LIFT AIR
FLIGHT DESIGN

CT Supralight

SERIAL NUMBER: E-14-08-07

Flight and Maintenance Manual

Document Number : AE 0430 0002

1. GENERAL

1.1. Introduction

Every pilot must familiarize him/herself with the specific characteristics of each aircraft. This Flight and Maintenance Manual must be studied in detail before the first flight is undertaken with the aircraft. The same applies to the operating handbooks and manuals of the ballistic recovery system, the engine and all other equipment installed in the aircraft, such as the Dynon EFIS / EMS, etc.

The engine of this aircraft is not a certified aviation engine. The flight route must thus be chosen to ensure that an emergency landing after engine failure can be undertaken without difficulty.

The CT Supralight may only be operated under visual flight rules (VFR). Due to the high cruise speed and the great range, pilots may encounter meteorologically critical weather conditions more often. Flying into IFR conditions without the necessary training is extremely dangerous. As the pilot in command, you are responsible for the safety of your passenger as well as for your own safety. You are also responsible for the safety of uninvolved third parties. Avoiding dangerous situations is a pilot's first duty.

Warning: Use only alkali-free products when cleaning your composite aircraft.

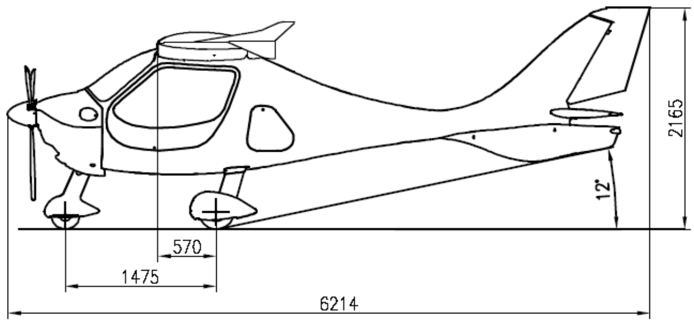
1.2. Manufacturer:

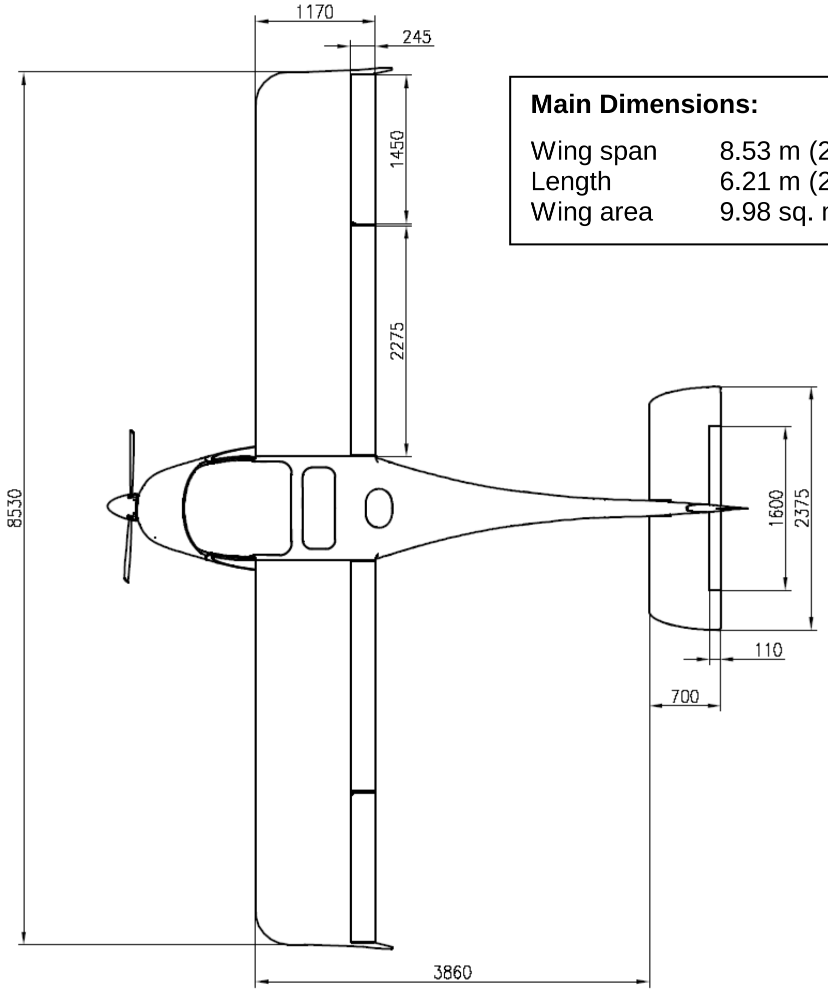
Flight Design general aviation GmbH
Am Flugplatz 3, 99820 Hörselberg Hainich
Germany.

Contact details can be retrieved at any time on the Flight Design webpage:

www.flightdesign.com

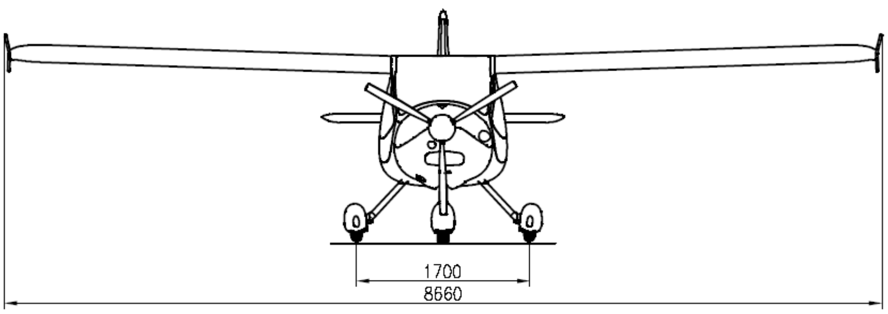
1.3. Three View, Main Dimensions:





Main Dimensions:

Wing span	8.53 m (28 ft.)
Length	6.21 m (20 ft 4 in.)
Wing area	9.98 sq. m (107.4 sq. ft)



1.4. Engine

The CT Supralight is available with the engines Rotax 912 UL with 80 BHP or Rotax 912 ULS with 100 BHP nominal power. More detailed information on the engine is available from Rotax for your specific engine serial number.

	Rotax 912 UL	**Rotax 912 ULS**
Engine type:	horizontally opposed, four cylinder, four stroke engine	horizontally opposed, four cylinder, four stroke engine
Cooling:	water-cooled cylinder heads	water-cooled cylinder heads
Horsepower rating and engine speed:	59.6 kW / 80 rated BHP at 5800 RPM	73.5 kW /100 rated BHP at 5800 RPM
Carburetor type:	Bing constant pressure carburetor	Bing constant pressure carburetor
Ignition:	electronically controlled dual ignition	electronically controlled dual ignition
Propeller gear reduction:	2.27 : 1	2.43 : 1

1.5. Propeller

Various types of propeller are available for the CT Supralight. Each propeller has its own operating handbook and maintenance manual published by the propeller manufacturer. These documents are delivered with the aircraft and must also be adhered to in detail. The following types of propeller have been certified for the CT Supralight:

Manufacturer	Parameters
Neuform	TXR 2-65-47-101.6, 1.66 m diameter, 2 blade, composite propeller, ground adjustable
Neuform	CR3-65-47-101.6, 1.70 m diameter, 3 blade, composite propeller, ground adjustable
Neuform	CR3-V-R2H, 1.70 m diameter, 3 blade, variable pitch, composite propeller
Neuform	CR3-V-R2-ECS, 1.70m diameter, 3 blade, composite propeller, variable pitch actuated by electric spindle drive, constant speed control ECS-M
Kaspar- Brändel	KA1, 1.60 m diameter, 3 blade, composite propeller, ground adjustable
Kaspar- Brändel	KA1, 1.60 m diameter, 3 blade, variable pitch, composite propeller

1.6. Minimum Equipment

Airspeed indicator	up to at least 350 km/h (200 knots)
Altimeter	with barometric window
Engine instruments	CHT, Oil Temp, Oil press, RPM.
Safety belts	four-point, one for each seat
Aircraft documents	national regulations apply

1.7. Recommended Additional Equipment

Magnetic compass	mandatory in some countries
Ballistic recovery system	mandatory in some countries
Emergency locator transmitter (ELT)	mandatory in some countries
Radio	with intercom and headsets
Transponder	Mode A/C or S
External lighting	anti-collision light (ACL) and navigation lights, landing light

2. LIMITATIONS

2.1. Airspeed Limitations

Stall speed	flaps -12°	V_{s1}	85 km/h	46 kts IAS
	flaps 0°	V_{s1}	75 km/h	41 kts IAS
	flaps 35°	V_{s0}	65 km/h	35 kts IAS
Maneuvering speed		V_a	194 km/h	105 kts IAS
Maximum flap extended speed	flaps 0°	V_{fe}	184 km/h	100 kts IAS
	flaps 15°	V_{fe}	148 km/h	80 kts IAS
	flaps 30°,35°	V_{fe}	115 km/h	62 kts IAS
Maximum rough-air speed		V_{ra}	245 km/h	132 kts IAS
Caution range			245 – V_{ne} km/h	132 – V_{ne} kts IAS
Never-exceed speed with used rescue system				
BRS 1050 SP		V_{ne}	276 km/h	149 kts IAS
Junkers High Speed SP		V_{ne}	260 km/h	140 kts IAS
Junkers Light Speed SP		V_{ne}	300 km/h	162 kts IAS
No rescue system installed		V_{ne}	300 km/h	162 kts IAS

Maximum demonstrated crosswind	flaps 0°	30 km/h	16 kts
	flaps 35°	20 km/h	11 kts

Warning: Take-off and landing with crosswinds require a lot of training and experience. The greater crosswind component, the more experience required.

2.2. Flight Load Factor Limits

Maximum flight load factor	up to V_a	+ 4g/ -2g
	up to V_{ne}	+ 4g/ -1.5g

Warning: Up to V_a = 194 km/h (105 kts) (maneuvering speed) full control movements may be made.
Above v_a all control surfaces may only be deflected to a third of their maximum displacement.

Warning: Up to V_{ra} = 245 km/h (132 kts) IAS the CT Supralight can safely withstand a vertical gust of 15m/s (3000 fpm)
Above V_{ra} = 245 km/h (132 kts) IAS the CT Supralight can safely withstand a vertical gust of 7,5 m/s (1500 fpm).

2.3. Tire Pressure

Main landing gear tires	2 bar (29 psi)
Nose wheel tire	2 bar (29 psi)

2.4. Mass and Center of Gravity Limits:

Minimum weight, solo pilot	70 kg (154 lbs)
Maximum mass per seat	100 kg (221 lbs)
Typical Empty weight, incl. recovery system *	279.5 kg (616 lbs)
Maximum take-off weight (MTOW)	472.5 kg (1042 lbs)

Baggage compartment	25 kg** (55 lbs) maximum on each side 50 kg** (110 lbs) maximum in total
Center of gravity range	282 – 478 mm*** (11.1 in. – 18.8 in.).

* Nominal empty weight with minimum equipment. The true empty weight depends greatly upon the equipment installed. The current weight of each aircraft is registered in the current weighing record. Refer to Chapter 6 “Weight and Balance”.

** Maximum values. The correct values for each aircraft may be calculated from the current weighing record. Refer to Chapter 6 “Weight and Balance”.

*** Reference datum is the wing leading edge with the aircraft in the neutral position. Refer to Chapter 6 “Weight and Balance”.

Warning: The weight data given are standard values. The correct data for each aircraft must be extracted from the current weighing record, see Chapter 6.

2.5. Power Plant Limitations

	ROTAX 912 UL	ROTAX 912 ULS
Maximum take-off power (at 5 800 RPM, max 5 min)	59.6 kW / 80 HP	73.5 kW / 100 HP
Maximum continuous power (at 5 500 RPM)	58 kW / 78 HP	69 kW / 93 HP
Maximum continuous engine speed	5500 RPM	5500 RPM
Idle engine speed	1400 RPM	1400 RPM
Cylinder head temperature, maximum *	150°C (300°F)	135°C (275°F)
Oil temperature, minimum	50°C (120°F)	50°C (120°F)
Oil temperature, maximum	140°C (285°F)	130°C (266°F)
Recommended oil operating temperature	90–110°C (190°F-230°F)	90–110°C (190°F-230°F)
Oil pressure, normal operation	2.0–5.0 bar (29–73psi)	2.0–5.0 bar (29–73psi)
Oil pressure, minimum	0.8 bar (12 psi)	0.8 bar (12 psi)
Oil pressure, short-term maximum during extreme cold start conditions	7 bar (102 psi)	7 bar (102 psi)
Oil grade	Motorcycle oil of a registered brand with gear additives. If aircraft oil is used, then only blended one. Refer to the relevant ROTAX operating handbook for information on viscosity and recommended brands.	
Oil tank capacity	2.0 - 3.0 l (2.1 – 3.1 quarts)	
Oil consumption, maximum	0.06 l/h (0.063 q/h)	
Fuel tank capacity	130 l (34 gal) - 2 wing tanks with 65 l (17 gal) capacity each	
Usable fuel	128 l (32 gallons)	
Types of fuel	min RON 90 / AKI 87 EN 228 Regular, EN 228 Super and EN 228 Super Plus AVGAS 100 LL (ASTM D910) UL 91 (ASTM D7547)	min RON 95 / AKI 91 EN 228 Super and EN 228 Super Plus AVGAS 100 LL (ASTM D910) UL 91 (ASTM D7547)

* Coolant temperature is monitored via the cylinder head temperature which is measured at the measuring point of the hottest cylinder

Warning: Due to its high lead content AVGAS has a detrimental effect on valve seating and causes greater deposition in the combustion chamber. It should thus only be used if fuel vapor or octane problems arise or if MOGAS is not available.

Warning: When using AVGAS particular attention must be paid to type of oil used. For details refer to the valid version of the ROTAX engine manual.

Warning: The engine data given here is not complete. For complete information refer to the current version of the relevant engine manual available from the engine manufacturer Rotax.

2.6. Other Limitations

Warning: The aircraft is **not** certified for aerobatics!

The aircraft may only be operated during the day in visual flight conditions. Flight into instrument meteorological conditions (IMC) is prohibited.

Flight into icing conditions is prohibited.

Turns steeper than 60 degrees of bank are prohibited.

Flight operations are not recommended during strong, gusty winds or wind speeds on the ground of more than 40 km/h (22 kts).

3. EMERGENCY PROCEDURES

3.1. Emergency Procedures Checklists

Emergency procedures are initially presented in the form of checklists. Amplified emergency procedures follow later in the chapter.

Even experienced pilots are strongly recommended to work with the checklists in the cockpit. It is the only way to ensure that in the distraction during flight important items are not overlooked.

The checklists are formulated so that they may be made into a small booklet which can be used in the cockpit. This booklet can be augmented with specific operational aspects should this be necessary.

The detailed procedures augment those points of the checklists which can only be explained in detail. It is important for safe operation that the pilot familiarizes himself with these detailed procedures before starting flight operations.

SPINNING

Controls	neutral
Rudder	opposite direction of rotation
Rotation	stopped
Throttle	retard
Elevator	smooth recovery from dive

DEPLOYING THE BALLISTIC RECOVERY SYSTEM

Ignition	off
Recovery system	release
Fuel shutoff valve	off
Emergency radio call	transmit
Master switch	off
Safety harness	tight
protective position	taken

ENGINE FAILURE

Below 100m (300 ft.) AGL	make an emergency landing straight ahead
Above 200m (600 ft.) AGL	refer to procedures for restarting the engine

RESTARTING THE ENGINE

Fuel shutoff valve	open
Fuel amount	check
Ignition	both
Propeller stopped	ignition key to start
Engine fails to restart	make an emergency landing

EMERGENCY LANDING

No suitable landing field	deploy recovery system
Landing field	selected
Safety harness	tight
Objects in cockpit	securely stored
Emergency radio call	transmit
Flaps	as required
Airspeed	as required
Flare	50 cm (20 in.) above ground or tree tops
Ignition during flare	off
Fuel shutoff valve	closed
Elevator on touchdown	tail low
ELT	automatic as required

ENGINE FIRE		**FAILURE OF FLAP CONTROL**	
Fuel shutoff valve	off	Alternator	off
Throttle	full	Master switch	off
Ignition	off	Master switch	after 3 seconds to on
Ignition key	remove	Alternator	on
Flight attitude	slip away from flames	If everything okay	end of procedure
Landing	make an emergency landing	Flaps in cruise flight	manually set to max. negative
		Long runway	landing flap max. negative
LOSS OF COOLANT		Short runway	in short final, manually set to max. positive
Engine power	reduce		
Cylinder head temperature	below 150°C	**EMS FAILURE**	
Landing	as soon as possible at airfield	Reduce airspeed	185 km/h (100 knots) with flaps negative
LOSS OF OIL			
Ignition	off		
Ignition key	remove		
Fuel shutoff valve	off		
Landing	make an emergency landing		

3.2. Stall

The stall characteristics in level flight are docile. Normal flight attitude can be recovered by pushing the stick forward, increasing speed and then smoothly pulling the aircraft up again.

Maximum loss of altitude during stall recovery is 50m (160 ft.). Pitch down does not exceed 25°.

The aircraft does not go into a spin during a stall in a 30° turn. Normal flight attitude can be recovered by pushing the stick forward, increasing speed and then smoothly pulling the aircraft up and simultaneously correcting the angle of bank.

Maximum loss of altitude during recovery is 60 m (200 ft.). The angle of bank does not exceed 60°.

3.3. Inadvertent Spin

The aircraft shows no inclination to go into an inadvertent spin during normal stall or during stalls in turns.

Should the aircraft, however, inadvertently enter into a spin, the following recovery procedure should be used:

All control surfaces in neutral position
Rudder opposite to direction of rotation
Retard throttle
Smooth recovery in the neutral attitude

Warning: As this aircraft is aerodynamically very efficient with low drag, airspeed increases quickly during a dive. It is essential that attention be paid to airspeed limitations, control surface deflection and flight load factors when recovering the aircraft from a steep dive.

Warning: Should the attempt to recover the aircraft fail or should recovery appear doubtful due to low altitude, the recovery system should be deployed.

3.4. Emergency Landing

An emergency landing may be necessary for several different reasons. In addition to the loss of lubricants or the failure of aircraft systems, ominous weather conditions may also lead to an emergency landing.

In order to carry out an emergency landing, a suitable landing site must be found. It should be free of obstacles - including the approach - and should be long enough. The final approach to the site should be flown at the usual approach speed of 100 km/h (54 kts).

The following points should be implemented during the approach:

Safety harness	lap belt tight, shoulders snug
Loose objects in the cockpit	securely stored
Radio signal	transmit to the appropriate ATC or to a nearby airfield so that the emergency services can be informed if necessary.

During a landing on unknown terrain it is recommended that the landing be accomplished at minimum safe speed and with the flaps set to 30° or 35°. The landing flare should be initiated at approx. 60 cm (2 ft) above the ground and the aircraft slowed down to minimum speed.

During flare it is recommended that the engine be shut down in order to reduce as far as possible the danger of a fire:

Ignition	off
Fuel shutoff valve	closed

On touchdown, the stick should be pulled back smoothly to prevent as far as possible overturning on landing caused by the nose wheel sinking into soft ground. Apply the brakes smoothly to bring the aircraft to a controlled stop.

During landings in cornfields, the tops of the trees or other crops should be seen as the landing surface. On short finals the flaps should be fully extended and airspeed should be 90 km/h (49 kts). The landing flare should be initiated at approx. 60 cm (2 ft) above the assumed landing plain and the aircraft slowed down to minimum speed. On touchdown the stick should be pulled back smoothly to prevent as far as possible overturning on landing.

Warning: If urgent help is required after a forced landing, the ELT (if installed) can be activated manually thus alerting the search and rescue services.

Warning: Every CT Supralight is delivered with a fire extinguisher in a pocket on the back of the passenger seat. It can be used to fight small fires in the cockpit.

Should a forced landing not be possible and should the aircraft be at a sufficiently high altitude, the ballistic recovery system may be deployed. Refer to special emergency procedures for the deployment of the recovery system.

3.5. After Overturn on Landing

Due to its design, the CT Supralight offers good occupant protection during an overturn. Should you find yourself in this situation, brace yourself with your legs against the wind-shield. Unhook your safety harness. Be careful not to injure yourself on shards from the windshield or broken parts of the structure when you drop out of the seat. Evacuate the aircraft as quickly as possible.

Warning: Check for leaking fuel when evacuating the aircraft - acute fire hazard - the fuel system is not designed for the upside-down position.

Warning: If urgent help is required after an emergency landing, the ELT (if installed) can be activated manually thus alerting the search and rescue services.

Warning: Every CT Supralight is delivered with a fire extinguisher in a pocket on the back of the passenger seat. It can be used to fight small fires in the cockpit.

3.6. Deploying the Ballistic Recovery System

Refer to the operating handbook published by the manufacturer of the recovery system for operating details. The recovery system can be deployed in relatively low altitudes. If deployed at a low airspeed, the damage to the aircraft can be kept to a remarkable minimum. Due to the position in which the aircraft is suspended from the parachute, the pilot is as well protected as possible during the deployment of the recovery system.

For the deployment of the ballistic recovery system the manufacturer gives the following sequence of activities. The manufacturer's manual provides further details the pilot has to acknowledge prior to first flight with the aircraft.

Kill the engine (that the rotating prop does not damage the parachute) – deploy the parachute (to do this, pull the handle with force to the very end, until the rocket has started) – re-tighten your seat belts (that they give best protection at touchdown) – brace yourself (hands in the neck, arms to protect face and head).

The release lever is located to the main bulkhead between the seats. In an emergency, the lever must be pulled forcefully forward to detent.

Warning: Once the recovery system is activated, the pilot gives up all active control of the aircraft. There is no possibility to release the parachute and return to aerodynamic flight.

Warning: The activation of the rescue system depends on the situation and is in the pilot´s decision. Once you decided to activate the rescue system do it at once and do not waste precious time. Before deployment, if possible, tighten lap belts tight, shoulder harnesses snug.

Warning: The rescue system requires a certain time – and therefore altitude – to be fully deployed. In an emergency where the pilot has no more control about the aircraft, the recovery system should be deployed regardless of altitude.

Warning: Maximum speed for deployment is limited by V_{NE}. Should the condition of the aircraft permit, aircraft speed should be reduced to below this value. If unavoidable, the recovery system can be deployed at a speed above the maximum. The parachute is attached to the aircraft at multiple hard points, so the chances of recovery are still good.

Warning: If urgent help is required after a landing using the recovery system, the ELT (if installed) can be activated manually thus alerting the search and rescue services.

Warning: Every CT Supralight is delivered with a fire extinguisher in a pocket on the back of the passenger seat. It can be used to fight small fires in the cockpit.

3.7. Engine Failure

Warning: Do not attempt to restart the engine at altitudes below 100 m (330 ft)

Warning: Do not attempt to return to the airfield if engine failure occurs immediately after take-off below an altitude of 250 m (820 ft).

Warning: Due to the increased loss in altitude, turns should not be attempted at altitudes below 50 m (160 ft).

After an engine failure in flight, an engine restart should be attempted if altitude and time permit. The prerequisites for a successful restart should first be checked:

Fuel shutoff valve	open
Amount of fuel	fuel available in both wing tanks
Ignition	both

If the fuel level is low in both tanks and one of the fuel tanks appears to be empty, level the wings and make certain that the aircraft is not side slipping or holding the wing with the apparently empty tank higher. If the aircraft is level and one of the tank indicators shows fuel available make certain you keep that wing slightly higher to ensure fuel is being supplied to the engine.

If airspeed is so low that the propeller has stopped, the engine must be started in the same way as on the ground using the starter.

The Rotax 912 series engine ignition is only active once a certain minimum propeller RPM is achieved (above approx. 200 RPM). If the propeller is wind-milling, it may be that the propeller RPM is too low to restart the engine. In this case the starter must be used.

Warning: Restarting the engine requires the full attention of the pilot. The stress factor in the cockpit increases considerably and simple mistakes may be made by even the most experienced pilot. It is therefore imperative that you continue to fly the aircraft! Be careful of controlled flight into terrain and other hazards of distraction.

If the engine cannot be restarted or if altitude does not allow an attempt to restart, a controlled forced landing should be carried out.

The power-off emergency landing procedure is basically the same as an emergency landing with engine power. The best glide speed is 125 km/h (67 knots) at a flight mass of 472.5 kg (1042 lbs).The flaps should be set to 0°. The flaps should only be extended beyond 0° when it is assured that the landing field will be reached. If you arrive too high at the chosen field perform descending figure 8’s keeping the landing site in view until the turn for final approach.

Warning: During a landing without engine power, the glide path cannot be extended. Due to flap effectiveness and side-slipping, the glide path can be shortened considerably. Choose a landing field that you can glide to with certainty.

3.8. Carburetor or Engine Fire

If a fire breaks out in the engine compartment, the fuel shutoff valve must be turned off immediately. Throttle to full open to allow the engine to use up the fuel in the system quickly. Turn the Ignition off and take out the ignition key to ensure that the ignition is not inadvertently turned. Check that the fuel shutoff valve is still completely closed. In the fully closed position the lever is covering the slot for the ignition key.

Descend as quickly as possible, holding the flames away from the aircraft by side slipping and perform an emergency landing similar to that without engine power.

If the flames have been extinguished and an emergency landing cannot be performed without engine power, an attempt may be made to restart the engine - should it indeed restart, an emergency landing should be made immediately.

The deployment of the recovery system can be a good alternative.

If the aircraft has become uncontrollable during the fire or if an emergency landing cannot be performed, the recovery system should not be deployed at greater altitudes, i.e. descend to an altitude of approx. 200 m (660 ft) (make sure that the maximum deployment speed for the recovery system is not exceeded). The recovery system can then be deployed.

Evacuate the aircraft immediately after landing.

Warning: Every CT Supralight is delivered with a fire extinguisher in a pocket on the back of the passenger seat. It can be used to fight small fires in the cockpit.

Warning: Do not activate the rescue system in case of fire on board, in this event you must land the aircraft as quickly as possible.

3.9. Loss of Coolant

A loss of engine coolant does not mean that a forced landing must be carried out immediately.

The coolant is used solely to cool the cylinder heads. The cylinders are air-cooled. As coolant temperature is only indirectly indicated via the cylinder head temperature of the hottest cylinder, engine temperature monitoring is still possible even after a total loss of coolant.

In the case of a loss of coolant, engine power should be reduced enough to ensure that the cylinder head temperature remains within normal operation limits - below 150°C (300°F). If airspeed becomes too low, the flaps may be partially extended 0°-15°. The aircraft can then be flown to a suitable airfield without causing permanent damage to the engine.

If the temperature cannot be held within operating limits, one must decide whether one is prepared to risk damage to the engine in order to reach a suitable field for an emergency landing.

3.10. Loss of Oil

A loss of oil is a very serious condition as the hot oil can easily ignite if it drops on to the hot exhaust system. Perform an emergency landing according to the procedures described above.

3.11. Failure of Flap Control

The flap motor is activated by a controller which allows the preselection of the desired flap position. The flap position is indicated digitally.

In principle, the CT Supralight can be landed irrespective of flap position. However, with negative flaps, the stall speed is higher and the resulting landing distance longer. When in doubt, an alternate airfield with a longer runway should be chosen. Recommended approach speed with flaps 0° is 110 km/h (59 kts). With flaps -12° the recommended approach speed increases to 120 km/h (65 kts).

Should the control unit fail (not the motor), the electronic control of the flap motor should be reset. This is achieved by switching the alternator switch and the master switch off and then on again. <u>It is safe</u> to do this in flight as engine ignition is independent from the aircraft's power supply. Should this not work, the flaps can be set manually by moving the flap selection lever past the detent, up or down.

To set the flaps to negative, move the flap lever past -12° position and above. Once the desired setting has been reached, the lever is returned to the -12° position. The flaps remain in the set position.

To set the flaps to positive, move the flap lever past +35° position and above. Once the desired setting has been reached, the lever is returned to the +35° position. The flaps remain in the set position.

Warning: If the lever is not returned from the manual position, the flap motor continues to run until the end position is reached.

Warning: As the flap position is no longer regulated by the controller, the pilot must ensure that airspeeds for flight with flaps extended are not above the limits shown on the flap lever placard.

3.12. Dynon EMS Failure

Dynon EMS failure does not automatically adversely affect flight safety. However, should the Dynon EMS fail completely, engine parameters can no longer be monitored by the pilot. In order to reduce the risk of damage, the flight may be continued but engine speed should be kept moderate (185 km/h - 100 kts cruise speed with negative flaps). Sailplane towing or banner towing should be stopped when this failure occurs.

4. NORMAL PROCEDURES

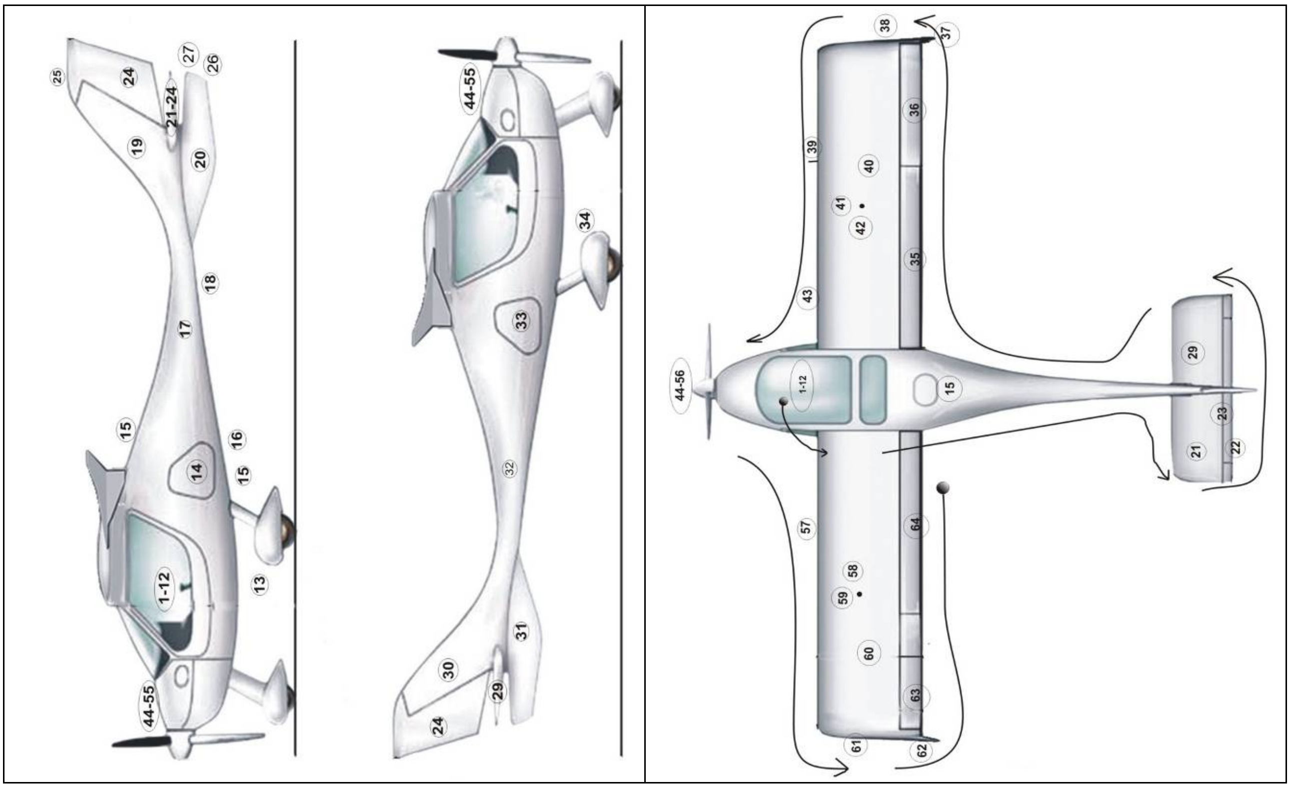
4.1. Normal Procedures Checklists

Normal procedures are initially presented in the form of checklists. Amplified normal procedures follow later in the chapter.

All pilots are strongly recommended to work with the checklists in the cockpit. It is the only way to ensure that in the distractions that may arise during flight important points are not overlooked.

The checklists are formulated so that they may be made into a small booklet which can be used easily in the cockpit. This booklet can be augmented with specific operational aspects including helpful local information.

The amplified procedures augment those points of the checklists which can only be explained in detail. Self-explanatory points will not be further dealt with. Both sources (checklists and amplified procedures) should be used during normal operation.



PREFLIGHT INSPECTION

A. Cabin

1 Aircraft documents	on board
2 Control surfaces	free and correct
3 Main pins	inserted, caps in place and secured
4 Ignition	off, key removed
5 Electrical equipment	off
6 Avionics switch	off
7 Master switch	on
8 Wing flaps	extended
9 Master switch	off
10 Fuel shutoff valve	open
11 Doors	function checked
12 Windows	check
12 Seats	adjusted
	positively locked

PREFLIGHT INSPECTION

B. Left side of aircraft

13 Main landing gear, tire	
Landing gear fairing	check
14 Baggage compartment	locked
15 Antennas	undamaged
16 Static pressure source	check clear
17 Fuselage	no damage
18 Rear tie-down	remove
19 Vertical stabilizer	check
20 Underfin	check
21 Horizontal stabilizer	check
22 Trim tab	check
23 Trim tab hinge	check
24 Trim tab control system	check
25 Rudder	check cables, bolts
26 Rudder ACL	check
27 Aerotow release	check
28 Tail navigation light	check

PREFLIGHT INSPECTION

C. Right side of aircraft

29 Horizontal stabilizer	check
30 Vertical stabilizer	check
31 Underfin	check
24 Rudder	check cables, bolts
32 Rear fuselage	check
33 Baggage compartment	locked
34 Main landing gear and tire	check

D. Right wing

35 Wing flap	check
36 Aileron	check
37 Winglet, wing tip	check
38 Navigation light	check
39 Pitot probe	check
40 Tie-down	remove
41 Fuel quantity	check
42 Filler cap	shut
	vent clear
	vent adjusted forward
43 Wing leading edge	check

PREFLIGHT INSPECTION

E. Aircraft - Nose

44 Engine cowling	remove
45 Exhaust system	check
46 Nose gear, tire	check
47 Air inlet	check
48 Fluid lines	check
49 Electrical wiring	check
50 Fuel	drain; no contamination
51 Landing light	check
52 Propeller	check
53 Spinner	check
54 Battery	check
55 Oil quantity	check
56 Coolant quantity	check
44 Engine cowling	mount

F. Left wing

57 Wing leading edge	check
58 Fuel quantity	check
59 Filler cap	shut
	vent clear
	vent adjusted forward
60 Tie-down	remove
61 Navigation light	check
62 Winglet, wing tip	check
63 Aileron	check
64 Wing flap	check

STARTING THE ENGINE

Preflight inspection	complete
Parking brake	set
Carburetor heat	off
Circuit breakers	all in
Avionics	off
Master switch	on
ACL	on
Fuel shutoff valve	on (up)
Ignition key	in
Choke	as required
Throttle	idle
Propeller area	clear
Ignition key	turn to start then release
Choke	adjust, then off (forward)
Oil pressure	check
Alternator	switch on
Avionics	switch on
Wing flaps	retract

TAXIING

Brakes	check
Steering	check

BEFORE TAKE-OFF

Parking brake	set
Safety harnesses	lap tight, shoulders snug
Doors	shut
Control surfaces	free
Altimeter	set to field elevation
Transponder	on, standby
Choke	shut
Carburetor heat	off
Throttle	4000 RPM
Engine gauges	check
Magneto, left	max. drop 300 RPM
Magnetos, both	check
Magneto, right	max. drop 300 RPM max. diff. 120 RPM
Magnetos, both	check
Oil temperature	min. 51°C (120°F)
Alternator control lamp	off
Throttle	idle
Flaps	set
Pitch trim	set (neutral for takeoff)
Radios	set
Recovery system	unlocked (pin out)
ELT	armed

BEFORE TAKE-OFF (continued)

Passenger briefing	complete
Approach & departure	clear
Parking brake	release

NORMAL TAKE-OFF

Wing flaps	0° - 15°
Carburetor heat	off
Throttle	full
Take-off RPM	4800 – 5000 RPM
Best rate-of climb	105 km/h (57 kts) (flaps 15°) 115 km/h (62 kts)(flaps 0°) 125 km/h (68 kts) (flaps -12°)
Best angle-of-climb	100 km/h (54 kts) (flaps 15°) 105 km/h (57 kts) (flaps -0°)

SHORT FIELD TAKE-OFF

Wing flaps	15°
Parking brake	set
Choke	shut
Carburetor heat	off
Throttle	full
Parking brake	release
Rotation	65 km/h (35 kts)
Acceleration	105 km/h (57 kts)
Best angle of climb	105 km/h (57 kts)

CLIMB

Wing flaps -12°
Airspeed @ -12° and 472,5 kg for
… best rate-of-climb v_y = 135 km/h (73 kts);
… best angle-of-climb v_x = 120 km/h (65 kts);
RPM max. 5500 RPM

CRUISE

Throttle	as required
Engine parameters	in the green

DESCENT

Carburetor heat	as required
Altimeter	set to field barometric

BEFORE LANDING

Safety harnesses	tight
Airspeed	110 km/h (59 kts)
Wing flaps	15° … 35°
Landing light	as required

NORMAL LANDING		SHUTTING DOWN THE ENGINE	
Approach airspeed	100 km/h (54 kts)	Parking brake	set
Flaps in finals	15° or 30° as required	Avionics	off
Airspeed on final	100 km/h (54 kts)	Electrical equipment	off
Flare	smoothly, nose not too high	Alternator	off
After touchdown	stick smoothly back to re-lieve nose wheel	Ignition	off
		Master switch	off
		Ignition key	remove
AFTER LANDING		Recovery system	lock (pin in)
Throttle	idle	ELT	check off
Brakes	as required		
Carburetor heat	off	**PASSENGER BRIEFING**	
Landing light	off		
Wing flaps	retract	Safety harness	instructed
		Door lock	instructed
GO-AROUND		Recovery system	instructed
		Fire extinguisher spray	instructed
Throttle	full	ELT remote control	instructed
Carburetor heat	off		
Wing flaps	15°		
Airspeed	110 km/h (59 kts)		
Rate of climb	confirm positive rate		

4.2. Preflight Inspection

Even if the CT Supralight was operated within the last 24 hours, it is essential that the aircraft be thoroughly inspected before the first flight of each day. This also means removing the engine cowling.

Warning: The inadvertent start-up of the engine is dangerous! Always ensure that the ignition and master switch are off.

Inspection details are given in the Rotax engine operating handbook. This pilot's operating handbook can only deal with the more important points.

Oil quantity can only be checked after the propeller has been slowly cranked (always crank in the rotation direction of the propeller, never against the direction of rotation) until a gurgling noise is clearly heard. Only then has the measurable amount of oil been transported into the oil reservoir. The amount of oil must lie between the two limits on the oil dipstick - max. /min. - and should never be allowed to sink below the minimum level. Before undertaking an extended trip, make sure that the oil level lies at least midway between the two limits. Do not overfill the tank.

Warning: If leakage of operating liquids is discovered, the engine may not be started until the cause of the leakage has been rectified. This is particularly important in the case of oil and fuel leaks as both constitute a fire risk.

The various propellers, which can be installed on the CT Supralight are made of light-weight composite materials. In comparison to propellers from the General Aviation sector, these propellers do not consist of a wooden core which has been covered with composite material. Should such a full-composite propeller be damaged, then the entire load-carrying structure is affected. The propeller can no longer be used and must be inspected by a qualified technician. The same applies to the spinner. It is subject to high loads which can cause the smallest damage to grow very quickly. If it is damaged it too may no longer be used. If necessary, the aircraft may however be flown to an aviation workshop without the spinner cap.

Should cracks appear in the finish, the cause should be sought immediately. Cracks in composite structures are often indication of damage to the underlying structure. A qualified technician often has the means to check the structure without first having to remove the finish.

During the inspection of the cockpit and the baggage compartment, particular attention should be paid to lost objects. Objects easily fall out of bags and/or pockets when leaving the aircraft. These objects can then shift during flight and interfere with the control surfaces.

When flying alone, the passenger seat safety belts should be pulled tight and locked. No loose objects should be on the passenger side as they are not accessible to the pilot during flight.

Warning: When seats are adjusted it must be positively checked that the seats are correct arrested in the seat rails - means both sides at the same hole position and both pins clearly show out of the holes to the outside.

Warning: The height of the seats is adjusted with a belt at the rear, so that the seats do not settle on the fuselage, even under the load.

Warning: The passenger seat is not intended for the transport of objects or bags. However, should objects (e.g. bags) be placed on the passenger seat, they must be secured so that they cannot shift even if the aircraft experiences strong vertical gusts and accelerations.

4.3. Passenger Briefing

Before take-off, passengers should be briefed on the emergency procedures. This ensures that in an emergency passengers will act properly and not become a further problem for the pilot.

Even although one can confidently assume that these circumstances may never happen, it is important that they be discussed calmly on the ground. In this way, one can be sure that if it comes to it, the passenger will react correctly. The briefing should include at the least the following points.

Passenger should be briefed on the proper use of the safety harness - how it is worn, locked, tightened and opened. The safety harness is tightened first at the waist and then the shoulders in order to prevent the lap strap from riding up in a dangerous manner. The safety harness should be held tight at all times as light aircraft such as the CT Supralight can experience turbulence at any time during flight.

The door latching mechanism should be demonstrated. Particular emphasis should be placed on the fact that the doors must be pulled firmly against the door seals before locking the doors in order to prevent the latches from jamming.

Deployment of the recovery system should be explained. Passengers must be told of the importance of the handle in the middle console and how to operate it. In the unlikely event that the pilot is incapacitated, this information is very important.

Warning: Even if the passenger is an experienced General Aviation pilot, he/she should be briefed on the peculiarities of this light aircraft. This is especially the case with respect to the parachute recovery system as these are usually not installed in GA aircraft.

A fire extinguisher spray is provided in a pocket on the back of the passenger seat. It can be used to extinguish small fires in the cockpit. This may be necessary after an emergency landing. Briefing passengers accordingly on the use of the fire extinguisher spray is very important.

If immediate help is required after an emergency landing, the ELT (if installed) can be activated using the remote control in the lower central panel. If the pilot is no longer capable of acting, the passenger should know how he can activate the unit. This information is very important.

4.4. Starting the Engine

The fuel shutoff valve is positioned so that it impedes the turning of the ignition key so that it is virtually impossible to forget it completely. However, before starting the engine one should make sure that the valve is completely open as only then is the supply of sufficient fuel to the engine guaranteed.

Before starting the engine, it should be cranked manually in the direction of rotation to prevent a hydraulic lock and thus damage to the engine. The safety regulations given in the engine operating handbook must be followed.

Warning: When starting the engine, the pilot’s attention is directed to inside the cockpit. The parking brake should thus be applied to prevent the aircraft from moving. Should the aircraft, despite parking brake, start to taxi after the engine has been started, the engine must be cut immediately by turning off the ignition. The aircraft has a tendency to move with the engine in idle when on concrete or if a tail wind prevails.

To start the engine, the starter should be activated for a maximum of 10 seconds. This prevents over-heating and a continuous over-loading of the battery. A cool down period lasting two minutes is recommended between attempts at starting.

Pull the choke out completely and keep it fully open for about 20 - 30 seconds after the engine starts to turn, then slowly push shut. Adjust the throttle as required. The throttle must be closed (full aft on lever) during choke operation for mixture enrichment to function.

Since the engine has a propeller gearbox, start-up impact loads should be avoided. When starting the engine the throttle should not be more than 10% open. Once the engine starts to turn, the throttle should be adjusted to ensure that the engine runs smoothly. This is usually the case at engine RPM between 2000 and 2500 RPM.

Warning: Oil pressure must begin to show at the latest 10 seconds after the engine has started to turn. If this is not the case, the engine must be cut immediately. Engine RPM may only be increased once oil pressure exceeds 2 bar (29 psi).

Allow the engine to warm up at medium RPM. We recommend 2 minutes at 2000 RPM and then increase to 2500 RPM. The engine is ready for operation when the oil temperature has reached 50°C (120°F).

4.5. Before Take-off

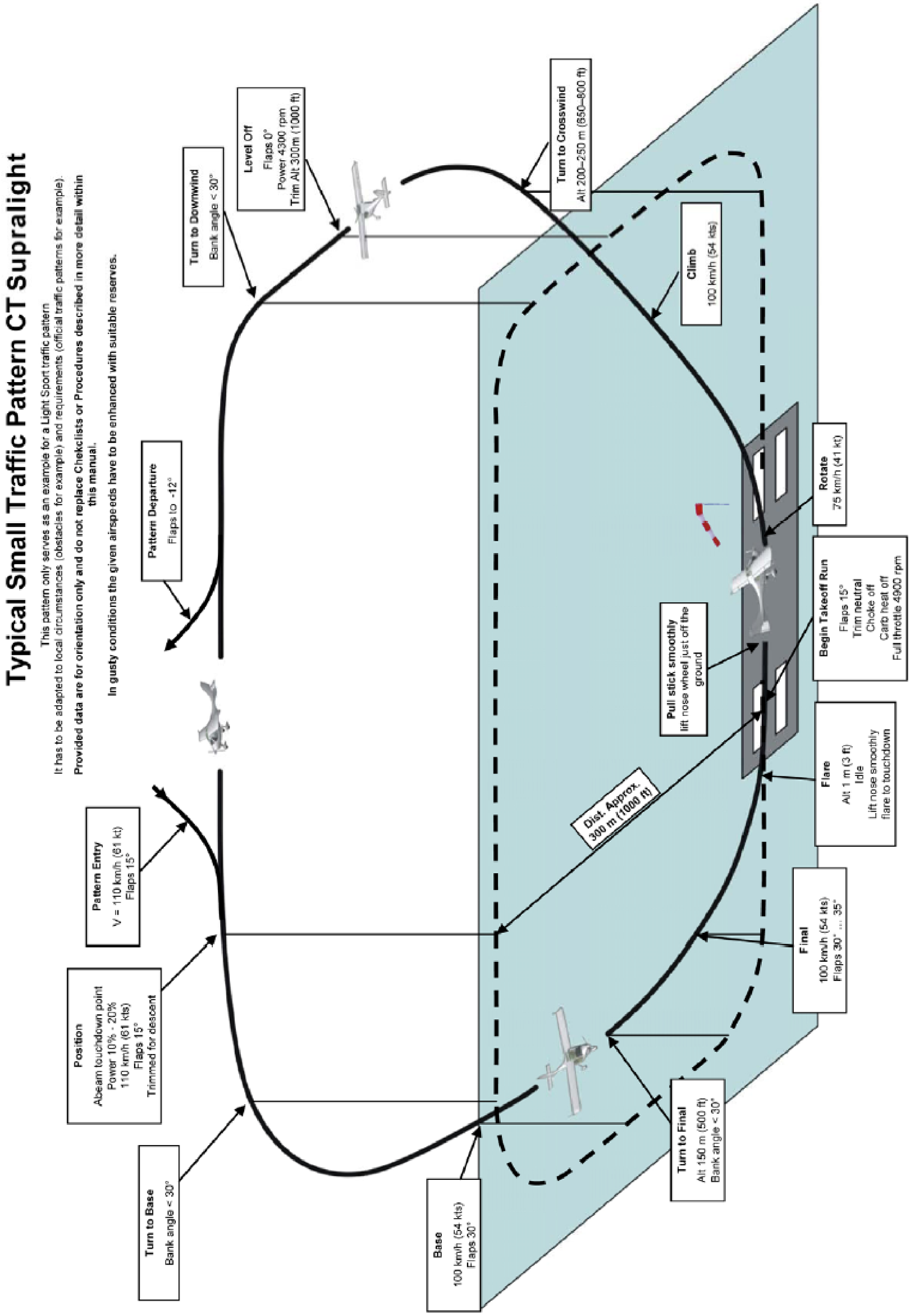
A flight should only be undertaken after a proper flight planning has been completed. Even if only pattern training is planned, you should first check if the runway length suffices under the prevailing conditions (surface conditions, wind, humidity, temperature).

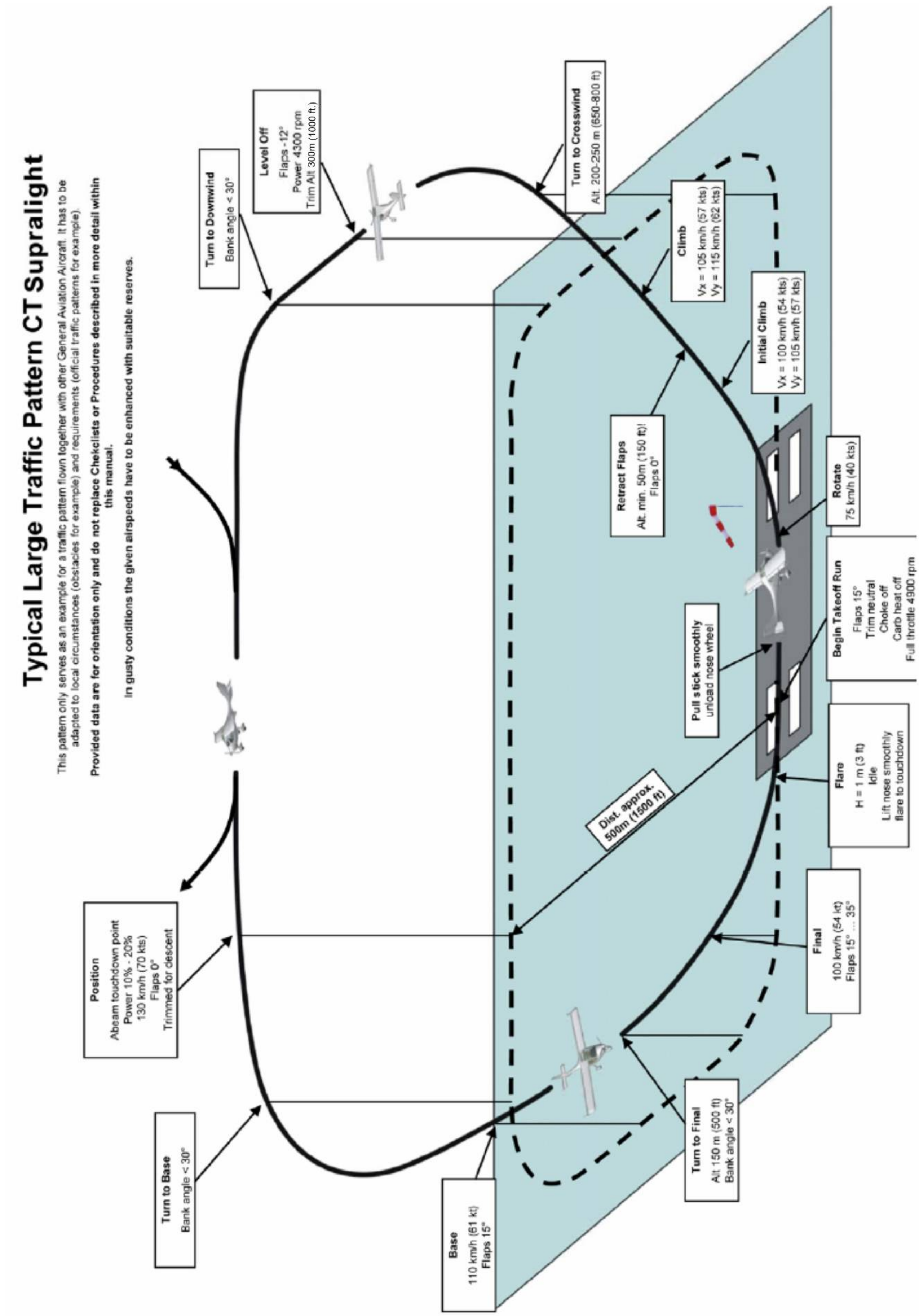
The relevant checklist should be properly executed before each take-off. Small mistakes - such as the wrong flap setting - can lead to unanticipated developments during take-off and quickly lead to problems, for example on short runways with obstacles.

4.6. Typical Pattern

The typical pattern can serve as guidance for the suitable flight configuration during the various different phases of the pattern. In practice, it must, of course, be modified to take into account external influences, local circumstances or a compulsory pattern. Nevertheless you will be able to find the individual points again.

Following charts show two variants of traffic patterns. The big one is used when flying together with General Aviation Aircraft in the same pattern. In order to not slow them down flaps are retracted relatively early, and portions of the pattern are flown at good speed. The pattern is more roomy and fast. The small pattern can be flown on typical small Ultralight airstrips, and together with slower aircraft. As the CT Supralight is aerodynamically very efficient emphasis is laid upon keeping flaps set and speed controlled within the lower but safe limits. The pattern can be flown much more narrow this way, without generating pilot overload.


Typical Small Traffic Pattern CT Supralight
This pattern only serves as an example for a Light Sport traffic pattern
It has to be adapted to local circumstances (obstacles for example) and requirements (official traffic patterns for example).
Provided data are for orientation only and do not replace Chekclists or Procedures described in more detail within this manual.
In gusty conditions the given airspeeds have to be enhanced with suitable reserves.
Turn to Base
Bank angle < 30°
Position
Abeam touchdown point
Power 10% - 20%
110 km/h (61 kts)
Flaps 15°
Trimmed for descent
Pattern Entry
V = 110 km/h (61 kt)
Flaps 15°
Pattern Departure
Flaps to -12°
Turn to Downwind
Bank angle < 30°
Level Off
Flaps 0°
Power 4300 rpm
Trim Alt 300m (1000 ft)
Base
100 km/h (54 kts)
Flaps 30°
Dist. Approx.
300 m (1000 ft)
Turn to Crosswind
Alt 200–250 m (650–800 ft)
Turn to Final
Alt 150 m (500 ft)
Bank angle < 30°
Pull stick smoothly
lift nose wheel just off the ground
Climb
100 km/h (54 kts)
Final
100 km/h (54 kts)
Flaps 30° … 35°
Flare
Alt 1 m (3 ft)
Idle
Lift nose smoothly
flare to touchdown
Begin Takeoff Run
Flaps 15°
Trim neutral
Choke off
Carb heat off
Full throttle 4900 rpm
Rotate
75 km/h (41 kt)


Typical Large Traffic Pattern CT Supralight
This pattern only serves as an example for a traffic pattern flown together with other General Aviation Aircraft. It has to be adapted to local circumstances (obstacles for example) and requirements (official traffic patterns for example).
Provided data are for orientation only and do not replace Chekclists or Procedures described in more detail within this manual.
In gusty conditions the given airspeeds have to be enhanced with suitable reserves.
Turn to Downwind
Bank angle < 30°
Level Off
Flaps -12°
Power 4300 rpm
Trim Alt 300m (1000 ft.)
Turn to Crosswind
Alt. 200-250 m (650-800 ft)
Climb
Vx = 105 km/h (57 kts)
Vy = 115 km/h (62 kts)
Initial Climb
Vx = 100 km/h (54 kts)
Vy = 105 km/h (57 kts)
Retract Flaps
Alt. min. 50m (150 ft)!
Flaps 0°
Rotate
75 km/h (40 kts)
Begin Takeoff Run
Flaps 15°
Trim neutral
Choke off
Carb heat off
Full throttle 4900 rpm
Pull stick smoothly
unload nose wheel
Flare
H = 1 m (3 ft)
Idle
Lift nose smoothly
flare to touchdown
Dist. approx.
500m (1500 ft)
Final
100 km/h (54 kt)
Flaps 15° ... 35°
Position
Abeam touchdown point
Power 10% - 20%
130 km/h (70 kts)
Flaps 0°
Trimmed for descent
Turn to Final
Alt 150 m (500 ft)
Bank angle < 30°
Turn to Base
Bank angle < 30°
Base
110 km/h (61 kt)
Flaps 15°

4.7. Take-off and Climb

The airfoil of the CT Supralight offers good climb characteristics, even in the cruise-optimized flap position. Normally on short runways, the flaps are set to 15° for take-off. On hard surface runways, however, take-off is more efficient with the flaps set to 0°. This setting can also be used for a closed circuit as it reduces the pilot workload as the flaps need not be reset until abeam the touchdown point.

During the take-off roll, engine rotational speed should be checked after full throttle has been applied. Indicated engine rotational speed should be about 4800 RPM. Only when the engine has reached this speed is the correct take-off power available. These values are not valid for variable pitch propellers, which leads to higher RPM for take-off which, in turn, results in better take-off performance.

In order to be able to hold direction on the runway, the CT Supralight pilot must look for an appropriate reference point. Pilots used to flying other types of aircraft are often confused by the strongly tapered fuselage nose of the CT Supralight, tending to take-off and land with a lot of sideslip. The pilot's view straight ahead is very much to the left. At first this appears to be far too far to the left, but it is indeed correct. The point can be located by drawing a vertical line upwards from the between the rudder pedals.

As soon as the aircraft starts to accelerate, the stick should be pulled back slightly to unload the nose wheel. The aircraft takes off faster when the nose wheel is slightly lifted. When airborne, relax the aft pressure slightly to increase speed to best rate-of-climb speed (105 km/h – 57 kts with wing flaps +15°; 115 km/h – 62 kts with wing flaps 0°).

Warning: Climbing at speeds below the recommended rate-of-climb speed does not bring any advantages as the aircraft will not climb as steeply when it is flying below the best angle-of-climb speed. With decreasing speed, the aircraft also becomes more difficult to control. These circumstances should be brought to mind when taking off from a short runway with obstacles.

Wing flap settings may be adjusted once a safe altitude of 50 m (164 ft) has been reached. The CT Supralight climbs at a better rate and a better angle with the flaps retracted to 0°. It is recommended that once an airspeed of 105 km/h (57 kts) is exceeded to retract the flaps from 15° to 0°. The climb can then be continued at 115 km/h (62 kts). When this speed is exceeded, the flaps can be further adjusted to -12°. The aircraft can then climb further and efficiently at 125 km/h (68 kts).

Warning: When adjusting the flaps to the negative position, the drag and lift coefficient of the airfoil are reduced for the same angle of incidence. The aircraft must thus be accelerated during flap retraction. As a result, climb rate drops initially before it then picks up again. When retracting the flaps in horizontal flight, the aircraft can sink slightly. Therefore, the flaps should never be moved in the negative direction near the ground!

4.8. Cruise

Normal cruise is performed with the flaps set at -12°. The airfoil offers the lowest drag in this setting and fuselage airflow is the most favorable. This is immediately apparent when the flaps are adjusted to this setting - the aircraft accelerates markedly.

The ground adjustable propeller installed in the CT Supralight is set by the manufacturer to ensure that maximum continuous power (5500 RPM) cannot be exceeded in horizontal cruise with full throttle. Despite this, attention should be paid to this limitation as climatic variations (temperature, air pressure) can lead to it being marginally exceeded.

Efficient cruise performance is achieved at about 4800 RPM. Greater RPM means greater airspeeds but this can only be achieved at the expense of much higher fuel consumption. The greatest range is achieved at the relatively low value of 4300 RPM.

In case of risk of carburetor icing carb heat is to be activated when installed. Removal of existing ice is not an issue of a few seconds. To remove ice, carb heat must remain activated for a longer duration. Nevertheless avoid prolonged or continuous activation of carb heat as this makes the mixture more rich and leads to plaque at the spark plugs, negatively affecting engine run and power availability.

Warning: Do not activate carb heat (when installed) during takeoff and climb, as this reduces the available power.

During cruise, fuel consumption should be monitored closely. When installed the Dynon EMS shows current consumption, total consumption since take-off and remaining fuel quantity.

Warning: In order to achieve an accurate indication of fuel consumption using the Dynon EMS, the correct amount of fuel available must be programmed before take-off. Otherwise the values shown are not reliable. It is thus recommended that you do not rely on values programmed by someone else.

Fuel quantity should also be continuously monitored during flight by checking the fuel tank indicators in the wing roots. Despite their simplicity, they do give clear information about the fuel load in the tanks, particularly as fuel the level drops.

Warning: A correct indication on the fuel quantity tubes in the wing ribs is only possible when the wings are completely level.

Warning: There is easy possible to fly the CT Supralight with a small sideslip angle. Flight performance is only marginally affected but it can lead to the tanks emptying at different rates. In this case, it is recommended that the wing with the fuller tank be raised in a gentle slip temporarily. The aircraft should be returned to level flight after a few minutes and the fuel indication checked. The amount in the tanks should now be more even.

Warning: The tanks in the CT Supralight have return flow flapper valves on the fuel tank anti-sloshing rib (refer to Chapter 7 Systems description). They prevent fuel from quickly flowing into the outer tank area during side slipping where it could not be fed into the engine. The return flow valve reduces but does not completely prevent return flow. An exact indication of fuel quantity is thus only possible at the wing root when, after a sideslip, the aircraft has returned to normal flight attitude (and the amount of fuel inside and outside the anti-sloshing rib has evened out).

4.9. Turns

Each heading change is flown coordinated in the CT Supralight with aileron and rudder. The horizon is held level with the stabilizer. Maximum permissible airspeed (dependent upon the ballistic recovery system) should never be exceeded. Steep turns should not be flown, particularly at low altitudes.

At low speeds in tight turns the aircraft loses altitude rapidly. Turns with more than 30° bank should, therefore, not be flown below an airspeed of 100 km/h (54 kts). Should one of the wings drop and the aircraft go into a spin because of too low airspeed and crossed controls, it can be easily recovered. Refer to the relevant emergency procedures in Chapter 3.

4.10. Stall

Stalling speed for the CT Supralight with a weight of 472.5 kg (1042 lbs) is 65 km/h (35 kts) with the flaps set at 35°, 75 km/h (41 kts) with the flaps set at 0° and 85 km/h (46 kts) with flaps set at -12°. Approaching stall is indicated by a sluggishness around the vertical axis. The controls become "soft" about 5 km/h (3 kts) above stall speed. Release the aft pressure on the stick to increase airspeed. Close to stall the aircraft can only be controlled by rudder and stabilizer. In a stall, the effectiveness of the ailerons is greatly reduced.

When the nose drops during a stall, the aircraft will lose approx. 50 m (160 ft) altitude. Thus, near the ground a safety minimum speed of approx. 115 km/h (62 kts) should be maintained.

4.11. Approach and Landing

When possible, an aircraft should land into the wind. Final approach should be flown in a straight line extending in the direction of the runways and begun at sufficient altitude.

Warning: A stable final approach is important for a successful landing. If the landing configuration is taken up in good time and at a sufficiently high altitude, the pilot's work load may be reduced considerably. With the aircraft flying stably it can be more easily controlled down to touch-down. Too high approach speeds with flap changes shortly before touch-down lead very quickly to dynamic flight conditions which are very stressful for the pilot. If in doubt: abandon the approach and perform a go around. This is always better than taking a chance of damaging the aircraft due to a hard landing.

Some power (10 – 20 %) should be maintained during approach. This makes it easier to determine that the engine is running properly and is able to provide full power, if required.

The slightly increased pressure on the empennage also has a positive effect on controllability and control feel.

If there is a risk of carburetor icing, the carburetor pre-heating must be turn on. However, this must be turning off again so that full power is available immediately in the event of a start-up.

The aircraft is flown to the ground with even power. About one meter above the ground, the gas is sentimentally completely reduced and the aircraft softly intercepted.

A somewhat higher approach speed should be used for landings in a crosswind to ensure that the aircraft remains controllable. In addition, it is also recommended that the wing flaps be set at 15° or even 0° when landing in a crosswind. Be mentally prepared to perform a missed approach-go around if needed.

During a landing with crosswind, the upwind wing should be dipped by applying aileron against the wind and direction kept using the rudder. As the CT Supralight is a high-wing airplane, there is no risk of the wing tips touching the ground.

Warning: Do not rely on the demonstrated wind speed data in the manual for crosswind landings. Local conditions can lead to lower limits. For example, hangars are often found at right angles to the touch-down point, causing dangerous leeward turbulence which cannot be avoided.

Warning: The aircraft can be landed with ease and safely with flaps set at 15°. A landing with flaps set at 0° or even -12° is possible. The maximum positive flap deflection 35° should be used to land on very short runways (less than 350m 1150 ft) under favorable wind condition (no crosswind component, very light wind and low gusts). Landing with flaps set at 35° requires a lot of practice and should be trained with an experienced flight instructor familiar with the CT Supralight. The increased flap deflection does not reduce the attainable minimum speed, it does, however, greatly increase drag. This permits very short landings but can also create a rapid loss of speed during the landing flare. Flaring too high above the ground will cause the aircraft to drop. In this case, apply full power immediately for a go-around and a new approach. A go-around initiated with full flaps is not a problem for the CT Supralight. It is, however, recommended not to use full flaps when landing in a crosswind.

After landing, all unnecessary electrical equipment, especially the landing light, should be switched off. As this equipment requires a lot of power and since the alternator does not produce much power during taxiing due to relatively low engine RPM, the battery would discharge considerably before the engine is finally shut down.

4.12. Shutting Down the Engine

Under normal conditions, the engine cools sufficiently during descent and taxiing that it may be shut down by switching off the ignition. All electrical equipment along with the alternator should be switched off before the engine is shut down in order to protect the equipment from damage caused by a voltage spike. The Dynon FlightDEK and the Garmin 496 have back-up batteries which are activated if the aircraft power system fails or is switched off. These instruments are, therefore, still active when the power supply is switched off. Since they are independent from the aircraft power system, no damage can occur when the engine is shut down.

4.13. Checking the Emergency Location Transmitter (ELT)

After every landing and, especially, after parking the aircraft, the ELT should be checked for accidental deployment. Under certain unfavorable circumstances, a hard landing can result in the activation of the ELT. It has also been known for the ELT to be switched on accidentally by hand during loading or unloading.

A false alarm can be simply detected by listening to the international emergency frequency 121.5 MHz on the COM radio. An active ELT is also shown on the remote control unit in the lower instrument panel.

5. PERFORMANCE

Performance data is based on an aircraft in good condition and correct settings. Even the smallest adjustments to the controls or the omission of a small piece of fairing can adversely affect aircraft performance. Sufficient reserve should be added to the data given in this handbook to cover all such possibilities.

5.1. Performance Data for MTOW @ 472.5 kg (1042 lbs)

Take-off roll	flaps 15°	140 m	(460 ft)
Take-off distance to clear 50ft obstacle	flaps 15°	250 m	(820 ft)
	Mowed, level, dry grass runway or pavement (It does not make a noticeable difference on this aircraft)		
Take-off speed	flaps 15°	75 km/h	(40 kts)
Best rate-of-climb	flaps 15°	105 km/h	(57 kts)
		4.2 m/s	(825 ft/min)
	flaps 0°	115 km/h	(62 kts)
		4.4 m/s	(865 ft/min)
	flaps -12°	125 km/h	(68 kts)
		4.9 m/s	(965 ft/min)
Best angle-of-climb	flaps 15°	100 km/h	(54 kts)
		approx. 8:1	
	flaps 0°	105 km/h	(57 kts)
		approx. 8:1	
Maximum level speed V_H	flaps -12°	240 km/h	(130 kts)
		@ 5500 RPM	
Maximum range	2000 km		(830 NM)
	180 km/h		(97 kts)
	@ flaps -12°; 4300 RPM		

Warning: All performance data are based on standard atmosphere at sea-level, Rotax 912 UL and the Neuform CR3-65-47-101.6 propeller. They are based on the procedures described in this manual. Higher runway elevations, higher temperatures and other propellers can lead to considerable differences in the data!

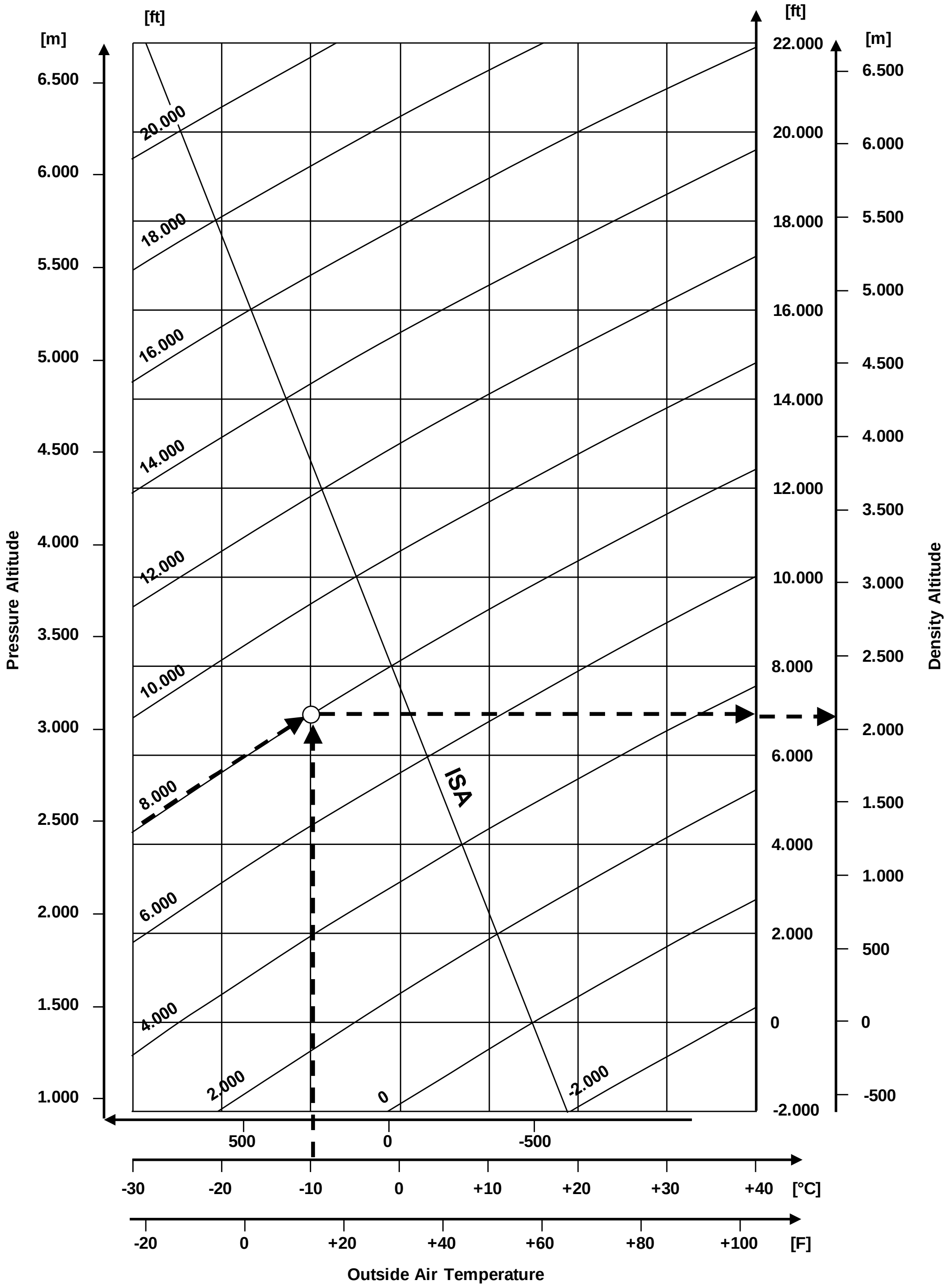
5.2. Flight Altitude and Density altitude

In order to determine exactly the aircraft performance available for a particular flight, the density altitude must be calculated. The CT Supralight is equipped with a carbureted engine, the performance of which varies according to ambient temperature and pressure. This is the reason that density altitude is so important. The aerodynamic characteristics of the aircraft are also dependent upon this parameter.

Density altitudes can easily be calculated using the following table. Using this density altitude as the input parameter, the performance which can truly be expected will be calculated in the following sections. An example is given in this diagram. Outside air temperature is -10°C (14° F.) and the altimeter shows a (pressure) altitude of 2400 m (8000ft).

Warning: pressure altitude can be obtained with the reference pressure of the altimeter set to standard atmosphere = 1013.25 hPa (=29.92 in Hg) only.

The corresponding density altitude is 2100 m (6800 ft). Performance values are thus equivalent to those given in the next chapter for 2100 m (6900 ft). If the pressure altitude of 2400 m (8000 ft) were used, the performance figures would be wrong. This difference can be very significant, particularly in the summer months when the density altitude is much higher than the pressure altitude due to the higher temperatures.

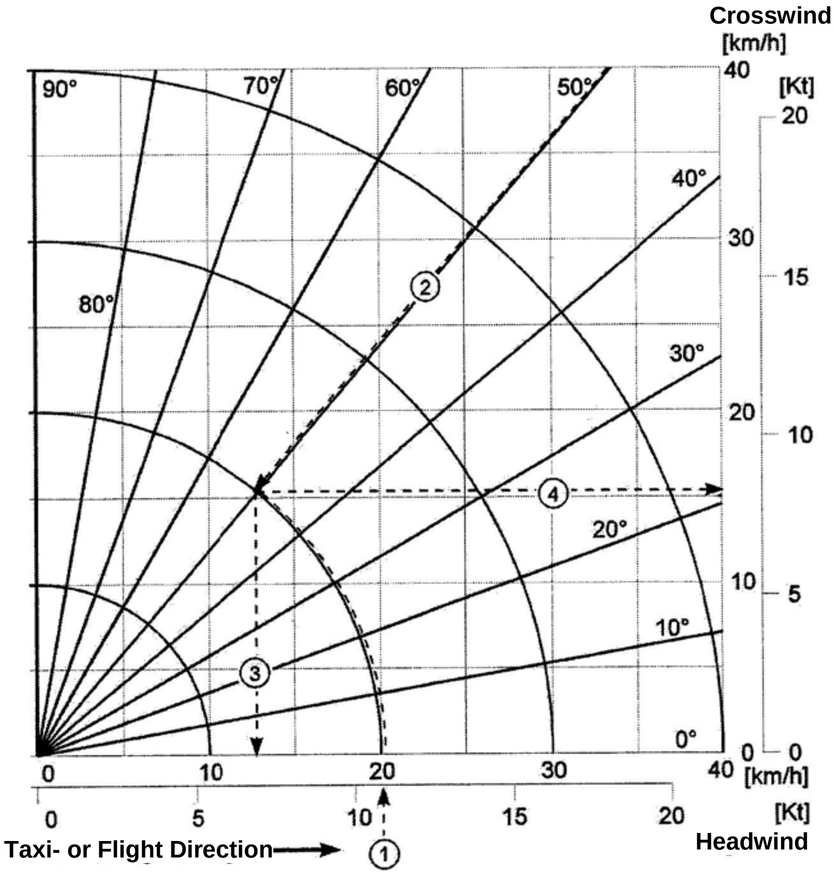


5.3. Significance of the Wind Component

Wind directly affects the flight path and thus aircraft performance. Two diagrams are presented below which show the significance of the wind component.

5.3.1. Wind Influence on Take-off Roll and Landing

To determine whether the aircraft can take-off safely, it is necessary to determine the prevailing crosswind component. On the one hand, this determines the appropriate take-off procedure while, on the other hand, it ensures that the demonstrated permissible crosswind component for take-off and landing is not exceeded. The following diagram is used to determine the crosswind component.

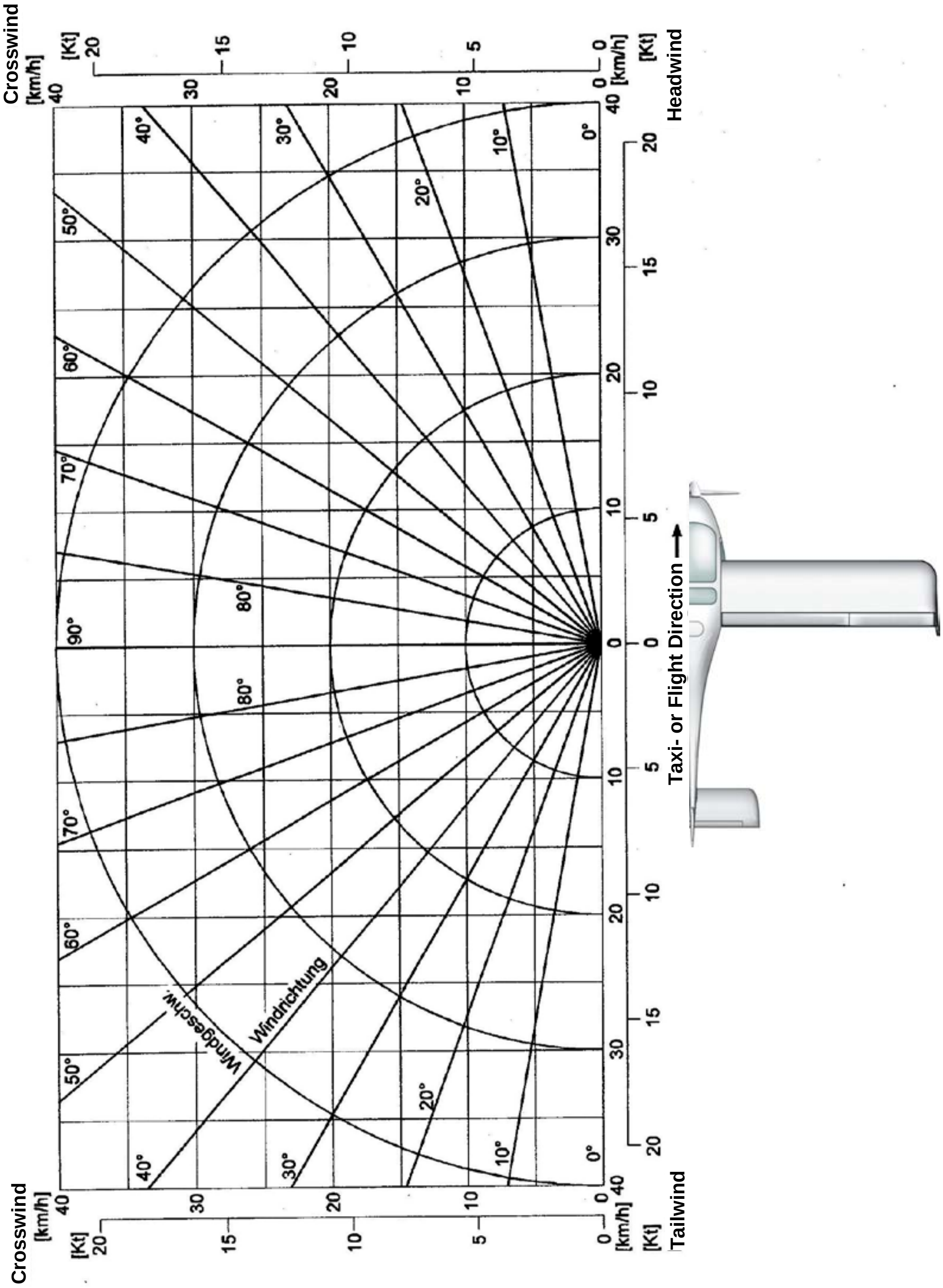


An example is shown in the diagram. Take-off direction is 120°. The wind direction is 70°, wind speed 20 km/h (11 kts). The wind angle is thus 120° - 70° = 50°. Wind speed is plotted along the circle segment (1) to the point where it intersects the wind angle (2). The corresponding value on the x-axis (3) results in a head wind component of 13 km/h (7.1 kts), the value on the y-axis (4) in a crosswind component of 15.5 km/h (8.4 kts).

Values for landing are determined in a similar manner.

5.3.2. Wind Influence on Cruise

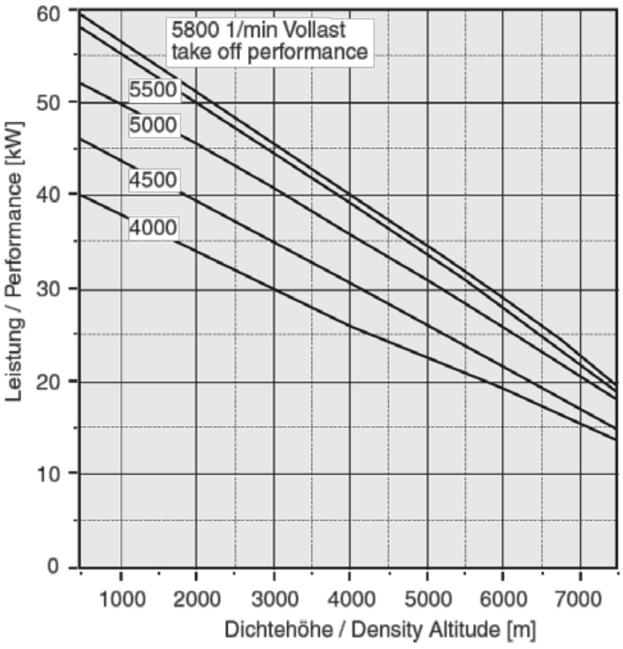
Wind also has a noticeable influence on the forward progress of the aircraft over ground in cruise. The relevant components can be easily calculated from the graph.



Calculation procedures are analogous to those used to determine take-off procedures, the only difference being the possible inclusion of a tailwind component.

5.4. Engine Performance Subject to Altitude

Engine performance decreases with increasing (density) altitude. The following data may be used to determine available engine performance.



5.5. Calculating the Take-off Distance

Takeoff distances in the following charts have been analyzed for varying conditions and takeoff weights using FAA approved analysis methods.

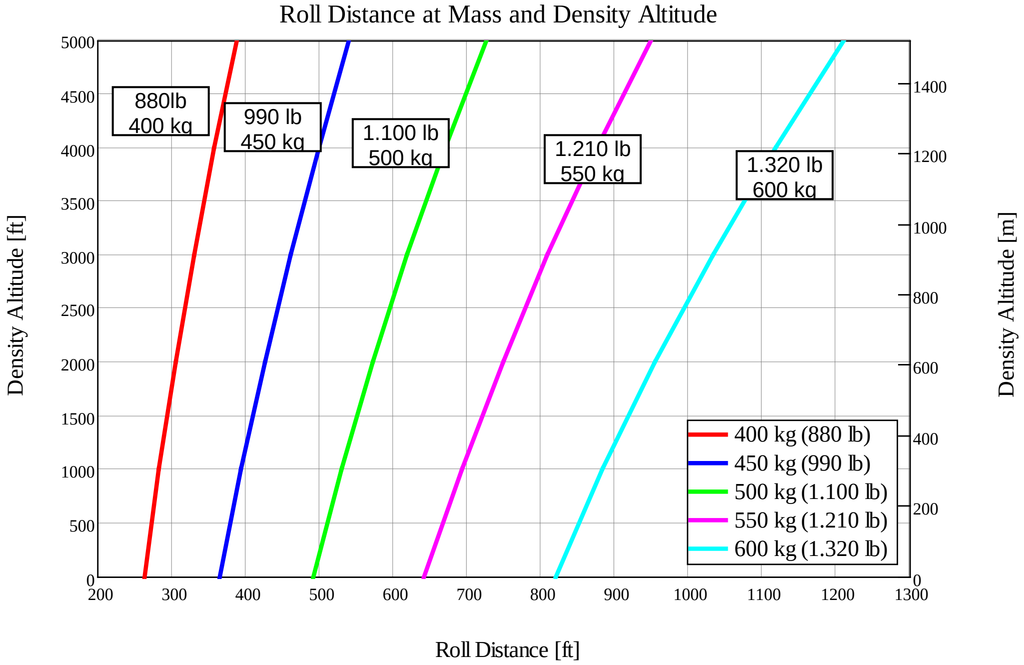
Warning: Important for the usage of these charts is again the correct density altitude. Field elevation is not sufficient, as this dies neither consider local day air pressure nor local temperature. Both have noticeable effect to the takeoff performance.

Warning: Don't forget that these are handbook methods which, in practice, are heavily dependent upon many factors and in particular from the way the take-off is actually performed. The values are based on an aircraft in good conditions piloted by an experienced pilot. Always add a reserve to the data which takes into consideration the local conditions and your level of piloting experience.

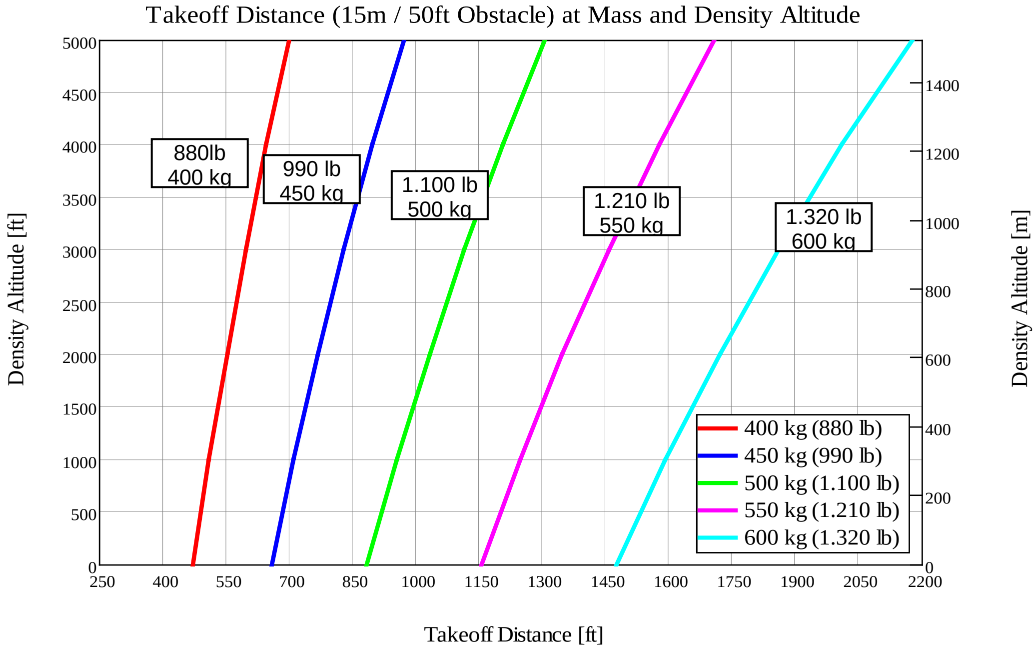
Warning: Even when the graphs show values for higher aircraft weights than allowed in the individual countries for the aircraft category, the limitations madated by the country for maximum takeoff weight must be obeyed!

5.5.1. Take-off Distance Charts

The take-off roll distance defines the distance between the begin of the take-off roll and the point where the aircraft leaves the ground. This distance is given for short mown grass on a hard and dry level soil, without wind influence. Distances for concrete are comparable with the CT Supralight.



The start distance gives, in which distance of the starting point the airplane with the concerning ones Conditions an obstacle with the height of 15 m precisely can fly. The same edge terms like with the previous diagrammed are valid for the rolling distance contained in it.



5.5.2. Influences to Take-off Distance

Take-off performance for conditions different to the ones named before can be estimated by using the following rules of thumb. Again the basis is an aircraft in good condition and a well-trained pilot.

Influence	**Increase of take-off rol distance**	**Increase of take-off distance**
high grass 20cm (8 in)	app. 20% (= x 1.2)	app. 17% (= x 1.17)
Flaps 0° instead of 15°	app. 10% (= x 1.1)	app. 20% (= x 1.2)

2% inclination of runway	app. 10% (= x 1.1)	app. 10% (= x 1.1)
4% inclination of runway	app. 14% (= x 1.14)	app. 12% (= x 1.12)
tail wind 5 kt	app. 20% (= x 1.2)	app. 25% (= x 1.25)
wet snow	app. 30% (= x 1.3)	n/a
soaked soil (1.2 in (3cm) deep)	app. 16 % (= x 1.16)	n/a

Each factor occurring at a time has to be considered individually.

Example: Takeoff at 450 kg (990 lb) at 20°C (68 F) at 600 m (2000 ft) pressure altitude in high grass with a runway 2% inclination. As by chapter 5.2 density altitude for this case is 900m (3000 ft). Takeoff charts show a take-off roll distance of 155 m (510 ft) and a take-off distance of 275 m (900 ft). Consideration of the deviating factors delivers: Take-off roll = 155m x 1.2 x 1.1 =205m (672 ft) and Take-off distance = 275m x 1.17 x 1.1 = 354m (1160 ft). Easy to see that just using the field elevation (200 ft) would have delivered values by approx. 25% too low.

5.6. Calculating Climb Performance

The aircraft is nearly always operated under different conditions than ISA standard atmosphere. Aircraft climb performance under different conditions can be estimated according to the following tables. The basis for these values is an aircraft in good conditions. Best climb is achieved with 0° flaps. Data are provided for 0° and 15° flaps (climb and take-off condition).

Warning: Knowledge of the correct density altitude is mandatory to obtain reliable values for the aircraft performance.

Climb performance at flaps 0°

		Aircraft weight 472.5 kg (1042 lbs)		
density altitude, [m]	**density altitude, [ft]**	**rate of climb [ft/min]**	**rate of climb [m/s]**	**at CAS [kts / km/h]**
0	0	980	5,0	72 / 130
1 525	5 000	710	3,6	71 / 128
3 050	10 000	490	2,5	69 / 125
3 660	12 000	390	2,0	68 / 122
4 575	15 000	300	1,5	67 / 120

Climb performance at flaps 15°

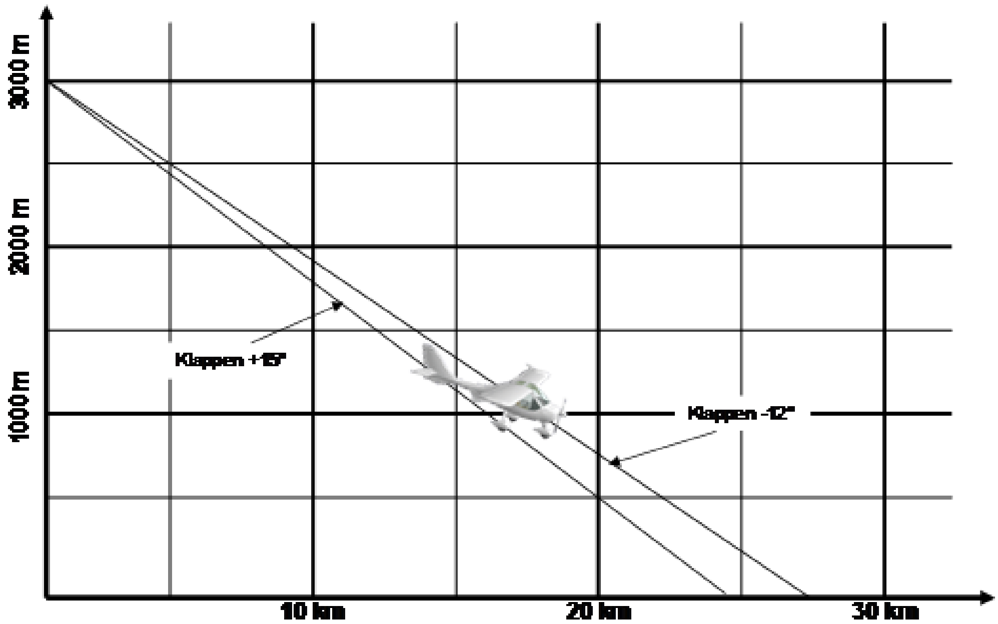
		Aircraft weight 472.5 kg (1042 lbs)		
density altitude, [m]	**density altitude, [ft]**	**rate of climb [ft/min]**	**rate of climb [m/s]**	**at CAS [kts / km/h]**
0	0	890	4,5	62 / 115
1 525	5 000	670	3,4	62 / 115
3 050	10 000	430	2,2	60 / 112
3 660	12 000	370	1,9	60 / 112
4 575	15 000	260	1,3	59 / 110

5.7. *Gliding Characteristics*

The following chart shows the distances the aircraft can glide, dependent upon altitude, assuming smooth air, no wind and no vertical air currents.

Warning: Intensive thermal activity can prolong these distances. Turbulence, however, usually leads to a reduction in gliding distance. One should never expect favorable conditions when estimating a possible gliding distance!

Gliderslope CT Supralight



Glide angle of the **CT Supralight** can be assumed in practice to be 8.5 to 1. With flaps extended this ratio gets worse. One effect of moderately set flaps is to reduce the minimum sink, but the speed at which the minimum sink is observed reduces faster. This results in a reduced possible gliding distance. Speeds for best glide at flight mass and negative flaps can be assumed as follows:

472.5 kg (1042 lbs)	124 km/h (67 kts)
400 kg (881 lbs)	115 km/h (62 kts)

6. WEIGHT AND BALANCE, EQUIPMENT

6.1. Weight Limits

The following limits ensure the safe operation of the aircraft:

Maximum take-off weight (MTOM)	472,5 kg (1042 lbs)
Minimum crew weight	70 kg (154 lbs)
Maximum load per seat	100 kg (221 lbs)
Maximum baggage load, total	50 kg, (110 lbs)
… in each compartment / side, max.	25 kg (55 lbs)
Center of gravity range:	282 – 478 mm (11.1 in. – 18.8 in.). Datum is the wing leading edge

6.2. Weighing

To weigh the aircraft, three scales must be set on a level floor. The aircraft is leveled by shimming either the nose wheel or both of the main wheels. It is in the correct position for weighing when the tunnel (where the throttle quadrant is located) in the cockpit is in the horizontal. The aircraft must also be level span-wise. This can be determined by placing a level on the cabin roof in the vicinity of the skylight.

Using a plumb bob, the middle of the wheel axles is projected on to the floor and marked. The same procedure is used to mark the reference datum. A plumb bob is dropped from the wing leading edge on the outer side of the root rib. The transition to the fuselage is faired in the root rib area which can lead to an incorrect measurement. The distance between the wheels must be measured during each weighing. These values must be then be used in the tabulation. If the original Flight Design weighing form is used as a spread sheet, the distances must be recorded with a positive algebraic sign. If the calculations are done manually, one must be careful to use the proper algebraic signs.

It is easy to make mistakes when weighing, particularly if the scales are interfered with by a side-load (e.g. due to landing gear strut compression). It is therefore very important that the weighing process remains free from distortion. Distortion can be avoided if at least one of the main wheels (better both) is placed on a pair of metal plates with grease in between. The two plates slide easily on each other which reduce the tension due to side-loads virtually to zero.

An example of a weighing record is given below. The weighing data for the aircraft as delivered from the factory is to be found in this manual. It is the responsibility of the owner of the aircraft to ensure that the aircraft is weighed after any relevant changes (change in equipment; repair work). Furthermore it is mandatory that the main mass data be recorded on the relevant page of the aircraft logbook.

FLIGHT DESI

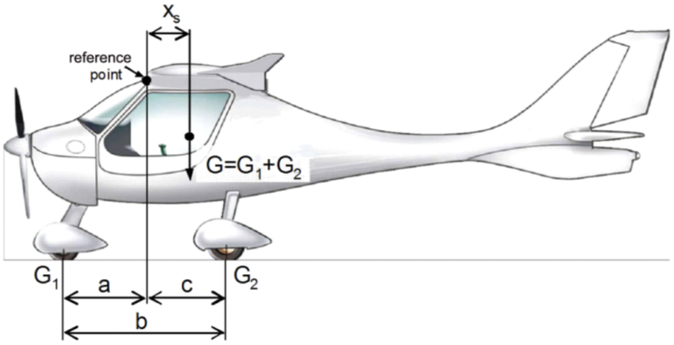
Gewichtsübersicht Ultraleichtflugzeug

Muster:	CT
Baureihe:	CT Supralight

Werk-Nr.:	E-yy-mm-nn
Motor-Nr.:	xxxxxxx

Ausrüstungsliste Stand vom:	dd.mmm.yy

Grau hinterlegt erfordert Eingabe



Bezugspunkt:	Tragflügel Vorderkante	Bezugsebene:	Tunneldach in Kabine waagrecht

Wägung und Leergewichts-Schwerpunktlage

Gesamtgewicht					
Auflagepunkte	Brutto-Gewicht	Tara	Netto-Gewicht	Abstand zu RP	Moment
Bugrad	55,50 kg	0,00 kg	55,50 kg	0,885 m	-49,1 kg*m
Haupträder	243,70 kg	0,00 kg	243,70 kg	0,570 m	138,9 kg*m

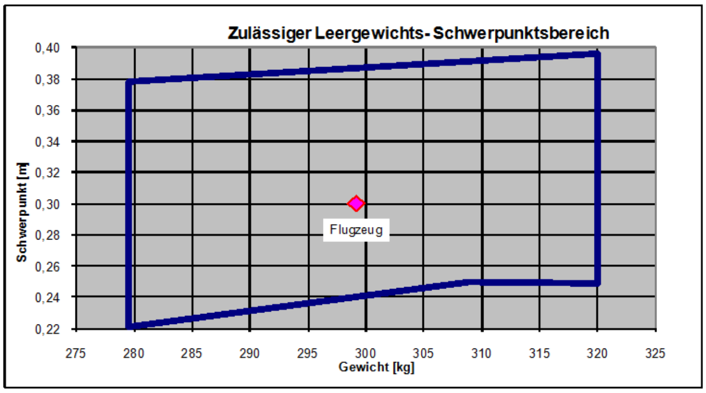
Abzüge					
Kraftstoff		0 l	0,00 kg	0,210 m	0,0 kg*m

Leergewicht und - Schwerpunkt	**299,20 kg**	**0,300 m**	89,8 kg*m
Zusatzausrüstung gem. Ausrüstungsliste:	25,36 kg	0,424 m	10,8 kg*m

Leergew. in Grundausstattg.:	**273,84 kg**

Komponentengewichte:

Tragflügel links	30,70 kg
Tragflügel rechts	31,10 kg
Höhenleitwerk	5,40 kg
Seitenruder	1,90 kg
Rumpf	230,10 kg
Kontroll-Summe:	299,20 kg
Gewicht der nichttrag. Teile	**237,40 kg**



Zusammenfassung:

Vorgabe aus Zulassung	
Max. Abflugmasse	**472,50 kg**
max. zul. Gewicht nichttrag. Teile	**391,50 kg**

Daten des Flugzeugs	
Leergewicht	**299,20 kg**
max. Zuladung	**173,30 kg**
max. Zul. Rumpf	**154,10 kg**

Miroshnichenko	Kherson	dd.mmm.yy
Unterschrift	***Ort***	***Datum***

Warning: The empty weight data in this example does not correspond to an actual air-crafts. Use only the empty weight and center of gravity data from the most current weight record!

The weighing record provides an insight into the state of the aircraft at the time of weighing. In addition to the empty weight with the currently installed equipment and the relevant center of gravity, the weighing record also states the empty weight with standard equipment installation. The MTOW as defined by the certification regulations and the maximum weight of the aircraft as defined for structural proofs are used to calculate the maximum permissible payload and the maximum payload in the fuselage. A diagram in the weighing form gives information about the position of the empty weight center of gravity. The aircraft is designed to make it impossible for the permissible center of gravity to be exceeded when the aircraft has been loaded within the limits set down in this manual and the empty weight is within the specified range. If necessary, trim ballast weight should be installed.

The weighing record is only valid in connection with the current equipment list. Any changes to the aircraft must be appropriately registered. It is also possible that national regulations require weighing to be carried out at specified intervals or after specified work on the aircraft. It is the responsibility of the owner to conform to such national requirements.

The aircraft is operated in different countries under different certification regulations. There is also a wide variety of options available for the aircraft, some of which may not be installed in some countries. A variety of these options can also lead to an increase in aircraft empty weight which exceeds that set down in the certification regulations of some countries. It is the responsibility of the owner to ensure that national regulations concerning aircraft specification and operation are followed.

6.3. Flight Mass and Center of Gravity

The flight mass and the connected center of gravity in flight must be determined prior to each flight. The following table and charts provide you with all necessary information to perform this part of your flight preparation.

Warning: You always have to expect that you burn all your fuel during one flight. Therefore, in all cases both conditions have to be verified to be within allowed limits: With tanks filled as on takeoff, and with tanks completely empty. In no case you may neither get out of the allowed cg range nor exceed MTOM as certified in your relevant country.

Warning: Explicit data used as example in the following charts have nothing to do with your real aircraft. The only purpose of these data is to illustrate the process of determining the required values for the flight planning. In any case you must make sure that you take the correct data as valid for your individual aircraft.

		CT supralight *example*		*Your* CT supralight	
		Mass [kg] *[lb]*	**Mass Moment [kg*m]** *[in*lb]*	**Mass [kg]** *[lb]*	**Mass Moment [kg*m]** *[in*lb]*
1.	Empty mass & mass moment (from most recent, valid Weight and Balance Report)	299,2 *(659)*	89,8 *(7.796)*		
2.	Combined pilot and passenger mass on front seats Lever arm: 0,52 m (*20,5 in*)	85 *(187)*	44,2 *(3.834)*		
3.	Mass loaded to luggage compartment behind the cabin Lever arm: 0.97 m (*38 in*)	12 *(27)*	11,6 *(1.026)*		
4.	Mass loaded to luggage compartments in foot area in front of the seats Lever arm: -0,335 m (*-13,2 in*)	0 *(0)*	0 *(0)*		
5.	**Total mass & total mass moment with empty fuel tanks (total of 1. – 4.)**	**396,2** ***(876)***	**145,6** ***(12.656)***		
6.	**Center of gravity with empty fuel tanks (Mass Moment of 7. divided by Mass of 7.)**	**0,367 m** *(14.4 in)*			
7.	Usable fuel as verified to be filled on the aircraft * Lever arm: 0,21 m (*8,3 in*)	43 *(95)*	9,0 *(789)*		
8.	**Total mass & total mass moment including fuel (5. plus 7.)**	**439,2** ***(971)***	**154,6** ***(13.445)***		
9.	**Center of gravity including fuel (Mass Moment of 8. divided by Mass of 8.)**	**0,352 m** *(13,8 in)*			
10.	The results in lines 5. and 8. must be all within the certified limits as defined for this aircraft in Chapter 6.1. Mass moments can be checked in the mass moment chart below. The results in lines 6. and 9. must be both within the limits as defined for this aircraft in Chapter 6.1				

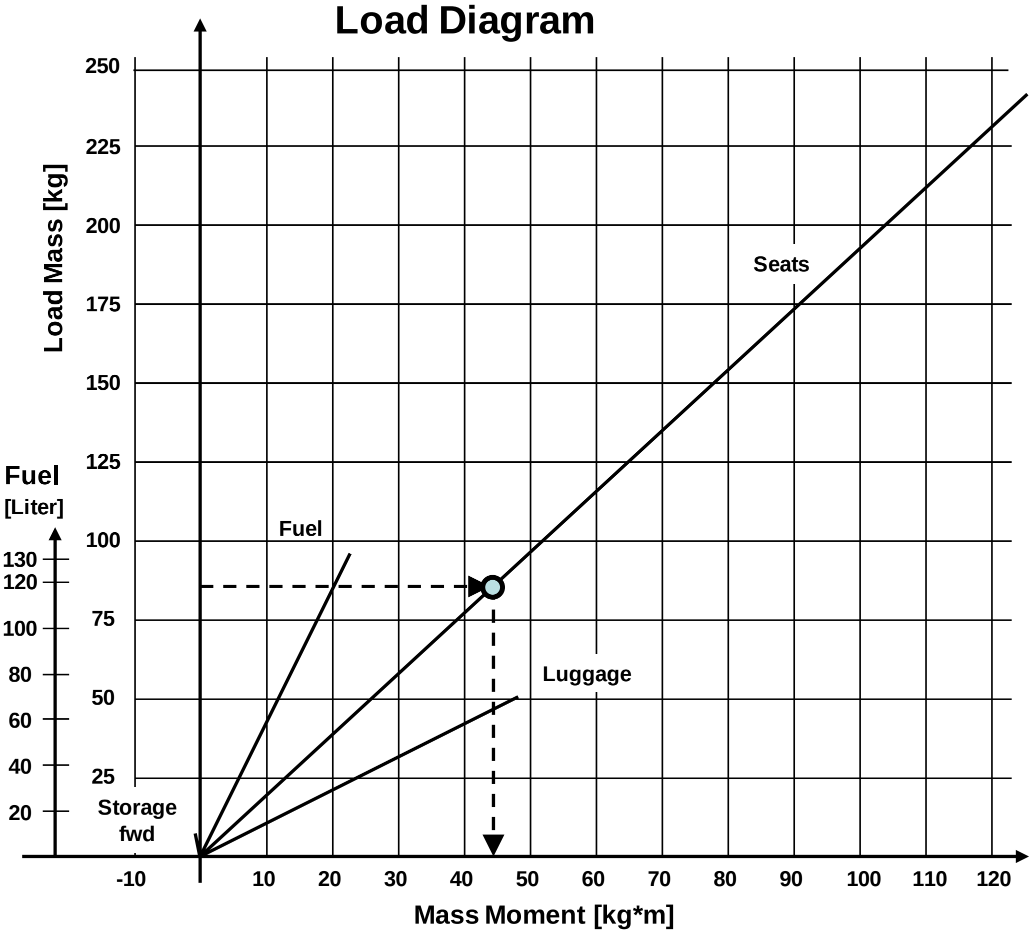
* One Liter of fuel weighs 0,725 kg – one US gal of fuel weighs 6,05lb.

The table above provides you with the calculation scheme for the aircraft center of gravity for your flight. You have the possibility to calculate the moments analytically, or to read them from the following diagrams. Both methods will lead to the same result. Always make sure that you calculate the results for your takeoff configuration, and for the configuration with empty fuel tanks. In both cases the center of gravity must be within the defined limits.

The following chart provides you with a graphical method to determine the mass moments of the individual positions. To obtain the value, select the correct weight (or volume) on the vertical axis. Go horizontally to the intersection with the correct loading graph. Go vertically down to the horizontal axis to obtain the mass moment value. Enter this mass moment value to the correct line in the analysis table above.

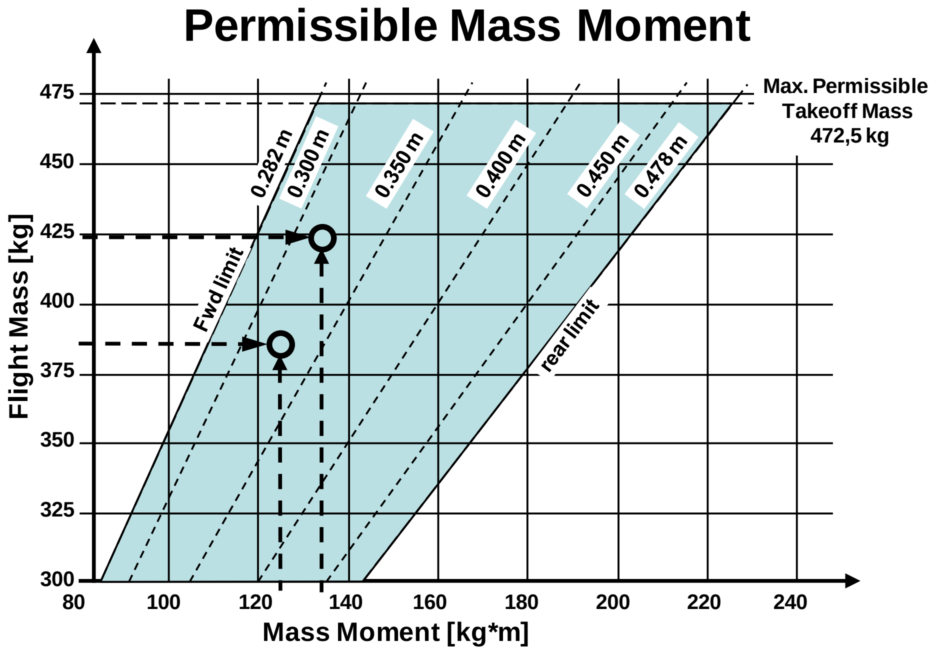
The next chart allows you to verify if your aircraft is within the allowable moment range. The allowable range is shaded in this chart. Six center of gravity positions are marked as lines.

The third chart “Permissible CG Range” allows you to verify if your aircraft is within the allowable cg range. The allowable range is shaded in this chart. Forward and aft cg limit, as well as maximum permissible flight mass are marked as lines. This allows you to determine the actual center of gravity position you have achieved.

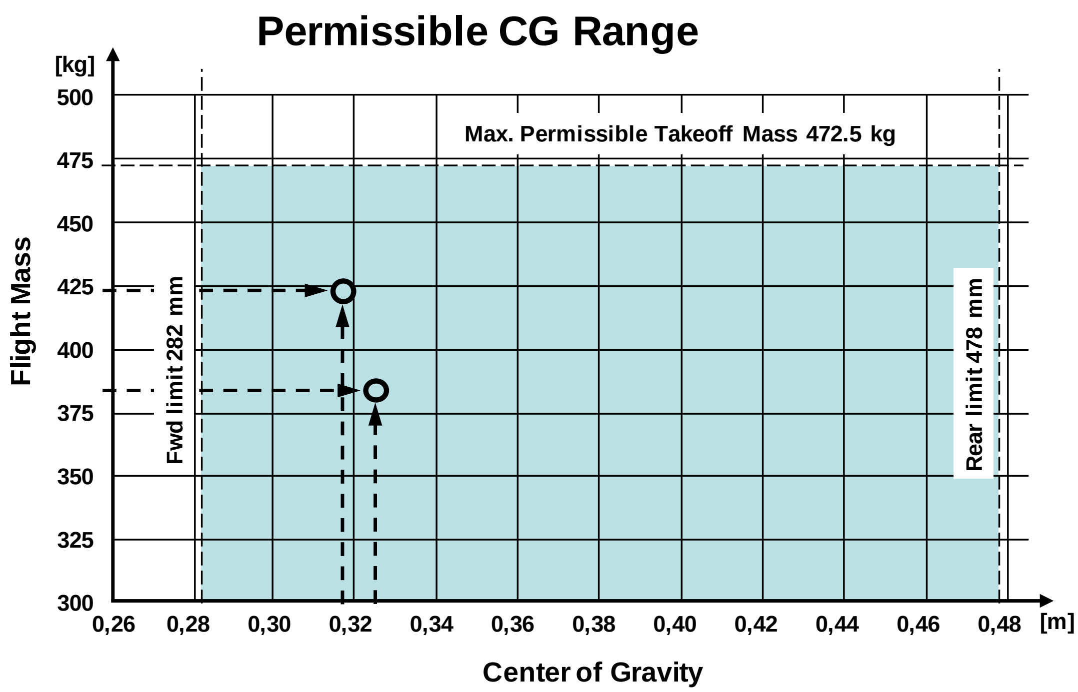


The example shown in this diagram represents the determination of the mass moment value as by the example shown in the analysis table. The pilot mass of 85 kg (*187 lb*) is selected at the vertical axis. Intersection with the line „Seats“ leads to a mass moment of 44,2 kg*m (*3.834 in*lb)*.

The example shown in this diagram represents the verification of the mass and mass moment values achieved as by the example shown in the analysis table. The aircraft with no fuel is represented by the values 396,2 kg (*876 lb*) and 145,6 kg*m (*12.656 in*lb*). The aircraft with takeoff fuel is represented by the values 439,2 kg (971 *lb*) and 154,6 kg*m (*13.445 in*lb*). Both values are within the allowed range. The two center of gravity positions can be determined as 0,367 m (*14,4 in*) and 0,352 m (*13,8 in*).



Both configurations lie within the allowed areas for takeoff mass, whole moment and main situation.



6.4. Equipment

Each aircraft is delivered with an equipment list that shows the installed equipment. An example of this equipment list is shown as follows.

An example of an equipment list is given below. Each aircraft is delivered with an initial equipment list as part of this handbook. A new equipment list must be compiled and added to aircraft logbook and to this manual when there is any change to the equipment. The owner of the aircraft is responsible for ensuring that the equipment list is current.

The equipment list includes options which are not certified in all the countries in which the CT Supralight may be operated. It is the responsibility of the owner to ensure that national regulations are followed, for example with respect to the ballistic recovery system and the autopilot. The equipment list is a summary of the aircraft at the time of an annual inspection or weighing. It is mandatory to record the installation and/or removal of instruments in the aircraft logbook.

Equipment List for Ultralight Aircraft

FLIGHT DESIGN

Type	CT	Prod. number	E-09-0X-XX
Model	CT Supralight	Data	18.XXX.09

Item	*Type*	*Manufacturer*	*Location*	*Weight*	*Installed*
1. Minimum Equipment					
EFIS&EMS	FlightDEK-D180	Dynon Avionics INC.	-0,180 m	1,600 kg	X
Rescue System	BRS-5 1050 DAeC	BRS	1,210 m	11,310 kg	X
Basic Battery	Cyclon	Zanzottera	-0,610 m	2,006 kg	X
Basic Propeller 2 blade	Novaprop TXR2-65	Neuform	-1,260 m	5,485 kg	X
2. Additional Equipment					
3. Additional Equipment Avionic					
Radio	SL 40	Garmin	-0,250 m	2,660 kg	X
Transponder	GTX330	Garmin	-0,245 m	2,900 kg	X
GPS	GPSMAP496	Garmin	-0,080 m	1,500 kg	X
ELT	ME 406	ARTEX INC.	1,470 m	1,500 kg	X
Intercom	PM 3000A	PS Engineering	-0,147 m	0,850 kg	X
4. Optional Equipment					
upgrade Propeller 3 blade FP	CR3-65-47-101,6"	Neuform			
upgrade Propeller 3 blade VP	KA-1/3 PA	Kaspar			
Cabin Heater	-	Flight Design	-0,585 m	1,640 kg	X
Slipper Clutch		Rotax	-1,020 m	1,700 kg	X
Towing Hook	E 22	Tost	2,010 m	4,454 kg	X
Towing Mirror System	-	Flight Design	0,100 m	0,926 kg	X
Autopilot 1 Axis	CT Pilot 1-Axis	Trutrak			
Autopilot 2 / 3 Axis	CT Pilot 2/3- Axis	Trutrak			
Cover Mixer	-	Flight Design	1,010 m	0,180 kg	X
Strobe / Position Light	EPL / ACL / ERB	Thiesen	2,470 m	0,640 kg	X
Landing Light	-	Flight Design			
Landing Light LED	ELL	Thiesen			
Door Gas Spring			0,780 m	0,150 kg	X
Door Sealing	-	Flight Design	0,300 m	0,910 kg	X
Door Locks	-	Flight Design	0,025 m	0,060 kg	X
Seat Leather	-	Flight Design	0,460 m	2,900 kg	X
Fire Extinguisher			0,690 m	0,500 kg	X
Map Pockets	-	Flight Design	-0,340 m	0,160 kg	X
Main Wheel Fairings	-	Flight Design	0,570 m	0,700 kg	X
Nose Wheel Fairing	-	Flight Design	-0,885 m	0,410 kg	X
12V Power Plug	-	Flight Design	-0,085 m	0,030 kg	X
Parking Brake	-	Flight Design	0,250 m	0,160 kg	X
Ventilation Windows	-	Flight Design	-0,070 m	0,430 kg	X
5. Misc. Equipment					

Total Weight All Equipment	0,350 m	45,761 kg
Total Weight Additional Equipment	0,424 m	25,360 kg

Miroshnichenko	Kherson	18.XXX.09
Signature	*City*	*Date*

All equipment that is approved for installation in the CT Super Sport is shown in the equipment list below.

Be aware that the equipment listed below cannot be installed in any arbitrary combination. When changing the installed equipment, this may only be done in accordance with manu-facturer instructions.

Description	***Type / part No.***	***Manufacturer***
SkyView Primary Flight Display	SV-D700 or SV-D1000 or SV-D1000T or SV-HDX1100	Dynon Avionics INC
Autopilot	SV-AP-PANEL	Dynon Avionics INC
Analog airspeed indicator	6 FMS 4	Winter
Analog three pointer altimeter	4 FGH 10	Winter
Slip indicator, 58 mm	Gr 1	Winter
Vertical speed indicator, 58 mm	5 STVM 5	Winter
Airspeed indicator	16-212-341	U.M.A., INC
COM radio 25 kHz channel spacing	GTR 225	Garmin
COM radio 8.33 kHz channel spacing	GTR 225A	Garmin
SV COM Radio, 8.33 kHz channel spacing	SV-COM-X83	Dynon Avionics INC
Transponder mode C	GTX 327	Garmin
Transponder mode S	GTX 328	Garmin
Transponder mode S	GTX330	Garmin
Transponder	SV-XPNDR-261	Dynon Avionics INC
Altitude encoder	A-30	ACK Technologies
Analog tachometer	19-519-211	UMA
Analog cyl. head temperature gauge °C	N12116V150C010	UMA
Analog cyl. head temperature gauge F	N12116V300F020	UMA
Analog voltmeter	N141100917V060	UMA
Analog oil temperature gauge °C	N12113V150C020	UMA
Analog oil temperature gauge F	N12113V300F0A0	UMA
Analog oil pressure gauge bar	N04113V010B010	UMA
Analog oil pressure gauge PSI	N04113V130P070	UMA
Hobbs hour meter	85094	Honeywell
Magnetic compass	C-2300-L4-B	Airpath
Compass	AIRPATH	Airpath Instrument CO
Intercom	PM 3000	PS Engineering
Intercom	SV-INTERCOM-2S	Dynon Avionics INC
406 MHz ELT unit	ME 406	Artex
406 MHz ELT unit	AF 406 Compact	Kannad
Lead-gel battery, 7 Ah	SBS 8	Hawker
Lead-gel battery, 15 Ah	SBS 15	Hawker
Basic Battery	Super B 10P	Super B
GPS Receiver	AERA 500	Garmin
GPS Receiver with XM capability	AERA 510	Garmin
GPS Receiver	GPSMAP 795	Garmin
GPS Receiver with XM capability	GPSMAP 796	Garmin

7. AIRPLANE AND SYSTEMS DESCRIPTION

7.1. Airframe

The CT Supralight is a conventional high-wing aircraft. The wings can be easily removed but should only be removed after appropriate instruction as important control elements and the fuel system must be properly attached on remounting.

The horizontal tail of the CT Supralight is a stabilizer (all-moving horizontal tail). An anti-servo tab has been attached, which moves in the same direction as the stabilizer during deflection. This anti-servo tab can be adjusted via the standard stabilizer trim and is attached to the horizontal tail.

The spacious cockpit is comfortably accessible to the pilot and passenger via two large doors held open by gas struts. The extensive acrylic windshield offers, for a high-wing aircraft, outstanding visibility.

Behind the cockpit there are baggage compartments on the right and left side with standard tie-downs for simple baggage. The baggage compartments are accessed via lockable hatches on the side of the aircraft to facilitate loading and unloading.

7.1.1. Assembly Instructions

Warning: In many countries assembly and disassembly of the aircraft is only allowed to licensed mechanics. The description of the procedure in this manual not automatically allows to do it.

Push the left and right wings into the spar openings up to the last 20 cm (8 in). Before the wings are completely pushed into place, attach the pitot tube lines, tank vent lines and connect the navigation lights.

The wings can now be pushed almost into place. The fuel lines must now be attached and secured with a line clamp. When pushing the wings in completely, make sure that the fuel lines do not become jammed.

The wing pins are inserted from front to back. After they have been inserted, they are secured from the back by means of a securing allen bolt and cap.

Warning: Both wings have to be prevented from falling down by placing them on support frames until **both** wing pins have been completely inserted. If a wing is supported in the wrong position or if indeed it falls down, this can lead to damage to the fuselage roof and even the spar stub.

Warning: In order to ensure the structural integrity of the aircraft, it is essential that the wing pins be properly tightened and secured. The allen bolt connection braces the spar stubs against each other and thus contributes to the total rigidity of the aircraft.

The two aileron interconnection control rods in the cockpit can now be attached to the appropriate bell cranks at the wing root ribs and secured by means of lock nuts.

Warning: In aviation the following is always valid: insert bolts from the top down, i.e. screw on nuts from below. In this way, should a nut be lost, the bolt cannot fall out.

Warning: Always use new lock nuts. A lock nut with an elastic locking insert may only be used once as the securing function is lost if used a second time.

Warning: After tightening, screws should be marked with screw lock lacquer. In this way, screw loosening can be easily detected during a preflight inspection.

Once the controls have been connected, the position of the ailerons has to be checked to ensure that an opened connection has not been loosened and moved inadvertently during transportation. Set the flaps to -12°. The ailerons must be in line with the flaps in this position.

Insert stabilizer and secure with two bolts. Again, the bolts must be inserted from the top down. The trim tab is connected to the rocker by control rods inside the tail boom.

Warning: After assembly has been completed, fuel flow must be measured. Refer to the maintenance checklist in Chapter 8.

7.1.2. Materials Used for the Airframe

The airframe is made of high-quality composite materials which permit excellent aerodynamic characteristics to be achieved at an efficient structural weight.

Due to the strict weight regulations for light aircraft, reinforced carbon and aramid fiber materials are used in the more advanced designs.

Due to the complex nature of composite materials and the necessary knowledge in the lay-up of a specific structure, repair work on the composite airframe may only be undertaken by a qualified facility. For this reason, only general information about the materials used is given in this handbook. Should the aircraft structure be damaged, detailed information must be requested from the manufacturer.

Carbon, aramid, glass fiber:	various qualities Lange & Ritter, Gerlingen
Resin and hardener:	Larit L 285 Lange & Ritter, Gerlingen
Core material:	Rohacell, Airex various qualities Lange & Ritter, Gerlingen

7.1.3. Baggage Compartments

The aircraft has two different baggage compartments:

1) a baggage compartment behind the pilots' seats
2) storage locker in the floor in front of the seats

Warning: Baggage must be carefully stored in all of the compartments. Even in apparently calm weather, turbulence can occur at any time. Baggage poses a great danger as it can slip in such a way as to adversely affect or even block the controls. Lost objects flying around in the cockpit can injure the pilot and/or passenger. Displaced baggage can also adversely affect the center of gravity of the aircraft, making it no longer controllable.

The baggage compartment in the fuselage barrel behind the pilots' seats has a maximum payload of 25 kg (55 lbs) on each side. Inside each of the compartments, hooks are attached to the fuselage walls, which help to secure baggage.

The storage compartment in the floor in front of the seats is for small, light objects only. For example, snacks, water bottle, light tools or the fuel dipstick, etc. can be stored here. The cover must be closed during flight.

Warning: The pilot is responsible for ensuring that any baggage has been properly stored before take-off.

7.2. Systems

7.2.1. Engine

The engine of the CT Supralight is a standard Rotax 912 series engine. It is a horizontally opposed, four-cylinder, four stroke engine with central camshaft-push rod-OHV, liquid-cooled cylinder heads and a dry sump, pump-fed lubrication system. The propeller is attached to the engine by an integrated gearbox (2.43:1 or 2.27:1 reduction) with a mechanical vibration damper. It is also equipped with a Bing constant pressure carburetor. The engine has an electric starter and a capacitive discharge (CDI)-dual ignition.

As an option the engine can be equipped with a friction clutch.

Air is fed into the engine via two separated air filter with environmental temperature, filling both carburetors with equal volumes.

7.2.2. Propeller

The CT Supralight may be equipped with various propellers. The operating handbook and the maintenance manual of the relevant propeller published by the propeller manufacturer are delivered with the aircraft and must be studied in detail. The following propellers are certified for the CT Supralight:

Manufacturer	Parameters
Neuform	TXR 2-65-47-101.6, 1.66 m diameter, 2 blade, composite propeller, ground adjustable
Neuform	CR3-65-47-101.6, 1.70 m diameter, 3 blade, composite propeller, ground adjustable
Neuform	CR3-V-R2H, 1.70 m diameter, 3 blade, variable pitch, composite propeller
Neuform	CR3-V-R2-ECS, 1.70m diameter, 3 blade, composite propeller, variable pitch actuated by electric spindle drive, constant speed control ECS-M
Kaspar- Brändel	KA1, 1.60 m diameter, 3 blade, composite propeller, ground adjustable
Kaspar- Brändel	KA1, 1.60 m diameter, 3 blade, variable pitch, composite propeller

All ground adjustable propellers are factory-set to prevent over-revving the engine during take-off, climb and level flight. Full throttle static engine speed on the ground will be roughly 5000 RPM. Engine speed of approx. 4800 RPM is achieved during climb, whereas almost 5500 RPM are reached during level flight with full throttle, corresponding to maximum continuous engine speed. This pre-setting makes the monitoring of the correct propeller speed in flight very simple for the pilot.

Both variable-pitch propellers are controlled via a hydraulic adjustment mechanism. The lever is located in the middle console, behind the power quadrant. The lever has several indexed positions. To set the propeller, the notch under the lever is released, the lever moved to the desired position and the notch locked in place. Via a hydraulic cylinder in the lever and the corresponding line, a hydraulic actuator in the engine compartment is activated. The actuator is located on the rear side of the gearbox, above the crankshaft. The propeller is adjusted via a control rod which runs through the hollow propeller shaft.

The variable-pitch propellers are factory-set so that engine speed at lowest pitch during take-off and initial climb does not exceed the maximum short-term permissible speed of 5800 RPM. The climb speeds given in the normal procedures section must be observed exactly. Should they be exceeded, there is a risk of the engine over-revving and being damaged.

Warning: If a variable-pitch propeller is not operated properly, the engine may over-rev. Propeller speed will increase constantly with increasing airspeed. For this reason, the variable-pitch propeller must already be adjusted to a higher pitch during climb. It is the responsibility of the pilot to ensure that engine operating limits are adhered to.

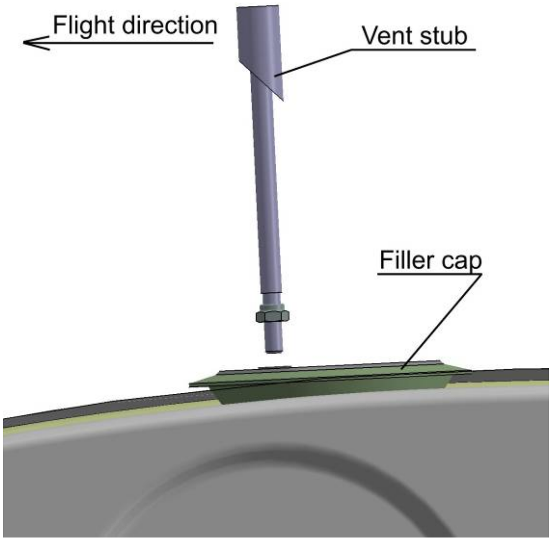
7.2.3. Fuel System

A fuel tank with a capacity of 65 l (17 gal) is integrated into each wing's console. The fuel tanks are each divided into two sections by an anti-sloshing rib. Fuel is filled into the outer section via a fuel filler opening on the upper side of each wing's console. To open the fuel filler cap, the lever in the cap must be raised and turned 90° anti-clockwise. The cap can then be removed. The cap is properly shut when the lever is pressed down into position.

Warning: The pilot must be certain during the preflight inspection that the fuel filler caps are properly shut. A missing cap leads to a massive loss of fuel in flight as the fuel is sucked out of the tank.

Fuel flows via a flapper valve into the inner section of the fuel tank inboard of the anti-sloshing rib. The flapper does not completely seal the inner tank. It does, however, greatly restrict the return flow of fuel into the outer chamber when one wing is low (sideslip). A sideslip can thus be undertaken even when low on fuel without risking fuel starvation to the engine.

The tanks are vented via individual ventilation studs integrated to each fuel filler cap, venting each tank volume individually to ambient air. These studs have to be oriented as shown on the picture below. The cutted edge of the vent cap must be directed towards the airflow.



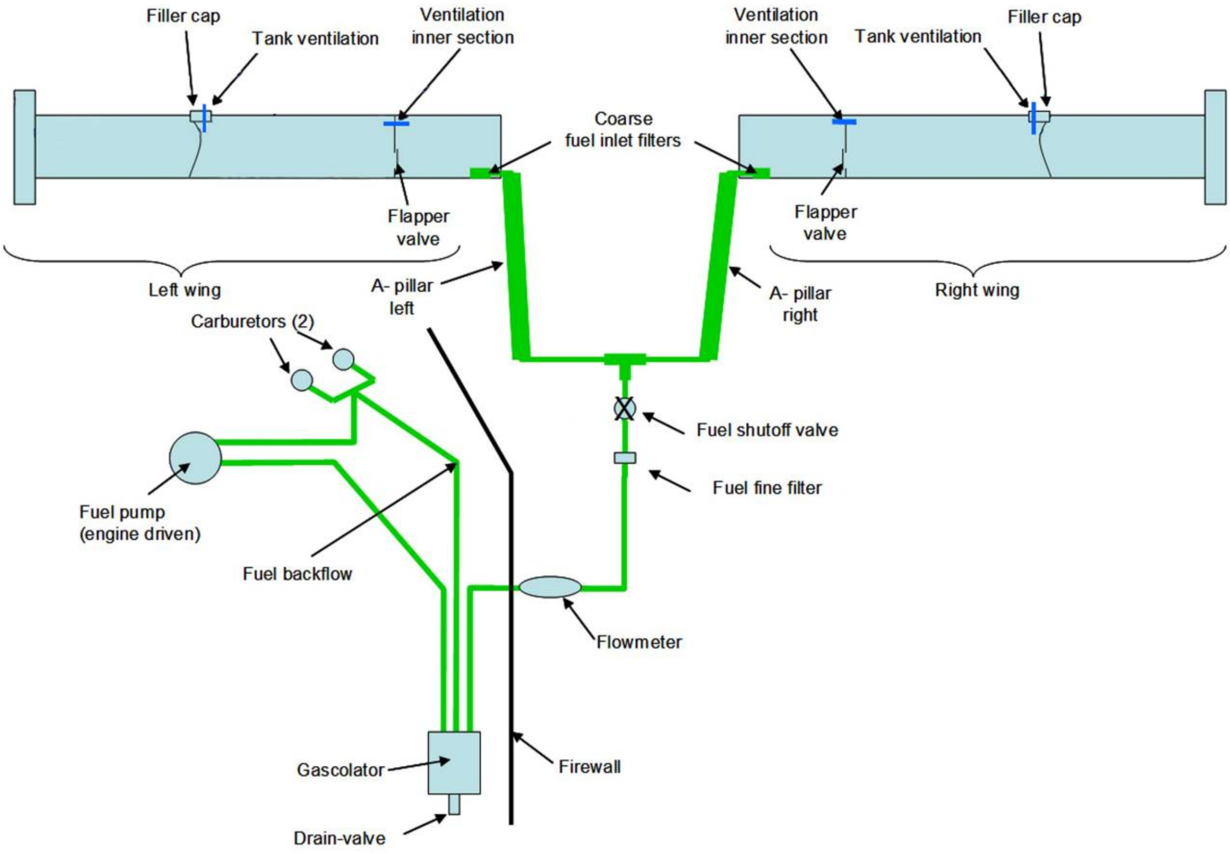
Each tank outlet has a coarse screen which can be removed via a maintenance plate in the root rib for visual inspection and cleaning.

For aircraft equipped with carburetor version of engine the fuel is fed by gravity via two fuel lines in the A-pillars. They have a large volume so that even with virtually empty tanks, enough fuel is available in a sideslip to ensure a engine power for landing. The two lines are connected to each other via a Y-connection. The fuel shutoff valve is located behind a second fuel filter and directly in front of the line through the fire wall. The fuel flow sensor is in this line to the engine compartment, on the cabin side of the firewall.

The fuel flows from there into the gascolator which finally has very fine filter. The gascolator is the lowest point in the fuel system and has a drain valve. The fuel system must be drained at this point before the first flight of the day and after filling up with fuel.

The fuel pump feeds fuel from the gascolator to the engine which then feeds the fuel to the carburetors. Excess fuel is pumped back to the gascolator.

The fuel system is presented schematically in the following diagram.

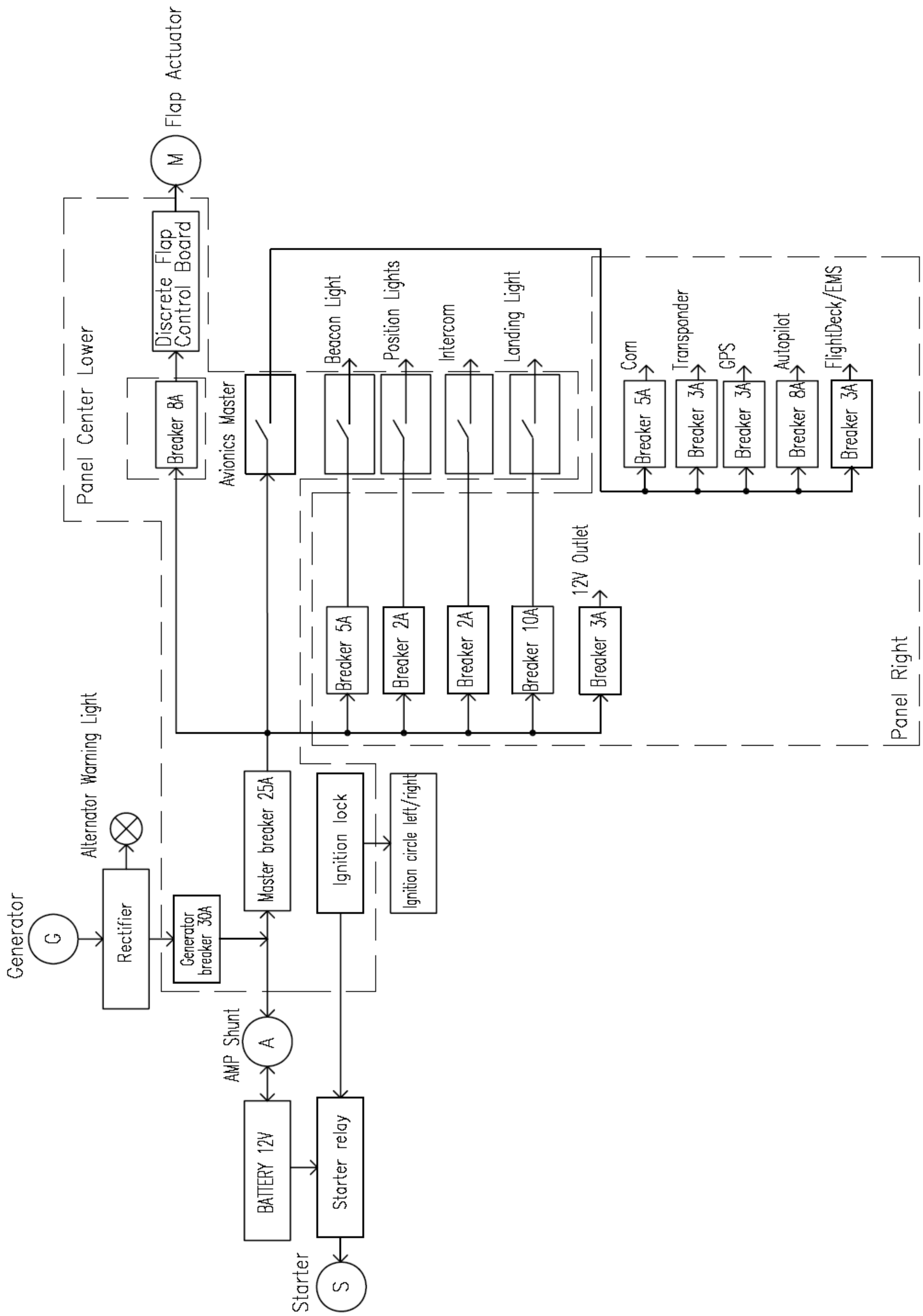


7.2.4. Electrical System

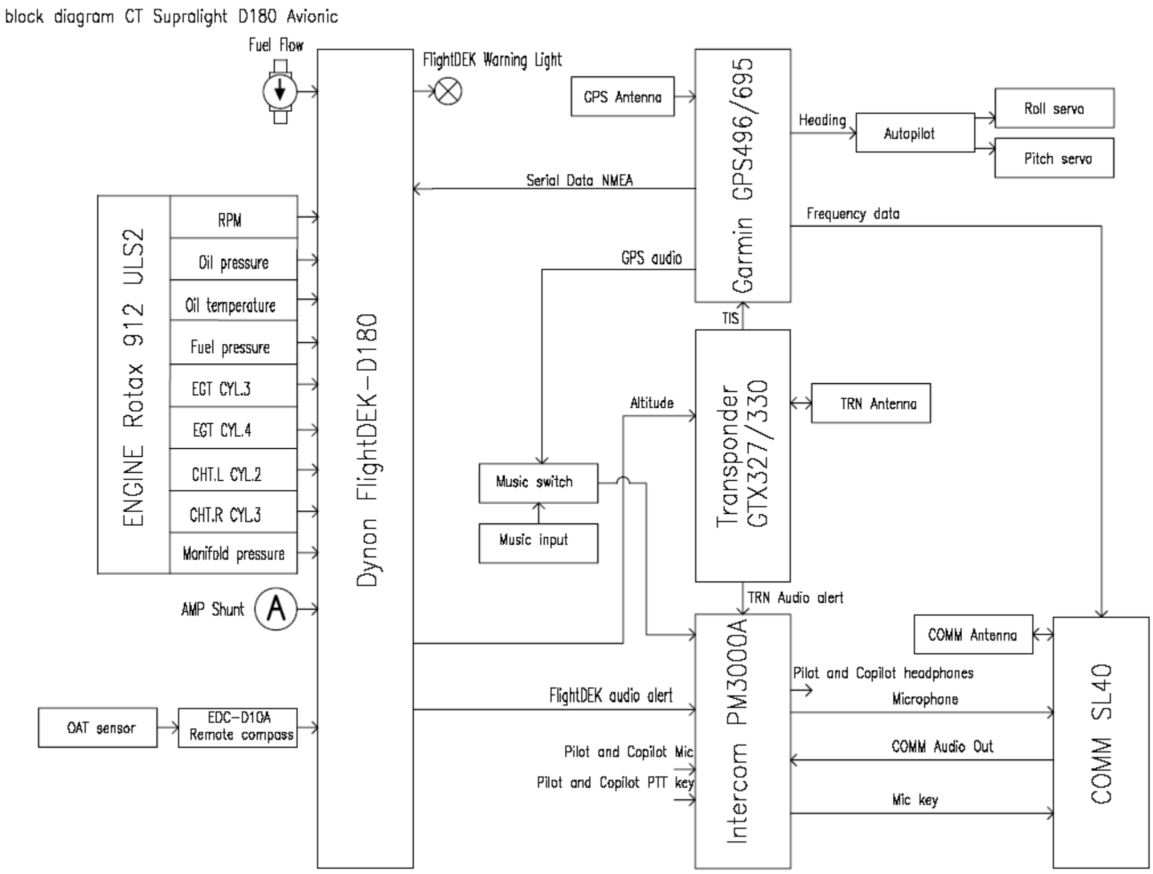
The electrical system is based on a 12V, 7Ah lead-gel battery which is charged with a maximum output of 250 Watt by a DC alternator integrated into the engine compartment. This battery has very high performance and needs specific charging procedure if discharged. If properly maintained it has a very long service life.

Power is distributed via a common power bus which the fuses and circuit breakers of the individual instrument groups are directly connected. Power is then transferred to the instruments and avionics using switches where necessary. All ground lines are connected to the battery via a ground bus. The avionics are grounded separately from the rest of the aircraft in order to avoid interference.

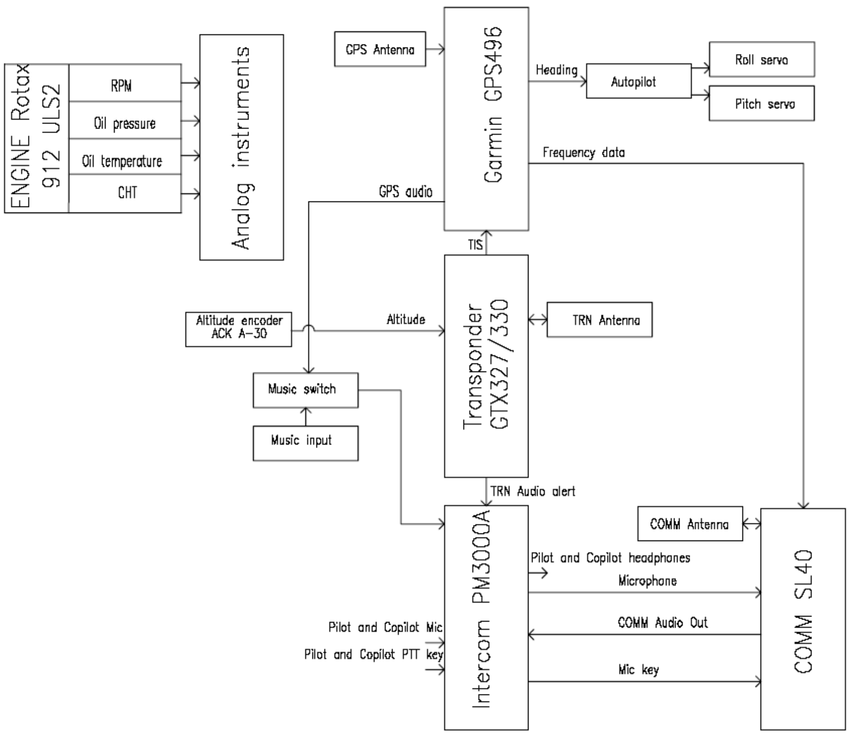
The layout of the electrical system is depicted in the following block diagrams. They show the wiring layout and help to explain the function of the installation with respect to power supply as well as the data interchange between the individual instruments. The exact installation depends from the individually selected equipment options. Should more detailed schematic diagrams be required for maintenance purposes, these can be requested from Flight Design.



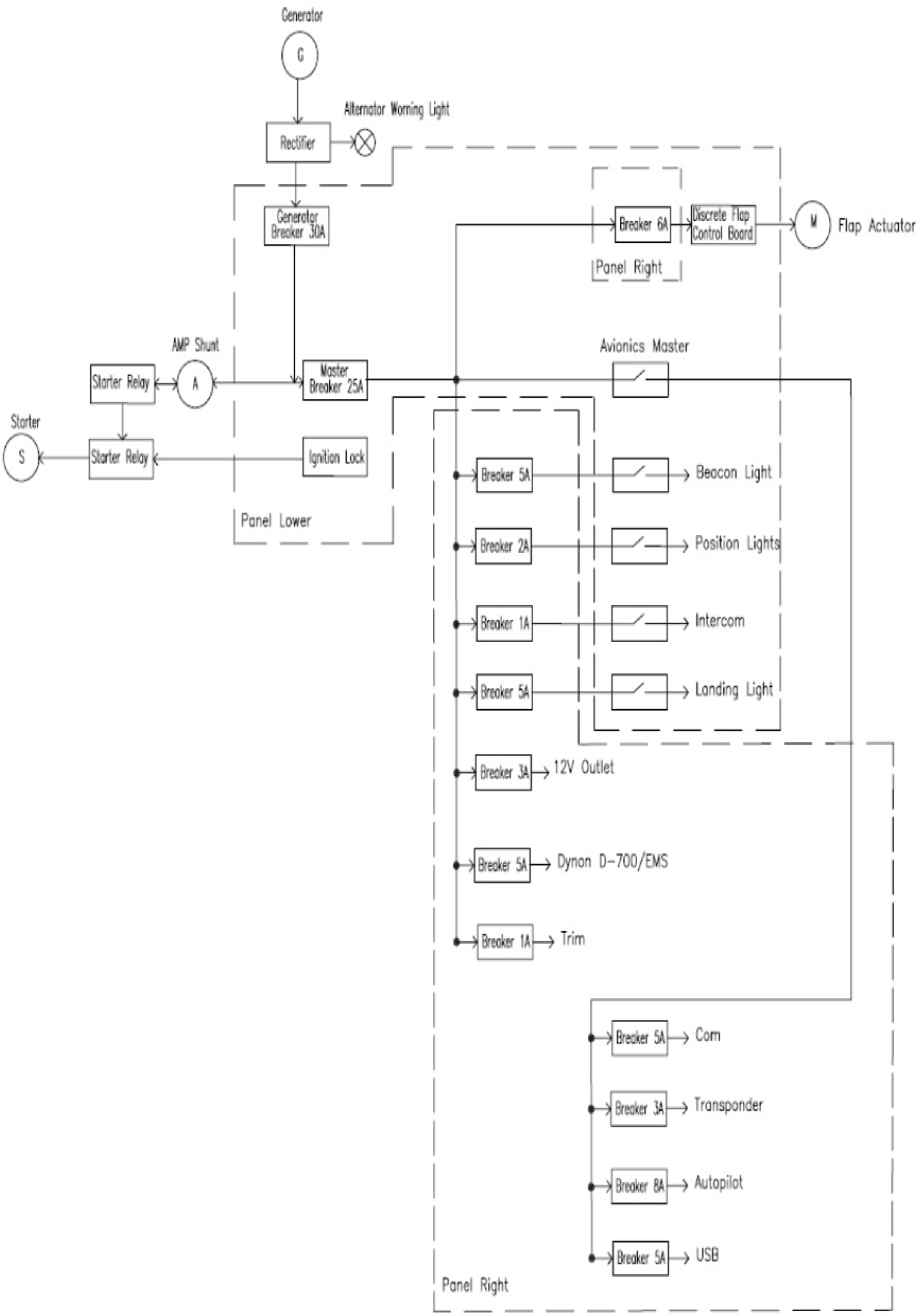
Block diagram - power supply



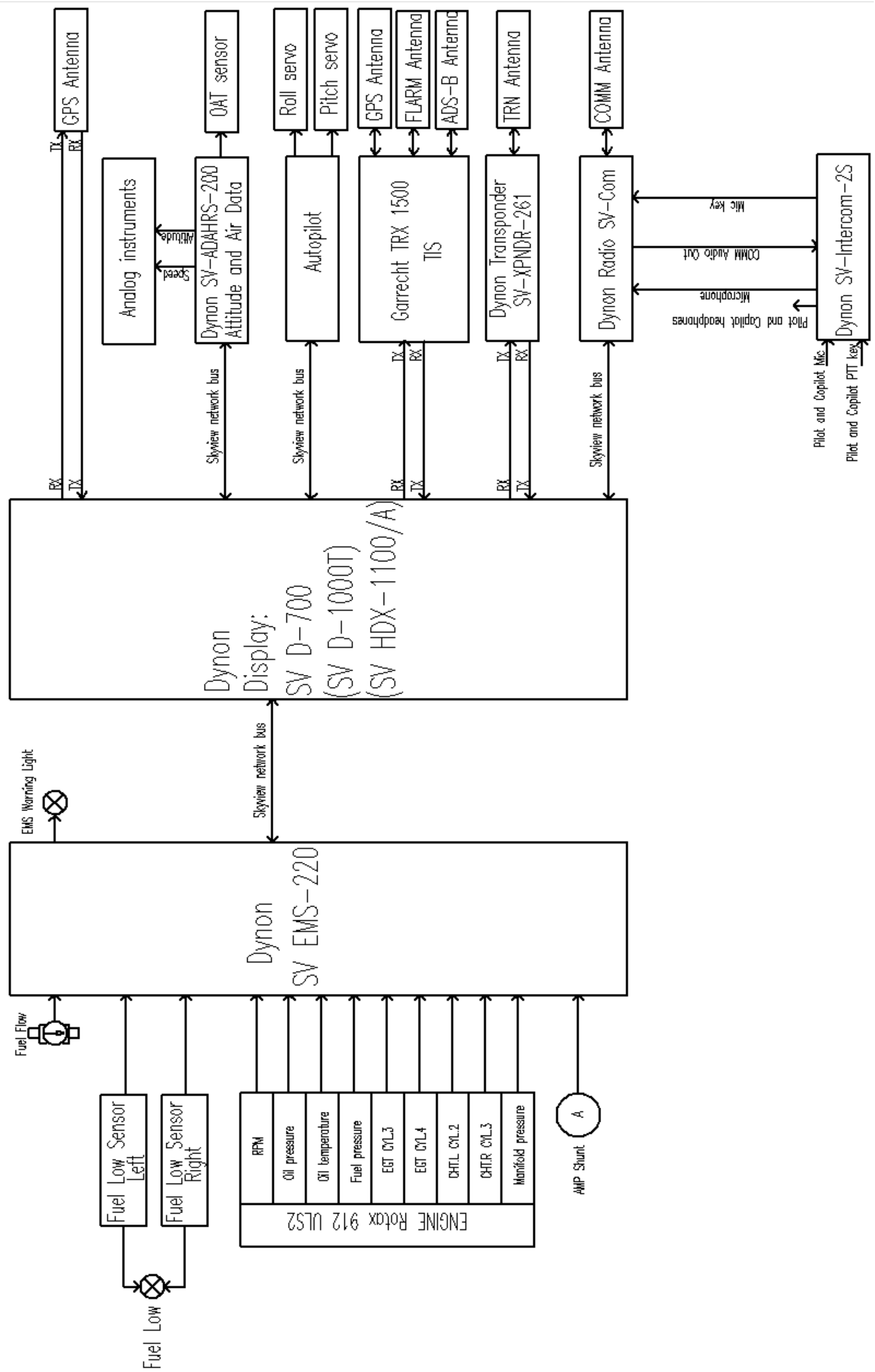
Block diagram - avionics installation with Dynon FlightDEK installed



Block diagram – analog instrumentation installation



Block diagram – analog power supply



Block diagram – analog avionics installation with Dynon FlightDEK installed

7.2.5. Landing Gear and Brakes

The CT Supralight is equipped with tricycle landing gear.

The main landing gear of the CT Supralight is made of a continuous composite beam that is attached below the fuselage, to the main bulkhead behind the pilot seats. The landing gear design ensures proper deflection behavior with good dampening. At the bottom of the landing gear strut there is a stub axle to which the main wheels and the brakes are attached. The main wheels have removable fairings.

The nose landing gear is supported from the big engine mount. The nose landing gear incorporates elastomeric spring damper elements. The nose wheel is steerable through direct link to the rudder pedals.

The nose gear is equipped with a composite fairing. This fairing can only be removed completely after the nose gear fork has been removed. This is, however, not necessary when the tire must be changed. It suffices to lift the fairing slightly. When remounting the fairing, ensure that it has threaded properly into the guide track at the top end of the fork (where the telescope is attached), the fairing could, otherwise, flutter and become damaged.

The main wheels of the CT Supralight have hydraulic disc brakes which are activated via a centrally located lever in the cockpit. High strength nylon tubes are used as brake lines. Connection fittings are crimped tightly to the lines, thus ensuring high line rigidity and stability at a low installed weight. This also results in better brake efficiency.

By blocking the return line, the brakes can be locked for a parking brake function. The locking lever is in the middle console in the cockpit, directly behind the throttle quadrant. The parking brake can be locked before activating the brakes. The brakes can then be activated once through the check valve. The check valves keep the system under pressure, thus making single-hand operation of the parking brake simple.

Warning: This does not, however, mean that chocks are not needed when the aircraft is parked. Changes in temperature can cause a hydraulic brake system blocked in this way to lose pressure.

Warning: Should the aircraft no longer taxi straight, do not simply adjust the push-rods. Due to the special kinematics the tension of the rudder cables and thus the force gradient of the rudder will also be affected. Please contact a Flight Design service station.

The nose gear has an aerodynamically optimal composite fairing. This fairing can only be removed completely after the nose gear fork has been removed. This is, however, not necessary when the tire must be changed. It suffices to lift the fairing slightly. When remounting the fairing, ensure that it has threaded properly into the guide track at the top end of the fork (where the telescope is attached), the fairing could, otherwise, flutter and become damaged.

7.3. Flight Controls

7.3.1. Dual Controls

The aircraft has dual controls, thus allowing operation from both seats. The dual controls cannot be separated.

Even although the aircraft can be flown from both seats, the pilot in command sits in the left seat. The arrangement of the instruments and operating devices is primarily optimized for this seat. Thanks to the dual controls, the aircraft is well equipped for training and instruction.

7.3.2. Rudder and Nose Wheel Steering

The rudder is activated via control cables which are housed in a plastic sleeve in the tunnel.

The left and right foot pedals are coupled in the tunnel. The turnbuckle units to tension the cables and the connection to the nose wheel steering are in the front section of the tunnel.

Warning: We advise against making adjustments to the rudder steering. Due to the mechanical interlinking, this can adversely affect cable tension and/or wheel alignment. Please contact a Flight Design service station.

7.3.3. Rudder Trim

Rudder trim is provided by a bendable aluminum plate, installed to the rudder's trailing edge. It is adjustable only on ground. It has no mechanical controls for adjustment during flight.

7.3.4. Stabilizer

The CT Supralight has a drag-optimized stabilizer with an anti-servo tab. It is attached to a bracket, which in its turn is mounted to fuselage-mounted pivot bearing. An individually matched counter-weight with which the stabilizer is completely mass-balanced is also attached to this bearing.

The anti-servo tab on the trailing edge of the horizontal tail covers 70% of the stabilizer span. It is activated through a mechanical coupling when the stabilizer is deflected. In this way the anti-servo tab deflects in the same direction as the stabilizer, thus improving stabilizer effectiveness and generating a proper force gradient on the control stick.

Warning: When dismounted or when the controls are disconnected, the anti-servo tab must never be pushed beyond normal operating limits as this causes damage to the hinge. We recommend that the trim tab be clamped with an edge guard or taped to the outside edges to prevent inadvertent movement.

The stabilizer is activated via a special push-pull cable that runs through the tunnel and along the fuselage floor. This push-pull cable aligns itself to the fuselage and is maintenance-free.

7.3.5. Stabilizer Trim

Stabilizer trim is adjusted via the trim wheel adjacent to the throttle. The trim indicator is located directly adjacent to the wheel. The aircraft becomes nose heavy when the wheel is rotated forward and tail heavy when it is turned backward.

Since the anti-tab has a large span, the required deflection is not very big.

7.3.6. Ailerons

The ailerons are activated via push rods which run from the control stick through the tunnel to the mixer in the baggage compartment behind the main frame. In the mixer the ailerons are coupled with the flap controls as the ailerons are deflected when the flaps are set.

Control rods run from the mixer upwards behind the main bulkhead where the associated bell cranks on the wing root rib are activated via a torsion shaft and a connecting rod.

The following diagram depicts the aileron controls (orange) and flap controls (turquoise) in the fuselage with mixer and with connection to the wings.

The aileron controls have return springs which ensure more harmonic force gradients. These springs are attached to the rear of the main bulkhead and engage in the mixer.

7.3.7. Aileron Trim

Aileron trim is provided by a bendable aluminum plate, installed to the aileron's trailing edge. It is adjustable only on ground. It has no mechanical controls for adjustment during flight.

7.3.8. Wing Flaps

The flaps are driven by a geared electric motor and are activated via the flap control in the lower section of the instrument panel. The desired flap setting is selected with a lever switch. The position indicator will flash as long as the flaps are moving to the desired setting. Once the desired setting has been reached, the position will be constantly illuminated. The flaps may be set at any of the following positions: -12° , +0°, +15°, +30°, +35°.

The flap motor is integrated into the mixer behind the main bulkhead in the aircraft baggage compartment. As it acts on the controls mixer, the flaps are activated via push rods. Both flaps are directly attached to a torque tube in the fuselage, thus ensuring that they are always deflected symmetrically.

Warning: An individual maximum airspeed is defined for each wing flap setting. The pilot must observe these to ensure that the aircraft and the flight controls are not over-stressed.

The flap servo has an internal load-limiting device which prevents the extension of the flaps at too high airspeeds without causing sustainable damage to the structure. Should the indicator blink constantly when extending the flaps, airspeed should be reduced. If the flaps then extend, the internal load-limiting device was in operation. If extension speed is below the maximum speed for flap extension as given in the handbook, the flap system may be out of adjustment. The nearest Flight Design service station should be contacted.

The flap control dual circuit breaker is to be found directly adjacent to the flap controls. It will pop if the flap servo is continuously over-loaded. As it is a thermal circuit breaker, it can take some time before it can be pushed back in. We emphasize once again that the

CT Supralight can be flown and landed safely in any flap position. Refer to Chapter 3 - Emergency Procedures.

7.3.9. Ballistic Recovery System

The CT Supralight is always delivered with a ballistic recovery system, if allowed by national regulations.

The operation of the recovery system is described in detail in Chapter 3 - Emergency Procedures and shall not be repeated here.

Warning: The recovery system is a very important safety element of this aircraft. Even assuming that the recovery system will never be used, it is absolutely essential that the pilot regularly familiarizes him/herself with the deployment of the system and the simple actions involved. It also pays off to watch the videos showing successful deployment of the parachute which the recovery system manufacturer has posted on its website. Some of the videos show real-life deployment filmed from the cockpit and illustrate well just how useful this system can be in doubtful situations.

The ballistic recovery system comprises a recovery parachute and a ballistic rocket which are located in the upper baggage compartment above the controls mixer behind the main bulkhead. The rocket is activated via a pull cable attached to the activation handle on the main bulkhead between pilot's seats in the cockpit.

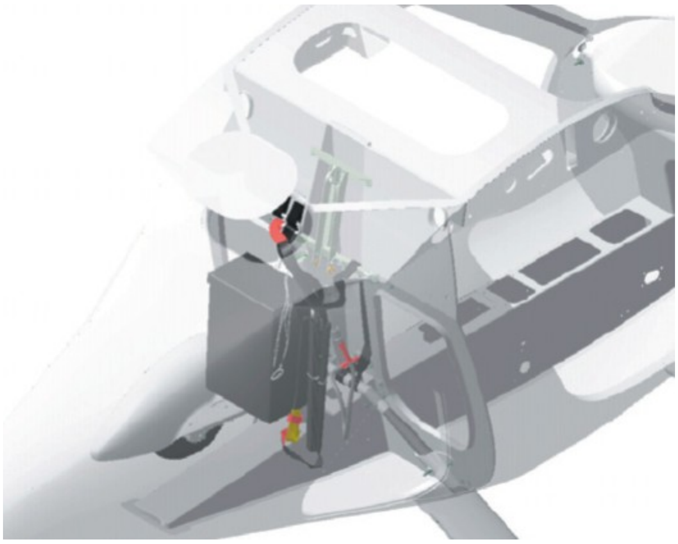
Operating handle Rescue device on the main frame, between the seats

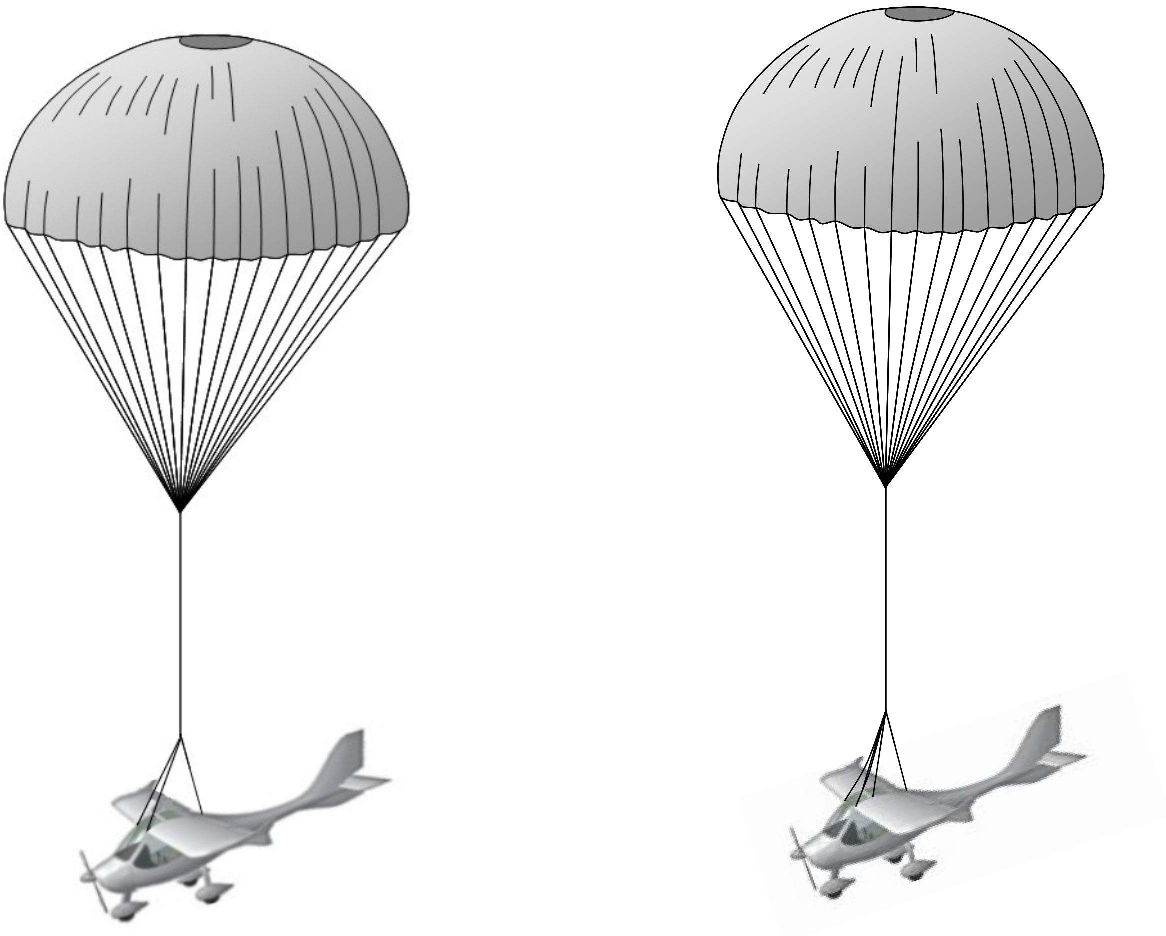
The parachute egress hatch is on the upper side of the fuselage, directly above the recovery system. The opening is covered by a light flap which easily lifts off when the system is deployed. Thus, the rocket in the CT Supralight does not have to find way into the outer skin of the aircraft as with other aircraft models. The installations design effectiveness has been repeatedly confirmed through ejection tests.

After deployment of the recovery system, the aircraft is suspended by three main harnesses. Two front harnesses are connected to the big engine frame and one rear harness is attached to main landing gear support near the main bulkhead. Also, suspension scheme with five harnesses is applied - two front harnesses are connected to the big engine frame, two of them are attached to the wing spar root part and rear one - to the main landing gear support near the main bulkhead (this suspension scheme applies for following list of countries: Germany, Austria, Switzerland). With this attachment the aircraft is suspended with approximately 13° nose down pitch under the parachute. In this stable position, the aircraft will come down nose wheel and engine / engine mount first. Deformation of the metal structure will absorb much of the impact energy before the airframe itself is affected.

In non-deployed condition the harnesses are covered by the fuselage roof and stored behind the main bulkhead. When deployed, typically the opening forces are strong enough to pull these harnesses through the roof. In very rare cases (extreme low aircraft weight and at stall speed) it might happen that the harnesses do not tear open the aircraft roof. In this case the aircraft will come down with little more pitch down, and the rear harness not tightened. Experience from a real CT ejection has shown this is a proper descent position.

The following picture shows the installation of the recovery system in the aircraft. The next illustration (not to scale!) shows the aircraft position suspended under the parachute.





Suspension scheme with three and five harnesses

7.4. Cockpit

7.4.1. Instrument Panel

The instrument panel for the CT Supralight is available in various layouts. The medium-size mushroom-shaped panel is usually standard. It has three sections - upper left, upper right and lower. The flight instruments are located in the two upper panels whereas the lower panel contains aircraft controls, the switches panel and the intercom.

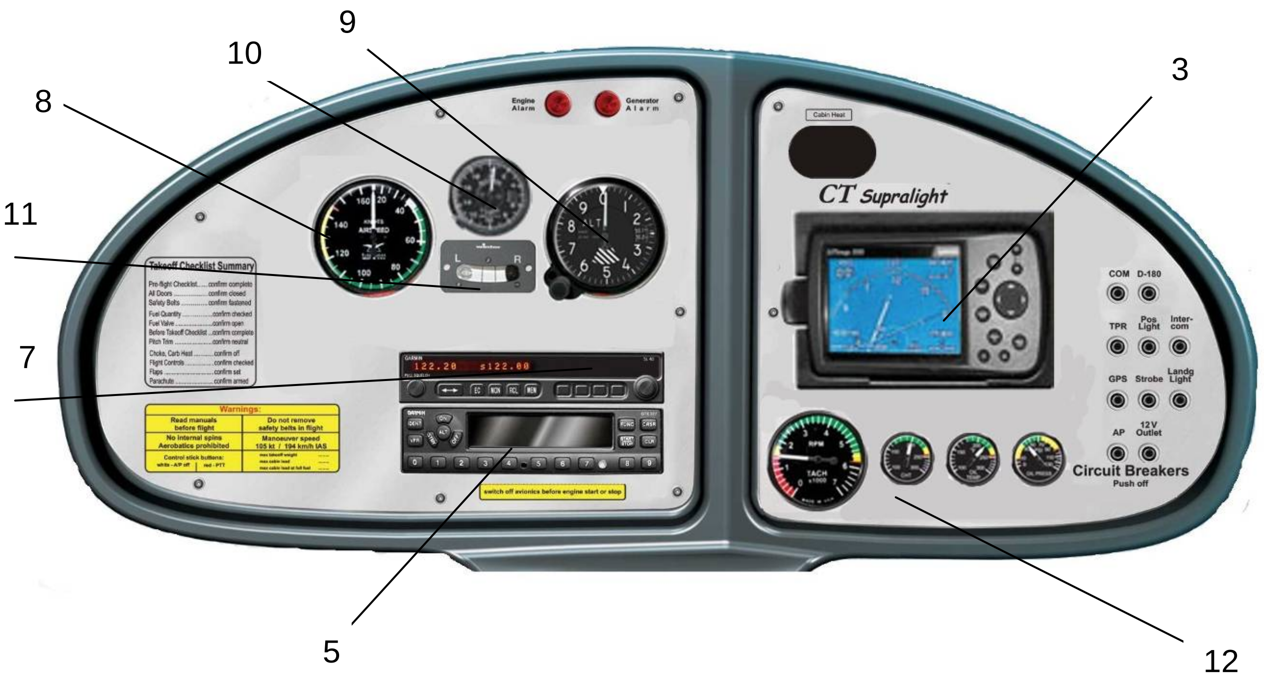
Standardized numbering of equipment based on the table below is used for the diagrams on the following pages.

Warning: your panel view may be different from views shown below, depending on your request.

1	**Dynon FlightDEK D180**
2	**FD Pilot 1 axis (based on Trutrak Digiflight II FP)**
3	**GPS, Garmin 496**
4	**GPS Garmin 695 (without XM function)**
5	**Transponder Garmin GTX 327 Mode A/C installed with antenna**
6	**Transponder Garmin GTX 330 Mode S installed with antenna**
7	**Radio Garmin SL40 installed with antenna**
8	**Air Speed Indicator**
9	**Altimeter**
10	**Variometer D 57mm**
11	**Slip & bank indicator**
12	**UMA analogs (RPM meter, Oil pressure, Oil temperature,Cylinder head water tempera-ture)**
13	**SkyView D-700 Display**
13a	**SkyView D-1000 Display / SkyView D-1000T Display**
13b	**SkyView HDX-1100 Display**
14	**Autopilot SV-AP-PANEL Dynon Avionics INC.**
15	**SV-COM-X83 Radio / H Dealer Bundle**
16	**2-Place Stereo Intercom SV-INTERCOM-2S**
17	**Lamp holder red**

7.4.2. Upper panel

Panel with analog equipment, GPS, Garmin 496



Panel with FlightDEK D180, GPS, Garmin 695

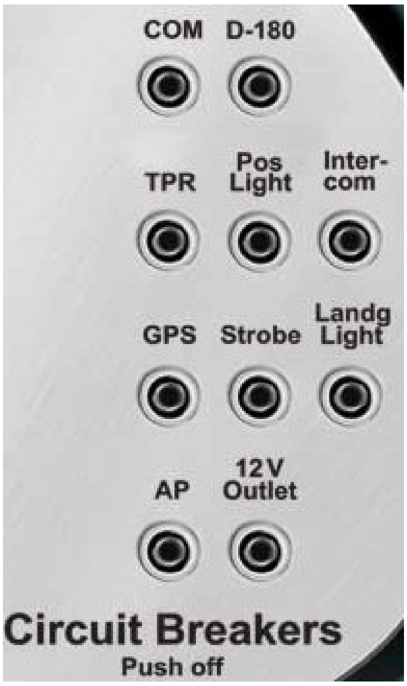
Panel with analog equipment, SkyView D-700 Display

Panel with analog equipment, SkyView D-1000 Display / SkyView D-1000T Display

Panel with analog equipment, SkyView HDX-1100 Display

7.4.3. Circuit Breakers

All circuit breakers – except the circuit breaker for the flap controller, which is located directly next to the flap controller – are located in the right part of the upper right panel. Depending from the actual aircraft equipment these are installed. The following illustration shows the order of the circuit breakers.

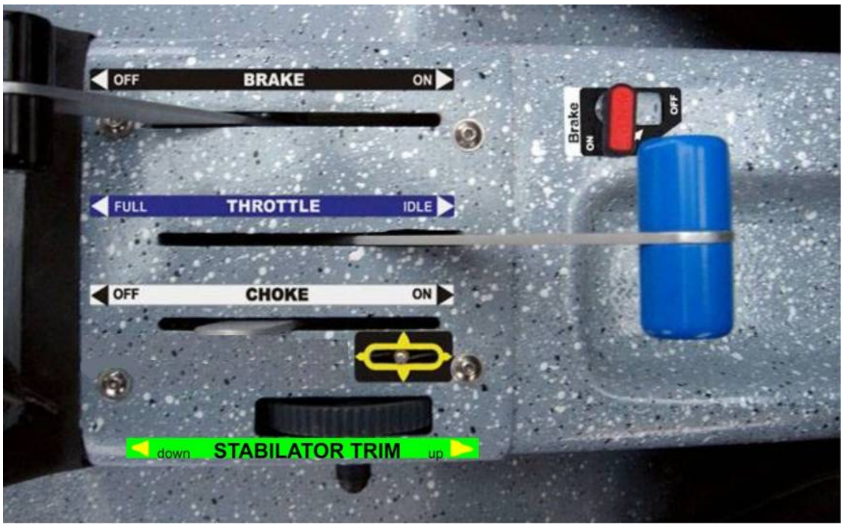


7.4.4. Lower Panel

The equipment in the lower panel varies only slightly. If no avionics are installed, there is no intercom. Otherwise, the controls and switches are always configured as shown below.

7.4.5. Throttle Quadrant

The throttle quadrant is located in the middle console/tunnel, in front of the lower instrument panel. It can be easily operated from both seats, although it is primarily designed to be operated from the left seat, by the pilot-in-command.



7.5. Placards and Markings

	Item	*Location*
Green arc	**94 – 245 km/h (51 – 132 kts)**	**airspeed indicator**
White arc	**72 – 115 km/h (39 – 62 kts)**	**airspeed indicator**
Yellow arc BRS 1050 **Junkers High Speed** **Junkers Light Speed / no RS**	**245 – 276 km/h (132 – 149 kts)** **245 – 260 km/h (132 – 140 kts)** **245 – 300 km/h (132 – 162 kts)**	**airspeed indicator**
Red line BRS 1050 **Junkers High Speed** **Junkers Light Speed / no RS**	**276 km/h (149 kts)** **260 km/h (140 kts)** **300 km/h (162 kts)**	**airspeed indicator**
Red line tach	**5800 RPM**	**RPM indicator**
Red line	**5 bar (73 psi)**	**oil pressure indicator**
Red line	**130°C (266 F)**	**oil temperature indicator**
Red line	**120°C (248 F)**	**water temperature indicator**
Metal identification plate	Aircraft Type: CT Model: Supralight Flight Design GA GmbH s/n: Date Manufactured:	**on the airframe inside the engine compartment or the left side rear fuselage near the stabilizer**
Calibration card	**after calibration**	**below the compass**
Warnings	Warnings: Read manuals before flight / Do not remove safety belts in flight No internal spins Aerobatics prohibited / Manoeuver speed 105 kt / 194 km/h IAS Control stick buttons: white - A/P off, red - PTT / max takeoff weight .... max cabin load .... max cabin load at full fuel	**upper left side of instrumental panel**
Take-off checklist summary	Takeoff Checklist Summary Pre-flight Checklist............confirm complete All Doors............................confirm closed Safety Belts.........................confirm fastened Fuel Quantity.......................confirm checked Fuel Valve............................confirm open Before Takeoff Checklist...confirm complete Pitch Trim..............................confirm neutral Choke, Carb Heat..............confirm off Flight Controls....................confirm checked Flaps.....................................confirm set Parachute.............................confirm armed Warning: Checklist summary only Compete checklists by manual are mandatory	**left instrument panel**
Warning	avionics off before engine start or stop	**Instrument panel, low center**
Fuel grade	Fuel: EN 228 Premium plus EN 228 Premium 65 Litres Per Side (62 Useable)	**adjacent to each fuel tank filler cap**
◀ Full Throttle Idle ▶		**adjacent to throttle**

	Item	*Location*
Off **Choke** On		adjacent to choke
Down **Stabilator Trim** Up		adjacent to trim wheel
Off **Brake** On		adjacent to brake lever
Flap position	-12°, 0°, 15°,30°, 35°	flap selection lever
Oil grade and amount	**Oil** Grade According To Rotax Manual Currently filled Qty: 3,2 l (3,4 l if oil thermostat installed)	inspection flap engine cowling
Circuit breakers	Main circuit breakers according to function	instrument panel
Master switch	Batt	instrument panel
Alternator switch	Gen	instrument panel
Packing interval	according to recovery system hand-book	recovery system hand-book and on recovery sys-tem
Baggage payload	**Baggage Compartment** max. 55 lbs. 25 kg. each side	Posted on both sides of the baggage compartment
Warning	**Secure Baggage**	Posted on all sides of the baggage compartment
Door opening instructions	**Open Door Thru Vent**	Posted on the outside of each door
OPEN Do Not Open Doors In-Flight **CLOSED**		Posted on the inside of each door handle
Warning	„Danger“	Parachute recovery sys-tem hatch
Warning	**Recovery system, only in an emer-gency!** 1. Switch off engine 2. Pull handle firmly 3. If time available, retighten seat belts 4. Protect face and body with your arms 5. Press into seat by extending your legs	Posted near the actuation handle for the parachute recovery system
Warning	Observe towing speed	Posted near the airspeed indicator if tow hook in-stalled

8. HANDLING, SERVICE, MAINTENANCE

Warning: Attention must be paid to the proper securing of the recovery system during any servicing or repair work to ensure that it is not inadvertently activated (ensure that the activation handle is secured with the safety pin inserted).

8.1. Jacking

There are several ways of jacking the aircraft. However, it must always be secured against inadvertent rolling by applying the parking brake and positioning chocks under the wheels which are on the ground.

The wheel fairing must be removed before work can be started on a main wheel. The aircraft can then be lifted off the ground on the appropriate side. A helper holds the aircraft in the area of the tie-down points on the wing under the spar (= exactly at the tie-down point) and lifts the wing slightly. As soon as the wheel is free, a chock or jack is placed under the lower end of the landing gear strut. The wheel can now be removed.

When work must be carried out on the nose wheel, the aircraft remains standing on the main wheels. Using the tail tie-down belt and ballast (e.g. a jerry-can filled with water), the tail is held down until the nose wheel is free. Alternatively, the aircraft can be jacked exactly under the firewall bulkhead, making sure that the fuselage is adequately cushioned.

When a requirement exists to jack the entire aircraft off the ground, this can be done as described above using the jack point on the firewall bulkhead. It can also be jacked at the main bulkhead, exactly between the main landing gear struts using a soft, wide support. In this case, both wings must also be supported to keep the plane level.

Warning: Particular care should be taken if the entire aircraft has to be jacked off the ground. The fuselage is a delicate, light-weight composite sandwich structure. The jacking load must, therefore, be distributed over a large area. In addition, there is also the risk of the fuselage starting to roll on the jacks when the aircraft is raised completely off the ground.

8.2. Securing the Aircraft for Road Transportation

The aircraft is not specifically designed for regular rigging and de-rigging. However, to transport the CT Supralight by road, it can be done with either a large flat trailer with tie-down points or a box truck with a lifting ramp (as used to transport furniture).

The fuselage is transported standing on its wheels. The wheel fairings are removed. The main wheels are secured against rolling back and forth with tension belts. The nose wheel mounting is also secured forward / down with a tension belt. The tail is secured down / backward with a tension belt. A tension belt is threaded through the spar tunnel and is attached to the right and left sides of the loading area. Care must be taken to ensure that the tension belts do not chafe the paint or press too much against the structure.

The wings are placed standing on their leading edge in well-cushioned multiple wing supports. These can then be secured to the loading area with the help of tension belts threaded through the flap slots. The wings are then secured against slipping span wise with more tension belts. The flaps must be secured against all movement. This can be best achieved using strong sticky tape (fabric tape, parcel tape) around padding or cloth.

Warning: Every glider pilot knows that most damage to an aircraft occurs during transportation on the road. For this reason, particular care should be taken when loading the aircraft. During transportation, the aircraft is exposed to dynamic loading which can easily cause the belts to loosen. The load must be secured in all directions to ensure that it cannot swing.

8.3. Parachute Recovery System Maintenance

Correct fixation must be checked during regular inspection intervals, as by checklist. The parachute recovery system requires no maintenance, except observance of the pack intervals for the parachute and the exchange intervals for the rocket. These intervals are recorded in the recovery system handbook.

The recovery system should only be removed from the aircraft by an authorized workshop. Depending upon national regulations, special approval may be required to handle the recovery system rocket.

8.4. Cleaning and Care

A modern aircraft made of composite materials must be cleaned with caution. Numerous cleaning agents have been developed especially for certain materials and can indeed cause damage to others. Using the wrong cleaning agent can damage your aircraft or parts of it. This damage may be visible or not directly detectable. Damage can take the form of simple flaws or can impair the structure. It is thus essential that you check the ingredients of a cleaning agent before use. If in doubt, contact your local Flight Design service station.

Warning: High-pressure washer equipment should never be used to clean the aircraft!

8.4.1. Airframe

Many components of composite aircraft are sandwich constructions comprising a foam core and layers of glass fiber, carbon fiber or aramid fiber. The CT Supralight is made from a carbon or aramid sandwich and is painted with a two-component polyurethane paint.

The Rohacell foam core used for the wings was chosen for its fuel durability. However, Rohacell is not resistant to alkaline liquids. For this reason, no alkaline cleaning agents such as Fantastic, Formula 409, Carbonex or Castrol Super Clean should be used. These alkaline cleaning agents can cause the Rohacell foam core to disintegrate if they penetrate to the core. A rippled surface is an indication of such disintegration. Components damaged in this way cannot be repaired and have to be replaced.

The wing spars of the CT Supralight cannot be damaged in this way.

Products from the ComposiClean series which has been specially developed for aircraft made of composite materials are approved as cleaning agents. Each CT Supralight leaves the factory with a basic set of this cleaning agent series.

8.4.2. Windshield and Windows

The windshield and windows of the CT Supralight are made of perspex (plexiglass, acrylic glass) which is formed at high temperatures. Although perspex is very robust, it must be cleaned with care to ensure that it is not scratched. Never use abrasive cleaning agents or dirty cloths. Usually the windshield and windows can be cleaned using lots of clean water. However, if dirt is stubborn, perspex cleaning agents only should be used.

Only use special perspex polish for the windshield and windows. Never polish in a circular movement, always in straight lines (up and down or from side to side). This prevents the occurrence of the disturbing halo effect caused by circular scratches. Light scratching can usually be polished out by your Flight Design service station.

Make sure that you never leave solvent-soaked cleaning cloths under the windshield or near the windows. Vapors can quickly lead to small stress cracks in the glass. A windshield or windows damaged in this way cannot be repaired and must be replaced.

8.4.3. Powerplant

The Rotax 912 operating handbook recommends to use standard degreaser. Please follow the instructions given in the operating handbook and make sure that the degreaser does not come in contact with the airframe.

Warning: If a moisture-based cleaning agent is used on the engine, the electronics must be protected from getting damp. High-pressure cleaning devices should never be used to clean the engine.

8.5. Mandatory Aircraft Inspections

The following inspections are a minimum requirement for the maintenance of the aircraft:

25 h inspection (engine only).

This control is identical to the regular 50 hrs control.

It is carried out only once on new aircraft after they have clocked the first 25 hours of operation. It must also be carried out 25 hours after a major overhaul.

100 h inspection (or annual).

This inspection must be carried out at least once a year even if the aircraft is not operated for 100 hours during the calendar year. The interval to the next inspection starts with this advanced inspection.

200 h inspection .

The same as the 100 h inspection, this inspection can be brought forward when fewer hours have been flown. It is performed at every other 100 h inspection.

The TBO times for the engine and propeller must also be observed. Provision is made for these items in the 100 h and 200 h inspection lists.

The current maintenance list as required by the engine manufacturer is mandatory for engine maintenance. The inspection items listed here only give a general indication of the condition of the installation as a whole, not of the engine itself.

These inspections do not supersede any mandatory airworthiness inspections required by the national aviation authority of the country in which the aircraft is registered.

The record of the inspections must be documented. A copy of following list in which the points are ticked off or appropriate notes should be kept as a record.

This checklist represents the minimum scope of the mandatory inspections. Inspections must be recorded and kept with the aircraft records. A copy of this table can serve as basis for this documentation.	50 h Inspection	100 h inspection	200 h inspection
Airframe and controls:			
Check the entire fuselage surface for damage (cracks in the paint, dents, etc.). Particular attention should be paid to the fuselage underside.		X	X
Check doors and baggage compartment hatches for damage.		X	X
Grease door hinges with a drop of non-corroding silicone oil.			X
Check function of door gas springs in the doors. Replace if weak.			X
Check windshield and windows for cracks. Carefully stop-drill small cracks at the ends to prevent the cracks from spreading. If the cracks are long (> 3 cm (1")) contact a specialist.			X
Check the cabin interior for foreign objects in inaccessible places.		X	X
Check all control rods in the fuselage for condition, play, freedom of movement and security.		X	X
Check control rods and hinges for damage and abrasion. Check thread-locking protection and marking.		X	X
Check control cables of the stabilizer trim for general condition, abrasion, freedom of movement and proper clamping.		X	X
Check pedals for freedom of movement, damage and proper securing of the bolts.		X	X
Check the rudder control cables for general condition, abrasion, freedom of movement and proper clamping.		X	X
Check the seat rails for proper attachment. Check that the seat locking mechanism catches for all positions.			X
Check seatbelts, buckles and seat back adjustment for damage and wear.		X	X
Check the recovery system and release mechanism for security, damage and corrosion.		X	X
Check rudder hinge for security, general condition and corrosion.			X
Check rudder for damage. The rudder is typically damaged during hangaring - check the rudder trailing edge carefully.			X
Check the drain holes in the rudder for fouling and blockage.			X
Check the stabilizer pivot bearing on the fuselage side for freedom of movement, security, play and corrosion. Particular attention should be paid to inspection for cracks and the proper securing of the connections.		X	X
Check the horizontal tail mounting on the fuselage side for cracks.			X
Check the stabilizer control for play.		X	X
Check the stabilizer for damage, particularly the underside.			X
Check the drain holes in the stabilizer for fouling / blockage.			X
Check the trim tab for damage, particularly the underside and the control horns. The trim tab is typically damaged during hangaring - check the tab edge carefully.			X
Check the hinges for cracks, particularly at the edges.		X	X
Check the drain holes in the trim tab for fouling / blockage.			X
Check the wing tanks for leakage.		X	X
Empty the tanks by putting a jerry-can under the gascolator and opening the drainage valve.			X
Every 600 hours, or after 2 years at the next 100 hrs inspection, remove the wings as described in the handbook. In this case the following 6 steps apply.		X	

This checklist represents the minimum scope of the mandatory inspections. Inspections must be recorded and kept with the aircraft records. A copy of this table can serve as basis for this documentation.	50 h Inspection	100 h inspection	200 h inspection
Check the shear pins in the root rib for security of attachment, look for cracks.		X	
Check the front spherical bearing on the fuselage side of the root rib for security and play.		X	
Check carefully the rear metal bearing for security and general condition.		X	
Check the automatic connections of the flaps for wear and security of the bolts.		X	
Inspect the tank through the service flap at the root rib and the tank filler opening.		X	
Clean the coarse screen in the tank if fouled.		X	
Check the upper side and underside of the wings for damage.			X
Check the flap and aileron hinge brackets for security of attachment to the wing.			X
Check the flap and aileron hinge pivots for security.			X
Check the ailerons and flaps for damage, paying particular attention to the undersides and the control horn brackets. The ailerons are frequently damaged during hangaring - check the edges carefully.			X
Check drain holes in the ailerons and flaps for fouling / blockage.			X
Check aileron for freedom of movement with respect to lower winglet and plates. Aileron must not chafe.		X	X
The plastic bearings of the aileron and flap hinges are maintenance-free. No greasing required. The rod ends of the controls should be lubricated with a drop of non-corroding silicone oil.		X	X
Check the control rods in the wings for security, play and freedom of movement!		X	X
Check the control rods in the wings for corrosion.		X	X
Attach the wings in accordance with the handbook. Connect the controls. Secure the screw connections and mark with red screw lock lacquer.			X
Check that the wing main pins are properly secured. Check screw lock lacquer marks for movement.		X	X
Check wings by rocking and yawing for secure fit.			
Check function and security of flap control when re-connected.		X	X
Check aileron control for play when re-connected.			
Check engine cowling for damage and security.		X	X
Check the nose wheel landing gear for freedom of movement, damage and corrosion, and grease rod ends.		X	X
Check the main landing gear for damage. Remove the fairings and pay particular attention to the screw connections to the fuselage and the wheel axle.		X	X
Check function of brakes.		X	X
Check brake pads and discs.		X	X
Check brake lines for leaks.		X	X
Check function of parking brake.		X	X
Check tires for damage and wear.		X	X
Check tire pressures.		X	X
Electrical system:			
Check the charge of the battery (voltage with/without electrical load).		X	X
If necessary charge battery using a constant voltage recharger (do not use a standard car battery recharger as this can lead to over-voltage which can damage the battery).		X	X

This checklist represents the minimum scope of the mandatory inspections. Inspections must be recorded and kept with the aircraft records. A copy of this table can serve as basis for this documentation.	50 h Inspection	100 h inspection	200 h inspection
Check cables for fractures, chafing and charring.			X
Check cable lugs for general condition and security.			X
Check switch and cable connections for security.			X
Check the electrical flap control, the motor and gearbox attachment. Particular attention should be paid to proper fit of the detent and position switch and wiring.			X
Check function of ELT (if necessary replace batteries).			X
Engine:			
Perform engine control according to the valid engine maintenance manual.	X	X	X
Fuel and exhaust system:			
Check fuel lines throughout complete routing for general condition, chafing, leaks, proper routing and attachment.			X
Check fuel line fittings and re-torque, if necessary.			X
Check fuselage located screen filter for damage, general condition and leaks.		X	X
Clean or replace the fuel filter.			X
Check function of fuel shutoff valve and for leaks.		X	X
Drain the fuel system via the gascolator and check fuel flow (at least 0.5 l in 45 seconds.).		X	X
Check the exhaust and heating system for cracks, leaks and security. Check springs		X	X
Cooling and lubrication system:			
Check and exchange of coolant according to the valid engine operation and maintenance manual.	X	X	X
Check and exchange of oil according to the valid engine operation and maint. manual.	X	X	X
Check coolant and lubricant tubes for general condition, chaffing, leaks, proper routing and fixation.	X	X	X
Check all liquid lines and fittings and tighten if necessary.	X	X	X
Check the oil cooler and coolant radiator for fouling / blockage by foreign objects, clean if necessary.	X	X	X
Check oil cooler and coolant radiator for damage to the casing or the fins.	X	X	X
Should leaks of operating fluids be visible, the engine must not be started until the fault has been rectified!	X	X	X
Propeller:			
Check the propeller blades for damage and security. If damage is detected, contact the propeller manufacturer manual for recommendations.		X	X
Check the propeller hub for damage, security and corrosion. If damage is detected, contact the propeller manufacturer.			X
Check the spinner for cracks and general condition. Check screw connections for security. A damaged spinner must be repaired by a qualified technician to prevent unbalancing.			X
If a hydraulic variable-pitch propeller is installed, the adjustment hydraulic system must be checked for leaks and adjustment range (adjustable rpm range; min rpm in idle 1400 rpm and max. rpm full throttle static 5400 rpm at minimum pitch).		X	X
If a electric constant speed propeller is used, check for adjustment range (adjustable rpm range; min rpm in idle 1400 rpm and max. rpm full throttle static 5400 rpm at minimum pitch).		X	X

This checklist represents the minimum scope of the mandatory inspections. Inspections must be recorded and kept with the aircraft records. A copy of this table can serve as basis for this documentation.	50 h Inspection	100 h inspection	200 h inspection
Polish the propeller blades with a mild automotive polish.		X	X
Conduct all further maintenance steps according to the manual provided by the propeller manufacturer.	X	X	X
The propeller must undergo a major overhaul as required by the propeller manufacturer (Neuform every 1000 hrs). The overhaul may only be carried out by the propeller manufacturer or a qualified workshop authorized by the propeller manufacturer.		X	X

8.6. Repairs to the Airframe

Warning: Minor repairs on non-lifting parts may only be carried out by qualified personnel approved by the manufacturer.

Warning: Major repairs, particularly after accidents, may only be carried out by the manufacturer or by a Flight Design authorized aviation workshop.

Original materials only should be used for repair work. Should you discover structural damage, please contact a Flight Design service station or a workshop qualified to undertake such repair work. Should this not be possible, please contact Flight Design at the valid service mail address listed on the website. Based on your description of the damage, we shall make recommendations as to what you should do. You will also receive precise repair instructions and documents showing exact structural details for the part of the aircraft affected.

8.6.1. Lubricants and Operating Fluids

Brake fluid	Use only red aircraft fluid Mil-H-5606 (fluid 41) or other suitable petroleum or silicon-based fluids.
Coolant	Glysantine/water mixture (50 : 50) in accordance with the instructions in the engine operating handbook.

Warning: Anti-freeze from different manufacturers must not be mixed as they may react with each other and flocculate. If in doubt, the mixture should be completely drained off and replaced. Flight Design uses BASF Protect Plus, as recommended by Rotax. If the anti-freeze is changed, an aluminum-compatible anti-freeze recommended by Rotax should be used.

Warning: Flight Design advises against the use of Evans coolant. The advantages offered by this fluid are negated by sustained operational problems (e.g. moisture absorption). Based on the results of testing under various climatic conditions, it has been demonstrated that Evans is not necessary for the safe operation of the CT Supralight.

Engine oil	in accordance with the Rotax manual
Fuel Rotax 912 UL engine (80 BHP):	min RON 90 / AKI 87 EN 228 Regular, EN 228 Super and EN 228 Super Plus AVGAS 100 LL (ASTM D910) UL 91 (ASTM D7547)
Fuel Rotax 912 ULS engine (100 BHP):	min RON 95 / AKI 91 EN 228 Super and EN 228 Super Plus AVGAS 100 LL (ASTM D910) UL 91 (ASTM D7547)

Warning: Not every oil type is suited to engine operation with AVGAS or MOGAS. Refer to the relevant version of the Rotax engine manual for detailed information on suitable oil types. The list of suitable engine oils is constantly adjusted according to availability. It is, therefore, recommended you consult the current list on the Rotax Service Bulletins website.

Hydraulic fluid, variable pitch propeller	DOT 3, DOT 4
Lubricant, wing bolts	Heavy duty grease WGF 130 DIN 51502
Lubricant, bearings, rod ends	Heavy duty grease WGF 130 DIN 51502

Warning: The plastic bearings on the flaps and the ailerons are maintenance-free and should not be greased.

8.7. Control Surface Deflections

The settings of the control surfaces and the wing flaps greatly influence aircraft characteristics. The correct surface deflections are defined within this manual.

The aileron-flap mixer system is highly sensitive to adjustments in the control elements. Modifying the adjustment of a bellcrank may change the mixing function. All adjustments to the control system must be done according to Flight Design specifications. We therefore recommend strongly that this type of work only be done by Flight Design approved service stations.

Anti-servo tab settings:

stabilizer position	Trim position	Anti-servo tab deflection	
Neutral	Neutral	5 mm - 13 mm	0.197 – 0.512 in
TE up	Up	38 mm– 47 mm	1.496 - 1.85 in
TE down	Down	23 mm - 32 mm	0.905 - .1.26 in

Aileron settings:

Aileron position*	Deflection**
Neutral	0°
Up	25° - 28°
Down	11° - 14°

*Aileron’s and flaps zero position is -12°.

** Negative and positive aileron’s deflections measure from its zero position.

Flaps settings:

Flaps position	Flap path in °	Difference left / right
-12°	-12° +/- 1°	+/- 0.5° +/- 0.5°
0°	0° +/- 1°	+/- 0.5° +/- 0.5°
15°	15° +/- 1°	+/- 0.5° +/- 0.5°
30°	30° +/- 1°	+/- 0.5° +/- 0.5°
35°	35° +/- 1°	+/- 0.5° +/- 0.5°

Rudder settings (relatively to lowest point of rudder’s trailing edge):

Rudder position	Deflection	
Left	28,5° +/- 1,5°	217 mm +/- 11 mm 8.543 +/- .433 in
right	28,5° +/- 1,5°	217 mm +/- 11 mm 8.543 +/- .433 in

9. SAILPLANE TOW

9.1. General

The CT Supralight can be optionally equipped with a TOST towing hook, as to allow towing of gliders. The hook can be released using a yellow handle located inside the cockpit.

Warning: All operation instructions given by this manual continue to apply. This chapter only adds the specific aspects to be considered in addition during towing.

Warning: All restrictions given by the official aircraft Type Datasheet have to be considered.

9.2. Limitations

The following operational limitations have to be considered in addition to the general limitations of the aircraft. Towing operation is only permitted with Rotax 912 ULS 100 BHP engine installed.

9.2.1. Maximum Take-off Mass of the Ultra-Light Aircraft

The maximum take-off mass of the aircraft does not change for the towing operation.

Warning: Increased takeoff mass of the aircraft has considerable negative effect to the takeoff and climb performance. Due to this reason it is strongly recommended:
- During towing operation all unnecessary things have to be removed from the aircraft
- Fuel tanks shall only be filled as much as needed for a safe towing operation. A complete filling of the fuel tanks is not recommended due to the high weight of the fuel.
- Aerotowing has to be conducted single seated only. When double seated towing flights are needed for instruction it must be absolutely considered, that the glider to be towed is of light weight and allows for a short takeoff run.

9.2.2. Maximum Take-off Mass of the Sailplane in Tow

The take-off mass of the sailplane in tow must not exceed 600 kg.

9.2.3. Weak Links

The maximum design breaking force of the weak link that must be used in the tow line is 300 daN.

9.2.4. Towing Speed

Minimum permitted towing speed is 85 km/h.

The airspeed for best climb, and therefore the optimum towing speed from the viewpoint of the tow airplane, is 115 km/h.

Warning: When towing modern gliders it must be considered explicitly, that the minimum speed of the towing Ultralight aircraft often is below the minimum speed of the towed glider. Due to this reason the towing pilot must at any time actively verify to fly with sufficient speed.

9.2.5. Towrope

Only approved aviation tow lines may be used. Tow line connections must be protected against chafing by a rubber sleeve. The length of the tow rope may be of minimum 40 m, maximum 60 m length.

9.2.6. Placards

In the cockpit, next to the airspeed indicator, a placard "Observe towing speed!" must be mounted.

On the towing aircraft, in the vicinity of the towing hook, a placard “Weak link must be used with max. breaking force of 300 daN” is to be mounted.

9.3. Emergency Procedures

9.3.1. Aborted Takeoff

When aborting takeoff the pilot of the glider in tow must be informed immediately with a radio call.

Power gets reduced to idle and the aircraft is braked down as necessary.

9.3.2. Engine Failure Direct After Takeoff

The pilot of the glider in tow must be informed immediately with a radio call. The towing rope is released immediately to avoid increased drag. Select speed for best glide (approx. 115 km/h at flaps 15°). Cut ignition. Close fuel valve. Perform emergency landing as described in the emergency procedures of the aircraft.

9.3.3. Significant Climb of Glider Above Towplane

The pilot of the glider in tow must be informed immediately with a radio call. The tow line must be released. A stable flight condition is re-established. Landing is performed according to standard procedures.

9.3.4. Break of Tow Rope

The pilot of the glider in tow must be informed immediately with a radio call. Landing is performed according to standard procedures.

9.3.5. Other Problems in Flight

When the flight safety of the towing aircraft is in immediate danger the tow rope must be released. Flight is continued following the normal emergency procedures as adequate.

When the flight safety of the towing aircraft is not in immediate danger, a controlled release of the glider in tow must be coordinated with the glider pilot with a radio call. Flight is continued following the normal emergency procedures as adequate.

9.4. Normal Procedures

All normal procedures of the aircraft must be followed. In addition the following applies.

9.4.1. Daily Inspections

Visual inspection of the towing installation and its connection points to the aircraft for dirt and other abnormalities.

Visual inspection of the rearview mirror, its attachment and verification of the adjustment.

9.4.2. Before Takeoff

Operational readiness of the towing installation must be verified with a release test. To do this as well on the towing aircraft as on the glider the rope must be released with the controls in the cockpit under a preload (assisting person pulls the rope). When this is done the function must be confirmed and attention must be paid to unusual control forces in the release.

9.4.3. Takeoff

The tow rope is hooked up by an assistant. The rope is tightened carefully. Only when the rope is tight and when the pilot of the glider has clearly signalized that he is ready for takeoff full power is applied. Takeoff is performed with flaps in position +15°. When it is observed (rearview mirror) that the wing tip of the glider in tow touches the ground with the effect that the aerotowing aircrafts cannot maintain their direction, the rope must be released immediately. The towing plane makes its takeoff with safe minimum speed and accelerates parallel to the ground, until safe towing speed is achieved. When towing with Ultralighty this is typically dictated by the towed glider!

9.4.4. Climb

From the viewpoint of the towing CT Supralight the ideal speed for the climb phase is 115 km/h. During the complete climb phase all engine operating values, especially the temperatures, have to be surveyed closely. When reaching limit values the towed glider pilot must be informed immediately with a radio call. As necessary airspeed must be adjusted in order to achieve better cooling efficiency.

9.4.5. Tow Release

After tow release of the glider, descent is initiated with a careful left turn. The towed glider should turn to the right at the same moment. This way the risk of a collision between the aircrafts or of the glider with the tow rope is minimized.

9.4.6. Descent and Landing

During descent the increased drag due to the tow rope must be considered. Normal approach procedures and speeds apply. During final approach it must be considered that the tow rope is suspended behind and below the aircraft. Tow rope release prior to touchdown is highly recommended, as to avoid that the free end of the rope gets hooked up at the ground with the high risk of overloading the aircraft structure. When operating from a long landing strip the tow rope can be released first and the landing performed on the remaining runway length. When operating from a short field a short pattern shall be performed after tow release, allowing a regular touchdown at the beginning of the runway.

9.5. Performance

9.5.1. Take-off Distance

The take-off distances below have been calculated assuming the following conditions:

- dry, level, short mown grass runway
- ISA standard atmosphere, 0m MSL
- flaps +15°

The following take-off routes result:

Glider Category	Aircraft type (Examples)	Take-off distance
single-seat, no water ballast	LS4, ASW 24, Discus, ASW 27	400 m
single-seat, with water ballast	LS 4, LS 6, ASW 28, Ventus	460 m
twin-seat, light (single seat)	Ka7, Ka13, ASK 21, TWIN Astir	500 m
twin-seat, heavy (twin seat)	DG 505, Duo Discus, ASH 25	550 m

Warning: The actual condition of the takeoff runway has significant influence to the achievable take-off distance. The individual effects as described in chapter “Takeoff-Distances” of this manual must be considered. Using the charts displayed there takeoff distances for density altitude conditions other than ISA 0m can be derived.

9.6. Weight, Center of Gravity, Equipment

9.6.1. Weight Limits

Weight and center of gravity limits of the aircraft are valid unchanged, also during aerotow operation.

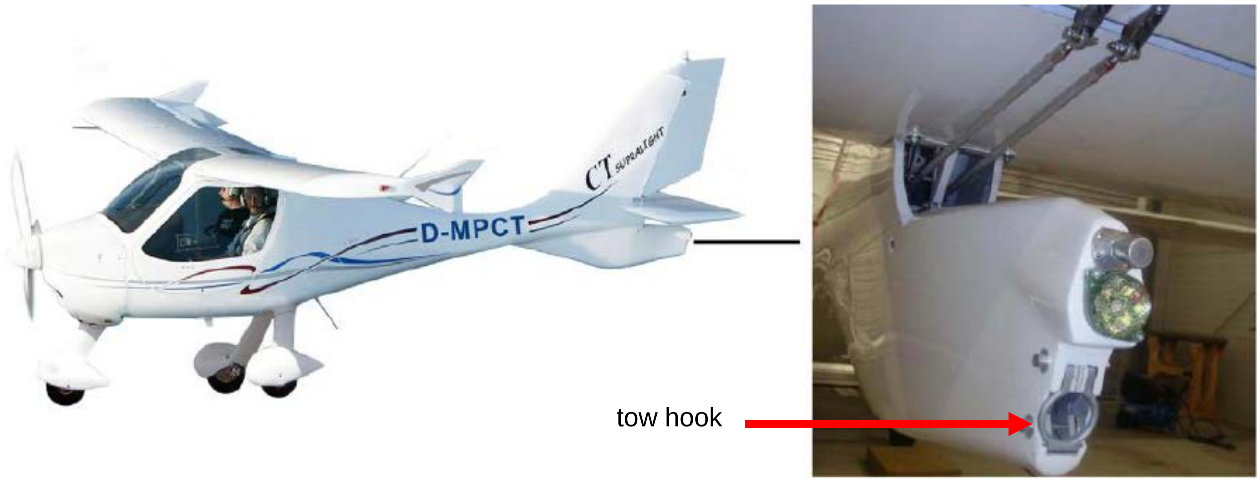
9.6.2. Equipment

The fixed installed portion of the Aerotowing equipment must be considered by amount, weight and center of gravity within the valid aircraft equipment list.

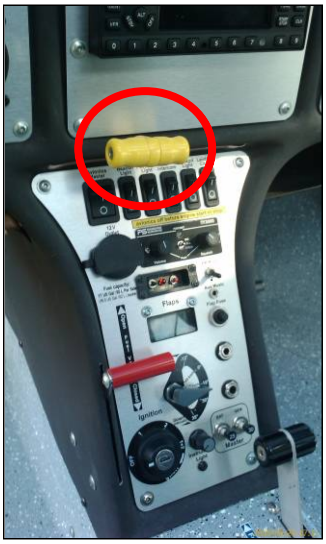
9.7. *System Description an Function*

The towing equipment consists of the following components:

- The TOST tow hook is factory installed to the rear end of the lower fin of the air-craft.



- The tow hook release handle (yellow) is installed to the middle section of the in-strument board. The handle is connected with a bowden cable to the tow hook. Us-ing this handle the pilot is safely able to release the tow rope at any time – even under normally to be expected pull on the rope. When intensively releasing the tow rope the release handle must be pulled to the full stop. Then the handle gets guid-ed back completely. To ensure a successful tow release this procedure must be re-peated at least once more. Release of the cable must be positively verified by watching it through the rearview mirror.



- An additional release handle is installed at the rear end of the lower fin of the air-craft, right above the tow hook. With this handle an assistant can comfortably at-tach the tow line during takeoff preparation.

- The removable, adjustable rearview mirror is to be attached to the left wing leading edge. The mirror must be adjusted so that the tow pilot can see the towed glider in all relevant positions during the flight, considering his properly attached and tightened safety belts. When this is not possible a second mirror (potentially on the other wing) must be attached and adjusted.

9.8. Maintenance, Service and Repairs

Maintenance events and schedules of the aircraft apply.

In addition, when performing the 100 hrs inspection, the condition of the tow release cable must be determined. When individual broken strands are identified the steel cable must be replaced.

Maintenance and overhaul instructions and schedules for the tow hook mechanism are provided by the manufacturer of the mechanism.

10. BANNER TOW

10.1. General

The CT Supralight can be optionally equipped with a TOST towing hook, as to allow towing of gliders. The hook can be released using a yellow handle located inside the cockpit.

Warning: All operation instructions given by this manual continue to apply. This chapter only adds the specific aspects to be considered in addition during towing.

Warning: All restrictions given by the official aircraft Type Datasheet have to be considered.

Every tow pilot must have good knowledge of the specific characteristics of the tow airplane. This Pilot's Operating Handbook and this chapter must be studied in detail before undertaking the first banner tow.

Warning: The study of this handbook does not waive the requirement to obtain any relevant national authorization.

10.2. Limitations

In addition to the normal operating limits for the aircraft, the following limits must be observed for banner tow. Towing operation is only permitted with Rotax 912 ULS 100 BHP engine installed.

10.2.1. Maximum Take-off Mass of the Ultra-Light Aircraft

The maximum take-off mass of the aircraft does not change for the towing operation.

Warning: Increased takeoff mass of the aircraft has considerable negative effect to the takeoff and climb performance. Due to this reason it is strongly recommended:
- During towing operation all unnecessary things have to be removed from the aircraft
- Fuel tanks shall only be filled as much as needed for a safe towing operation. A complete filling of the fuel tanks is not recommended due to the high weight of the fuel.
- Aerotowing has to be conducted single seated only. When double seated towing flights are needed for instruction it must be absolutely considered, that the glider to be towed is of light weight and allows for a short takeoff run.

10.2.2. Airspeeds:

Warning: Banner tow may only be performed with flaps in either position +15° or 0°.

The following maximum speed limits apply during banner tow:

Minimum airspeed with flaps 15°, Banner 70 x 1,2	84 km/h IAS
Maximum airspeed with flaps 15°	115 km/h IAS
Minimum airspeed with flaps 0°, Banner 75 x 1,2	90 km/h IAS
Maximum airspeed with flaps 0°	150 km/h IAS

Warning: If the maximum permissible banner speeds are lower than the maximum speeds listed above, the banner limit speeds must be obeyed.

10.2.3. Banner:

Maximum mass	20 kg including all flying parts
Maximum banner drag:	70 daN

Banner size according to banner manufacturer instructions, considering these limit values.

10.2.4. Towrope:

Material:	textile rope made of synthetic material
Length:	approx. 25 m
Strength:	at least 20 % above the breaking force of the weak link
Breaking force of weak link:	200 daN

10.2.5. Placards

In the cockpit, next to the airspeed indicator, a placard "Observe towing speed!" must be mounted.

10.2.6. Environmental Limitations

Take-off from a grass runway is only permitted when the runway is dry and the grass mown.

Take-off from a hard runway is only permitted when the runway is dry. It is not a problem if it starts to rain after take-off as the banner must be made of non-hygroscopic material. Banner tow should not be carried out if the wind is strong and gusty, particularly if wind speed exceeds 40 km/h.

10.3. Emergency Procedures

The emergency procedures described in the main part of the handbook retain their validity and are supplemented by the following for banner tow.

10.3.1. Aborted Takeoff

The banner must be released immediately. Power is reduced to idle and aircraft is braked as required.

10.3.2. Banner Does Not Lift

Particular caution is necessary on grass runways. The banner characteristics must be borne in mind. If the banner does not lift off the ground, it should be released immediately. If the remaining runway is long enough, land the aircraft. If the remaining runway is not long enough, continue with take-off climb and then fly a normal approach. During landing take special care of the banner that might lie in the landing area.

This procedure is valid for any difficulty which arises during take-off, even if it is not explicitly mentioned here.

10.3.3. Difficulties of Any Kind in Flight

If difficulties arise in flight, the banner should be dropped if this will lead to a return to safe flight conditions. If at all possible, the banner should only be dropped over free terrain. Ensure that the banner will not injure anyone on the ground or cause any damage to property.

10.3.4. Engine Failure Direct After Takeoff

The banner is released immediately to avoid increased drag. Select speed for best glide (approx. 115 km/h at flaps 15°). Cut ignition. Close fuel valve. Perform emergency landing as described in the emergency procedures of the aircraft.

10.4. Normal Procedures

All normal procedures of the aircraft must be followed. In addition the following applies.

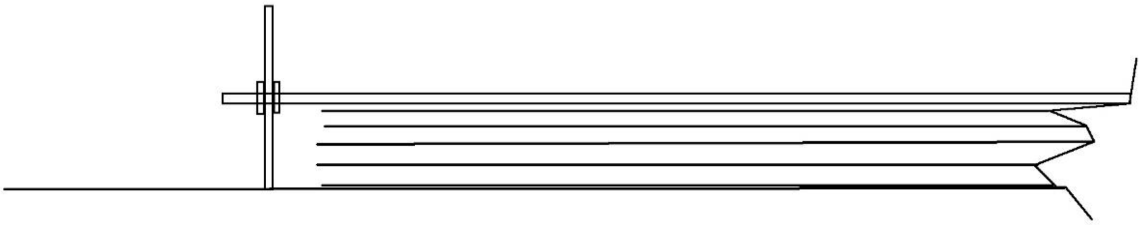
10.4.1. Daily inspections:

Visual inspection of the towing installation and its connection points to the aircraft for dirt and other abnormalities.

Visual inspection of the rearview mirror, its attachment and verification of the adjustment.

10.4.2. Laying out the Banner:

The entire banner is spread out. To reduce the risk of damage to the banner, two wheels (20 to 40 cm) are attached to the rod (refer to drawing). This ensures that the banner does not catch and rip during take-off. As the banner is towed at the end of a rope which is approx. 25 m long, it can glide and lift off independent of the aircraft.



View of the rod with wheel and banner

The lower end of the rod at the front end of the banner has a bob-weight to ensure that it hangs down properly in flight.

10.4.3. Before Take-off

Operational readiness of the towing installation must be verified with a release test. To do this the rope must be released with the controls in the cockpit under a preload (assisting person pulls the rope). When this is done the function must be confirmed and attention must be paid to unusual control forces in the release.

When positively confirmed that banner and tow rope are free laid out, the rope gets connected to the tow hook of the aircraft.

Wind conditions get checked and considered. The place to drop the banner is defined and clear. An assistant is available to remove the banner, in case the banner drop area is within the aircraft movement areas.

10.4.4. Take-off

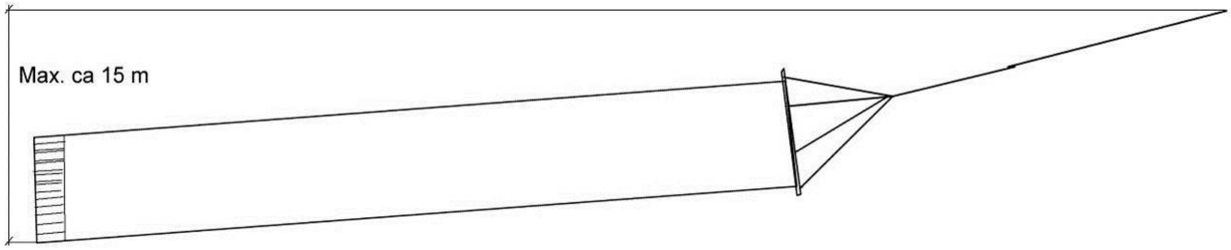
Warning: Takeoff is only permitted with banner attached. Catching the banner while in flight is prohibited.

When the runway is clear, carefully enter the runway. The banner and the required space must be considered.

Takeoff is performed with flaps set to 15°. Accelerate on the centerline of the runway – the towed banner may not be outside the runway limits. When it can be seen in the rearview mirror that the banner catches or shows any other problem, the banner must be released immediately. The towing aircraft performs its takeoff with safe minimum speed and accelerates parallel to the ground to 100 km/h. Only then climb is carefully initiated. When doing this take special care that the banner lifts off without problems.

10.4.5. Climb

Full throttle until the lowest point of the tow combination reaches the 50 ft obstacle height. Keep in mind that the banner end can be up to 50 ft lower than the aircraft (see sketch below). Climb to the desired altitude taking the airspeed limitations into account. Reduce throttle slowly.



10.4.6. Flight with Banner Attached

After climbing to the desired altitude, slowly reduce engine speed until desired cruise speed is reached. Observe the maximum speed for the flap setting - and the maximum banner speed. With the variable-pitch propeller, it is recommended to keep engine speed at roughly 5000 rpm to ensure that the engine is properly cooled during low airspeeds. Particular attention should be paid to oil temperature, especially on hot days.

10.4.7. Turns

Turns should be flown smoothly and with a large radius.

10.4.8. Dropping the Banner:

Prior to banner drop it must be checked that the drop area is free from obstacles and persons. Fly above the drop area with approx. 100 km/h airspeed. Make the overflight in the lowest safe altitude.

Warning: The lowest part of the banner is approx. 50 ft below the aircraft!

Release the banner when right above the drop area.

10.4.9. Final Approach and Landing

Final approach and landing are conducted as described in normal procedures for the aircraft. Make sure that the banner is not obstructing the landing zone.

10.5. Performance

10.5.1. Takeoff Distance

For the CT supralight with a maximum take-off mass of 472.5 kg and the largest permitted banner, the following flight performances apply:

Take-off distance to clear 50ft obstacle	flaps 15°	400 m*
variable-pitch propeller set for take-off		300 m
Take-off speed	flaps 15°	75 km/h IAS
Best angle-of-climb Vx	flaps 15°	100 km/h IAS
with fixed propeller (ca. 4800 rpm)		2.4 m/s
with variable-pitch propeller (ca. 5500 rpm)		3.5 m/s

* Level and dry grass track

Attention! These values are only valid for standard atmosphere at sea level. In higher places and at different temperatures, the actual values may sometimes differ considerably.

Warning: The actual condition of the takeoff runway has significant influence to the achievable take-off distance. The individual effects as described in chapter “Takeoff-Distances” of this manual must be considered. Using the charts displayed there takeoff distances for density altitude conditions other than ISA 0m can be derived.

10.6. Weight, Center of Gravity, Equipment

10.6.1. Permitted Limits of Weight and Center of Gravity with Banner Attached

Center of gravity range:	508 – 612 mm (20.0 – 24.1 in) Datum is the wing leading edge
Maximum take-off mass:	472.5 kg

Warning: The center of gravity must be within the allowed limits in both conditions, with and without banner attached.

10.6.2. Determination of Center of Gravity

When calculating the center of gravity the weight of the banner must be considered. To do this the analysis scheme for weight and balance of the aircraft is enhanced by one position. The following tabel gives an example.

	Position	Weight	Moment	
Empty mass	0.280 m (11.0 in)	310.0 kg (683 lb)	Position * Weight →	86.8 kg*m (7513 lb*in)
Pilot	0.520 m (20.5 in)	85 kg (190 lb)		44.2 kg*m (3895 lb*in)
Passenger	0.520 m (20.5 in)	0 kg (0 lb)		0 kg*m (0 lb*in)
Baggage	1.09 m (43 in)	0 kg (0 lb)		0 kg*m (0 lb*in)
Fuel *	0.210 m (8.3 in)	43 kg (95 lb)		9.0 kg*m (789 lb*in)
Banner ** (max. 20 kg 44 lb)	4.80 m (189.0 in)	12 kg (26.5 lb)		57.6 kg*m (5009 lb*in)
Take-off weight		**450.0 kg (992 lb)**		
C.G.	**0.439 m (17.3 in)**		← Moment / Weight	197.6 kg*m (17206 lb*in)

All grey shaded fields have to be updated for the individual case every time.
* one liter of fuel weighs 0.725 kg - one gal of fuel weighs 6.05 lb.
** weight of the banner with all flying accessories (rope, rod, rollers, coupling box, etc.)

The moments are achieved by multiplying the individual weights with the lever indicated. The columns with individual weights and moments are added up to total weight and total moment. The total moment divided by the total weight results in the center of gravity.

10.6.3. Equipment

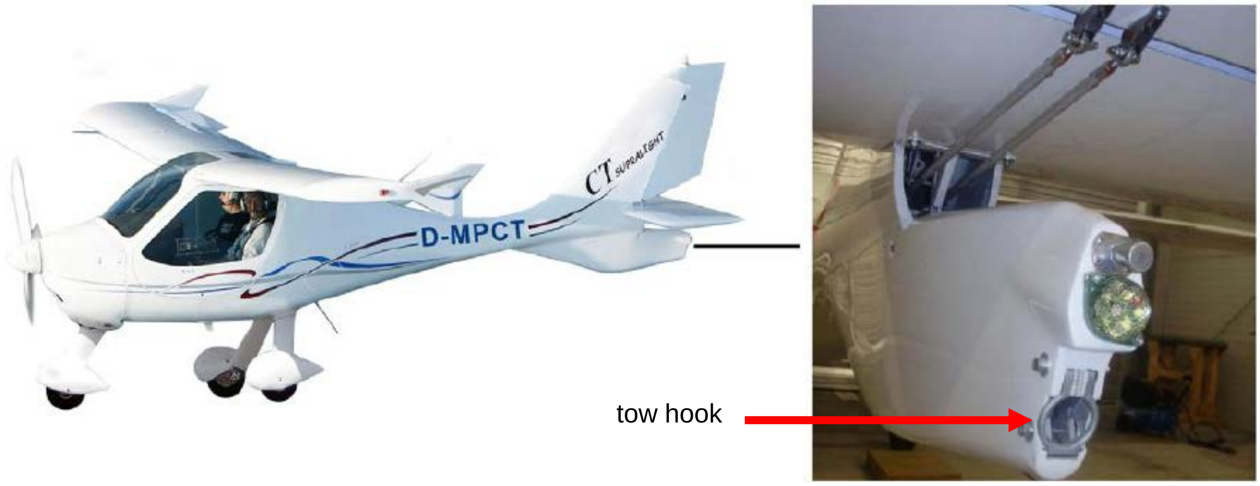
The fixed installed portion of the Aerotowing equipment must be considered by amount, weight and center of gravity within the valid aircraft equipment list.

10.7. System Description an Function

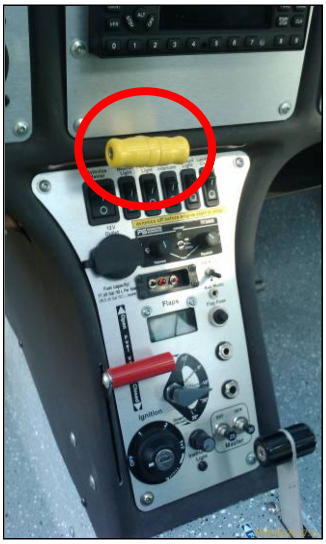
10.7.1. Towing Equipment

The towing equipment consists of the following components:

- The TOST tow hook is factory installed to the rear end of the lower fin of the aircraft.



- The tow hook release handle (yellow) is installed to the middle section of the instrument board. The handle is connected with a bowden cable to the tow hook. Using this handle the pilot is safely able to release the tow rope at any time – even under normally to be expected pull on the rope. When intensively releasing the tow rope the release handle must be pulled to the full stop. Then the handle gets guided back completely. To ensure a successful tow release this procedure must be repeated at least once more. Release of the cable must be positively verified by watching it through the rearview mirror.



- An additional release handle is installed at the rear end of the lower fin of the aircraft, right above the tow hook. With this handle an assistant can comfortably attach the tow line during takeoff preparation.

- The removable, adjustable rearview mirror is to be attached to the left wing leading edge. The mirror must be adjusted so that the tow pilot can see the towed glider in all relevant positions during the flight, considering his properly attached and tightened safety belts. When this is not possible a second mirror (potentially on the other wing) must be attached and adjusted.

10.7.2. Banner

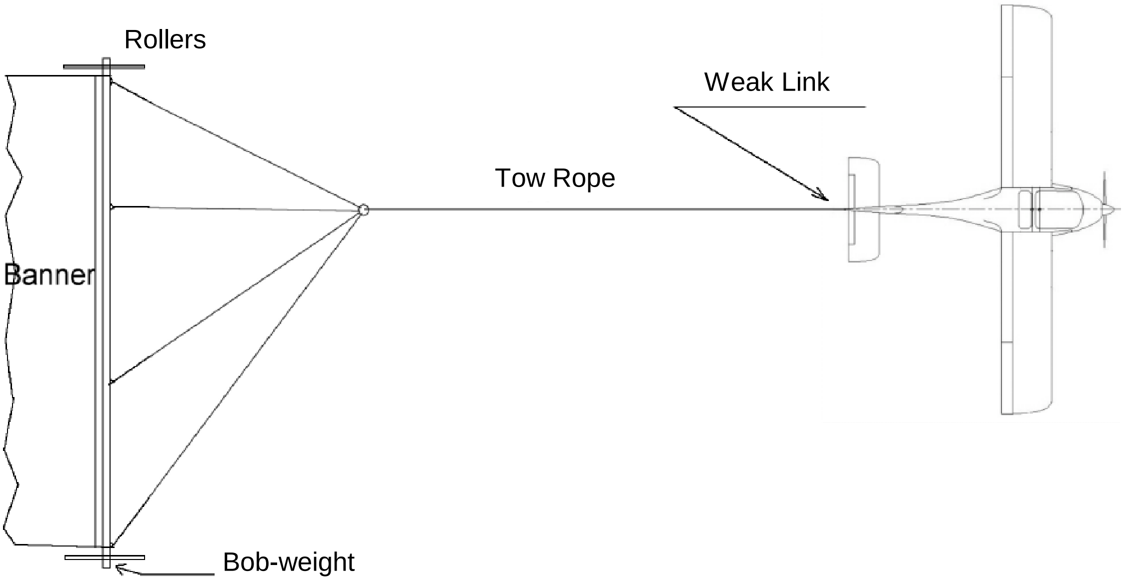
Only banners made from non-hygroscopic materials with known characteristics and limits should be used. The banner must be made by a qualified manufacturer. The banner in its entirety consists of:

- Banner
- Rod
- Wheels
- Central distribution box
- Tow line
- Harness lines
- Weak link
- Ring

The banner must comply at all times with the valid certification requirements for ultra-light banner tow as laid down by the competent aviation authority or association.

10.7.3. Banner structure

The entire banner structure is shown in the following figure. Warning: Watch the direction of the wind and the restrictions on the runway! The banner panel can be up to 8 m be long!



10.8. Maintenance

Service and maintenance as described in the aircraft handbook.

In addition, when performing the 100 hrs inspection, the condition of the tow release cable must be determined. When individual broken strands are identified the steel cable must be replaced.

Check the propeller blades intensively due to higher loads

Check the landing gear intensively due to higher loads

Maintenance and overhaul instructions and schedules for the tow hook mechanism are provided by the manufacturer of the mechanism.

Maintenance and overhaul instructions and schedules for the banner are provided by the manufacturer of the banner.

11. CURRENT WEIGHING REPORT

The current weighing report should be inserted here. Old weighing reports should be kept so that the history of the aircraft is properly documented. They should be marked by hand with the word “INVALID”. The owner of the aircraft is responsible for ensuring that a valid weighing report is made available.

12. CURRENT EQUIPMENT LIST

The current equipment list should be inserted here. Old equipment lists should be kept so that the history of the aircraft is properly documented. They should be marked by hand with the word “INVALID”. The owner of the aircraft is responsible for ensuring that a valid equipment list is available.

13. REVISION STATUS:

Rev	***Pages***	***Date***	***Chapter***	***Completed***
cert draft	all	27 May 2009	New document for certification process	Alexandra Lyashchenko
01		06 July 2011	Make correspondence to the German “CT Supralight – Flug- und Wartungshandbuch” Rev 01	SP
	1-3 7-4: 7-5 8-4; 8-8		1; 7; 8; Add Propeller Neuform CR3-V-70-R2-ECS constant speed control	
	2-2 6-1 6-2 6-7		2.4; 6.1, 6.3 Make correction of misprinting	
02	1-1 7-10	07 July 2014	1; 7. Editorial changes. Updated description of aircraft landing gear.	AKA
03	1 1-1 6-8/9 7-6 7-16 7-18/19 7-22	15 May 2018	Supplement document number / new logo Change Name / Address Manufacturer / Musterbe-faithful. Addition to the equipment list Correction Description Fuel system Supplement numbering list equipment Supplement panel - finishes Change Metal identification plate	AKA