Alexander Schleicher GmbH & Co. Segelflugzeugbau
D-36163 Poppenhausen/Wasserkuppe

Flight Manual

for the powered sailplane

ASG 32 Mi

Model:	ASG 32 Mi
Serial Number:	
Registration:	
Data Sheet No.:	EASA.A.599
Issue:	01.12.2015

Pages identified by “Appr.” are approved by EASA within the scope of type certification.

This powered sailplane is to operate only in compliance with the operating instructions and limitations contained herein.

The translation has been done by best knowledge and judgment. In any case the original text in German is authoritative.

Section 0

IMPORTANT NOTE:

The text given in this Manual (including figures, descriptions and operational or handling information) was produced by the authors with great care. However mistakes or misprint as well as misunderstanding can never be excluded. Therefore the authors must state, that juristic responsibility or guaranty or any other warranty which results from mistakes, misprints or misunderstanding cannot be given. The authors however are very grateful to accept advice for corrections.

0.1 Record of Revisions

Any revision of the present manual, except actual weighing data, must be recorded in the following table and, in case of approved sections, must be endorsed by the responsible airworthiness authority. The new or amended text in the revised page will be indicated by a black vertical line in the left hand margin, and the Revision No. and the date will be shown on the bottom of the page.

Record of Revisions

Rev No.	Section & Pages Affected	Date of Issue	Approval	Date of Approval	Date of Insertion	Ref. / Signature

Record of Revisions

Rev No.	Section & Pages Affected	Date of Issue	Approval	Date of Approval	Date of Insertion	Ref. / Signature

0.2 List of Effective Pages

Section		Page	Date	Section		Page	Date
Title Page		---	01.12.2015		approved	3.2	01.12.2015
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0.3 Table of Contents

Section

Section 1

1.1 Introduction

This Flight Manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of the ASG 32 Mi sailplane.

This Manual includes the material required to be furnished to the pilot by CS-22. It also contains supplemental data supplied by the sailplane manufacturer.

1.2 Type Certification Basis

This type of self-launching powered sailplane has been approved by the European Aviation Safety Agency (EASA) in accordance with CS-22 Amendment 2 issued 5 March 2009.

Additionally the following requirement had to be complied with:
"Guidelines for the substantiation of the stress analysis for sailplanes and powered sailplanes made from glass and carbon fiber reinforced plastics", issued 1991.

The Type Certificate has the number EASA.A.599
Category of Airworthiness: Utility.
“Utility” refers to sailplanes and powered sailplanes used in normal gliding operation.

Information about the approved noise emission measurements are given in section 5.3.8.

1.3 Warnings, Cautions and Notes

The following definitions apply to warnings, cautions and notes used in the Flight Manual:

"WARNING" *means that non-compliance with the corresponding procedure leads to an immediate or important degradation of the flight safety.*

"CAUTION" *means that non-compliance with the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety.*

"NOTE" *draws attention to any special item not directly related to safety, but which is important or unusual.*

1.4 Description and Technical Data

The ASG 32 Mi is a high performance, double-seat, self-launching sailplane with flaps and 20m span. It falls into the 20m two-seater class specification of the FAI.

The ASG 32 Mi is suitable for record breaking and competition flying. It can be used to familiarize pilots with flaps, cross-country flying or self-launching. Not least, its pleasant flying characteristics make it suitable for versatile club flying use.

The ASG 32 Mi is a mid-wing glider, built mainly from carbon fibre reinforced epoxy resin. Aramid-, glass- and Dyneema-fibres are used when appropriate. Along most of the trailing edge, the four-part wing provides two flaps, which also serve as ailerons (so called flaperons). In their role as ailerons, the inner and outer flaperons deflect in different degrees, to allow for the necessities of thermalling. In landing flap setting, the inner flaperon deflects downwards strongly, for steep approaches while retaining good maneuverability. The wing comprises two-part Schempp-Hirth-airbrakes on the upper surface. The wing tips end in 0,6m high winglets.

The tail is a damped T-tail. In the vertical tail there are probes for total pressure, static pressure, and total energy compensation. The pressures for the airspeed indicator and for the altimeter are taken from orifices in the tail boom (static pressure) and in the fuselage nose (total pressure).

The sprung, retractable landing gear has a 6” wheel and a hydraulic disc brake, which is operated when the airbrakes are fully extended.

The gaps at all control surfaces are covered with Mylar-tape. All control surfaces except the rudder are sealed with Teflon-tape.

A single rotor engine, type IAE50R-AA, serves as a compact power-plant. Engine and exhaust silencer are fitted stationary in the fuselage. Only the fixed twin-bladed propeller of this self-launching sailplane is extended electrically. The power-plant has a very low noise and vibration level and is fitted behind the wing in the fuselage. The 41 kW engine provides excellent rates of climb even at maximum all-up weight.

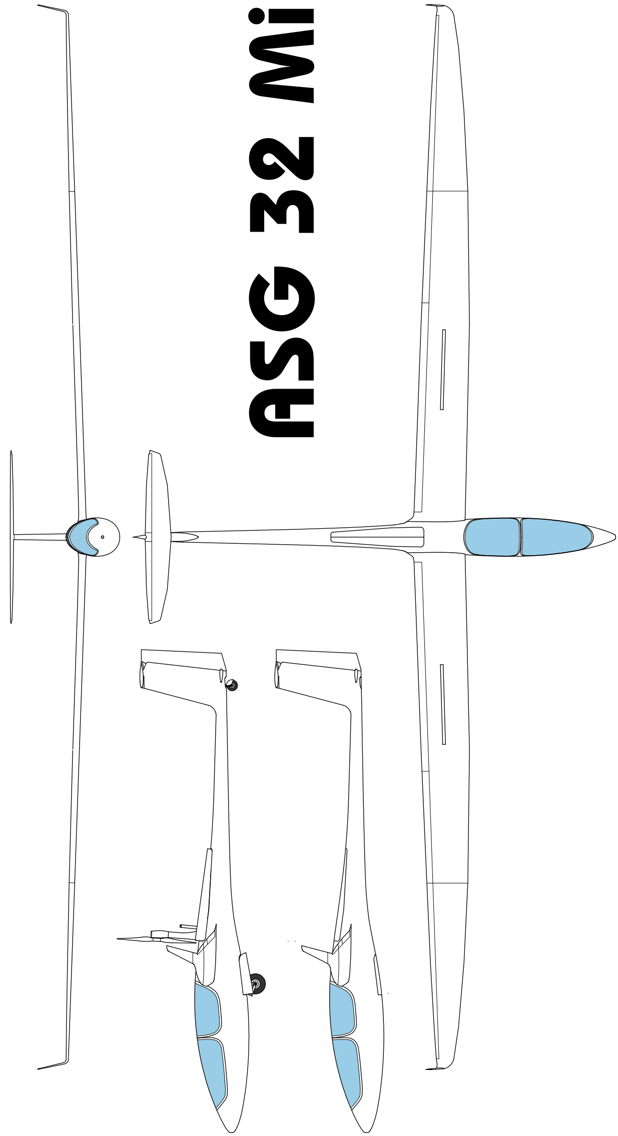
Technical Data:

Span incl. Winglets	20 m	65.6 ft
Fuselage length	9,07 m	29.8 ft
Height (Fin and Tail Wheel)	1,84 m	6.0 ft
Max.Take-Off Mass	850 kg	1874 lbs
Wing chord (mean aerodynamic)	0,829 m	2.72 ft
Wing area	15,7 m^2	169 ft^2
Wing loadings:		
• minimal	~ 42 kg/m^2	~ 8.6 lbs/ft^2
• maximal	54 kg/m^2	11.0 lbs/ft^2

General View:

Photo: Manfred Münch

1.5 Three View Drawing



Section 2

2.1 Introduction

Section 2 includes operating limitations, instrument markings and basic placards necessary for the safe operation of the ASG 32 Mi, its engine, standard systems and standard equipment as provided by the manufacturer.

2.2 Airspeed

Airspeed limitations (indicated airspeed IAS) and their operational significance are shown below:

	Speed	IAS	Remarks
V_{NE}	Never exceed speed for **calm air**	270 km/h 146 kts 168 mph	Do not exceed this speed in any operation and do not use more than 1/3 of control deflection.
V_{RA}	**Rough air speed**	180 km/h 97 kts 111 mph	Do not exceed this speed except in smooth air, and then only with caution. Examples of rough air are lee-wave rotors, thunderclouds, visible whirlwinds, or over mountain crests.
V_A	**Manoeuvring speed**	180 km/h 97 kts 111 mph	Do not make full or abrupt control movement above this speed, because under certain conditions the sailplane structure may be overstressed by full control movement.

	Speed	IAS	Remarks
V_{FE}	Maximum **Flap Extended speeds**	1 – 2 – 3 – 4 270 km/h 146 kts 168 mph 5 – 6 180 km/h 97 kts 111 mph L 150km/h 81 kts 93 mph	Do not exceed these speeds with the flap in position of the given numbers
V_W	Maximum **Winch-launching speed**	140 km/h, 75 kts 87 mph	Do not exceed this speed during winch- or autotow launching
V_T	Maximum **Aero-towing speed**	180 km/h 97 kts 111 mph	Do not exceed this speed during aerotowing.
V_{LO}	Maximum **Landing Gear Operating speed**	180 km/h 97 kts 111 mph	Do not extend or retract the landing gear above this speed.
V_{PE}	Maximum **speed with propeller extended**	180 km/h 97 kts 111 mph	Do not exceed this speed with the engine extended
V_{PO} max	Maximum speed **for extending and retracting the propeller**	120 km/h 64 kts 74 mph	Do not extend or retract the retractable powerplant outside of this speed range
V_{PO} min	Minimum speed **for extending and retracting the propeller**	95 km/h, 51 kts, 59 mph	

2.3 Airspeed Indicator Markings

Airspeed indicator markings and their colour-code significance are shown below:

Marking	(IAS) value or range	Meaning
White Arc	80 - 180 km/h 43 -97 kts 49 – 111 mph	Positive Flap Operating Range
WK 5/6	180 km/h 97 kts 111 mph	Maximum Speed in Flap Settings 5, 6
WK L	150km/h 81 kts 93 mph	Maximum Speed in Landing Flap Setting
Green arc	88 - 180 km/h 47 - 97 kts 54 – 111 mph	Normal Operating Range
Yellow arc	180 - 270 km/h 97 - 146 kts 111 – 168 mph	Manoeuvres must be conducted with caution and only in smooth air.
Red line	270 km/h 146 kts 168 mph	Maximum speed for all operations.
Yellow triangle	100 km/h 54 kts 62 mph	Approach speed at maximum weight **without** water ballast.
Blue line	90 km/h 49 kts 56 mph	Best rate-of-climb speed V_y.

2.4 Power-plant, fuel and oil

Power-plant:

Engine manufacturer:	Austro Engine GmbH	
Engine:	IAE50R-AA	
Maximum power, take-off:	37.3 kW (for 3 Minutes)	
Maximum take-off revs:	7750 rpm	
Maximum power, continuous:	35.8 kW	
Maximum continuous revs:	7100 rpm	
Maximum overspeed revs:	8000 rpm (for 20 Sec)	
Minimum idle revs:	2800 rpm	
Maximum coolant temperature:	100°C	212°F
Maximum coolant temperature, take-off:	90°C	194°F
Minimum coolant temperature, take-off:	40°C	104°F
Maximum rotor cooling air temperature:	130°C	266 °F

NOTE: *The above stated take-off performance refers to the minimum value as given in the engine data sheet. A nominal performance of 41 kW is typical on the other hand.*

Gearing and Propeller:

Gearing:	Toothed belt transmission with 1:2.68 reduction ratio
Propeller Manufacturer:	Alexander Schleicher GmbH & Co.
Propeller:	AS 2 F1-1 / R153 – 92 – N1

Fuel and Oil:

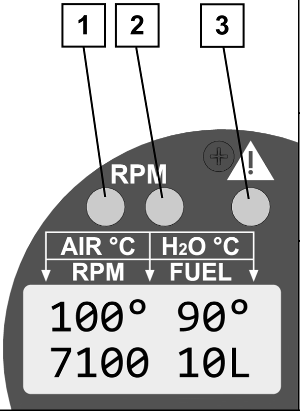
Approved fuel grade:	AVGAS 100LL (preferably) Fuel grades like Car Super, Euro-Super ROZ 95 according to EN 228, and Super-plus are also permissible, but only with an Ethanol content of not more than 5%. Only fuel **WITHOUT** two-stroke oil must be used. The Maintenance Instruction „Fuels“ in appendix of the Maintenance Manual is to be followed as well. For further data, refer to the Engine Manual IAE50R-AA.
Appr. Octane Rating:	not less than 94 RON/ROZ (research o.n.)
Lubrication:	Total loss oil lubrication, at ratio 1:60 approximately
Engine Oil:	Castrol Power 1 Racing 2T (API TC+, JASO FD, ISO EGD) Castrol XR77 (EMPA specification 417478/01) Silkolene Comp 2 Pre-Mix (nicht comp 2 Injector) AeroShell Oil Sport PLUS 2 (API TC) For additionally approved oils refer to the latest issue of the IAE50R-AA engine manual.

Capacity of the fuel tanks:

Usable fuel in the fuselage tank::	14 Litrs.	3.7 US Gal.
each wing tank (if fitted):	15 Litrs.	3.9 US Gal.
Maximum fuel capacity fuselage tank and 1 wing tanks	29 Litrs.	7.6 US Gal.
Maximum fuel capacity fuselage tank and 2 wing tanks	44 Litrs.	11.5 US Gal.
Non-usable fuel :	0.4 Litrs.	0.1 US Gal.

2.5 Power-plant instrument markings

The following table describes the main display of the digital ILEC engine control unit and explains the colour scheme of the different rpm ranges



1	**Green LED** Normal Operating Range	**2700 to 7100 rpm**
2	**Yellow LED** Caution Range, LED blinks after 3 minutes	**7100 to 7750 rpm**
3	**Red ⚠LED** Warning Range, LCD-blinks	**7750 rpm** and more
LCD-Display	Internal Cooling Air Temperature **[°C]**	Liquid Coolant Temperature **[°C]**
	RPM Indication **[rpm]**	Fuel Quantity **[Litrs]**

For further Displays, see section 7.9 Power-Plant, “Description of ILEC Engine Control Unit”

2.6 Weight (Mass)

Maximum Take-Off Mass	850 kg	1874 lbs
Maximum Landing Mass	850 kg	1874 lbs
Maximum Mass non-lifting parts	550 kg	1212 lbs
Max. Mass in Baggage Compartment	9 kg	20 lbs
Max. Mass in Stowage in the engine bay	1,8 kg	4 lbs
Max. Mass in Tail Battery Compartment	10 kg	22 lbs

2.7 Centre of Gravity

Centre of gravity range (for flight):

foremost limit	156 mm	6.14 inch	aft of RP
rearmost limit	385 mm	15.15 inch	aft of RP

"RP" stands for "Reference Point"(Datum), which is located at the leading edge of the wing at the wing root rib. An example of a C.G. position calculation as well as a table of c.g. ranges at different empty weight is shown in Section 6.

2.8 Approved manoeuvres

This sailplane is certified for use in normal gliding operation according to Airworthiness Category U, "Utility".

Aerobatic manoeuvres are not approved.
Intentional spinning is approved in the configuration as described in section 4.5.4 subsection “Intentional Spinning”.

2.9 Manoeuvring Load Factors

The airworthiness requirements result in the following limits:

Maximum permissible manoeuvring load factors,
at an air speed of 180 km/h (97 kts, 111 mph):

maximum positive load factor:	+ 5.3
maximum negative load factor:	- 2.65

With increasing air speeds, these values will reduce
At an air speed of 270 km/h (146 kts, 168 mph):

Airbrakes:	closed	open
maximum positive load factor:	+ 4.0	+ 3.5
maximum negative load factor:	- 1.5	- 1.5

With flaps in landing setting,
at an air speed of 150 km/h (81 kts, 93 mph)

maximum positive load factor:	+ 4.0

With aileron deflections, the permissible load factors reduce by $^{1}/_{3}$.

2.10 Flight crew

Solo flights have to be conducted only from the front seat.

Pilots (incl. parachute) weighing less than the minimum cockpit load, must use additional trim ballast plates. Please refer to the "Weight (mass) and balance form" in Section 6 and the description of trim ballast plates in Section 7. In addition the minimum cockpit load is shown in the Operating Limitations Placard in the cockpit (DATA and LOADING PLACARD).

With a crew of two, the pilot in command sits in the front seat – unless the occupants agree prior to the flight that the pilot in command sits in the rear seat. For the latter it is necessary that all controls and instruments are available in the rear seat and that the pilot is familiar with the operation of the aircraft from this position.

2.11 Kinds of operation

Flights may be carried out in accordance with day VFR.

2.12 Minimum Equipment

Minimum Equipment consists of:

1 ASI in both instrument panels, indicating up to at least 300 km/h (162 kts, 187mph)
1 Altimeter in both instrument panels
1 Magnetic Compass in the front instrument panel
1 Power-plant instrument in the front instrument panel
1 Rear view mirror
1 Outside air temperature gauge in the front instrument panel (if water ballast tanks are installed)
2 4-part safety harness (symmetrical)
A parachute or cushion for the back rest (~ 8 cm thickness) for each occupant

NOTE: *The temperature indication can be provided by an on-board computer.*

CAUTION: *It's strongly recommended to use adequate ear protection during engine operation!*

The list of equipment that must be operative for all flights consists of this listed minimum equipment as well as of equipment required for the flight by the associated operational rules. Such implemented rules can cover operational requirements, airspace requirements and any other applicable requirements to the intended operation.

Approved equipment is listed in the Maintenance Manual in Section 12.1. The manufacturer recommends installing a yaw string on top of the canopy.

2.13 Aerotow, Winch and Autotow Launching

Launching by Aerotow is approved using the towing release in the fuselage nose. Winch and Autotow launches are approved using the tow-release below the rear seat

Launches have to be performed with the engine retracted.

The flap settings 1 -3 are not permitted for Aerotow, Winch and Autotow launches.

The maximum permissible launch speeds are:

aerotowing	180 km/h (97 kts, 111 mph)
winch launch	140 km/h (75.5 kts, 86 mph)

For winch launch, a weak link of 1000 daN ±10% (2248 lbs, black) must be used with the launch cable or tow rope.

For Aero Tow, a weak link according to the tow plane must be used, not stronger than 1000 daN ±10% (2248 lbs, black). Besides other regulations which may exist, the tow rope must be a textile rope not less than 40 m = 130 ft or more than 60 m = 200 ft in length.

Weak link colours are not binding; this information refers to the colour scheme of the Tost company.

2.14 Other limitations

Water Ballast

Section 6 describes what amount of water may be used, to stay within the limitations of mass and c.g.
After water ballast has been loaded, it has to be checked that the ballast is distributed symmetrically. This is the case only if the wings can be held level with ease.

The time required to jettison the water ballast:

Wing tanks:	about 6 min
Tail tank (optional):	about 2 min

Only pure water may be used, without any additives.

WARNING: *Flying with water ballast in air mass temperatures of less than 3°C is not permitted. At outside temperatures of less than 3°C the water ballast has to be jettisoned.*

WARNING: *Due to reasons of flutter safety, with water ballast in the wings Flight Level FL160 (5000m pressure altitude above 1013 hPa) may not be exceeded.*

WARNING: *Spinning with water ballast is not permitted.*

See section 4.5 for more information about water ballast.

2.15 Limitations Placards

This placard is fixed to the right-hand cockpit sidewall and contains the most important mass (weight) and speed limitations. (The original placard is to be enlarged by 130%)

Segelflugzeugbau Alexander Schleicher GmbH & Co. Poppenhausen

Model: **ASG 32 Mi** Serial-No.: 32

DATA and LOADING PLACARD

Empty Mass (Weight):		lbs	kg
Max. Mass (Weight):		1874 lbs	850 kg

Seat Load	Front	Rear
Min. Seat Load	lbs kg	--
Max. Seat Load 242 lbs 110 kg *)		lbs kg
Max. Total Load in Fuselage		lbs kg

*) For higher Seat Loads refer to Flight Manual Ch. 6

Max. Permissible Speeds:

Calm Air	146 kts	270 km/h
Winch Launch W/L	75 kts	140 km/h
Aerotow A/T	97 kts	180 km/h
Extending Landing Gear	97 kts	180 km/h
Maneuvering Speed	97 kts	180 km/h
to extend / retract propeller	51 - 64 kts	95 - 120 km/h
with propeller extended	97 kts	180 km/h

Weak Link		
	Winch	900 to 1100 daN
	Aerotow	max. 1100 daN

Tire pressure		
Main Wheel	68 - 72 psi	4.7 - 5.0 bar
Tail Wheel (fixed)	49 - 52 psi	3.4 - 3.6 bar
Tail Wheel (retractable)	78 - 81 psi	5.4 - 5.6 bar

This placard is to be glued near the data placard:

Reduced minimum Cockpit Load
without Trim Ballast in the Fin:
see Flight Manual Page 6.5

This placard is to be glued near the data placard:

Reduced minimum Cockpit Load
with Power-Plant removed
see Flight Manual Page 6.5

This placard is to be glued near the data placard:

Reduced minimum Cockpit Load
with Batteries installed under Seat
see Flight Manual Page 6.5

This placard is to be glued near the data placard.

Cloud flying and Aerobatics
are not permitted!

This placard is to be glued near the data placard.

Water ballast jettison time
Wingtanks: approx. 6 min
Tailtanks: approx. 2 min

This placard is to be glued near the data placard.

Load (max. 1.8 kg / 4 lbs) in the stowage in the engine bay **increases** the **Minimum Cockpit Load by 2 kg (4.4 lbs)!**

If an attachment for trim weights in front of the front pedals is installed, then this placard is affixed at the right side of the front seat.

Prior to take-off, check weight of the trim plates and their secure fixing

1 Plate (1 kg; 2.2 lbs) **in front of the pedals** equals a front pilot mass of 1.6 kg (3.5 lbs)

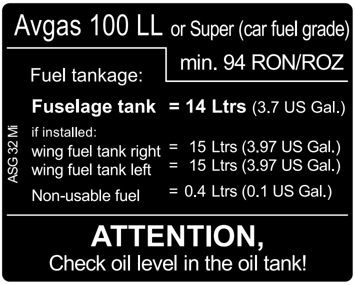
This placard is attached on the tube between the front lift pins.

Baggage compartment load **max. 9 kg (20 lbs)**

This placard is attached at the rear end of the engine bay, next to the stowage.

Maximum loading of
1.8 kg (4 lbs)
must not be exceeded!

This placard is affixed beside the refuelling coupling



This placard is affixed on the right wall of the engine compartment near the oil tank.

NOTE: *For further placards refer to Maintenance Manual Section 9.*

Section 3

3.1 Introduction

This section provides checklists, which describe briefly the recommended procedures to follow in emergencies. Afterwards a more detailed description follows.

EMERGENCY PROCEDURES

(1) **Canopy Jettison**

- Ignition: OFF!
- Engage the propeller stop

front seat	**rear seat**
• Fully pull back both red canopy jettison handles • Push canopy upwards by the handles	• Fully pull back both red canopy jettison handles • Push canopy upwards by the handles

(2) **Bailing Out**

front seat	**rear seat**
• Push instrument panel upwards • Open safety harness • Roll over cockpit side • Push off strongly • Caution: Watch wing & tailplane • Pull parachute	• Open safety harness • Get up • Climb over cockpit side • Push off strongly • Caution: Watch wing & tailplane • Pull parachute

(3) **Spin Recovery**

- (If power plant running: set throttle to IDLE)
- Apply rudder opposite to the direction of the spin
- Ease the control column forward until rotation ceases
- Centralise rudder and ease out of the ensuing dive

NOTE: *Aileron neutral supports recovery*

CAUTION: *If flaps are set to positions 5, 6, L, set the flaps to position 4 for recovery.*

(4) **Fire**

- Fuel valve: SHUT! (rear position)
- Full throttle until engine stops
- Ignition: OFF!
- Retract the propeller if possible
- Engine master switch: OFF!
- Land as quickly as possible
- Extinguish fire

3.2 Jettisoning of Canopy

If - while the propeller is running - jettisoning of the canopy is unavoidable, then the propeller must first be moved into a position which is less dangerous for the pilot. To do this, switch off the ignition and engage the propeller stop. Do not wait until the propeller stops rotating but retract the propeller immediately. Any position from half-retracted onward seems sufficient. This position should prevent the propeller from destroying the canopy and thereby hurting the pilot with pieces of the shattered canopy.

After this procedure - or in soaring configuration:

Front canopy: Pull back both red canopy jettison handles and use them to push open the canopy.

Rear canopy: Pull back both red canopy jettison handles and use them to push open the canopy. The air stream will break off the canopy rearwards.

CAUTION*:* *Push the front canopy open with the canopy jettison handles. Do not push up the canopy above the head directly with the hands. The rear pins of the locking mechanism will hold the rear end of the canopy down, to make it swivel around its trailing edge.*

In a vertical dive, the air loads on the front canopy may be high. With some yaw, however, low pressure builds up over the canopy. Therefore, apply some rudder in this case!

3.3 Bailing Out

If bailing out becomes inevitable, first the canopy is jettisoned, and only then should the seat harness be released.

Front Pilot: Push instrument panel upwards (if this was not yet already done in the course of jettisoning the canopy). Get up or simply roll over cockpit side.

Rear Pilot: Get up - the supporting structure at either side of the instrument panel and the canopy arch serve as handholds - and climb out.

When jumping, push yourself away from the aircraft as strongly as possible.

CAUTION: *Watch out for wing leading edge and tailplane!*

3.4 Stall Recovery

In straight or circling flight, relaxing the back pressure on the stick will always lead to recovery. Due to its aerodynamic qualities the ASG 32 Mi will immediately regain airspeed.

When the glider drops a wing, do not try to counteract rolling motion with the aileron. Relax back pressure on the stick and use the rudder.

3.5 Spin Recovery

The ASG 32 Mi is not in all configurations approved for spins. This section describes the recovery procedure from unintended spins.

① Check ailerons neutral.
② Apply rudder opposite to the direction of the spin.
③ Ease the control column forward until rotation ceases.
④ Centralise rudder and ease out of the ensuing dive.

CAUTION: *With the propeller extended the throttle must only be in 'Idle Position'! This ensures that the engine will not over-rev when pulling out of the spin.*

CAUTION: *When spinning in flap settings 5, 6, or L, reduce the flap to neutral (position 4), so that the flap maximum speed is not exceeded during the recovery.*

Spinning is not noticeably affected by extending the air brakes, but this increases the height loss and reduces the permissible load factor during recovery. It is therefore advisable to keep the airbrakes retracted.

WARNING: *Spinning in the landing-flap setting is prohibited. If a spin should inadvertently develop while in this flap setting, the flaps should immediately be set to neutral (flap setting 4) before the airspeed limits of flap setting L are reached (maximum speed of 150km/h (81kts, 93mph) and maximum load factor of 4g)*

NOTE: *Waterballast has no noticeable influence on spinning qualities except that recovery speeds are higher and as a consequence greater losses in altitude are experienced.*

3.6 Spiral Dive Recovery

Depending on the aileron position in a spin, with forward C.G. positions (i.e. the C.G.-range in which the ASG 32 Mi cannot sustain a steady spin) it will immediately or after a few turns develop a spiral dive or a slipping turn similar to a spiral dive.

In contrast to a spin, a spiral dive is characterized by high g-loads. Therefore, do not pull the stick further back, but

① release stick
② reduce bank angle with rudder and aileron against direction of turn
③ gently pull out of the dive

3.7 Engine Failure

Failure at safe Altitude

- Fuel valve: OPEN? (forward position?)
- Ignition: ON? (upward position ?)
- Engine master switch: ON? (ILEC responding?)
- Fuel pump 2: ON?
- Fuel: ??? (Fuselage tank content?)
- ILEC Change Over Switch: Turned towards the pilot?

If the above points check out correctly, the fault cannot be rectified in flight, the propeller should be retracted and the ASG 32 Mi should from then on be operated as a pure sailplane.

Retract propeller in the normal manner in accordance with the check list. If necessary, carry out a normal sailplane outlanding.

If the failure is caused by lack of fuel in the fuselage tank, open the valve serving the wing fuel tank(s), if these are fitted (see Section 7). After about 2 minutes enough fuel will have flown into the fuselage tank to allow the engine to be re-started in accordance with the checklist.

Failure at Low Altitude

First check the points on the above check list. Fuel from the wing tanks cannot be transferred fast enough into the fuselage tank, therefore there is no sense in opening the valve any more.

- Fuel valve: SHUT! (rear position)
- Ignition: OFF!
- Engine master switch: OFF!
- Propeller Stop: ENGAGED! (lower position.)
- Leave the propeller extended
- Initiate outlanding

If the situation becomes so critical that a crash landing seems probable, because no landable terrain can be reached, the propeller stop should be engaged at a speed of about 90 km/h (49 kts) - even with the propeller still turning. This will help to stop the propeller more quickly. Then retract the propeller at least to a "halfway in" position. This action not only improves the gliding performance (perhaps now a more suitable field can be reached), but also reduces the risks in case of a crash landing. In this case the engine master switch must not be turned off until the propeller has reached at least its partially retracted position.

Strong Buffeting of the Power-plant

Proceed as per check list. If no fault can be found, shut off the power-plant in the normal manner and retract the propeller. The pilot must assume that the propeller is damaged and hence may be out of balance. Do not start the engine any more.

Failure of the Propeller Drive

If the engine revs up unexpectedly strong, the power transmission to the propeller might be interrupted. Immediately reduce the throttle to IDLE and turn off the ignition. If the propeller keeps windmilling, reduce the airspeed as far as safely possible and carefully brake the propeller with the propeller stop.

Despite the risk of damaging the propeller stop, it is better to bring the propeller into a position, which allows at least a partial retraction of the propeller. Continue the flight in gliding configuration until a suitable landing option becomes available.

3.8 Fire

Fire with propeller extended

A fire in the engine compartment is indicated by a red blinking diode in the instrument panel. Further details are given in Section 7.9.

Proceed as per Check List in Section 3.1 and land as quickly as possible. If possible, retract the propeller, as closing the engine doors will reduce the oxygen feed!

Fight fire with extinguisher or fire blanket (clothing).

Fire with propeller retracted

The propeller remains retracted because of the reduction of oxygen supply.

- Fuel valve: SHUT! (rear position)
- Engine master switch: OFF!
- Land as quickly as possible
- Extinguish fire

3.9 Other Emergencies

Jammed Elevator Control System

In the emergency case it does not always occur to the pilot that, with the elevator control system jammed, the flaps still afford some measure of pitch control for improving the situation for bailing out or even perhaps eliminating the need to do so. Setting the flaps to a more negative position causes an increase in pitch and speed. A more positive flap setting decreases pitch and speed. It is recommended to test this behaviour of the flaps during familiarization with the glider.

If the flap control system is jammed, the ASG 32 Mi is converted into an aircraft with a fixed wing airfoil.

Emergency Landing with retracted Landing Gear

Emergency landings with retracted landing gear are not advised in principle, as the capacity for energy absorption of the fuselage is many times less than that of the sprung landing gear. If the wheel cannot be lowered, the ASG 32 Mi should be touched down with flaps in position 6 and the airbrakes closed as far as possible, at a shallow angle and without stalling onto the ground.

Groundloops

If the aircraft threatens to roll out beyond the intended landing area, the decision should be made not less than 40 m (130 ft) before reaching the end of the landing area to initiate a controlled ground loop.

- If possible, turn into wind!
- When putting down a wing, at the same time push the stick forward and apply opposite rudder!

Emergency Landing on Water

A landing on water with a composite glider with wheel retracted has been experimentally tried out. The experience gained on that occasion suggests that the aircraft will not skim on the water surface, but that the whole cockpit area will be forced under the surface. If the depth of the water is less than 2m (6,5ft), the pilot is in the greatest danger. Touching down on water is, therefore, recommended **only with extended landing gear,** and **only** as the very last resort.

Flying with Defective Water Ballast Drainage

The water ballast dump valve operation ensures that the tanks in both wings are drained at the same time, when water ballast is jettisoned. If the optional ballast tank in the tail fin is installed, this tank is opened simultaneously. This is necessary for reasons of flight characteristics.

When jettisoning water ballast in flight, it should be positively observed that the water is draining from both wings.

If a failure of the valves should cause asymmetric loads, the flight should be terminated with extreme care, maintaining an adequate margin above stalling speed as incipient or full spins with asymmetric ballast load are not permissible. Special care should be taken to avoid turning and slipping in the direction of the heavier wing.

If a wing drain valve does not open, the matching valve on the opposite side must be closed, as a landing at a higher landing weight is to be preferred compared to a landing with an uneven load.

If a wing drain valve does not close, dump all water ballast.

Defective Airbrake Control Circuit

If sudden strong change of flight course happens, the pilot should immediately visually check whether the airbrakes have extended on both wings as this asymmetry may have been caused by an airbrake extended on one wing only. This problem could occur due a defect in the airbrake control circuit and cannot be compensated by rudder deflection.
If the airbrake has extended on one wing only, the other airbrake must immediately be extended so far that the aircraft will regain straight and level flight and the airbrake lever must be held in this position.

Depending on the flight altitude immediately initiate an outlanding.

Lightning Strike or Assumed Lightning Strike

Select an airspeed within the green range of the airspeed indicator. Check whether all control surfaces are operational and work correctly. However, the airbrakes should only be tested near a suitable landing area. Should structural damage be anticipated, immediately look for a suitable landing area.

CAUTION: *Electrical systems are likely to be affected after a lightning strike or they might even fail totally.*

3.10 Other Emergencies in Powered Flight

Strong Noise Development Due To Defective Exhaust Silencer

If the noise from the exhaust silencer increases considerably, a failure of the exhaust system must be taken into account. As hot exhaust fumes may cause a fire, the engine must be stopped immediately or after having reached a safety altitude respectively. Prior to the next flight the exhaust system must be inspected and, if necessary, maintained.

Throttle Cable Broken

If the throttle cable fails, a spring at the throttle body opens the throttle valve wide open and the engine is running at full throttle. Climb to a safe altitude, switch off the ignition and stop the propeller so that it can be retracted in the normal manner. If no airfield or no landable terrain can be reached and further height gain is not possible, you may prevent a further climb by using the airbrakes and possible by setting the flaps in landing position. Then you may continue the flight in this configuration, until you can reach an airfield. Prior to landing, switch off the power plant and retract the propeller.

Fuel Exhaustion in the Fuselage Tank

If the fuel in the fuel tank is almost used up (and wing tanks are fitted and contain fuel as per section 7), open the valve to allow fuel flow from the wing tank to the fuselage tank. Remain in climb as this maximizes the amount of usable fuel.

If no wing tanks are fitted (or if they are empty) remain in climb until the fuselage tank has been emptied and then continue the flight in the normal gliding configuration after the propeller has been retracted.

Starter Failure

If ample altitude is available and a suitable landing site is within reach: Follow the check list „Starting engine“ and prepare the engine for starting. Instead of pushing the starter button, push firmly on the stick to accelerate to approximately 170 km/h (92 kts, 106 mph) in order to allow the windmilling effect so that the propeller rotates sufficiently for an engine start.

Insufficient fuel pressure

In case the **Red ⚠LED** illuminates on the ILEC engine control unit and in the display "**FUELPRES**" appears, check the position of the fuel valve first. Then activate the secondary electrical fuel pump. Should the fuel pressure still be insufficient, it is allowable to continue powered flight until a safety altitude has been reached and engine temperature limits have not been exceeded. If the internal cooling air temperature remains within the normal range, the engine can be further operated but the fuel system needs checking prior to the next flight and has to be serviced if necessary.

Excessive Engine Temperatures

The **Red ⚠LED** on the ILEC engine control unit is blinking and the display shows "**AIR 126°**" or "**H2O 110°**".
Reduce power settings and check the fuel pressure. Should the temperature increase further, stop the engine after having reached a safe altitude and after having carried out an adequate cooling run, retract the engine in accordance with the normal check list. Continue the flight in the normal gliding configuration. Prior to the next flight the engine has to be checked and serviced if necessary.

Cable Fire

If possible, stop the power plant and retract the propeller as per check list. Turn off the master switch on the engine operating console as well as the engine master switch and the avionics master switch on the instrument panel.

If the propeller cannot be retracted, it should be put into a vertical position by means of the propeller stop.

Open the sliding window to allow fresh air into the cockpit.

Generator warning lamp illuminates

In case the **Red LED "GEN"** illuminates on the ILEC engine control unit, the battery voltage has dropped below 12.8 volt. There are three possible reasons.

(1) Too many power consumers are lowering the on-board voltage. Turn off the secondary electrical fuel pump after having reached a safe altitude.
(2) The engine battery is in poor condition.
(3) The generator has failed.

In case 2: Continue the flight in the normal gliding configuration, keep in mind that a later engine restart might no longer be possible.

In case 3: Climb until a safe altitude has been reached or try to maintain it. Keep in mind that both fuel pumps and the ignition are now powered by the engine battery. Depending on the charging status and the general condition of the battery, the engine might only remain operational for a short period of time.

Section 4

4.1 Introduction

Section 4 provides checklists and procedures for the conduct of normal, daily, operations. Normal procedures associated with optional systems can be found in Section 9.

4.2 Rigging and Derigging

To rig: The ASG 32 Mi can be rigged without use of rigging aids by four people, or by three people when a fuselage cradle and a wing stand are used.

1. Clean and lubricate all pins, bushings and control connections.

2. Support fuselage and keep upright. If the wheel is lowered, check that the landing gear is securely locked down.

3. Push the airbrake lever forward and centre the stick.

4. Begin with the left inner wing and insert its spar fork into the fuselage. If available, support the wing with a wing stand. While rigging, unlock the airbrake over-centre lock in the wing with the special tool (AS-P/N 270.05.0002, the grey, metal lever).

NOTE: *The wing stand must not obstruct the movement of the flaps / ailerons!*

5. Insert right wing spar root and line up the main pin bushings. Insert and lock main pins. Only now - and not before - may the wing weight be relaxed. If the aircraft is still supported in a fuselage cradle, it is recommended that the landing gear should be extended at this stage and locked. Complete rigging with the aircraft standing on its main wheel.

6. Screw the provided tool (AS-P/N 290.05.0010, the red, T-shaped handle) into the hole at the outer end of the inner wing leading edge. Pull the safety pin. Align the outer wing and slide its spar stub into the inner wing. Both the lift pins and the ailerons must connect. When the safety pin lines up with its corresponding bushing, push it in to its distinct stop and lock it. Now the outer wing can be relieved and the tool unscrewed.

NOTE: *To lock the safety pin, turn the top of the tool in the direction to the wing tip.*
To unlock the safety pin, turn the top of the tool in the direction of the fuselage

NOTE: *Before finally pushing the outer wing into its position, check that the ventilation from the inner wing connects to the outer wing (silicon hose and brass tube).*

NOTE: *Check that the safety pin's extension vanishing completely under the airfoil contour.*

7. The winglets are installed into their pockets in the wing tips and secured by the self engaging spring loaded bolt. Adhesive tape seals the gap and secures the winglet additionally.

8. Prior to rigging the horizontal tail, check if a trim weight or -battery in the fin compartment is needed, or is already installed! After cleaning and lightly lubricating the elevator studs and sockets, the tailplane is pushed onto the fin from the front. Each half-elevator must be guided into the elevator connections. The elastic lip seal covering the elevator gap must be placed on top of the elevator actuator. Now push the tailplane home until the hexagon socket head bolt at the leading edge will engage its thread. The bolt must be fully and firmly tightened.

It is secured by means of a spring ball catch, whose ball must engage in the grooves on the side of the bolt head.

9. Insert the multi probe into the fin up to the stop and secure it with adhesive tape.

10. A considerable performance improvement can be achieved with little effort by taping all gaps at the wing junctions with plastic adhesive tape (on the non-moving parts only).

NOTE: *The ventilation ports of the water tanks must be kept open in any case!*

	Ventilation port location
Inner wing water tank	*below the winglet outwards*
Optional tail water tank	*atop the left side of the vertical tail*

The elevator-rudder junctions should also be sealed with tape. The canopy rim must never be taped over, so as not to impair bail-out.
It is recommended that appropriate areas should be thoroughly waxed beforehand, so that the adhesive tape can afterwards be cleanly removed without lifting the paint finish.

11. Refill the fuel tank

12. Now use the Check List (see the following Section 4.3) to carry out the pre-flight check.

To de-rig: proceed in the reverse order of rigging starting with the horizontal tail, winglets, wing tips and inner wings. We would add the following suggestions:

1. Drain all water ballast. Ensure that all the water has emptied out by alternatively putting down wing tips several times.
   Despite technical provisions, the wing surfaces might suffer from humidity on the long run.

2. If the tailplane is very firmly located in its rear seating, it will be more easily dismantled by two people alternately pushing it forwards by the tips.

4.3 Daily Inspection

Before commencing flying operations, the aircraft must be thoroughly inspected and its controls checked; this also applies to aircraft kept in the hangar, as experience shows them to be vulnerable to hangar-packing damage and vermin.

Daily Inspection of the Glider

① - Open canopies and visually check front canopy jettison.

- Main pins inserted up to the handle and secured?
- Check cockpit and control runs for loose objects or components.
- Check all batteries for firm and proper attachment.
- Check full, free and stress-free operation of all controls. Hold controls firmly at full deflection while loads are applied to control surfaces.
- Check ventilation opening and pitot tube in fuselage nose.
- Check condition and operation of towing hook(s). Release control operating freely? Do not forget release checks!
- Check wheel brake for operation and leaks. With airbrake paddles fully extended the resilient brake pressure from the main brake cylinder should be felt through the brake handle.

② - Check both upper and lower wing surfaces for damage.

- Check the wing tips for correct installation: Does the safety pin extension vanish under the airfoil contour and are the ailerons properly connected without loose play?

③ - Flaps and Ailerons:
Check condition and full and free movement (control surface clearances). The gaps between the inboard/outboard edge of the aileron resp. flap and the fixed wing must have a clearance of min. 1.5 mm (1/16 in). This clearance is necessary to ensure that these surfaces do not foul the wing cut-out edges when deformed under load in flight. Check linkage fairing for clearance. The contact areas of the elastic seals must be free of any dirt!

- Are the winglets undamaged and secured? Is the ventilation port of the wing water ballast tank unobstructed?

④ - Airbrake paddles:
Check condition and control connections. Do both sides have good over-centre lock? Check both airbrake boxes for loose objects, stones, water etc.

- The seat areas of the airbrake cover plates must be carefully cleaned!

⑤ - Check inflation and condition of tires:
Main wheel (15x6.00-6 6 PR):
    4.85 bar ± 0.15 bar (70 psi ± 2 psi)

Fixed tail wheel (210 x 65 2PR):
    3.5 bar ± 0.1 bar (50 psi ± 1.5 psi)

Retractable tail wheel (Tost Aero 200 x 50 6PR):
    5.5 bar ± 0.1 bar (80 psi ± 1.5 psi)

Retractable tail wheel: Check over-centre lock when the tail is set on the tail dolly and the tail wheel does not touch the ground (it must not be possible to push the tail wheel into the fuselage by hand).

⑥ - Check fuselage, especially underside, for damage.

⑦ - Check static ports in the fuselage tail boom for obstructions (moisture?).

⑧ - Check the pressure probe in the fin:
Is the probe properly seated, tight and secured by elastic tape?

- Check (if installed) tail water ballast tank drain hole and the ventilation hole for cleanliness.

⑨ - Is a trim weight or battery installed inside the fin compartment? Elevated minimum cockpit load, see mass and balance form, section 6.2.

- Check that the tailplane bolt is tight and locked.

⑩ - Check that rudder, tailplane and elevator are correctly fitted and check for damage or excessive play.

The numbers for the above points correspond with those in the following illustration "Tour of Inspection".

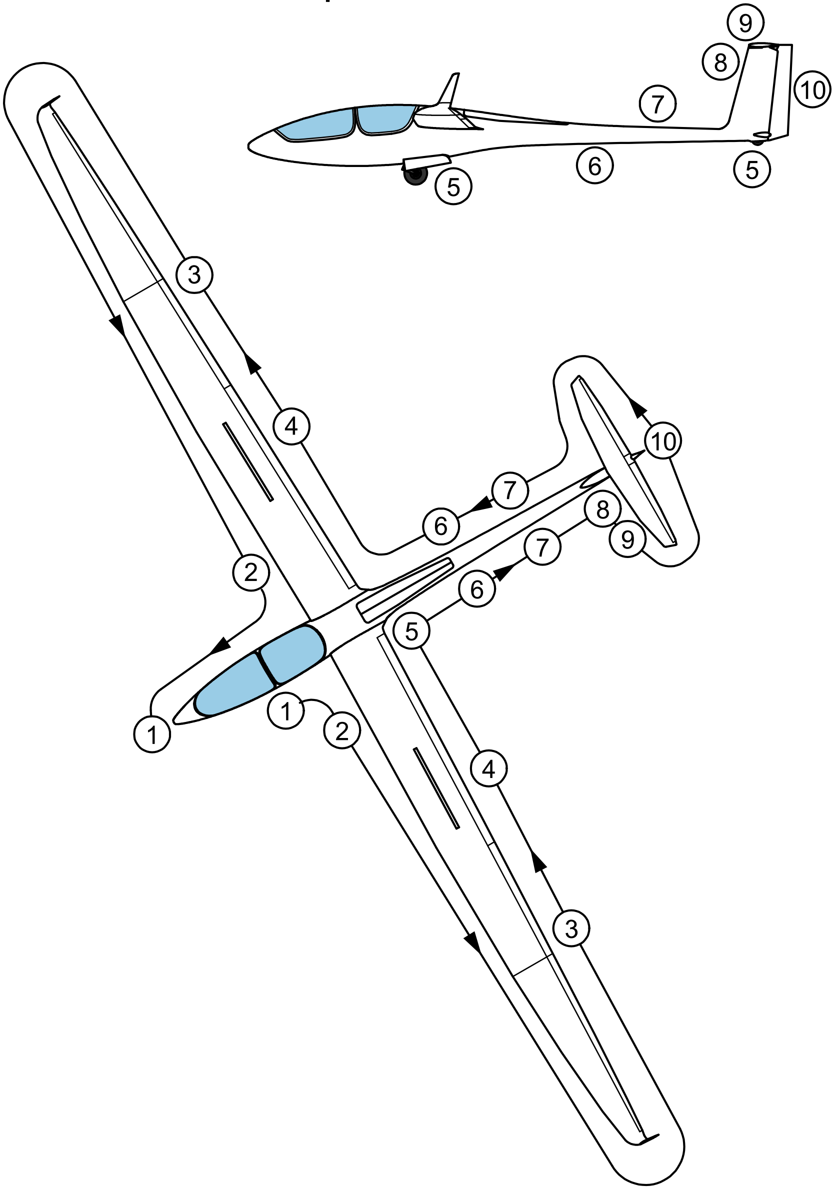
NOTE: *Finally, check the water ballast system for leaks, after it has been filled.*

These points are briefly repeated on a checklist on the cockpit sidewall:

Pre Flight Check

1. Main pins fully home an secured?
2. Check for foreign matter in the cockpit!
3. Outer wing pins and tailplane bolt secure?
4. Check controls for positive connections, freedom of movement and allowable slack!
5. Visible damage on towing hooks, landing gear or surface?
6. Multi probe inserted info fin until stop?
7. Pitot and static pressure openings dry and unobstructed?
8. Check tyre pressure!
9. Tow release tested?
10. Water tank outlets and ventilation clean?
11. Trim ballast in vertical tail?
12. Observe mass and balance data!
13. Fuel level checked?
14. Fuel wing tanks connected?
15. Engine checked as per manual?

Tour of Inspection round the Aircraft



Daily Inspection with Extended Propeller

a) When extending the propeller pay attention to unusual noises and stiffness of operation.

b) The most important bolted connections can be checked from above through the open engine bay doors. Particular attention must be paid to both front engine mounting screws and to the bolted connections of the extending toggle crank with jack head. The front engine mounting screws need no locking elements.

c) The rear engine mounting screw which runs through the engine oil tank is secured with locking wire. Check this locking wire for damage.

d) By pushing against the propeller assembly from the side and from the front, check the rubber elements of the engine mounting. The powerplant should react flexibly and should not immediately move against the fuselage structure.

e) Check the over-centre action of the drive mechanism of the propeller assembly! Do both sides have good over-centre lock?

f) Check limit switch of the electric jack for damage, secure seating and proper electrical connections.

g) Check radiator mount and radiator support plate for incipient cracks.

h) Inspect lines (especially fuel lines and coolant hoses) and all components for signs of chafing.

i) Any kinks in Bowden cables or fuel lines and hoses? Elastic cords of the engine bay doors in good condition?

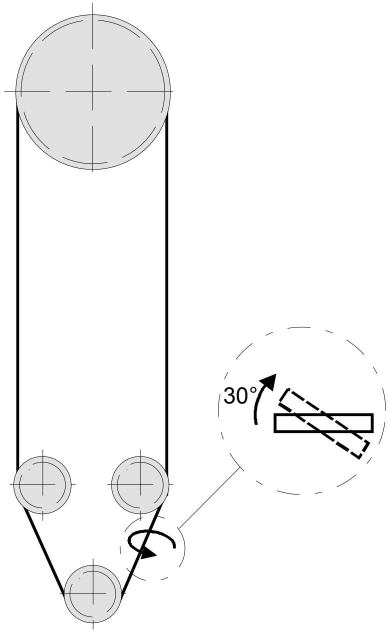
j) Check mounting of the flexible ram pipe. Is the air filter securely seated at its upper end?

k) Inspect the mounting of the exhaust silencer. The spring mountings can be checked by shaking the silencer.

l) Inspect the rear engine mounting for discoloration and damage through the gap between oil tank and exhaust silencer. The side of the oil tank faced towards the silencer must not show any discoloration.

m) Check the toothed belt for wear and correct pre-tension.

   It should be possible to twist the belt just by 30° with normal hand force applied between the bottom belt pulley and one of the guide pulleys. This measuring method may be relatively imprecise, yet it may aid to recognise a considerably too low belt tension. Further notes on measuring and adjustment of belt tension are given in the Maintenance Manual, Section 2.



n) Check operation of throttle and propeller stop mechanism.

o) Turn the propeller through by hand once (Ignition OFF?) and check for excessive friction, unusual noise and compression.

Visual Inspection of the Propeller

a) Visual inspection of the propeller as per propeller manual

b) Visual inspection of propeller mounting

Daily Inspection of the Tank System

a) Check that hose connections to the wing tanks (if installed) are secure and tight.

b) Check visually fuselage tank through wheel cut out for damage due to impact from stones and for leaks.

c) Press drainer and release any condensation if present. Watch carefully that the drainer closes again tightly afterwards.
The drainer is located at the rear, lower end of the fuselage tank, accessible from within the landing gear box.

d) Check fuel tank vent opening. This vent is located on the left side behind the landing gear doors.

e) Check fuel level for a safe take-off (min. 5 litres)?

f) Check engine oil tank (between engine and exhaust silencer) for signs of leakage. Check oil level! Sufficient oil usage? (See also Section 7.10)

Always top up the oil tank to approx. 1 cm (0.39 in) below the filling hole.

4.4 Pre-Flight Inspection

Place the headrest in the front seat correctly before entering the sail-plane. If the adjustable backrest is used, the headrest is inserted into the attachment on the backrest - otherwise into the attachment inside the rear instrument cover.

The headrest of the front seat has to be adjusted such, that the point of head contact is at eye level.

The following Check List containing the most important points is affixed within easy view of the pilot, upon the left cockpit frame:

Pre Take-off Check:

1. Tail dolly removed?
2. Parachute fastened?
3. Rip-chord for automatic parachute connected?
4. Seat comfortable?
5. Safety harness fastened?
   (especially, lap straps tight)?
6. Controls free?
7. Airbrakes closed and locked?
8. Trim in take-off position?
9. Flap in take-off position?
10. Altimeter correctly set?
11. Radio transmission checked?
12. Landing gear locked?
13. Check wind direction!
14. Close and lock canopy!
15. Procedure for take-off interruption clear?

4.5 Normal Procedures and Recommended Speeds

4.5.1 Operation of the Power-Plant and Self-Launch

CAUTION: *Medical investigations have shown, how much the interior noise of powered sailplanes with retractable engines can harm the unprotected ear. Therefore* ***always*** *wear ear protection during powered flight. To compensate for this, increase the speaker volume on the radio.*

CHECKLIST: Extending propeller and starting engine

- Fuel valve: **OPEN?**
- Power-plant main switch: **ON** (ILEC responding)
- (with optional ILEC Change Over Switch select the master instrument)
- Switch "Extend Propeller" engaged upwards
- Green LED "Propeller extended" on?
- Propeller stop disengaged?
- Ignition: **ON**
- Fuel pump 2 **OFF**
- Check fuel pump 1 (must be heard)!
- Fuel pressure okay? No warnings from ILEC?
- ECU ready? (ECU-LED constantly **RED**)?

Cold and warm start on the ground (not too cold)

- Propeller area CLEAR?
- Set THROTTLE not more than ¼ of max. travel.
- Push STARTER button max. 5 seconds.
- If the engine fails to start, push STARTER button again, after a short recovery for starter battery.
- Choose a throttle position at which the engine is running smoothly.
- Is the red ECU-LED off or constantly on?
- Allow the engine to warm up at **4000 rpm** for 2 minutes (or up to a coolant-temperature of 40 °C / 104°F).
- Check ignition circuits at **6200 rpm**. Maximum drop 300 rpm.

Cold start (very cold, strongly cooled engine)

- Propeller area CLEAR?
- Set THROTTLE to "IDLE" (at lowest position).
- Push STARTER button max. 5 seconds.
- If the engine fails to start, push STARTER button again, after a short recovery for starter battery.
- Choose a throttle position at which the engine is running smoothly.
- Is the red ECU-LED off or constantly on?
- Allow the engine to warm up at **4000 rpm** for 3 to 4 minutes (or up to a coolant-temperature of 40 °C (104°F)).
- Check ignition circuits at **6200 rpm**. Maximum drop 300 rpm.

Cold and warm start in flight

- Air speed 90 to 110 km/h (49 to 59 kts, 56 to 68 mph)
- Set THROTTLE to "IDLE" (at lowest position).
- Push STARTER button.
- Is the red ECU-LED off or permanent on?
- If possible, allow engine to warm up.
- Reduce airspeed and move throttle to Wide Open Throttle (WOT). (Watch RPM!)

CHECKLIST: Stopping engine and retracting propeller

- Perform engine cooling run.
- Air speed: 90 to 110 km/h (49 to 59 kts, 56 to 68 mph)
- Throttle: IDLE (bottom position). Wait until low rpm has stabilized.
- Ignition: **OFF**
- Let engine revs. die down
- Engage propeller stop lever (bottom position). When engaging the stop the propeller must not stand directly above the stop block.
- Wait until propeller runs against the propeller stop block.
- Check vertical position of the propeller by means of the mirror.
- Press switch "RETRACT" down and hold. Propeller travels into cooling position (Beep). After the engine has cooled down enough, the LC-Display shows “RETRACT” (pulsing sound). Then press the "RETRACT" switch again until the ILEC LED "Propeller retracted" lights.
- Switch off Power-Plant Main Switch by pushing the red key next to it.

Revolution Rates (rpm) and Speeds

Best climb: at V_y = 90 km/h (49 kts, 56 mph) (blue line)
Cruising speed: 130 to 140 km/h (70 to 76 kts, 81 to 87 mph) at 7100 rpm
Maximum take-off revs: 7750 rpm for maximum 3 minutes
Maximum continuous revs: 7100 rpm

The power plant of the ASG 32 Mi 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, for instance when crossing 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 as that of a sailplane pilot not always finding a thermal 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 as reliable.

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

The propeller can be extended and the power-plant started up to a height of 5,000 m (16,400 ft). Special procedures are not necessary.

The height loss for extending the propeller and starting the engine is about 50 m / 164 ft (adverse case / inexperienced pilot). A sink rate of about 1 m/s (200 ft/min) has to be considered for flying with max. wing loading, idling speed of 4100 rpm and V_y = 90 km/h (49 kts, 56 mph). If the engine has to warm up, a further height loss of 150 - 200 m (490 - 660 ft) must be considered.

In exceptional cases it is also possible to set engine speeds between 5500 and 6500 rpm even for the cold engine, thus making it possible to climb.

Extending the propeller

Proceed as per checklist.

If the red ECU LED remains off after the ignition is switched on and starts with a flash code after 10 seconds, then an error has occurred in part of the engine control unit. This has to be repaired prior to the next take-off. Furthermore, an error description is shown in the display. Additional information concerning this flash code is given in section 7.9 of this Flight Manual or in the Engine Manual.

If, after switching on ignition, the red **⚠LED** on the ILEC power-plant control unit blinks and the LC-Display reads “**FUELPRES**”, then there is not enough fuel pressure in the system for the fuel injection to work properly. The engine is then not able to develop full power. The reason can be a faulty fuel pump or pressure regulator or even a leaking fuel line.

WARNING: *In this case the engine must be stopped at once and no self launching must be attempted.*

If the problem occurs during take off at a self launch it might be possible to restore normal fuel pressure by activating fuel pump number 2. After reaching a safe height the engine has to be shut down and a landing is to be initiated. Prior to the next launch the problem must be fixed.

Do not extend the propeller under higher g-loads. G-forces can increase, for instance while circling. In such a case the G-forces can be so high that the electrical jack can extend the propeller only very slowly or fails to do so fully.
The speed range for extending and retracting the propeller is given in Section 2.

Starting the Engine

WARNING: *A test run of the power plant must under no circumstances be performed without the aircraft being completely rigged and safely chocked! In addition, a competent person must be seated 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 then 5 seconds, as thereby the starter battery is unnecessarily stressed. The mixture generation through an injection system normally permits an unproblematic start of the engine. In case of problems, an operating error should also be considered. A closed fuel cock is most often the cause of the engine not starting.

The red ECU-LED normally remains off when the engine is running. If it is permanently on as long as the engine is running, and a message appears in the LC-display, an error has occurred in part of the engine control unit. This has to be repaired prior to the next take-off. If the ECU-LED is permanently on during flight and the engine performs normally, the flight can be continued. As some sensors do have a backup, an error message does not necessarily immediately affect the power output of the engine. However, as long as an error message is shown, all available values on display should be continuously monitored to make sure they are within operating limits.

NOTE: *It is required to solve the indicated error prior to the next take-off.*

Depending on the ambient temperature, the power plant should warm up on the ground for 2 to 4 minutes at 4000 rpm, until the indicator of the coolant temperature reacts and indicates about 40°C (104)°F. This will ensure that the engine accelerates smoothly to maximum rpm. If the operating temperature (internal cooling air) is to low, the electronic injection system automatically reduces the rpm. A safe self launch cannot be made until a static speed of at least 7000 rpm is achieved and the engine is running smoothly.

NOTE: *Depending on tailwind speed, a lower static rpm will be observed. Please remember that a headwind will increase the rpm and tailwind will reduce them.*

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.

Self-Launch

- ECU LED **OFF** ?
- Fuel pump 2 as a precaution **ON**
- After approaching a safe altitude: fuel pump 2 **OFF**
- After 3 minutes, reduce power from maximum take off power to 7100 rpm

For a safe self-launch maximum engine revolutions should come up to 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 on ground are below 7000 rpm, the aircraft must not take off. First a system check together with a ground run has to be accomplished. In case of doubt, contact the manufacturer.*

WARNING: *For the following reason it is prohibited to switch over between the two ILEC control units during powered flight: If the ignition of the control unit to which the pilot wants to change is set „OFF“, then the engine fails, as the ignition power supply switches off during change over.*

Take-off procedure for hard surface

The shortest take-off distance is achieved in the following manner: A helper at one wingtip initially runs along and keeps the wing in balance. Accelerate with "Wide Open" throttle in flap setting 2 and slightly pull the stick to load the tail wheel. This also improves directional stability in crosswinds. At a speed of about 80 km/h (43 kts, 50 mph) engage flap setting 6 and gently pull the stick until the aircraft unsticks. Then accelerate to V_y = 90 km/h (49 kts, 56 mph) (blue line on ASI scale). Above a minimum safe height of 150 m (500 ft) change to flap setting 5.

If under favourable conditions the take-off distance is not of importance, flap setting 6 can be engaged from the beginning.

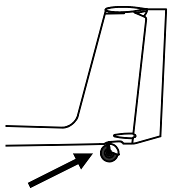
Take-off procedure for soft surface

The take-off procedure is the same as the hard surface procedure, except that flap setting 6 is engaged from the beginning.

Maximum acceptable crosswind components are stated in section 5.3.1.

CAUTION: *In case of an engine failure during take-off, the stick must be pushed forward sufficiently, since otherwise the airspeed will quickly drop due to pitch attitude and additional drag.*

CAUTION: *For ASG 32 with **retractable** tailwheel:*
When taxiing take care of cables lying on the ground (e.g. winch cables, aerotow ropes). These can catch into the gap between the tail wheel and the tail cone unnoticed.
After taxiing over cables it must be verified that the tail wheel is clear before starting.



Climb

The maximum take-off power of 7750rpm is only allowed for 3 minutes, after which the throttle has to be reduced to 7100rpm. Climb is performed at V_y = 90 km/h (49 kts, 56 mph).

Cruise

The largest cruising range can be achieved with a saw-tooth pattern. That means to fly under power at the best climb-rate and glide with retracted engine at the speed for best glide-ratio.

Cruise in horizontal flight is made with about 6500 rpm and an air speed of 130 to 140 km/h (70 to 76 kts, 81 to 87 mph).

Monitor fuel reserves and open wing tank valve if appropriate.

See section 5.3.6 for performance information.

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 valve(s) closed at the right time.*

CAUTION: *If wing fuel tank(s) is (are) fitted, check that the oil supply is sufficient for the total amount of fuel on board. Monitor oil warning light!*

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

Stopping the Power-Plant including cooling run

CAUTION: *Stopping the power-plant consists of 2 major steps – "cooling run" and "cooling position":*

1. *The **cooling run** serves to cool down the inner surfaces of the engine.*
2. *The **cooling position** during retracting avoids damaging the propeller which lies over the hot muffler in retracted position.*

The procedures described hereafter must be met!

Long-term operational experience of this rotary engine installation has shown that the engine itself requires only a small amount of care and maintenance but the right measure. One of the most important maintenance tasks, especially for a power-plant which has not been used for some time, is a correctly executed stopping procedure. This provides a sufficient oil film on the inner engine surfaces and is very important for a sufficient protection against corrosion. In particular, the tight notches for the seals of the rotary piston are prone to corrosion and can lose their seal effect. If an engine is stopped too hot, the oil film on the inner engine surfaces evaporates, the lubrication gets lost and the protection against corrosion suffers considerably. If no cooling run was performed after a ground run, this can be identified by white smoke escaping from the big fan inlet filter.

NOTE: *The cooling run is also for the preservation of the engine, if it is only used infrequently.*

If the air temperature is over 120 °C (248 °F), then the climb should be continued at a lower power setting or flown in level flight with around 6000 rpm until the air temperature has dropped significantly (about 5°C, 9°F) before switching off the ignition.
Has the air temperature dropped significantly or 115°C (239°F) was only slightly exceeded during the climb, a cooling run has to be performed for 1 - 2 minutes at circling speed and 4000 - 5000 rpm before switching off the ignition. It is advised to perform this cooling run during centring a thermal. In this setting the engine behaves nearly drag neutral. It also makes sense from a safety perspective because if the current thermal is not usable, unnecessary engine stopping and restarting is avoided. Thus, the pilot's workload is reduced and this time is used for cooling the hot inner engine surfaces. The oil film will not evaporate and stays as lubrication and protection against corrosion of the engine surfaces.

Retracting the Propeller including cooling position

Switching off the ignition is done at an airspeed of 90 – 100 km/h (49 – 54 kts, 56 – 62 mph), with the throttle completely closed. Only after the engine rpms have almost completely died down and the propeller is only windmilling, may the propeller stop block be swivelled into the arc of the propeller. The step by step retraction of the propeller is indispensable to preserve the propeller. This procedure serves to cool down the power plant and the exhaust silencer more quickly. This may only be left out in cases of emergency.

The high temperature of the silencer is no problem it or the surrounding fuselage structure. But if the propeller is retracted without putting it first into the cooling position, it may be damaged or the lifetime reduced by hot gases emitted by the silencer.

NOTE: *While the RETRACT switch is pressed down, the retraction of the propeller is automatically interrupted after 2/3 of the travel (cooling position). A short signal is audible when this position is reached. The pilot must press the RETRACT switch again in order to retract the propeller entirely.*

In practical operation the following procedure has proven itself:

After engine shut-off, the liquid coolant temperature first increases a little, because the coolant is no longer circulated and the temperature sensor is fitted directly on the engine housing where it immediately indicates the engine temperature. As the degree of cooling down is indicated by this temperature, monitor it closely and wait until the maximum value has dropped by about 2 °C (4 °F). Only then may the propeller be completely retracted without any problems.
The engine control unit tries to apply this procedure and informs the pilot if this criterion is fulfilled. If this automatic measurement fails, the pilot will be reminded after at least 6 minutes. A pulsing signal and the hint “RETRACT” on the LC-display appear in both cases.

The internal cooling air temperature is no longer available with the ignition switched off, as the engine control unit (ECU), which passes this value on the ILEC power-plant control unit, is no longer active.

NOTE: *During cooling position of the propeller the hint “RETRACT“ is shown in the LC-display and a pulsing signal sounds after the power-plant has sufficient cooled down as a reminder that the retraction process has not yet been finished.*

Approach and Landing

Preferably with retracted propeller.

After an electric failure it is also possible to land with the propeller extended. Ignition and power-plant main switch are off, fuel valve is closed and propeller stopper engaged.
With the propeller extended the increased sink rate has to be regarded. In general, a sink rate of around 1.5 m/s (300 ft/min) can be assumed for the approach with propeller extended at 100 km/h (54 kts, 62 mph) in flap setting 6. Possibly, during the landing airbrakes are not needed and it is necessary to pull back a little bit more for the touch-down.

4.5.2 Winch Launch

CAUTION: *Winch- and autotow-launches must be conducted using the c.g. tow release in front of the landing gear.*

CAUTION: *Always start the launch prepared to release. If you cannot keep the wings level, release immediately.*

For winch launch, a weak link of 1000 daN ±10% (2248 lbs, black) must be used in the launch cable or tow rope. (Weak link colours refer to the colour scheme of the Tost company)

For winch-launching only flap setting 4 (+ 12°) is permitted. The trim should be set half-way nose-heavy.

CAUTION: *The flap settings for circling (5 and 6) must not be set, because pushing the nose down after a cable break is more difficult in rearward centre of gravity settings. These flap settings are also not drag optimal for the winch launching speeds.*

	Recommended	Maximum
Winch-launch airspeed:	115 – 130 km/h 62 – 70 kts 72 – 80 mph	140 km/h 75 kts 87 mph

Maximum acceptable crosswind component is 25 km/h (13.5 kts).

During take-off run, rudder and aileron immediately respond, such that it is possible to keep the wings level. With the trimmer adjusted as mentioned above, the ASG 32 Mi will assume a gentle climb attitude after take-off. Nevertheless every winch launch is different and the pilot must be prepared to correct the flight attitude immediately. After take off, pitch and flight path is controllable right away.

NOTE: *Actions necessary after a cable failure are always also subject to wind and airfield circumstances. Apart from this, after a cable failure in the flat phase of a winch launch the pilot must immediately push, to establish a stabilized flight attitude before taking any further action.*

Above a minimum safe altitude the climb angle should be increased by applying backpressure on the stick

CAUTION: *After a cable failure in the steep part of the winch launch the stick must be immediately and fully pushed forward. Achievement of a safe airspeed can only be learned from the airspeed indicator, not from the pitch attitude.*

CAUTION: *Before Take-Off, check seating position and that controls are within reach. The seating position, especially when using cushions, must preclude the possibility of sliding backwards during initial acceleration or steep climb. To do so, bring the backrest in the most upright position which is comfortable in order to provide the shoulder straps holding the pilot down in the seat.*

CAUTION: *Winch launches with water ballast are only recommended with powerful winches. The winch driver must be informed of the total take-off mass.*

WARNING: *We expressly warn against attempting any launch by an under-powered winch in a tail wind!*

4.5.2 Aero Tow

CAUTION: *The sailplane is only certificated for aerotow operation when the forward tow release is used.*

The take-off run is usually made in flap setting 5. On hard surfaces flap setting 4. The trim should be set half-way nose-heavy. The minimum length of the tow-rope is 40 m (130 ft). A length of 40 m to 60 m (130 to 200 ft) is recommended. A textile rope must be used.

CAUTION: *There is **no** need to start the take-off run in negative flap settings. Due to the unique flaperon control system, lateral control is even better in positive flap settings. In addition, access of the release knob is best in neutral or positive flap settings.*

Depending on the tow speed select flap setting 4 or 5 in safe altitude.

The flap settings 1 – 3 are not permitted for aero tow.

CAUTION: *During aerotow the flap setting should be changed only gradually. This makes it easier to keep position behind the towplane with the elevator.*

NOTE: *Before start, inform the tug pilot of the recommended towing speed.*

Wing loading		Recommended Towing Speed		
40 kg/m^2	8.19 lbs/ft^2	115 km/h	62.0 kts	71.5 mph
45 kg/m^2	9.22 lbs/ft^2	120 km/h	64.8 kts	74.6 mph
54 kg/m^2	11.1 lbs/ft^2	135 km/h	72.9 kts	84.9 mph

Maximum acceptable crosswind component: 25 km/h (13.5 kts).

4.5.4 Flight

CAUTION: *Flights in conditions conducive to lightning strikes must be avoided as these are not covered in approvals according to CS22.*

Flaps

Flap control allows adaptation of the aircraft to changing flight attitudes. See diagram in section 5.3.4 for correct flap setting.

Flap settings 1 through 4 are straight flight settings. Setting 1 is for high speed flight, setting 2 is mostly used between thermals. In flap setting 2 the lower wing surface contour is flush and the low drag laminar boundary layer can pass the hinge line to the blowing holes. Flap settings 3 gives the best L/D and flap setting 4 gives the smallest sink rate in straight flight.

Flap settings 5 and 6 are purely for use while circling. Flap setting 5 is designed for centring in thermals and circling in turbulent lift. Flap setting 6 should be selected when the conditions warrant strong and tight lift in the core of a thermal.

Because the flap setting directly influences the amount of lift generated over the whole of the wing, a sudden, jerky operation of the flaps will cause a sudden drop or climb; therefore, care should be exercised in this respect, especially when flying close to the ground or circling near other sailplanes.

Low Speed Flight, Stalls and Spins

The ASG 32 Mi behaves normally in slow and stalled flight. In all C.G. positions, reduced control forces together with flow separations at the fuselage, coinciding with a slight disturbance on the stick, will give warning of an impending stall. Approaching stall, the glider can be brought back to a normal flight attitude any time by releasing stick back pressure.

When stalling, the glider may drop a wing. This reaction is more pronounced with more rearward C.G.-positions and more positive flap settings. In positive flap settings and rear C.G. positions, loss of height may be up to 70 m (230 ft) and pitch below the horizon may be up to 40°. The loss of height with airbrakes extended depends also on, how fast the airbrakes are retracted. Normally an additional height loss of 20 m (66 ft) can be assumed.

At the foremost C.G. position, the stall characteristics become very gentle, as the limited elevator deflection will no longer allow maximum angles of attack to be reached. At this C.G. position, only a gentle stall warning will be experienced, but large aileron deflections can be applied without dropping a wing.

With the propeller extended, but stopped or windmilling, there is a stall warning, but it is less marked – because there is already some turbulence in the wake of the propeller. With the engine running a strong stall warning comes from the turbulent air impacting the propeller.

When circling, the stalling speed will increase compared to that in straight flight. As a general guideline, you should expect the stalling speed to increase by 10 % at about 30° bank and by 20 % at about 45 ° bank, refer also to section 5.2.2.

The ASG 32 Mi is well behaved in circling flight. Approaching stall with a bank angle of 45° usually leads into a stable sideslip. But if it happens that a wing drops, it may be more drastic than in straight flight (at least with rearmost C.G. position, flap setting 6). Before it occurs, there is a significant stall warning.

With the propeller extended, but stopped or windmilling, the airspeed approaches stall speed quicker than in clean configuration, due to the increased drag. In straight flight as well as in circling flight, the glider can be controlled with the stick in the rearmost position for some time, but will drop a wing due to a gust or control deflection. In rearmost c.g. positions, with flap settings 6 and L (which already create more drag) and the propeller extended (stopped or windmilling), a heavy wing drop may not be avoidable.

Violent applications of rudder and/or aileron would result in a spiral dive, spinning or side slipping, depending on C.G. position and control deflection.

More specifically, the following would apply:

C.G. Position	Aileron neutral or in direction of ruder	Rudder & Aileron Crossed
rearmost and middle	steady spin	spin, leading to a side slip after 1-2 turns
middle and mid-forward	spin, leading to a spiral dive after 1-2 turns	side slip
mid-forward and foremost	spiral dive	side slip

In all flap settings, the glider behaves quite similarly while spinning. With water ballast the glider accelerates faster after the rotation has stopped. Therefore, it is necessary to ease out of the dive without any delay. Also the height loss for recovering increases with filled water ballast.

Depending on C.G. position and glider configuration distinct pitch oscillations occur in some cases.
The loss of altitude for wind drop / spin recovery may be **up to 250 m (820 ft)** !

Intentional Spinning

The spinning characteristics of the ASG 32 allows intentional spinning for training purposes.

CAUTION: *Intentional spinning has to be done **without** water ballast, propeller retracted, airbrakes retracted and in flap setting 4.*

Spinning is initiated as follows:

- Establish yaw free straight flight in flap setting 4.
- Slowly reduce speed to minimum speed.
- Pull the stick completely and hold, full rudder into the desired direction. Aileron stays neutral.
- Hold controls in this positions during spinning.

As stated in the table above the ASG 32 is only able to spin steadily in middle and rearward C.G. positions. In forward C.G. positions it leads immediately or after a short while to a spiral dive.

WARNING: *If the attempt to spin leads to a spiral dive, this hast to be recovered promptly to stay within the permissible limits of airspeed and load factors.*

The pitch angle below the horizon is relatively high in forward and middle C.G. positions, in more rearward C.G. positions the spinning gets more flat. Furthermore, the tendency for pitch oscillations (especially in the initial phase) is increased in rearward C.G. positions.

The loss of altitude depends on the state of spinning, as a guide an altitude loss of 100 - 150 m (330 - 500 ft) per turn can be assumed.

Spinning recovery is done in agreement to the standard procedure:

① Check ailerons neutral.
② Apply rudder opposite to the direction of the spin.
③ Ease the control column forward until rotation ceases.
④ Centralise rudder and ease out of the ensuing dive.

If the recovery is done as described, the ASG 32 usually needs ¼ additional turn for stopping. If a pitch oscillation occurs and the recovery is begun at an unfavorable point (nose up), the tendency for additional turns during recovery is increased and may be up to a ¾ additional turn.

The loss of altitude for spin recovery depends on the state of spinning and pilot abilities. 250 m (820 ft) should be taken into account.

CAUTION: *Spinning is not noticeably affected by extending the air brakes, but this increases the height loss and reduces the permissible load factor during recovery. It is therefore advisable to keep the airbrakes retracted.*

WARNING: *For intentional spinning a reasonable altitude with a reasonable safety margin hast to be chosen.*

High Speed Flight (Airspeed Indicator in yellow Range)

The following consequences arise from the airworthiness requirements:

CAUTION: *Exceed the rough-air speed only in calm air (yellow arc of airspeed indicator).*

CAUTION: *Above manoeuvring speed (yellow arc of airspeed indicator), full control deflections must not be applied. At V_{NE} (red radial line) only one third of the full travel is permissible.*

CAUTION: *In the yellow range airbrakes may only be opened under g-loads between –1,5g and +3.5g.*

CAUTION: *And generally it applies: Do not utilise the otherwise permissible range of control deflections during strong gust loads. Simultaneous full gust loads and maneuvering loads can exceed the structural strength.*

4.5.5 Approach

Make the decision to land in good time, change to flap setting 5 or 6 and lower the wheel at not less than 150 m (~ 500 ft) above ground.

For the remaining circuit, maintain about 100 km/h (54 kts). The yellow triangle on the ASI scale is valid for maximum weight without water ballast. With remaining water ballast, or in turbulence or strong headwind, increase the approach speed.

The double-paddle air brakes are normally effective in controlling the glide angle.

CAUTION: *Landing flap setting L can be selected on final for steep approaches. You should be certain of easily reaching the boundary of the landing area.*

At airspeeds above 100 km/h (54 kts, 62 mph), the control forces required to engage flap setting L will increase. They are generated by the large deflection of the inboard flaps, which deflect downwards +47°, while the outboard ailerons deflects only +9° down.

This twist increases the sink rate, especially at air speeds between 120 and 130 km/h (65 and 70 kts / 75 and 81 mph). As well, it improves the aileron efficiency.

NOTE: *In a strong headwind, use of the landing-flap setting L is NOT recommended, due to the danger of undershooting the landing area!*

If you are not familiar with the use of flaps as a landing aid, you should initially use only flap setting 6 for landing into a headwind.

NOTE: *When in danger of undershooting, a reduction of flaps from L to 6 is possible, because due to the flap twist, the stall speeds are in close proximity. But it must only be employed at a safe speed clearly free of any stall warning, above a safe height (at least 40m, 131 ft), and with conscious control of the airspeed. One should have practiced this maneuver at greater heights.*

CAUTION: *The danger of a sudden drop makes it inadvisable to reduce the flap setting near the ground.*

Sideslip

CAUTION: *During side slipping, the leeward engine bay door may be blown up, and the hinge may be bent. This may impair the exact fitting of the door, therefore side slipping should be avoided. Airbrakes and the landing setting of the flaps are very effective.*

Side slipping with the ASW 32 Mi is very effective.
The sideslip is initiated with airspeed between 90 km/h and 120 km/h IAS (49 to 65 kts) by gently applying aileron control and holding the flight path with the rudder. In a stationary side slip the ASI reading is not usable as it reads between 50 km/h (27 kts) and zero. The correct flying speed is estimated by the pitch attitude. The upper edge of the instrument panel must not rise above a horizon position more than that experienced during thermalling.

The amount of bank and yaw is controllable with the size of the control deflections. Associated negative rudder control force gradients can be overcome by moderate pedal forces or by easing the control stick into a more neutral position. Very high negative rudder forces may be a sign of a too high airspeed.

With airbrakes already extended, the slip is more effective, the bank and pitch angle are larger.

If the slip is initiated at too high airspeed and with too dynamic control deflections, the glider may react with violent motions. Entry speed should therefore be max. 130 km/h / 70 kts / 80 mph

CAUTION: *With a partial but symmetric water ballast load, side slipping is possible!*

WARNING: *When an asymmetric water ballast load is suspected or recognized,* ***emergency procedures*** *according to* ***Section 3*** *are applicable. Side slipping into the direction of the heavier wing must be avoided!*

4.5.6 Landing

In an emergency (e.g. abandoned take-off), structural strength will prove adequate for a landing at maximum all-up mass.
However in normal operation it is strongly recommended that the water ballast is jettisoned before landing, in order to increase the safety margin.

CAUTION: *When final approach is flown in flap setting L with some nose-down attitude, remember to round out in time and with increased speed to allow a clean 2-point touch down.*

Immediately before touching down, the airbrake setting may be reduced so as to avoid touching down with wheel brake too firmly applied.
During the ground run the stick should be held fully back; this gives better directional stability in crosswinds, and prevents the tail from lifting due to hard application of the wheel brake.

If flap setting 6 is used for the landing, flap setting 3 or 4 can be engaged at touch down. This will inhibit the sailplane from lifting off again.

When parking the aircraft, engage flap setting 3 to save the plastic sealing strips at the control surface gaps from deformation.

Landing with propeller extended

Approach and landing is preferably carried out with the propeller retracted. If the electric power supply fails, it is possible to land with the propeller extended. Ignition should be **OFF** and propeller stop **ENGAGED**. The fuel valve is **SHUT** and the engine master switch is **OFF**.

The increased sink should be borne in mind. As a general guideline, a basic sink speed of about 2 m/s (400 ft/min) at 100 km/h (54 kts) may be assumed. It may be possible to do without airbrakes during the landing, and a firmer round-out will be needed.

4.5.7 Flight with Water Ballast

NOTE: *Ballast will increase the stalling speeds and take-off distance. Ensure that the condition of the airfield, the length of take-off run available and the power of the tug, tow-car or winch permits a safe launch.*

A water bag of approx. 60 ltrs capacity can be installed in each inner wing of the ASG 32 Mi. An optional water tank of 5 ltrs capacity can be installed in the vertical fin.

The tail water tank is intended only to counteract the nose heavy moment of the wing water ballast. Therefore the valves of these tanks are opened with a common lever.

Ballast Limits

See section 6.3 to determine the maximum permissible amount of water ballast

Water ballast limitations are listed in section 2.14

Filling of Water Ballast

The levers for the water ballast valves are located on the right hand cockpit wall. The valves are open with the levers in the forward position.

The tanks are filled through their drain ports. A transparent filling hose which can be screwed into the port is supplied. The drain ports of the wing tanks are located on the lower wing surfaces, approximately 1 m (3.3 ft) from the root rib. The drain port of the tail tank is located behind the tail wheel.

NOTE: *When an optional tail water ballast tank is installed, and tail water ballast is to be used, the tail tank has to be filled before the wings.*

The amount of water in the tail tank can be read from the water level in the hose and the level marks on the fin skin. After having filled the tank, close the valve and remove the hose.

Start by filling the tank of the wing, whose wing tip lies on the ground. The design of the tank ventilation will allow the wing to vent best in this position. In the baggage compartment levers are located on the root rib, with which single valves can be opened. By pushing down the lever and pushing the black button, the valve can be held open. After filling of the tank, another short push on the lever will close the valve again.

WARNING: *It is expressly prohibited to use pressurised water (mains, immersion pumps etc.) for filling ballast tanks due to possible damage to the wing structure!*

Now the other wing tip is put down while its tank is filled. With wings level, carry out a balancing test to check that the ballast loads are even. Should one wing prove to be heavier, open its valve until equilibrium is achieved.

It is recommended to fill from slightly elevated, non pressurised containers (on wing or car roof etc.). If water under pressure is used, it is essential to interpose an open intermediate vessel (funnel etc.), to ensure that the head-of-pressure cannot rise beyond 1.5 m = 4,9 ft.

WARNING: *As the all-up weight influences the take-off distance significantly, the amount of water filled into the bags must be really carefully checked (use calibrated containers or a water meter)!*

CAUTION: *Having filled the tanks, briefly open valves to check their functionality.*

If the wings are filled to capacity, it can happen that the tanks slowly drain through the vents while the aircraft is parked. In this case we recommend that the wingtips be supported in level, but on no account to tape up the vents!

Jettisoning of Water Ballast

To jettison water ballast, the operating lever on the right hand cockpit arm rest (in the landing gear gate) is pushed forward (valve open).

Draining the complete wing water ballast takes 6 minutes. The dump system does not synchronise the water flow from wing and tail tank. The tail tank must unload in less than half the time for safety reasons. Therefore it is not possible to maintain the c.g., when the water load is only partially emptied.

Every time any water is jettisoned, it is most important to check that the water is draining at an equal rate from both wings! Asymmetric control deflections may also indicate unequal loading.

Should the wing ballast fail to drain as intended, the valves should be closed immediately (pull the lever backwards); try again to achieve even drainage by operating the valves again or, if icing is suspected, try again after descending into warmer air to achieve a symmetric jettison.

If the valves are to be closed again to retain water in the tanks (partial reduction of wing loading), also check that both valves really close. Otherwise, jettison all water.

If you do not achieve a symmetric situation after several attempts the situation should be regarded as an emergency, and instructions in Section 3.9 (Other Emergencies) should be followed.

C.G. Positions of the Water Ballast

The c.g. of the wing water ballast depends on the amount loaded:

Wing tanks:

Wing ballast, total		C.G. of wing ballast	
40 kg	88 lbs	152 mm	5.98 inch
80 kg	176 lbs	145 mm	5.71 inch
120 kg	264 lbs	145 mm	5.71 inch

The tail tank c.g. is located at x = 5678 mm / 224 inch

4.5.8 High Altitude Flight

The ASG 32 Mi is structurally limited to an EAS of max. 270 km/h (146 kt, 168 mph). Simultaneously, flutter prevention restricts true airspeed TAS to max. 348 km/h (188 kts, 216 mph). From both restrictions the never exceed airspeed V_{NE} changes with height as follows:

Altitude MSL.		V_{NE} Indicated Airspeed		
0 m	0 ft	270 km/h	146 kts	168 mph
5000 m	16404 ft	270 km/h	146 kts	168 mph
6000 m	19685 ft	256 km/h	138 kts	159 mph
7000 m	22966 ft	242 km/h	130 kts	150 mph
8000 m	26247 ft	228 km/h	123 kts	142 mph
9000 m	29528 ft	215 km/h	116 kts	134 mph
10000 m	32808 ft	202 km/h	109 kts	126 mph

The ASI under reads with increasing altitude, thus the true airspeed TAS relative to air mass is sufficient to make progress into even the strongest head winds at high altitude.

Placard for airspeed reduction at high altitude:

V_{NE} Speed Limit for high altitude	
Altitude msl [m]	V_{NE} IAS [km/h]
0 - 5000	270
< 6000	256
< 7000	242
< 8000	228
< 9000	215
< 10000	202

ASG 32 Mi

V_{NE} Speed Limit for high altitude	
Altitude msl [ft]	V_{NE} IAS [kts]
0-16000	146
< 19500	138
< 23000	130
< 26200	123
< 29500	116
< 32000	109

ASG 32 Mi

V_{NE} Speed Limit for high altitude	
Altitude msl [ft]	V_{NE} IAS [mph]
0-16000	168
< 19500	159
< 23000	150
< 26200	142
< 29500	134
< 32000	126

ASG 32 Mi

The appropriate placard has to be installed near the ASI.

The units of measurements used to indicate airspeed on placards must be the same as those used on the indicator.

WARNING: *Flights in icing conditions are not advised, especially when the aircraft is wet before climbing through the icing level. Experience suggests that drops of moisture on the surface will be blown back, lodge in the control gaps, and dry comparatively slowly there.*

This may cause the controls to become stiff to operate, or in extreme cases, jammed. A single climb through icing level with a previously dry aircraft, on the other hand, is not likely to impair the use of the controls, if icing-up of wing and tail leading edges occurs.

WARNING: *When carrying water ballast, avoid flying above icing level due to the danger of iced-up outlet valves, or in extreme cases bursting of wings due to ice formation.*

Water ballast must therefore be dumped, before entering altitudes with lower temperatures than 3°C (37°F).

WARNING: *Due to reasons of flutter safety, with water ballast in the wings Flight Level FL160 (5000m pressure altitude above 1013 hPa) may not be exceeded.*

4.5.9 Flight in Rain

Rain drops, frost and ice impair the aerodynamic qualities and also alter the flying behaviour. Therefore in such conditions, the quoted minimum speeds for straight and circling flight should be increased by approx. 10 km/h = 5,5 kts. Air speeds should not be allowed to drop below these values.

CAUTION: *Rain drops should be removed from a wet aircraft before take-off.*

Do not fly into icing conditions with a wet aircraft. In this context, see also Section 4.5.7 above.

4.5.10 Aerobatics

Aerobatics are not approved!

4.5.11 Operation with Power-Plant removed

The ASG 32 Mi may be operated as a normal sailplane when the power-plant is removed. However, the procedures for the removal and the re-installation of the powerplant as per section 2.3.4 of the maintenance manual are to be observed.

NOTE: *It is recommended to consult the certifying staff (person signing out the reinstallation and the revised loading chart) prior to the removal of the power plant.*

Section 5

5.1 Introduction

This section provides EASA-approved data for airspeed calibration, stall speeds and take-off performance and non-approved further information.

The data in the charts has been computed from actual flight tests with the sailplane and engine in good condition and using average piloting techniques.

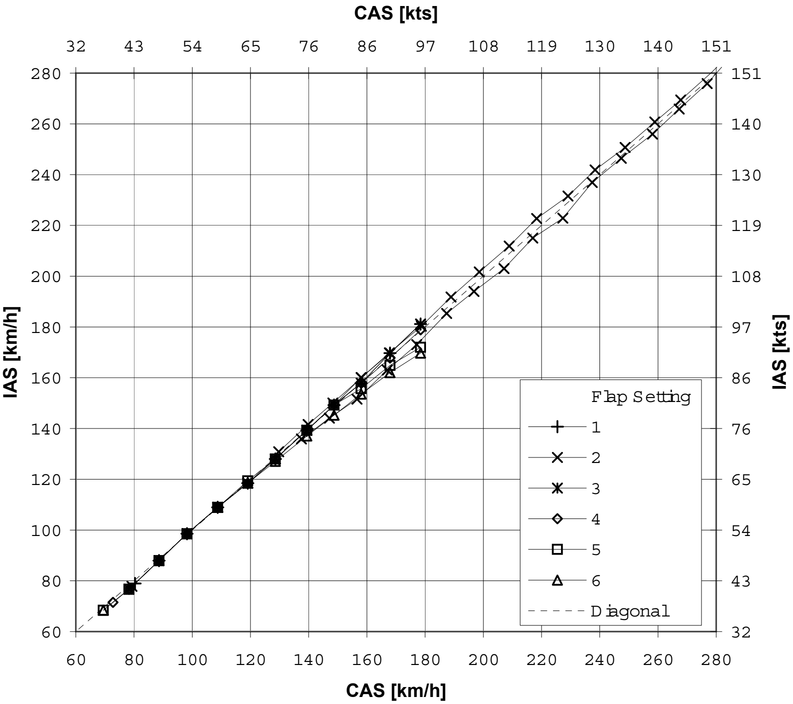
5.2 Approved Data

5.2.1 Airspeed Indicator System Calibration

The following diagram shows the position error of the ASG 32 Mi pressure system (The error of the airspeed indicator instrument adds to the diagrammed error). In the normally used range, the pressure system has a deviation of less than 3 km/h (2 kts, 2 mph).

Larger deviations only show up with very negative angle of attacks, i.e. in flap settings 5 and 6 above 150 km/h (81 kts, 93 mph). The position error is taken into account in the specified Maximum Flap Extended Speeds.

NOTE: *The ASI must take its pitot pressure from the pitot-tube in the fuselage nose, and its static pressure from the static ports in the fuselage tail boom.*



IAS = **I**ndicated **A**ir-**S**peed

CAS = **C**alibrated **A**ir-**S**peed

5.2.2 Stall Speeds

Stall Speeds in km/h and kts Indicated Air Speed.

Flap Setting	All up mass		
	650 kg / 1433 lbs	750 kg / 1653 lbs	850 kg / 1873 lbs
1	76 km/h 41 kts 47 mph	81 km/h 44 kts 50 mph	86 km/h 47 kts 54 mph
2	74 km/h 40 kts 46 mph	79 km/h 43 kts 49 mph	84 km/h 45 kts 52 mph
3	73 km/h 39 kts 45 mph	78 km/h 42 kts 49 mph	83 km/h 45 kts 52 mph
4	68 km/h 37 kts 42 mph	73 km/h 39 kts 45 mph	77 km/h 42 kts 48 mph
5	67 km/h 36 kts 41 mph	72 km/h 39 kts 45 mph	76 km/h 41 kts 47 mph
6	66 km/h 36 kts 41 mph	71 km/h 38 kts 44 mph	75 km/h 41 kts 47 mph
L	64 km/h 35 kts 40 mph	69 km/h 37 kts 43 mph	74 km/h 40 kts 46 mph
L + Airbrake	74 km/h 40 kts 46 mph	79 km/h 43 kts 49 mph	84 km/h 45 kts 52 mph

The speeds quoted are valid for an aerodynamically clean glider.

Stall warning in the form of buffeting will commence at about 5 - 8% above the indicated stall speeds.

Extension of air brakes increases the indicated stall speed in straight flight by 5 - 10 km/h (3 - 5 kts). The extension of the landing gear has no influence.

Stall Speeds in Circling Flight

In circling flight the stall speeds increase due to the higher load factors.

Bank angle	0°	30°	45°	60°	75°
Stall speed in turns compared to straight flight	100%	107%	119%	141%	200%

Loss of Altitude and Pitch below Horizon

Loss of altitude until to regain level flight after stall from straight or circling flight depends largely on:

- the all-up flight mass and c.g. position
- how quickly the pilot reacts
- the flap setting (more loss of height in more positive settings)
- turbulence of the air (lower stall speed achievable in still air, but more drastic wing drop)

From straight flight and in flap settings 1 to 6, the loss of altitude is about 30 m (100 ft), and 70 m (230 ft) with airbrakes extended.

From straight flight and with flaps in landing setting, the loss of altitude is up to 70 m (230 ft).

The cockpit nose may pitch 10° to 40° below the horizon.

Height loss from circling flight: up to 50 m (164 ft)

Stall speed and stall characteristics with propeller extended

Extension of the propeller does not significantly influence the stall speed.

With the engine running the stall characteristics are more docile. Close to stall, the engine runs rougher and changes its sound, which adds to the stall warning.

With the propeller extended, but stopped or windmilling, the stall warning is less pronounced, because there is always some buffeting from wake turbulences of the extracted propeller.
While flying at the threshold of the stall, with the propeller extended and stopped or windmilling, the additional drag can cause the airspeed to drop quicker than usual. Therefore, the time between dropping a wing and getting into a spin is shorter than in other configurations. This is valid especially for rearward c.g. positions, in flap settings 5, 6, L and with airbrakes extended.

5.2.3 Take-off performance

The take-off performances given below are applicable to launches

- on hard runways or hard, level and short mown grass runways
- with the aircraft, propeller and engine in good condition
- with application of the self-launch procedure described in section 4.5.1
- and for the following conditions:

Airfield elevation	0 m NN
Temperature:	15°C (59°F)
Air Pressure:	1013 hPa
Take-off mass (with two pilots):	850 kg (1874 lbs)
Speed (V_{IAS}):	90 km/h 49 kts 56 mph

	Grass runway	Hard runway
Take off roll:	400 m 1312 ft	270 m 886 ft
Take-off distance to 15 m (50 ft) height:	600 m 1968 ft	470 m 1542 ft

The influence of air temperature and air pressure (airfield elevation) on take-off performance is given in the following take-off chart

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!*

Tailwind, as well as an uphill runway, increase the take-off distances considerably. The possibility of abandoning the take-off must be considered, see also Section 4.5.1, point (3) Self-Launch.

Take-off Chart

The following chart gives values for take off roll and take-off distance to 15 m (50 ft) height related to various airfield elevations and temperatures.

Take-off mass 850kg (1874 lb)

		On hard surface		On grass	
Altitude m	Temperature °C	Take-off roll m	Take-off distance m	Take-off roll m	Take-off distance m
0	-15	201	350	266	415
0	0	234	407	327	500
0	15	270	470	402	602
0	30	309	538	495	724
500	-15	236	411	323	498
500	0	274	478	400	603
500	15	317	551	496	731
500	30	362	631	619	887
1000	-15	277	483	395	601
1000	0	322	561	494	732
1000	15	372	647	619	895
1000	30	425	740	784	1098
1500	-15	326	568	487	729
1500	0	379	660	615	896
1500	15	437	760	783	1107
1500	30	499	869	1011	1380
2000	-15	384	669	606	891
2000	0	446	777	776	1107
2000	15	514	894	1006	1387
2000	30	587	1022	1333	1767

Take-off mass 850 kg (1874 lb)

		On hard surface		On grass	
Altitude ft	Temperature °F	Take-off roll ft	Take-off distance ft	Take-off roll ft	Take-off distance ft
0	5	659	1147	838	1326
0	32	767	1336	1021	1590
0	59	886	1542	1242	1898
0	86	1014	1766	1510	2262
1500	5	763	1329	996	1562
1500	32	888	1546	1220	1878
1500	59	1024	1783	1493	2252
1500	86	1173	2041	1830	2699
3000	5	885	1540	1190	1845
3000	32	1029	1791	1466	2228
3000	59	1186	2064	1808	2686
3000	86	1357	2361	2237	3242
4500	5	1026	1786	1429	2189
4500	32	1193	2076	1773	2657
4500	59	1374	2392	2207	3224
4500	86	1571	2735	2763	3927
6500	5	1253	2181	1840	2768
6500	32	1455	2532	2311	3388
6500	59	1675	2916	2921	4162
6500	86	1914	3332	3735	5153

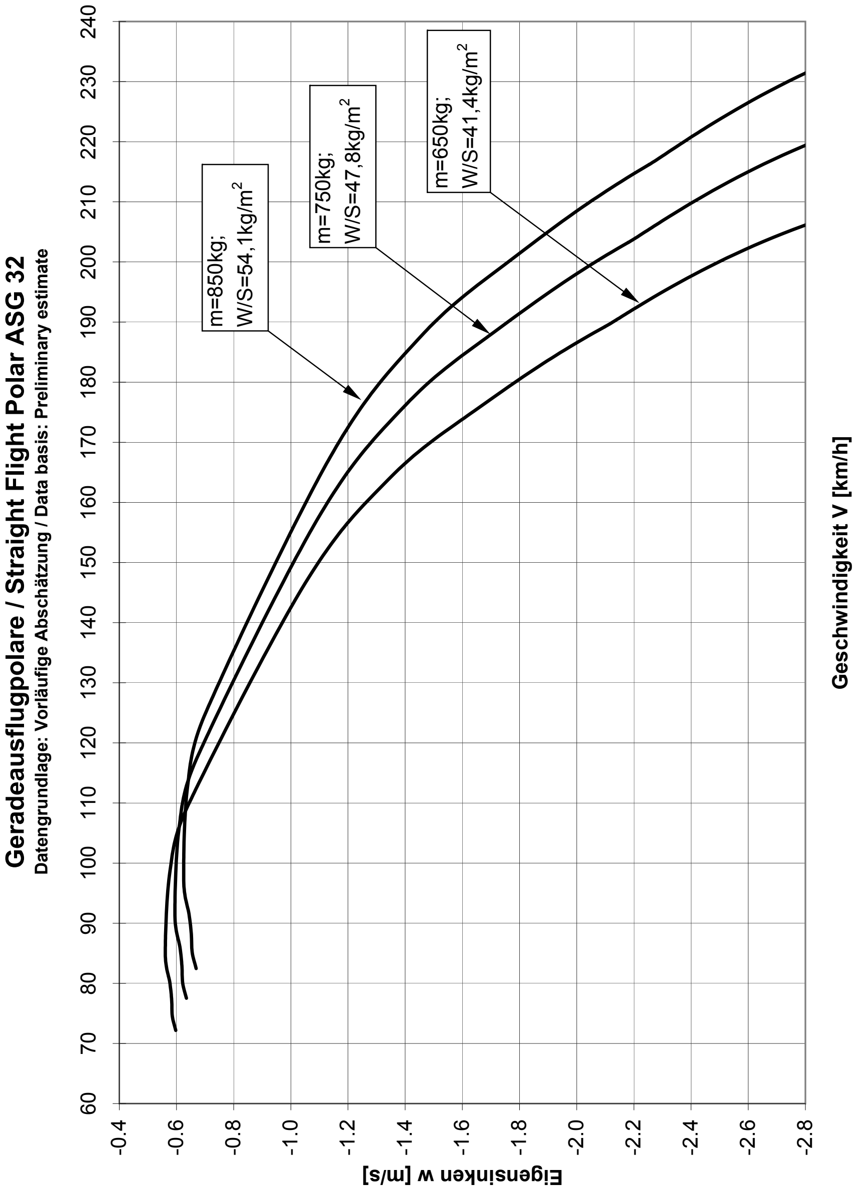
CAUTION: *For other runway surface conditions such as wet grass, soft ground, high grass, snow and water spots etc., which are not given in these charts, it is recommended to use the additional distance factors or percentages given in the AIP (Airport) Manual Volume 1!*

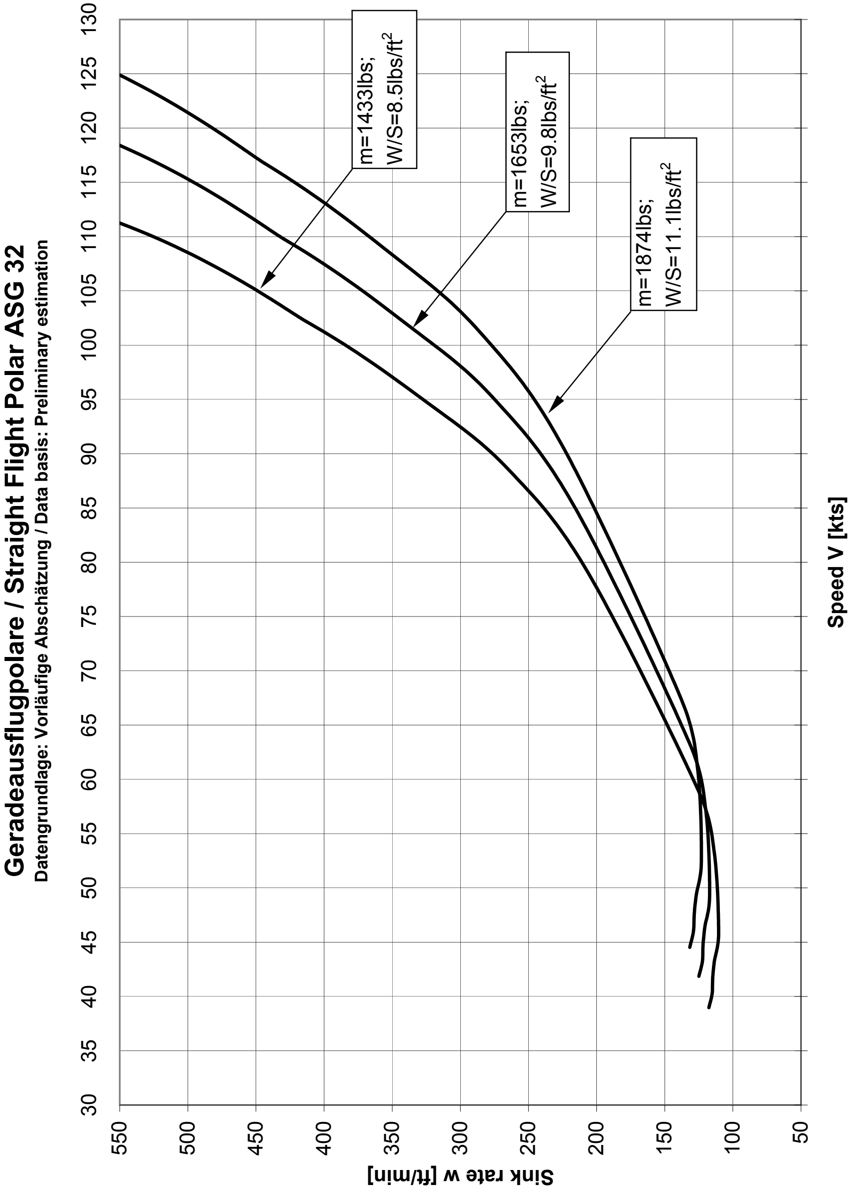
5.3 Non-Approved Further Information

5.3.1 Demonstrated Crosswind Performance

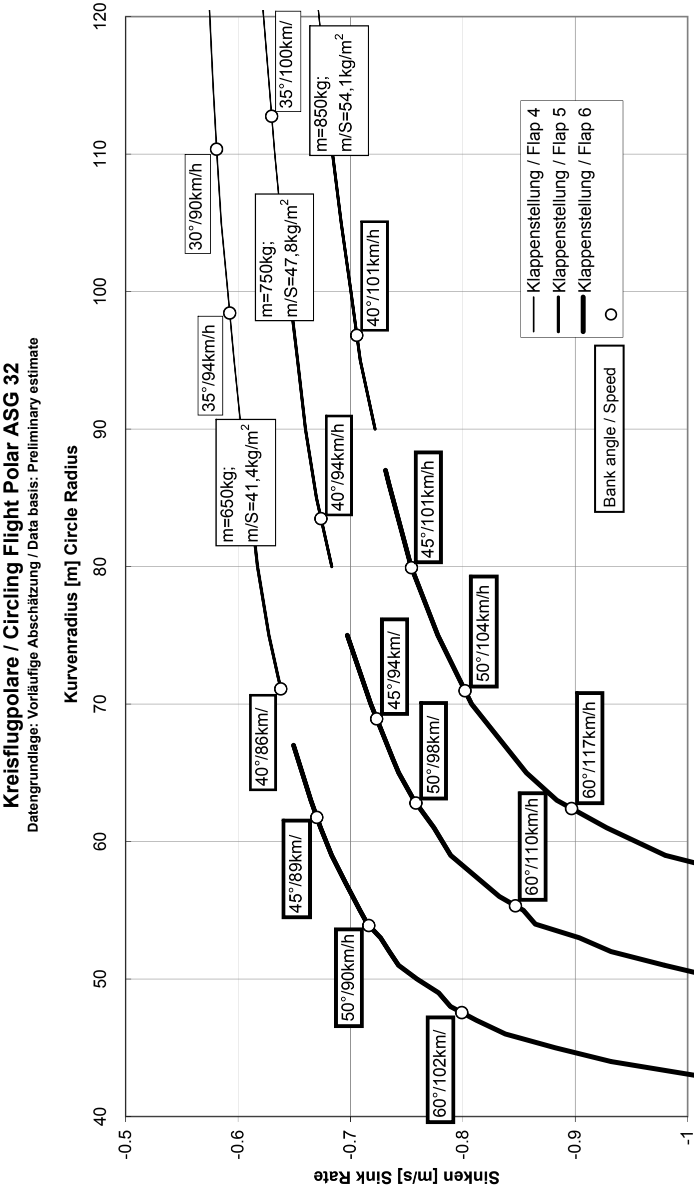
Self-Launch	25 km/h	13.5 kts	15.5 mph
Winch Launch	25 km/h	13.5 kts	15.5 mph
Aerotow	25 km/h	13.5 kts	15.5 mph
Landing	25 km/h	13.5 kts	15.5 mph

5.3.2 Flight Polar - Level Flight



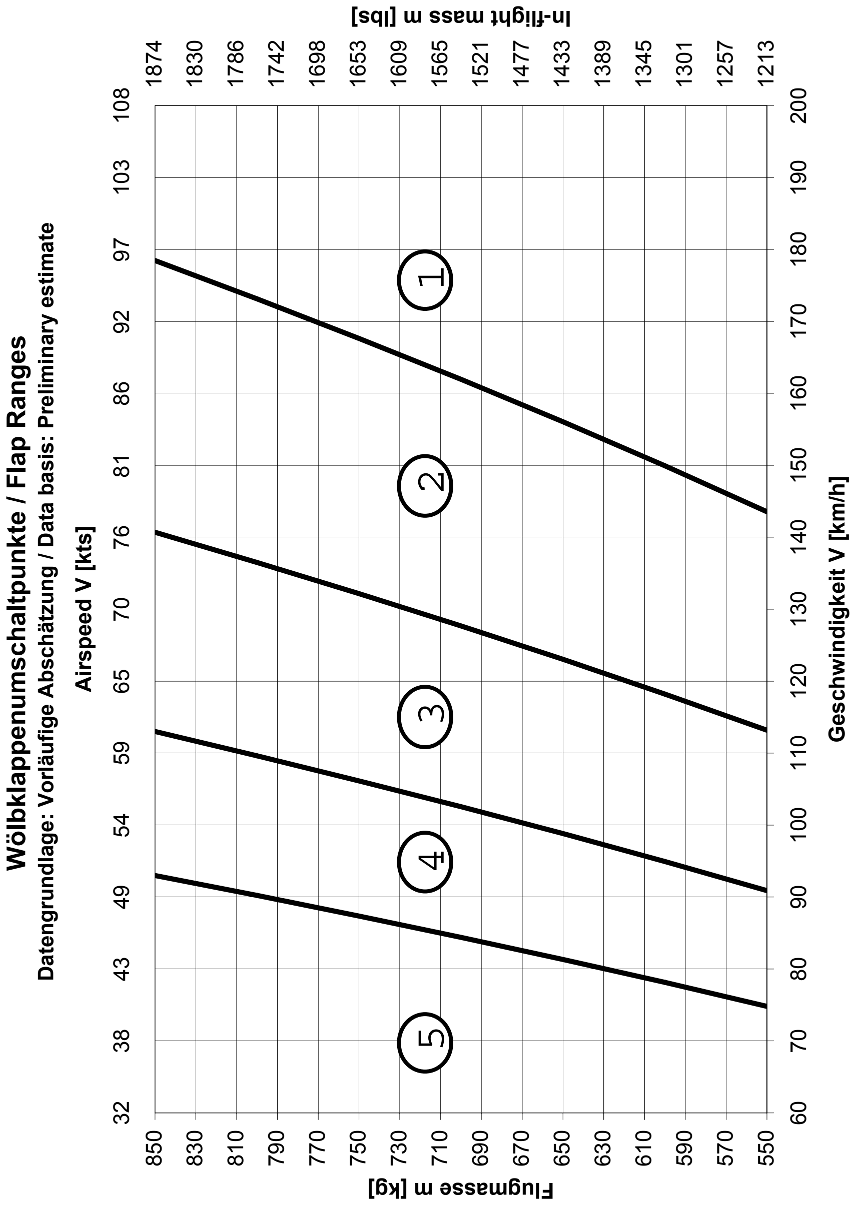

Geradeausflugpolare / Straight Flight Polar ASG 32
Datengrundlage: Vorläufige Abschätzung / Data basis: Preliminary estimation
m=1433lbs; W/S=8.5lbs/ft²
m=1653lbs; W/S=9.8lbs/ft²
m=1874lbs; W/S=11.1lbs/ft²
Speed V [kts]
Sink rate w [ft/min]
30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130
550 500 450 400 350 300 250 200 150 100 50

5.3.3 Flight Polar - Circling Flight



CAUTION: *These are solely the calculated optima! Additionally observe a safety distance to the stall!*

5.3.4 Flap Setting Ranges



The above diagrams describe the speed ranges of the various flap settings in straight flight, depending on the mass.

Flap Setting	L	6	5	4	3	2	1
Flap deflection	47°/12°	24°	20°	12°	5°	0°	-2,5°
Description	Landing	Circling	Circling	Neutral	Gliding	Gliding	Gliding

Flap setting 5 has a smaller sink rate than flap setting 6 over most of its speed range. Therefore flap setting 6 is only advisable in tight circles and for landing patterns.

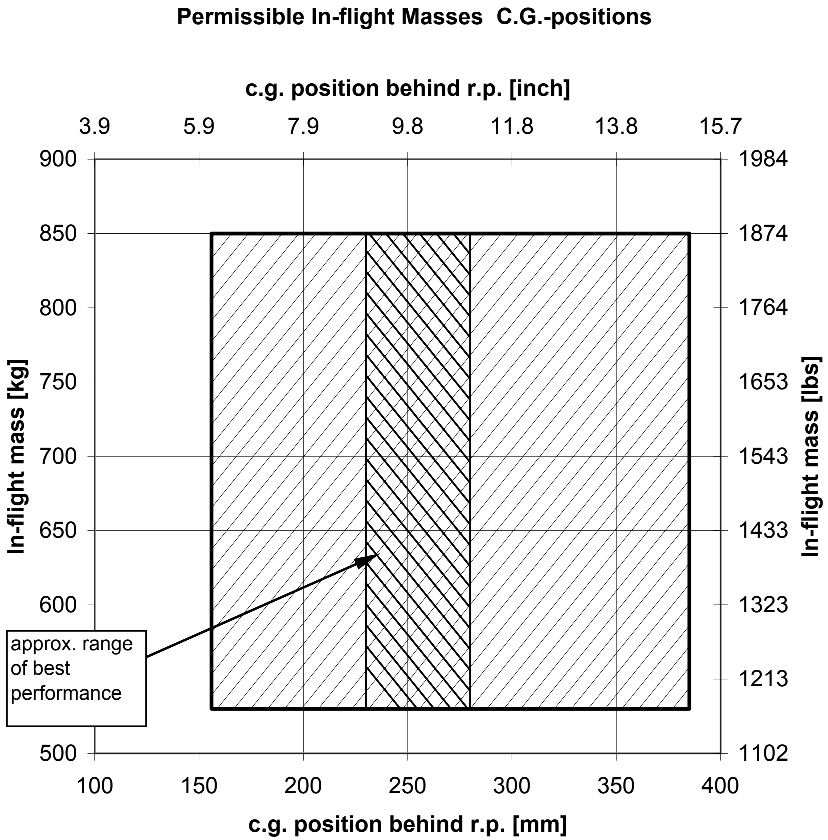
5.3.5 Influence of c.g.-position

To achieve the best gliding performance, the horizontal tail surface must not produce up- or downward lift, for the wing with its high aspect ratio is much more efficient in producing lift at low induced drag than the horizontal tail with its compact plan form.

This optimum cannot be realized over the whole range of airspeeds. During fast flight, the optimum c.g.-position varies around 190 - 220 mm (7.5 - 8.7 inch, flap settings 1, 2). During circling it varies around 270 - 315 mm (10.6 - 12.4 inch, flap settings 5, 6). Therefore the best choice depends on the proportion of time spent in circling and in gliding. With regard to the total loss of energy during a complete cross country flight, the optimum c.g. position may vary around 230 - 280 mm (9.1 - 11.0 inch) behind r.p.

As a matter of principle, the c.g. position has a great influence on longitudinal stability. In forward c.g. positions, control deflections and hand force gradients are larger. Thus it is advisable for inexperienced, light pilots to add more lead on the (optional) attachment in front of the pedals than necessary to comply with the minimum cockpit load.

5.3.6 Diagram for approved c.g.-limits



The permitted c.g.-range is maintained, when

- the maximum weight of non lifting parts is observed
- the c.g. of the dry glider is within the permissible range (see Mass and Balance Form, section 6.2), and
- water ballast is only filled in accordance with section 6.3.

5.3.7 Performance with engine running

Climb Rate

At MSL and normal atmosphere the ASG 32 Mi climbs at a rate of **2.1 m/s** (413 ft/min) at the best climb speed of V_y = 90 km/h (49 kts, 56 mph) (with take-off power).

Cruise

Cruise speed is V_H = 135 km/h (73 kts, 84 mph) at 7100 rpm.

Range

With full fuselage fuel tank the engine run time is about one hour, if the climb is done in three saw tooth profiles up to 2000 m. The initial three minutes of each climb are made at max. 7750 rpm and then continued at 7100 rpm.

Climb rate of **2.1 m/s** (413 ft/min) at 7750 rpm, mean flight height of 500 m (1640 ft), maximum take-off mass (weight) and standard temperature.

Climb rate of **1.4 m/s** (276 ft/min) at 7100 rpm, mean flight height of 1500 m (4921 ft), maximum take-off mass (weight) and standard temperature.

Fuel consumption of 19 l/h (5.0 US Gal/h) for take-off performance (3 min at 7750 rpm) and 13 l/h (3.4 US Gal/h) at 7100 rpm).

These consumptions are typical values from experience, but can be larger by up to 5/h (1.3 US Gal/h) according to the engine manual.

Climb speed is v_y = 90 km/h (49 kts, 56 mph). During the climbs, a distance of 90 km (48 Nm) is covered and a theoretical combined height gain of 5000 m is achieved. If this height is used to glide at best L/D, a further 250 km (135 Nm) is add to the 90 km. A maximum range of 340 km (183 Nm) results, not regarding losses due to taxiing, extending and retracting the propeller.

Type of fuel and aerodynamic condition of the aircraft can significantly affect this result. Therefore, this example should be used as guidance only.

If the cruise flight is done at V_H = 135 km/h (73 kts, 84 mph) and at 7100 rpm, a fuel consumption of 12 l/h (3.1 US Gal/h) gives a flight time of 66 minutes from a full fuselage tank. This provides a range of 150 km (81 Nm). A gain in altitude, which could be used for glide, is not obtained. Fuel to warm up the engine and for taxiing was not subtracted.

The current fuel consumption is indicated on the ILEC-LC Display as „fuel flow“. See Section 7.9 of this Flight Manual for additional information.

5.3.8 Noise Data

The noise emission measurements were carried out in accordance with ICAO Annex 16, Chapter 10 (Issue 6, July 2011). The determined noise levels are:

Take-off mass	Noise Level Kapitel 10	Limit Value: Kapitel 10.4b)
850 kg	65.9 dB (A)	76.2 dB (A)

Section 6

6.1 Introduction

This section describes the payload range within which the sailplane may be safely operated.

Procedures for weighing the sailplane and the calculation method for establishing the permitted payload range and a list of all equipment available for this sailplane are contained in the applicable ASG 32 Mi **Maintenance Manual**, Section 6.

A complete list of all equipment installed in the particular sailplane during the last weighing is enclosed in the sailplane records.

It is of vital importance for safe flight not to exceed the limits for the in-flight center of gravity, given in section 2.7.

After repairs, refinishing and fitting additional equipment this weight and balance record has to be updated, either by calculation, or if this is not possible, by weighing.

6.2 Mass (Weight) and Balance Form

The Mass and Balance Form overleaf shows the maximum and minimum cockpit loads, and the total load permitted in the fuselage.

These mass and balance data must be calculated in accordance with the currently valid weighing data. The data and diagrams needed for establishing these are to be found in the ASG 32 Mi **Maintenance Manual**, Section 6.

This Mass and Balance Form is valid only for the aircraft bearing the Serial No. shown on the title page of this manual.

Too lightweight pilot

If the **front pilot is lighter** than the minimum mass given in the Mass and Balance Form, then

- weight can be replaced with trim ballast plates fitted in front of the rudder pedals. See also Section 7.11.

- the rear pilot can be regarded with 40% of his mass

Too heavyweight pilot

If there are two pilots, and the **front pilot exceeds** the maximum mass given in the Mass and Balance Form (110 kg, 242 lbs), then the maximum mass in the rear seat must be reduced with 3 times of this amount of excess weight.

If there are two pilots, and the **rear pilot exceeds** the maximum mass given in the Mass and Balance Form, then the maximum mass of 110 kg (242 lbs) in the front seat must be reduced by this amount of excess weight.

A more precise calculation is possible with the pilot arms given in the maintenance manual, section 6.8.

CAUTION: *The seat loading may not exceed 120 kg (264 lbs) in either seat.*

Trim ballast in the vertical fin

A housing is provided in the upper part of the fin where trim ballast, for instance in the form of a battery, may be fitted.

Of course, if any trim ballast is mounted in the fin, the minimum cockpit load will be increased! This increased minimum cockpit load must also be shown in the DATA and LOADING PLACARD in the cockpit.

The lower permissible cockpit load without trim ballast in the fin will be shown only on page 6.5 of the Flight Manual.

An additional placard is to be affixed in the cockpit:

Reduced minimum Cockpit Load
without Trim Ballast in the Fin:
see Flight Manual Page 6.5

It has to be verified whether or not any trim ballast has been fitted by removing the horizontal fin. See also section 7.11.

Batteries underneath the front seat

Optional the ASG 32 Mi can be equipped with two batteries underneath the front seat.

Of course, if the batteries are removed, the minimum cockpit load will be increased! This increased minimum cockpit load must also be shown in the DATA and LOADING PLACARD in the cockpit.

The lower permissible cockpit load with batteries installed be shown only on page 6.5 of the Flight Manual.

An additional placard is to be affixed in the cockpit:

Reduced minimum Cockpit Load
with Batteries installed under Seat
see Flight Manual Page 6.5

It has to be verified whether or not any battery has been fitted by opening both fairings in the front seat. See also section 7.11.

Baggage

The baggage must be considered as part of the total mass of non lifting components.

Baggage in the baggage compartment in front of and on top the spar stubs has no significant influence on the in-flight c.g. If the stowage at the rear end of the engine bay (max 1.8 kg respectively 4 lbs) is used, then the minimum cockpit load increases by 2 kg (4 lbs)

Water ballast and fuel

See section 6.3

Disassembled Power-Plant

In case the ASG 32 Mi is to be operated without power-plant, the different minimum cockpit load can be inserted in the Mass and Balance Form **on page 6.5 of the flight manual**.

An additional placard is to be affixed in the cockpit:

Reduced minimum Cockpit Load
with Power-Plant removed
see Flight Manual Page 6.5

Also refer to section 2.3.5 in the maintenance manual.

MASS AND BALANCE FORM

Date of Weigh-ing	Empty mass 1)	Empty mass C.G. aft of RP 2)	Permissible pilot mass incl. parachute			max useful load in the fuselage (pilots, fuel, trim mass, , baggage) 1)	Inspector´s stamp and signature
			Front seat single seated		Rear seat, with 110 kg (242 lbs) in the front seat		
			min. 1)	max. 1)	max. 1)		

1) For U.S.-registered sailplanes show lbs.
2) For U.S.-registered sailplanes show inches.
   Other countries may use metric units

Example of load / C.G. calculation:

A weighing gave the following results:

m_e	=	574 kg	(1265 lbs)	Empty mass
x_e	=	630 mm	(24.8 inches)	Empty mass C.G.
m_{nl}	=	317 kg	(699 lbs)	Weight of non lifting components

A second weighing with a (removable) trim ballast of 5.4 kg (11.9 lbs) in the fin showed:

m_e	=	579.4 kg	(1277 lbs)	Empty mass
x_e	=	676 mm	(26.6 inches)	Empty mass C.G.

The **Mass and Balance Form** in page 6.4 must be filled out according to the following example:

Date	Empty mass 1)	Empty mass C.G. aft of RP 2)	Permissible pilot mass incl. parachute: Front seat single seated min 1)	Permissible pilot mass incl. parachute: Front seat single seated max 1)	Permissible pilot mass incl. parachute: Rear seat, with 110 kg (242 lbs) in the front seat max. 1)	max useful load in the fuselage (pilots, fuel, trim mass, baggage) 1)
xx.xx.xx	574 kg 1265 lbs	630 mm 24.8 inch without trim-ballast in the fin	78 kg 172 lbs	120 kg 264 lbs	120 kg 264 lbs	233 kg 513 lbs
	579.4 kg 1277 lbs	676 mm 26.6 inch with trim-ballast in the fin	93 kg 205 lbs	120 kg 264 lbs	117 kg 258 lbs	227 kg 501 lbs

For details see maintenance manual section 6.

6.3 Acceptable Water Ballast and Fuel Load

The amount of fuel and water ballast is restricted by the following limits:

1. Maximum Take-Off-Weight

Maximum take-off weight may not be exceeded.

	Maximum Take-off Weight	850 [kg]
less -	Empty Weight	-xxx [kg]
less -	Cockpit Load	-xxx [kg]
= max. total fuel and water load		xxx [kg]

2. Maximum Weight of non lifting Components

Maximum weight of non lifting components (550 kg / 1212 lbs) may not be exceeded.

	Total useful load in fuselage (from Mass and Balance Form above)	xxx [kg]
less -	Cockpit Load	-xxx [kg]
= max. load in tail tank and fuel tank		xxx [kg]

3. C.G. Limit for the Fuel Tank

The influence of the fuel on the inflight c.g. is negligible.

4. C.G. Limit for the Tail Tank

The tail tank may only be used in combination with the wing tanks. For every 30 Ltrs put in the wing tanks, not more than 1 Ltr may be filled in the tail tank.

Notes and Recommendations

The integrated wing water ballast tanks in the ASG 32 Mi can together hold about 120 liters.

To bring the c.g. into the optimum range of x = 230 to 280 mm (see section 5.3.5), exceed the minimum cockpit load in the front seat by 48 kg (106 lbs). For the purpose of this rule of thumb, the rear pilot must be regarded, namely 10 kg (22 lbs) of the rear pilot count as 4 kg (9 lbs) on the front seat.

The ratio of 1 Ltr tail ballast per 30 Ltrs wing ballast is more than sufficient to keep the c.g. in the optimum range.

Section 7

7.1 Introduction

This Section provides description and operation of the sailplane and its systems. Refer to Section 9, Supplements, for details of optional systems and equipment.

A detailed technical description of the glider with layout drawings can be found in the Maintenance Manual.

7.2 Cockpit Controls

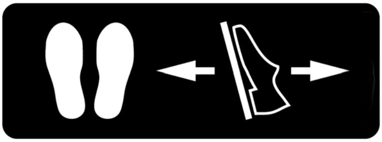
Aileron and Elevator

Both these controls are operated by means of the control column. The stick is also fitted with the trim release lever for setting the trim, and with the radio transmit button.

Rudder

The rudder pedals are adjustable to suit the length of the pilot's legs.

Front Seat:



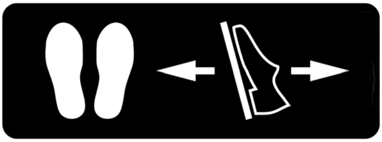
Pedal Adjustment:
Grey knob right of the stick.

To move pedals forward: Pull knob and push pedals forward with your heels. Release knob and push again to lock in position.

To move pedals aft: Relax pressure on pedals, pull knob back. Then release knob and apply pressure to pedals to lock in position.

WARNING: *When the pedals are in their foremost position, large shoes may interfere with the fuselage structure. Check free movement of the rudder control circuit!*

Rear Seat:



Pedal Adjustment:
Grey ring between seat and stick

To adjust: Relax pressure on pedals, and pull grey ring up. Move pedals with the ring or with the heels. Left and right of the ring there are holes in the floor, into which the assembly must hook again.

Flap Control

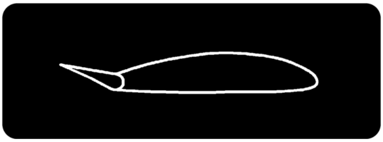
Each wing of the ASG 32 Mi is equipped with two trailing-edge flaps each side which cover the entire span. In flap settings 1 to 6 both flaps make synchronous deflections. Both flaps also work as aileron, with the inboard flap making only small deflections, for higher lift in circling flight. (Therefore the inner flap is often referred to as “flap”, while the outer flap is called “aileron”)

When the landing flap setting L is selected, the inboard flap deflects downwards 47° whereas the aileron only deflects downwards 9°. This increases the sink rate, improves the aileron effectiveness, and slightly reduces the stall speed.

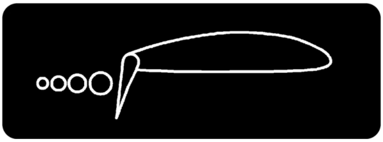
The wing flaps and ailerons are equipped with pneumatic turbulators on the lower surface for the purpose of boundary-layer transition control. NACA inlets integrated on the lower surface supply the air emitted through the capillary holes. This solution is very simple and robust in operation.

Flap settings are selected by means of the black handle on the left cockpit wall. Pivot the handle down to unlock so that it may be moved forwards or backwards.

The flap settings are marked 1, 2, 3, 4, 5, 6 and L above the position pointer.



Negative flap setting for high speed

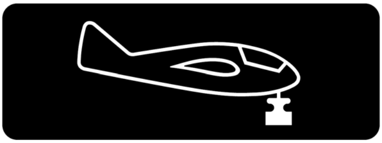


Flap in landing setting

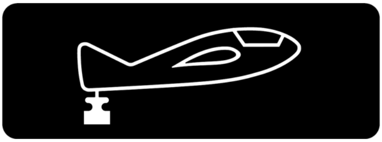
Trim

There is a trim control for the longitudinal trim. To set the trim, press the trim release lever on the control stick when flying at the desired air speed. A trim indicator is fitted on the left cockpit wall at the seat.

While pressing the stick mounted trim release lever, the trim can also be adjusted by sliding the trim indicator knob to a desired position.



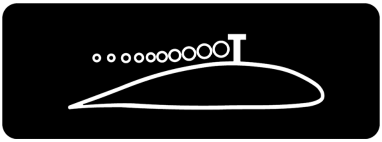
Trim nose heavy



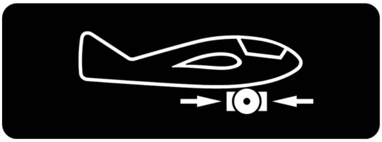
Trim tail heavy

Airbrakes

The airbrakes are operated with the blue handle mounted on the left cockpit wall.



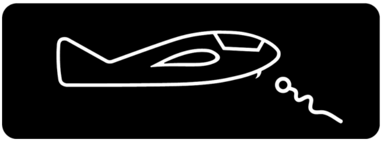
Pull the blue handle to extend the airbrake paddles.



When the airbrake handle is pulled back to its fullest extent, it will also actuate the hydraulic disc brake of the main wheel.

Launch Cable / Tow Hook Release

High on the left cockpit wall you will find the yellow cable release knob.



Yellow T-handle for cable release

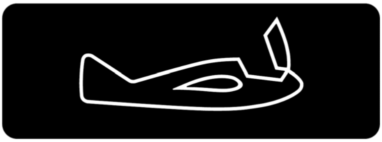
Pulling the yellow knob will open one or both of the tow hooks.

To allow the launch cable to be attached, pull the yellow knob back to the stop and then let it go, to allow the tow hook to snap shut and lock.

Opening and Closing the Canopy

<u>Front Seat:</u>

The canopy is locked by means of the two **white** lever handles fitted to the canopy frame at the right and left.



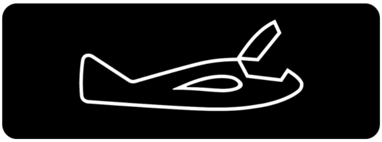
White levers for opening the front canopy

NOTE: *The front canopy can only be locked, when the rear canopy is closed and locked.*

To open the canopy, both levers are pivoted to the rear and the canopy is pushed up.

<u>Rear Seat:</u>

The canopy is locked by means of the two **red** lever handles fitted to the canopy frame on the right and left.



Red levers for opening the rear canopy

To open the canopy, both levers are pivoted to the rear and the canopy is pushed up.

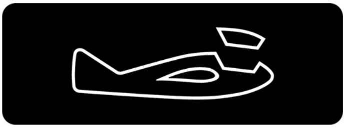
NOTE: *If possible, do not leave the aircraft parked or unattended with the canopy open, because:*

1. *the canopy could be slammed shut by a gust of wind which might shatter the Perspex.*
2. *at certain elevations of the sun the canopy could act as a lens concentrating the sun's rays, which might harm instruments and equipment severely.*

Emergency Canopy Jettison

Front Seat:

To jettison the canopy, pull jettison levers (red levers mounted at either side of the canopy frame) and pull canopy up!



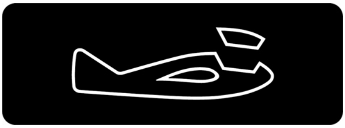
Red levers for jettisoning the canopy

***CAUTION**:* *Push the front canopy open with the canopy jettison handles. Do not push up the canopy above the head directly with the hands. The rear pins of the locking mechanism will hold the rear end of the canopy down, to make it swivel around its trailing edge.*

NOTE: *Operating the jettison levers allows the canopy to be removed for easy access when inspecting instruments.*

Rear Seat:

Pull back both red canopy jettison handles and use them to push open the canopy. The air stream will break off the canopy rearwards.



Red levers for jettisoning the canopy

Ventilation

<u>Front Seat:</u>

There are two means of ventilation in the cockpit:

A ventilation flap is located at the front of the canopy. This is operated with the small black knob on the instrument panel. This ventilation also serves as a de-mister for the canopy.

Knob for ventilation
Pull to open

A second ventilation nozzle adjustable in flow rate and direction is fitted on the right cockpit wall.

<u>Rear Seat:</u>

There are two means of ventilation in the cockpit:

On the canopy arch there are small ventilation nozzles, which are turned on/off by the black knobon the right side of the canopy arch. This ventilation also serves as a demister for the canopy.

Knob for ventilation
Move up to open

A second ventilation nozzle, adjustable in flow rate and direction, is fitted on the right cockpit wall.

To increase the de-mist effect of the vents on the canopy frames, the ventilation on the right cockpit wall should be closed.

7.3 Instrument panel

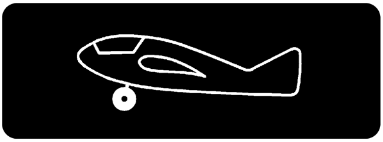
For safety reasons, only a GRP panel made in accordance with the lamination scheme specified by the manufacturer may be used.

Instruments of more than 1kg (2.2 lbs) need additional support beyond the screws provided. This can be done by means of aluminum straps fixed to the box in front of the instrument panel.

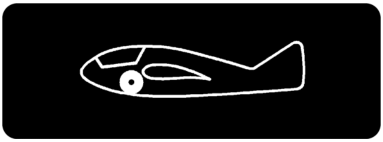
Equipment with operating controls must be fitted conveniently within reach, when the pilot is secured in the seat safely. Flight monitoring instruments, like ASI and altimeter, must be mounted within the pilots field of view from which the ASI should be mounted high in the panel in a preferred position.

7.4 Landing Gear System

The landing gear is extended and retracted by means of the black handled lever mounted at the right-hand cockpit wall. The front, extended position is reached, when the handle is pivoted to the cockpit wall. When retracted, the landing gear is locked through a catch inside the landing gear compartment.



Landing gear extended
(lever forward)



Landing gear retracted
(lever aft)

NOTE: *Remember the crib > Retractable landing gear*
*to **retract** landing gear = **retract** lever.*

Tire pressures: see section 4.3

The valves of main wheel and tail wheel are on the left hand side.

On the fixed tail wheel, the valve is only accessible when the tail wheel is removed from the fuselage. Optionally the fuselage can be modified in such a way, that a gap in the seam of the tail wheel fender allows direct filling (see **Maintenance Manual** Section 2.5.4).

7.5 Seats and Safety Harness

Seat and Seating Positions

Front Seat:

Before flight, the lower hinge of the backrest can be set in either of two positions. The angle of the backrest can be set with the hand crank on the right cockpit wall, even in flight. The backrest requires the use an appropriate parachute or a rigid foam cushion.

Adjustment crank of the backrest

Optimum seating position is achieved when the upper thighs contact the wedge of the seatpan and the backside fits into the corner of the cockpit floor. The anchor points of the lap straps are fixed in such a relation to the seatpan that submarining (sliding forward from underneath) is extremely remote.

Very large pilots can take out the back rest totally. In this case the headrest must be pulled out, and be inserted into the openings of the rear instrument panel.

CAUTION: *With the backrest installed, the head rest must be inserted into the backrest. Otherwise the head rest must be inserted into the rear instrument panel.*

The headrest must be adjusted in such a way that the point of head contact is at eye level.

Very short pilots must adjust their seating position by means of a firm cushion (energy absorbing, semi-rigid foams are optimum) so that all controls are within comfortable reach and that their view to the outside is improved. A small pilot is positioned high enough when the instrument panel does not restrict the forward view and the headrest contacts your head at eye level. The instrument cover is designed so that the panel edge is in line with the front contour of the canopy glass.

For all sizes of pilots it is very important to adjust and lock the backrest, to prevent being moved backwards during initial take-off acceleration (winch-launch). For the same reason, cushions used must be sufficiently rigid and stiff.

Rear Seat:

There is no means of adjusting the rear seat. A seat cushion, which moves the sitting position forward as well as upwards, is available as optional accessory for small pilots.

Apart from that the same applies as in the front seat.

Safety Harness

Correct fastening of seatbelts in gliders (recommendation by "TÜV Rheinland"):

① sit down in the seat

② put pelvic belts on and fasten them as tightly as possible

③ make sure that the pelvic belts are lying on the pelvis and the buckle is in the middle of the pelvis

④ plug shoulder belts into the central buckle and fasten them with significantly lower tension than the pelvic belts
IMPORTANT: in doing so, the buckle must not be pulled up towards the soft parts of the body!

⑤ when the belt system loosens during the flight: always refasten the pelvic belts first and then the shoulder belts.

Check every time that each individual strap is properly secured in the harness lock. Check from time to time if the lock opens easily under simulated load.

Automatic parachute static line

As an option, anchor rings for the static lines (ripcord) of automatic parachutes are attached. These rings are painted red. For the front seat one is located on the structure beside the rear instrument panel, and for the rear seat one is located on the rear canopy frame.

7.6 Pitot and Static Systems

A multi-probe is located in the vertical fin, delivering static-, pitot- and TE-pressure. Static ports are located laterally in the tail cone. A pitot tube is located in the fuselage nose.

The airspeed indicator is driven by the pitot pressure from the tube in the fuselage nose and by the static pressure from the tail cone.

The altimeter is connected to the static ports in the tail cone.

Pneumatic and electric variometers are fed from the probe in the vertical fin.

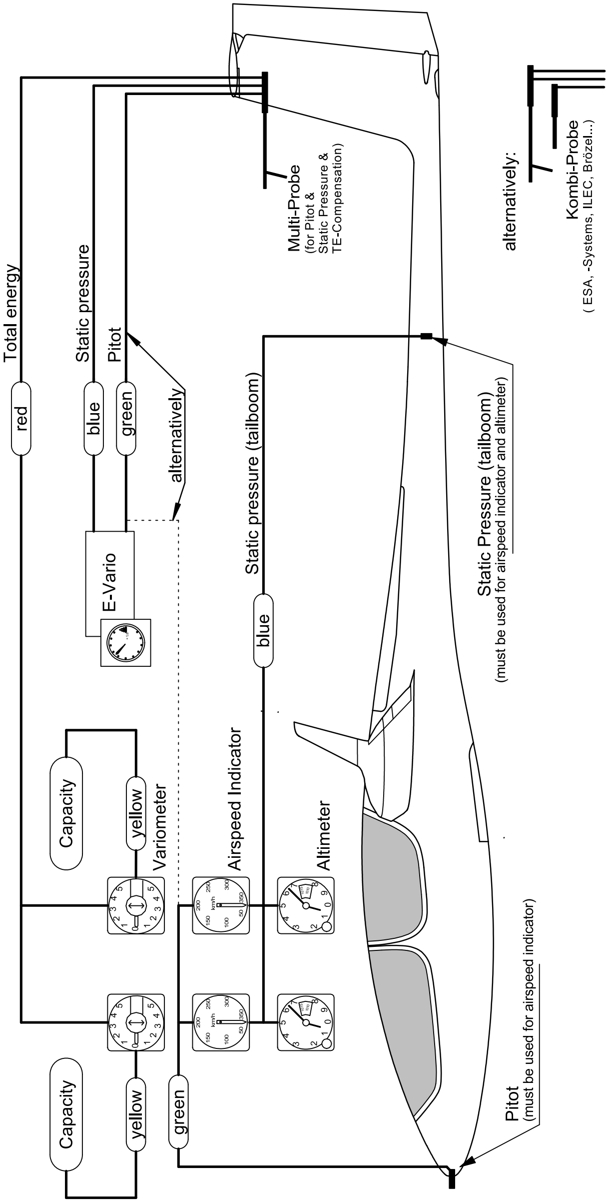
Ensure that the multi-probe is fully pushed home in its seating in the fin. From time to time, the inner end of the probe should be lightly lubricated with Vaseline or a similar lubricant, in order to save the O-ring gaskets from wear.

7.7 Airbrake System

The ASG 32 Mi is equipped with Schempp-Hirth type airbrakes on the upper side of each wing. They efficiently increase sink rate, but also increase stall speed by 5-10km/h (3-5kts, 3-6mph). They have only a small effect on trim. See section 2.9 for max load factors with airbrakes extended.

The airbrake handle also actuates the hydraulic disk brake of the landing gear, when it is fully pulled back.

Fig. 7.6-1 Pitot and Static Lines and Instrument Connections



7.8 Baggage Compartment

Hard objects may not be carried in the baggage compartments without being securely fastened! If, for instance, a barograph is to be carried in this space, a mounting recommended by the manufacturer must be used.

In front or on top of the spar

The baggage load in this compartment may not exceed 9 kg (20 lbs).

Baggage com- partment load **max. 9 kg** **(20 lbs)**

Stowage in the engine bay

At the rear end of the engine bay there is a stowage compartment, in the form of a FRP-insert, which can be closed with an aluminum cover. The baggage load in this compartment may not exceed 1,8 kg (4 lbs).

Maximum loading of
1.8 kg (4 lbs)
must not be exceeded!

Loading items into this stowage compartment increases the minimum cockpit load by 2kg (4.4 lbs):

Load (max. 1.8 kg / 4 lbs) in the stowage in the engine bay **increases** the **Minimum Cockpit Load** **by 2 kg (4.4 lbs)!**

7.9 Water ballast system

In each wing there is a water bag installed with a capacity of 60 l (15 US-gal, in total: 120 l or 31 US-gal). As an option, a tail tank of 5 l (1.3 US-gal) can be installed to counteract the nose heavy moment of the wing water ballast.

The mechanical valves are operated by means of a lever on the right side of the cockpit in the landing gear lever gate. The valves are operated simultaneously.

Pushing the lever forward opens all valves at the same time.

The tail tank must drain in at least half the time of the wing tanks, to safely prevent the in-flight c.g. from exceeding the rear limit.

For filling and balancing there are levers in the baggage compartment, which open the individual wing tanks independently. These levers can be locked open. This lock is cleared, when the lever is pushed further open or the valves are opened from the cockpit.

The tanks are filled through their draining ports. Therefore a filling hose is necessary, see section 4.5.7. The air vents of the tanks end in ports on the winglet roots (wing tanks) and in a port on the left side of the vertical fin (tail tank).

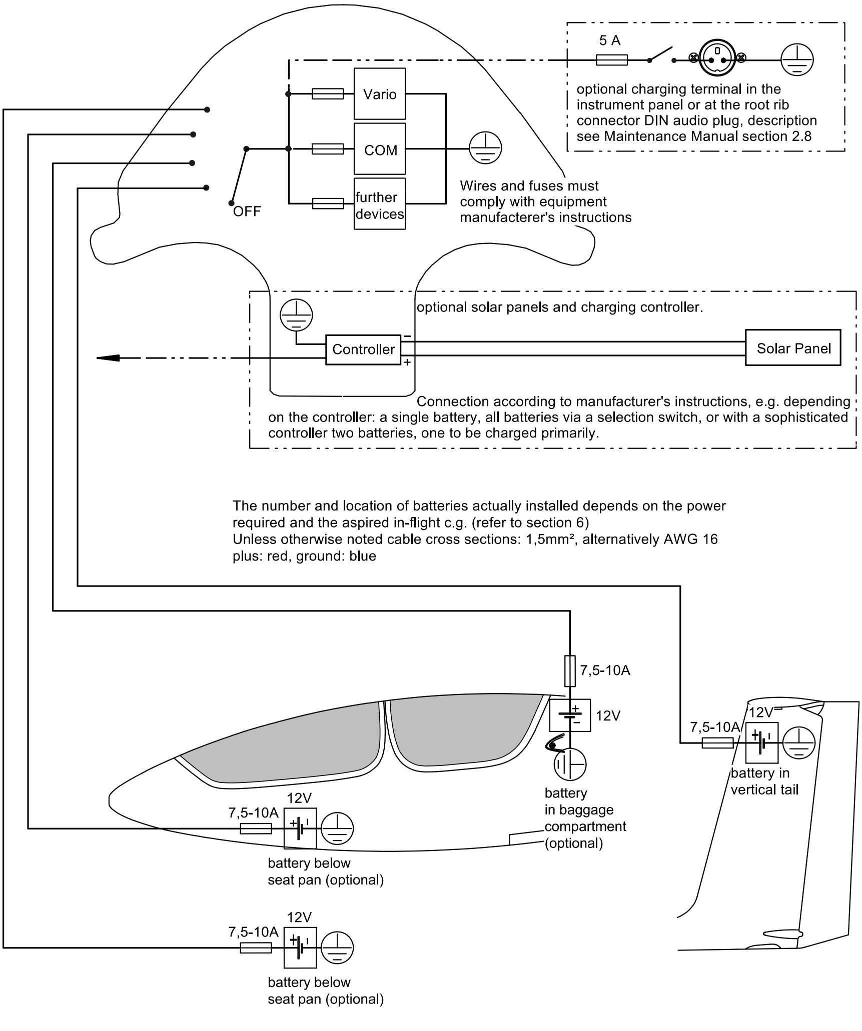
7.10 Electrical System of the Avionics

The electrical system is powered by 12V batteries. Battery compartments are provided below the seat pan (optional), in the baggage compartment (optional) and at the top of the vertical fin. Close to each battery, the circuit is protected with a fuse between 7,5A and 10A, depending on the electrical requirements. The battery selector switch in the instrument panel also serves as main switch.

Each electrical consumer is protected by its own fuse.

If solar cells are installed different variations are possible, depending on the charging controller: e.g. always charging a specific battery; primarily charging one battery and then another, or a switch to select the battery to be charged.

Fig. 7.10-1 Circuit Diagram



7.11 Miscellaneous Equipment

Removable Trim Ballast

If required, the ASG 32 Mi can be equipped with a fitting for lead trim ballast plates which can be bolted into place in front of the rudder pedals.

For this location, a 1 kg (2.2 lbs) lead trim plate equals a pilot weight of 1.6 kg (3.5 lbs).

Thus, a pilot weighing 11 kg (24 lbs) less than the minimum cockpit load must fit seven trim plates weighing 1 kg (2.2 lbs) each.

A maximum of 9 trim plates are allowed for installation.

Trim Mass (Battery) mounted in the fin

Fitting a trim mass (or battery) in the fin increases the minimum cockpit seat load. Only use trim masses that were prepared for the individual glider and were considered in the latest entry of the mass- and balance form. Then the minimum cockpit seat load with or without trim mass in the tail can be looked up in section 6.2 (Mass & Balance Form). Only the highest value for the minimum cockpit seat load may be registered on the cockpit placards.

The foam buffer fitted over the mass or battery secures it upwards. This plastic foam pad must not be forgotten when changing or replacing batteries. You should also ensure that there is adequate plastic foam seating under the battery to protect it from hard knocks!

The maximum weight allowed to be installed in the fin compartment is 10 kg (22 lbs).

Batteries underneath the front seat

If both batteries under the front seat are removed, the minimum cockpit load will be increased. Only use batteries that were prepared for the individual glider and were considered in the latest entry of the mass- and balance form. Then the minimum cockpit seat load with or without trim mass in the tail can be looked up in section 6.2 (Mass & Balance Form). Only the highest value for the minimum cockpit seat load may be registered on the cockpit placards.

Oxygen

Up to two oxygen bottles can be mounted in the area above the spar stubs, if the appropriate attachments are installed. Adapters according to the individual bottles are necessary, which are available from AS as optional accessory. In order to support the bottles in the bulkhead behind the spar, various inserts for the bulkhead required by different oxygen bottles are available.

When fitting the oxygen bottle, ensure that it is properly installed and securely anchored.

NOTE: *Fitting of oxygen equipment causes only a minimal change in the empty-mass c.g. position.*

When flying at greater heights while using the oxygen installation, it should be borne in mind that any particular system may only be suitable for a limited altitude range. The manufacturers' instructions should be complied with.

Emergency Location Transmitter

The location least vulnerable to damage in case of accident is the area between the two drag spar pins at either side of the fuselage. Therefore, the emergency location transmitter (ELT) should be fitted to the fuselage wall in the baggage compartment area, in an appropriate mounting.

The antenna must be located in the area of the baggage compartment between the spar stubs and the canopy. Except from the vertical fin and the area above the baggage compartment, all parts of the sailplane contain carbon reinforced plastic (CRP). This material would shield the antenna.

7.12 Power-plant

The propeller of the power plant unit - when retracted - is accommodated in the engine bay in the fuselage behind the wing. It is extended and retracted by means of an electric jack.

The following controls are provided for the power plant:

- **the Control Console** (below the instrument panel in front of the front control column and a throttle lever for the rear seat),

- **the ILEC Control Unit** (fitted in the front instrument panel. An optional second control unit can be fitted in the rear instrument panel; the hand over between the two units is done by a **switch** on top of the rear instrument cover),

- the **Power Plant Main Switch** (fitted in the control console),

- the **Fuel Valve** (left of the seat pan),

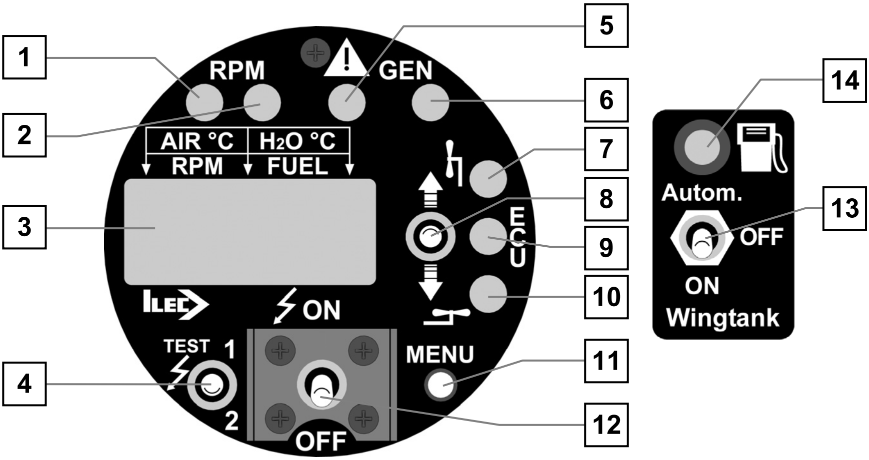
- the **switch for fuel pump 2** (on the instrument panel),

- the **Rear View Mirror** for Propeller Positioning (on the front instrument panel cover or on the instrument panel),

- and the **Fire Warning Light** (red blinking light diode in the instrument panel).

- **Tank selector switch** (next to the ILEC Engine Control Unit)

Fig. 7.12-1 ILEC Engine Control Unit and Tank selector switch



1. **green** LED for green RPM Range
2. **yellow** LED for yellow RPM Range
3. LC-Display
4. Switch for testing ignition circuits
5. **red** LED: RPM limit exceeded and General Alarm
6. **red** LED: Charging Control – Warning
7. **green** LED: Propeller completely extended
8. Switch for extending/retracting propeller
9. **red** LED: ECU - Error
10. **green** LED: Propeller completely retracted
11. Menu Button (Display switching)
12. Ignition Switch
13. Tank Selector Switch
14. **yellow** Tank-LED: Wing tank valve opened

Instrument display check

When switching the ILEC Engine Control Unit on, all LEDs light up for approx. 1 second. At the same time all segments of the two digit display appear. Thus, all display elements can be checked.

Description of ILEC Engine Control Unit

The figures given in the square brackets refer to the numbering in the preceding ILEC Overall View Fig. 7.12-1

Switch for extending and retracting the propeller [8]

The propeller is actuated by the extending/retracting switch, located on the right side of the unit. The switch remains in its “Propeller Extended” position, that is to say the propeller extends fully, when the pilot has given the command. The switch does not have a detent-setting in direction “Propeller Retracted”. This means that the electric jack stops immediately (the propeller stops retracting) when the pilot stops pushing the switch.

NOTE: *While the "Retract" switch is pressed the retraction process is automatically interrupted after 2/3 of the travel (cooling position). The pilot must press the switch again, if he wants the entire retraction to occur at this point.*

When the propeller is in the "cooling position", the ILEC constantly monitors the Liquid Coolant Temperature. If this temperature drops 2°C from its maximum value or after 6 minutes after ignition is switched off, the exhaust has cooled down enough and the propeller can be retracted completely. The LC-Display message "RETRACT" and a pulsating tone provide a reminder for that.

Limit switches fixed at the engine communicate to the micro controller once the end position “retracted” or “extended” is reached. The micro controller then switches off the electric jack.

The micro controller prohibits the retraction of the propeller unit as long as the ignition is on in order to prevent dangerous situations. But the propeller can be extended when the ignition is on, the starter however remains deactivated until the propeller is fully extended. To indicate the actual position of the propeller unit to the pilot, two green LED’s **[7** and **11]** have been positioned above and below the switch respectively.

If the propeller is fully retracted, the lower LED **[10]** is permanently on whereas the upper LED **[7]** is permanently on once the propeller is fully extended. At positions between fully extended and fully retracted neither of the LEDs is illuminated since the limit switch signals are missing.

NOTE: *With ignition ON* ***[12]****, the propeller can be extended, but not retracted.*

Ignition

The ignition is switched on or off by the ignition switch **[12]**. The ignition switch is protected against unintended activation by means of a safety bracket. The engine can only be retracted when ignition is switched off.

With the ignition circuit test switch **[4]** to the left of the ignition switch, the functioning of the ignition circuits 1 and 2 can be tested separately. For that the ignition circuit 2 is interrupted in switch position 1. Conversely, the ignition circuit 1 is interrupted in position 2.

Fuel pumps

The fuel pump 1 is switched on at the same time as the ignition.
In addition, the second fuel pump can be switched on by means of a switch on the instrument panel. However, it is only supplied with current when the ignition is switched on.

RPM Measuring

At about 400 RPM the RPM is displayed in four digits at the lower left of the LC-Display **[3]**. The RPM display has a resolution of 10 RPM. At 7750 RPM the RPM reading starts flashing.
To signal that the RPM are approaching the maximum permissible RPM limit, a green **[1]** and a yellow **[2]** LED are installed above the RPM display. Each respective LED is on while the RPM are in the corresponding range. Reaching the yellow range, the green LED extinguishes and the yellow LED **[2]** illuminates. Reaching the red range, the yellow LED extinguishes and the **Red ⚠LED [5]** on its right blinks. The latter occurs parallel to the blinking of the RPM-reading. If the speed of 7100 RPM is exceeded for more than 3 minutes, the yellow LED **[2]** starts to blink and a continuous audible signal will be generated.

The RPM ranges are:	**Green**	2700 to 7100 RPM
	Yellow	over 7100 to 7750 RPM
	Red	over 7750 RPM

Fuselage Tank Fuel gauge

The amount of fuel is displayed three digits in litres at lower right (FUEL) on the LC-Display **[3]**. If the motorglider is equipped with fuel tanks in the wing, the magnetic valve is opened if the fuel level falls below 6 litres. The fuselage tank is now filled up automatically out of the wing tanks. For that to happen, the tank selector switch **[13]** has to be in the "**Automatic**" position. If the fuel level in the fuselage tank approaches 12 litres, the valve is closed automatically. The automatic control of the magnetic valve can be switched off (**OFF**) by the tank selector switch **[13]** or switched to manual mode (**ON**). As soon as the magnetic valve opens, the yellow Tank-LED **[14]** blinks.

If the fuel level in the fuselage tank falls below 4 litres, an alarm signal is heard and the LC-display indicates the fuel reserve (FUEL 3L, blinking). The alarm signal can be switched off by pressing the menu button **[11]**, but after 4 minutes it will come on again automatically.

Calibration of the fuel gauge

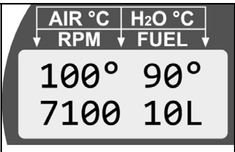
With the ignition off, propeller retracted and topped up fuselage tank, the LCD-display can be put into "**Calibr.?**"(calibration) mode by pressing the menu button **[11]** 8 times. Then press the same button **[11]** for 5 seconds. If the LC-display indicates a calibration value (for example **[100]**), the calibration procedure is completed. Now the fuselage tank sensor is calibrated to the type of fuel in the reservoir. This calibration value is electronically stored. The calibration has to be repeated whenever a change of the type of fuel (e.g. from Mogas to Avgas) is undertaken.

Recalibrating fuel gauge to include the wing tanks

Turn off ignition, retract engine and top off the fuselage tank. With the menu button **[11]** the mode "**FUEL**" is chosen (press 6 times). Then press the same button **[11]** for 5 seconds. The indication "FUEL" in the LC-display starts blinking. As well, if the menu button is not pushed for 5 seconds, it is now possible to log the total amount of fuel (fuselage and wing tanks) in the aircraft. If during flight the total amount of fuel in the fuselage tank sinks below 4 litres, the number of litres in the wing tank will be reset to zero.

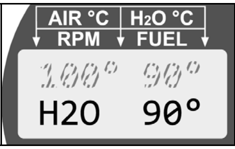
Moving through the pages of the LC-display [3]

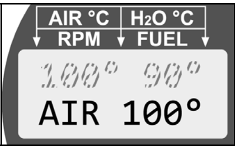
LC-display:

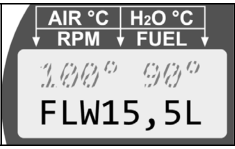
Main page		Internal Cooling Air Temperature **[°C]**	Liquid Coolant Temperature **[°C]**
		RPM Indication **[U/min]**	Fuel Quantity **[Liter]**

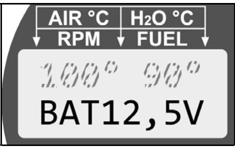
(comes up automatically after 5 seconds)

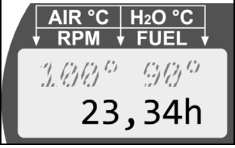
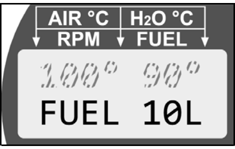
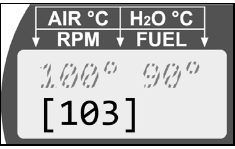
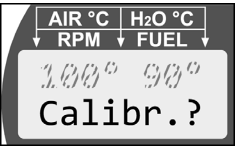
Display after pressing the menu button [11]

press **1 time**		Liquid Coolant Temperature **[°C]**
		Range of indication 40°C to 120°C with a resolution of 1°C.

press **2 times**		Internal Cooling Air Temperature **[°C]**
		Range of indication 40°C to 128°C with a resolution of 1°C.

press **3 times**		Current Fuel Consumption **[L/h]**
		The measured data, provided by the ECU, are indicated as current fuel consumption per hour

press **4 times**		Engine Battery Voltage **[Volt]**

press **5 times**		Operating hours **[h]** Operating hours will be logged for operations over 2000 RPM. They will be stored in the internal EEPROM of the microcontroller and will be retained in memory even after the operating voltage is turned off. The counting resolution is 1/100 hours.
press **6 times**		Fuel quantity **[Litre]** Display of the amount of fuel remaining, as well as adjustment of the amount of fuel remaining when the sailplane is equipped with wing tanks.
press **7 times**		Result of fuel gauge calibration Result of the fuel gauge calibration. [103] is shown only as an example.
press **8 times**		Calibration of the fuel gauge Calibration of the fuel gauge for different fuel types.

If the display is set to a different page from the main page and no further input is made, the display reverts to the main page after **about 5 seconds**.

If one of the operating limits is either exceeded or not been reached, a warning buzzer will sound and the red ⚠ LED **[5]** will blink. The value of the fault indication which triggered the alarm will be displayed simultaneously. By pushing the menu button **[11]**, the alarm signal will be switched off for the duration of about 3 minutes and the LC-Display **[3]** is switched back to the main page.

For operational warnings the buzzer will sound continuously. A pulsating sound will be heard for operational notices.

Display of the ILEC hard and software versions:
With the propeller completely retracted the menu button [11] must be pushed for 5 seconds and the ILEC hardware and software versions will appear in the LC-display.

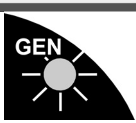
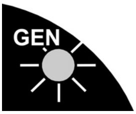
Notices and warning displays in connection with the red blinking ⚠ LED [5] and the buzzer

RETRACT	Display flashes, Buzzer: **pulsating tone**
	The engine is in cooling mode and it has cooled sufficiently that the propeller can be completely retracted by pushing the retraction switch **[8]**.

IGNI.OFF	Display flashes, Buzzer: **pulsating tone**
	The retraction switch **[8]** was pushed while the ignition **[12]** was on.

IGNI.ON	Display flashes, Buzzer: **pulsating tone**
	The starter button was pushed while the propeller was fully extended and the ignition **[12]** was off.

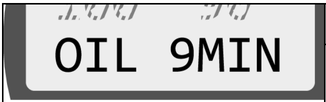
EXTEND	Display flashes, Buzzer: **pulsating tone**
	The starter button was pushed while the ignition **[12]** was on but the propeller was not fully extended. The starter is disabled until the propeller is fully extended.

BAT11,5V	Display flashes, Buzzer.: **continuous. tone,** LED **"GEN"**: flashes **red**
	The on-board voltage has declined to under 11.5 V (at any level of RPM). This is an indication of generator failure. Required power can possibly be supplied by the on-board batteries. ***WARNING**: The engine may stop at any time.*
	LED **"GEN":** lights up **red**
	The LED **"GEN" [6]** will light as a charging warning as soon as either the RPM drop below 2000 or the battery voltage drops below 12.8 V. ***WARNING**: Depending on the battery voltage, the pilot has to assume the risk that the ignition and the injection unit will fail and the engine stops running.*

AIR 126°	Display flashes, Buzzer: **continuous tone**
	The air cooling temperature has reached 126 °C, which is 4 °C under the maximum permissible temperature. This can be confirmed by pushing menu button **[11]**.

Display flashes, Buzzer: **continuous tone**

The maximum cooling liquid temperature of 110°C has been exceeded. This can be confirmed by pushing menu button **[11]**.



Display flashes, Buzzer: **continuous tone**

The oil level in the lubricating oil reservoir has dropped below the minimum level. Then only a reserve of about 10 minutes is still available. After confirmation by pushing menu button **[11]** the alarm sound will repeat every minute and the time display will show the available remaining operating time.

WARNING: *If the engine is operated beyond this time, the supply of lubricating oil ceases. The engine suffers irreparable damage and will stop running after a short time.*

A level sensor is installed in the reservoir. Its output signal triggers the warning light.

Display flashes, Buzzer: **continuous tone**

The fuel pressure in the injection system has dropped and is insufficient for the engine to reach full performance. The reason may be a fault with the fuel pumps or the pressure regulator, or possibly a leak in the fuel system.

WARNING: *If this is the case, the engine must be shut off immediately. No self-launch is allowed.*

If the defect occurs during take-off phase in powered flight, the necessary fuel pressure may possibly be reached by switching on fuel pump 2. After reaching a safe height, the engine must be shut off immediately and the pilot must land without delay. The defect must be repaired prior to the next take-off.

FUEL 3L	Display flashes, Buzzer: **continuous tone** The fuel tank level is below 4 liters. This can be confirmed by pushing menu button **[11]**.
ERROR	Display flashes, Buzzer: **continuous tone** If this notice appears during the fuel tank calibration procedure, the value for the tank calibration is outside the valid limits. The reason could be a partially filled fuselage fuel tank. This can be confirmed by pushing menu button **[11]**.
SWITCH E	Display flashes, Buzzer: **continuous tone** The propeller extraction process is monitored over time. If after a certain time no signal is received from the limit switch, the ILEC unit shows an error condition. If, nevertheless, the propeller has been complete extracted but the spindle has not been shut off by the limit switch, the automated safety system in the instrument panel (main switch) will break the electrical connection.
SWITCH R	Display flashes, Buzzer: **continuous tone** The retraction process is similarly monitored. If, after a certain time no signal arrives from the retraction limit switch, the ILEC unit will signal an error condition. Here also the continued operation of the spindle can be interrupted by the automated safety system in the instrument panel. This can be confirmed by pushing menu button **[11]**.
SWITCH 2	Display flashes, Buzzer: **continuous tone** This signals an error condition which indicates that both the retraction and the extraction limit switches are closed which cannot normally be the case. After a confirmation using menu button **[11]** and an optical verification that the propeller has been completely extracted, the motor may be started.
SW ERROR	Display flashes, Buzzer: **continuous tone** This indicates the presence of a program error and prevents operation of the engine.

Red LED "ECU " [9] and error messages of the ECU (Electronic Engine Control Unit) in the ILEC LC-display

The red LED "ECU" **[9]** serves to indicate an error when problems occur with a sensor or the Electronic Engine Control Unit (ECU) itself.

If there are no errors, this red LED is on as soon as the Power-Plant Main Switch is pressed, i.e. the ILEC Control Unit is switched on. If the ignition is switched on, the LED remains on until the engine starts to run. When the engine is running the light will be off if there are no errors.

A continued illumination of this LED while the engine is running indicates a sensor or ECU error condition. The ILEC can also show the exact nature of the error but this is only possible if the engine is turned off, followed by turning the ignition back on. Only then will the LED “ECU” produce a blink code. In addition, the ILEC LC-display will show a short description of the error. The following errors can be shown:

LC-display (alternating)	Blink code ECU-LED	Affected System
ECU / MAP1	1 pause 1	Manifold Press 1 Sensor (MAP)
ECU / MAP2	1 pause 2	Manifold Press 2 Sensor (MAP)
ECU / AIR TEMP	1 pause 3	Internal Cooling Air Temperature Sensor
ECU / COOLTEMP	1 pause 4	Liquid Coolant Temperature Sensor
ECU / VOLTAGE	2 pause 1	Supply Voltage
ECU / TIMGSEN1	2 pause 2	Engine Speed 1
ECU / TIMGSEN2	2 pause 3	Engine Speed 2
ECU / CHECKSUM	2 pause 4	Checksum Error
ECU / OVRSPEED	3 pause 1	RPM >12700
ECU / MAP DIFF	3 pause 2	MAP difference
ECU / CLOCK	4 pause 2	Clock failure
ECU / REGISTER	4 pause 3	Program run away
ECU / ROM	4 pause 4	Program Checksum Error

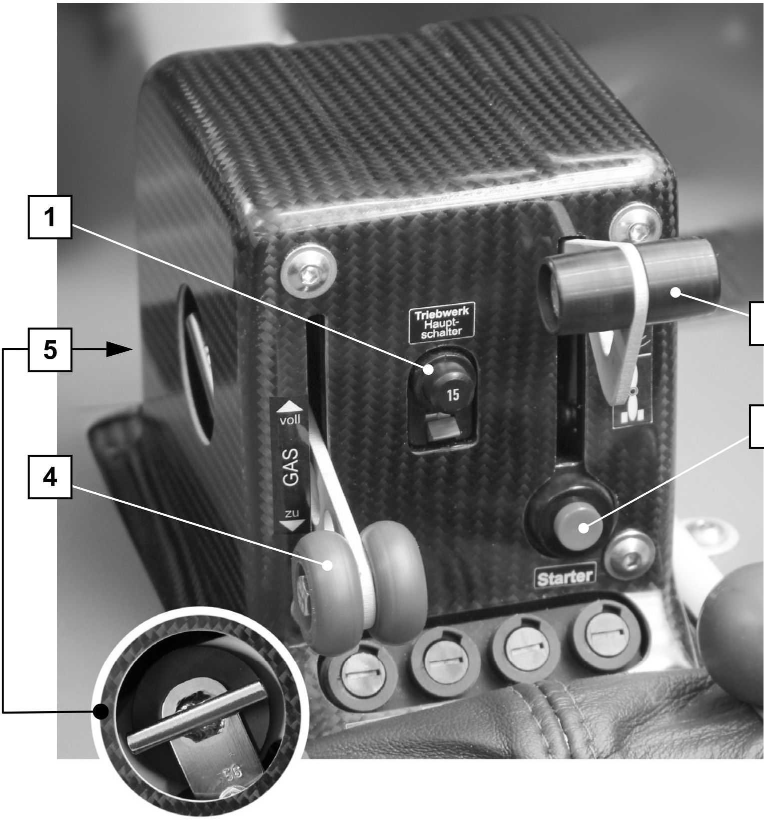
The pair of numbers shown in the column "Blink code" is counted out in flashes according to which sensor has failed. If there is, for example, an error in the Internal Cooling Air Temperature Sensor, the red ECU-LED goes on when the Power-Plant Main Switch is set and after the ILEC

Control Unit has finished its start-up check. If the ignition is now switched on, the LED extinguishes and after about 10 seconds it will start with the error code. (E.g. the code for 1 pause 3 means that the light will flash once and after a delay of one second will then flash three times). This error code is repeated once. If more than one sensor is damaged, then each code will be flashed in sequence with 5 seconds between codes.

Systems which are driven by the core system of the engine control unit (ECU), for example injection valve and ignition coils, are not subjected to an error checking. That means a failure of these systems is not indicated by flashing of the red ECU-LED **[9]**.

For more detailed information refer to the Engine Manual.

Fig. 7.12-2 Power-Plant Control Console



1. Power-plant Main Switch
2. Propeller stop
3. Starter
4. Throttle
5. Adjusting lever for throttle friction brake

Description of the power-plant control console

The figures in brackets refer to the numbering in the preceding control console views (fig. 7.12-2).

The power-plant main switch [1] cuts out the battery from the power-plant circuit. This switch is designed as an automatic fuse. By pressing the black push-button the engine circuit is connected: ILEC is powered on. Next to the black push-button is a red lever. By pressing in direction of the black push-button this is released: ILEC is powered off. If the electrical circuit of the power-plant is overloaded, the black push button will be automatically unlatched. The circuit breaker is re-set by pressing the black button.

When the propeller stop [2] is moved downwards and engaged behind the pin [3], a stop block is pivoted into the arc of the propeller. A tab on the stop lever [2] obstructs the access to the STARTER button [3].

The Throttle [4] is set idle in the bottom position. The upper position is Wide Open Throttle (**WOT**).

The throttle friction brake is adjusted with the adjusting twist knob [5] on the left side wall of the control console. The throttle cable is spring-loaded (if a throttle cable breaks the throttle valve goes to full throttle). The friction brake in its normal setting prevents the spring resilience from drawing the throttle to the full position.

Further power plant controls in the cockpit

Fuel valve

The fuel valve is next to the seat pan on the left cockpit wall.

In the forward position the fuel valve is open. Rear position is shut.

CAUTION: *Prior to attempting to start the engine the position of the fuel valve has to be checked and, where necessary, moved to its foremost position.*

Fire warning light

A temperature sensor is fitted in the engine compartment which triggers the fire warning at a temperature above 140 °C (284 °F). The fire warning is a red blinking diode in the instrument panel with the following placard:

Fire

Optionally, a fire warning is available which observes the whole engine compartment by means of a sensor-cable. This fire warning is not supported by the engine circuit but by the avionic circuit and so also active with retracted engine. Weak blinking of the LED shows the normal operation of the system. In case of fire this diode blinks very bright and a resettable acoustic alarm sounds.

If a fire warning is given, proceed as per 3.8 in Section 3 "Emergency Procedures".

Rear View Mirror for propeller setting:
This mirror is fitted on the front instrument panel cover or in the instrument panel on the right within the view of the pilot. By means of this mirror, the vertical position of the propeller must be checked prior to retracting it.

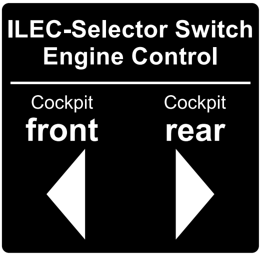
Switch for fuel pump 2:
As the fuel pumps consume a relatively large amount of current for producing a fuel pressure of minimum 3 bar (43.5 psi), the engine start procedure should be carried out with only one active fuel pump. For this reason the fuel pump 2 is activated only temporarily with this switch during take-off until a safe height is reached.

The pump is activated if both the ignition switch **and** the switch "Fuel Pump 2" are "ON".

NOTE: *When the fuel pump 2 is constantly on, the charging current of the generator is just not sufficient to keep the battery voltage constant for a longer time. As a consequence, the generator warning light on the ILEC control unit will go on; this may also happen if the battery voltage is too low.*

Switch between the ILEC Engine Control Units

If the optional second ILEC engine control unit is installed in the rear instrument panel, it can be switched between both units by the switch on top of the rear panel.



Because this switch also switches the power supply of the ignition, it is possible to switch off the ignition inadvertently. This is the case if the ignition switch of the ILEC to which the priority goes is set “OFF”. That is why for safety reasons there should be no switching between the ILEC control units if the engine is running.

7.13 Fuel and Oil Tank System

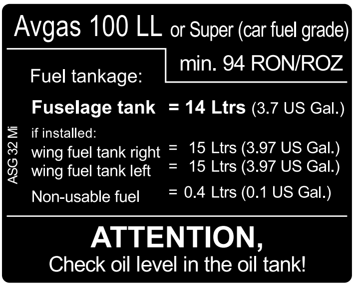
See also Fig. 7.13-6 at the end of this section.

The fuel system consists of a fuselage tank, mounted in the wheel well, with a fuel capacity for about 30 minutes of engine operation (at max. power). For further information refer to section 5.3.7.
The ASG 32 Mi can also be optionally delivered with one or two fuel tank(s) fitted in the wings.

The fuel drainer is located at the rear end of the fuselage tank and is easily accessible when the landing gear is down. The fuel tank vent is fitted on the left-hand side underneath and behind the wing. The vent of the wing tank is linked back into the fuselage tank.

The tank for oil loss lubrication is fitted in the engine compartment between engine block and exhaust silencer and is accessible when the propeller is extended.

WARNING: *The rotary engine uses an oil loss lubrication system. If no oil is refilled into the oil tank or if the oil supply is interrupted, this will inevitably destroy the engine.*



The oil consumption has to be checked. The following reference values are given for this purpose (consumption depends on rpm):

a) 0.21 litre oil/h (7.1 ounces/h) at revolutions of about 7100 rpm
b) 0.23 litre oil/h (7.8 ounces/h) at revolutions of about 7750 rpm
c) or a bit more than 0.015 litre (0.51 ounces) oil per 1 litre of fuel.

Electric or Gravity Fuel Filling System

Filling of the fuel tanks in fuselage and wings must be carried out only by means of the on board electric refuelling system. A gravity refuelling from the special “Container for gravity refuelling” (AS-Part-Nr. 309.62.1003) may be carried out alternatively. The use of filter is necessary in the connected fuel hoses.

The on board refuelling system is shown at the end of this section in fig. 7.13-4, the gravity refuelling system in fig. 7.13-5.

(1) Filling of Fuselage Fuel Tank

If so equipped, the wing tanks must be filled first!

Option 1 - refuelling with on board electric refuelling system:

Connect the fuel refilling hose including a fuel filter to the coupling at the rear end of the engine compartment and refuel from a canister.

The ASG 32 Mi can also be optionally equipped with an automatic shut off feature for the permanently installed refilling system. This prevents accidental overfilling of the fuselage fuel tank. This is accomplished by means of a sensor in the expansion tank which shuts off the re-fueling system when the fuselage tank is full.

Procedures which are altered because of the installation of the automatic shut-off system are described below inside this boxes.

The refilling system is activated via the switch on the instrument panel. When filling the fuselage tank, monitor the fuel level indicator and switch off the electric filling system at the latest when 14 litres are indicated.

With the automatic fuel filling shut-off system
The fuel refilling system switch located in the instrument panel (don't confuse this with the fuel tank selection switch **[13]** beside the ILEC Power-Plant Control Unit) has three settings:

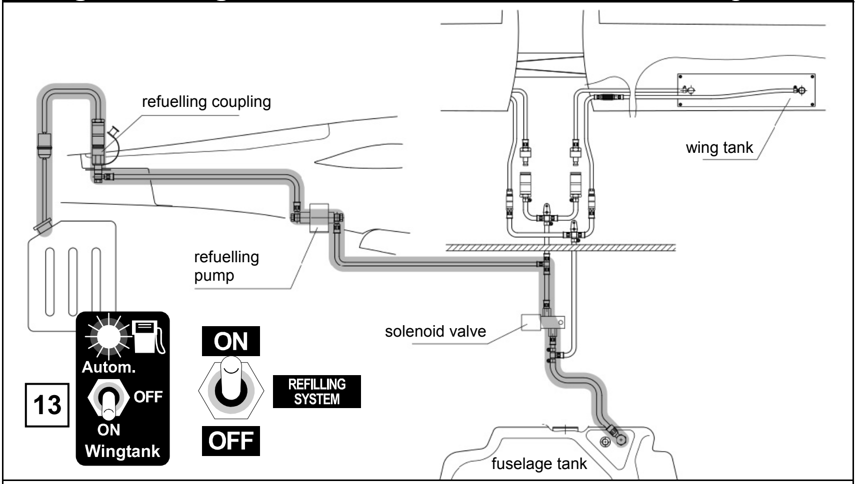
OFF:	Fuel re-filling system is switched off
AUTOMATIC:	The fuel re-filling system is active and will be automatically shut off when the fuselage tank is full
Manual:	The automatic shut-off feature will be deactivated and the refilling process must be accomplished manually.

When equipped additionally with fuel tanks in the wing:
Prior to switching on the refilling equipment the Tank Selector Switch **[13]** to the right of the ILEC engine control unit needs to be switched to **„ON“**. This will open the solenoid valve and allows the flow of fuel into the fuselage tank (refer to figure 7.13-1).

CAUTION: *Disconnect the wing tanks prior to refuelling the fuselage tank in order to only fill fuel from the refilling equipment into the fuselage tank and not inadvertently from the wing tanks as well. The vent line always remains connected.*

After refuelling the fuselage tank turn the Tank Selector Switch back to **“OFF“** in order to close the solenoid valve and to avoid unintentional drainage of wing fuel and overfilling the fuselage tank. This fuel would be drained and lost through the fuselage tank vent.

Filling of Fuselage Fuel Tank Fig. 7.13-1



Wing tanks disconnected (vent line remains connected),
tank selector switch "**ON**" - solenoid valve opens - LED flashes,
refilling system on - fuel flows into the fuselage tank

Option 2 - refuelling by gravity (see fig. 7.13-5):

Connect the refilling hose (including fuel filter) of the “Container for gravity refuelling” with the fuel hose, which is located in the baggage compartment in front of the spar. The fuselage tank is filled using gravity. The container should be laid on the wing. Although an overflowing of the fuselage tank is not possible in this position, the ILEC engine control unit has to be switched on to monitor the fuel level. Stop the filling at the latest when 14 litres are indicated.

(2) Filling the Wing Tank(s)

The optional wing tanks are interconnected by the refuelling connectors located in the baggage compartment in front of the main spar but also with the fuselage tank.

The Tank Selector Switch **[13]** to the right of the ILEC engine control unit needs to be switched to **„OFF“**. This will close the solenoid valve and prevents inadvertent fuel flow into the fuselage tank.

Option 1 - refuelling with on board electric refuelling system:

Connect the fuel refilling hose including a fuel filter to the coupling at the rear end of the engine compartment and refuel from a canister (refer to fig. 7.13-2).

The refilling system is activated via the switch on the instrument panel. Hold the wings in level during refilling.

With automatic shutting off of the fuel re-filling system

The fuel re-filling system switch in the instrument panel can be set to “**AUTOMATIC**” or “**MANUAL**”. However, the shut off feature does not function when re-filling the wing tanks. Consequently the amount of fuel being filled must be monitored in the usual manner.

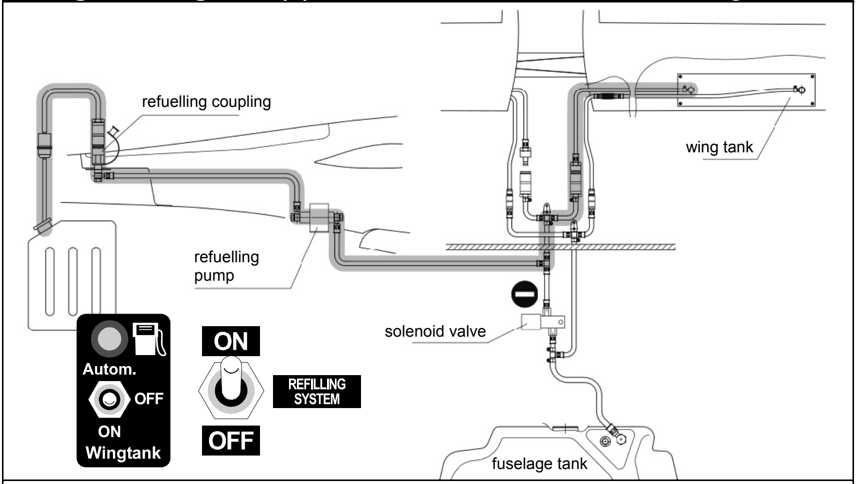
NOTE: *In case the fuel refilling system has already been shut off by the sensor while filling the fuselage tank, it is possible that when attempting to fuel the wing tanks, the fuel refilling system can only be activated by setting the switch to “**MANUAL**”.*

As the wing tanks are not equipped with a fuel gauge, it is advisable to fill from a container of a capacity approximately matching that of one wing tank, or on which the amount filled can be read. If the wing tank is overfilled, the waste fuel flows through the vent. This goes to the fuselage tank, possibly resulting in overfilling.

In case wing tanks are fitted to both wings, the fuel line to the tank not being refuelled (or the already refuelled wing tank) must be disconnect-ed. The vent line of both wing tanks must always remain connected.

Fuselage and wing tanks must **not** be filled **simultaneously**!

Filling the Wing Tank(s) Fig. 7.13-2



One wing tank connected (all vents stay connected),
Tank selector switch "**OFF**" - solenoid valve closed - LED is off,
refilling system on - fuel flows into the wing tank

Starting with wing tanks **empty** refuelling can also be conducted as fol-lows:

First the fuselage tank is filled with the wing tank(s) connected and the Tank Selector Switch **[13]** to the right of the ILEC Power-Plant Control Unit in the **„ON“** position. When the fuselage tank contains 16 litres the Tank Selector Switch **[13]** is put in the **„OFF“** position. This closes the solenoid valve and from then on fuel is directed into the wing tank(s). In case wing tanks are fitted to both wings the fuel lines to the tank not be-ing refilled (or the already filled wing tank) must be momentarily discon-nected.

Option 2 - refuelling by gravity (see fig. 7.13-5):

Connect the refilling hose (including fuel filter) of the “Container for gravity refuelling” directly with the fuel hose of the wing tank, which is located in the baggage compartment. The wing tank is filled because of the gravity. The container should be laid on the wing. The vent hose of the wing tank must remain connected to the fuselage tank.

As the wing tanks are not equipped with a fuel gauge, it is advisable to fill from a container of a capacity approximately matching that of one wing tank, or on which the amount filled can be read. If the wing tank is overfilled, the waste fuel flows through the vent. This goes to the fuselage tank, possibly resulting in overfilling.

(3) Filling the Fuselage Tank in Flight

See fig. 7.13-3

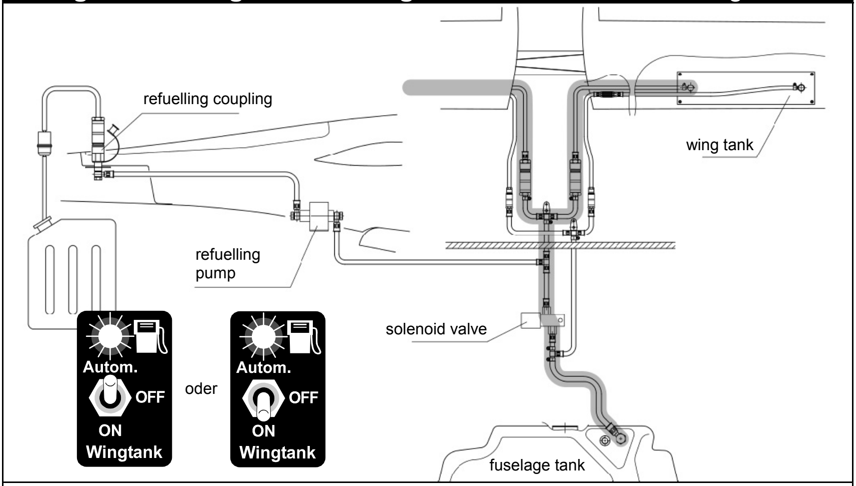
The engine is fed with fuel exclusively from the fuselage tank. The wing tanks merely serve to refuel the fuselage tank.

If, therefore, the fuselage tank is to be refuelled with fuel from the wing tanks in flight, the magnetic valve of the wing tanks must be opened with the Tank Selector Switch **[13]** to the right of the ILEC control unit (switch must be set to **"ON"** or **"Autom."**). The blinking yellow Tank LED **[14]** signals that the solenoid valve is open. In the switch position “**Autom.**“ the solenoid valve will open automatically if there are at least 6 liters of fuel in the fuselage tank. When the fuel level in the fuel tank reaches 12 liters the solenoid valve automatically closes and the Tank LED **[14]** goes out.

WARNING: *With the switch in position **"ON"** care should be taken to close the wing tanks again in good time in order to prevent the fuselage tank being overfilled, causing fuel to be lost by overflowing through the tank vent. Monitor fuel level indicator!*

CAUTION: *It is recommended to use the* Tank Selector Switch ***[13]*** *only in setting* ***"Autom."*** *because this makes it less likely that the fuselage tank will be overfilled. In any case, the fuel level indicator must always be monitored!*

Filling the Fuselage Tank in Flight Fig. 7.13-3



Wing tanks connected,
tank selector switch "**Autom.**" or "**ON**" -
solenoid valve opens - LED flashes,
fuel flows from the wing tanks into the fuselage tank

(4) Draining Wing Fuel Tanks on the Ground

In order to drain the wing tanks on the ground, both flexible wing fuel tanks must be disconnected from the fuselage tank. The connector is compatible with the fuel hose of the refilling system. This hose is inserted into the container, and connected to the wing tank it is intended to drain.

Fig. 7.13-4

On board
electric refilling
system

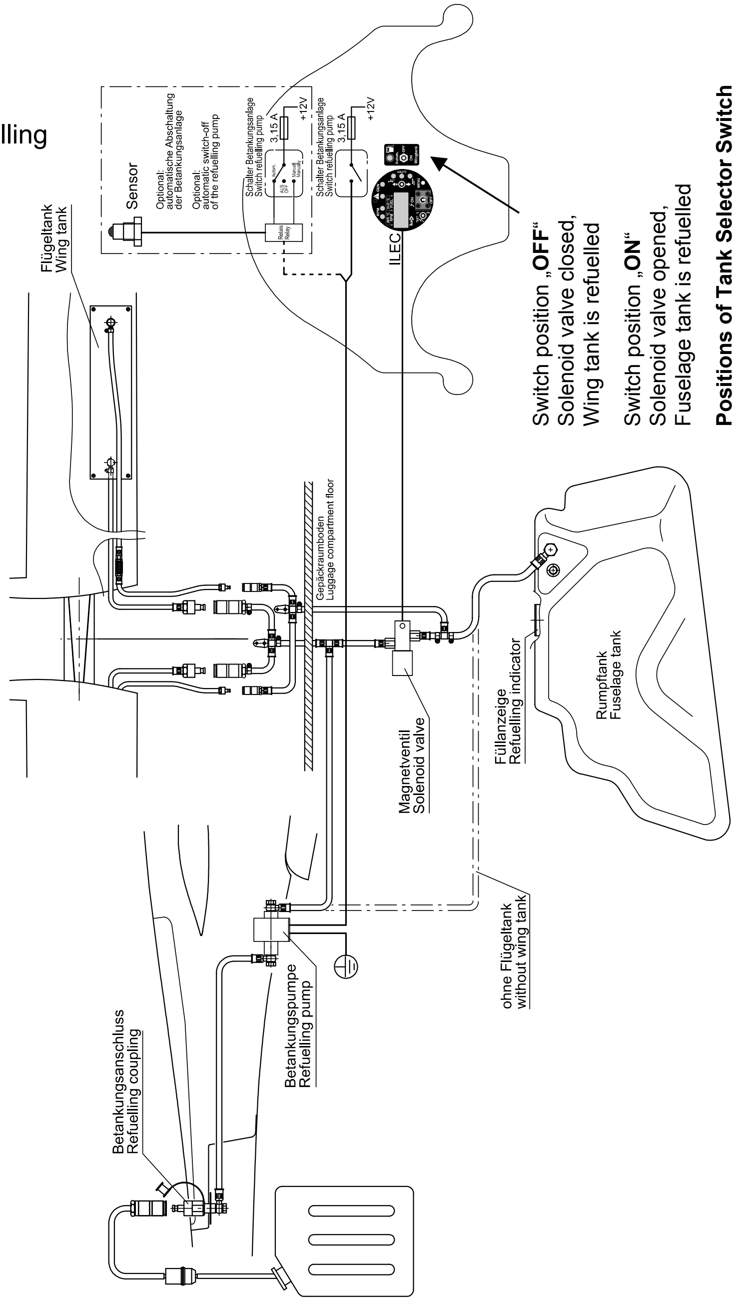


Fig. 7.13-5

Gravity Refuelling

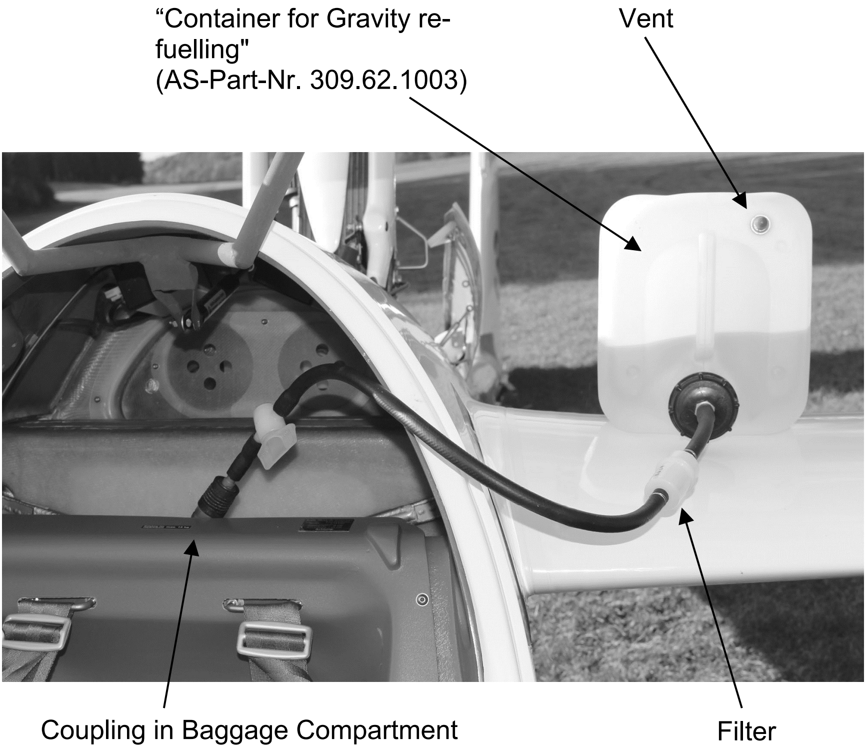
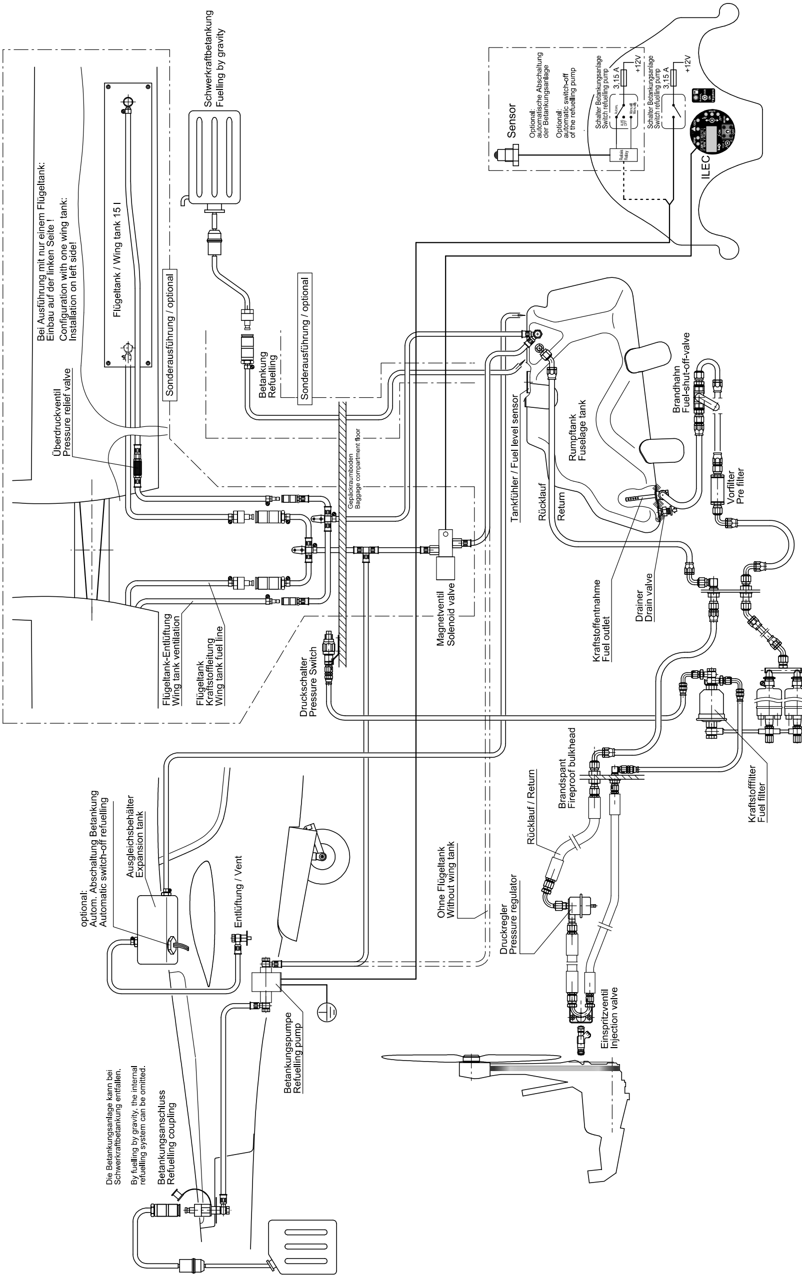


Fig. 7.13-6 Fuel System



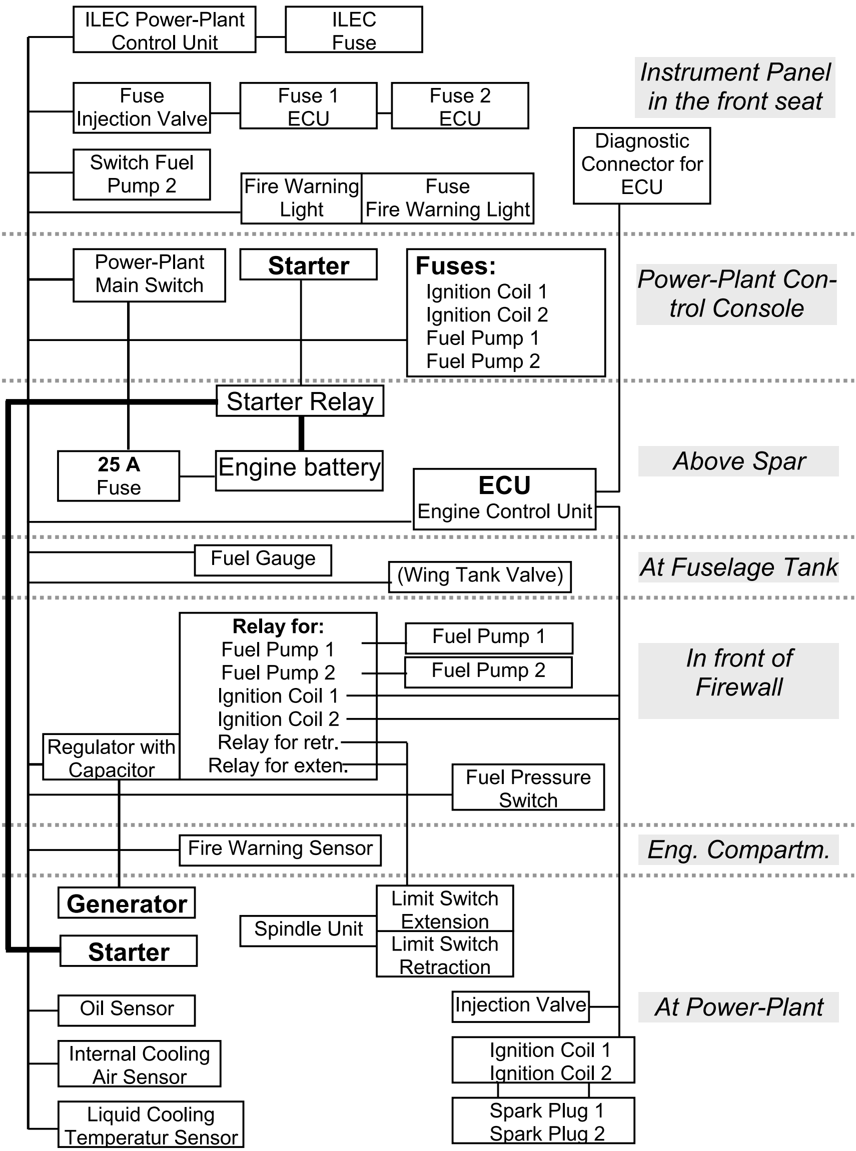
7.14 Electrical System of the Power-plant

The power-plant has its own independent electrical circuit, which is fused by the power-plant main switch. The engine batteries (starter batteries) are located in the fuselage behind the spar.

The electric jack for extending and retracting the propeller is powered by the engine batteries. It depends on the state of charge of these batteries whether the propeller can be extended/retracted or not.

Only the engine batteries are charged during powered flight by the generator.

Fig. 7.14-1 Schematic Engine Electric Circuit



Section 8

8.1 Introduction

This Section contains manufacturer`s recommended procedures for proper ground handling and servicing of the sailplane. It also identifies certain inspection and maintenance requirements to be followed if the sailplane is to retain that new-plane performance and dependability.

It is advisable to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered.

8.2 Sailplane Inspection Periods

A Certificate of Airworthiness renewal inspection hast to be carried out annually.

Refer to ASG 32 Mi **Maintenance Manual**, Sections 4 and 7 and to maintenance manuals of engine and propeller.

8.3 Sailplane Alterations or Repairs

It is essential that the responsible airworthiness Authority be contacted **prior** to any alterations to the sailplane to ensure that the airworthiness of the sailplane is not compromised.

For repairs and modifications refer to the applicable Maintenance Manual ASG 32 Mi **Maintenance Manual**, Sections 10 and 11.

8.4 Ground Handling / Road Transport

Parking

The ASG 32 Mi is equipped with elastic tape to seal the gaps on the control surfaces. When parking the aircraft, principally all the controls and flaps must be set to neutral.

<u>In the open</u>

Parking the aircraft in the open can only be recommended when the predicted weather conditions are suitable. It should be seriously considered whether securing, covering, and cleaning the aircraft before the next flight may demand more effort than derigging and rigging.

For tying-down the wings, trestles (perhaps from the trailer) should be used to ensure that the ailerons cannot be stressed by the tie-down ropes.

Optionally, an 8 mm threaded hole can be installed at the bottom of the wing tip, into which a special eyelet can be screwed.

NOTE: *Parking in the open without protection against weather or light will reduce the life of the surface finish.*

CAUTION: *The anti-freeze of the engine coolant liquid should be checked before the beginning of the cold season. If there is insufficient anti-freeze in the coolant, the engine will be destroyed by deep temperatures!*

In the hangar

If the aircraft is parked in the hangar for protracted periods, it is recommended to cover only the perspex® canopy with a dust cover, as dust covers retain moisture in wet weather for long periods. Moisture can impair the dimensional stability and even the strength of all fibre reinforced composites.

General

For this reason, **parking with water ballast on board for** protracted periods is also **not** permissible! The filling and ventilation openings on the upper wing surface and the drain valves must both be opened!

When parking, carefully remove any remnants of food (chocolate, sweets, etc.) because experience shows these attract vermin which can cause damage to the aircraft.

For tying-down, the outer wings can be derigged and replaced by the rigging bars (trailer equipment).

Road Transport

Alexander Schleicher GmbH & Co. can supply dimensioned drawings of the glider which will provide all the measurements needed for building a closed trailer. We can also supply the names and addresses of reputable trailer manufacturers.

Above all, it is important to ensure that the wings are supported in properly shaped and fitted wing cradles or at the very least, that the spar ends are securely supported as closely as possible to the root ribs.
Reinforced points of the fuselage are the main wheel (remember the suspension springing!), and tail wheel; also, the drag pins (make up support bushings from plastic material like Nylon!) and the area under the canopy arch.

For an aircraft of this quality and value, an open trailer, even with tarpaulin, cannot be recommended. Only a closed trailer of plastic or metal construction, may be considered suitable. The trailer should have light-colored surfaces and be well ventilated both while moving and while stationary so as to avoid high internal temperatures or humidity.

CAUTION: *Road transport with water ballast or fuel in the wing tanks is **not** permissible!*

CAUTION: *In order to protect the air brake cover plates from damage the airbrakes must be closed and locked!*

WARNING: *Under **no** circumstances should the elevator actuator on top of the vertical fin be loaded or fixed in any way, even by soft foam cushions!*
When designing or adapting the trailer, free movement and side clearance for the elevator actuator must be provided.

8.5 Cleaning and Care

Contrary to the popular belief that composite materials are impervious to moisture and ultra-violet light, even modern gliders need care and maintenance!

Moisture-Effects on the structure of the fiber-reinforced plastics and on the surface finish.

In the long run, moisture will also damage fiber re-inforced composites, as it will penetrate into the expoxy resin base and cause it to swell, which will partially burst the tight cohesion of the plastic molecules.

In particular, a combination of high temperature and humidity must be avoided! (e.g. poorly ventilated trailer becoming damp inside, which is then heated by the sun).

Neither the best quality of paint protection on the surfaces nor the plastic skins of the water ballast tanks can fundamentally prevent water vapour diffusion; they can only retard the process. If water has entered the airframe and cannot be removed by means of sponge or chamois leather, the aircraft should be de-rigged and dried out in a dry but not too hot room. Also, the affected part should be periodically turned.

Sunlight-Effects on the surface finish

Sunlight, especially its ultraviolet (UV) component, makes the paint and the canopy plastic brittle. Do not unnecessarily expose the aircraft to strong sunlight.

The now available optional 2-pack acrylic paint finish provides a significantly improved weathering resistance. Still, regular care is required to maintain the good appearance and the value of the aircraft.

Care of Surface Finish

Because the white polyester gelcoat is protected by a fairly durable wax layer, it will tolerate washing occasionally with cold water, with a little cleaning solution added.
The optional available 2-pack acrylic paint finish may be treated in the same way.

CAUTION: *The use of alcaline cleaning agents (e.g. "Meister Proper") may affect the paint surface and even penetrate as far as into the foam of the sandwich structure and damage it. In a few cases the acrylic foam in the control surface sandwich structure was destroyed by the use of unsuitable cleaning agents. Heavy dirt should therefore be removed using a cleaning polish.*

In normal use, the wax coating need only be renewed annually with a rotary mop.

In moderate European conditions it will suffice if on two occasions a paint preservative is used in addition. In areas subject to long and stronger sun exposure this should be done more often.

For the care of the paint finish, only preparations containing **the lowest available amount of silicone** may be used (e.g.: CARLACK Complete or AEROLACK All In One by Carlack Vertriebsgesellschaft Deutschland mbH, www.carlack.com).

Traces of Adhesive from Self Adhesive Tapes are best removed by means of cleaning benzine (car petrol is toxic!) or paint thinners. After cleaning, renew the wax coating.

NOTE: *The signal and decorative markings are built up from nitric or acrylic paint; therefore no thinners must be used and even benzene should not be allowed to act on them for prolonged periods.*

Canopy

The Acrylic Canopy (Plexiglas or Perspex) should only be cleaned by means of a special cleaner (e.g.: Plexus Kunststoffreiniger or Acryshield) or with lots of clean water. On no account should a dry cloth be used for dusting or cleaning.

Safety Harness

The safety harness straps should be regularly inspected for tears, compressed folds or wear, and corrosion of metal parts and buckles. The reliable operation of the release mechanism - even under simulated load - should be tested occasionally.

Oil-Film and residual Oil Spots

The power-plant running develops a film of (semi-burnt) oil residues from the silencer. Prior to the normal cleaning of the paint surface this film should be removed with a soft and blotting out cloth.
The Power-plant and the engine compartment are cleaned in the same way where accessible.

Fire Protection Coating of the Engine Compartment

The engine compartment is painted with a special fire protection paint, which is covered by a protective paint layer. Under heat the fire protection paint will develop a foam layer which in turn should reduce the heat conductivity into the structure.

The fire protection paint must be renewed when foam blisters have developed after exposure to high heat. For refreshing the paint see the Maintenance Manual.

Section 9

9.1 Introduction

This Section contains the appropriate supplements necessary to safety and efficiently operate the sailplane when equipped with various optional systems and equipment not provided with the standard sailplane.

Some commonly used optional installations are covered in Section 7.11 of this manual:

Oxygen system installation

Emergency Location Transmitter

9.2 List of Inserted Supplements

Date of Insertion	Doc. No.	Title of inserted supplement