °C	224 °F
Max. coolant temperature, take-off	90 °C	194 °F
Min. coolant temperature, take-off:	60 °C	140 °F
Max. rotor cooling air temp.:	125 °C	257 °F
Lubricant:	Total loss oil lubrication at ratio 1:60 approx.	
Transmission:	Toothed belt transmission with 1 : 2.78 reduction ratio.	

The installation of the following propeller is type-approved:
Manufacturer: Alexander Schleicher GmbH & Co.
Propeller: AS 2 F1-1 /R 153 – 92 – N1

2.5 Power-Plant Control Unit Markings

The following table shows the markings of the digital ILEC engine control unit and the meaning of the colors employed.

Permanent Display:

RPM Indication (4 digits) [rpm]	**Green Diode** Normal Operating Range 1800 to 6900	**Yellow Diode** Caution Range 6900 to 7500	**Red Diode** Max. Limit, blinking at 7500 plus
Fuel quantity (2 digits) in liters		0 to 16	

Display reading when pressing the white button:
Press one time:

Liquid Coolant Temperature (3 digits)	--- °C

Press two times:

Internal Cooling Air Temperature (3 digits)	--- °C

Press three times:

Engine Battery Voltage (4 digits)	XX,X [Volts]

2.6 Masses (Weights)

Max. Take-Off Mass:		
-with water ballast	525 kg	(1158 lb)
-without water ballast but with fuel in the wing tank	525 kg	(1158 lb)
Max. Landing Mass:	525 kg	(1158 lb)
Max. mass of all non-lifting parts	344 kg	(758 lb)
Max. mass in baggage compartment:	15 kg	(33 lb)

Checklist stopping engine and retracting propeller

- Air Speed: 90-100 km/h (49-54 kts)
- Throttle: **IDLE** (bottom position). Wait until low RPM have stabilized.
- Ignition: **OFF**
- Let engine revs. die down.
- Engage propeller stop lever (bottom position). When engaging the stop the propeller must not stand direct above the stop block.
- Wait until propeller runs against the propeller stop block.
- Check vertical position of the propeller by means of the mirror.
- Hold down switch "RETRACT" and let propeller retract only so far that its tip can no longer be seen in the rear view mirror.
  Then after about 2 min. or when the maximum liquid coolant temperature has dropped by 2°C, press again "RETRACT" until the ILEC LED "Propeller retracted" lights.
- Fuel valve: **SHUT**
- Switch off Power-Plant Main Switch by pushing the red lever next to it.

Revolution Rates (RPM) and Speeds

Best climb at $\mathbf{V_y}$ = 95 km/h = 51 kts (blue line).
Cruising speed 135 km/h (73 kts) at 6900 rpm.
Maximum continuous revs: 6900 rpm.

The power-plant of the ASH 26 E gives the possibility to self-launch with good climbing performance, extending the operational range of a pure sailplane. It is advisable to familiarize oneself with the extending and starting procedures in the first instance within safe reach of an airfield, before attempting a cross country flight. The power-plant of a powered sailplane must not be regarded as a life insurance, ing unlandable areas. One should always be prepared for the possibility that the power-plant will fail to deliver the hoped-for propulsion. This may not necessarily be due to a technical shortcoming, but might be caused by nervous tension of the pilot (mistakes in carrying out starting procedure). The engine and its reliability should be regarded in the same light of a sailplane pilot's experience as that a thermal is not necessarily found when it is most urgently needed. The engines of powered sailplanes are not subject to quite such stringent production and test regulations as normal aviation engines, and therefore cannot be expected to be quite so reliable.

A minimum safe height for extending the propeller and starting the engine must be met. The criterium is that it must be possible to retract the propeller again and carry out a normal sailplane outlanding if the engine cannot be started. A valid value for this minimum safe height is about 300 meters (980 feet); however, this is depending also strongly on pilot ability and geographic factors.

(1) Extending the Power-Plant

Proceed as per checklist.
Do not extend the propeller at higher g-loads.
G-loads can increase, for instance while circling, to such an extent that the electric jack can only extend the propeller very slowly, or fails to do so fully.
Speeds for retracting and extending the propeller are given in Section 2.

(2) Starting the Engine

WARNING: A test run of the power-plant must <u>under no circumstances</u> be performed <u>without</u> the aircraft being completely rigged and safely chocked. Also a competent person must be securely strapped in the cockpit.

CAUTION: The local conditions for a safe take-off should be checked prior to take-off in accordance with the data given in Section 5 of this manual

Proceed in accordance with checklist.
If the engine fails to start, check it over as recommended in the Engine Manual.
It makes no sense to press the STARTER button for more than 5 seconds because the engine fires only if sufficient fuel has been primed. Therefore, after the 5 seconds first fuel should be primed again. If the engine still does not fire, this should be repeated again at 15 second intervals with increasing amounts of priming fuel.
If however, white smoke is observed to come out of the exhaust silencer already on the third trial and still no firing happened, then the engine is "overflooded". You must not prime any more fuel. Instead move throttle to 1/3 towards "WIDE OPEN", shut the fuel valve, and press STARTER until engine fires. Then immediately re-open the fuel valve.

Check ignition circuits. The RPM must not drop by

more than 200 RPM.
Allow engine to warm through at 4000 RPM for 3 to 4 minutes on ground; the coolant temperature should then be around 60 °C (140 °F). This way it will be ensured that the engine will smoothly accelerate to max. RPM.
With temperatures below -10 °C (14 °F) the engine should not be started because there is the danger with a very cold engine that the lubricant oil is too thick and thus the oil feed into the engine could be interrupted.

(3) Self-Launch

For a safe self-launch maximum engine revolutions should come up to at least 7000 rpm on the ground. With lower revolutions the pilot must face longer take-off distances than indicated in Section 5.2.3.

WARNING: If maximum revolutions reached on the ground are distinctly below 7000 rpm, the aircraft must not take off any longer. First the carburettor adjustment must be checked and again a test run of the power-plant on the ground must be done.

Experienced pilots should start their take-off run at the most negative flap setting 1. This flap setting affords excellent lateral control. At an indicated air speed of about 50 km/h = 27 kts the flap should be increased to Flap 4 (+23 °). For the remainder of the climb Flap 4 should be maintained.

For pilots without experience of flapped aircraft, we recommend setting Flap 4 both during take-off and throughout the climb.

For the acceleration run and actual lift-off, the following .....

For the acceleration run and actual lift-off, the following practises apply for different runway characteristics:

- **Concrete runways:**
Accelerate with "Wide Open" throttle in flap setting 2 and slightly push the stick until the tail wheel is unloaded. Up to a speed of about 50 km/h (27 kts) acceleration continues on the main wheel, then set flap 4 and at the same time gently pull the stick until the aircraft lifts off. After lift-off, climb to between 1 m and 2 m (3 and 6 ft) and accelerate then slowly to v_Y.
But in case of crosswind the procedure differs and the tailwheel is loaded by slightly pulling the stick in order to increase directional stability during the ground run.

- **Soft surface runways:**
Use flap setting 2 and by pulling the stick try to keep the tail wheel in contact with the ground until the aircraft lifts off. This is in order to reduce the load on the main wheel.
As early as possible change to flap 4 and at the same time gently pull the stick until the aircraft lifts off. After lift-off, climb to between 1 m and 2 m (3 and 6 ft) and accelerate then slowly to v_Y.

Maximum acceptable crosswind components are stated in Section 5.3.1.

(4) Climbing Flight

During climbing flight, the engine should be run at maximum 7500 rpm at v_Y = 95 km/h = 51 kts (blue line on ASI scale).

(5) Cruising Flight

This can be carried out in a saw-tooth pattern (climb followed by straight glide with propeller retracted), or in horizontal flight at 6900 rpm and an air speed of 135 km/h (73 kts). Monitor fuel reserves and open wing tank valve if appropriate.

CAUTION: The wing tank(s) valve will switch off automatically only if the tank selector switch is set to "AUTO" position. With manual position "ON" selected the valve will not close when the fuselage tank is full and fuel will be lost via the overflow vent! Therefore, the fuel level indicator must be monitored and the wing tank(s) valve closed in good time.

CAUTION: If wing fuel tank(s) are fitted, check that the oil supply is sufficient for the whole intended fuel contents. Monitor oil warning light!

A detailed description of the ILEC engine control unit is given under Section 7.9!

(6) Stopping the Power-Plant

CAUTION: To avoid damage to the propeller the procedures described hereafter must be met!

With normal outside air and engine temperatures the flight testing has shown that there is no need for ...

5.2.3. Take-Off Performance

The take-off performances given below are applicable to take-offs on hard and level grass runways and for the aircraft, propeller, and engine in good condition and for the following conditions:

Airfield elevation	0 msl	
Temperature	15°C	59°F
Air pressure	1013°hPa	29.92°in.merc.
Take-off mass (with water ballast)	525 kg	1158 lb
Speed to climb over 15°m (= 50°ft) obstacle (**V**$_{IAS}$):	95 km/h	(51 kts)*

* After safety altitude is reached, climb with $\mathbf{V_y}$ = 95 km/h = 51 kts.

	GRASS RUNWAY:	HARD RUNWAY:
Take-off roll	195 m	160 m
	640 ft	525 ft
Take-off distance to 15°m (50°ft) height	305 m	270 m
	1001 ft	886 ft

The influence of air temperature and air pressure (airfield elevation) on take-off performance is given in the take-off charts. (See Section 5.2.3.1.)

CAUTION: In rain (wet wings) or with frost or ice on the leading edges, the aerodynamic quality of the aircraft is drastically reduced.
Take-off is prohibited!
First wing and tailplane must be cleaned !

- A tailwind as well as an uphill runway increases the take-off distances considerably. The possibility of abandoning the take-off must be considered. See also Section 4.5.1(3).

5.2.3.1 Take-off Charts

CAUTION: For other runway surface conditions such as wet grass, soft ground, high grass, wet snow, water spots, etc., which are not given in these charts, it is recommended to use the additional distance factors or percentages given in the AIP (Airport) Manual Volume 1 !

For pilots inexperienced in self-launch the following observation may be helpful for estimating a safe self-launch:
The flight testing of the ASH 26 E demonstrated that take-off and climb characteristics during self-launch are slightly better than for an aerotow behind a powerful 132 kW tug aircraft (eg: Robin DR 400). If therefore a safe aerotow may be expected, there will neither be any problems for the self-launch.

The following charts give values for various airfield elevations and temperatures.

S_R = Take-off roll
S = Take-off distance to 15 m (50 ft) height

Take-Off Mass 525 kg (1158 lbs)

Pressure Altitude		Temperature		S_R Take-off roll distance				S Take-off dist. to 50 ft height			
				Hard surface		Grass		Hard surface		Grass	
m msl	ft	°C	°F	m	ft	m	ft	m	ft	m	ft
0	0	-15	5	119	391	145	476	201	659	227	745
0	0	+0	32	139	455	169	554	234	767	264	867
0	0	+15	59	160	525	195	640	270	886	305	1001
0	0	+30	86	183	601	223	733	309	1014	349	1146
500	1640	-15	5	140	459	170	559	236	774	266	874
500	1640	+0	32	163	534	198	650	274	900	310	1017
500	1640	+15	59	188	615	229	750	317	1039	358	1173
500	1640	+30	86	215	704	262	858	362	1189	409	1343
1000	3281	-15	5	164	539	200	657	277	909	313	1027
1000	3281	+0	32	191	627	233	764	322	1057	364	1194
1000	3281	+15	59	220	722	268	880	372	1219	420	1377
1000	3281	+30	86	252	826	307	1007	425	1394	480	1575
1500	4921	-15	5	193	634	236	773	326	1070	368	1209
1500	4921	+0	32	225	737	274	898	379	1243	428	1404
1500	4921	+15	59	259	849	315	1034	437	1432	493	1618
1500	4921	+30	86	296	970	360	1183	499	1638	564	1850
2000	6562	-15	5	228	747	277	910	384	1260	434	1424
2000	6562	+0	32	264	867	322	1057	446	1464	504	1653
2000	6562	+15	59	304	999	371	1217	514	1685	580	1904
2000	6562	+30	86	348	1141	424	1391	587	1926	663	2176
2500	8202	-15	5	269	881	327	1074	453	1487	512	1679
2500	8202	+0	32	312	1022	380	1246	526	1725	594	1949
2500	8202	+15	59	359	1177	437	1434	605	1986	684	2243
2500	8202	+30	86	410	1344	499	1638	691	2268	781	2562
3000	9843	-15	5	317	1040	387	1268	535	1756	605	1983
3000	9843	+0	32	368	1207	448	1471	621	2037	701	2301
3000	9843	+15	59	423	1388	516	1692	714	2343	807	2647
3000	9843	+30	86	483	1585	589	1932	815	2675	921	3022

5.2.4 Flight Performance with Engine Running

Climb Rate:
At msl and normal atmosphere the ASH 26 E climbs at a rate of 3.4 m/s (669.3 ft/min) at the best climb speed $\mathbf{V_y}$ = 95 km/h (51 kts) and at a maximum take off mass of 525 kg (1158 lb).

Cruise:
Cruise speed is $\mathbf{V_H}$ = 135 km/h (73 kts) at 6900 RPM.

Range:
With a full fuselage fuel tank the engine running time is about 1 hour when climbing three times in a saw tooth flight to approx. 3000 m (9843 ft). The climb is done each time for five minutes at 7000 RPM and then with throttle back to 6900 RPM. Climb speed is $\mathbf{V_y}$ = 95 km/h (51 kts). During this hour a distance of about 95 km will be flown and a theoretical flight height in saw tooth flight of 8600 m (28.215 ft) is gained.

If this height is glided at the best L/D, another 430 km (267 miles) adds to the 95 km (59 miles). The maximum range is then 525 Km (326 miles) under the following conditions:

Climb rate 3.2 m/s (629.93 ft/min) at 7500 RPM,
medium flight height 500 m (1.640 ft)

Climb rate 2.1 m/s (413.4 ft/min) at 6900 RPM,
medium flight height 1500 m (4.921 ft)

in each case with standard temperature, max. take-off mass and with a fuel usage of 16.0 l/h (4.23 US Gal/h); i.e. 15 minutes at 7500 RPM and 45 minutes at 6900 RPM.

The carburettor adjustment, the fuel type and the aerodynamic condition of the aircraft may have a considerable influence on these results. Therefore, these examples should serve as a guidance only.

If fuel tanks are fitted in the wings, the fuel capacity is increased by each 15 liters (3.96 US Gal) per tank.

In cruise flight at $\mathbf{V_H}$ = 135 km/h (73 kts) and at 6900 RPM with a resulting fuel usage of 9.7 liters/h a flight time of approx. 98 minutes is reached when using 16 liters out of a full fuselage tank. This gives a range of 220 km (137 miles). Fuel for engine warm-up and taxying is not taken into consideration here.
Then there is no height gain which can be used for glide.

5.3 Additional Information

5.3.1 Demonstrated Crosswind Components

Self Launch	20 km/h	= 10.8 kts
Winch Launch	20 km/h	= 10.8 kts
Aero tow	20 km/h	= 10.8 kts
Landing	25 km/h	= 13.5 kts.

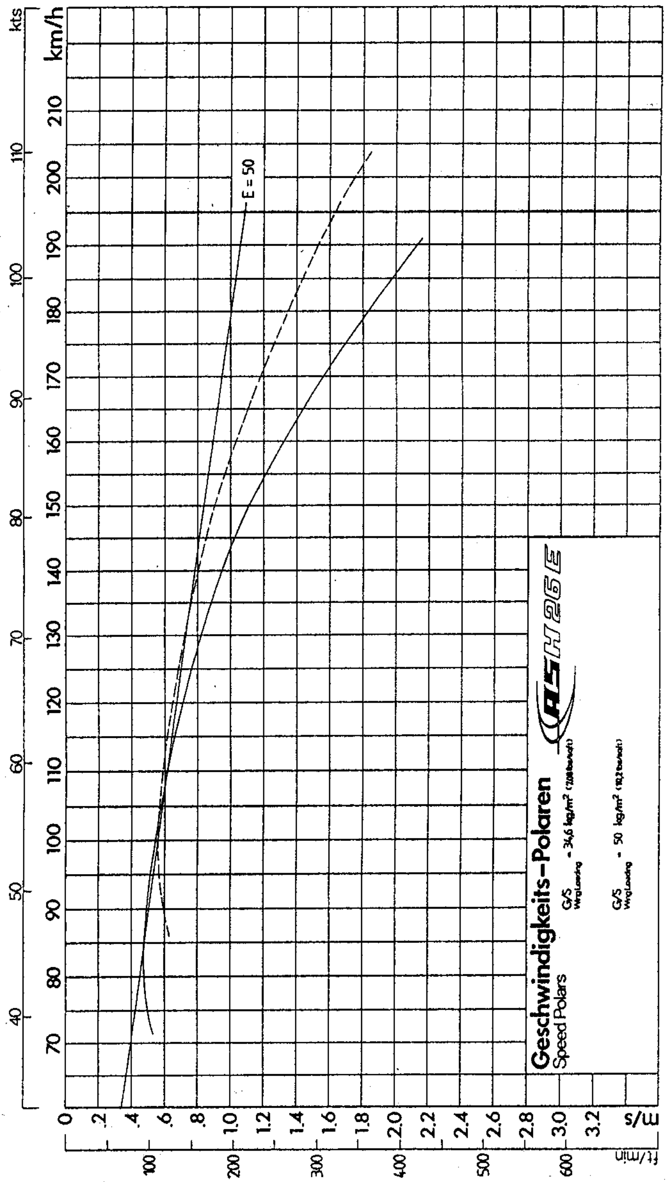
5.3.2 Noise Emission

The noise emission measurements were carried out in accordance with ICAO, Annex 16, Chapter 10, currently effective.

Measurement	Measured Value	Limit Value
Chapter 10	62.4 dB(A)	68.44 dB(A)

5.3.3 Flight Polars

Calculated Polar:



Fuselage

Length	7.05 m	(23.13 ft)
Height (Fin and Tail Wheel)	1.51 m	(4.95 ft)
Cockpit width	0.66 m	(2.17 ft)
Cockpit height	0.877 m	(2.88 ft)

Vertical Tail

Height above tail boom top edge	1.25 m	(4.10 ft)
Surface area	1.064 m^2	(11.45 ft^2)

Airfoil Section DU 86-131/30 with 13.1 % thickness.

Rudder

Chord ratio	30 %	
Surface area	0.319 m^2	(3.43 ft^2)

Horizontal Tail

Span	2.85 m	(9.35 ft)
Surface area	0.988 m^2	(10.63 ft^2)
Aspect ratio	7.644	

Airfoil Section DU 86-137/25 with 13.7 % thickness.
or: DU 92-131/25 with 13.1 % thickness.

Elevator

Chord ratio	30 %	
Surface area	0.209 m^2	(2.25 ft^2)
or:	0.232 m^2	(2.50 ft^2)

Airbrake Paddles

(Schempp-Hirth type - on top surface only)

Length	1.40 m	(4.59 ft)
Surface area (both together)	≈ 0,18 m^2	(1.94 ft^2)
Height	≈ 0.10 m	(0.33 ft)

Power-Plant

Engine Manufacturer:	Mid-West Engines Ltd.	
Engine Model:	AE50R	
Max. power,		
- take-off:	37 kW (5 minute limit)	7500 rpm
- continuous:	34.6 kW	6900 rpm

Max. take-off revs:	7500 rpm
Max. continuous revs:	6900 rpm
Max. overspeed revs (20 sec.)	7800 rpm

Max. coolant temperature:	107 °C	224 °F
Max. coolant temp., take-off	90 °C	194 °F
Min.~ ~, take-off:	60 °C	140 °F
Max. rotor cooling air temp.:	125 °C	257 °F

Lubricant: Total loss oil lubrication at ratio 1:60 approx.

Transmission: Toothed belt transmission with 1 : 2.78 reduction ratio.

The installation of the following propeller is type-approved:

Manufacturer:	Alexander Schleicher GmbH & Co.
Propeller:	AS 2 F1-1 /R 153 – 92 – N1

Safety harness

The safety harness has a maximum service life of 12 years as of the date of manufacture which is entered in the corresponding "JAA Form One" (airworthiness release tag). As a general rule, the makers' instructions should be complied with.

Oxygen System

Oxygen systems and oxygen supply must comply with JAR 22.1441 and 22.1449 !
For oxygen systems fitted, the relevant TBO is stated in the appertaining "airworthiness release tag" issued by the makers. Over and beyond this, the oxygen bottles must be re-inspected by a technical inspection institute every five years in accordance with pressure vessel regulations.

Water bags

"Smiley" water bags have a preliminary service life of 6 years. Prior to the expiry of this time limit the customer should contact Messrs. SCHLEICHER and check whether it is possible to increase this service life by means of a special inspection program.

Power-Plant

Service life limits and maintenance intervals for the Mid-West AE50R power-plant are specified in the engine manual "P 002", in its currently valid edition. Any inspection and maintenance work in view of the increase of service life must be performed and certified by the manufacturers, or by a licensed aircraft repair and maintenance establishment who has been authorized by the manufacturers and by the relevant civil aviation authority.

Propeller

According to the Technical Note no. 2 for AS-propellers the propeller type AS2F1 is subject to a service life limitation.

Fuel Lines

Fuel lines from Elastomers have a limited service life. According to German NOTAM (NFL II-39/76 and NFL II-96/78): "Permissible service limits are laid down generally in the Aviation Standard LN 9088 and in the respective U.S. publications." The fuel lines used as standard in the ASH 26 E have a maximum service life of five years.

Flexible Wing Fuel Tanks

The flexible fuel tanks are subject to a service life limitation. The service life is specified in the currently valid edition of the "Installation, Test & Inspection Instructions for flexible fuel tanks HFK T-LF.

CFRP Exhaust Fairing

Because of the extreme heat influence the CFRP exhaust fairing is subject to a service life limitation of 150 operating hours. Upon this time limit the fairing must be replaced by a fairing version with further improved heat resistance. This version is available from Schleicher as of November 1999.

5.3 Bolt Torque Settings Table

Table of maximum permissible torques for bolts in standard bolted connections.
These apply also to the bolted connections at the power plant unit but **NEITHER** to the engine AE50R itself, **NOR** to the groove nuts at the propeller shaft and engine drive shaft, **NOR** to the radial screws at the Centaflex-rubber coupling at the belt drive **NOR** to the six screws at the propeller!

Thread Size	daNm (mkp)
M4	0.18
M5	0.36
M6	0.64
M8	1.60
M10	3.20
M12	5.70
M14	9.20

Bolt Torque Settings for the groove nuts at the propeller shaft and at the engine drive shaft:

Groove Nuts	daNm (mkp)
M24*1,5 Propeller shaft	15,0
M38*1,0 Propeller shaft	12,0
M30*1,5 Engine drive shaft	12,0
M20*1,5 Engine crank shaft	12,0

Bolt Torque Settings for the radial screws at the Centaflex-rubber coupling at the belt drive:

Thread Size	daNm (mkp)
M10	5.00

Table of bolt torque settings of the engine AE50R:

see Engine Manual **Appendix 4** !

Table of bolt torque settings of the propeller:

see Propeller Manual **Section 7** !

NLP = non-lifting parts

For a 70 kg (154 lb) pilot incl. parachute

$m_{NLP\ max}$	344 kg	(758.5 lb)
$m_{NLP\ as\ weighed}$	- 224 kg	(494 lb)
$m_{PILOT+PARACHUTE}$	- 70 kg	(154 lb)
possible useful load =	50 kg* ??	(110.5 lb)

* As however the maximum mass in the baggage compartment is limited to 15 kg (33 lb), this value of 50 kg must not be entered into the Mass and Balance Form. However, the fuselage tank can be filled completely, i.e. 16 liters ≈ 11.2 kg (i.e. 4.23 US Gal. = 24.7 lb) and the maximum baggage load can be carried on board. Therefore, it may be entered in the Mass and Balance Form only a max. useful load of 15 kg of bagagge and 11.2 kg of fuel; i.e. together 26.2 kg.

For a 110 kg (242.5 lb) pilot incl. parachute

$m_{NLP\ max}$	344 kg	(758.5 lb)
$m_{NLP\ as\ weighed}$	- 224 kg	(494 lb)
$m_{PILOT+PARACHUTE}$	- 110 kg	(242.5 lb)
possible useful load =	10 kg	(22 lb)

(Fuel in fuselage tank, or baggage)

This value of 10 kg must be entered in the Mass and Balance Form as the maximum useful load. So if 14 liters fuel are loaded, no baggage at all must be loaded anymore (10 kg of fuel are ≈ 14 liters).

The examples (2a), (2b), and (2c) must be calculated in an equivalent manner!

(3) Power-plant and engine battery are disassembled and shall be considered by applying a compensating calculation instead of re-weighing the aircraft.

The currently valid inspection report gives the following results:

m_E = 368 kg (812 lb) from weighing all components
x_E = 625 mm (24.6 in)

See the following table for masses and arms of power-plant and engine battery. To be on the safe side, the masses of the disassembled parts can also be weighed in addition:

Exemplary table values for power-plant:

m_{PP} = 65.1 kg; and x_{PPre} = 1026 mm

Engine battery (installed in most forward location):

m_{PB} =6.23 kg and x_{PB} =1150 mm

$$x_{Enew} = \frac{(m_E \cdot x_E)_{old} - m_{PP} \cdot x_{PPre} - m_{PB} \cdot x_{PB}}{m_{Eold} - m_{PP} - m_{PB}}$$

$$x_{Enew} = \frac{368 \cdot 625 - 65.1 \cdot 1026 - 6.23 \cdot -1150}{368 - 65.1 - 6.23}$$

$$x_{Enew} = \frac{170371.9}{296.67}$$

m_{Enew} = 296.67 kg
x_{Enew} = 574.3 mm ≈ 574 mm

Taking into account these values, please refer to the "Empty Mass C.G. Diagram of the Powered Sailplane, but with Power-Plant disassembled Fig.6.4-2" and check which minimum and maximum useful load in the cockpit is possible.
These new values shall be entered, as illustrated in the following ...

Table of established Arms and Masses

Designation	Unit of Measmt.	Amount	Remarks
x_W	Meter	+0.201	waterballast distance from Datum
x_{O2}	Meter	+0.28	in factory-standard fitting location
m_{O2}	kg	4.4	oxygen bottle, 3 l
x_B	Meter	+4.581	arm of battery in fin
m_B	kg	≈1.8*	optional battery in fin
x_{BG}	Meter	+0.16	baggage in baggage compartment top, front of spar
x_{Fu}	Meter	+0.304	mean mass arm of fuel in the fuselage tank
x_H	Meter	+1.938	Distance of barograph in engine compartment, from datum point
m_H	kg	1.5	Mass of this barograph (engine vibration recording barograph made by WINTER)
x_I	Meter	-1.12	instrument mass arm in instrument panel
x_T	Meter	-1.80	trim weights mass arm in front of pedals

Designation	Unit of Measmt	Value	Remarks
x_{PPex}	Meter	+0.919	propeller extended
x_{PPre}	Meter	+1.026	propeller retracted
m_{PP}	kg	66.00*	power-plant with propeller
x_{PB}	Meter	-1.15	engine battery arm fitted in front end of box
		-0.99	engine battery arm fitted in rear end of box
m_{PB}	Kg	6.23	engine battery in front of control stick

* The exact mass of the battery (see Section 2.8), the trim ballast, or the power-plant must be determined by weighing !

The max. permissible mass of 6 kg (13.23 lb.) for trim ballast in the fin must not be exceeded !

12.2 Special Tools

a) Socket wrench for hexagon socket head screws, 6 DIN 911-12.9 (Allen Key), and

b) Rigging plate AS P/N 99.000.4657 (both for rigging the tailplane).

c) Filling nozzle AS P/N 99.336.0022, and

d) Stopper plug AS P/N 99.000.8861 (both for filling the water bags)

e) Unlocking tool for winglet and detachable short wing tip.

Special tool not supplied:

f) Caliper Face Spanner - e.g: Gedore No.44/7" (for water ballast valve assembly).

12.3 Supply Sources for Special Tools

The special tools b) thru d) can only be obtained through Messrs. Alexander Schleicher.

The Allen key a) and the caliper face spanner f) are available from all good tool shops, but can also be obtained through Messrs. Alexander Schleicher.

The unlocking tool e) for example may also be made from a screwdriver which is cut obtuse.

12.4 List of Maintenance Documents for Fitted Equipment

- Currently valid edition of the Engine Manual AE50R Report No. (P)002.

- Currently valid edition of the Operating and Maintenance Manual for the propeller AS2F1, made by Messrs.SCHLEICHER,

- Operating Manual for Tow Release Coupling Series "Europa G 88" Safety Tow Release, issue February 1989, LBA approved.
  or:
- Operating Manual for the Tow Release Coupling,
  Series: Safety Tow Release "Europa G 72" and
  Safety Tow Release "Europa G 73", issue January 1989, LBA approved.

- Operating Manual for Tow Release Coupling Series Nose Tow Release Hook "E 85", issue March 1989, LBA approved.
  or:
- Operating Manual for Tow Release Coupling Series Nose Tow Release Hook "E 72" and "E 75", issue March 1989, LBA approved.

- WHEEL and BRAKE ASSEMBLIES CATALOGUE, Component Maintenance Manual, Appendix A, Fits and Clearances -
  A-1. Brake Lining Wear Limits
  A-2. Brake Disc Minimum Thickness,
  by Parker Hannifin Corporation, Avon, OH, USA.

- Installation, Test & Inspection Instructions for flexible fuel tanks Drawing No.12/89, by Messrs. HEIMANN, in the currently valid edition.