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MANDATORY BULLETIN NO.:	MBWT9LSA-1A-2011
Revision: **Initial revision**	Date of publication: **07.12.2011**

A. SUBJECT:
Modification of Flight Manual.

B. AFFECTED AIRPLANES:
Serial numbers: DY-391/2010 LSA

C. REASON:
Improving of airplane equipment description in Flight Manual.

D. REQUIRED ACTION:
Replace the Flight Manual dated 28.10.2010 with a Flight Manual revision 2 dated 14.06.2011 (Enclosed).

E. COMPLIANCE:
At next periodical inspection.

F. WEIGHT AND BALANCE:
Weight change: Not affected.
Moment change: Not affected.

G. ACTION CARRIED OUT BY:
Owner or operator of airplane.

H. COSTS COVERED BY:
Owner of airplane.

I. NECESSARY MATERIAL:
None.

J. ENCLOSURES:
Flight Manual for DY-391/2010 LSA revision 2 dated 14.06.2011.

Place, date: **Prievidza, 7th December 2011**	Place, date:
Issued by:	Approved by: **EASA**

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F L I G H T M A N U A L

FOR THE LIGHT SPORT AIRCRAFT

WT9 Dynamic LSA Speed S

MTOW 600kg

Type:	**WT9 Dynamic LSA**
Model:	**Speed S**
Serial No:	**DY - 391/2010 LSA**
Registration:	**OK-WOW**
Date of Issue:	**14.06.2011**

Signature:

Authority:

Stamp:

Original date of approval:

This airplane is to be operated in compliance with information and limitations contained herein.

0.1. RECORD OF REVISION

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

Rev. No.	Affected Section	Affected Pages	Date of issue	Approval	Date	Date inserted	Signature
1	ALL	ALL	28.10.2010				
2	0	1, 2, 3	14.06.2011				
2	1	3	14.06.2011				
2	2	8	14.06.2011				
2	3	5, 6	14.06.2011				
2	4	5, 8-12	14.06.2011				
2	7	4, 5	14.06.2011				
2	9	1, 2, 4-18	14.06.2011				

0.2 LIST OF EFFECTIVE PAGES

Section	Page	Date	Section	Page	Date
0	0-1	14.06.2011	5	5-1	28.10.2010
	0-2	14.06.2011		5-2	28.10.2010
	0-3	14.06.2011		5-3	28.10.2010
	0-4	28.10.2010			
			6	6-1	28.10.2010
1	1-1	28.10.2010		6-2	28.10.2010
	1-2	28.10.2010		6-3	28.10.2010
	1-3	14.06.2011		6-4	28.10.2010
	1-4	28.10.2010			
			7	7-1	28.10.2010
2	2-1	28.10.2010		7-2	28.10.2010
	2-2	28.10.2010		7-3	28.10.2010
	2-3	28.10.2010		7-4	14.06.2011
	2-4	28.10.2010		7-5	14.06.2011
	2-5	28.10.2010		7-6	28.10.2010
	2-6	28.10.2010		7-7	28.10.2010
	2-7	28.10.2010		7-8	28.10.2010
	2-8	14.06.2011		7-9	28.10.2010
				7-10	28.10.2010
3	3-1	28.10.2010		7-11	28.10.2010
	3-2	28.10.2010		7-12	28.10.2010
	3-3	28.10.2010		7-13	28.10.2010
	3-4	28.10.2010			
	3-5	14.06.2011	8	8-1	28.10.2010
	3-6	14.06.2011		8-2	28.10.2010
				8-3	28.10.2010
4	4-1	28.10.2010		8-4	28.10.2010
	4-2	28.10.2010		8-5	28.10.2010
	4-3	28.10.2010		8-6	28.10.2010
	4-4	28.10.2010			
	4-5	14.06.2011	9	9-1	14.06.2011
	4-6	28.10.2010		9-2	14.06.2011
	4-7	28.10.2010		9-3	28.10.2010
	4-8	14.06.2011		9-4	14.06.2011
	4-9	14.06.2011		9-5	14.06.2011
	4-10	14.06.2011		9-6	14.06.2011
	4-11	14.06.2011		9-7	14.06.2011
	4-12	14.06.2011		9-8	14.06.2011
				9-9	14.06.2011
				9-10	14.06.2011
				9-11	14.06.2011
				9-12	14.06.2011
				9-13	14.06.2011
				9-14	14.06.2011

Section	Page	Date	Section	Page	Date
9	9-15	14.06.2011			
	9-16	14.06.2011			
	9-17	14.06.2011			
	9-18	14.06.2011			

0.3 TABLE OF CONTENTS

SECTION 1

GENERAL

1.1 Introduction

The airplane Flight Manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of this airplane.

This manual contains supplementary data supplied by the airplane manufacturer.

1.2 Certification basis

F-2245 Standard Specification for Design and Performance of Light Sport Aircraft.

1.3 Warnings, cautions and notes

The following definitions apply to warnings, cautions and notes used in the flight manual.

WARNING
Means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

CAUTION
Means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety.

NOTE
Draws the attention to any special item, not directly related to safety but which is important or unusual.

1.4 Descriptive data

1.4.1 Airplane description

WT9 Dynamic LSA Speed S is low-wing monoplane with retractable undercarriage. The airframe consists of a sandwich shells from advanced composite material. There are two places in the cockpit, side by side type. This airplane is intended for sporting, recreation and tourist flying in accordance with VFR day.

As the power plant this airplane uses the 4 cylinder, 4 stroke engines ROTAX 912 ULS serie.

Propeller: airplane is fitted with 3 blades adjustable propeller SR 2000 D.

1.4.2 Technical data

Wing span.....9,00 m
Wing area…..... 10,3 m^2
Wing aspect ratio.....7,82
Length..... 6,4 m
Height.....2,0 m
Aerodynamic mean chord (MAC).....1,185 m

Control surfaces

Aileron span……..... 1,25 m
Aileron area….....0,273 m^2
Flap span…….....2,28 m
Flap area……..... 0,75 m^2
Horizontal tail span……..... 2,40 m
Horizontal tail area……..... 1,68 m^2
Vertical tail span…….....…..... 1,022 m
Vertical tail area…….....…..... 1,02 m^2

Landing gear

Wheel spacing.…….....…..... 1,49 m
Wheel base.....…..... 2,27 m
Main wheel diameter…….....…..... 0,35 m
Nose wheel diameter……..... 0,32 m

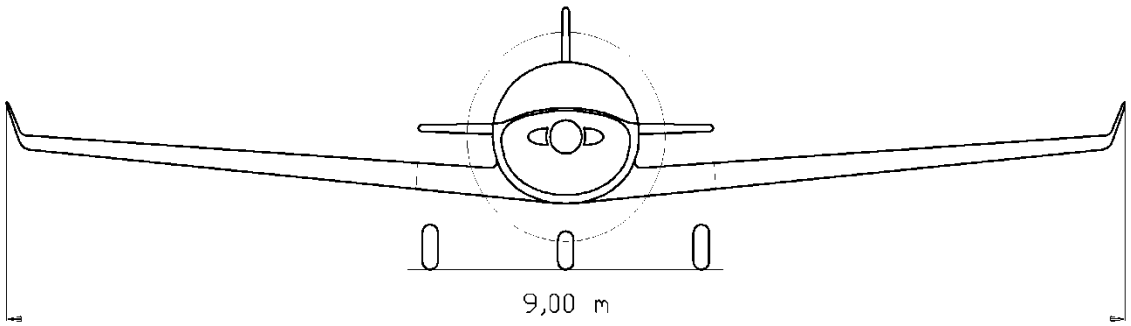
Weights

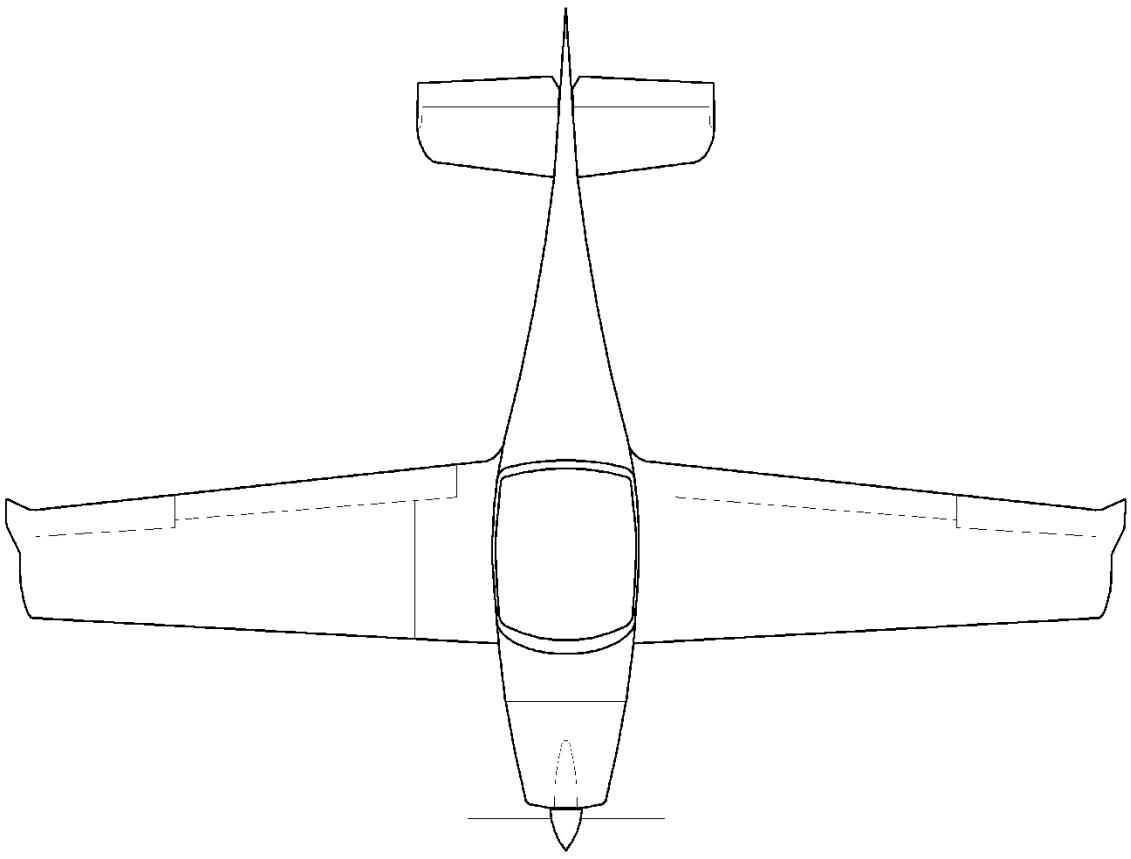
Empty weight ……..... 356,2 kg
Maximum take-off weight…….....……. 600,0 kg
Useful load…….....…….... 243,8 kg
Fuel tanks capacity……..... 126,0 litres

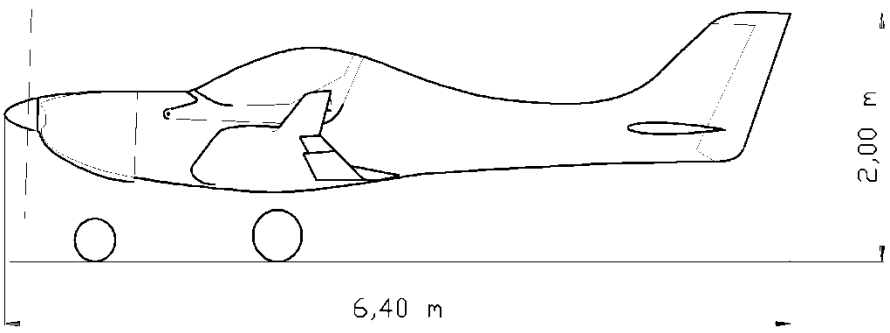
The ROTAX 912 ULS (73 kW- 100HP) with a maximum rpm limitation on take off of 5800 1/min. airplane is fitted with 3 blades adjustable propeller SR 2000 D.

1.5. Airplane views

1.5.1 Three – view drawing







SECTION 2
LIMITATIONS

2.1 Introduction

Section 2 includes operating limitations, instrument markings, and basic placards necessary for safe operation of the airplane, its engine, standard systems and standard equipment. The limitations included in this section and in Section 9 have been approved by the aviation authority.

2.2 Airspeed

Airspeed limitations and their operational significance are shown below:

	Speed	IAS+			Remarks
		km/h	MPH	knots	
V_{NE}	Never Exceed speed	**280**	**174**	**150**	Do not exceed this speed in any operation
V_{NO}	Normal Operating Limit speed	**250**	**156**	**135**	Do not exceed this speed except in smooth air, and then only with caution
V_{RA}	Rough Air speed	**225**	**140**	**122**	Do not exceed this speed except in smooth air. Air movements in lee-wave rotors, thunderclouds, visible whirlwind, or over mountain crests are to be understood as rough air

	Speed	IAS			Remarks
		km/h	MPH	knots	
V_A	Manoeuvring speed	**180**	**112**	**97**	Do not make full or abrupt control movement above this speed, because under certain conditions the airplane may be overstressed by full control movement
V_{FE}	Maximum Flap Extended speed	**140**	**88**	**75**	Do not exceed these speeds with the given flap setting.
V_{LO}	Maximum Landing Gear Operating Speed	**140**	**88**	**75**	Do not extend the landing gear above this speed.
V_{LE}	Maximum Landing Gear Extended Speed	**250**	**156**	**135**	Do not exceed this speed with the landing gear extended.

2.3 Airspeed indicator markings

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

Marking	IAS value or range			Significance
	km/h	MPH	knots	
White arc	**82 – 140**	**44 – 88**	**51 - 75**	Positive Flap Operating Range. (Lower limit is maximum weight 1.1 V_{SO} in landing configuration. Upper limit is maximum speed permissible with flaps extended positive.)
Green arc	**91 – 225**	**57 - 140**	**49 – 122**	Normal Operating Range. (Lower limit is maximum weight 1.1 V_{S1} at most forward c.g. with flaps . Upper limit is V_{RA} .
Yellow arc	**225 – 280**	**140 - 174**	**122 - 150**	Manoeuvres must be conducted with caution and only in smooth air.
Yellow triangle	**110**	**68**	**59**	Minimum Approach speed
Yellow line	**180**	**112**	**97**	V_A Manoevring speed
Red line	**280**	**174**	**150**	Maximum speed for all operations.

2.4 Powerplant

Engine Manufacturer: ROTAX-Bombardier, Gunskirchen, Austria
Engine Models: ROTAX 912 ULS
Maximum Power - Take-off: 73,5 kW / 100 HP
Continuous: 69 kW / 93,8 HP
Maximum Engine Speed – Take-off: 5800 1/min (5 min)
Continuous: 5500 1/min
Maximum Cylinder Head Temperature: 135 ° C
Maximum Oil Temperature: 130 ° C
Oil Pressure: Minimum: 0,8 bar (12 psi)
Maximum: 7 bar (102 psi)
Fuel Pressure: Minimum: 0,15 bar (2.2 psi)
Maximum: 0,4 bar (5.8 psi)

Fuel Grade: the following fuels can be used:
min. RON 95

- EN 228 Super (Unleaded Automotive Gasoline RON 95)
- EN 228 Super plus (Unleaded Automotive Gasoline RON 98)
- AVGAS 100 LL (Due to the higher lead content in AVGAS, the wear of the valve seats, the deposits in combustion chamber and lead sediments in the lubrication system will increase. Therefore, use AVGAS only if you encounter problems with vapour lock or if the other fuel types are not available)
- Fuel E10 (unleaded gasoline blended with 10% ethanol

Oil Grade:	- engine oil of a registered brand with gear additives. Use only oil with API classification "SG" or higher. - high performance 4-stroke motor cycle oils are recommended - If using airplane engine oil, then only blended one.
Oil capacity:	3,0 litre
Minimum:	2,0 litre
Oil consumption:	max. 0,06 l/h

WARNING
Never use AVGAS, LB 95 with fully synthetic engine oils.

Propeller Manufacturer:	WOODCOMP, Czech
Propeller Model:	SR 2000 D, 3 blade electricaly adjustable propeller
Propeller Diameter:	1,7 m
Propeller Blade Angle	24°

Additional data can be found in Section 7, Subpart 7.9, in the Operator Manual for engine ROTAX 912 ULS and in the User Guide for propeller SR 2000 D.

WARNING
Never run the engine without propeller, this inevitably causes engine damage and is an explosion hazard.

2.5 Powerplant instrument markings

According to customer requirement round one–purpose needle instruments could be fitted in the instrument panel.

Powerplant instrument markings and their colour code significance are shown below:

Instrument (indication within SkyView system)	**Unit**	**Red Line Minimum Limit**	**Green Arc Normal Operating**	**Yellow Arc Caution Range**	**Red Line Maximum Limit**
Tachometer	**rpm**	**1 400**	**1 800 – 5 500**	**5500–5800**	**5 800**
Oil temperature indicator	**°C**	**50**	**90 – 110**	**50 – 90** **110 – 130**	**130**
Cylinder-head temperature indicator	**°C**	**50**	**90 – 110**	**50 – 90** **110 – 135**	**135**
Fuel-pressure indicator	**bar**	**0,15**			**0,4**
Oil-pressure indicator	**bar**	**0,8**	**2– 5**	**0,8 - 2** **5 – 7**	**7**
Fuel indicator	**litre**				

2.6 Miscellaneous instrument markings

According to option of the customer miscellaneous instrument can be mounted. The following miscellaneous instrument markings and their colour code significance are shown below:

Instrument	**Unit**	**Red Line Minimum Limit**	**Green Arc Normal Operating**	**Yellow Arc Caution Range**	**Red Line Maximum Limit**
Boost-pressure gauge	**in Hg**	**11,8**	**11,8-28**	**28-29,5**	**29,5**
Exhaust gas temperature	**°C**	**250**	**300-800**	**250-300** **800-880**	**880**
Fuel flow meter	**LPH**		**up to 25**		**25**
Fuel reserve indicator	**litre**	**Red light annunciator will be illuminated with the remaining fuel of 7 litre in each fuel tank.**			

2.7 Weight

Empty weight …..…….....	356,2 kg
Maximum take-off weight...…….....…….	600 kg
Maximum landing weight …….....……	600 kg
Useful load …….....…….	243,8 kg
Maximum fuel weight …….....…….	89,3 kg
Maximum occupant weight per seat…….....…….	115,0 kg
Minimum weight solo pilot (no baggage, full tanks)..	92,9 kg
Maximum weight in Baggage Compartment….....	40 kg

WARNING
Maximum take off weight 600 kg

2.8 Centre of gravity

Position of C.G.:
Empty airplane.....12 ± 2% MAC
Position of C.G. in flight….....20 ÷ 30% MAC
Rear centre of gravity limit is valid for en-route weight at maximum crew weight. Forward centre of gravity limit is valid for minimum pilot weight and maximum capacity of the fuel tanks. Example to check the centre of gravity position is in Sect. 6.

WARNING
A flight shall not be commenced until the pilot-in-command is satisfied that the mass of the airplane and centre of gravity location are such that the flight can be conducted safely!

2.9 Approved manoeuvres

- **Steep turns with the angle of bank up to 60°** - appropriate entry speed is **145** km/h.
- **Lazy eighths** - appropriate entry speed is **145** km/h.
- **Combat turns** - appropriate entry speed is **200** km/h.

WARNING
Aerobatic manoeuvres and intentional spins are prohibited!

2.10 Manoeuvring load factors

Manoeuvre speed	Speed km/h	Speed MPH	Speed knots	Load factors
V_A- Manoeuvring speed	**180**	**112**	**97**	**+ 4**
V_{NE} – Never exceed speed	**280**	**174**	**150**	**+ 4**
V_A – Manoeuvring speed	**180**	**112**	**97**	**- 2**
V_{NE} – Never exceed speed	**280**	**174**	**150**	**- 2**
V_{FE} – Maximum Flap Extended speed	**140**	**88**	**75**	**+ 2**

2.11 Flight crew

The minimum flight crew with which the airplane is allowed to fly is one pilot sitting in the left pilot seat. The passenger or another pilot may occupy the right seat in the cockpit.

2.12 Kinds of operation

The airplane WT9 Dynamic LSA Speed S is approved to perform flights in accordance with VFR day only. Aerobatic manoeuvres and intentional spins are prohibited!

WARNING
IFR flights and flights in icing conditions are prohibited.

For flight operations the following minimum equipment must be installed:
- Magnetic compass
- Sensitive barometric altimeter
- Airspeed indicator
- Pilot's Safety belts

2.13 Fuel

The following fuels and oils can be used for the airplane WT9 Dynamic LSA Speed S : see chapter 2.4 Powerplant and the Operator's Manual for engine ROTAX 912 ULS.

	Left tank (l)	Right tank (l)
The total quantity of fuel in the tank	**63**	**63**
Unusable fuel in the tank	**2,9**	**2,9**
The total usable quantity of fuel in the tank	**60,1**	**60,1**

2.14 Maximum passenger seating

The maximum number of passenger aboard is one passenger sitting in the right seat in the cockpit.

2.15 Other limitations

a) Wind speed

The maximum crosswind component limit according to the airworthiness requirements for take off and landing is **6 m/s, 12 knots.**

b) Smoking

NO SMOKING on board the airplane.

2.16 Limitations placards

Airspeed IAS				
		km/h	**MPH**	**knots**
Never Exceed speed	V_{NE}	**280**	**174**	**150**
Normal Operating Limit speed	V_{NO}	**250**	**156**	**135**
Rough Air speed	V_{RA}	**225**	**140**	**122**
Manoeuvring speed	V_A	**180**	**112**	**97**
Maximum Flap Extended speed	V_{FE}	**140**	**88**	**75**
Maximum Landing Gear Operating Speed	V_{LO}	**140**	**88**	**75**
Maximum Landing Gear Exceed Speed	V_{LE}	**250**	**156**	**135**

Aerobatics, itentional spins and stalls are prohibited!

IFR flights and flights in icing conditions are prohibited!

Maximum allowed filling of the fuel tanks in litres									
Baggage weight (kg)	Crew weight (kg)								
	140	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**
0	full	116	103	89	75	61	47	33	19
20	116	89	75	61	47	33	19	5	0
40	89	61	47	33	19	5	0	0	0

Maximum Baggage weight 40 kg

SECTION 3

EMERGENCY PROCEDURES

3.1 Introduction

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur. Emergencies caused by airplane or engine malfunction are extremely rare if proper preflight inspections and maintenance are practised.

However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

3.2 Engine failure

3.2.1 Engine failure at take-off roll

1. Throttle lever - set to idle position
2. Ignition/ Starter switch - switch off
3. Brakes - apply till stop

3.2.2 Engine failure at take-off up to height 50 m

1. Airspeed - modify to 120 km/h
2. Field selection - land straight ahead no more than 15° left or right into wind if possible..
3. Ignition/ Starter switch - switch off
4. Fuel selector valve - close

3.2.3 Engine failure at take-off above height 50 m

1. Airspeed - modify to 120 km/h
2. Field selection - select in the direction of the free area without obstacles, if possible into wind
3. Ignition/ Starter switch - switch off
4. Fuel selector valve - close
5. Flaps - extend as required

3.2.4 Engine failure in flight

1. Airspeed - modify to 120 km/h
2. Field selection - according to height available
3. Air start - in accordance with item 3.3
4. In case of an unsuccessful air start, perform emergency landing in accordance with item 3.6.1.

3.2.5 Performance loss and irregular running of the engine during flight

This situation may occur with carburettor icing.
Apply carburettor pre-heating as required to restore normal power, smooth running.
Or it can happen because of empty fuel tank, the indicator is the fuel pressure loss – select the non empty fuel tank. If everything fails perform an emergency landing.

3.3 Air start

1. Airspeed -modify to 120 km/h
2. Altitude flight - check
3. Field selection - select according to height available
4. Fuel selector valve - open
5. Choke - if the engine is already in operating temperature, start the engine without choke
6. Throttle lever - at cold engine set to idle position
   - at warm engine slightly open
7. Ignition/ Starter switch - position "both" starting for max. 10 sec. only without interruption

As soon as engine runs, adjust throttle to achieve smooth running at 2500 r.p.m for approximately half a minute before increasing power as required.

WARNING
The rate of descent approx. 2.5 m/s causes measurable loss of altitude during the air start. If the air start is unsuccessful up to height 150 m above ground level, perform emergency landing according to item 3.6.1.

3.4 Smoke and fire

3.4.1 Engine fire on the ground

1. Fuel selector valve - close
2. Throttle lever - full open
3. Ignition/ Starter switch - switch off after consumption of the fuel
4. Crew - leave the cockpit immediately
5. Extinguish fire - with best available means

3.4.2 Engine fire in flight

1. Fuel selector valve - close
2. Throttle lever - full open
3. Ignition/ Starter switch - switch off after consumption of the fuel

4. Try to extinguish the fire with side slip
5. Perform emergency landing in accordance with item 3.6.1.

CAUTION
After extinguishing the fire do not start engine again!

3.4.3 Fire in cockpit

1.	Fire source	- locate
2.	Ignition/ Starter switch	- switch off
3.	Bat1, Bat2	- switch off
4.	Crew	- leave the cockpit on the ground , - perform emergency landing accordance with item 3.6.1.
5.	Try to extinguish	- with best available means

3.5 Glide

Glide path will determine the field selection for emergency landing. The optimum gliding performance is with retracted wing flaps and with stopped propeller.

In case of engine failure it is necessary to maintain the following optimum speeds for given configuration.

Optimum descent airspeed IAS	**km/h**	**MPH**	**knots**
	120	**75**	**65**
Maximum gliding range	**11**		
Rate of descent	**3,1 m/s 620 ft/min**		

3.6 Landing emergency

3.6.1 Emergency landing

1.	Airspeed	- modify to 120 km/h
2.	Field selection	- select in the direction of the free area without obstacles, if possible into wind
3.	Seat belts and harness	- fasten
4.	Extend landing gear	- during landing on airfield or similar surface
5.	Flaps	- extend as required
6.	Fuel selector valve	- close
7.	Ignition/ Starter switch	- switch off
8.	Bat1, Bat2	- switch off

CAUTION
The loss of height for 360 ° turn is approx.. 200 m.

3.6.2. Precautionary landing

In the event of the airplane failure, disorientation, shortage of fuel, dangerous deterioration of the meteorological conditions (visibility, thunderstorm) and approaching sunset, a precautionary landing should be conducted.

1. Select a suitable landing field, if possible into the wind.
2. Fly over selected field with wing flaps 15° and 120 km/h airspeed at a height 50 m AGL, noting the preferred area for touchdown for the next landing approach to inspect the terrain for obstructions and surface conditions.
3. Make landing circuit at a height 150 m AGL or at a safe altitude in accordance with the ceiling with flaps 15° and 120 km/h airspeed. Extend "down wind" position and make approach with sufficient power.
4. Don't lose sight of the selected field in low visibility.
5. Landing approach with flaps for landing and sufficient power.
6. Arrange approach so that the desired touch down spot will be immediately after passing the edge of the selected landing field.
7. After touch down apply heavy breaking till stopped. ground loop if necessary.
8. When the airplane comes to a stop, shut down the engine, master switch off, Main fuel selector close, secure the airplane and seek assistance.

3.6.3 Landing with a flat tyre

1. Landing approach - with flaps 38 ° and 110 km/h airspeed
2. Touch down - with the bank angle on the unflat tyre at minimum touch down speed,
3. Direction after landing - maintain ground roll direction.

3.7 Recovery from unintentional spin

For recovery from an unintentional spin the following procedure should be used:

1. Throttle lever - set to idle position
2. Control stick - set neutral position, without deflection of the ailerons
3. Rudder control - apply full rudder opposite to the direction of rotation
4. Control stick - move forward of neutral in a brisk motion until rotation stops.
5. Rudder control - immediately as rotation stops, neutralize rudder position
6. Control stick - make a smooth recovery from the resulting dive.

WARNING
Intentional spins are prohibited!

3.8 Other emergencies

3.8.1 Control failures

Aileron control fault - the airplane is possible to control laterally by the secondary effect of the rudder. Start and termination of the yawing up to bank angle 15° is possible using the rudder only.

Rudder control fault - the yawing and the termination is conducted with help of the lateral control of the ailerons.

3.8.2 Vibrations

The power plant can be the source of the vibrations.

1. Reduce engine speed to minimize the vibrations.
2. Proceed to the nearest airport for landing or select a suitable precautionary landing field in accordance with item 3.6.2.

3.8.3 Emergency extension of the undercarriage

An overswitch on the instrument panel labelled "HYDRLCS" is in the up position at normal operation. In case of the electrical driven hydraulic pump malfunction or the overswitch is set in the down position, the emergency extension of the undercarriage is carried out by its own mass with the help of a three-way valve. "HYDRLCS OFF/INOP" light on announciator panel gets illuminated. The drag stay is arrested with the help of the springs. The undercarriage is extended even in an electrical power loss. The emergency extension of the undercarriage is terminated, when "three green" lights are illuminated on the gear announciator panel.

Fig. 2 Emergency extension of L/G overswitch

3.8.4 Rescue system

For operation and handling with rescue system to see Operation manual delivered by producer of equipment. See Section 9 "Supplement"

3.8.5 Unsecured cockpit canopy

If the „Before Take-off" Checklist is performed insufficiently (page 4-9, paragraph 4.5.5. , point 14 canopy of cockpit – latched, locked), there is a danger of partial cockpit canopy latching or non locking. The canopy is equipped with a lock on the upper rear section of the frame and it is secured by the lock lever shot backwards. The lock pin is projected as latch with compression spring. The gap cca. 8-12 mm will be rise between fuselage and cockpit canopy, which is constant during straight line flight without side-slipping due to the air flow and the function of the gas struts. Partial cockpit canopy latching or non locking will stack up by the noise increase due to the agitated air through the gap between fuselage and cockpit canopy. Partial cockpit canopy latching is possible to close safely during straight line flight without side-slipping by the following way according to appropriate stage of flight:

3.8.5.1 During take-off roll

1. Abort the take-off, if the cockpit canopy unlatching, unlocking is detected during take-off roll.
2. Latch and lock the cockpit canopy by normal procedure after stopping. (the cockpit canopy handle pull down and check the cockpit canopy latching and locking by canopy frame and the red ring position) (see page 7-6, paragraph 7.8)

3.8.5.2 After unstick or during climbing

1. Safely terminate take-off
2. Climb to safety altitude
3. Fly straight line flight without side-slipping and carry out procedure for level flight.

3.8.5.3 Level flight

1. Open the left ventilation sliding window on cockpit canopy
2. Reduce speed to 120 km/h
3. Hold control stick by one hand
4. The cockpit canopy handle pull down for cockpit canopy latching and locking
5. Check the cockpit canopy latching and locking by canopy frame and red ring position
6. Close the left ventilation sliding window on cockpit canopy
7. Adjust flight airspeed to cruising speed

WARNING

During side-slipping flights (incorrect turn –slipping turn, skidding turn, and side slipping for landing) with partial cockpit canopy latching or non locking due to asymmetrical flow over fuselage by the air flow, the cockpit canopy will be carved through the gap and subsequently will be full open by help of the gas struts. The cockpit canopy will become the braking shield, what will cause abnormal airplane descent due to increased total drag.

SECTION 4

NORMAL PROCEDURES

4.1 Introduction

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

4.2 Rigging and derigging

4.2.1 Rigging of the wings

The airplane has the wings disassembled for transportation purposes or to save space in the hangar. There is a description for the rigging procedure of the right wing. The procedure for the left wing is analogous. Thoroughly clean and lubricate all the wing fittings and pins so pins locate easily.

Rigging:

1. Fit the spar end of the right wing into the spar end (fork) of the wing central section and push the wing along its longitudinal axis so that a connection slot between the wing central section and the wing root is approx. 100 mm (Fig. 3). Connect the hoses from the Pitot-static tube and prepare and adjust the wing fuel tank hoses, connect the wiring for fuel tank conductive connection ans position lights
2. Fully push the wing into the wing central panel and slide the wing tank fuel houses on theirs sockets together with theirs clamps. Carefully insert the pin of the extended wing flap hinge into the fitting of the wing central panel. Take care of the hoses from the Pitot-static tube and for fuel houses they must not be twisted.
3. Insert wing pins to connect wing spar end with the wing central panel. The outer pin is inserted through the access hole on the lower wing surface . The inner pin is inserted through the hole in the cockpit below pilot seat (slightly lift and lower the wing tip to ease the pin insertion).
4. Insert rear spar into the fitting to lecate the rear spar to the centre section. Secure all 6 pins with safety pins (Fig.4).
5. Insert connecting pin of the flap rod. During this procedure the flap control lever in the cockpit shall be set to the rearmost position and the flap shall be deflected to maximum down position.

7. Connect the aileron control rod with the rod in the wing centre section and secure the nut (Fig.4) with the safety pin. Than tight the fuel houses clamps.
8. Repeat the procedure with the second wing. After checking the security of the all connection. The connection slot between wing and the wing centre section should be sealed with sticky tape.

WARNING

After rigging of the wings check for correct operation and security of the aileron control pins and the flap control pins as well as the connection of the hoses from the Pitot-static tube and fuel houses.

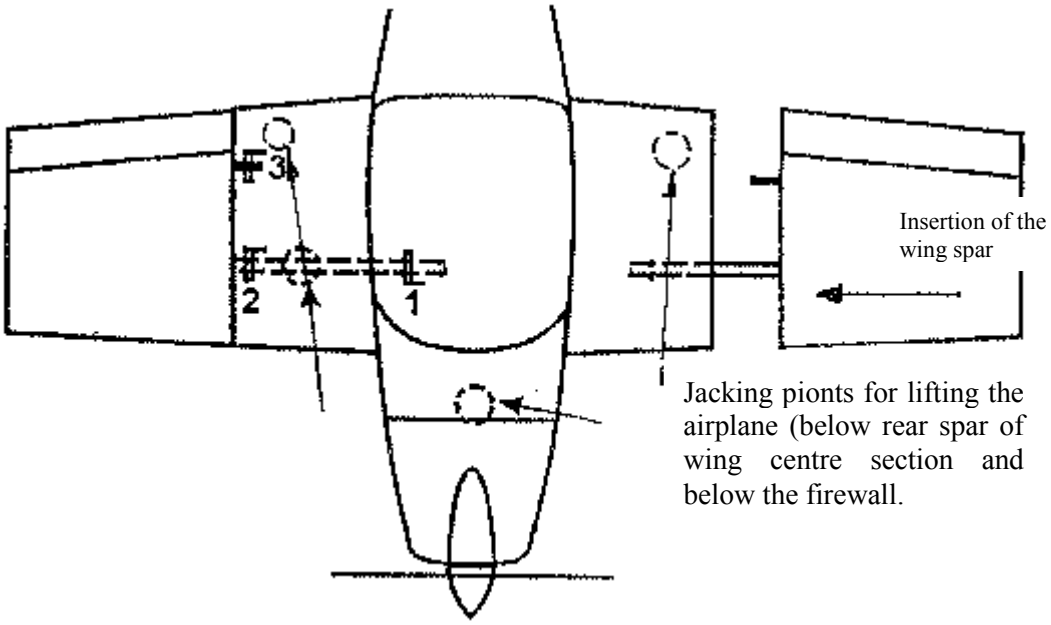


Fig. 3 Insertion of the wing spar into the wing centre section, position of the wing pins and the support points.

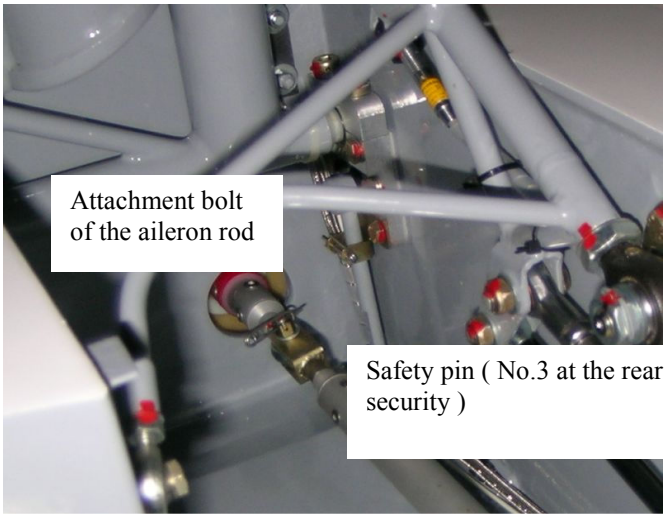


Fig. 4. Connecting bolt + safety pin of aileron connection.

4.2.2 Derigging of the wings

Use the opposite sequence for derigging:

1. Drain central section fuel tanks and wing tanks
2. Disconnect aileron rod from the rod in the wing centre section.
3. Remove the sticky tapes from the connection slot between wing and the wing centre section. Unlock the joints of the flap shaft.
4. Pull out all wing pins. (Pull out the fixation pins for connection of the wing spar end with the wing central panel and the auxiliary rear pin.)
5. Pull out the wing along its longitudinal axis so that there is a distance between the wing and the wing root of approx. 100 mm (Fig. 3). Disconnect the hoses from the Pitot-static tube, the wing fuel tank hoses, disconnect the wiring for fuel tank conductive connection and position lights.
6. Carefully pull the wing away from the wing centre section and put on soft mats.

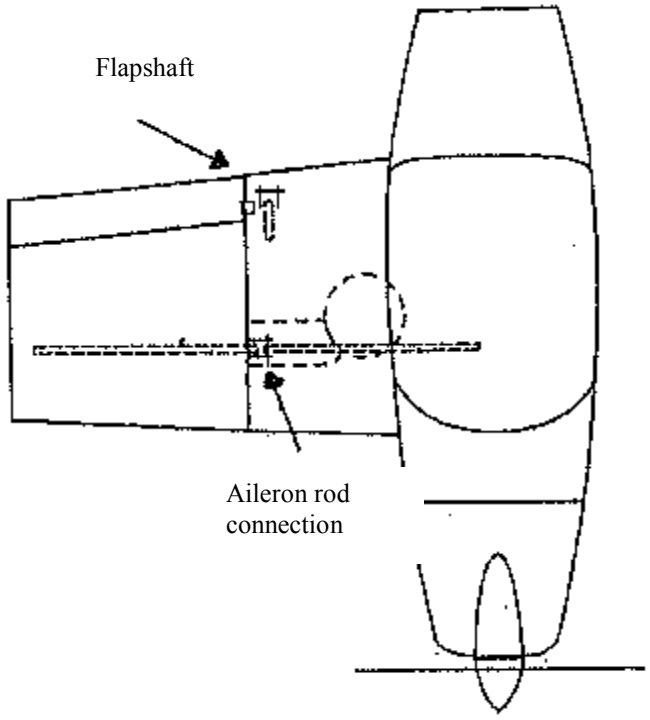


Fig. 5 Connecting position for the flap and the aileron.

4.3 Daily inspection

The daily inspection must be performed every day before flight of the airplane. The scope of this inspection is to check the following:

1. Airplane log-book and airworthiness certificate
2. Airplane technical log-book
3. Cockpit
4. Landing gear
5. All control surfaces for full and free movement
6. All surfaces of the airplane for cracks, nicks or any visible damage.
7. Power plant and propeller
8. Check fuel, oil, coolant liquid.

WARNING
If any problems are found they must be corrected before flying.

4.4 Preflight inspection

It is most important to perform a preflight inspection carefully to prevent possible trouble. The preflight inspection is essential for flight safety.

CAUTION
Special attention must be devoted to the parts, which are affected by high vibrations and high temperatures.

Preflight inspection procedure:

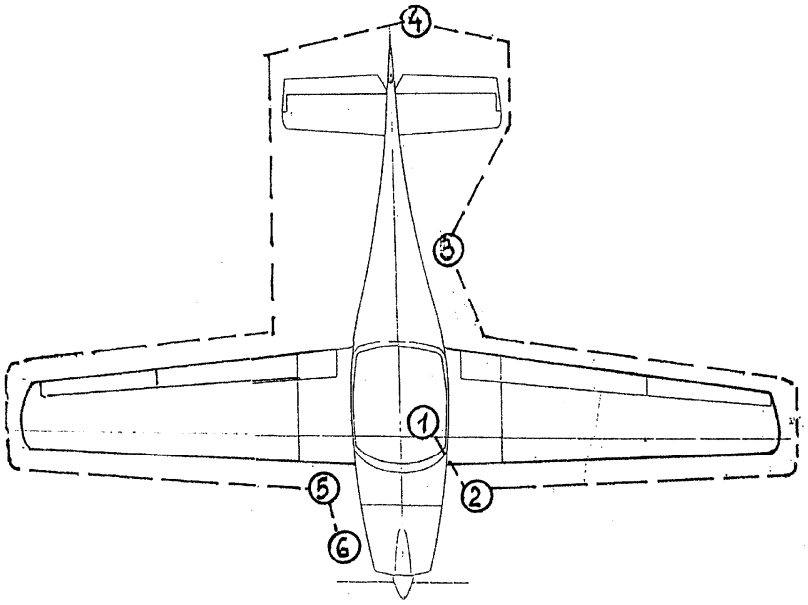


Fig. 6 Walk-around inspection

1. Cockpit:

Flight controls	- check for freedom of movement
BAT 1	- switched off
BAT 2	- switched off
Ignition/ Starter switch	- position off
Electrical control switches	- all off
Circuit brakers	- all in
Gear operating switch	- down
Loose items	- secure or remove
Cockpit canopy glass	- clean, check cockpit canopy lock
Safety harness	- inspect

2. Wing

Surface	- state of wing surface
Connection	- wing pins fully inserted and secured
Pitot static tube	- pitot tube cover removed, check opening for blockage.
Leading edges	- without damage, clean
Ailerons	- check for freedom of movement and security
Flaps	- without play, check hinges for security

3. Fuselage

Surface	- without damage
Static pressure receivers	- check opening for blockage
Antennas	- fixed, without damage
Cockpit wing walks	- without damage

4. Tail units

Surface	- without damage
Control surfaces	- check for freedom of movement , without excess play
Auxiliary tail skid	- check for secure attachment

5. Landing gear

Main wheel tyres	- state, inflation (250 kPa)
Brakes	- visually check condition of pads, brake system for leaks
Legs	- state without damage, attachment
Nose wheel leg	- nose wheel tyre state, inflation (200 kPa) attachment, suspension check, wheel free rotation

6. Powerplant

Propeller - attachment, leading edge blade state, check for nicks and security, check spinner for cracks and attachment.

Engine

- check for any operating fluids leaks below engine cowlings
- state of the cowlings
- state of the exhaust system attachment
- check coolant level and oil level
- turn the propeller by hand several times for odd noises or excessive resistance and normal compression.

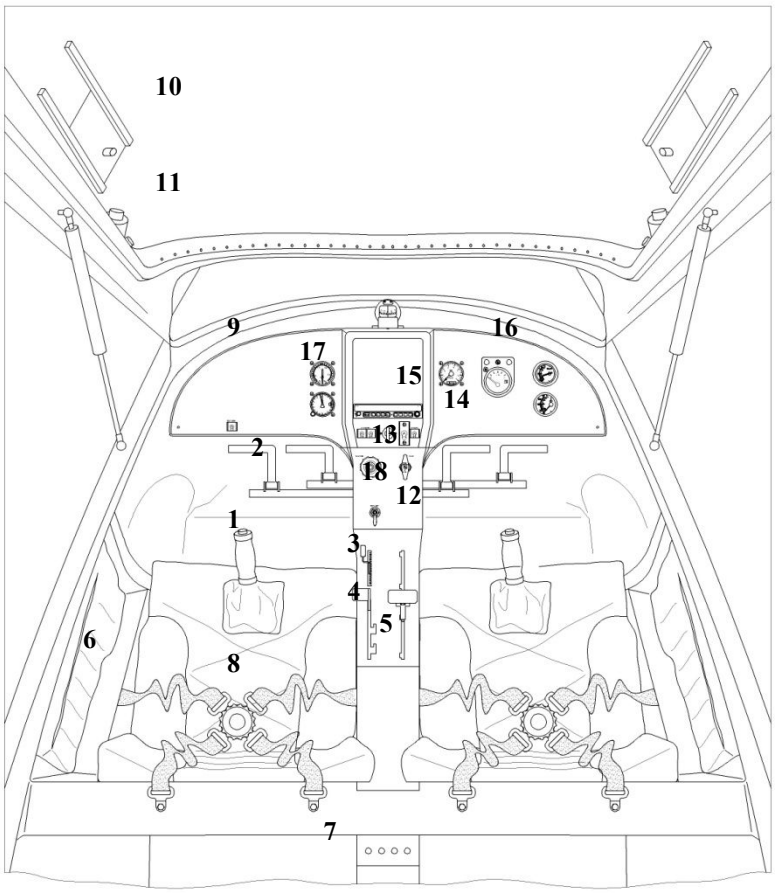
WARNING

Before cranking the propeller switch off both ignition circuits. The propeller must be caught at the blade surface every time. Do not catch at the edge.

4.5 Normal procedures and check list

The standard cockpit control arrangement is shown in fig.7 and the actual instrument panel is shown in fig.9.

Fig. 7. The standard cockpit controls (see also fig.9 on page 7 – 3)



1. Control stick
2. Rudder pedals
3. Trim lever
4. Brake control lever
5. Flaps lever
6. Pocket
7. Headset socket / jack
8. Seat and safety belt
9. Instrument panel
10. Ventilation sliding window
11. Ventilation flow baffle
12. Choke
13. Ignition, Starter key, Master switch
14. Tachometer
15. GPS, Radio, Transponder
16. Powerplant instruments
17. Flight instruments
18. Throttle lever

4.5.1 Before starting engine

1. Ignition/ Starter switch - position off
2. Rudder pedals - freedom of movement
3. Control stick - freedom of movement
4. Throttle lever - freedom of movement, set to idle position
5. Seat and safety harness - adjust and lock
6. Brake - set "brake" position
7. Canopy of cockpit - shut and latched

4.5.2 Engine starting

WARNING
Before starting engine check position of the landing gear overswitch .
Overswitch position – **EXTENSION** (L/G extended).

Cold engine:

1. Fuel selector valve - select left tank
2. Choke - set open
3. Throttle lever - set to idle position
4. Bat 1 - switch on
5. Bat 2 - switch on
6. Storbe lights - switch on
7. Fuel pump - switch on for 5 sec. than switch off
8. Ignition/ Starter switch - position "both" starting for max. 10 sec. Only without interruption
9. Hydraulics - switch on
10. Avionics - switch on
11. As soon as engine runs - adjust throttle lever to achieve smooth running at approximately 2000 r.p.m, choke off
12. Oil pressure - check in green
13. Voltage - check in green
14. Generator - check "OK"
15. Alternator - check > 0 Amps
16. Nav lights - as required
17. Dashboard lights - as required
18. Handle control rescue system - remove secure lock

Warm engine: if the engine is already at operating temperature

1. Fuel selector valve - select left tank
2. Choke - set close
3. Throttle lever - set to slight open position
4. Bat 1 - switch on
5. Bat 2 - switch on
6. Storbe lights - switch on
7. Fuel pump - switch on for 5 sec. than switch off
8. Ignition/ Starter switch - position "both" starting for max. 10 sec. Only without interruption

9. Hydraulics	- switch on
10. Avionics	- switch on
11. As soon as engine runs	- adjust throttle lever to achieve smooth running at approximately 2000 r.p.m
12. Oil pressure	- check in green
13. Voltage	- check in green
14. Generator	- check "OK"
15. Alternator	- check > 0 Amps
16. Nav lights	- as required
17.Dashboard lights	- as required
18.Handle control rescue system	- remove secure lock

4.5.3 Engine warming up

In accordance with the Operator's Manual for all versions of ROTAX 912 as follow: Start warming up period at 2000 r.p.m for approx. 2 minutes, continue at 2500 r.p.m, duration depending on ambient temperature, until oil temperature reaches 50 ^{o}C.

Engine ground test:

1. Ignition check – check the two ignition circuits at 4000 r.p.m. Speed drop with only one ignition circuit must not exceed 300 r.p.m. Max. difference 115 r.p.m of speed by use of either circuit A or B
2. Throttle response – short full throttle ground test, speed must not exceed 5800 r.p.m.
3. The minimum speed on the ground must be 5000 r.p.m depending on ambient temperature and pressure
4. Check idle speed 1800 r.p.m

4.5.4 Taxying

Use of the throttle will help with smooth adjustments of power during taxying. Taxying of the airplane is controlled by he rudder pedals which are connected to the nose wheel steering. The wheel brakes are actuated by sliding the brake lever rearwards in the centre console.

4.5.5. Before take-off

1. Rudder pedals	- freedom of movement
2. Control stick	- freedom of movement
3. Elevator trim control	- set to green line
4. Wing flaps	- as required
5. Fuel selector valve	- left tank
6. Fuel pump	- switch on
7. Pitot heating	- as required
8. Landing gear operating switch	- down
9. Hydraulics	- check switched on
10. Power plant instrument	- check for correct reading; green
11. Flight instruments	- check altimeter setting
12. Propeller	- set 5400 r.p.m. (take off position)
13. Seat and safety harness	- adjust and lock
14. Canopy of cockpit	- latched

4.5.6. Normal Take-off

- Throttle lever – full open
- control stick set into neutral position
- direction on the ground run controlled by rudder pedals
- unstick at speed at 80-85 km/h (according to take off weight)
- accelerating at speed 110-120 km/h (acceleration after unstick)
- at positive climb gear up
- at height 50 m AGL wing flaps up

4.5.7. Climbing

Normal climbs are conducted at climb speeds 130 - 140 km/h in accordance with the take off weight of the airplane. Monitor cylinder head temperature and oil pressure during climb. Oil temperature limits must not be exceeded. In case of high readings, increase airspeed and reduce engine power setting. At safety altitude switch fuel pump off.

4.5.8. Cruise

The range of cruising speeds is from 140 to 230 km/h in accordance with the engine speed setting from 4000 to 5500 r.p.m. The economy airspeed for best fuel economy is at 180 km/h, the optimum operation is between 180 km/h to 230 km/h. In case of turbulence reduce cruising speed below 180 km/h. Under certain conditions the airplane may be overstressed. The airplane is able to be trimmed through the range of the cruising speeds. Due to economy reasons is recommended to maintain the following data:

Engine ROTAX 912 ULS Engine power setting	**Engine Speed (r.p.m)**	**Performance (kW)**	**Torque (Nm)**	**Manifold pressure (in Hg)**
Take-off power	**5 800**	**73,5**	**119,0**	**27,5**
Max. continuous power	**5 500**	**69,0**	**121,8**	**27**
75 %	**5 000**	**51,0**	**97,4**	**26**
65 %	**4 800**	**44,6**	**88,7**	**26**
55 %	**4 300**	**38,0**	**84,3**	**24**

4.5.9. Descending

Descending is conducted at airspeeds 120 – 130 km/h with the throttle lever set to idle position. For increasing the rate of descent it is recommended wing flaps set to landing position (38° flaps deflection) and proceed at airspeed 120 km/h. In this configuration the gliding range is 1:8.

Side slipping is conducted with airspeed 120 km/h, and bank angle 30° with help of the full rudder deflection. The side slip direction is controlled by the bank.

4.5.10 Landing

Check systems of a fuel before approach for landing. Landing approach conduct at small glide slope angle due to long distance of the float before aeroplane touch-down

1. Mannifold pressure - 15 in. Hg
2. Propeller - set 5.400 rpm
3. Fuel valve - left tank
4. Fuel pump - switch on
5. Landing light - switch on
6. Landing gear operating switch - below 80KIAS down, check 3 greens
7. Wing flaps - as required flaps down at speed below 140 km/h
8. Approach speed - 110-120 km/h according to the weight and wind
9. Elevator trim - adjust as required
10. Actual touch down should be made with power-idle and on the main wheel first. The nose wheel should be lowered smoothly to the runway as speed is diminished
11. During landing run control the aeroplane with help of the rudder pedals.
12. Apply braking as required. The main wheel brakes are actuated via the handle on the pedestall between the pilot seats.

4.5.11 Balked landing

1. Smoothly adjust the throttle lever – full open (a thrust yawing moment is manifested in case of the steep setting of the throttle lever)
2. Airspeed modify to 120 km/h
3. The wing flaps setting reduced to take-off position
4. Elevator trim – adjust as required and proceed in the climb out

4.5.12 After landing

1. Engine r.p.m. - adjust throttle for taxying
2. Wing flaps - retract
3. Elevator trim - set to rearmost position of neutral
4. Landing gear - check if in down position
5. Fuel pump - switch off
6. Landing lights - switch off
7. Taxying - to the parking position

4.5.13. Securing aeroplane

1. Brakes - set “park” position
2. Throttle - set idling
3. All electrics switches except strobe. - switch off
4. Ignition/ Starter switch - position “left” after 2-3 s. position “off”
5. Bat 1 - switch off
6. Bat 2 - switch off
7. Handle control rescue system - secure with the lock
8. After leaving the cockpit, the canopy should be covered with the cloth dust cover, to avoid the effects of the sun.

SECTION 5

PERFORMANCE

5.1 Introduction

Section 5 provides approved data for airspeed calibration, stall speed and take-off performance and non-approved additional information. The data in the charts has been computed for condition of the standard atmosphere from actual flight tests with the airplane at maximum take-off weight and engine in good condition and using average piloting techniques.

5.2 Approved data

5.2.1 Airspeed indicator system calibration

IAS (km/h)	50	55	60	100	112	125	137	146	165	176	184
CAS (km/h)	55	60	65	100	110	120	130	140	160	170	180

IAS (km/h)	203	225	245	267	285
CAS (km/h)	200	220	240	260	280

IAS = indicated airspeed
CAS = calibrated airspeed

5.2.2 Stall speed

Maximum weight 600 kg, C.G. in 30% MAC, idle engine speed

Position wing flaps	0°	15°	38°
Stall speed IAS in km/h	85	76	70
Stall speed CAS in km/h	87	79	74

5.2.3 Take-off performance

The data is valid for following conditions: MTOW 600kg, H = 260 m MSL, Temperature t = 15 ° C, Wing flaps position 15°, engine ROTAX 912 ULS, propeller SR 2000 D

Surface of the runway	Take-off run distance (m)	Take-off distance up to 15m (m)
Paved runway	147	313
Non paved – grass	173	348

5.2.4 Landing distance

The data is valid for following conditions: H = 260 m MSL, Temperature t = 15 ° C Wing flaps position 38° , landing speed 1,3 VSo, landing roll is braked.

Surface of the runway	Landing distance (m) from height 15 m	Landing roll distance (m)
Paved runway	263	75
Non paved - grass	272	84

5.2.5 Climb performance

The data is valid for max.weight 600 kg , without flaps, ROTAX 912 ULS, engine speed 5000 r.p.m, propeller SR 2000 D

Altitude (m MSL)	Speed IAS km/h	Rate of climb m/s
0	130	4,55
1000	130	3,16
2000	130	2,54

The service ceiling is 5500 m at the max. continuous power.

5.3 Additional information

5.3.1 Balked landing climb

The data is valid for maximum landing weight 600 kg , wing flaps position 38°.
Engine ROTAX 912 ULS, engine speed 5500 r.p.m, SR 2000 D

Flight altitude (m)	Airspeed IAS km/h	Rate of climb m/s
0	120	4,22
1000	120	2,85
2000	120	2,20

5.3.2 Effect on flight performance and characteristics

No disturbing effects on flight performance and characteristic of the aeroplane WT-9 Dynamic LSA Speed were recorded during the flight tests.

5.3.3 Demonstrated crosswind performance

The maximum demonstrated crosswind speed for take-off and landing is 6 m/s according to the airworthiness requirements.

5.3.4 Noise data

The maximum noise data 56,7 dB (A) was measured during the flight tests according to the German noise requirement LS – UL 96.

SECTION 6

WEIGHT AND BALANCE / EQUIPMENT LIST

6.1 Introduction

This section contains the payload range with which the airplane may be safely operated. C.G. position is very important parameter which effects the safety of flight.

NOTE
Weight and balance data listed in this section is informative.
True data will be given after manufactured plane balancing

6.2 Weighing procedure

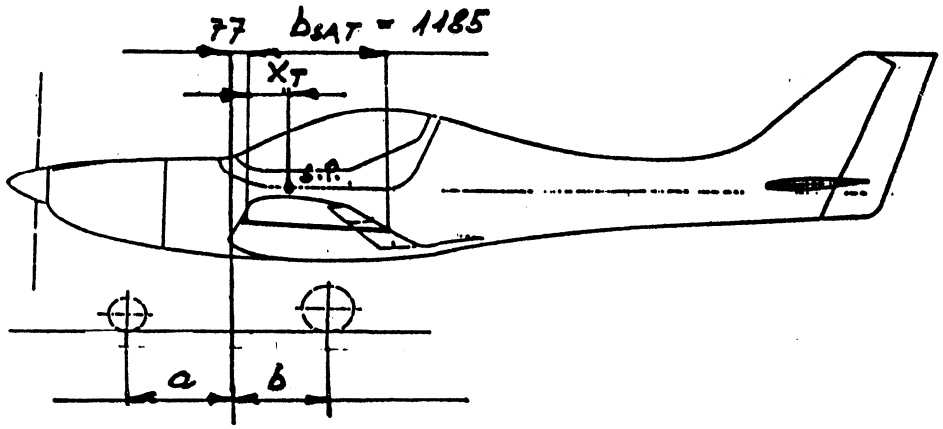
To define the airplane C.G. it is necessary to weigh the empty airplane with standard and optional equipment, with operating fluids of the engine but without the fuel in the tanks.
The airplane is weighed with the help of three weighing-machines located below the left and right main wheels and below the nose wheel. The airplane position for weighing has to be parallel with the horizontal plane which passes through the side edge of the cockpit. The reference point (datum point = DP) is leading edge of wing root section. To measure the distance from centre of main landing wheel axle and of nose wheel axle to reference point DP. C.G. position is calculated from the reference point DP (leading edge) and C.G. position is calculated in % aerodynamic mean chord (MAC) too. The leading edge of the MAC is located in distance 77 mm rear from DP.
Centre of gravity position after loading airplane (crew, fuel, baggage or additional equipment) is calculated as following: The sum moments of airplane all components mass is added to the total moment of the empty airplane and divided by total weight.

6.3 Weight and balance record and permitted payload range

Permitted crew + passenger weight with											
Date	Empty weight (kg)	Empty moment (kgmm)	C.G. Position (%)	Max. baggage 40 kg		Half baggage 20 kg		No baggage		Approved	
				Maximum (kg)	Minimum (kg)	Maximum (kg)	Minimum (kg)	Maximum (kg)	Minimum (kg)	Date	Signed
28.10.10	356,2	80774,4	12,64 %	162,0	15,4	208,4	54,1	243,8	92,9		

Condition: Airplane in the range from maximum fuel of 126 litres to minimum fuel of 10 litres.

Type:	Type landing-gear:	Registration:	S/N:	Date of production:
WT – 9 DYNAMIC	**RETRACTABLE**	**OK - WOW**	**DY - 391/2010 LSA**	**28.10.2010**



Type of Scale	3 x 500 NDS	Calibration valid till	01.06.2012
Weighing Point	**Scale Reading(kg)**	**Distant from DP (mm)**	**Moment (kg mm)**
Nose wheel	**112,2**	**a = - 748**	**-83925,6**
Right main wheel	**127,1**	**b = 675**	**85792,5**
Left main wheel	**116,9**	**b = 675**	**78907,5**
Total Weight	**356,2**	**Total Moment =**	**80774,4**
Fuel		**240**	

Weight = 356,2 kg **Moment = 80774,4 kg/mm**
Oil and coolant including

C.G. position from DP = Moment / Weight - 77

$$X_T \text{ (mm)} \quad \frac{80774,4}{356,2} - 77 = 150 \text{ mm} \qquad X_{CT} \text{ \% MAC} \quad \frac{150}{1185} \times 100 = 12,6 \text{ \%}$$

Permitted C.G. range of empty aeroplane X_{CT} is from 10 to 14 % MAC.
Calculated position of C.G. is within an permitted range.

Place, Date:

Prievidza 28.10.2010

.....
Supervisor / Signature

6.4 Master minimum equipment list

The following minimum instrument equipment is requested:

Flight and navigation instruments:

- Airspeed indicator – with the Airspeed indicator markings in accordance with item 2.3, Section 2 of this Manual
- Sensitive Barometric Altimeter
- Magnetic compass

Powerplant instruments :

- Ignition Indicator
- Fuel indicator
- Tachometer
- Oil temperature indicator and Oil pressure indicator
- Coolant temperature indicator

Additional equipment :

- Master Switches of the electrical system with fuses
- Batteries – located in front of the firewall and on the rear baggage bulkhead
- Safety harness – 4 point static harness restrain system is attached to the fuselage structure
- Limitation placards - in accordance with item 2.16, Section 2 of this Manual

CAUTION

If additional equipment is mounted within the magnetic field of the compass, it may affect the readings of the compass.

SECTION 7

AIRPLANE AND SYSTEM DESCRIPTION

7.1 Introduction

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

7.2 Airframe

WT9 Dynamic LSA Speed S is a single engine airplane, controlled aerodynamically, made from advanced composite material, low-wing monoplane with two side-by side seats. The airplane is equipped with a retractable tricycle undercarriage.

Fuselage

The fuselage sandwich shell is divided in the symmetry plane. The shell is of three layer construction. The external and internal shell layers are made of glass and carbon fibre fabrics, which are saturated with a resin. Between them there is a filling of hard foam panels. The fin is made together with the fuselage. The wing central panel is fixed at the fuselage.

There are two places in the cockpit, side by side type. The interior width is 1,15 m. A lifting cockpit canopy hinges forward. The canopy opening system is assisted by an air strut. The wing central panel with span 2,45 m is fixed at the fuselage. There is an integral tank in the forward box of the wing central panel.

Wing

The tapered wing is a monospar construction with a rear auxiliary spar for the aileron and flap attachments. The main spar caps are made from carbon rovings. The slotted flaps are rectangular sandwich construction. The flap is attached to the wing with four hinges. The aileron is attached to the upper surface of the wing with three hinges. The spars of right and left wings are joined to the wing central panel spar with the help of two pins. The third connecting point is the pin in the rear auxiliary spar. An aileron control system consists of duraluminium rods. The control handle of flaps is attached to the pedestal in the cockpit. The movement by help of the rods and the bellcranks is transmitted to the flap shaft in the wing, next the movement from the shaft is transmitted to the flaps. Optional wing fuel tanks are integral part of wing structure. It is connected with central section tanks with simple house connection and tighted with clamp.

Horizontal tail unit

The horizontal tail unit consists of a stabilizer and elevator. The stabilizer consists of sandwich shells from advanced composite material. The stabilizer is fixed at the fin. The width of the horizontal tail unit is 2.4 m, (the same width as the wing central panel) and allows the transport of the fuselage with regular truck.
The elevator consists of two parts, which are joined together by help of the elevator control.

Vertical tail unit

The vertical tail unit consists of the fin and rudder and has trapezoidal shape. The rudder consists of a sandwich shell from advanced composite material with the control-surface weight balance. The rudder is attached by three hinges at the fin.

7.3 Flight controls

The airplane has dual controls with two control sticks. The ailerons are controlled by control sticks, connecting rods and arms.
The elevator is controlled by control sticks, connecting rods. The rudder is controlled by cables attached at the rudder pedals and guided alongside the fuselage sides to the rudder. The rudder pedals position is adjustable (see Maintenance Manual, Directional control system, page 1-22)

The wing flaps are controlled by a flap lever control located on the top of central tunel manualy. The rocker control switch allows four positions of the flaps: retracted, take-off with flap deflection 15°, landing position with flap deflection 24 ° and landing position with flap deflection 38°. Movement with help of rods and bellcranks is transmitted onto the coaxial shaft and from the shaft is transmitted onto the flaps with help of the rod.

7.4 Instrument panel

The actual instrument panel arrangement is shown in the following figure (fig.9). A different instrument panel arrangement may be used, if optional flight and navigation instruments are mounted in the airplane.

Fig. 9. Instrument panel

1. Gear annunciator panel
2. Master switch (Bat1, Bat2)
3. Electrical switch panel
4. Magnetos / Start switch
5. MFD (PFD, Engine, GPS/Mapping
6. PC-monitor
7. Audio control panel
8. COM1/NAV1, COM2
9. Transponder
10. Switches: PTT, A/P off
11. Flaps control panel
12. Propeller control
13. Throttle lever
14. Rescue system lever
15. Pedals adjustment
16. Heat control valve
17. Fuel selector valve
18. Choke
19. Cabin air control
20. Trim, PTT switches, COM 1/COM2 switch, AP disc. switch
21. Wheel brake lever
22. Carburettor heating control
23. Gear switch
24. Board computer track ball
25. Annunciator panel
26. USB connectors
27. ELT control panel
28. Stick control side selector
29. Circuit breaker panel
30. Compass

7.5 Landing gear system

The model SPEED is equipped with a retractable undercarriage, which is actuated by a hydraulic system with the help of the electrical driven hydraulic pump. The emergency extension of the undercarriage is carried out by its own mass with help of a three-way valve. The drag stay is arrested with help of the springs. The main undercarriage legs are attached to the left and to the right outside of the wing central panel and they are retracted inside. The nose undercarriage leg is retracted backwards. The main wheels on both legs are equipped with hydraulic disc brakes. The main wheel are braked by hydraulic brakes with main hydraulic face ram, which is located beyond the seats. The main wheel brakes are actuated via the handle on the pedestal between the pilot seats. This handle actuates the parking brake too.

The tires of the main landing gear have dimension 350 x 140 mm , the tire of the nose wheel has dimension 320 x 120 mm.

The hydraulic system schematic of the retractable undercarriage is shown in the following figure (fig.11). The power is supplied from the battery over "BAT1" switch (11) to the switch (13) "HYDRLCS". This switch "HYDRLCS" in the up position on the instrument panel, which switch on the hydraulic pump by help of the pressure switch and the relay. The pressure switch switches off the power after reaching the desired pressure. The switch (13) "HYDRLCS" in the down position switches on the emergency extension of the undercarriage. The emergency extension will happen too, when "BAT1" switch is off. The emergency extension of the undercarriage is carried out by own mass with the help of a three-way valve. The drag stay is arrested with help of the springs. The other switch (14) "GEAR UP/DOWN" controls the direction of the pressure fluid movement for extension or retraction of the undercarriage. The pressure fluid proceeds via the three-way valve to the one or another side of the hydraulic face ram. Both sides of the hydraulic face ram are without pressure during the emergency extension of the undercarriage.

WARNING

When Bat1 and Bat2 switches are off, emergency extension of the undercarriage will proceed and green lights are off!

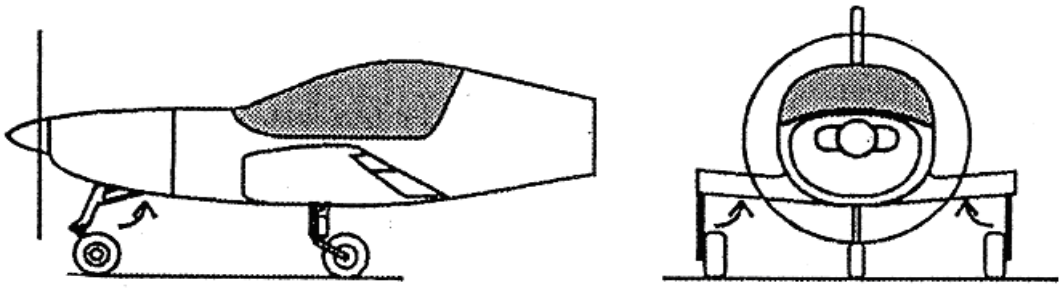


Fig.10. Retractable undercarriage

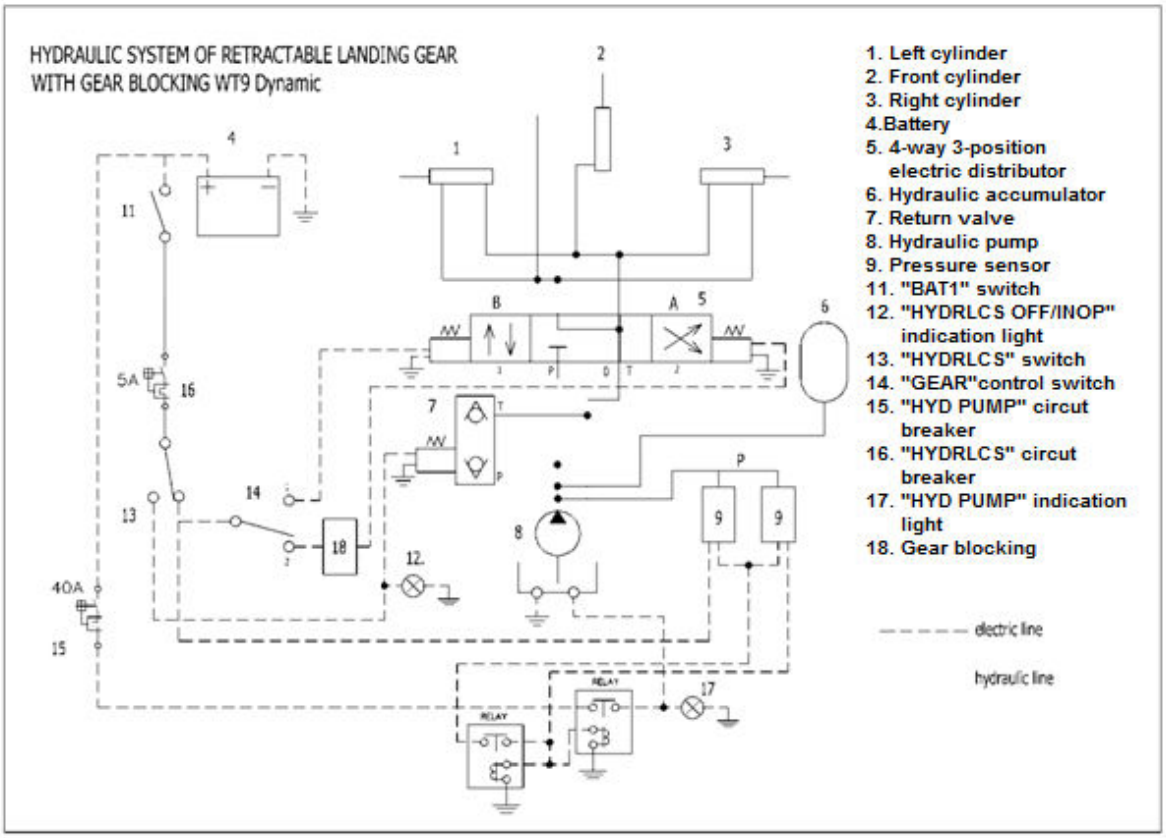


Fig. 11 The hydraulic system schematic of the retractable undercarriage

CAUTION

In case that the Hydraulic pump indication light (17) is shining for more than 20 seconds switch off the Hydraulic pump circuit breaker (15). The continues running of hydraulic pump will causes damage of hydraulic system. This can be caused by loose of hydraulic pressure because of hose leaking or other resson. Fly with extended undercarriage and after landing contact authorised technican to find and solve the problem.

7.6 Seats and safety harness

The plane has two side-by-side seats which are fixed, unadjustable. The back support of the seats is glued into the fuselage construction as the frame. The safety belts – 4 point static harness restraint system is attached to the left and right seat side panel and to the strut behind the back support of the seats.

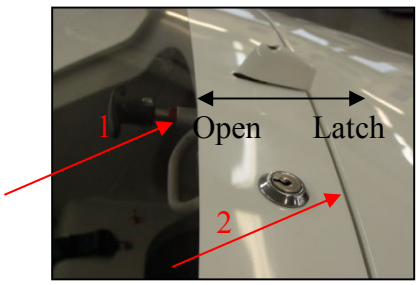
7.7 Baggage compartment

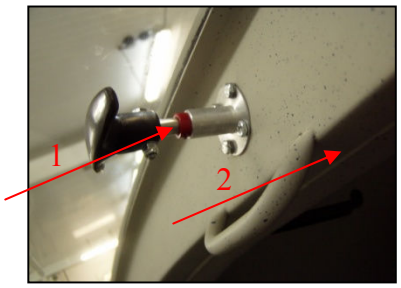
The baggage compartment is situated behind the seats. Maximum baggage weight is stated on a placard near the compartment. Hard objects may not be carried in the baggage compartment without a suitably designed lashing or anchorage.

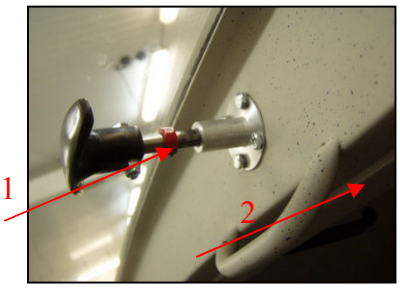
7.8 Doors, windows and exits

The cockpit canopy consists of one part. The Perspex canopy is glued on the composite frame. The canopy is attached to the nose section of the fuselage by pins which make it possible for the canopy to be tilted forward. For easier manipulation, the weight of the canopy is counterbalanced by two gas struts which allow it to open effortlessly. On the lower frame there are handles outside the canopy. The canopy is equipped with a lock on the upper rear section of the frame (see Fig.12) and the red ring on lock pin as the correct cockpit canopy locking indicator.

CORRECT cockpit canopy latching (2) and locking (1)







Cockpit canopy latched (2) but unlocked (1) – **WRONG !**

Cockpit canopy latched but partially locked- **WRONG!**

Cockpit canopy unlatched and apparently locked - **WRONG!**

Fig.12 Cockpit canopy latching and locking

7.9 Powerplant

Powerplant consists of 4 cylinder horizontally opposed, 4-stroke engine ROTAX 912 ULS with power 73 kW and a three blade on ground adjustable airplane propeller. This engine is suitable for airplane, but it must never fly at locations, airspeeds, altitudes, or in any other circumstances from which a successful no-power landing cannot be made, after sudden engine stoppage.

Description

ROTAX 912 ULS is 4-stroke, 4 cylinders horizontally opposed, spark ignition engine, one central camshaft-push-rods-OHV. Liquid cooled cylinder heads, ram air cooled cylinders. Dry sump forced lubrication. The engine is fitted with electric starter, AC generator, mechanical fuel pump and the reduction gear with integrated shock absorber. Refer to the Operator's Manual for all versions of ROTAX 912 ULS for more details about versions difference.

WARNING

Due to carburettors, flights in icing conditions are prohibited.

The cooling system of the engine is designed for liquid cooling of the cylinder heads and ram-air cooling of the cylinders. As coolant for the cooling system 50 % antifreeze concentrate with additives against corrosion and 50 % pure water is used. The coolant must be renewed every two years. Refer to the Operator's Manual for ROTAX 912 ULS.

The periodic inspections are structured on 25, 50, 100 and 200 hours check which must be performed according to the maintenance schedule. Check after the first 25 hours of operation must be performed.

There are two laminated cowlings (upper and lower) which cover the engine suspended at the engine bed. The disassembly and assembly of the upper cowling is easy – just release the quick-closing locks. The upper cowling is usually removed during engine pre-flight inspection to check the engine compartment, operating fluids quantity (oil, coolant) and to check engine installation.

After removing the upper cowling of the engine, check the following:

1. Oil quantity check: Remove the cover of the oil tank (3). The oil level in the oil tank should be between two marks (max./min.) on the dip-stick, but must never fall below the min. mark.
2. Coolant quantity check: Remove the cover of the expansion tank (7). The coolant level in the overflow bottle should be between min. and max. mark.

The lower cowling is removed after unscrewing the attachment screws connecting the cooler to the cowling face side, then unscrew the attachment screws connecting the cowling to the firewall border.

Propeller

SR 2000 D is the three blades, electrically adjustable propeller with diameter 1,7 m of mixed structure.

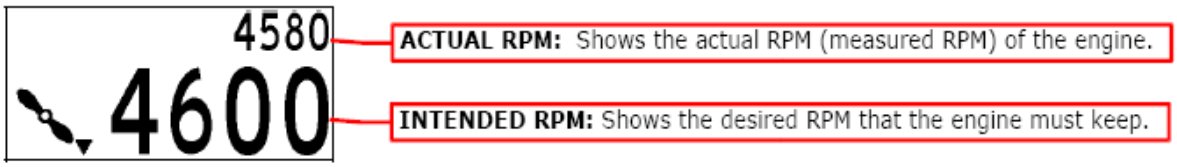
The propeller is controlled with electronical constant speed instrument which is shown below.

The instrument has two operating modes: “Constant speed” and “Manual”: you can select the operating mode using the corresponding switch on the front panel.

For normal oeration use always the “Constant speed” mode; the “Manual mode must be used in case of emergency or failure of the control instrument because it exclude the electronic system and drive directly the pitch motor using the INC/DEC switch.

Use in “Constant speed” mode

At start up the display briefly shows the software version, then it appear the main screen:



To change the intended RPM you can use either the knob or the INC/DEC switch (INC to increment the RPM and DEC to decrement the RPM).

In both case the increment/decrement can be in step of 10, 20, 50 or 100 RPM, depending on the setting “RPM step” in the setup menu (see “Setup menu”)

In case of failure/emergency

If during flight you notice that the instrument don´t adjust the propeller pitch turn immediately the operating mode switch to the “Manual” position; this switch has a safety lock to avoid accidental operation: it must first pulled on the outside and than moved to the desired position.

Use in “Manual” mode

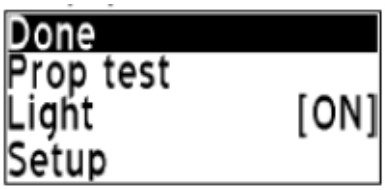
The “Manual” mode must be used only when testing the propeller system and in case of failure or emergency. In this mode the propeller pitch is adjusted using exclusively the INC/DEC switch: press in the “INC” position to increment the engine RPM and press in the “DEC” position to decrease it

The display shows only a screen with a fixed “Manual” indication.

NOTE: To adjust the propeller pitch in "MANUAL" mode you must use exclusively the INC/DEC switch in instrument frontpanel, because the knob and the external switch/lever (if presents) has no effect.

Function menu

To display the functions menu press the knob for at least one second:



Done: return to the main screen.

Prop test: execute a self-test (varying the propeller pitch) to check the correct working of the system regulator/propeller; to execute this test you must have the engine turned-on at about 5000 RPM.

Press the knob to start the propeller test: it will increase the pitch until the propeller reach a settable RPM value (see "RPM prop t." in setup menu), and then exit from the test and return to previous RPM value.

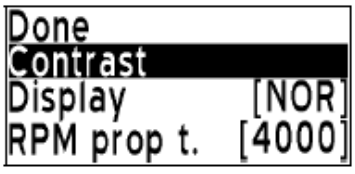
While the instrument is in test you can press the knob or the INC/DEC switch to stop the test and bring the propeller to the min pitch position.

NOTE: To prevent accidental activation of the test when in flight this function is removed after takeoff (the instrument consider a takeoff when the engine meets or exceed 4500RPM for 30 seconds).

Light: Turns on/off the display backlight.

Setup: enter the setup menu (see next)

Setup menu



Done: Exit the setup menu and return to the main screen.

Contrast: Adjust the LCD contrast

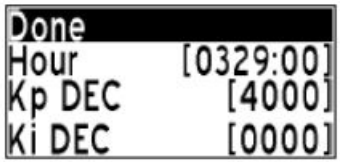
Display: Set the display mode (white or black background).

RPM prop t.: Set the RPM that the engine must reach in the propeller test.

RPM step: Set the minimum step when changing the RPM with knob or the INC/DC switch. The step value can be 10, 20, 50 or 100 RPM.

Additional functions

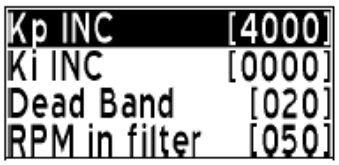
To enter in the additional functions menu you must go in the setup menu, then position the cursor in the first line ("Done") and keep pressed the knob for 3 seconds, until the display shows a screen that allows you to insert a password: now insert the password "2010" and the display will show this menu:



Done: Exit and return to the main screen.

Hour: Shows the effective operating time of the propeller pitch electric motor (indications in hhhh:mm).

If you keep pressed the knob for 10 seconds the number become editable and you can rotate the knob to modify the value of the hour, then press again the knob to store the new value or you can keep pressed the knob for 10 seconds to reset to zero the counter.



The following parameters are already set in factory and it´s recommended to modify it only if the instrument don´t work correctly during the propeller pitch regulation; the parameters must be modified only by qualified persons and must not be modified during the flight.

KP DEC: Adjust the pitch speed variation when the instrument is decreasing the RPM (increase the pitch).
Increasing this value means increasing the response speed of the system but if the value is too high the response become inaccurate, unstable and the regulation may oscilate. Modify this value in step of 100 units and then check the effect in flight (range = 100 – 5000).

KI DEC: This parameter affect the response regulation when the system try to decrease the RPM without manage to reach the setpoint. If this value is too high the regulation may oscilate. Modify this value in step of 5 units and then check the effect in flight (range = 0 – 100).

KP INC: Adjust the pitch speed variation when the instrument is decreasing the RPM (decrease the pitch). Increasing this value means increasing the response speed of the system but if the value is too high the response become inaccurate, unstable and the regulation may oscilate. Modify this value in step of 100 units and then check the effect in flight (range = 100 – 5000).

KI INC: This parameter affect the response regulation when the system tries to increase the RPM without manages to reach the setpoint. If this value is too high the regulation may oscilate. Modify this value in step of 5 units and then check the effect in flight (range = 0 – 100).

Dead band: To prevent continuous action of the propeller pitch electric motor it´s possible to use this parameter: if the difference between the measured RPM and the intended RPM is lower than this parameter there will be no pitch regulation. (Default value is 20, range = 0 – 100).

RPM in filter: If you notice that the measured RPM indications is unstable (fluctuation or jump in the RPM reading) you must increase this value; don´t exceed to increase the value because this parameter slower the RPM reading and thus also the response of the system. Default value = 50, rang= 1-100)

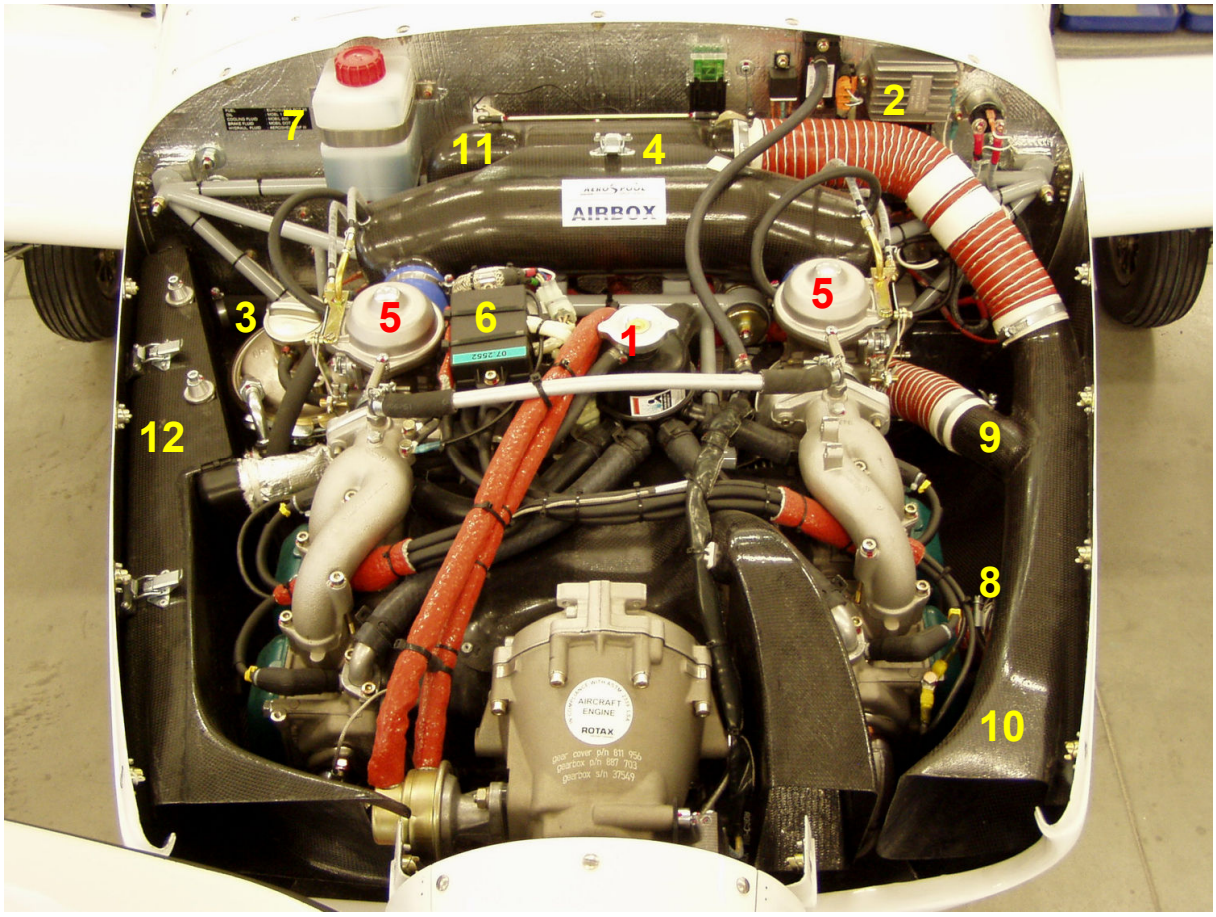


Fig. 13 Powerplant ROTAX 912 ULS

1 – Coolant filler tank	5 – Carburettor	9 – Cabin ventilation intake
2 – Regulator	6 – Ignition	10 – Ram air (optional)
3 – Oil tank	7 – Coolant overflow bottle	11 – Carburator preheating (optional)
4 – Air filter	8 – Cabin heating intake	12 – Coolant radiator

7.10 Fuel system

The fuel tanks are located in the forward box of the wing central panel. The auxiliary tanks are installed in the wings. The fuel system scheme is shown at fig.14.
The fuel is fed from the fuel tank into the fuel selector located inside the cockpit below the instrument panel, then through the fuel filter into the engine fuel pump into the carburettor. The unconsumed fuel is supplied back through return piping into the left tank. The vent pipe is outgoing from the upper part of the fuel tank, proceeds along the fire wall and the vent opening is located at a lower surface of the fuselage behind the fire wall. The electrical fuel indicator switch allows the indication of the fuel quantity in the left or the right fuel tank. Red light annunciator above the fuel indicator will be illuminated when 7 litres of fuel remain in each fuel tank.

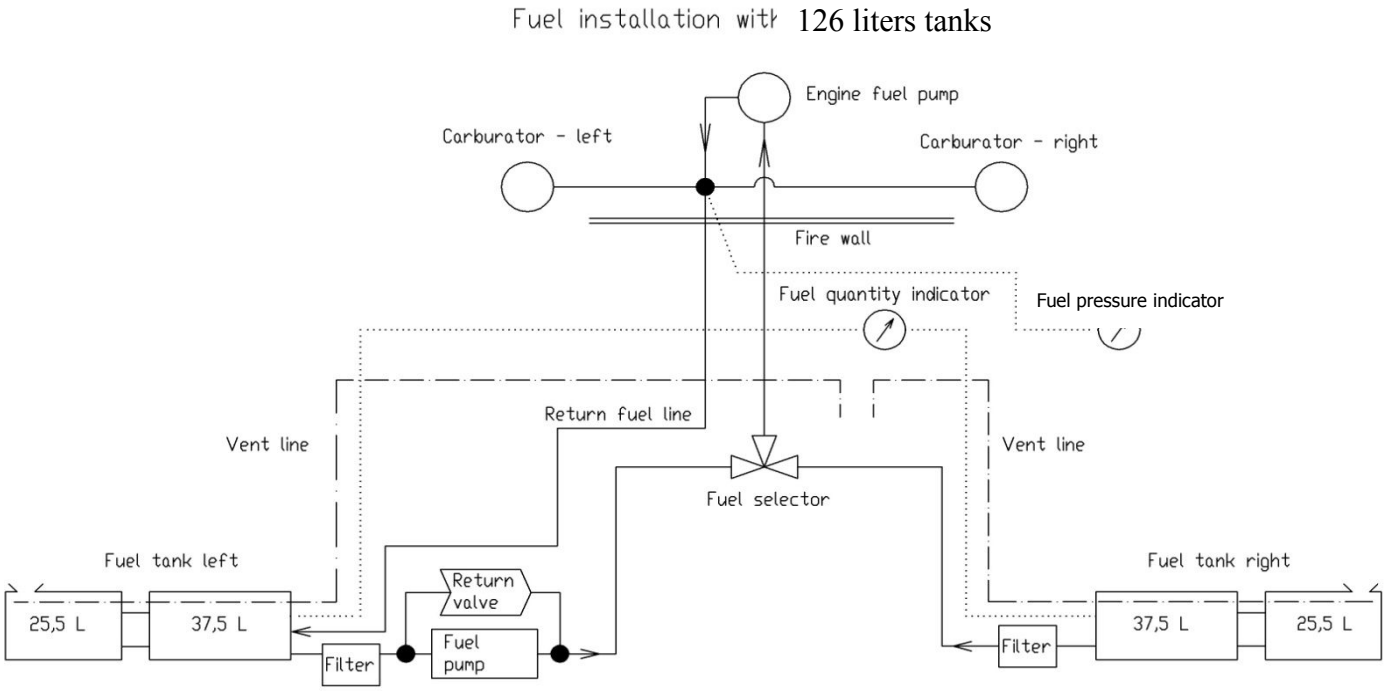


Fig. 14 The fuel system scheme

On the WT9 Dynamic LSA Speed S airplane the left tank is considered the main tank as the electric fuel pump operates on this tank and the excess fuel is also returned there.

The left tank must be used for all take offs and landings. When you are flying with full tanks, use the left tank for 30 – 40 minutes before changing to the right tank. This allows space for the return of excess fuel without venting it overboard.
Monitor the fuel quantity when you are doing long flights or flights with low fuel quantity. To maximize range/endurance when the red annunciator lights flash (7 litters each tank), the following procedure is recommended. Select the right tank and use this tank until all the fuel is exhausted. Change back to the left tank should now have slightly more than 7 litres (around 20 minutes flying depending on power settings) because of the return fuel. Continue flight and landing procedure with the electric fuel pump on, as is written in this manual.

7.11 Electrical system

There are electrical system diagrams in the Maintenance Manual for the airplane WT9 Dynamic LSA Speed S. The wiring system depends on instrumentation and other electric equipment of an individual airplane according to a customer's desire. The dual engine ignition is a separate part of the electric system. Each of two ignition circuits has its own break switch. The detailed description of the ignition, the AC generator and auxiliary alternator is listed at the Operator's Manual for ROTAX 912 engine.

7.12 Pitot and static pressure system

The Pitot tube for the airsped indicator is located on the bellow right wing. Pressure distribution to individual instruments in the cockpit is done through flexible plastic hoses. The static pressure receivers are located on the both sides of the fuselage behind the cockpit. The ALT static air valve control is situated behind left hand pilot seat in the cocpit. Keep the system clear to assure its right function.

7.13 Avionics

The following avionics are mounted in the airplane: radios and intercom. This equipment must be connected with the headphones and with the antenna. The airplane might be equipped with other instruments such as GPS, transponder, board computer…. These flight and navigation instruments are mounted as an option of the customer. (See Chapter 9.1 List of inserted supplements). For right operation of the instruments and for more details refer to the Manuals supplied with above mentioned instruments.

7.14 Miscellaneous equipment

Rescue system Magnum 601 is mounted as miscellaneous equipment of the airplane WT9 Dynamic LSA Speed S. (for operation see Operation manual delivered by producer of equipment or See supplement Quick pilot guide).

Landing gear non opening signalization and on ground landing gear retraction blockage

No opening of a landing gear when a flaps are in a 2nd and 3rd position (landing configuration) is signalized by acustic signalisation in cabine and flashing of red control light on the gear annunciator panel.
Dissabling of the possibility to retract the landing gear when the speed is below 80 km/h (if a pilot by mistake would retract the gear on the ground, a system of blockage does not allow gear retracting and signalizes this operation error by flashing of three green control lights on the gear annunciator panel)
To verify this option it is necessary to lift the plane by lifting device and give the selector (switch) on the position „ test“ (selector is situated behind a instrument panel under a instrument panel cover)

SECTION 8

AIRPLANE HANDLING, SERVICING AND MAINTENANCE

8.1 Introduction

This section contains factory recommended procedures for proper ground handling and servicing of the airplane. It also identifies certain inspection and maintenance requirements which must be followed if the airplane is to retain that new-plane performance and dependability. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered.

The airframe surfaces should be protected with light plastic foil or cloth cover against dust. All engine intakes, vents, the fuel vents and pitot static system should be covered before long term airplane parking or storing, due to contamination by foreign objects (insects, birds).

The external surfaces of the airplane should be washed with a sufficient quantity of the water and an adequate quantity of detergent. Do not apply petrol or chemical solvents for cleaning the external surfaces of the airplane.

It is advisable to park the airplane inside a hangar or eventually inside other weather-proof space with stable temperature, good ventilation, low humidity and dust-free environment. The parking place should be protected against possible damage caused by sun radiation, humidity and wind. Sunbeams reflected through the canopy can magnified and may cause spot heating, which can create damage to the cockpit area and the upholstery.

8.2 Airplane inspection periods

8.2.1 Powerplant

The engine periodic inspections and maintenance are conducted according to the procedures contained in the Maintenance Manual for ROTAX Engine Type 912 Series.

Daily inspection – is carried out in accordance with the instruction for execution of the preflight inspection, which are contained in Section 4, item 4.4.

Check after 25 hr. of operation – must be carried out according to the Maintenance Manual for ROTAX Engine Type 912 Series.

Check after 50 hr. of operation – must be carried out according to the Maintenance Manual for ROTAX Engine Type 912 Series

100 hr. check – must be performed according to the Maintenance Manual for ROTAX Engine Type 912 Series every 100 hr. of operation or 1 year, whichever comes first. The renewal of the spark plugs, the fuel filter and the coolant are carried out after 200 hr. of operation.

TBO (Time Between Overhaul) – 2000 hours

Oil change

must be performed according to the Maintenance Manual for ROTAX Engine Type 912 Series. There is an oil drain screw on the bottom of the oil tank. There is an oil filter at the left side beside the propeller gearbox. At every oil change, replace the oil filter and open the old one with special tool, to ensure the engine is not producing chips. Remove filter insert, cut top and bottom cover off the mat. remove filter mat, unroll and check it for metal chips, foreign matter, contamination and abrasion. This check is important as it allows conclusions regarding the condition of the engine and gives information about a possible cause of any failure.

8.2.2. Propeller

The propeller in operation does not require any special maintenance. In case of propeller contamination wash its surface with a piece of cloth dipped in warm water with addition of the usual detergent. The operator is allowed carry out repairs to common little nicks on the leading edges, up to a maximum size of 4 mm. This repair can be done by using Epoxy resin with filler. The damaged place is to be degreased and fill with resin. After hardening the resin the repaired area is to be sanded and protected with enamel or varnish of the epoxy or polyurethane type. Replace the parts supplied by producer and remove the cone from the propeller. Any other dismantling is forbidden. The repair of large damage must be carried out by the manufacturer or by an authorised service centre. Operator's Manual of the airplane propeller SR 2000 D includes additional information about maintenance.

Period to overhaul (TBO) is – 1500 hours

8.2.3 Airframe

Daily inspection - is carried out in accordance with the instructions for the execution of the preflight inspection, which are contained in Section 4, item 4.4.

Check after 25 hr. of operation – must be performed according to the Maintenance Manual for the WT9 Dynamic LSA Speed S after the first 25 ± 2 hr. operation together with the engine check. The scope of this check is same as the check after 50 hr. of operation.

Check after the 50 hr. of operation – must be performed according to the Maintenance Manual for the WT9 Dynamic LSA Speed S every 50 ± 3 hr. operation together with the engine check. The following work should be carried out:

1. **Retractable undercarriage**: Check the leg attachment into the wing central panel and into the fuselage. Check the control of the nose wheel, the brakes, the tyres.
2. **Outside surface check**, check all control surface shafts, the rods, the articulated joints, the hinges, the control cables, the auxiliary tail skid. Sparingly lubricate the control service hinges. Thoroughly clean and lubricate the piston rod of the canopy gas struts.
3. **Check the control cable guides**, lubricate the roller-bearings of the elevator control rod.
4. **Check charging** – charge battery if need be, cleaning.
5. **Power plant** – visually check the hoses for condition, damage, leaks, attachment and security, the rubber flange of the air filter for cracks. Visually check exhaust system for condition, cracks, deformation or damage. Lubricate the bowden cable for throttle and starting carburettor (choke) (see the Maintenance Manual for ROTAX Engine Type 912 Series).
6. **Check the brake fluid level** in the main hydraulic face ram, which is located beyond the seats. Check the brakes for operation.
7. **Control surfaces deflections** – to check the control surfaces deflections see Control Surfaces Deflections Record, which is contained in the Maintenance Manual for airplane WT9 Dynamic LSA Speed S.

100 hr. check - must be performed every 100 hr. of operation or 1 year, whichever comes first. This inspection must be performed by qualified staff. The scope of this inspection is the same as the check after 50 hr. of operation covering the following work:

1. Full cleaning of the airplane
2. Check airplane surfaces for mechanical damage and cracks
3. Pay special attention to:
   - Undercarriage and its attachment into the wing central panel
   - Wing-fuselage connection reliability, clearances, spar ends state
   - Engine bed, welded areas, rubber engine mounts, security of attachment bolts: engine-engine bed, engine bed-firewall

4. Visually check condition and integrity of wires, check charging – charge battery, function of the signal bulbs, function of the fuel quantity indicator, fuel drains and fuel vents for blockages, fuel filters.
5. Visually check condition of the instruments and the avionics (connector, a plug) and for correct operation
6. Lubricate according to the Lubrication Chart
7. Check tyres for condition, cuts, uneven or excessive wear and slippage – replace if need be.

Lubrication Chart

The manufacturer recommends using grease and oil without acid for lubrication only. Apply the lubricants sparingly without contaminating of the airframe.

- Check condition of the bearings of the main wheels – clean and lubricate if need be, at least every 2 years.
- Check condition of the bearings of the nose wheel – clean and lubricate if need be, at least twice per year.

Lubricate: Main and rear spar pins
The axle of the nose wheel leg
The pins of the nose undercarriage leg, the leg support struts

Sparingly lubricate: The hinges of the control surfaces, movable parts of the control surfaces, bearings of the ailerons, the pedals and the brake control lever, all control cables at inlet into the terminations (in engine compartment).

Battery

The power plant is equipped with an AC generator and alternator, which recharge the two batteries in the flight. The Gel -Electrolyte battery is dry and hermetized; it doesn't release any toxic or explosive gas The battery needs a visual check of the attachment and security, and inspection for leakage of the electrolyte. The electrolyte contains mordant vitriol acid, which may cause damage to the airframe and equipment.

8.3 Airplane alterations or repairs

It is essential that the responsible airworthiness authority be contacted prior to any alterations on the airplane to ensure that the airworthiness of the airplane is not violated. For repairs refer to the applicable Maintenance Manual. The operator is allowed replace parts supplied by the producer only. The repairs to damaged skin must be carried out by qualified staff in accordance with approved procedures.

WARNING
After airplane repairs, repainting or mounting of additional instruments or equipment it is necessary to check weights and positions of C.G.

8.4 Ground handling / Road transport

The airplanes can suffer higher stress loads on the ground than in the air. In this case can result a potential menace of the safety, as the airplane construction is designed for the manoeuvring load. The high airplane normal accelerations are occurred at the hard landing, during the taxying at the rough surface and during the driving at the hole road.
Don't use unnecessary transportation in the road.

CAUTION
The airplane is equipped with mooring eyes which are screwed into the threaded hubs on the wing lower surface located approx. half way along the wing. It is also necessary to moor the nose wheel landing gear.

CAUTION
Push or pull the airplane from the propeller root only, never at the wing tips or the control surfaces.

8.5 Cleaning and care

Regular cleaning and care of the powerplant, propeller, wings and the airframe is the first consideration for safe and efficient operation. Cleaning and care should be based on climatic and flying conditions. The exterior painted surfaces should be cleaned with clear water using a sponge or soft cotton towel and chamois. These surfaces should also be protected with a silicone free hard wax reapplied at least once a year by hand or with a rotating cloth disc.
Clean the Plexiglas canopy only as necessary using a soft cotton towel and clear water mixed with a small amount of mild detergent. Protect the canopy with anti-static cleaning agents which are made specifically for Plexiglas.

CAUTION
Do not clean the canopy with alcohol, acetone or lacquer thinner, because the canopy is made from acrylic. Acrylic becomes fragile after contact with these liquids.

8.6 Winter operation

The cooling system of the cylinder heads is filled with a mixture of anti-freeze and water, which protects the cooling system against freezing up to – 38 ° C. Check coolant with densimeter or glycol tester before winter operation and to prevent the failure of the radiator or cooling system due ice.

If the temperature is below this value, the coolant must be drained or renewed with pure anti-freeze liquid. The coolant must be renewed every two years. Use only coolant according to the current Operator's Manual for engine ROTAX 912 ULS.

If low cylinder head or oil temperatures occur during operation under low outside temperature, then the following is recommended:

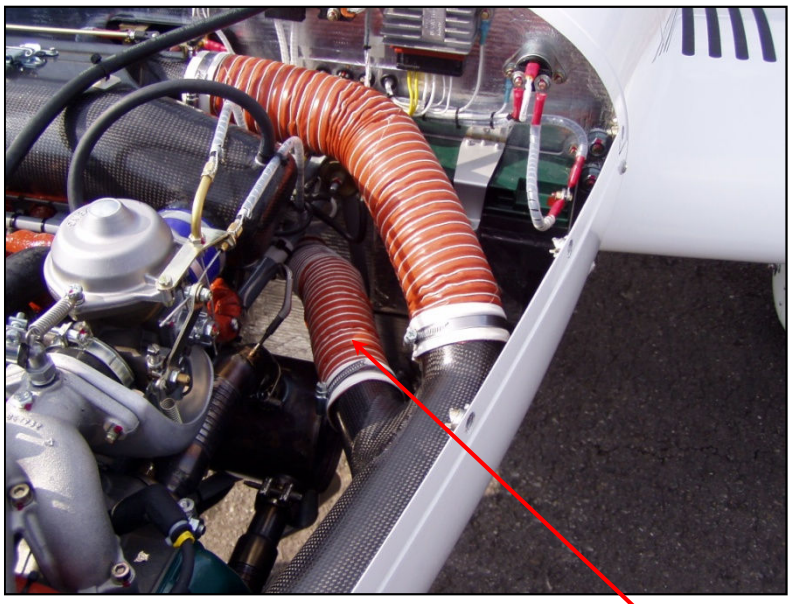
Cover a part of radiator face by a duralumin sheet or drawing paper of appropriate dimensions, insert it between the radiator and the bottom engine cowling.

Cover the oil cooler face or a part of the face only, by a duralumin sheet or drawing paper attached with a suitable adhesive tape (or bend the oil cooler with that tape) and lag the oil tank.

CAUTION

The temperature limits of the coolant, cylinder heads and oil must be checked after these arrangements.

If the airplane has a fixed undercarriage with wheel spats fitted it is recommended that these should be removed during winter operations on frozen or rough ground to minimize damage to the spats.



I winter operation is advisable to disconnect the ventilation intake hose (VIH) due the better performance of heating system. After disconnecting the ventilation intake hose close the socket for the hose. Otherwise the ram air will be loosen by this opening.

SECTION 9

SUPPLEMENTS

9.1 Introduction

This section contains the appropriate supplements necessary to safely and efficiently operate the airplane when equipped with various optional systems and equipment not provided with the standard airplane.

NOTE
Additional individual equipment in accordance with a customer's request will increase the airplane empty weight and reduce the allowed useful load.

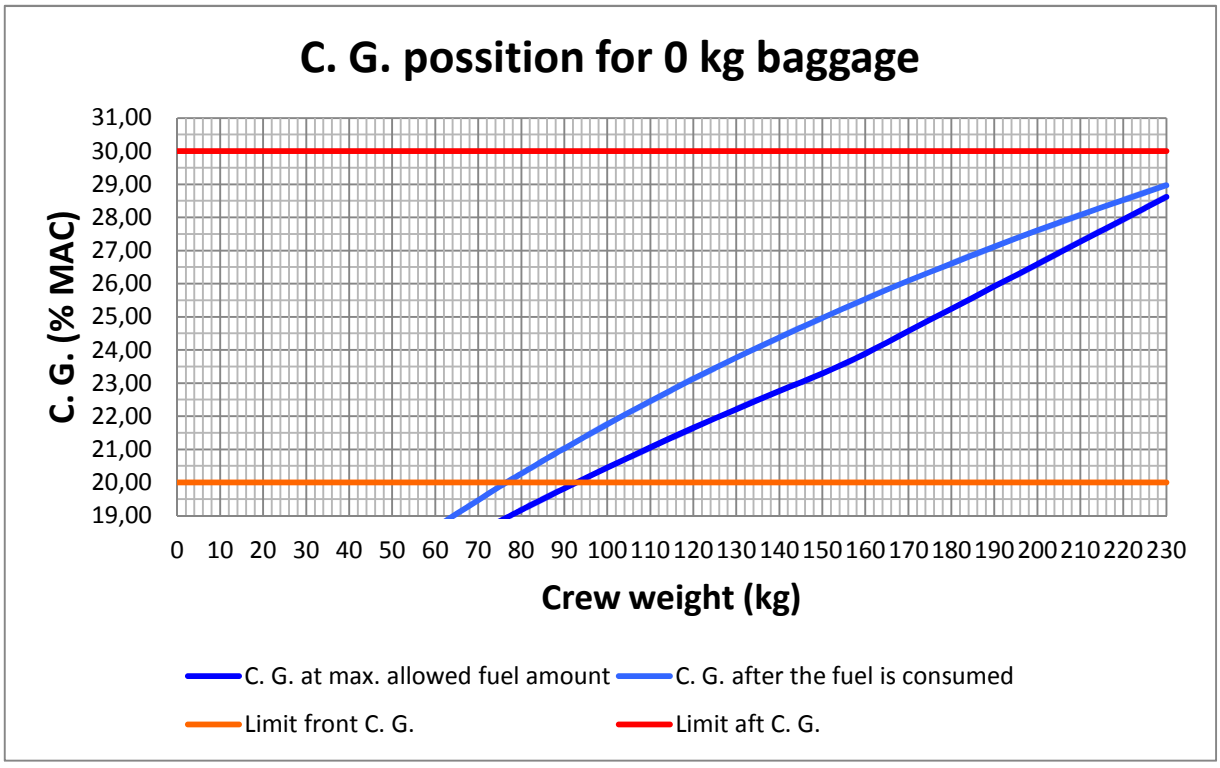
9.2 List of inserted supplements

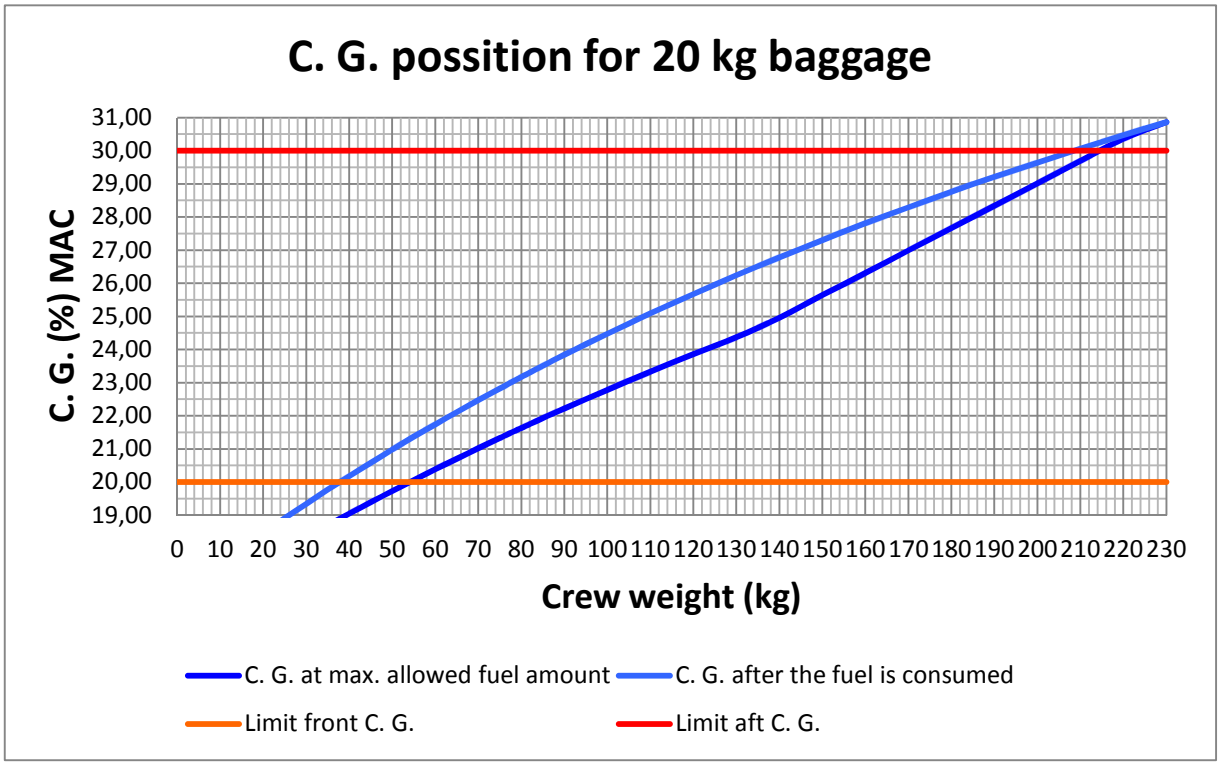
Date	Doc. No.	Title of the inserted supplement
28.10.2010		DYNON Avionics SkyView system (2x10´´ display, 2xADHARS, 2xGPS, EMS) ELT AK-451 Rescue Parachute system Magnum 601 Dynamic Board computer Garmin SL 30, SL 40 Com/Nav Radios Garmin GMA 240 Audio Panel Garmin GTX 328 Transponder

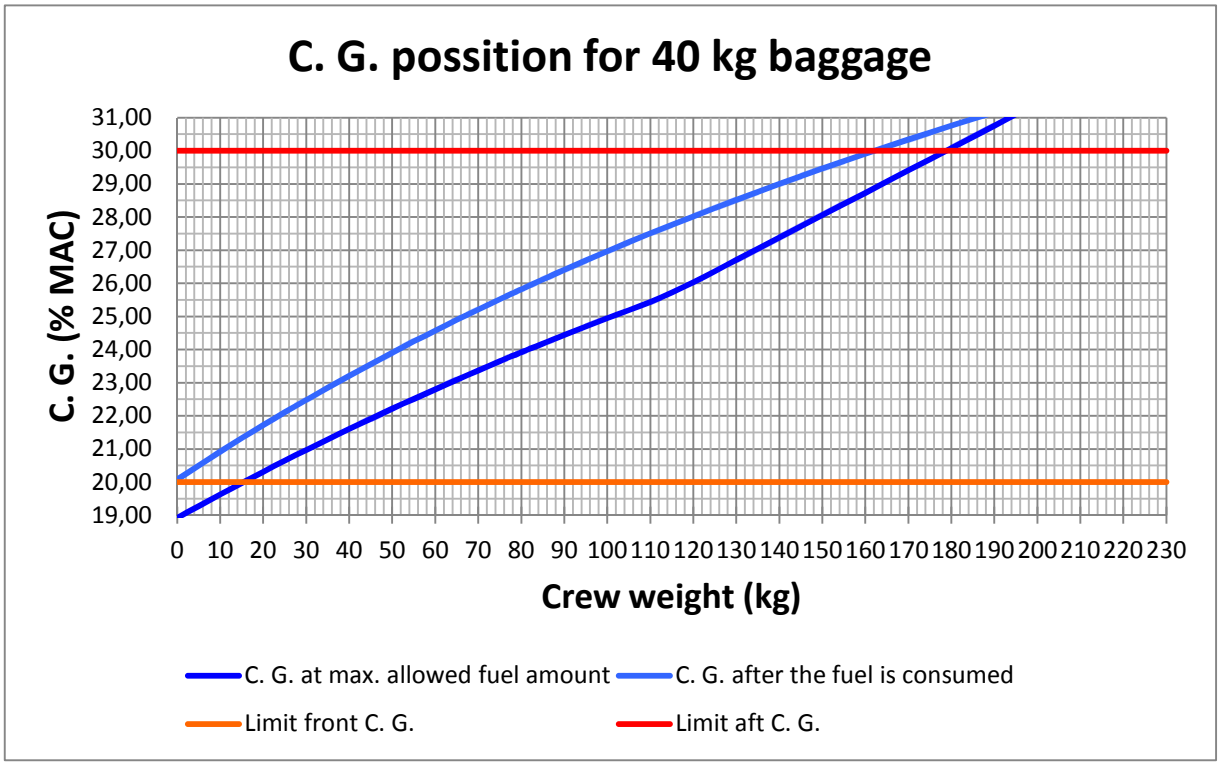
9.3 Supplements inserted

For operation and handling with Dynon Avionic's SkyView System consult corresponding Operation manual. For other inserted supplements see respective chapters of this section (Section 9)

9.4 Payload range diagrams




C. G. possition for 20 kg baggage
C. G. (%) MAC
31,00
30,00
29,00
28,00
27,00
26,00
25,00
24,00
23,00
22,00
21,00
20,00
19,00
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230
Crew weight (kg)
C. G. at max. allowed fuel amount
C. G. after the fuel is consumed
Limit front C. G.
Limit aft C. G.


C. G. possition for 40 kg baggage
C. G. (% MAC)
31,00
30,00
29,00
28,00
27,00
26,00
25,00
24,00
23,00
22,00
21,00
20,00
19,00
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230
Crew weight (kg)
C. G. at max. allowed fuel amount
C. G. after the fuel is consumed
Limit front C. G.
Limit aft C. G.

9.5 Placards

NO PUSH

Elevator, Rudder, Ailerons

FUEL
EUROSUPER 95
MAX. 63 l

Wing, adjacent to fuel filler caps

OIL
MOBIL 1 RACING 4T
MAX 3,0 l

Engine cowling close oil filler access

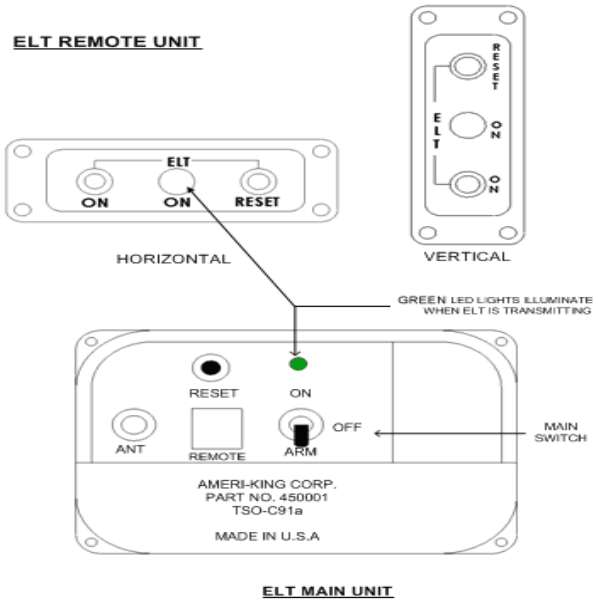
NO STEP

Right wing, Flaps aft edge

STATIC VENT
KEEP CLEAN

Both sides of fuselage close to static vent

9.6 ELT AK-451 Quick Guide



	LEDs (Main Unit + Remote Unit)	***Buzzer Sound***	***Swept tone on 121.5 MHz VHF Radio***
1. ELT switch at **ON** position	4 sec off 1 sec on		On continuously
2. ELT switch at **ARM** position	4 sec on		None
3. ELT switch at **ARM** position for another **25 sec** (Self Test Mode) Self Test takes 25 sec	None NOTE: If the LEDs flash there is a problem. Please refer to "Installation and Operation manual" paragraph 2.4 for details.		
4. ELT switch at **ARM** position. Shake ELT hard Forward and Backward (G Switch Test)	4 sec off 1 sec on		On continuously
5. Press **RESET** button on **Main Unit**	None		
6. Press **ON** button on **Remote Unit**	4 sec off 1 sec on		On continuously
7. Press **RESET** button on **Remote Unit**	None		

The ELT switch on the Main Unit should be left at ARM position and the ELT is ready to go.

Note 1: The ELT switch is "make before break." Return to OFF for at least 1 sec before changing positions.

Note 2: Press RESET anytime to turn off unwanted transmission.

9.7 Rescue parachute System

1. Operations before the flight

1) The control of the rescue system anchorage incl. the rocket and the activation handle

2) The control of the cable anchorage to the aircraft, it must be not slack

3) If nothing does prevent the parachute to be smoothly pulled out of the aircraft

4) To unlock the activation handle.

2. How and when to activate the rescue system

A) In critical situations activate the rescue system immediately regardless to the flight altitude and terrain character over which you are (e.g. an unavoidable collision resolve by the activation of the system MAGNUM as soon as possible, in the moment before it comes – sufficiently ahead of it!)

B) Ideal action:

1. Switch off the ignition

2. Strongly pull the activation handle

3. Protect with the hands your face, the hands and feet together (the position „roll into a ball“), firm up the whole body!

ATTENTION! It is necessary to fix oneself in this position especially:

a) by the opening of the parachute!

b) by the landing!

4. After the parachute opening shut up the fuel pipe(if there is enough time for it)

5. Before the shock fasten the safety belt!

C) In the case of really extreme distress pull at first the activation handle and then immediately switch off the ignition and the fuel pipe.

D) The right operations is necessary to train in beforehand.

3. How does perceive the crew the activating process

After the activation is heard the rocket motor ignition followed by the sound of leaking gasesby the motor nozzle. After it comes gradual retarding of the movement ending by a gentle pulling. It shows that the parachute is loaded. There may follow several swings with a stabilization trend. (Everything depends on the situation, circumstances of the proceeding rescue, on the position and on the altitude. By the activation in a larger altitude you have got a larger chance for the stabilization of the swings and for a smooth landing on the earth.)

The touch with the earth should be such as if you would be unsuccessful by a smooth landing. It depends on the character of the terrain where you are landing.

Stopping of the motor is important in order to prevent the conflict of the suspension cable with the rotating propeller and this especially by aircraft with the propeller in pushing arrangement.

Closing of the fuel feed is necessary to prevent a start of the fire!

! A vital notice: When you pull the activation handle it begins with a lesser resistance. The handle gets loose from the safety position fixed by a flexible picket. It follows a free approximately 5cm long going of the safety cable. Then grows slowly the resistance by the influence of the starting spring stretching. In the moment, when the spring is maximally compressed, gets the percussive device in the upper position loose and strikes two percussion caps, that activate the rocket motor of the rescue system.

4 How to behave after the landing

1) It is necessary to leave the aircraft without delay and this with regard to the health of the crew – possible injuries.

-reasons:

a) in windy weather may the loaded parachute be the cause of aircraft dragging. (by pulling of several parachute lines, that are beside one another pours the parachute out and gets calm)

b) after a harder landing, when e.g. the landing did not happen on the pandiny gear, may start a fault, may come to the fuel tank damage and to the fire danger.

Attention!

a) after the landing on a hill side always step out in the direction up the hill!

b) after a landing on an electric line neither do touch further wires nor step out on the earth. Call for help, secure the switch off of the electric current on the line and then you may come down!

5 How large powers do influence the aircraft and the crew after the development of the parachute.

In maximal speed, for which are the parachutes designed, may the short-time overload get till the value of 5G. Therefore every point, where are fastened the guy cables into the aircraft, must have the minimum strength of 5G! Use only cables and snap hooks delivered by the producer, or recommended by him!

The aircraft should be hanged on the parachute so as to fall to the ground, after the touch with the earth, on the wheels of the landing gear, because they will soften the fall. Appropriate is the position to be moderately inclined forwards, because of the stabilization during the descent on the parachute. This reality is necessary to regard with the choice of the length of suspending cable harness.

6 Situations in which it is possible to use successfully the rescue system

a)Engine failure over a terrain, where it is not possible to land safely from the gliding flight.

Do not hesitate and activate the rescue system in time with the regard to the safe stabilization and so that the meeting with the earth would come after calming of the swings. Do not hesitate with the activation in cases when you are not sure, that you will overcome some obstacle by the gliding flight, or that you will not surely reach the area chosen for the landing!

b) Loss of orientation

1) In good weather is the fuel at the end and in the reach is no appropriate area for emergency landing

2) Sudden worsening of weather conditions when during the flight VFR is the visibility reduced under an acceptable limit and it could come to a collision with an obstacle.

3) Loss of the notion of the aircraft flight position. It may come after the flying into a cloud or the fog. The situation of sudden worsening of meteorological conditions.

In these situations activate your rescue system immediately!!!
Be careful in situations, when you are in a strong updraft. In these cases you must at first get out of it and then use the rescue system.

c)Short landing path

If there‘s no way out and if there threatens on the end of the path some obstacle and the flying up is not possible or safe, you may activate the rescue system in the ground flight near over the earth approximately max. till 1m. But it is necessary to go on in the landing after the firing of the rescue system and to become the aircraft quickly to the earth. In such a situation begins the parachute to brake in the moment, when the wheels touch the earth.

d)Mechanical defect

If a mechanical defect makes impossible the aircraft control or safe landing, there is a reason for the activation of the rescue system MAGNUM. If it is possible choose a propriate terrain for the parachute landing with regard to the high voltage line, the buiding development, the wood, the wind direction, etc.

e)Collision during the flight

Activate your rescue system if possible in the time before it inevitably comes! Here it applies, the earlier you react, the higher will be the chance for rescuing your life! Fractions of asecond may decide!

f)Piloting control mistake

To dangerous piloting control mistakes, that may you endanger, comes mostly in small altitudes. The loss of speed, the corcscrew spin, the fall down plane etc.
In such situations you have to react without delay! Even from a small altitude you have a chance to be rescued!

Remember, that even a piloting control mistake in a larger altitude may be for you dangerous. Such a transit from a corcscrew spin to a spiral and a spiral itself may be for you dangerous by the sharp speed rise to such a limit, that your rescue system could be inefficient. The altitude lessens in such situations very quickly. Activate therefore your rescue system as soon as possible!

g)Pilots disability to control the aircraft

It may be health problems as heart attack, injury of the pilot, loss of consciousness ... If it is possible he may activate the rescue system by himself, or his fellow passenger, who must be informed of the rescue system function and use before the flight!

h)Fire on the aircraft deck

It is important to stop the oxygen supply to the flame and also of the material which burns, it is of the fuel. In case you can not immediatelly safely land, activate the rescue system. So you can come on the earth and from the reach of the flames more quick. In case, that it burns in the area of the motor space, or somewhere after the fuel-lock on the line to the motor, lock the fuel supply, let the motor run, open the supply of the mixture feed (open the throttle) to consume the fuel from its line and to stop the burning!

Even because of such situations are favourable cables of steel or of Kevlar. These materials resist the flames more, than e.g. cables on the base of nylon, etc...

9.8 Dynamic Board Computer

This computer is standard PC, based on Intel CPU, usually running Microsoft Windows operation system, but can also be running other platforms like Linux and so on. The computer is constructed to perform in such conditions like turbulence and hi/low temperatures. For that reason there no mechanical moving parts but fans. Standard hard drive is substituted with a solid state disk. Technical specification like memory size, SSD size, CPU performance is subject to individual wishes of the customer.

System sustains from:

- Main computer unit of special design in aluminum case located behind baggage compartment
- 7" wide screen LCD touch screen located on a dashboard
- Additional pointing device (trackball) located on horizontal center panel just beside the throttle lever.
- Independent GPS module providing current GPS location of the aircraft this can be used by any custom applications running on the PC eventually.
- Wireless Bluetooth keyboard powered form battery and can be recharged from any USB interface.

To power on the computer, switch on the " PC " switch. It's third switch from left from set of electric control switches located below left MFD. It takes approximately 5 sec. to start power-on process. If the computer will not start, check if both circuit breakers "PC PWR" and "PC CTRL" are in. If the circuit breakers are in proper position and computer still will not start, please contact service.

To shut down the PC, switch off the " PC " switch. This will start the shut down sequence (closing all running applications and operation system). It may take some time to power off the system.

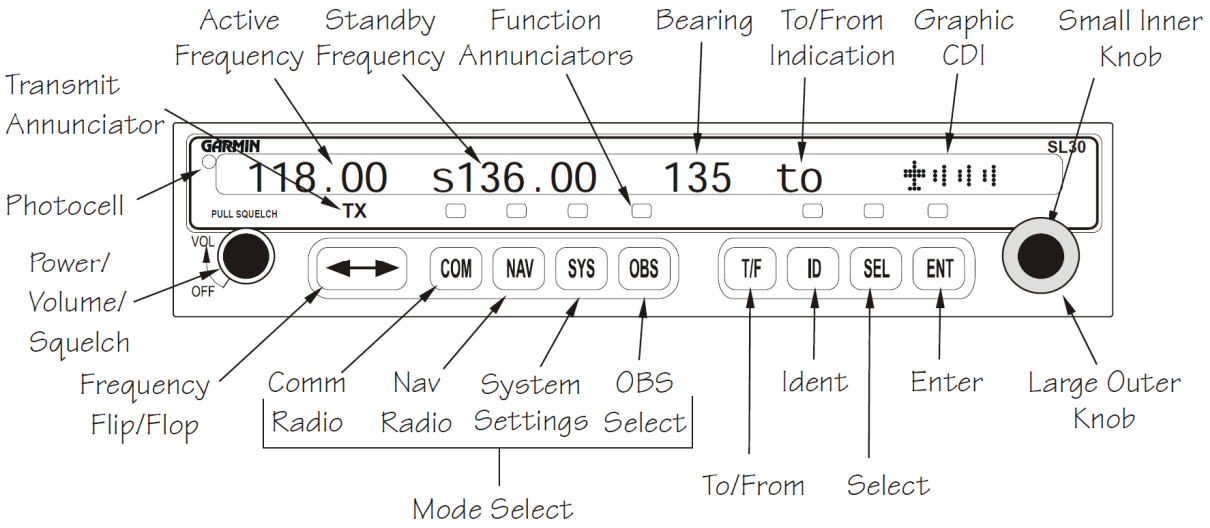
User's guides and manuals of individual applications running on the PC are usually in a form of online help within these applications and programs.

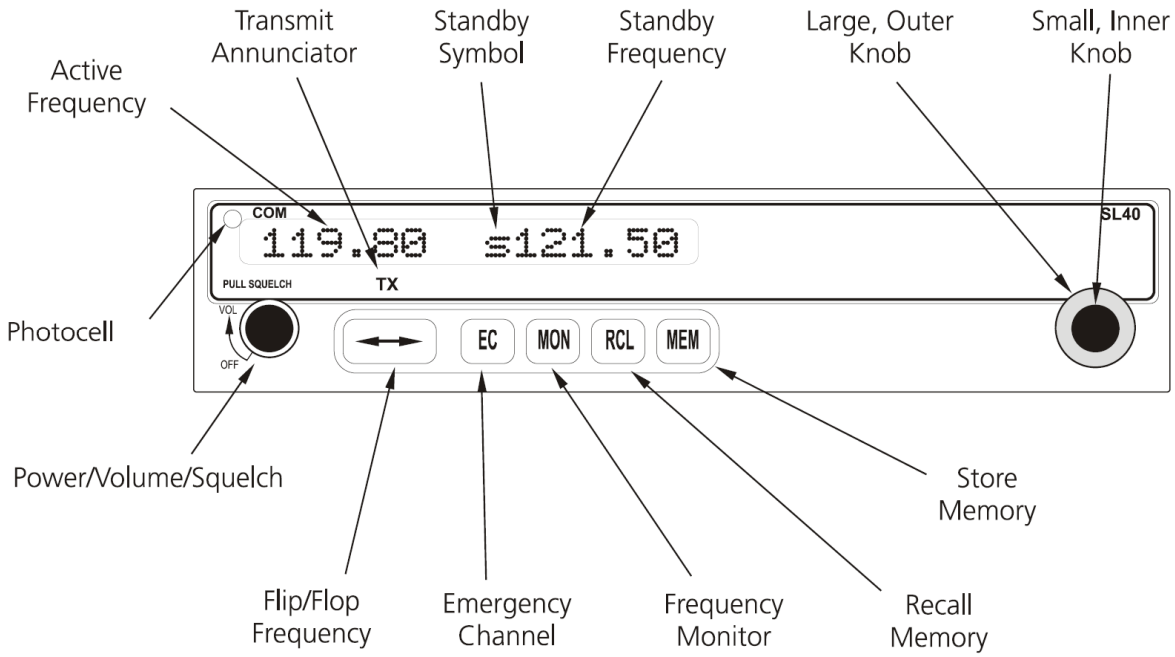
There are also 4 standard USB interfaces in the cabin of the aircraft. Two of them are located on a dashboard and the rest two are located on back wall of baggage compartment. These USB ports can be used for connecting to any standard USB devices, like USB flash sticks, USB CD-ROM drive, USB Wi-Fi dongle ….

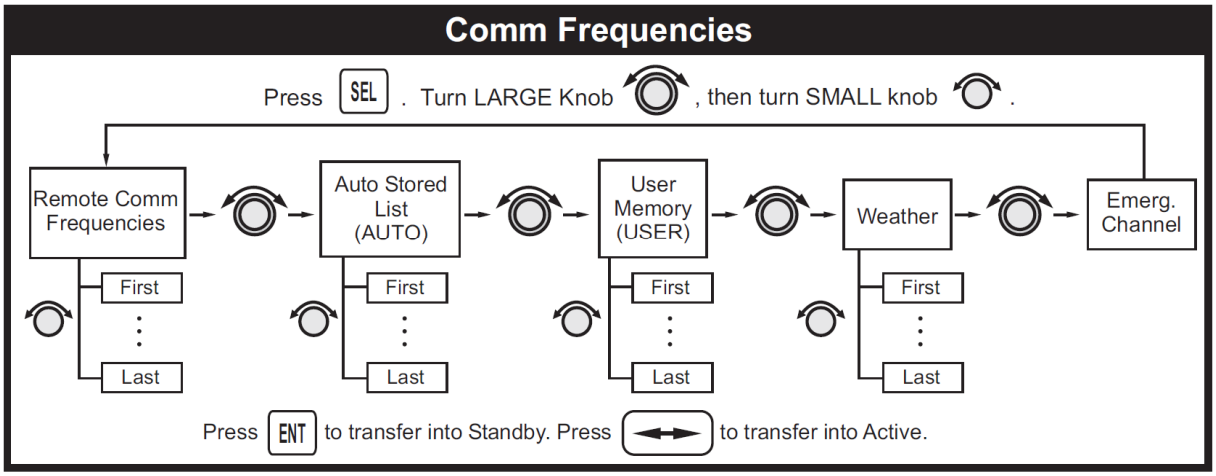
PC also have a stereo audio output which is connected into "Music 2" input of a Garmin GMA240 audio panel located just below the 7" LCD touch screen. This provides hi-fidelity stereo sound directly into your headsets and is intended for multimedia use. Please consult Garmin GMA240 audio panel manual for managing the audio.

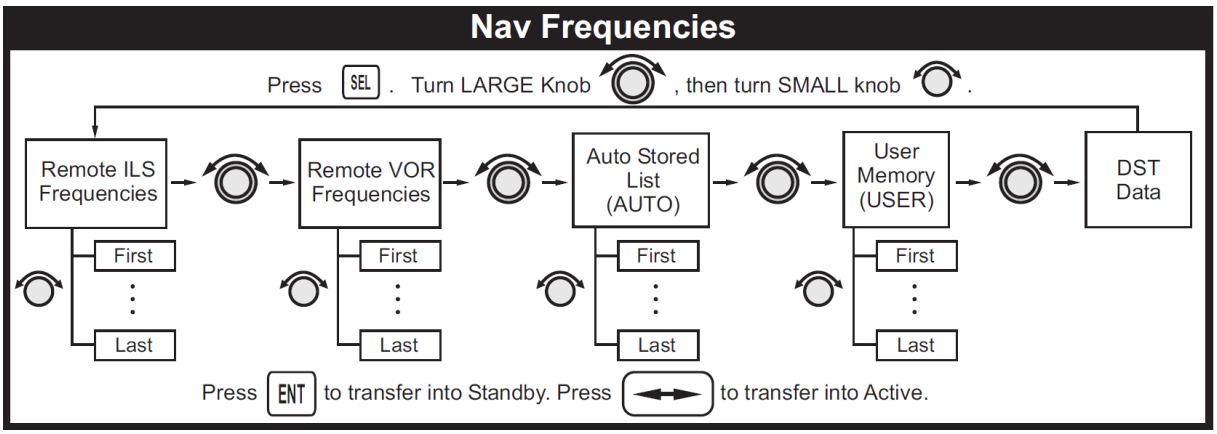
NOTE: IT'S RECOMMENDED TO CHECK FOR UPDATES OF OPERATION SYSTEM AND PROGRAMS INSTALLED ON THE PC TO ASSURE OPTIMAL PERFORMANCE AND RELIABILITY.

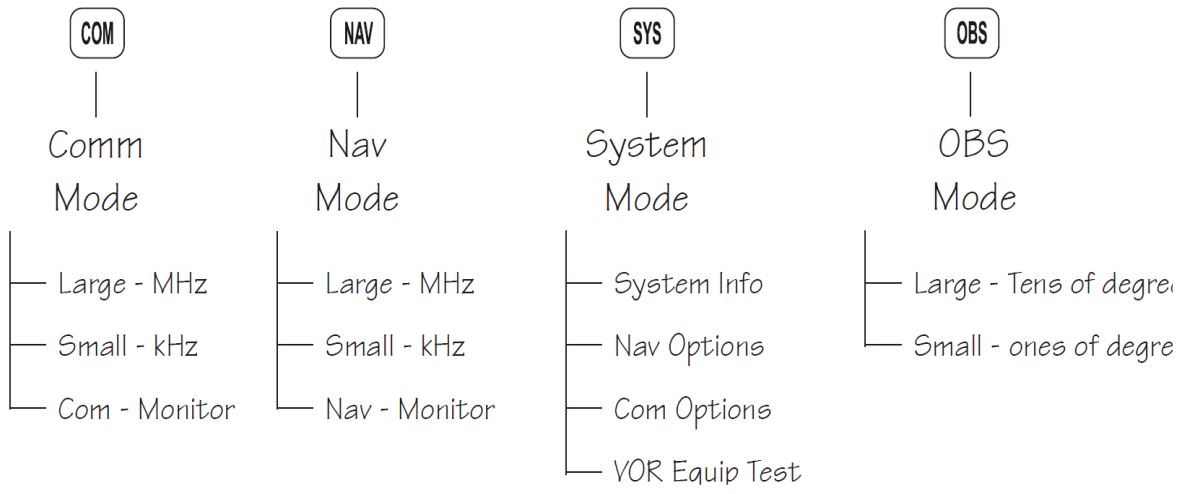
9.9 Garmin SL 30, SL 40 Quick Guide



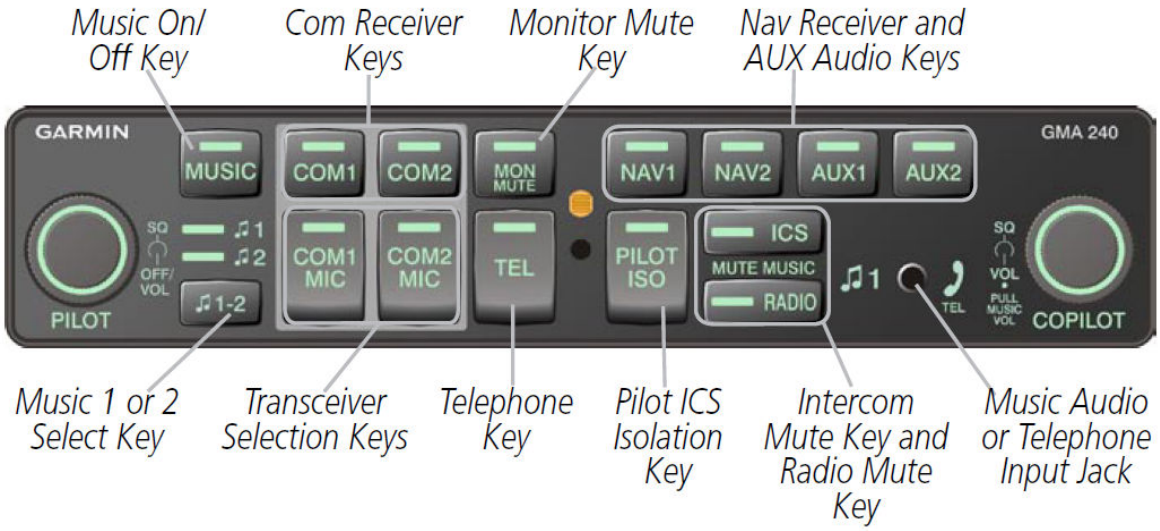



Comm Frequencies
Press SEL . Turn LARGE Knob , then turn SMALL knob .
Remote Comm Frequencies
Auto Stored List (AUTO)
User Memory (USER)
Weather
Emerg. Channel
First
Last
Press ENT to transfer into Standby. Press to transfer into Active.


Nav Frequencies
Press SEL . Turn LARGE Knob , then turn SMALL knob .
Remote ILS Frequencies
Remote VOR Frequencies
Auto Stored List (AUTO)
User Memory (USER)
DST Data
First
Last
Press ENT to transfer into Standby. Press to transfer into Active.


COM
Comm Mode
Large - MHz
Small - kHz
Com - Monitor
NAV
Nav Mode
Large - MHz
Small - kHz
Nav - Monitor
SYS
System Mode
System Info
Nav Options
Com Options
VOR Equip Test
OBS
OBS Mode
Large - Tens of degre
Small - ones of degre

9.10 Garmin GMA240 Audio Panel Quick Guide



Volume/Squelch: Rotating the Pilot Volume Knob (left small knob) controls the ON and OFF function (Full CCW detent is OFF). The large left knob controls Pilot squelch.

Pulling the right volume knob (small knob) controls music volume, pushing in controls Copilot and passenger volume. The large right knob controls Copilot and passenger squelch.

9.11 Garmin GTX328 Transponder Quick Guide

The GTX 328 transponder is powered on by pressing the STBY, ALT or ON keys, or by a remote avionics master

switch (if applicable). After power on, a start-up page is displayed while the unit performs a self test.

Mode Selection Keys

OFF - Powers off the GTX 328. Pressing **STBY**, **ON** or **ALT** Key powers on the transponder displaying the last active identification code.

STBY - Selects the standby mode. When in standby mode, the transponder will not reply to any interrogations.

ON - Selects Mode A. In this mode, the transponder replies to interrogations, as indicated by the Reply Symbol ( ). Replies do not include altitude information.

ALT - Selects Mode A and Mode C. In ALT mode, the transponder replies to identification and altitude interrogations as indicated by the Reply Symbol ( ). Replies to altitude interrogations include the standard pressure altitude received from an external altitude source, which is not adjusted for barometric pressure. The ALT mode may be selected in aircraft not equipped with an optional altitude encoder; however, the reply signal will not include altitude information.

Any time the function **ON** or **ALT** is selected the transponder becomes an active part of the Air Traffic Control Radar Beacon System (ATCRBS). The transponder also responds to interrogations from TCAS equipped aircraft.

Code Selection

Code selection is done with eight keys (**0 – 7**) providing 4,096 active identification codes.

Pushing one of these keys begins the code selection sequence. Digits that are not yet entered appear as dashes. The new code is activated when the fourth digit is entered. Pressing the **CLR** Key moves the cursor back to the previous digit. Pressing the **CLR** Key when the cursor is on the first digit of the code, or pressing the **CRSR** Key during code entry, removes the cursor and cancels data entry, restoring the previous code. Press the **CLR** Key up to five seconds after code entry is complete to return the cursor to the fourth digit. The numbers 8 and 9 are not used for code entry, only for entering a Count Down time, and contrast and display brightness.

Important Codes:

1200 - The VFR code for any altitude in the US (Refer to ICAO standards elsewhere)
7000 - The VFR code commonly used in Europe (Refer to ICAO standards)
7500 - Hijack code (Aircraft is subject to unlawful interference)
7600 - Loss of communications
7700 - Emergency
7777 - Military interceptor operations (Never squawk this code)
0000 - Military use

Avoid selecting codes 0000, 7500, and all codes in the 7600-7777 range. These codes trigger special indicators in automated facilities. An aircraft's transponder code is used for ATC tracking purposes, therefore exercise care when making routine code changes!

Keys for Other GTX 328 Functions

IDENT - Pressing the IDENT Key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.

VFR - Sets the transponder code to the pre-programmed VFR code selected in Configuration Mode (this is set to 7000 at the factory). Pressing the VFR Key again restores the previous identification code. If the VFR Key is disabled (dependent upon installation configuration) a 'VFR Key Disabled'
message appears, to indicate that no operation took place.

FUNC - Changes the page shown on the right side of the display. Display data includes Pressure Altitude, Flight Time, Altitude Monitor, Count Up and Count Down timers. Also displays Outside Air Temperature, Density Altitude, Contrast, and Display (dependent upon installation configuration).

START/STOP - Starts and stops the Altitude Monitor, Count Up, Count Down and Flight timers.

CRSR - Initiates starting time entry for the Count Down timer and cancels transponder code entry.

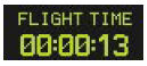
CLR - Resets the Count Up, Count Down and Flight timers. Cancels the previous keypress during code selection and Count Down entry. Returns cursor to the fourth code digit within five seconds after entry.

8 - Reduces Contrast and Display Brightness when the respective fields are displayed (dependent upon installation configuration) and enters the number eight into the Count Down timer.

9 - Increases Contrast and Display Brightness when the respective fields are displayed (dependent upon installation configuration) and enters the number nine into the Count Down timer.

Function Display

PRESSURE ALT - Displays the altitude data supplied to the GTX 328 in feet, hundreds of feet (i.e., flight level), or meters, (dependent upon installation configuration.



FLIGHT TIME - Timer start is configured as either Manual or Automatic. When Manual, displays the Flight Time, controlled by the **START/STOP** and **CLR** keys. When Automatic, the timer begins when take off is sensed.

ALTITUDE MONITOR - Controlled by **START/STOP** Key. Activates a voice alarm and warning annunciator when altitude limit is exceeded.

OAT/DALT - Displayed when the GTX 328 is configured with temperature input. Displays Outside Air Temperature and Density Altitude.

COUNT UP TIMER - Controlled by **START/STOP** and **CLR** keys.

COUNT DOWN TIMER - Controlled by **START/STOP**, **CLR**, and **CRSR** keys. The initial Count Down time is entered with the 0 – 9 keys.

CONTRAST - This page is only displayed if manual contrast mode is selected during installation configuration. Contrast is controlled by the **8** and **9** keys.

DISPLAY - This page is only displayed if manual backlighting mode is selected during installation configuration. Backlighting is controlled by the **8** and **9** keys.

Altitude Trend Indicator

When the 'PRESSURE ALT' page is displayed, an arrow may be displayed to the right of the altitude, indicating that the altitude is increasing or decreasing. One of two sizes of arrows may be displayed depending on the vertical speed rate. The sensitivity of these arrows is set by an authorized Garmin Aviation Service Center.

The GTX 328's options are normally set at time of installation. To request any changes of the GTX 328 parameters, contact an authorized Garmin Aviation Service Center.

Mode S Data Transmission

In addition to 4096 code and pressure altitude, the GTX 328 is capable of transmitting aircraft identification, transponder capability and maximum speed range. "Aircraft Identification" is commonly referred to as **FLT ID** (Flight Identification). The GTX 328 may be configured by the installer to allow the flight crew to enter **FLT ID** for each flight. An example is when air-carrier service requires changing the **FLT ID**.

The **FLT ID** may consist of the aircraft registration or a flight number as agreed upon with the local aviation authority. In either case, the **FLT ID** must be the same aircraft identification that appears in the flight plan to correlate the aircraft identification seen on ATC radar with the correct voice call sign for the aircraft. If no flight plan is filed with the aviation authority (as may be permitted by regulations), the **FLT ID** entered is the aircraft registration marking. When flight crew entry of the **FLT ID** is not required, the installer configures the system to report the aircraft identification according to local aviation requirements. In this configuration, alteration of the **FLT ID** by the flight crew is not possible.

Audio Alerts

(Setting options; male/female voice or tone, and volume level.)

- "Leaving Altitude" Altitude deviation is exceeded.
- "Timer Expired" for countdown time.