CT2K

Flight & Maintenance Manual

COPY 507003

List :

Rev	Pages	Date	Chapter	Carried out
02	All	August 24, 2003		
03	All	May 20, 2004		
04	24	June 1, 2004	Changed pictures: • Remove parking brake from Lever box. • Changed design Flap position indicator	
05	1	September 3, 2004	CONTENTS: Changed from “1200 hours…” to “ 1500 hours…”	
	30	September 3, 2004	Changed from “1200 hours…” to “ 1500 hours…”	
06	1	March 18, 2005	CONTENTS: Changed form “trimming” to “Stabilator Trim System, Aileron Trim System, Rudder Trim System”	
	21	March 18, 2005	Changed from “Trim system” to “Stabilator Trim System” Added points: Aileron Trim System Rudder Trim System	
	24	March 18, 2005	Changed picture of Standard equipment in version with Flydat.	
	25	March 18, 2005	Changed picture of Lever box.	
07	4	June 14, 2005	Corrected dimensions on the views	Sergey Pilipenko
	27	June 14, 2005	Changed from “1200 hours…” to “ 1500 hours…”	
08	5	June 23, 2005	Changed “Minimum Equipment list” and “Recommended additional equipment“	Sergey Pilipenko
	7	June 23, 2005	Changed Oil capacity from “2.5 l-min.1.75l” to “3.0 l – min. 2.0 l”; Oil consumption from “max. 0.1 l/h” to “max. 0.06 l/h”	
	20	June 23, 2005	Changed from “propeller TXR2-65 1660mm” to “propeller TXR2-65 1650mm”	

1 GENERAL

Read this before your first flight.

Every pilot has to understand the limitations and specifications of this Light aircraft.
The Flight manual must be read thoroughly as well. Please pay attention to the pre-flight check and maintenance instructions for the aircraft, the Rotax ® engine and the Emergency Parachute system, if equipped.

The Flight Design CT2K is equipped with non-certified engines. Flying the CT2K must always be done with the possibility of a safe landing due to the loss of the engine power.

The Flight Design CT2K is a VFR aircraft only. Because of the high cruising speed and range of the CT2K, flight into vastly different weather patterns and meteorological conditions can occur. The entry into bad weather with IFR conditions by VFR pilots and aircraft is extremely dangerous. As the owner or operator of an aircraft you are responsible for the safety of your passenger and yourself. Do not attempt to operate the CT2K in any manner that would endanger the aircraft, the occupants or persons on the ground.

Manufacturer:

Flight Design GmbH
Siemlinger Str. 65
D – 70771 L.-Echterdingen

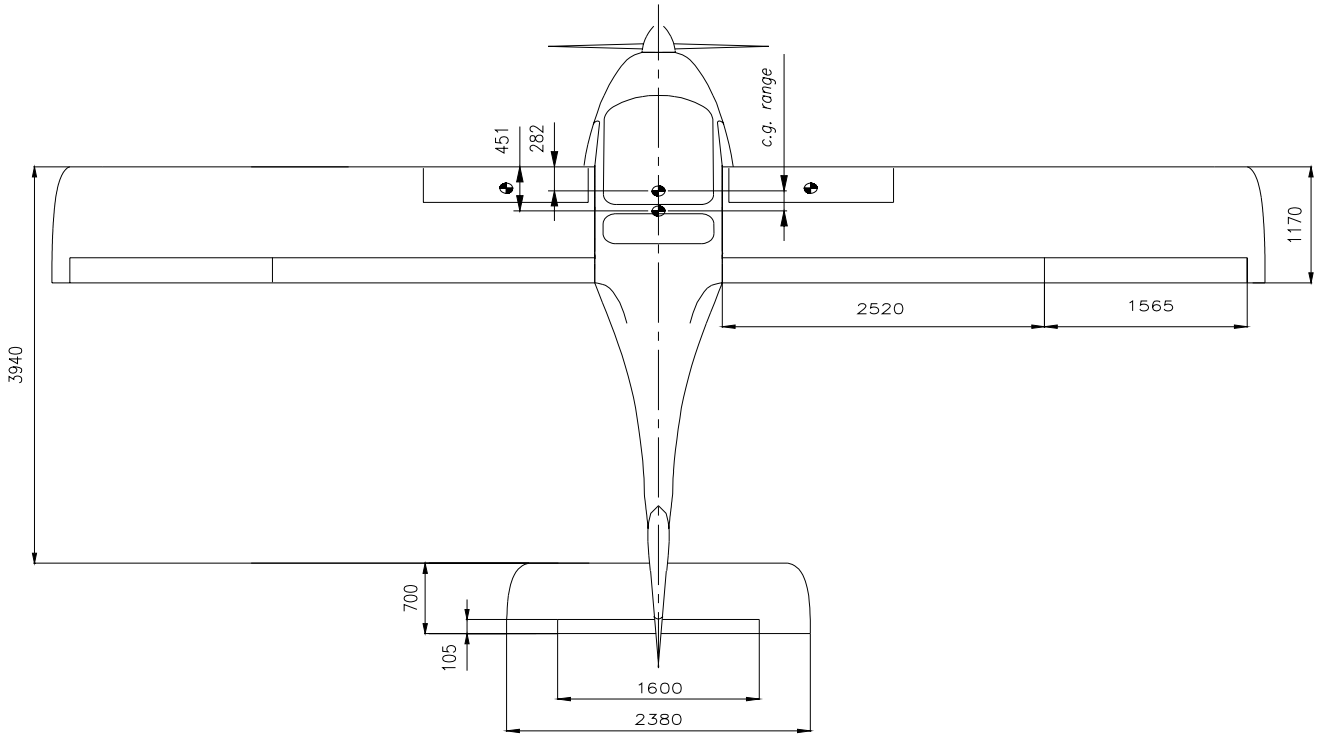
Description of the aircraft:

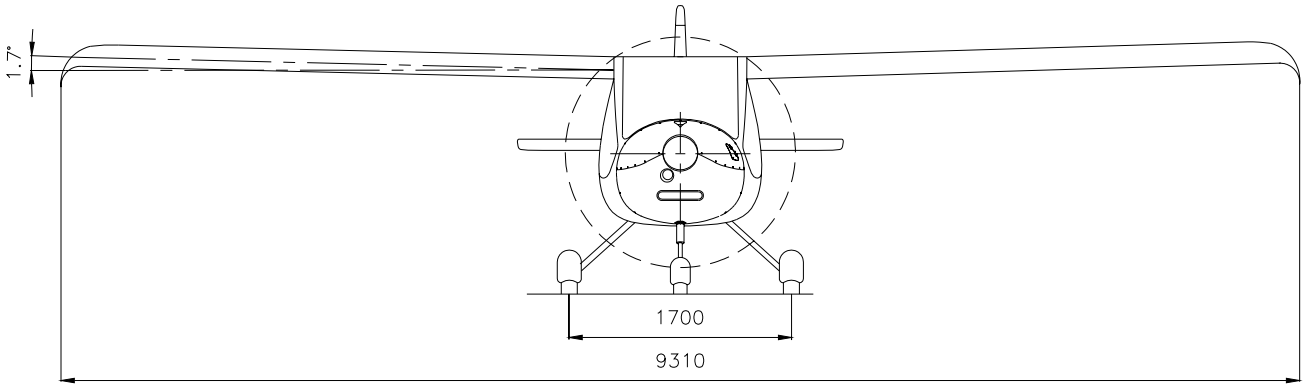
Three-axis control high performance light aircraft
Two-seat high-wing monoplane with carbon fiber reinforced plastic structure
Conventional, cruciform tail surfaces.
Full flying stabilator, with servo/trim tab
Tricycle landing gear with steerable nose-wheel

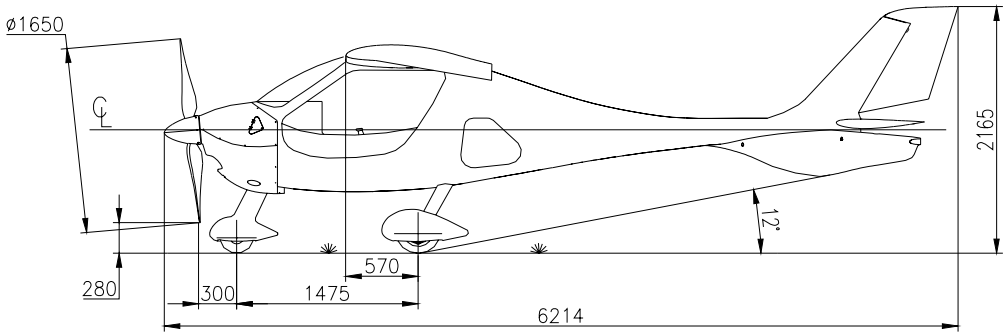
Dimensions:

Wing span: 9,31 m
Length: 6,21 m
Wing area: 10,80 qm

Views, dimensions:







Construction materials:

KDU & Rovings:	Lange & Ritter
Carbon, aramid and glass fabrics:	Lange & Ritter, Interglas
Resin and hardener:	Scheuffler Stuttgart
Foam:	Rohacell
Screws and bolts:	Metric 8.8 zinc-coated or stainless steel according to DIN Standard

Engine:

	ROTAX 912 UL	ROTAX 912 ULS
Four-cylinder four-stroke Boxer engine		
	59.6 KW/81 HP at 5800 1/min	73.5 KW/100 HP at 5800 1/min
Bing constant velocity carburetors		
Dual ignition		
Reduction ratio:	2.27:1	2,43:1

Propeller:

Neuform TXR2-65 2-blade composite propeller, ground adjustable TXR2-65
Neuform CR3 3-blade composite propeller, variable-pitch (please follow the Propeller Manual)
Kaspar-Braendel KA1 3-blade composite propeller, variable-pitch (please follow the Propeller Manual)

Minimum Equipment list:

1	Air speed indicator to 320 km/h
1	Altimeter with pressure setting window
1	4 point pilot harness for each seat
1	Magnetic compass with deviation table
1	Tachometer
1	Sideslip indicator (bubble level)
1	Oil pressure indicator
1	Oil temperature indicator
1	Cylinder head temperature indicator
1	Charging system warning light
div.	Airplane papers

Recommended additional equipment:

Emergency parachute system
Emergency Locating Transmitter (ELT)
Radio equipment with Intercom
Rotax Fly-Dat electronic engine management system
Anti-collision strobe system

Recommended pilot's gear:

Sectional map and plotter equipment

2 PERFORMANCE LIMITATIONS

Airspeeds:

Minimum speed	flaps - 12º	V_{S1}	85	km/h IAS
	flaps 0º	V_{S1}	75	km/h IAS
	flaps 40º	V_{SO}	65	km/h IAS
Maximum in turbulent air		V_{RA}	245	km/h IAS
Maneuver speed		V_A	184	km/h IAS
Yellow arc speed			245-260*	km/h IAS
Maximum permissible speed, reduced because of parachute system*		V_{NE}	260*	km/h IAS
Maximum speed for flight from 0º to 40º extended flaps		V_{FE}	115	km/h IAS
Maximum cross wind components for take off and landing				
	with 0º flaps		30	km/h IAS
	with 40º flaps		20	km/h IAS

Cross wind take-offs and landings demand a lot of training and skill, the higher the crosswind component the greater your skill should be.

*** The tested maximum speed (V_{NE}) is 301 km/h,**
The authorised maximum airspeed is limited by the allowed maximum opening speed of the Rescue system Junkers (260 km/h).

Manoeuvring load factors:
Maximum authorised load by BfU:

Up to V_A	**+ 4 g/ -2 g**
Up to V_{NE}	**+4 g/ -1,5 g**

Explanations to load factors :

- Up to V_A 184 km/h (maneuvering speed) All control surfaces can be fully deflected
- At V_{NE} 270 km/h you are only allowed to use 1/3 of the maximum deflections of the control surfaces
- At V_{RA} 245 km/h the CT supports a vertical gust of 15 m/sec without being structurally overloaded.

Tire pressure:

Main landing gear:	2 bar
Nose wheel:	2 bar

Weights:

Minimum load:	60 kg
Maximum weight per seat:	100 kg
Equipment weights (see weight sheet):	about 285 kg
Maximum permissible take off weight:	472,5 kg (varied between 450 kg and 600 kg, please check and follow only the actual MTWO limits in the country of registration)
Luggage weight:	max 25 kg – see Item 6

Range of centre of gravity: 282-451 mm from the leading edge, the span-wise point of reference is not specified, as the wings are rectangular and un-tapered.

Engine performance limitations:

ROTAX 912 UL or 912 ULS

Take-off performance:	59.6 KW (81 HP) at 5.800 1/min (max 5 min)	73.5 KW (100HP)
Max. continuous performance:	58 KW (79 HP) at 5.500 1/min	69 KW (95 HP)
Min Rpm before take-off:	4.400	4.500 1/min (max 5 min)
Max Rpm before take-off:	5.500 1/min	
Idle speed:	1400 1/min	

Oil:

Normal operating pressure:	1.5 – 5	bar
min	1.5	bar

on very cold start, momentary 7 bar allowed

Temperature measured at the oil inlet of the engine:

min	50	ºC
max	140	ºC
optimum operating temperature	90-110	ºC

Quality automotive motor oil, not approved for aircraft motor oil – for viscosity see Chapter 9 of the ROTAX Operation Manual. Do not use oil additives.

Oil capacity:	3.0 l – min. 2.0 l
Oil consumption:	max. 0.06 l/h

The coolant temperature is checked through the cylinder head temperature.
The cylinder head temperature measured at the measuring position of the hottest cylinder:

max	150	ºC

Fuel content: (2 wing fuel tanks for 65 l)	130	l
Maximum fuel available:	128	l

Kind of fuel:

SUPER leaded, DIN 51600, ONORM C 1103
EURO-SUPER ROZ 95 unleaded, DIN 51603, ONORM 1101
SUPER PLUS ROZ 98 unleaded, DIN 51607, ONORM 1100
AVGAS 100 LL.
ATTENTION: AVGAS loads the valve seats with high lead content and forms more combustion chamber deposits. That is why it should be used only in case of steam blast problems or MOGAS failing.

More engine data see in the Engine Operation Manual of the firm Rotax.

Other limitations:

The CT2K is not certified for aerobatics. Flights are only in day only under VFR conditions. Flights in icing conditions not allowed. Flights at icing hazard are not allowed. Steep turns beyond 50 Degrees should not be performed.

In gusty wind or wind speed more than 40 km/h flight operations should be stopped.

3 EMERGENCY PROCEDURES

Stall:
The loss in altitude during stalls is approx. 50 meters with a maximum pitch down of 25º.
In the case of a stall-spin entered through crossed controls:
Oppose a spin with opposite rudder input. Center the ailerons and elevator until the rotation stops, then level out the airplane gently.
If the attempt to level out the airplane fail or leveling out is doubtful because of too low altitude the emergency parachute system (if equipped) should be actuated.

Engine failure:
At an altitude of less than 100 m, no attempt to re-start the engine should be made.
Below and altitude of 250 m, no attempt to return to the runway should be made.
Choose a landing spot without trees or obstacles and with sufficient length.
Below an altitude of 50 m any turns are to be avoided because of increased loss of in altitude.
Keep a minimum speed of 100 km/h until final approach.

In case of landing on a field with crops or in a forest:

- Look for a flat spot in the plants, treetops or bushes.
- For final approach, the flap position should be 40 degrees and airspeed should be 80 km/h on short final.
- The final approach should be carried out at an altitude of about 50 cm over the chosen spot.
- Ignition should be turned off.
- The elevator control should be fully pulled back.

Carburetor:

- In case of engine fire
- shut down the engine
- take out the key
- close the fuel valve
- full-open throttle
- Slip away from the location of smoke if possible
- land as quickly as possible
- perform an emergency landing
- If the fire is extinguished and there is no emergency landing possibility without engine help, you can try to start the engine again – if it starts, land as quickly as safely possible.
- If the airplane is not under control during a fire or there is no emergency landing possibility, the optional parachute system should not be used at higher altitudes. The airplane should be flown down to 200 m, and then the system operated.
- After landing, leave the airplane immediately.

Rescue system:

ATTENTION: The maximum speed for release should be observed:
Junkers High Speed: 260 km/h

- The data in the manufacturer's Operation Manual concerning the rescue equipment should be observed.
- The rescue equipment gives good rescue possibilities also in low altitudes.
- In emergency case the rescue equipment should be activated irrespective of the altitude in any case. Before activating, if it is possible, please tighten the belts.
- The **activating lever** is on the center console (page 24) between the seats. In case of emergency it is to be pulled up to the stop.

Overturn on land:

- Open the parachute harness (in an emergency cut with a belt knife
- Be careful because of the effluent fuel – fire hazard
- Leave the airplane immediately.

4 NORMAL PROCEDURES

Daily flight check:

At the start of every new flying day the CT should be checked thoroughly.
An accidental engine start is very dangerous, that is why you must always ensure that the ignition and main switch are turned off!

- Make sure that the throttle and choke controls are free from friction and binding.
- Check the coolant level on the Rotax overflow bottle and add more if needed.
- Check the oil level and add more if needed. The oil level should be between the two markings – max/min – of the oil dipstick and should not be lower than the minimum mark in any case. Before a long-term engine operation the oil level should be in the middle of two marks at least.
- Carefully examine the oil, cooling and fuel system for leaks.
- In case of the any in-operative equipment, the engine should not be started before proper maintenance is performed.
- Check that all visible bolts are fastened and secured.
- In case of varnish cracks their cause should be established. Eliminate defects and remove their causes if necessary!??

Pre-flight checklist:

- Check fuel in both tanks using the dipstick. Are the tank vents clear?
- Make sure both tank caps closed tightly
- Move the fuel valve lever to on, exposing the starting key switch.
- Remove water from fuel system by draining the fuel gascolator.
- Is there any contamination in the fuel? Drain until fuel is clear.
- Make certain the control stick and rudder pedals are free.
- Check the flaps. Run the electric flap drive motor up to the limit switch - watch the function of the indicator lights and limit switches (listen for a “click” – when the drive motor stops).
- Check that the main spar bolts are secure.
- Check that the trim system is functioning.
- Check that the hinge points are free.
- Are all the wing control surfaces secure and free?
- Check the stabilizer attach bolts for security
- Check that the servo/trim tab bolted and the spring pin secured?
- Is the Pitot tube cover removed? Check that the Pitot tube is clear.
- Is the tire air pressure correct (2 Bar. 32 PSI)? Check that the wheel pants and fairings are secure.
- Check that the air intakes for the oil cooler, water radiator and cylinder air cooling are clear.
- Check that the propeller is free and without nicks or defects.
- Check the spinner attachment.
- In case baggage is carried: Is it properly fastened? Follow the weight and balance loading plan!
- Solo flight: Are the passenger side belts set and fastened?

Checklist before engine start:

- Did you complete the Pre-flight checklist?
- Are the baggage doors closed?
- Are the pilot and the passenger harnesses fastened correctly?
- Is the emergency parachute system ready for operation? Is the protection removed?
- Is the altitude balancing set?
- Is the altimeter set?
- Is the wind direction known?
- Are the doors closed and secured (all latches ahead and behind)?
- Is the radio and other equipment switched off before starting the airplane?
- Is the immediate area around the airplane clear of persons and obstacles – **especially around the propeller?**

Engine start:

- Fuel cock — open
- Choke (with cold engine) pull backwards — on
- Throttle level — idle position
- Carburetor preheating pressed — off
- Main safety devices (Parachute, ELT) — on
- All electrical equipment , for example, radio equipment — off
- Push the brake lever forward, fasten the parking brake — pull
- Ignition – both circuits — on
- Ignition key turn to start position — on

Engage the starter for a maximum of 10 sec. Allow the starter to cool for two minutes if the engine does not start. As soon as the engine starts, set the throttle level in such a way that the engine runs smoothly at minimum RPM.

- Check the oil pressure immediately (it should increase during 10 sec.)
- Move the choke forward to close
- Run the engine warm at a middle RPM, 2 min 2000 1/min, then 2500 1/min until the oil temperature rises to 50ºC.
- Switch on additional instruments, for example, radio, strobe light, position lights, GPS …
- Perform a “Mag” check on both of the ignition circuits at 4000 RPM, the maximum allowable drop in RPM is 300 and 115 RPM difference between the two circuits.
- If the airplane rolls and cannot be stopped with the brakes, the engine should be stopped immediately. The airplane lends to roll more easily on asphalt or with a tail wind even with the engine at idle.
- The nose wheel is directly linked to the rudder pedals for taxiing, takeoff and all maneuvers on the ground.
- After practice, the airplane can be taxied in crosswinds up to 30 km/h.

Before start:

- Make certain the oil temperature at least 50ºC.
- Confirm both doors are locked.
- Confirm the pilot and the passenger harnesses properly fastened.
- Check that the controls are free and correct.

- Confirm the main switch and the ignition “on” (both circuits).
- Choke “closed”.
- Alternator warning light out? Do not take off with the red light on.
- Set the flaps to 15º.
- Confirm the trim lever is set for takeoff.
- Is the radio frequency and the squelch set?
- Are the runway and taxiways clear?
- Are the brakes off?
- Make certain the clear takeoff distance is sufficient.

Take-off:

If the runway and approach to the runway are clear. Roll out to the take-off position.

- Confirm the nose wheel is centered.
- Controls in proper position for takeoff.
- Apply the throttle smoothly to full open (forward).
- Engine speed: 4.400 – 5.300 1/min
- Flaps: 15º (0º is fine on longer runways)
- If it is possible, take-off directly into the wind.
- The maximum direct crosswind component at take-off is 25 km/h (See Item 2 of Performance Limitations).
- As soon as the airplane accelerates, gently pull back on control stick – keep the nose wheel slightly elevated until the airplane takes off.
- After take-off, release the back pressure on the stick slowly as airspeed builds to 110 km/h. Climb to a minimum height of XXX in straight ahead flight at 110 km/h before attempting to turn the aircraft.
- Do not reduce the flaps to 0º with less than 115 km/h airspeed.

Climb

- Decrease the throttle to 5200 RPM.
- Set the flaps to 0º - the airplane will increase in speed to 160 km/h.
- Set the flaps to -12º - the airplane will increase speed to 180 up to 245 km/h.

Cruising flight

During cruising flight, a maximum RPM of 4800 – 5200 r/min should be used (redline is 5800 RPM).
During cruising flight, monitor your fuel consumption and total fuel on board for flight planning, fuel consumption at cruising flight is about 18L per hour.
In case of possible carburetor icing, pull on the carburetor heat (immediately after icing clears, push it back in again – as significant power is lost).
Direction for normal cruising flight: Bring the airplane to the desired cruising speed in level flight by observing the VSI or the altimeter. Adjust the throttle and trim to hold altitude.

Banked turn:
Each of turn should be made with the coordinated use of the aileron and rudder. The maximum permissible speed of 260 km/h should not be exceeded. Steep turns in excess of 60 degrees are not recommended. At lower speeds in banked turns with small radius, the airplane loses altitude quickly. Banked turns with more than 30º of banking should not be carried out less than 100 km/h. If the airplane enters an inadvertent spin, push the rudder opposite the spin direction. Position the control stick in neutral position for recovery. After the spin rotation stops, recover to level flight carefully to not exceed Vne, or the load limits of the aircraft.

Stall:
The stall speed is 65 km/h for 475.2 kg of the equipment weight and 40º flaps, 75 km/h at 0º flaps, 85 km/h at -12º flaps. The stall is noted through buffeting. At 5 km/h above the stall speed the rudder becomes “soft”. When flying close to stall speed, only the rudder and elevator are controllable. The ailerons have less effectiveness in a slow flight.
The airplane loses about 50 meters in altitude during a stall. Close to the ground, do not fly slower than a minimum speed of about 115 km/h.

Approach landing and landing:

Land into the wind, or the runway with the least crosswind if possible. The final approach to landing is to be carried out in level attitude.

Engine power at	about 10-20 %	Slightly above idle to confirm that the engine still has power.
Approach speed	about 100 km/h	With experience, a slightly slower approach speed can be used.
Flaps	from 15º to 40º	

In case of carburetor icing hazard pull the carburetor heating.

At the distance of 1 meter over the ground close the throttle control and land the airplane gently. If engine cools too much in descent with the engine at idle and won't increase RPM, pull the choke and then increase throttle. Close the choke again.
When landing with crosswind, perform a crabbing approach or slip carefully.
The flights over the obstacles at approach landing should be avoided.

Control of the emergency transmitter ELT:

Before switching off the radio equipment, adjust frequency to the international emergency frequency 121.5 and check if the ELT is activated.

Engine stop:

Under normal conditions, the engine is sufficiently cooled during the landing approach and rollout, therefore it can be stopped through ignition switching off. The radios and instruments should be switched off before stopping the engine.

5 CAPACITIES

Airspeeds:

Minimum speed:	flaps -12º	V_{S1}	85	km/h IAS
	flaps 0º	V_{S1}	75	km/h IAS
	flaps 40º	V_{SO}	65	km/h IAS
Maximum at a strong wind		V_{RA}	245	km/h IAS
Maximal speed at horizon flight with Maximum continuous power of engine		V_H	272	km/h IAS
Maneuvering speed		V_A	184	km/h IAS
Danger area			245-260*	km/h IAS
Maximum permissible speed, reduced because of rescue equipment*		V_{NE}	260*	km/h IAS
Permissible maximum speed for flight with 0º to 40º extended flaps		V_{FE}	115	km/h IAS
maximum longitudinal wind components for start and landing				
	with 0º flaps		30	km/h IAS
	with 40º flaps		20	km/h IAS

Taking off and landing in strong cross winds requires skill and judgment. Do not attempt to flying in strong wind conditions without adequate training and practice.

*** The tested maximum speed (V_{NE}) is 301 km/h, however it is limited to 260 km/h IAS through the maximum release speed of the Junkers rescue equipment.**

Flight characteristic of the **CT2K**:	912 UL	912 ULS Neuform TXR2-65
Take-off range over 15 m of the obstacle at a plane, dry grass runway, flaps 15º	160 m	130 m
liftoff speed, flaps 15º:	75	km/h
best climb speed:	145	km/h
at	5030	1/min
at	0º	flaps position
at that climb	3.8 m/s	5.0 m
Cruising speed at 75% of engine capacity:	220 km/h	245 km/h
max. range ability with 472.5 kg:	1450 km	

Attention: The performance figures stated above are for Sea level and standard meteorological (60F.) conditions. Operations at higher altitudes and temperatures will reduce takeoff and climb performance.

Engine power 912 UL – 912 ULS:

Take-off power max:	59.6 KW (81 HP) at 5.800 1/min (max. 5 min)	73.5 KW (100 HP)
Continuous power:	58 KW (79 HP) at 5.500 1/min	69 KW (95 HP)
Maximum RPM in level flight:	5800	1/min (max. 5 min)
Idling speed:	1500	1/min (2.100 at flight)
Cruising flight:	4.200 – 5.500	1/min
Fuel consumption at take-off power:	24	l/h
Fuel consumption at cruising power:	10 – 20	l/h
Fuel consumption at max cruising power:	20	l/h 5.200 RPM = 75% of the power

For more engine data, refer to the Engine Operation Manual from Rotax found in your CT documents package.

6 MASSES, WEIGHTS, CENTRE OF GRAVITY

Masses:

Minimum loading: 60 kg

Maximum permissible gross weight – MTOW: 472,5 kg (varied between 450 kg and 600 kg, please check and follow only the actual MTWO limits in the country of registration)

Baggage loading: left+right together. max. 25 kg

Centre of gravity range: 282 – 451 mm behind the leading edge of wing

Weighing:

The airplane is to be put on a level space on three scales or one scale with leveling blocks. Make certain the plane is level using a bubble level. The reference point is the console (called the tunnel by Flight Design) the between the seats.
The seat of wheels is marked on the ground by a plumb??

The centre of gravity is determined in centimeters behind the leading edge of wing – the measuring point is not important, as the wings are rectangular and un-tapered.
Important: In determining the centre of gravity, the aircraft must be level.

Diagram of weight, centre of gravity and loading:

Calculation of the centre of gravity position

		kg		Arm,m
Main landing gear	G2:	220.6	b	1.46
Nose wheel	G1:	52.4	a	0.88
In total	G:	**273.0**		

Calculation of the empty weight – correction 1

		kg		Arm,m
Main landing gear	G2:		b	1.46
Nose wheel	G1:		a	0.88
In total	G:			

Centre of gravity of the empty weight:

G2 x b : G – a =	**0.300**

Centre of gravity of the empty weight 1:

G2 x b : G – a =	

Calculation of the centre of gravity position

	kg	Arm,m		M om kg*m
Empty weight	273.0	0.300		81.84
Pilot	75	0.52		39.00
Passenger	75	0.52		39.00
Tank content	44.5	0.21		9.35
Baggage	5	1.09		5.45
In total	**472.5**	**0.370**		174.63

Calculation of the empty weight – correction 2

		kg		Arm,m
Main landing gear	G2:		b	1.46
Nose wheel	G1:		a	0.88
In total	G:			

Centre of gravity in the empty weight 2:

G2 x b : G – a =	

Limitations of the centre of gravity:

Forward limit for the centre of gravity: Xg.f = Total mom.: total weight = **0.282**
Aft limit for the centre of gravity: Xg.f = Total mom.: total weight = **0.451 m**
Maximum take-off weight: 472,5 kg (varied between 450 kg and 600 kg, please check and follow only the actual MTWO limits in the country of registration)

Equipment list:

Description:	Manufacturer:	Type:	Serial number:	S/O:
Engine	Rotax			S
Propeller	Neuform			S
Rescue system	Junkers			O
Slip clutch	Rotax	--	--	O
Wingtips	Flight Design	--	--	O
Electrical flaps	Flight-Design	--	--	S
Heating	Flight-Design	--	--	O
Wheel fairing	Flight-Design	--	--	O
Landing gear fairing	Flight-Design	--	--	O
Anti-Collision-Lights	Flight-Design	--	--	O
Door locks	Flight-Design	--	--	O
Parking brake	Flight-Design	--	--	O
Airborne first-aid set	--	--	--	O
Towing gear				O

Equipment list - instruments:

Description:	Manufacturer:	Type:	S/O:
Speed indicator	Winter	GFMS440	S
Altimeter with hPa-Corr.Scale	Winter	--	S
Vario	Winter	--	O
Sideslip indicator	Winter	GR 1	S
Magnetic compass with Dev.Table	Airpath	--	S
Fuel indicator	Flight-Design	2 x raising mains?*	S
Tachometer	Rotax	electrical	*
Oil temperature indicator	VDO	analogue	*
Oil pressure indicator	VDO	analogue	*
Indicator of cylinder head temperature	VDO	analogue	*
Loading control lamp	--	--	S
Multi-purpose instrument	Rotax	Fly Dat	O
Transponder	King	KT 76 A	O
Altitude Encoder	ACK	A 30	O
Emergency/crash transmitter	ACK	E01ELT	O
Radio equipment including antenna	Becker	AR 4201	O
Artificial horizon, electrical	R.C. Allen	--	O
Headsets including Intercom	Flightcom	Nighthawk	O

x= built-in into this model. O = Option. S = series
[x]= raising mains from left and from right in cutout of the aerofoil rib.
*these asterisks indicate Rotax Flydat.

7 SYSTEM DESCRIPTIONS AND FUNCTIONS

Description of the aircraft:
Three-axis controlled ultra light aircraft, two seat, high-wing monoplane with composite airframe design, cruciform tail.

Assembling manual:

- Insert left and right wing into the spar hollow for 20 cm.
  Before the wings are completely inserted, connect the Pitot tube line properly and the plugs of the position and strobe lights. Watch that the fuel lines are not pinched.
- Push the main bolts fully in and secure them with the cap and bolt. Then take out the aileron support from the baggage compartment, screw it with the joint head to the wing through opening and fasten with a stop nut, then connect the joint head with the screw and nut in the baggage compartment.
- Connect fuel line properly.
- Insert the stabilizer and fasten with two bolts. Connect the trimming tab and fasten with a spring washer.

Attention: Check the clearance and smooth operation of all control surfaces.

Adjusting of the aileron

- Set the flap into the -12º position.
- Through screwing and unscrewing of the aileron support the stabilizer will be set up or down. The aileron should be in straight line with the flap at its -12º position.

Fuselage – Wing:
The high-wing plane without braces of coal/glass sandwich, or coal/aramid sandwich.
The cockpit can take the full load from all sides.
The fuselage of the CT is made from a carbon fiber and aramid (Kevlar) foam core sandwich. This provides superior pilot and passenger crash protection and low structural weight.

Wingtips: The wingtips of the CT are highly developed drooped type. They improve stability and low speed control of the CT.

Engine:

ROTAX	912 UL	912 ULS

Four-cylinder four-stroke Boxer engine,
central camshaft – push rod – OHV,
cylinder heads with liquid cooling, dry-sump pressure lubrication,
Propeller drive through integrated gear with mechanical vibration damping,
Bing CV carburetors, optional propeller clutch, Vacuum pump or hydraulic constant speed regulation system for propeller.

Gear reduction:	2.27:1	2.43:1

Fuel system:
Fuel is supplied from two wing tanks by gravity feed with a total capacity of 65 liters. The ignition key cannot be inserted unless the fuel valve is in the on position.

Electric system:
Direct-current generator 13.5 – 14.2 V, 250 W (about 18 A), battery 12 V, electric starter, non-contact magnet-condenser-double ignition. The Rotax 912 series engines have a lighting coil type alternator with a rectifier-regulator converting and regulating the accessory voltage to a nominal 13.5 V – 14.2V 250W (roughly 18A). The battery for the electric starting system is 12V sealed lead acid spiral wound. The dual ignition system is a CDI (capacitive discharge).

Propeller:
NewForm, carbon fiber reinforced plastic propeller TXR2-65 1650mm. (Standard)

Landing gear:
The landing gear of the CT is Tricycle type. The nose wheel is steerable through direct link to the rudder pedals. The main gear legs are heavy duty aluminum rods.

Brakes:
Hydraulic disk type, actuated through a handbrake lever. Parking brake is set though a small tab.
Control system -
Rudder:
Conventional foot pedal type, activated with cables and pulleys.

Stabilizer:
Balanced weight stabilizer through 2 control sticks over the lever arm and flexible ball duct. Full flying type with servo tab, actuated with ball bearing push pulls connected to the twin cockpit located control sticks.

Ailerons:
Frise type. Controlled with push pull tubes and rod bearings.

Flaps:
Pay attention to the maximum speed (Vf 115 km/h) for flight with extended flaps.

Continuous activation from -12º to +40º with a switch on the control panel. They run until the limit switch is engaged at the respective limit. Each intermediate setting is available. The ailerons move simultaneously with the flaps together from 0º to -12º. The ailerons also droop automatically with the flaps for reduced stalling speed. The flap position is indicated on the panel with red LEDs (light-emitting diodes see page 24). In case of any problems with the flaps, release the flap switch immediately!

Stabilator Trim System:
Activated with the wheel near the throttle and choke controls.
Forward – nose down, back – nose up.

Aileron Trim System, if equipped:
Activated with the wheel on the top of the tunnel between the pilots.
Right – right bank, left – left bank.

Rudder Trim System, if equipped:
Activated with the wheel on the bulkhead right above the tunnel.
Right – right turn, left – left turn.

Control surface installation table

Control surface	Position	Limits, degrees/mm	Actual, degrees/mm	Note
Flap left+right	up	11 deg/50mm 13 deg/59mm		
Flap left+right	down	39 deg/ 177mm 41 deg/ 186mm		
Aileron left	up	25 deg/ 106mm 28 deg/ 118mm		Aileron and flap zero position is –12 degrees
Aileron left	down	11 deg/ 46mm 14 deg/ 58mm		Aileron and flap zero position is –12 degrees
Aileron right	up	25 deg/ 106mm 28 deg/ 118mm		Aileron and flap zero position is –12 degrees
Aileron right	down	11 deg/ 46mm 14 deg/ 58mm		Aileron and flap zero position is –12 degrees
Stabilizer	up	13 deg/ 121mm 15 deg/ 139mm		
Stabilizer	down	8 deg/ 74mm 10 deg/ 93mm		
Trim tab	up	5mm 13mm		Handle neutral Stabilizer in neutral position
Trim tab	up	46mm 56mm		Handle forward Stabilizer TE up
Trim tab	down	40mm 50mm		Handle rearward Stabilizer TE down
Rudder	left+right	29deg/ 209mm		
		32 deg/ 231mm		

Rescue system (Instruction in D and A):
Rocket operating rescue system, release through the pull handle secured on the ground unlocked in the in-flight operation near the middle console between the seats.
In case of emergency pull the lever hard out to the stop.

List of indications and markings, as well as their arrangement locations

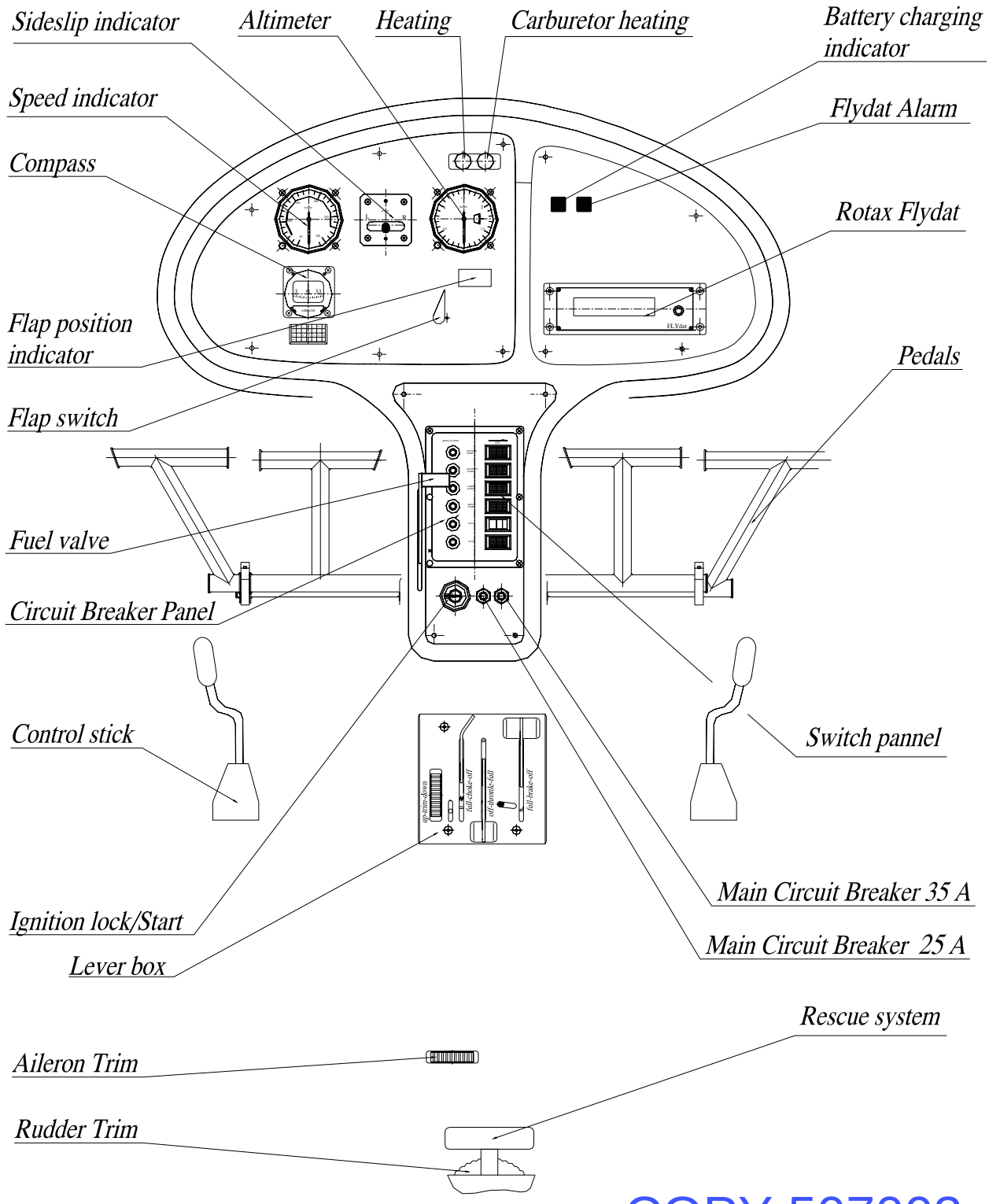
Markings	**Arrangement locations**
Speed indicator mark	
Green arc	94 – 245 km/h IAS
Write arc	71.5 – 115 km/h IAS
Yellow arc	245 – 260 km/h IAS
Red line marking (because of rescue equipment red V_{NE})	**260 km/h**

Fuel kind:	Super leaded	2 x beside filling cap
	Avgas 100LL	2 x beside filling cap
	Super Plus	2 x beside filling cap
	Super unleaded	2 x beside filling cap

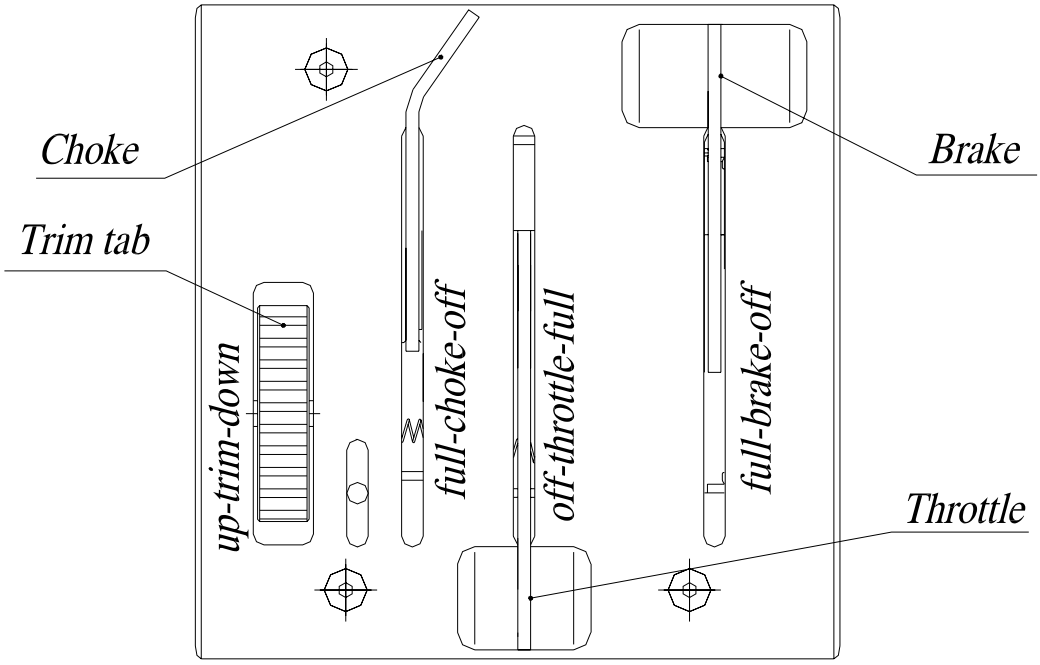
Red marking	5800 r/min	Tachometer
Red marking	5 bar	oil pressure gauge
Red marking	130ºC	oil temperature gauge
Red marking	135ºC	water temp gauge (cylinder head)
Throttle		lever box
Choke		lever box
Trim fast/slow		lever box
Brakes		lever box
Flaps	-12°, 0°, 20°, 40°	flap indicator
Oil quality	SAE 15 W 40	oil tank
Fuses		switch panel Middle console
Main fuses		Instrument panel
Maintenance/packing interval		rescue equipment
Maximum weight	472.5 kg	cockpit
Maximum load in cockpit	180 kg	cockpit
Maximum load in cockpit at full fuel tanks	114.5 kg	cockpit
Baggage	in total left+right 25 kg	baggage box

Standard equipment in version with Flydat

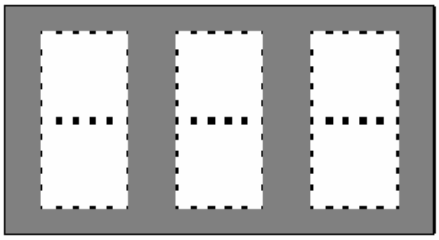
List and Positions of the Operation Elements



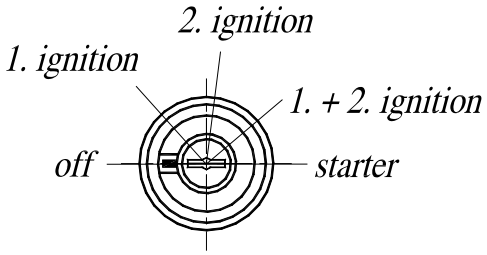
Lever box



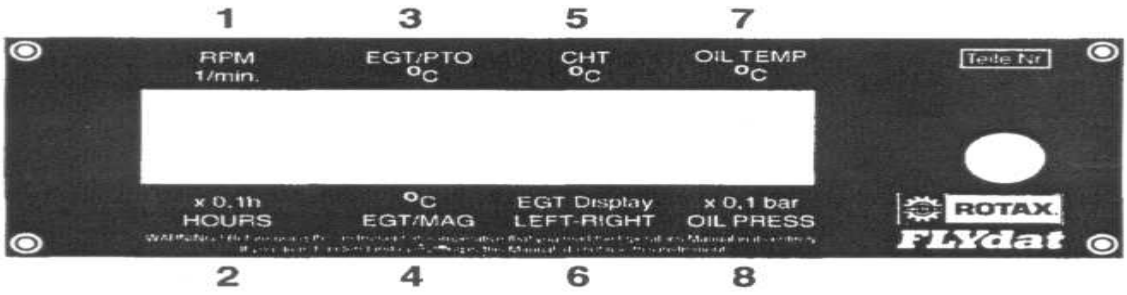
Flap position indicator



Ignition switch and starter



Flydat – Rotax
for water-cooled 4-stroke engine 912 ULS



Display panel	Description	Unit	Resolution
1	RPM	1/min	1
2	Operation hours	hour	0,1
3	Exhaust gas temperature AS	°C or °F	1 or 10
4	Exhaust gas temperature MS	°C or °F	1 or 10
5	Cylinder head temperature	°C or °F	1
6	x)		
7	Oil temperature	C or °F	1
8	Oil pressure	bar	0,1

x) Indicator of cylinder series, for which the exhaust gas temperature is indicated.

- **NOTICE:** Arrowhead pointer ← symbolizes left cylinder series.
  Arrowhead pointer → symbolizes right cylinder series.
  Switching of exhaust gas temperature is carried out in 6-8 sec. intervals.

Rotax 912 ULS

Indicator	Unit	Warning limits	Alarm limits
RPM / rotation speed	**(1/min)**	**5800**	**6000**
EGT/Exhaust gas temperature	**(°C)**	**880**	**900**
CHT/cylinder head temperature.	**(°C)**	**135**	**150**
Oil temperature	**(°C)**	**130**	**145**
Oil pressure, max	**(bar)**	**6.0**	**8.0**
Oil pressure, min	**(bar)**	**2.0**	**1.0**

- At exceeding one or more **warning limits** they are indicated on the display blinking and the **alarm lamp blinks.**
- At exceeding one or more not-permissible values **(alarm limit values)** they are also indicated on the display blinking and the **alarm lamp blinks with long-term blinking.**
- Rotax Operation Manual should always be followed!

8 MAINTENANCE, SERVICE, REPAIRS

ATTENTION: During all service and repair work beware of activating the Ballistic Parachute system rocket!

Maintenance of the rescue equipment:

In case of parachute system equipment observe packing/rocket intervals and the maximum operational period according to the manufacturer (manufacturer's operation manual, labels on the equipment).

Dismounting: push out the cotter-pin out of rescue system handle, dismount the handle carefully. Loosen the screws in the fixing tube of the packaging sack of the rescue equipment, as well as the threaded joint on the rocket and the release handle. Take off loops on the drop lip hook (slings) and loosen loops on the drop lip hook of the discharge system (rocket). Move off the rocket from the airplane carefully. Take off the rescue system.

Reset in the reverse order.

ATTENTION: In doubtful case please turn to an authorized workshop!

Plane maintenance:

- For cleaning of the airplane use only water with dishwashing detergents, **no solvents**, otherwise the paint and structure may be affected.
- Clean the Plexiglas windowpanes with soft cloth.
- All mechanically actuated parts should be kept lubricated by using acid-free oil from time to time.
- Lubricate bolts and bolt seats.

Plane maintenance – general plan:

- 50 hours control according to the checklist
- 100 hours control according to the checklist **= should be carried out at least once year!**

Engine maintenance – general plan:

Shall be carried out always according to the Rotax Maintenance Manual (copy)

- 25 hours control should be carried out **only once after the first 25 hours** according to the engine manual!

  50 hours control – **advised by the engine manufacturer, but not required except the prescribed oil change (exhaust gas operation).**
- 100 hours control according to the checklist **= should be carried out at least once a year**
- 200 hours control according to the checklist
- 1500 hours or 10-year control

The basic maintenance work should be carried out after 1500 flight hours or no later than 10 years after the first flight depending on which occurs first.

ATTENTION! CHECK TESTS:

All check test prescribed by competent authority in the check test certificates should be carried out irrespective of the above stated periods!

ATTENTION! INSPECTIONS

All inspections required by your local aviation laws should be followed in addition to the inspection guidelines stated above .

50 hours control – plane:

- Carry out all items of the daily checks and inspections before flight!
- Clean the airplane by dishwashing detergents (with a dirty airplane no defects can be detected).
- Check the fuselage for wear, defects and cracks.
- Check all control mechanisms, cables and ducts in the fuselage for connection, clearance and slop, free movement and security of attachment.
- Check control rods and joints for defects and wear.
- Check the oil tank for leaks.
- Check the rudder pedals for free movement, for bolt attachment and cable connecting links.
- Check the control cable for cleanliness, wear, free movement and fraying.
- Check the stabilizer lever arm in the fuselage side for free movement, connection, play and corrosion.
- Check the stabilizer hinge and connection for attachment, damage and corrosion.
- Check the stabilizer for wear or defects.
- Check the trim tab adjustment and trimming tab joints for connection, cleanness and corrosion.
- Check the trim tab itself for defects.
- Check the rudder pivots for security of connection. Check for cleanliness and corrosion.
- Check the rudder for defects.
- Check the cowl for defects and security of attachment.
- Check the nose gear for freedom of movement, defects and corrosion. Lubricate.
- Check the main landing gear for defects and corrosion.
- Check the brakes for function and wear (check the brake pads).
- Check the tires for defects, cuts, overall wear and if they have rotated on the wheels
- Check the tire pressure.
- Check the main bolts of the surfaces control for security of fastening, defects and corrosion.
- Check the splinting!
- Check the surface of the control surfaces and wings for damage.
- Check the wings by forward and downward movement for slop or wear.
- Check the ailerons for security of attachment and control slop.
- Check the flaps and flap control for proper function, control slop and security of connection.
- Check the control mechanism for the surfaces for connection, lack of slop, free movement and security of the fasteners.
- Check the emergency parachute system and activation handle for connection, defects, and corrosion.

Lubricate all joints with one drop of the silicon oil (acid-free)!

Electrical system:

- Check the battery for oxidation, liquid level and voltage.
- Charge the battery (if necessary)
- Check the cables for wear and signs of arcing.
- Check the tags for condition and connection.
- Check the switch and cable connections for proper attachment
- Check the electrical flap control and geared motor for functioning; check the switches, indicators and cable connections.
- Check the emergency transmitter ELT for proper function (if necessary change the battery).

Fuel system:

- Check the fuel lines for wear, overall condition, leaks and wear.
- Check the fuel filter for defects, cleanness and leaks.
- Check the fuel valve for function and leaks.
- Check the fuel flow of the gascolator (min. 0.5l per 45 sec.).
- Check the exhaust and heating systems for wear and leaks.

Cooling & Oil system:

- Check the coolant and oil lines for wear, overall condition, leaks and wear.
- Check the threaded fittings and re-torque them if necessary.
- Pay attention to dint of leakage!

Propeller:

- Check the propeller blades for nicks, defects and connection.
- Check the propeller hub for defects, security of connection and corrosion.
- Recheck the spinner for cracks and overall condition.

Attention: Report all possible defects on the propeller or propeller hub to the firm Neuform Kunststofftechnik.

100-hours or 1-year control – plane and engine:

your CT is a high performance aircraft that is a complete system. We recommend to carry out 100-hours inspections at one of our authorized service centers.

Plane – all items of the 50-hours control + in addition:

- Clean plane with non-alkaline and pH-neutral water and detergent. A dirty plane is hard to inspect!
- Remove the wings:
  - Check the lateral bolt for connection (it should not turn and move).
  - Check the front articulated bush for connection and for clearance-free seat of the joint eye. Lack of slop in the attachment ball socket.
  - Check the rear (removed ball) socket for connection.
  - Check the aileron automatic locks for clearance and wear.
  - Check the flap automatic locks for connection of the bolts and wear.
  - Clean the tank; change the fuel filter in case of dirtying (only Scotch Glad by 3M is allowed for as hermetic for tank connecting pipe)!
  - Lubricate all pedal and rudder axes and joints with oil.

Engine:
Always check the most current inspection list supplied by Rotax.

- Recheck the driving gear (only in models with slip clutch).
- Check the total lubrication system.
- Check the cooling system for leakage.
- Check the air filters
- Change the oil filter.
- Oil change (3 liters)
- Check the spark-plugs (use only spark-plugs of EYQUEM)!
- Check condition of the fuses and connections, especially the ones used for the engine circuit!
- Control and lubrication of the operation draft!
- Clean the engine.
- Carefully inspect the complete fuel system.
- Replace or clean the fuel filters.
- Check the wires and cables.
- Hermetic control of the hydraulic constant speed propeller servo system (if available)!
- Test run the engine.

Propeller:

- Clean and polish the propeller blades with mild automotive-polish.

200-hours control – engine:
Always check the most current inspection list supplied by Rotax.

All items of the 100-hours control + in addition:

- Change the spark-plugs.
- Check the engine compression.
- Check of connection of the resistive spark-plug connectors, minimum tightening force 30N!
- Change the fuel filter.
- In case of changes in the operating temperature flush the cooling system or change the coolant (Dexcool type 50 percent distilled water) every 2 years

500-hours propeller major overhaul:

Overhaul should be carried out only by the propeller manufacturer or an authorized service center.

1.500-hours or 10-years control of TBO (time between overhauls) of the engine:

Overhaul should be carried out only by a authorized Rotax service center.

Repairs – plane:

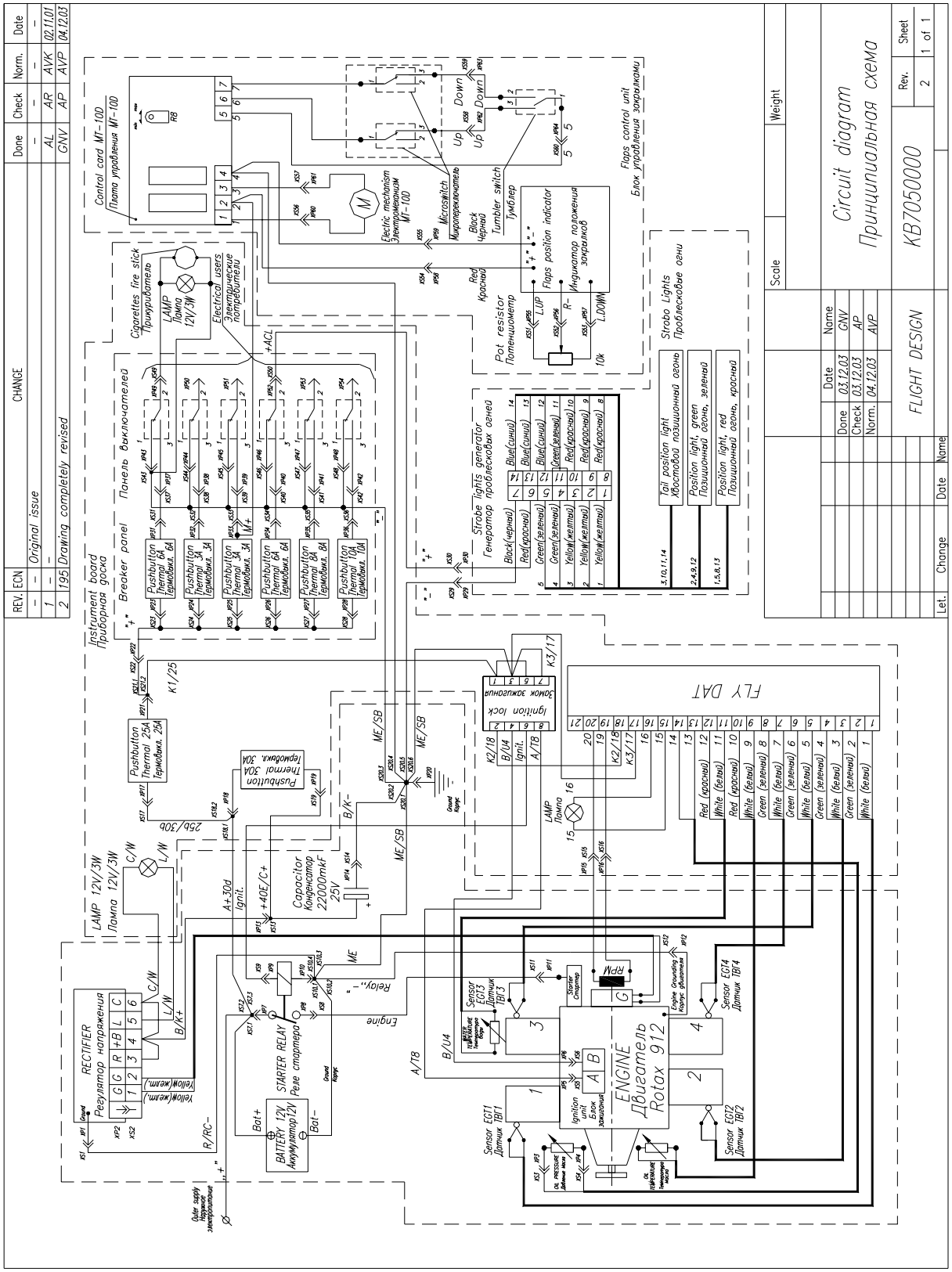
- Only a licensed repair facility or a Flight Design authorized facility.
- Large repairs especially after accidents should be carried out only by the manufacturer or by Flight Design authorized facility.
- Only Flight Design original spare parts should be used.

Lubricant and fuel:

Braking fluid:	Aeroshell Fluid 41 MIL-H-5606 Brake Fluid
Cooling fluid:	according Rotax Handbook. Attention: different coolants cannot not mixed, if in doubt, drain and replace all of the coolant.
Motor oil:	according Rotax Handbook
Hydraulic fluid for propeller regulation:	DOT4 SAE J1703 /FMVSS116
Fuel:	EN 228 Super, EN 228 Super Plus, AVGAS 100 LL
Lubricant of main bolts:	High-duty grease WGF 130 DIN 51502
Lubricant:	Lager & Gelenklager:

Alum- and Steel connection of gear landing: corrosion preventing copper grease CU 800.

Circuit diagram for basic design with FlyDat



Supplement for glider towing
01-14-2002, Alexander Patt

General
Общие положения

For application of ***CT*** for gliders towing take effect the following additions to the Flight and Maintenance Manual:

Performance limitations and data

I. Maximum weight of the ultra-light airplane

For towing operation the maximum weight of the CT is to be observed accordingly to the type pass.

II. Maximum weight of the towed glider

The maximum weight of **600 kg** of the towed glider is determined.

III. Breaking points
The maximum nominal breaking strength of the used breaking points in the dragline makes **300 daN.**

IV. Towing speeds

The minimum permissible towing speed makes **85 km/h**, the speed for the best take-off makes **115 km/h.**

V. Take-off distances

Under the conditions
- Dry, even, short-cut grass ground,
- Normal conditions,
- Flaps **+15º**,

follow such take-off distances:

Category	Aircraft type	Take-off distance
Single-seater, without water ballast	LS4, ASW 24, Discus, ASW 27	**400 m**
Single-seater, with water ballast	LS 4, LS 6, ASW 28, Ventus	**460 m**
Double-seater, light (single-seated)	Ka7, Ka13, ASK 21, TWIN Astir	**500 m**
Double-seater, heavy (double-seated)	DG 505, Duo Discus, ASH 25	**550 m**

Because of high grass or soft ground the take-off distance can increase up to **35%.** Mud and rain increase the take-off distance up to **5%,** high air temperature increase the take-off distance up to **25%.**

VI. Tow cable

Only the lines in compliance with the aeronautic standard should be used. The line connections should be secured against wear by rubber layer. The tow cables' length should make minimum **40 m**, maximum – **60 m**.

VII. Boards

There is a board near the speed indicator in the cockpit: **"Watch for towing speed!"**
For control of the critical oil temperature because of engine load there is an oil temperature indicator in the right half of the instrument panel, the maximum permissible temperature (**130ºC**) is marked on the indicator with a red line. At exceeding of this temperature a yellow light blinks near the instrument in addition.
On the towing airplane there is a board in the latching range: **"The breaking points of 300 daN should be used".**

VIII. Maintenance

The maintenance intervals and checks of ***CT's*** intended for towing of gliders should be carried out in the form and volume according to the values given by the engine manufacturer, entered into maintenance reports and taken to the operation records.

OVERVIEW RESCUE SYSTEM INSTALLATION