Aircraft Flight Manual

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Type Certificate No.:	EASA.A.606
Model:	Viper SD-4 RTC

This AFM is prepared following the recommended structure for flight manuals as defined in GAMA Specification No. 1.

The following documents belong to this aircraft flight manual:

- Operation manual for engine ROTAX 912S2
- manuals for installed avionics and propeller

The Airplane flight manual must be carried on board the airplane at all times. It should be stored in the aircraft.

Approved by European Aviation Safety Agency through

TCDS No.: EASA.A.606 Issue: 2

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LOG OF REVISIONS

Rev. No. / Date	Revised Pages	Description of Revision
TOM-TC-01-AFM.C	0-1 0-2 0-3 0-4 4-6; 7-8; 7-24; 7-36; 7-40;	Dual trim design change ADxC-DC-58-003
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List of approved sections

Section	Name	Status
1.5	Fuel	Approved (EASA.A.606)
1.6	Oil	Approved (EASA.A.606)
2.	Limitations	Approved (EASA.A.606)
3.	Emergency procedures	Approved (EASA.A.606)
5.	Performance	Approved (EASA.A.606)
6.1	Weight and Balance Chart and CG range	Approved (EASA.A.606)
6.3	Operating Weights & CG determination	Approved (EASA.A.606)

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Section 1
GENERAL

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1.1 Introduction

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1.1.1 Certification Base

The airplane Viper SD-4 RTC has been approved in accordance with the CS-LSA Amendment1 certification specification of the European Aviation Safety Agency (EASA.A.606).

1.1.2 General

The content of this Aircraft Flight Manual covers all instructions for carrying out a safe flight with the Viper SD-4 RTC airplane.

Each pilot and maintenance technician of the Viper SD-4 RTC airplane is obliged to get acquainted with this Manual.

The Viper SD-4 RTC airplane is operated upon its user's own responsibility.

The Viper SD-4 RTC is designed for sporting and recreational purposes.

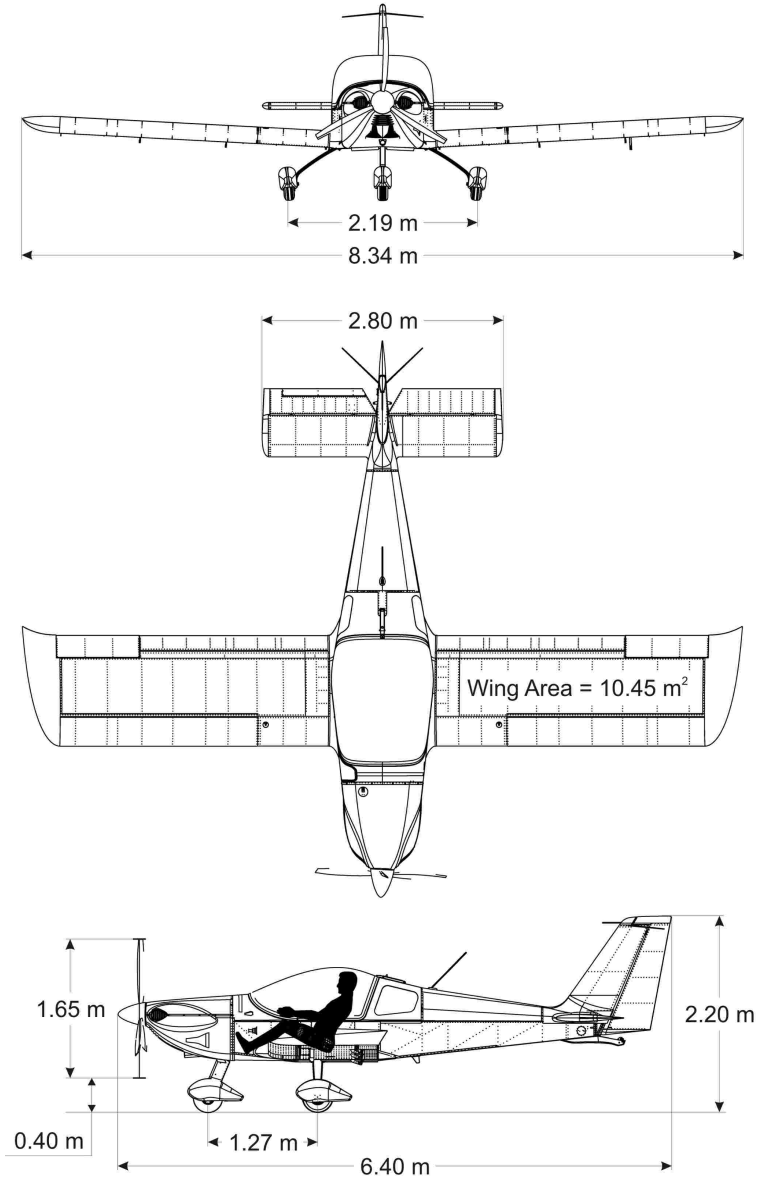
The manufacturer of the Viper SD-4 RTC airplane does not bear responsibility for damage to the airplane caused by the use of the airplane in breach of individual provisions of the operation, control or maintenance documentation of the airplane.

THIS MANUAL INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE EUROPEAN AVIATION SAFETY AGENCY REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER AND CONSTITUTES THE EASA APPROVED AIRPLANE FLIGHT MANUAL

Further documentation for the operation, control and maintenance of Viper SD-4 RTC refer to latest approved revisions of (supplied by TOMARK):

Aircraft Maintenance Manual TOM-TC-01-AMM
Rotax Engine Operation Manual 912S/ULS
Neuform Propeller Operation Manual
f.u.n.k.e. ATR-833 transceiver Pilot's Guide
f.u.n.k.e. TRT-800H transponder Pilot's Guide
Model E-04 ELT Installation manual Operation manual
Galaxy Ballistic Rescue System user guide GRS 6/600 SD S-LSA
DYNON SkyView User Guide
Garmin Aera 500 GPS manual

1.2 Three View Drawing



1.3 Engine

NOTE

For 912 ULS variants of the Viper - do not install any Service Bulletin / Service Instruction / Technical Note or other publication released by Rotax without written confirmation by TOMARK.

Number of Engines:	1
Engine Manufacturer:	BRP-Power train
Engine Model Number:	912 ULS / S
Engine type:	Reciprocating Normally aspirated Geared 2,43:1 Air cooled cylinders Liquid cooled cylinder heads 4 cylinders

Power Ratings (kW(HP)) / Engine Rotational Speeds (RPM)

(1) Take-off Power	73,5 (100) / 5 800
(2) Maximum Continuous Power	69 (90) / 5 500
(3) Operating Power = 75%	51 (68) / 5 000
Operating Power = 65%	44,6 (60) / 4 800
Operating Power = 55%	38 (50) / 4 300

Engine Speed over 5 500 RPM is restricted to 5 min.

1.4 Propeller

NOTE

Do not install any Service Bulletin / Service Instruction / Technical Note or other publication released by Neuform without written confirmation by TOMARK.

Number of Propellers:	1
Propeller Manufacturer:	Neuform
Propeller Model Name:	CR3-65-(IP)-47-101.6
Number of Blades:	3
Propeller Diameter:	1,65 m

1.5 Fuel

Usable capacity:	90 litres
Total capacity of fuel tanks:	100 litres
Fuel specification:	
Knock resistance:	min. RON 95 (min. AKI 91)
European standard (MOGAS):	
	EN 228 Super, EN 228 Super Plus
AVGAS - unleaded	UL91 (ASTM D7547)
AVGAS - leaded	AVGAS 100 LL (ASTM D910)
US standard	ASTM D4814

1.6 Oil

Description:	For the selection of suitable lubricants refer to SI-912-016 latest edition
Brand:	SHELL AeroShell Sport Plus 4 (recommended)
Specification:	Min. API SG
Viscosity:	SAE 5W-30 ÷ 15W-50 (depends on oil temperature operation
Total oil Capacity:	3,5 litres (with oil cooler)
Refill Quantity	3 litres
Oil Quantity Operating Range:	2,5 ÷ 3 litres (in sump; oil level between min. and max. mark)

1.7 Maximum Certificated Weights

Maximum Takeoff Weight	600kg
Maximum Landing Weight	600kg
Maximum Baggage Weight	7,5kg per Compartment 15kg TOTAL

1.8 Typical Airplane Weights

Empty Weight:	369 kg 410 kg maximum
Minimum Crew Weight	55kg

1.9 Specific Loadings

Wing Loading:	57,4 kg / m^2
Power Loading:	8,16 kg / kW (6 kg / HP)

1.10 Cabin Dimensions

Cabin Width:	1000/1100 mm
Cabin Length:	850/1350 mm
Cabin Height	950/1050 mm

1.11 Baggage Space

Compartment Width:	420 mm
Compartment Length:	230 mm
Compartment Height:	310 mm
Compartment Volume:	40 dm^3

1.12 Symbols, Abbreviations and Terminology

General Airspeed Terminology and Symbols

AFM	*Aircraft Flight Manual*
AMM	*Aircraft Maintenance Manual*
AMO	*Approved Maintenance Organisation*
CAS	*Calibrated Airspeed*, airspeed corrected by the error of the speed measuring system
GS	*Ground Speed*
IAS	*Indicated Airspeed* is the speed of an aircraft as shown in the airspeed indicator when corrected for instrument error.
TAS	*True Airspeed*
V_A	*Maneuvering Speed* is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{FE}	*Maximum Flap Extended Speed* is the highest speed permissible with wing flaps in a prescribed extended position

V_O	*Operating Maneuvering Speed*: No full or abrupt single pitch control input above this speed.
V_{NE}	*Never Exceed Speed* is the speed limit that may not be exceeded at any time
V_S	*Stalling Speed* or the minimum steady flight speed at which the airplane is controllable.(in clean configuration)
V_{S1}	*Stalling Speed* or the minimum steady flight speed at which the airplane is controllable in the take-off configuration
V_{S0}	*Stalling Speed* or the minimum steady flight speed at which the airplane is controllable in the landing configuration
V_X	*Best Angle-of-Climb Speed* is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	*Best Rate-of-Climb Speed* is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

Meteorological Terminology

bar.	*bar* - unit of pressure, 1 bar = 1 000 mbar
Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 1013.25 hPa (29.92” Hg).
Pressure Altitude	Altitude measured from standard sea level pressure (1013.25 hPa (29.92” Hg)) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error.
Station Pressure	An actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as the headwind or tailwind components of the reported wind.
ISA	*International Standard Atmosphere* in which (1) The air is a dry perfect gas; (2) The temperature at sea level is 15° C (59° F); (3) The pressure at sea level is 1013.25 hPa (29.92” Hg); (4) The temperature gradient from sea level to the altitude at which the temperature is -56,5°C (-69,7°F) is -0,0065° C (-0,0117° F) /m and 0°/m above that altitude.

OAT	*Outside Air Temperature* is the free air static temperature, obtained either from in flight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.

Power Terminology

Note: *Maximum Power for the combination of the engine and propeller is determined by engine speed"*

Takeoff Power	The maximum power permissible for takeoff (may be time limited)
Maximum Continuous Power (MCP)	Continuous The maximum power for abnormal or emergency operations.
Maximum Normal Operating Power (MNOP)	The maximum power for all normal operations (except Take-off). This power may be the same as Maximum Continuous Power
Cruising Climb Power	The power (not to exceed MNOP) recommended to operate the airplane in a cruise climb (a continuous, gradual climb)
Ground Idle Power	The power required to run an engine on the ground, as slowly as possible, yet sufficient to ensure satisfactory engine, engine accessory, and airplane operation with a minimum of thrust.
RPM	*Revolutions Per Minute*
kW	*Kilo-Watt*- unit of power, 1 kW = 1 000 W
HP	*Horse-Power* - unit of power, 1 HP = 0,735 kW

Engine Controls and Instruments

THROTTLE LEVER	The lever used to control engine power, from the lowest through the highest power, by engine speed.
EGT Gauge	The exhaust gas temperature indicator, on piston engine powered airplanes,
Tachometer	An instrument that indicates rotational speed of engine as RPM
3 Main Switches	"INSTR" + "MASTR" + "GENRTR"

Section Switches	Switches/Automatic Circuit Breakers to control of electric/electronic onboard equipment

Airplane Performance, Flight Planning and Navigation Terminology	
Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval
Demonstrated Crosswind Velocity	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests.
GPS	*Global Positioning System*
IFR	*Instrument Flight Rules*
IMC	*Instrument Metrological Conditions*
RWY	*Runway*
TWR	*Tower*
TXY	*Taxi Way*
VFR	*Visual Flight Rules*
VMC	*Visual Meteorological Conditions*
Weight & Balance	
Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the centre of gravity (C.G.) of an item
Moment	The product of the weight of item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Centre of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.

C.G. Limits	The extreme centre of gravity locations within which the airplane must be operated at a given weight
Usable Fuel	Fuel available for flight planning
Unusable Fuel	Fuel remaining after a run out test has been completed in accordance with governmental regulations
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment
Payload	Weight of crew and baggage.
Useful Load	Difference between takeoff weight and basic empty weight.
Maximum Takeoff Weight	Maximum weight approved for the start of the take-off run
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel
MAC	Mean Aerodynamic Chord

1.13 Warnings, Cautions and Notes

Definitions of Warning, Caution and Note used in text of the Aircraft Flight Manual are listed below:

WARNING

It means that the failure to observe the specified procedures will lead to an immediate or substantial decrease of the flight safety.
Information that may prevent danger to life and crew

CAUTION

It means that the failure to observe the specified procedures will lead to a smaller or longer-term decreased flight safety.
Information that may prevent damage to the aircraft and its equipment

NOTE

Focuses attention to a special step, which is not related directly with the flight safety but which is important or unusual.
Information of special importance to the pilot.

Section 2
LIMITATIONS

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2.1 Airspeed Limitations

Air-Speed	Description	KIAS	KCAS	Remarks
V_{NE}	Never-exceed speed	126	130	Do not exceed this speed in any flight mode!
V_C	Design Cruise speed	102	105	
V_O	operating Maneuvering speed	88	90	No full or abrupt single pitch control input above this speed.
V_A	Design maneuvering speed	88	90	
V_{FE}	Maximum flap extended speed	79	81	It must not be exceeded with extended flaps in any position.
V_S	Stalling speed in clean configuration	49	50	Soiling of the wing, rain and frost on the wing increase the airplane's stalling speed.
V_{S1}	Stalling speed in configuration Flaps – pos. II	43	44	

2.2 Airspeed Indicator Markings

Marking	KIAS value or range	Meaning
White band	**43-79**	Flap operating range. The lower limit is V_{S1} at the maximum weight in the landing configuration. The upper limit is the maximum flap extended speed.
Green band	**49-102**	Normal operating range. The lower limit is V_{S1} at the maximum weight and the front-most CG position with retracted flaps. The upper limit is the maximum structural cruising speed.
Yellow band	**102-126**	Caution range. Turns must be made with care and in calm air.
Red line	**126**	Never-Exceed speed for any flight mode.

2.3 Minimum instruments and equipment list

Instrument	optional	required	x-station[1]
Airspeed indicator		X	-200
Altimeter		X	-200
Magnetic compass		X	-250
Skyview - EFIS	X		-200
Skyview - EMS		X	-200
Trim indication (pitch and roll)		X	-200
Safety harness for every used seat		X	-200
Garmin GPS	X		-200
Radio		X	-200
Transponder		X	-200
ELT		X[2]	1248

[1] mm aft of wing leading edge
[2] depending on national regulations

2.4 Power plant Limitations

2.4.1 Propeller Limitations

Number of Propellers:	1
Propeller Type:	Ground adjustable
Blade angle	22°±°0.5°Measured at distance 425 mm from the root of the blade
Propeller Manufacturer:	Neuform
Propeller Model Name:	CR3-65 (IP) 47-101,6
Number of Blades:	3
Propeller Diameter:	1.65 m
Propeller Speed:	Max.: 2 600 RPM (equals 6320 engine RPM; exceeds engine Max RPM

2.4.2 Engine Limitations

Number of Engines:	1	
Engine Manufacturer:	BRP-Power train	
Engine Model Number:	912 S / ULS	
Max. Power:	73.5 kW (100 HP)	
Speed:	Max.:	5800 RPM Speed over 5 500 RPM is restricted to 5 min.
	Min.:	1 400 RPM
Engine operation at zero gravity	Max.:	5 second at max. -0,5g
Coolant Temperature:	Max.:	120° C (248° F)
Oil Pressure:	Max.:	7 bar (102 psi); For a short period admissible at cold start
	Min.:	0,8 bar (12 psi) Below 3 500 RPM
Oil Temperature:	Max.:	130° C (266° F)
	Min.:	50° C (120° F)
Fuel Pressure:	Max.:	0.50 bar
	Min.:	0.15 bar
Exhaust Gas Temperature (EGT):	Max.:	880° C (1616° F) /take-off/
Engine Start Operating	Max.:	50° C (120° F) / ambient /

Temperature: Min.: -25° C (-16° F) / oil /

2.4.3 Power Plant Instruments Markings

Instrument	Red line Lower limit	Yellow band Warning range	Green band Normal operation	Yellow band Warning range	Red line Upper limit
Tachometer	0÷220 RPM	220÷1350 RPM	1 350÷ 5 500 RPM	5 500÷ 5 800 RPM	5 800÷ 5900 RPM
Manifold Pressure	-----	-----	600÷926 mbar	926÷1 014 mbar	1 014 mbar
Exhaust Gas Temperature	-----	0÷800 °C	800÷850 °C	850÷880 °C	880÷900 °C
Coolant Temperature	-----	50÷75 °C	75÷110 °C	110÷120 °C	120÷135 °C
Oil Temperature	0÷50 °C	50÷90 °C	90÷110 °C	110÷130 °C	130÷150 °C
Oil Pressure	0÷0.8 bar	-----	0.8÷5.0 bar	5.0÷7.0 bar	7.0÷8.0 bar
Fuel Pressure	0.15 bar	-----	0.15÷0.50 bar	-----	0.5÷0,7 bar
Fuel Flow	-----	-----	0÷25 l/h	25÷30 l/h	30÷35 l/h
Ammeter	-15÷-14 A	-14÷-12 A	-12÷+23 A	+23÷+24 A	+24÷+25 A
Voltmeter	10÷11 V	11÷12.4 V	12.4÷14.6 V	14.6÷15.6 V	15.6÷16 V
Fuel Capacity	0÷5 litres	5÷10 litres	10÷45+ litres	-----	-----

2.5 Weight Limits

Maximum Takeoff Weight	600 kg
Maximum Landing Weight	600 kg
Minimum Weight of Crew	55 kg
Maximum Baggage Weight	7.5kg per Compartment/15kg Total
Maximum Empty Weight	410 kg

2.6 Centre of Gravity Limits

CG range:	Forward: 24 %MAC
	Aft: 32 %MAC

2.7 Maneuver Limits

Viper SD-4 RTC airplane is designed only for non-aerobatic operation!

Aerobatic flights and intentional spins with the Viper SD - 4 are strictly forbidden.

2.8 Kinds of Operation Limits

Viper SD-4 RTC may only be used for flights during the day, under VMC conditions, according to the day-VFR rules.

Flights in icing conditions, flight into IMC conditions are prohibited.

Intentional spinning and aerobatic maneuvers are prohibited.

Maximum demonstrated components of wind for Take-off and Landing

Cross	Max.: 15 kts (7.5 m/s)
Tail	Max.: 5 kts (2,5 m/s)

2.9 Flight Load Factor Limits

In normal operations:

Maximum Positive g-load:	+4 g
Maximum Negative g-load:	-2 g
With Flaps out max pos. g-load	+2 g
With Flaps out max neg. g-load	0 g

2.10 Fuel Limitations

Fuel Capacity in Each Fuel Tank:	50 litres
Total Fuel Capacity:	100 litres
Unusable Fuel in Each Tank:	5 litres
Total Usable Fuel Capacity:	90 litres

2.11 Outside Air Temperature Limits

Maximum outside temperature	+40 °C
Minimum outside temperature	-15 °C (at ground)

2.12 System and Equipment Limits

Starter

Starter activation without interruption	Max.:	10 seconds
Cooling period after 10 seconds starter use	Min.:	2 minutes

Ballistic Parachute Rescue System

Allowed never exceed speed KTAS for use V_{NE}	Max.:	170 kts
Temperature range	Max.:	+60° C
	Min.:	- 40° C

On-board electric socket

Power consumption 12V	Max.:	1 A (12 W)

2.13 Miscellaneous Limits

Flap position III (40deg) is only to be used for emergency and precautionary short field landings as described in section 3. At this flap setting, full trimmability is not possible.

Pilot in command seat is the left hand seat.

No smoking on board of Viper SD-4 RTC aircraft.

2.14 Placards

Location	Placard
Inside the Cabin	
The Left Instruments Panel	
Above the push button starter	START
Above the generator switch/circuit breaker	GENRTR
Above the master switch/circuit breaker	MASTR
Above the instrument switch/circuit breaker	INSTR
Above left RED warning indicator light	GENRTR WARNING
Above GREEN indicator light	FUEL PUMP
Above middle RED indicator light	ALARM EMS
Above right RED indicator light	STARTER PROCESS
Above the EFIS screen USB interface connector	USB SkyView ONLY
At the top in the right corner near centre panel	KIAS LIMITS
Above the BRS activation handle in the centre at the bottom	TO ACTIVATE PARACHUTE PULL HANDLE
Left at the bottom	POH/AMM
Centre Instrument Panel	
At the top in the centre	(Call sign)
At the left side in line with switches/circuit breakers	ON OFF
Above the EMS switch/circuit breaker/	EMS
Above the Inter COMM switch/circuit breaker	INTRCM
Above the COMM Transceiver switch/circuit breaker	RADIO
Above the EFIS switch/circuit breaker	EFIS
Above the Fuel Pump switch/circuit breaker	FUEL PUMP
Above the Start Power switch/circuit breaker	STARTER POWER
Above the Flaps switch/circuit breaker	FLAPS

Location	Placard
At the left side in line with switches/circuit breakers	ON OFF
Centre Instrument Panel	
Above the Trim switch/circuit breaker	TRIM
Above the GPS Navigation receiver switch/circuit breaker	GPS
Above the Transponder SSR ATC switch/circuit breaker	XPDR
Above the Navigation Lights switch/circuit breaker	NAV LIGHTS
Above the Strobe Lights switch/circuit breaker	STROBE
Above the Socket 12V/1A switch/circuit breaker	SOCKET 12V/1A
Above position of blended opening for reserve switch/circuit breaker	RES.
Left at the bottom	Do not exceed MTOM 600kg!
In the centre at the bottom	AEROBATICS and intentional spins are PROHIBITED !
Right at the bottom	This aircraft has been approved only for VFR day flights under no icing conditions and must be operated within limitations defined in AFM
Right Instrument Panel	
Above the EMS screen USB interface connector	USB SkyView ONLY
Above the SOCKET 12V (Cigarette Lighter Connector)	SOCKET 12V
Above the Cabin Heating control handle	CABIN HEAT
Above the Carburettor Heating control handle	CARB. HEAT
Above the Cylinder Heating control handle	CYLINDER AIR

Location	**Placard**
Cylinder Air lever head	PULL ON
Cabin Heat and Carb. Heat lever heads	PULL CLOSE
Above instrument Panel	
Inside of cockpit on the upper left/right cover of instrument panel	WARNING This aircraft is equipped with ballistically-deployed emergency parachute system
Front part of the centre console between the seats	
Under/In back of the THROTTLE LEVER	THROTTLE
Under the Choke control handle	CHOKE PULL & HOLD ON
On top of the Brake Lever	BRAKE
Under the Brake Lever head	Viper SD-4 RTC (logo)
Behind the Seats	
Baggage compartment (2x)	Baggage 7,5kg
Behind the baggage compartment	NOT FOR BAGGAGE
Storage Compartment	
Storage compartment for Pilot Operation Handbook / Aircraft Maintenance Manual	POH/AMM
Air Valve	
Informative direction at each air valve on canopy	CLOSE ⇔ OPEN OPEN ⇔ CLOSE

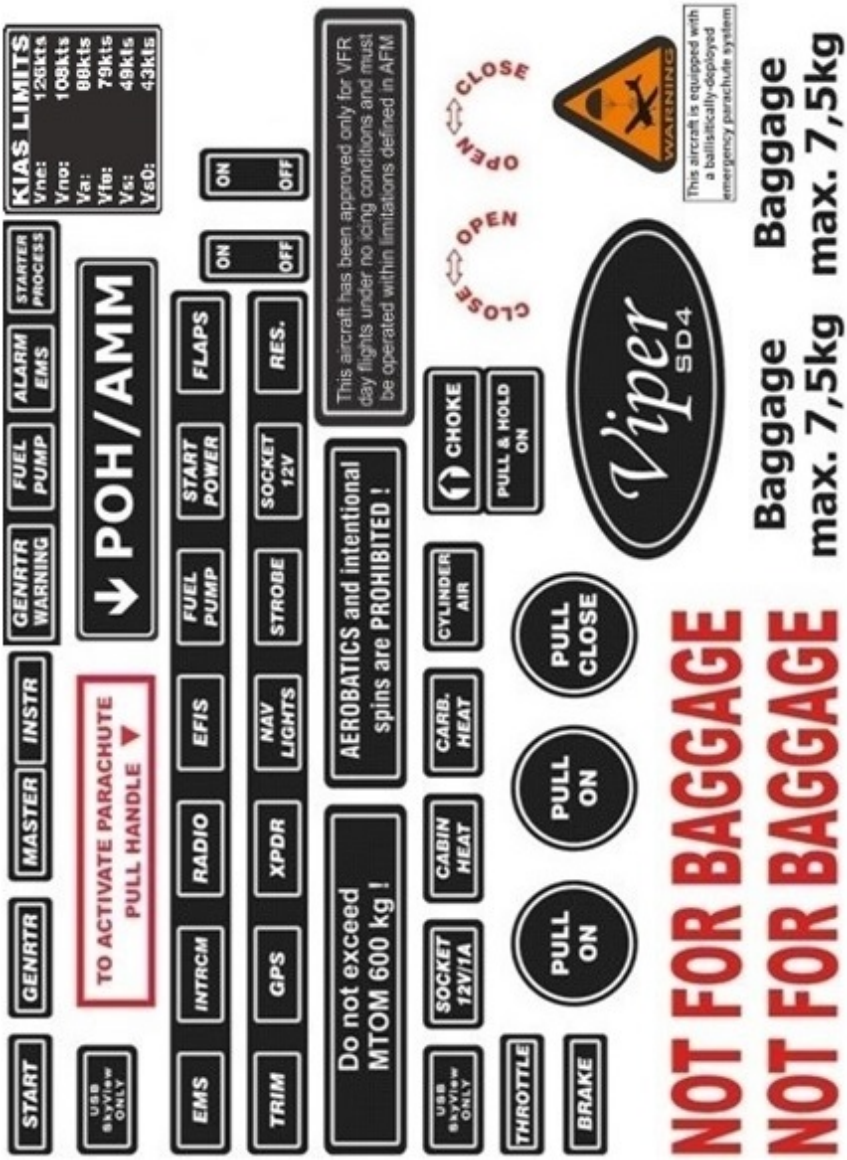


Figure 2-1 Cabin placards preview

Location	Placard
Outer airplane surfaces	
Under the oil dipstick cover located at the right side of the upper part of the engine cowl in front of the canopy edge	RON 424 / SAE 10W-40 API min. SG or higher (see also SI-912-016 ch. 3 the latest issue)
The right side of the fuselage in front of the leading edge of the right wing and in front of the lower edge of the edge (BRS rocket cover)	DANGER - EXPLOSIVE - EGRESS triangle + pictogram
The right side of the fuselage in front of the leading edge of the right wing and in front of the lower edge of the edge under the warning triangle (BRS rocket cover)	STAY CLEAR
Front part of the fuselage (2 x, left side + right side; under the upper edge and in front of the aft edge of the lower engine cowl)	SD-4 (logo)
Fuel tank (edgewise fuselage)	NO STEP
Near the tank filler cap of the fuel tank (2x)	MAX 50L, Usable Fuel 45L, Min RON 95
Ailerons, Flaps, Elevator, Elevator up-float tab, Rudder (trailing edge)	NO PUSH
Flaps (edgewise fuselage)	RED RECTANGLE + RED CROSS + NO STEP (written on red cross)
Canopy (2 x, left side + right side; in front of the lower front edge of the ventilation window, nearby lock handles)	OPEN - CLOSE (PICTOGRAM)
Vertical stabilizer (2x, left side + right side)	Viper SD-4 RTC (logo)
The wheel fairing of the front landing gear – at the left side of just above the wheel axis seat	TYRE 120 + 10kPa

Location	Placard
The wheel fairing at the left leg of the main landing gear - at the left side just above the wheel axis seat (1x) The wheel fairing at the right leg of the main landing gear - at the right side just above the wheel axis seat (1x)	TYRE 220 + 10kPa
Right side of fuselage near the location of the ELT in Baggage compartment	White cross on green rectangle
Left side of fuselage near the location of the First-aid kid in Baggage compartment	White pictogram of fire extinguisher on red rectangle
Left side of fuselage near the location of the Fire extinguisher in Baggage compartment	Black ELT LOCATED HERE on yellow triangle
The fuselage (2x, left and right side between wing trailing edge and vertical stabilizer leading edge at the upper half part of the fuselage The bottom part of the left wing	(Registration)

Figure 2-2 Outer airplane surface placards preview

Section 3
EMERGENCY PROCEDURES

Table of Contents

3.1 Airspeeds for Emergency Procedures

Engine Failure After Take-off:	
Flaps UP	64 KIAS
Flaps Down-Position I	64 KIAS
Air Start:	>70 KIAS
Balked Landing:	>53 KIAS
Maximum Glide:	64 KIAS
Landing Without Engine Power:	
Flaps Up	64 KIAS
Flaps Down	64 KIAS

3.2 Engine Failure

3.2.1 During Take-off run

THROTTLE LEVER	Pull to idle
Brake	Brake until STOP
Fuel Pump	Switch OFF
FUEL selector	CLOSE
IGNITION	Switch OFF
Section switches	Switch OFF
3 Main switches	Switch OFF

3.2.2 After Take-off

Airspeed	Maintain 65 KIAS
Fuel Pump	Switch OFF
IGNITION	Switch OFF
3 position FUEL LANE selector	CLOSE
Flaps	Extend as desire
Carry out an Precautionary Landing	
Instruments	Switch OFF after landing
Section switches	Switch OFF
3 Main switches	Switch OFF

CAUTION

If the engine fails at low altitudes, carry out landing in the direction of the flight (with diverting, if there are obstacles in the direction of the flight).

3.2.3 Engine Failure in-Flight, engine restart

Airspeed ..... Maintain 70 KIAS
Carburettor Heat ..... ON
Landing field ..... Chosen
All unnecessary equipment ..... Switch OFF
3 position FUEL LANE selector Switch to the tank with more fuel
FUEL pump ..... Switch ON
Fuel Pressure ..... Confirm
IGNITION ..... Switch OFF than to BOTH
If engine is not windmilling
STARTER POWER ..... Check if it is ON or switch ON
START button ..... Press until engine starts
If starter is inoperative and propeller is not windmilling:
AIRSPEED 115KIAS
Engine is running ..... Switch ON all necessary equipment
THROTTLE LEVER ..... Adjust
Carburettor Heat ..... Check

Note: *The carburettor heat control should never be used in intermediate position. A gradually reducing power might be caused by carburettor icing – this however is not always noticed; therefore carburettor icing must also be considered as potential reason for complete engine shut down.*

Note: *In case of engine failure maintain speed at best glide and do not reduce speed unnecessary to avoid the propeller stopping.*

CAUTION

After starting the engine land as soon as practical.

If you fail starting the engine proceed with emergency landing according to the point 3.9.1

3.2.4 Engine shut down after Failure in-Flight

Airspeed ..... Maintain 65 KIAS
IGNITION ..... Switch OFF
Fuel Pump ..... Switch OFF
3 position FUEL LANE selector Switch OFF
Carry out Emergency Landing according to the point 3.9.1

3.3 Exceeding of Maximum Admissible Engine Speed

Engine Speed ..... Reduce engine speed

3.4 Not possible power setting - Throttle lever linkage cables failure

Air speed ..... Appropriate to power setting
Altitude ..... Control by switching ignition ON/OFF as required
Airspeed while engine OFF ..... > 70 KIAS
Landing ..... As soon as practical

3.5 Oil System Failures

Oil Pressure Below Minimum – On Ground

Engine Speed ..... Stop the engine immediately
Oil system ..... Check

3.5.1 Oil Pressure Below Minimum – During Flight

THROTTLE LEVER ..... Reduce engine power setting to the minimum necessary to maintain flight
Oil Temperature ..... Monitor
Landing ..... Land as soon as practical / prepare for emergency landing

3.5.2 Oil Pressure Over Maximum – On Ground

Engine Speed ..... Stop the engine immediately
Oil system ..... Check

3.5.3 Oil Pressure Over Maximum – During Flight

THROTTLE LEVER	Reduce engine power setting to the minimum necessary to maintain flight
Oil Temperature	Monitor
Landing	Land as soon as practical / prepare for emergency landing

3.5.4 Exceeding of Maximum Admissible Oil Temperature – On Ground

Engine Speed	Stop the engine immediately
Oil system	Check

3.5.5 Exceeding of Maximum Admissible Oil Temperature – During Flight

THROTTLE LEVER	Reduce engine power setting to the minimum necessary to maintain flight
Oil Temperature	Monitor
Landing	Land as soon as practical / prepare for emergency landing

3.6 Cooling System Failures

3.6.1 Exceeding of Maximum Admissible Coolant Temperature

THROTTLE LEVER	Reduce engine power setting to the minimum necessary to maintain flight
Oil Temperature	Monitor
Landing	Land as soon as practical / prepare for emergency landing

3.7 Propeller Failures During Flight

This failure is accompanied by strong vibrations. Vibrations of the engine are transmitted to the structure of the entire airplane.

The propeller malfunction can cause significant destruction of propeller and consequently damage to the engine or its attachment to the fuselage.

It can be accompanied by an immediate increase of engine speed over maximum admissible engine speed.

THROTTLE LEVER	Reduce engine power
IGNITION	Switch OFF if necessary
Airspeed	Reduce until vibrations are within acceptable level.
Section switches	Switch OFF all not need equipment for flight continuation
Landing	Land as soon as practical / prepare for emergency landing

3.8 Glide

Airspeed specified	Maintain 64 KIAS
Glide ratio:	8:1
Glide range:	1.32 Nm per 1000 ft

3.9 Landing Emergencies

3.9.1 Emergency Landing without Engine Power

Airspeed	Maintain 64 KIAS
Section switches	Switch OFF unnecessary for the continuation of the flight
IGNITION	Switch OFF
Fuel Pump	Switch OFF
3 position FUEL LANE selector	Switch OFF
Flaps	As appropriate
ELT	Consider Activation
After landing:	
Section switches	Switch OFF

3 Main switches ..... Switch OFF

3.9.2 Precautionary Landing with Engine Power

Airspeed ..... Adjust to 64 KIAS
Section Switches ..... Switch off all unnecessary equipment
Fly over the ground altitude ..... 500 ft
Flaps ..... Position I
Traffic pattern altitude ..... 500 ft
Final approach FLAPS ..... Position III
ELT ..... Consider activation
Short before touch down
Fuel Pump ..... OFF
Fuel selector ..... OFF
Ignition ..... OFF
After touch down
Brake ..... Brakes; apply full and lock after airplane is stopped
3 Main switches ..... Switch OFF

- ✈ Select a suitable area for landing, against the wind direction, if possible.
- ✈ Carry out a fly-over 500 ft above the ground against the wind with flaps at Position I at 64 KIAS and examine thoroughly the condition of the surface (obstacles, quality of the surface).
- ✈ Do a traffic pattern at 500 ft above ground or at an altitude allowed by a decreased cloud base.
- ✈ Extend the flaps into Position I before making the last turn.
- ✈ Do not lose the sight of the selected area.
- ✈ Consider to activate the ELT in case a crash during landing cannot be excluded.
- ✈ Make the final approach in the landing configuration, with increased power of the engine, adjust the approach to touch down right after the passing of the edge of the selected area.
- ✈ Right before touchdown shut OFF the fuel pump and turn OFF the FUEL SELECTOR.
- ✈ Brake after touch down; when the airplane stops, switch off the main switches, and secure the airplane against movement.

3.9.3 Approach and Landing with Flaps Retracted

Approach	Perform with engine power with estimation of landing to the RWY threshold
Airspeed	Adjust to 64 KIAS
THROTTLE LEVER	As appropriate
Touchdown	Perform standard touchdown on RWY at the RWY threshold

3.10 Landing Gear failures

The pilot finds out that gear is defective generally in the moment of touchdown.

Airplane tends to veer to the side of the damaged landing gear leg with a strong braking effect on the side of the damaged landing gear leg after touch down on the runway.

However, it can cause extensive damage of individual aircraft parts (landing gear, propeller, engine fairings, engine, wings, fuselage and tail).

Short before touch down:

Flaps	Position III
Fuel Pump	OFF
Fuel selector	OFF
Ignition	OFF
Touch down	Accomplish standard touch down at the lowest possible speed

After touch down:

Brake	Brakes; apply full and lock after airplane is stopped
Control	Maintain control, unload nose gear
Brake	Gentle if possible; apply only to avoid obstacle
3 Main switches	Switch OFF

After the aircraft is stopped:

Flaps	Retract
Section switches	Switch OFF
3 Main switches	Switch OFF

3.11 Smoke and Fire

3.11.1 Engine Fire During Take-off (On the Ground)

3 position FUEL LANE selector CLOSE
THROTTLE LEVER ..... IDLE
IGNITION ..... Switch OFF
Fuel Pump ..... Switch OFF
Brake ..... Brake until STOP
3 Main switches ..... Switch OFF
Evacuate airplane

3.11.2 Engine Fire After Take-off and During Flight

3 position FUEL LANE selector CLOSE
Fuel Pump ..... Switch OFF
THROTTLE LEVER ..... MAX until engine stops
IGNITION ..... Switch OFF
Equipment unnecessary for
the continuation of the flight ..... Switch OFF
Cabin Heat ..... OFF
Attitude and Ventilation ..... Adjust
Carry out an Emergency Descent
Brake ..... Brake until STOP
3 Main switches ..... Switch OFF
Evacuate airplane

WARNING

Do not start the engine
after you extinguished the fire on the engine compartment.

3.11.3 Fire in the cockpit

Localize the place of fire
Extinguish the fire with all available means
Vent the cabin through the vents

WARNING

If you fail to extinguish the fire carry out the emergency landing. Land the airplane as soon as possible to inspect for damage.

3.12 System Emergencies

3.12.1 Electrical system failures

Generator failure

When the red GENRTR WARNING indicator on the left instrument panel, located above the Dynon SkyView screen, is ON, it informs the pilot about charging failure.

Charging current and voltage.... Check
Recycle generator
Instruments unnecessary for
flight continuation ..... Switch OFF
Landing ..... Land as soon as possible

CAUTION

After flight with failed generator the battery has to be checked and recharged before the next flight.

Overloading of the current circuit (shortcut)

An overloading of a current circuit is signalled by the failure of the device concerned and the activation of the automatic circuit breaker in the respective section switch.

Section switches ..... Check
The respective section switch ... Switch ON
The device concerned..... Check the functionality

WARNING

After repeated overloading of a current circuit
do not switch-ON the respective section switch!

There is a risk of electric fire or permanent damage to the current circuit and/or to the device concerned.

3.13 Loss of EMS or EFIS functionality

In case of a Skyview system display failure the remaining operational display switches to a default setting in which only PFD and ENG page are shown. The NAV page is no longer accessible. Resume navigation on traditional means and/or Garmin GPS.

Failure of the ADAHRS can lead to erroneous display of one or several parameters of air data, attitude or heading. Resume flight on outside reference and analogue instrumentation.

In case of EMS data failure all engine related information is lost.
Resume flight with airspeeds not exceeding 85KIAS which ensures that engine speed stays within limits.

Land as soon as practical
Continue to the nearest airfield / airport
Follow procedures for Normal Landing described in Chapter 4.10

3.14 Loss of Flight Controls

For all possible flight control failures:

Airplane configuration	Do not change the airplane configuration (flaps should stay where they are)
Power setting	Change power setting only gradual
Control	Control the airplane by remaining means
ELT	Activate ELT
Landing	Land as soon as possible

If control is not possible:

IGNITION	Switch OFF
FUEL selector	OFF
Rescue parachute	Activate (see 3.17)

3.15 Spin

The Viper SD4 can be recovered from an unintentional spin by standard "PARE" (Power/Aileron/Rudder/Elevator) procedure

POWER	Idle
AILERONS	Neutral position
RUDDER	Fully push against direction of rotation until rotation stops
ELEVATOR	Release and make a smooth but fast recovery from the dive

Note: *The four recovery initiation actions are performed basically simultaneously. The pull out must be limited to avoid dynamic stall which is noticeable by buffeting. In case of spin recovery, it may happen that the published load factor and V_{FE} is exceeded. The aeroplane has been proven to withstand such exceedance.*

WARNING

In case of spin recovery the airplane must undergo a specific inspection as prescribed in the maintenance manual

3.16 Vibrations

Vibrations may occur as a consequence of:

1. An adverse flight mode (slipping/skidding, stalling speed)
   - ➢ Change the flight mode.
2. A technical fault of the engine or propeller
   - ➢ Choose an engine mode in which the vibrations are the lowest (by controlling the engine`s RPM and flight speed).
   - ➢ Land as soon as possible
3. Carburettor icing
   - ➢ Use carburettor heating control.
   - ➢ Change the flight level/altitude.
4. Spinning unbalanced landing gear wheels
   - ➢ Stop the wheels by pushing the wheel brake. Do not lock the landing brake!

3.17 Activation of the rescue parachute

IGNITION	Switch OFF
Passenger	Advice to brace
ACTIVATION HANDLE	PULL hard at least 100 mm Force required for firing is approx. 110 N.
ELT	Activate
Fuel selector	OFF
Devices not necessary needed for further descent	Switch OFF all
Ground impact	Protect your face and body as possible

CAUTION

The system is designed for the use in the following cases:

- ➢ Damage to the airplane after collision with other object
- ➢ Loss of the integrity of the airplane's structure
- ➢ Loss of the possibility to control the airplane
- ➢ Engine failure over a terrain in which it is not possible to land safely
- ➢ Pilot's difficulties during the flight that may cause his inability to land normally

3.18 List of EMS warning alerts

Message Displayed in Message Window	Meaning	Recommended Pilot Action
ENGINE MONITOR	(audio only) unspecified alarm	• Look at screen
ENGINE SPEED HIGH	Tachometer exceeds 5800 RPM	• Reduce RPM by reducing Throttle or airspeed, if possible. • Perform according to emergency checklist 3.3
CYLINDER HEAD TEMPERATURE HIGH	Cylinder head temperature above 120°C	• Reduce engine power • Open cylinder air
EXHAUST GAS TEMPERATURE HIGH	Exhaust gas temperature above 880°C	• Reduce engine power • Pull Carb
OIL PRES HIGH	Oil pressure above 7 bar at least 5 seconds after engine start	• Reduce engine power • Perform according to emergency checklist 3.5.2 and 3.5.3
OIL PRES LOW	Oil pressure below 0,8 bar	• Monitor oil temperature • Perform according to emergency checklist 3.5 and 3.5.1
OIL TEMP HIGH	Oil temperature above 130°C	• Monitor oil pressure • Perform according to emergency checklist 3.5.4 and 3.5.5.

FUEL PRESSURE HIGH	Fuel pressure above 0,5 bar	• Switch OFF electric fuel pump • Monitor fuel pressure
Message Displayed in Message Window	**Meaning**	**Recommended Pilot Action**
FUEL PRESSURE LOW	Fuel pressure below 0,15 bar	• Switch ON electric fuel pump • Monitor fuel pressure • If problem remains, switch fuel tanks
FUEL FLOW		• Turn ON fuel pump • Change fuel tanks • Monitor fuel pressure and fuel flow
FUEL QUANTITY	Fuel quantity below 5 litres useable in one tank. This warning might occur during a side slip or crosswind landing.	• Switch to full tank • Check fuel quantity and refuel as needed. • Consider landing to refuel
VOLTAGE HIGH	System voltage above 15,6V	• Switch OFF GENERTR • Monitor Voltage and Ammeter • Reduce electrical load • Land as soon as practical

VOLTAGE LOW	System voltage below 11V	• Reduce electrical load • Monitor Voltage and Ammeter • Land as soon as practical
Message Displayed in Message Window	**Meaning**	**Recommended Pilot Action**
ELECTRICAL CURRENT HIGH	Ammeter above +24 A	• Switch OFF GENERTR • Monitor Voltage and Ammeter • Reduce electrical load • Land as soon as practical
ELECTRICAL CURRENT LOW	Ammeter below -24 A	• Reduce electrical load • Monitor Voltage and Ammeter • Land as soon as practical
CHECK CANOPY LATCH	Canopy switches indicate open canopy	• Check Canopy locks on both sides.

3.19 List of EMS caution alerts

Message Displayed in Message Window	Meaning
BACKUP BATTERY IN USE	System has switched to SkyView Battery Backup
OTHER DISPLAY OFFLINE	A SkyView Display has failed or is no longer communication via SkyView Network

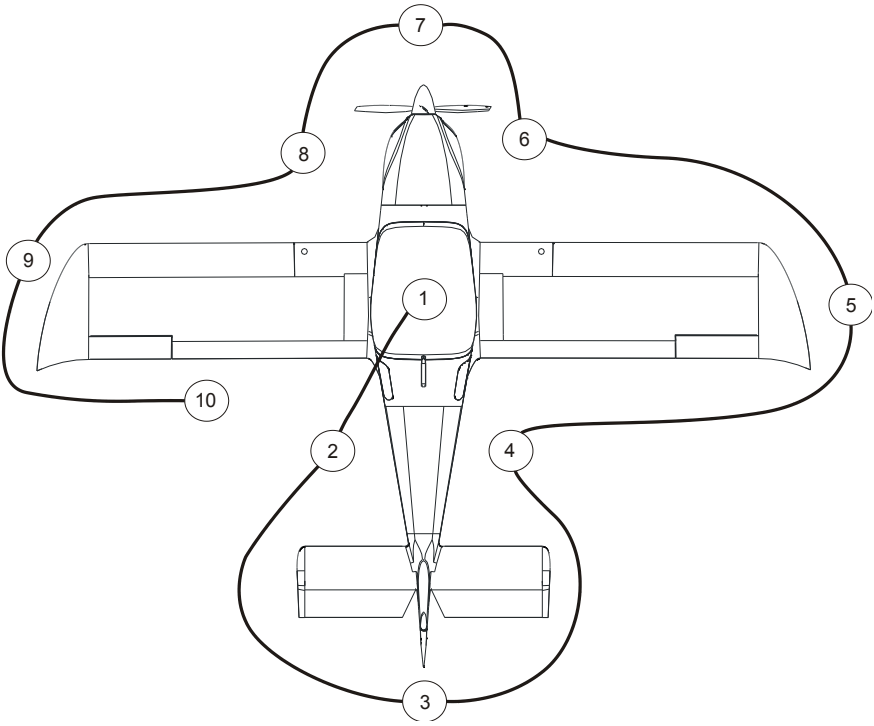
Section 4
NORMAL PROCEDURES

Table of Contents

4.1 Airspeeds for Normal Operations

Takeoff, Flaps Up	
Normal Climb out	65 KIAS
Short Field Takeoff, Flaps Up, Speed at 50 ft	56 KIAS
En-route Climb, Flaps Up:	
Recommendation: *Pick a speed of 500fpm climb as it will provide enough cooling and a sufficient cruise speed for a cruise climb*.	
Best rate of climb (Vy)	
Normal, Sea Level	66 KIAS
Normal, 10, 000 Feet	60 KIAS
Best angle of climb (Vx)	53 KIAS
Maneuver speed	88 KIAS
Approach and Landing	
Normal Approach, Flaps Up	65 KIAS
Normal Approach, Flaps Position II	63 KIAS
Maximum speed for flaps extracting to Position II	79 KIAS

4.2 Pre-flight Inspections



1 - Cockpit
2 - Left side of the fuselage
3 - Empennage
4 - Right side of the fuselage
5 - Right wing
6 - Engine compartment
7 - Propeller
8 - Front landing gear
9 - Left wing

10 - Main landing gear

Pre-flight inspection must be carried out by the pilot according to the procedure specified below. Identified deficiencies have to be removed before the flight and should be recorded in the aircraft log book.

1. Cockpit:

- ✈ Remove cockpit and aircraft covers
- ✈ Open the canopy.
- ✈ Check IGNITION is OFF
- ✈ Check the canopy for cleanliness, possible damage, functioning of the canopy locks.
- ✈ Check the seat harness.
- ✈ Attach loose objects (put them into boxes) or remove them.
- ✈ Check the movements of the control stick and rudder
- ✈ Verify free movement of the THROTTLE LEVER
- ✈ Switch on 3 Main switches MASTR, GENRTR and INSTRUMENTS
- ✈ Switch on section switches: EFIS, EMS, FLAPS, TRIM, NAV LIGHTS, STROBE
- ✈ Set FLAPS to Position III – check functionality
- ✈ Set trims to both take-off positions – check functionality
- ✈ Check functionality of navigation and strobe lights
- ✈ Check the fuel qty indication (EMS screen, compare to actual filling as visible with removed filler cap).
- ✈ Switch OFF section switches and 3 main switches. (all OFF)

2. Left side of the fuselage

- ✈ Check the fuselage skin, damage to the coating, riveted joints, check the attachment of covers.
- ✈ Check fixation of antennas

3. Empennage

- ✈ Check the attachment and skins of the surfaces and riveted joints
- ✈ Check free movement of the rudder and elevator
- ✈ Check play and attachment of trim tabs
- ✈ Check play in the hinge pins of the rudder and elevator hinges.
- ✈ Check correct seating of split pins in the rudder and elevator hinges, steering rods and connections.
- ✈ Check the static pressure sensor at the top of the vertical stabilizer for possible damage.
- ✈ Check mounting of strobe
- ✈ Check tail skid for damage
- ✈ Remove mooring rope and rudder and elevator locks

4. Right side of the fuselage

- ✈ Check the fuselage skin for damage to the coating and riveted joints, check the attachment of the covers and antennas.

5. Right wing

- ✈ Check the wing for the integrity of the skin, riveted joints, attachment of the wing-tip;
- ✈ Check flap and aileron hinges and their free movement
- ✈ Check securing of flap and aileron pins
- ✈ Check identical extension of the flaps in all positions;
- ✈ Check aileron trim tab and hinges
- ✈ Check visually the quantity of fuel
- ✈ Check fuel drain for water and sediment
- ✈ Check the closing of the fuel tank,
- ✈ Remove mooring ropes and aileron locks

NOTE

When the same trim is operated simultaneously in opposition, the trim will not respond, vice-versa when operated simultaneously in the same direction, the trim will continue responding. PIC should be aware that the trim might be modified from the co-pilot seat. The not responding of trim is visible to pilot/co-pilot on the SkyView screen by stopped movement of trim indicator.

NOTE

Recommend to not fill individual tanks more than 90% of their maximum volume at outside temperature exceeding 25°C in order to avoid excessive spillage due to thermal expansion.

6. ***Engine compartment***

- Demount the upper part of the engine cowl
- Check the attachment of the engine mount and of the engine
- Check the electric cable cabling, connector connections
- Check hoses and their attachment
- Check the attachment of the cables to the battery and the air filter
- Check the attachment of the exhaust pipes
- Check the tightness of the engine, lubrication system, cooling system, oil radiator and cooling radiator (traces of operation fluids), attachment of the high-voltage cables of the sparking plugs
- Check clear tube between manifold pressure sensor and engine to not have accumulated fuel
- Check coolant and replenish as required
- Remove oil tank cover
- Turn the propeller slowly by hand in direction of engine rotation several times to pump oil from the engine into the oil tank.
  Maintain the compression pressure for a few seconds to let the gas flow via piston rings into crankcase.
  This process is finished when air is returning back to the oil tank and can by noticed by a gurgle from the open oil tank
- Check oil level and replenish as required
- Install oil tank cap back.
- Check the exhaust pipes, cabin heat shroud and muffler for damage, leakage, and overall condition
- Check the cleanness of the radiator inlets
- Check the condition of the cushioning rubber band of the front landing gear
- Mount the upper part of the engine cowl
- Check the Landing light for cracks (if installed)
- Wash the landing light if its surface is covered with dirt (if installed)

7. ***Propeller***

- Firm fit of the blades and of all screws
- Check propeller tips for play. Play of propeller tips should solely originate from the play of the gearbox.
- Check the surface of the propeller blades for damage:
  - minor damage (scratches) to the leading edge surface are accepted. No visual cracks or indents are accepted.
- Check visible parts of the hub - must be free of cracks

WARNING

The propeller must not be turned in the direction opposite to that of its normal rotation.

WARNING

Before manual turning of the propeller, switch off both ignition circuits, brake the wheels, set engine throttle to the idle position, check main switches being switched off. If the ignition is not off, there is a risk of injury.

8. Front landing gear

- ✈ Check the wheel for symmetry, deformation and play of the wheel fairing; check slip mark; the locking of the wheel pin nut; the inflation of the tire (the pressure according to the value on label); the wear of the tire; check the condition of the grounding cable on the landing gear's leg.

9. Left wing

- ✈ Check the wing for the integrity of the skin, riveted joints, attachment of the wing-tip
- ✈ Check flap and aileron hinges and their free movement
- ✈ Check securing of flap and aileron pins;
- ✈ Check identical extension of the flaps in all positions
- ✈ Check visually the quantity of fuel
- ✈ Check fuel drain for water and sediment
- ✈ Check the closing of the fuel tank
- ✈ Check the functioning and the condition of the navigation lights
- ✈ Remove the Pitot tube cover
- ✈ Remove mooring ropes and aileron locks

10. Main landing gear

- ✈ Check the wheels for symmetry, deformation and play of the wheel fairing;
- ✈ Check creep marks
- ✈ Check the inflation of the tires and their wear;
- ✈ Check the surface of the main landing gear legs for cracks;
- ✈ Check the locking of the wheel pin nuts,
- ✈ Check the overall condition of the disk brakes and of the brake tubing.

4.3 Before Flight

Pre-flight inspection	Completed
Luggage	Secured in luggage compartment
ELT Main Switch	Switch to ARM (One step down to Down) When applicable perform ELT check as described in ELT manual.
Brake	Apply Full and Lock
Headphones	Plug-in jacks into headset sockets
Control stick and rudder	Check of free movement
Harness	Fasten and tighten
Canopy	Close and lock
GRS Activation Handle	Take-out Operational Safety Pin

4.4 Engine Start

FUEL selector	Position to the tank with the higher quantity of fuel or **LEFT**
MASTR	Switch ON
INSTR	Switch ON
GNRTR	Switch ON
EMS	Switch ON
EFIS	Switch ON
STROBE	Switch ON
FUEL PUMP	Switch ON
STARTER POWER	Switch ON
Propeller Area	Clear
IGNITION	Switch to **BOTH**

Cold start

THROTTLE LEVER	Set to IDLE position
CHOKE	Pull out and hold (if the engine is cold)
START	Push Release after engine is started

Warm/Hot engine start:

THROTTLE LEVER	Advance 2-5mm
START	Push Release after engine is started

WARNING

The Skyview Synthetic vision is for situational awareness only. Manuevering the aircraft based upon the SVS information is forbidden

4.5 After Engine Start

After starting	Adjust THROTTLE LEVER to achieve smooth running at approx. 2 000 RPM
Oil Pressure	Check
STARTER POWER	Switch OFF
FUEL PUMP	Switch OFF
Fuel Pressure	Check
CHOKE	Release after engine runs uniformly
Engine Speed for 2 min	Set 2 000 RPM
Warming up oil	Set 2 500 RPM until oil temperature reached 50° C

CAUTION

The oil pressure must rise within 10 seconds after starting. Only when the oil reaches a stable pressure, the engine's RPM may be increased.

If the oil is cold, constantly monitor the oil pressure since, because of an increased flow resistance in the suction branch, the oil pressure may drop again.

To avoid acceleration stresses, when starting the engine, set the THROTTLE LEVER to idle. For the same reason, after reducing the throttle, wait for about 3 seconds before increasing the THROTTLE LEVER to achieve constant RPM of the engine.

If the airplane is standing on a stony surface, do not start the engine – there is a risk of damage to the propeller by sucked in stones.

NOTE

When starting a cold engine, move the THROTTLE LEVER to idle and pull-out and held the choke control.

When starting a warm engine, set the THROTTLE LEVER slightly over the idle position.

If the engine does not start, repeat the starting not earlier than in 2 minutes, during which the starter will cool off.

4.6 Taxiing

4.6.1 Before Taxiing

INTERCOM	Switch ON if necessary
RADIO	Switch ON
FLAPS	Switch ON
TRIM	Switch ON
GPS	Switch ON
XPDR	Switch ON
NAV LIGHTS	Switch ON if necessary
SOCKET 12V	Switch ON if necessary
Radio	ON and SET
XPDR	ON and SET
EFIS and EMS	SET (Baro / QNH)
Altimeter	SET (QNH)
Trims	Check functionality and indication
Flaps	Check functionality and retract (Position 0)
On-board devices and equipment	Check functionality

4.6.2 Taxiing

Brake	Release, test
Elevator	Full back
Taxiing speed	Adjust

WARNING

It is forbidden to taxi with a partially open canopy.

The canopy might get damaged when taxiing through rough surface or due to the airflow from the rotating propeller.

4.7 Take-off

4.7.1 Before Take-off

Brake	Brake and Lock
Canopy	Check - close and lock (verify indication on EMS)
Harness	Check on and tighten belts
Flight Instruments	SET
Engine Instruments	Engine parameters: check within limits
Engine Speed	Set 4 000 RPM
IGNITION	Switch L and Check Engine Speed
IGNITION	Switch BOTH
IGNITION	Switch R and Check Engine Speed
IGNITION	Switch BOTH and Check Engine Speed
Carburettor heat	Pull and check RPM drop (min 50); push back in
THROTTLE LEVER	MAX, check max RPM (min 5000)
Brake	Check (hold position)
THROTTLE LEVER	Set to idle position
THROTTLE LEVER	Set 2000 RPM
FUEL selector	Position to the tank with the higher quantity of fuel or **LEFT**
Trims	Set to required position
GRS Activation Handle	Check Unlocking

CAUTION

Engine RPM drop with only one ignition circuit must not exceed 300 RPM.
Maximum allowable difference of engine speed by use of either circuit L or R is 115 RPM
When testing the ignition circuits only one ignition circuit may be switched on/off at a time.
No run irregularity or RPM fluctuations may occur during the engine test. The maximum allowed temperatures and pressures must not be exceeded defined values during the engine test.

WARNING

Take-off is forbidden, if:

- The engine runs irregularly;
- Any of the engine parameter is not within limits;
- Insufficient Brake performance
- Aircraft systems working incorrectly
- Crosswind velocity exceeds permitted limits;
- Usable Fuel quantity in the tanks is less than 2x10 litres;

4.7.2 Normal Take-off

Transponder	ACS
FUEL PUMP	Switch ON
FLAPS	Position I
Brake	Unlock and Release
THROTTLE LEVER	Set Take-off Power
Elevator Control	Neutral Position. At 30÷35 KIAS pull slightly to lift the nose wheel
Airplane unstuck	At 40÷45 KIAS
Climb	Airspeed 65 KIAS
Flaps	Retract at safe altitude
FUEL PUMP	Switch OFF

All airspeeds are given for MTOM and ISA conditions.

4.7.3 Short Field Take off

Transponder	ACS
FUEL PUMP	Switch ON
FLAPS	Position I
THROTTLE LEVER	Set Take-off Power
Brake	Unlock and Release
Elevator Control	Neutral Position. At 30÷35 KIAS pull slightly to lift the nose wheel
Airplane unstuck	At 40÷45 KIAS
Climb	Airspeed *56 KIAS*
Once cleared the obstacle	Airspeed 65 KIAS
FUEL PUMP	Switch OFF

All airspeeds are given for MTOM and ISA conditions.

4.8 Climb

Airspeed ..... Steady 65 KIAS
Engine Speed ..... Keep continuous 5 200 ÷ 5 500 RPM
Engine Values ..... Green bands

CAUTION

If the cylinder head temperature or oil temperature and/or coolant temperature approaches or exceeds limits, reduce the climb angle to increase airspeed and possibly return within limits. If readings do not improve, troubleshoot causes other than high power setting at low airspeed.

4.9 Cruise

Engine Speed ..... Keep within the cruise range 4 500 ÷ 5 500 RPM, as necessary
Engine Parameters ..... Green bands
FUEL selector ..... Position to the tank with the higher quantity of fuel or **LEFT**

Note 1: The fuel system features a return fuel line that ends in the left hand side fuel tank. When flying on the right hand side tank some fuel (approx 5-10 l/h) is pumped into the left tank. Therefore to maintain fuel symmetry during the flight the time increment on the left fuel tank is more than on the right hand side fuel tank.

Note 2: The fuel quantity indication system is most accurate in horizontal stable flight. During maneuvering the fuel level may be indicated with some time delay.

4.10 Descent

THROTTLE LEVER .....Keep within the cruise range 4 500 ÷ 5 500 RPM, as necessary
Engine Parameters .....Keep in limits

NOTE

It is recommended to descend from higher flight levels with engine at increased idle RPM to prevent its excessive cooling.

4.11 Approach

Airspeed .....65 KIAS
CARB HEAT .....ON
FUEL PUMP .....Switch ON
Flaps .....Position I or II
THROTTLE LEVER .....Maintain 3000- 3500RPM
FUEL selector .....Position to the tank with the higher quantity of fuel or **LEFT**
BRAKES .....Check released
SOCKET 12V / Landing light .....Switch ON
LANDING LIGHT Switch toggle switch to LANDING LIGHT position

NOTE

Landing Light (if installed) is not required to be switched on during landing at all airports. By switching the toggle switch to the LANDING LIGHT position ON-BOARD 12V socket is not usable for charging any connected device. LANDING LIGHT is operable only when section switch SOCKET 12V/LANDING LIGHT is switched to ON position.

4.12 Landing

4.12.1 Before Landing

Flaps .....Position II
Airspeed.....Decrease to 57 KIAS
THROTTLE LEVER .....IDLE

NOTE

When landing in gusty winds, add the amount of wind gusts to the correct approach speed.

NOTE

Flap position III is only to be used for precautionary short field landing

4.12.2 Balked Landing (GO AROUND)

THROTTLE LEVER .....Set Take-off Power
Carburettor heat.....Push
Airspeed.....Maintain 53 KIAS
Flap Set Position I
Climb.....After reaching stable engine run and 65KIAS
LANDING LIGHT (if installed).....Switch toggle switch to SOCKET 12V position
Flaps .....Retract at safe altitude

4.12.3 Landing

Touchdown .....Main Wheels fist
Landing Roll .....Lower Nose Wheel gently
Brake.....Minimum required

4.12.4 After Landing

Flaps .....Retract
Trims .....Set neutral position
CARB HEAT .....Cold
Transponder.....SET to STBY
LANDING LIGHT (if installed) .....Switch toggle switch to SOCKET 12V position

4.13 Parking and Shutdown

THROTTLE LEVER .....Idle
Brake.....Apply until airplane stops
Brake.....Apply FULL and LOCK
On-board instruments and equipment .....Switch OFF
Section switches .....Switch OFF except EMS
Engine Parameters .....Check, must be within Limits
IGNITION .....Switch OFF, remove Key
EMS .....Switch OFF
GENRTR.....Switch OFF
INSTR .....Switch OFF
MASTR .....Switch OFF
FUEL selector .....OFF
GRS Activation Handle .....Take-in Operational Safety and Lock
Aircraft.....Secure

4.14 SAFETY AND OPERATIONAL TIPS

4.14.1 Operation Liquids

The operation is considered to be a winter one when the outside air temperature drops below +5 °C.
Before the winter operation, do the following:

Cooling system

- The cooling system has been filled in the factory by anti-freeze cooling liquid.
- Check the quantity and the freezing point of the anti-freeze liquid.
- Check the tightness of the cooling system.

Fuel system

- Check the fuel before it is filled into the airplane for possible content of water to prevent the possible freezing of the fuel system.
- Check the fuel filter and replace it if necessary.
- Drain sludge from the fuel tanks.

Lubrication system

- During the operation under worsened climatic conditions we recommend to use the engine oil as it is specified in the Operation Manual of the Rotax 912S/ULS engine.

Electric installation

- Check the condition of the battery and recharge it, if necessary
- Clean the battery's terminals
- When parking the airplane outside a hangar and if the outside air temperature drops below 0°C, demount the battery from the airplane and store it in a warm room.

4.14.2 Winter Operation

- When the outside air temperature decreases under + 5 °C, it is recommended to heat the engine by hot air until the oil temperature is 25 °C before starting.
- Do the heating through the air inlets, so that the laminate cowling of the engine is not heated directly.
- The temperature of the blown hot air shall not exceed 50 °C.
- Before taxiing or pushing the plane, make sure the brakes are not frozen.

WARNING

Icing from the air humidity forms in the carburettor on the fuel nozzle and on the throttling flap. It leads a loss in the engine's power and a change in the richness of the mixture.

Minimize flight time at levels with outside air temperatures from +5°C to -5°C.

Use carburettor heating to prevent occurrence of this state in such conditions.

Flights into known icing conditions are prohibited!

Section 5
PERFORMANCE

Table of Contents

5.1 Introduction to Performance and Flight Planning

5.1.1 General

All values listed in this section are determined for standard ISA condition.

5.1.2 Conditions for determining flight performance

The below-specified performance values apply under the conditions:
- The standard atmosphere at the sea level for a stable flight,
- The calm air,
- The Maximum Take-off Weight 600 kg,

5.1.3 Performance validity

The performance data are specified for a good condition of the airplane, the engine and the propeller and for usual flying techniques.

5.2 Airspeed Calibration

Note: *The calibration factor is 0,973.*

Speed [kt]	V_{S0}	V_{S1}	V_S	V_Y	V_{FE}	V_H	V_C	V_{NE}
KIAS	41	43	49	64	79	100	102	126
KCAS	42	44	50	66	81	103	105	130

5.3 Stall Speeds

Stall speed Flap UP .....49 KIAS
Stall Speed Flap I.....45 KIAS
Stall speed Flap II = normal landing configuration .....43 KIAS
Stall Speed Flap III = **only for precautionary short field landing** (no normal operation).....41 KIAS

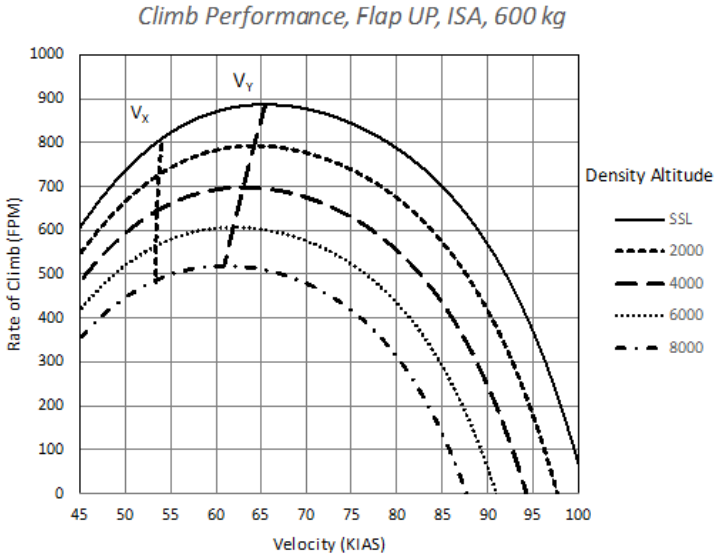
5.4 Take-off Distance

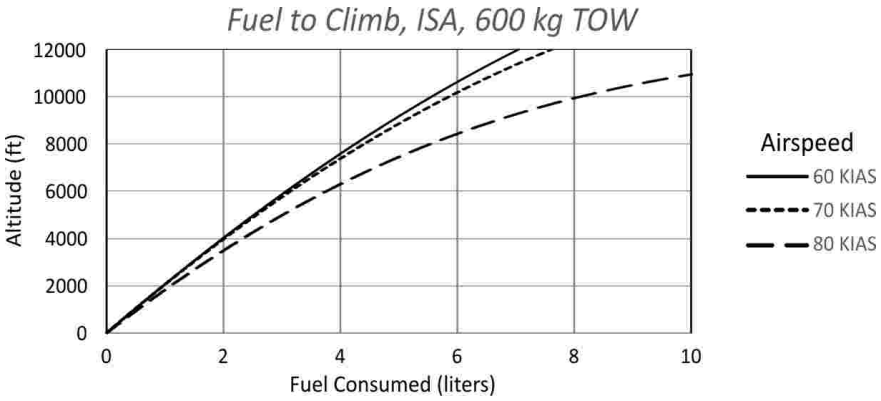
The specified take-off ground roll is specified for level runway
Flaps ..... Position I

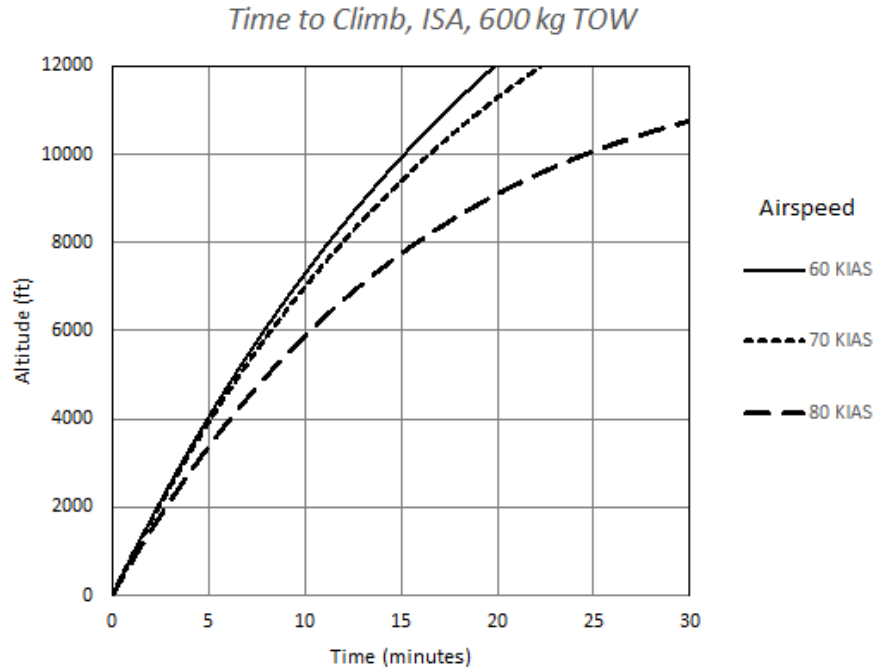
RUNWAY SURFACE	Take-off run distance		Take-off distance over 50 ft (15 m) obstacle	
	m	ft	m	ft
Tarmac/Concrete	**241**	**791**	**391**	**1 283**
Grass*	**275**	**902**	**446**	**1 463**
* not tested: AC91-3 suggests that take-off and landing distances of concrete are multiplied with 1.14 for grass. To be conservative the distances over 50ft are also linearly extrapolated.				

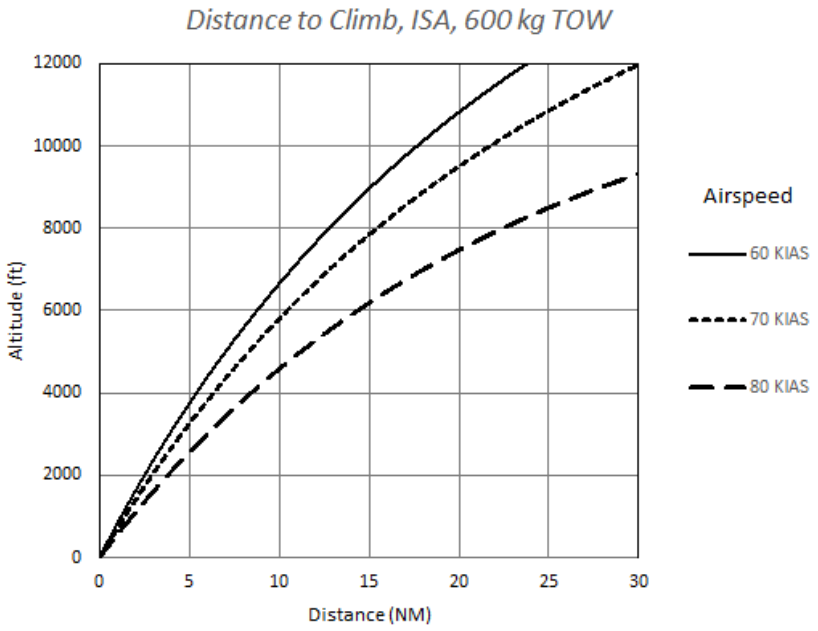
5.5 Climb Performances

The Climb Performances are specified for 600kg at any altitude and:
Throttle.....Max Power
Flaps .....Retracted
Best angle of climb speed:..... V_X (SL) = 54 KCAS = 53 KIAS
Best rate of climb speed: ..... V_Y (SL) = 67 KCAS = 65 KIAS




Fuel to Climb, ISA, 600 kg TOW
Altitude (ft)
12000
10000
8000
6000
4000
2000
0
0
2
4
6
8
10
Fuel Consumed (liters)
Airspeed
60 KIAS
70 KIAS
80 KIAS

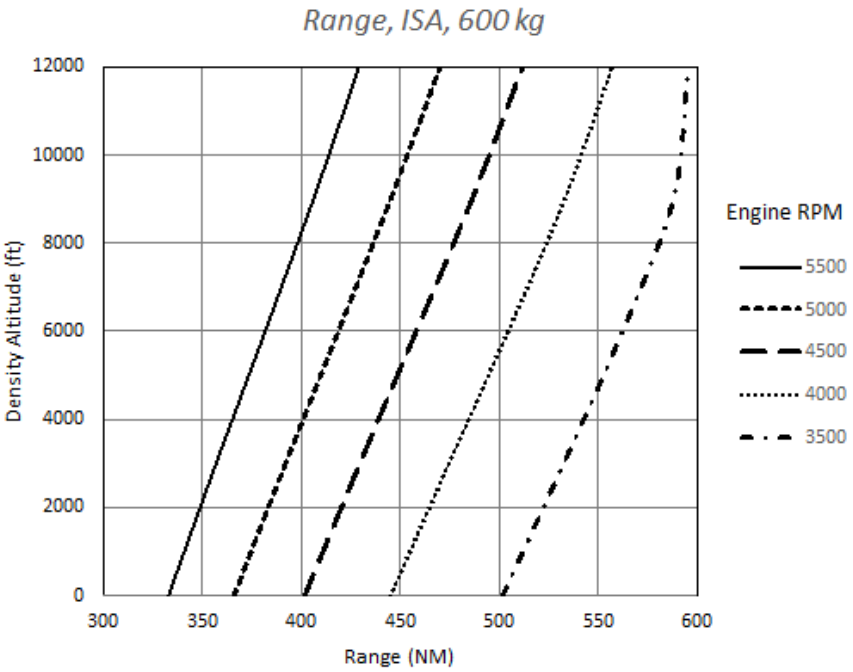

Time to Climb, ISA, 600 kg TOW
Altitude (ft)
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
Time (minutes)
Airspeed
60 KIAS
70 KIAS
80 KIAS



5.6 Service Ceiling

Service Ceiling (Approved)……..	**15 500 ft (4 725 m)**

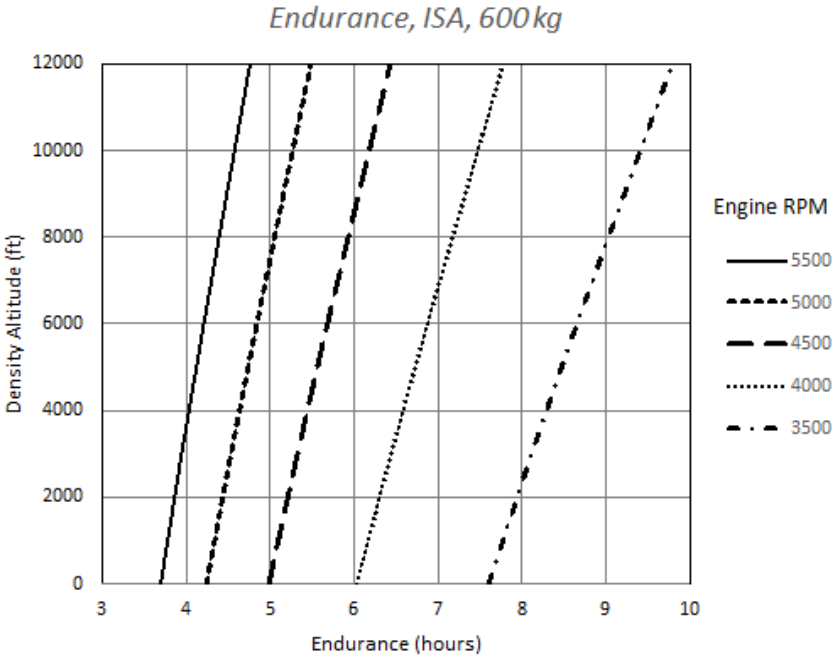
5.7 Range Profiles



The Range is calculated without the effect of wind considered and assumes a take-off and landing at sea level. It further assumes a reserve of 30min fuel for the selected cruise condition.

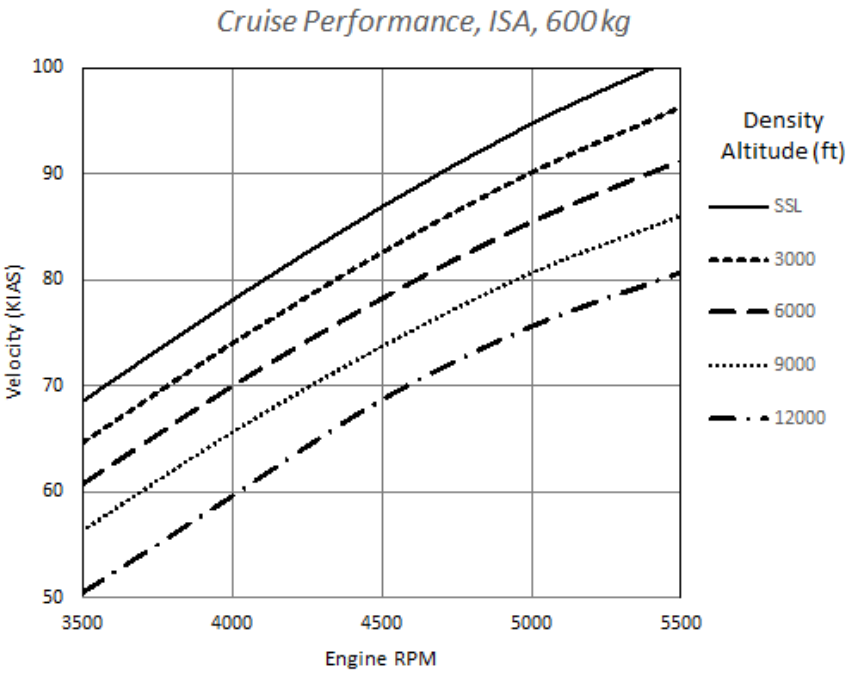
5.8 Endurance Profiles

You should consider the flight endurance data only as indicative.



The endurance assumes a take-off and landing at sea level. It further assumes a reserve of 30min fuel for the selected cruise condition.

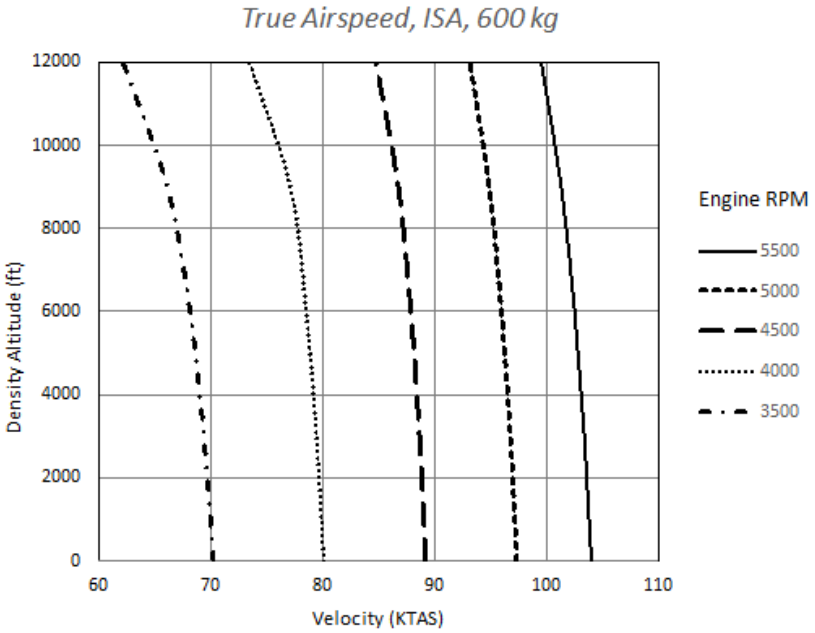
5.9 Cruise Speed Profiles



5.10 Glide Ratio

Glide ratios are specified for:
Airspeed.....64 KIAS
Glide ratio.....1:8

5.11 True Airspeed Profiles



5.12 Landing Distances

The landing distances are specified for:
Power at 50ft IDLE
Runway surface .....see table
Distance over 50 ft (15 m) obstacle

Normal landing Flap II, Speed over 50ft 57KIAS

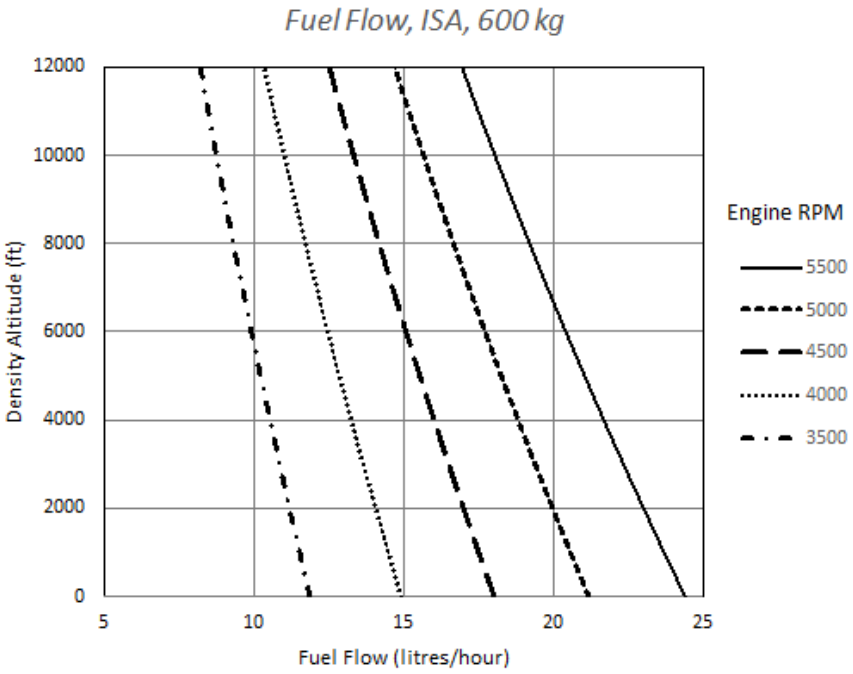
	Tarmac/Concrete	**Grass***
Landing distance from 50 KIAS	**382 m (1253 ft)**	**436 m**
Landing ground roll distance with braking	**176 m (577 ft)**	**201 m**

Precautionary short field landing Flap III, speed over 50ft 55KIAS

Landing distance from 50 KIAS……..	**323 m (1060 ft)**	**368 m**
Landing ground roll distance with braking….	**210 m (689 ft)**	**240 m**

* not tested: AC91-3 suggests that take-off and landing distances of concrete are multiplied with 1.14 for grass. To be conservative the distances over 50ft are also linearly extrapolated.

5.13 Fuel Flow Profiles



5.14 Demonstrated Wind Speeds Performance

Maximum demonstrated speed of wind	**[kts]**
Head wind at airplane operation……	**24**
Cross wind for take-off and landing……..	**15**
Tail wind for take-off and landing……..	**5**

Section 6
WEIGHT AND BALLANCE

Table of Contents

6.1 Introduction

This chapter defines the range of loading within which the airplane may be operated safely.

Procedures for weighing, calculation methods to determine limits of loading and lists of equipment available for this airplane are found in the maintenance manual TOM-TC-01-AMM.

The weighing record sheet (chapter 6.2) reflects the actual status of empty mass and empty mass center of gravity at time of last weighing.

The Viper SD-4 RTC reference system for weight and balance is:

Datum:	Wing leading edge

For weighing the airplane the relevant weighing stations and data are:

Nose gear:	-706 mm aft datum
Main gear:	578 mm aft datum
Length Mean aerodynamic chord (MAC):	1290 mm

The approved cg range is:

Operational CG range:	**309.6 – 412.8 mm aft datum**
	24% – 32% MAC

The approved flight center of gravity location is expressed in mm aft of wing leading edge. Conversion to %MAC is by:

$$Station_{CG}/Lenght_{MAC}*100\%$$

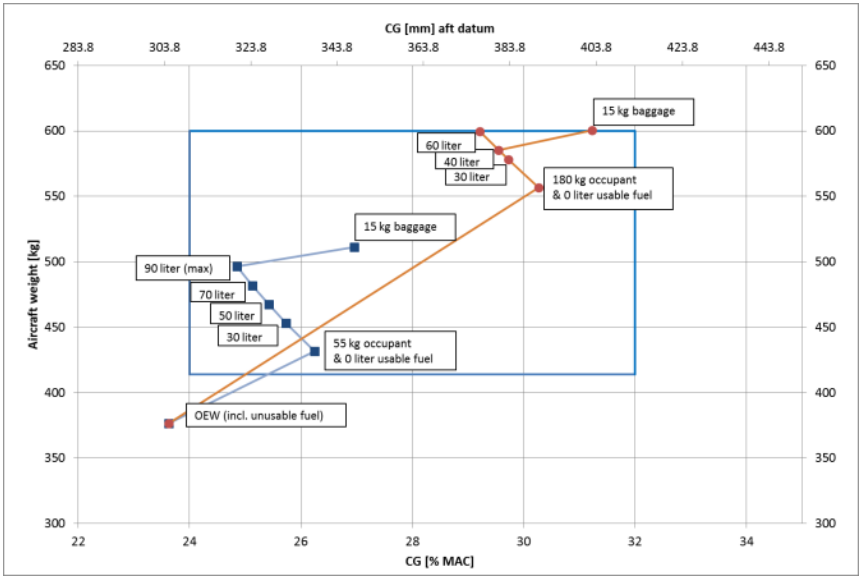


Figure 6-1 Approved weight and balance envelope

6.2 Weighing records

Signature				
Note				
CG positions				
Empty Weight				
Date				

6.3 Weight and balance determination for Flight

To calculate the flight mass and center of gravity the following station data must be used:

Occupant	570 mm aft datum
Fuel	201 mm aft datum
Luggage	1248 mm aft datum

Lever arms for loading are calculated in accordance with the datum.

Prior each flight compliance with permissible loading limits has to be checked with the following calculation:

	Mass m [kg]	**Center of gravity CG [mm]**	**Moment M = m*CG [kg*mm]**
Empty (incl. unusable fuel)	376.5	305	
+ baggage (max 15 kg)		1248	
+ occupant(s).		570	
	Σ m	**Σ M / Σ m**	**Σ M**
= flight condition, no fuel			-
+ fuel		201	
	Σ m	**Σ M / Σ m**	**Σ M**
= flight condition, with fuel permissible	max 600	309.6 – 412.8 mm aft datum	-

Both conditions with and without fuel must fall within the approved envelope (see chapter 6.1).

Example calculation (see blue line in Figure 6-1):

	Mass m [kg]	**Center of gravity CG [mm]**	**Moment M = m*CG [kg*mm]**
Empty	376.5	305	114832.5
+ baggage		1248	
+ occupant(s)	*55*	570	*31350*
	Σ m	**Σ M / Σ m**	**Σ M**
= flight condition, no fuel	*431.5*	*338.8*	*146182.5*
+ fuel 90liter @0.72kg/liter	*64.8*	**201**	*13024.8*
	Σ m	**Σ M / Σ m**	**Σ M**
= flight condition, with fuel permissible	*496.3* max 600	*320.8*	*159207.3*

Section 7
AIRPLANE & SYSTEMS DESCRIPTION

Table of Contents

7.1 Basic technical specifications of the airplane

7.1.1 Basic dimensions

Wing span	8.34 m
Length	6.40 m
Height	2.20 m
Wing area	10.45 m^2
Wing chord	1.29 m
Aspect ratio	6.69
Wing platform	rectangular
Wing profile	NACA 4415
Sweep angle	0°
Wing twist	0°
Dihedral	3°
Incident angle	3°

7.1.2 Control surfaces

Ailerons

Aileron length	0.96 m
Aileron chord	0.27 m
Ailerons area	0.52 m^2

Flaps

Type of flap	slot
Flap length	2.197 m
Flap depth	0.255 m
Flaps area	1.12 m^2

Horizontal tail surface

Platform	rectangle
Span	2.800 m
Depth	0.785 m
Area	2.20 m^2
Dihedral	0°
Leading edge swap angle	0°
Twist	0°
Incident angle	-1.5°

Elevator

Chord	0.32 m
Span	2.60 m
Area	0.75 m^2

Vertical tail surface

Platform	rectangular
Root chord	1.217 m
End chord	0.587 m
Area	1.178 m^2
Height	1.300 m
Profile	NACA 0010

Rudder

Area	0.56 m^2
Leading edge sweep angle	35°
Trailing edge sweep angle	11°

7.1.3 Landing gear

Track width	2.190 mm
Wheel base	1.270 mm
Brakes	Hydraulic, disk on the wheels of the main landing gear The front Wheel is not braked
Cushioning of the main landing gear	By tires and spring type legs
Cushioning of the front wheel	By the tire and rubber bands
Main landing gear Wheel dimensions	4.00-6 (Kaspar K-226A-000 6”)
Front landing gear Wheel dimensions	4.00-6 (Kaspar K-116A-000 6”)

7.1.4 Power plant

Engine	Rotax 912S/ULS, 100 HP
Maximum take-off power	73.5 kW at 5,800 RPM
Propeller	NEUFORM CR-65-(IP)-47-101
Number of blades	3
Diameter	1.65 m

7.1.5 Miscellaneous data

Weights

Empty weight of the airplane	369,3kg
Maximum take-off mass MTOM	600 kg
Fuel tank capacity	72 kg (2 x 50 litres)

Rescue system	Galaxy High Technology
Type	GRS 6/600 SD S-LSA

ELT	ACK Technologies
Type	E-04 (406 MHz)

7.2 Description of the airplane

Viper SD - 4 is an aerodynamically controlled, single-engine, two-seat, low-wing all-metal airplane with the side-by-side configuration of the seats.

7.2.1 Fuselage

The aircraft's fuselage is made as an all-metal monocoque frame structure, comprising stringers and aluminium alloy skin; the vertical stabiliser is an integral part of the fuselage. The engine compartment is separated from the crew compartment by a steel firewall.

7.2.2 Landing gear

It is tricycle with a nose wheel.

The wheels of the landing gear are equipped with wheel shoes

The wheels of the main landing gears are braked by hydraulic disc brakes. The brakes are controlled centrally by a lever located on the central panel between the pilots' seats.

Nose landing gear

The nose landing gear suspension is provided by a dual rubber band and a sliding tube guided by two sleeves incorporated to the firewall bulkhead. The front landing gear wheel is steerable.

Main landing gear

The main landing gear legs are a composite spring type design with individual spring for right and left hand side.

7.2.3 Wing

It is all-metal, of a rectangular platform and a single-spar design, with an auxiliary/rear spar. The wing is equipped with ailerons, slot flaps controlled electrically into three positions and with integral fuel tanks. The right aileron is equipped with an electrically controlled trim tab. The wing tips are equipped with composite wingtip fairings.

7.2.4 Empennage

It consists of a vertical tail surface and a horizontal tail surface at the back end of the fuselage with conventional configuration. The horizontal tail surface is made of a single-piece stabilizer with a right and left elevators, which are interconnected by the control transmission. The elevator is equipped with a trim tab, controlled electrically. The vertical tail surface of a trapeze shape consists of a vertical stabilizer and a rudder with aerodynamically used rudder horn.

7.2.5 Cockpit

The seats are configured side-by-side. The cockpit is covered by a clear canopy, which ensures very well outside view. The canopy opens up and backwards. The closing of the canopy is a two point one, controlled by two independent levers on the inner sides of the canopy frame, which allow its locking. The cockpit is ventilated by the pressure of the flowing air above the instrument panel without a possibility to control the air through-flow. The canopy is equipped with two ventilation windows. The cockpit is equipped with three air vents. Two vents are located on the left side of the fuselage in front of the cockpit and one on the right side of the fuselage in front of the cockpit. The air from the lower two vents is led to the air showers. The air showers are controllable and located in the corners of the instrument panel.

Two levers located on both sides of canopy frame provide canopy locking. Visual indication is displayed on Dynon in EMS page.

The cockpit is equipped with an on-board 12V electric socket, located on the right instrument panel. The socket can be used for charging of the battery.

7.2.6 Control

It is complete dual control system for elevator, aileron and rudder. The elevator and the ailerons are controlled via control rods and the rudder is controlled via a pair of Bowden cables.

The rudder pedals are adjustable for left and right side individually.

7.2.7 Fuel system

The fuel system comprises two lockable integrated tanks in the wings, equipped with fuel gauge floats and a drain valve, fuel piping, a main FUEL selector and a fuel filter. FUEL selector operates from which fuel tank the fuel is used. Lift the red knob and turn the selector to required fuel tank. When selecting between left and right fuel tank the lifting of the red knob is not necessary. When closing the fuel system, lift the red knob and turn the selector into OFF position.

7.2.8 Harness

In Viper SD - 4 provides a SCHROTH JTSO-C114 approved 3-point static harness restraint system (Type: 4-03-D802xx).

7.2.9 Luggage area

Area for luggage is divided into two storage parts and is integrated into the fuselage. Luggage area is in the cockpit right behind the pilot seats and both its parts are secured by manually operated - open / close roller hard plastic blinds guided in rails over full length.

No luggage allowed on free surface behind.

7.3 Control elements

7.3.1 Control stick and rudder

Standard control elements - control stick and rudder are used for Viper SD-4 RTC aerodynamic control.

7.3.2 Flaps

The flaps are controlled in four positions electrically, by a lever control, located on the central control panel between the pilots' seats. The signalling of individual positions of the flap lever control is done by a single LED in the OFF position (retracted) and three yellow LEDs in positions I, II and III (extended).

After the Flaps section switch is set to ON position the Flaps control unit should always be in 0 position. 3 green light blinks indicates that the flaps are set in retracted 0 position. By changing the flap configuration, for each position the yellow LED should blink 4 times till it's locked.

By pushing the lever to the right and pulling it backwards, the pilot extends the flaps into individual positions:

OFF	-	Retracted
I	-	15°
II	-	30°
III	-	40°

7.3.3 Trimming

The control of the elevator's trim tab and the right aileron tab is electric, by buttons located on the pilot and co-pilot control stick. The indicators of the positions of the trim tabs are displayed on the SkyView on the ENG page.

NOTE

When the same trim is operated simultaneously in opposition, the trim will not respond, vice-versa when operated simultaneously in the same direction, the trim will continue responding. PIC should be aware that the trim might be modified from the co-pilot seat. The not responding of trim is visible to pilot/co-pilot on the SkyView screen by stopped movement of trim indicator.

7.3.4 Throttle

Throttle lever is located on the centre panel between pilot seats upper to the brake lever. Front position of the lever corresponds to the maximum power. Back position corresponds to the idle rotations.

7.3.5 Carburettor preheating

The heated air is streaming from a heat exchanger to the carburettor through the airbox. The control lever is installed on the right side of the instrument panel.

Note: *The best efficiency of the carburettor heat system is at high power settings and slow airspeed speeds (preferably below 80KIAS).*

7.3.6 Landing gear brakes

Both wheels of the main landing gear brake simultaneously, without the possibility of independent braking of individual wheels. The hydraulic brake control lever is located on the central control panel between the pilots' seats, under the engine throttle lever. The braking effect on the wheels is actuated by the pushing of the lever downwards. The lever may be locked in the braking position by a push-button on the left side of the braking cylinder bracket.

Care should be taken if wheel rotation is stopped after take-off in order to not unintentionally engage the brake lock.

7.4 Overview of drain holes and access hatches

7.4.1 Drain holes

As the structure design is a riveted aluminium construction several openings and lead thru options for liquid drain and venting are available.

Drain holes are illustrated in figure 7-1

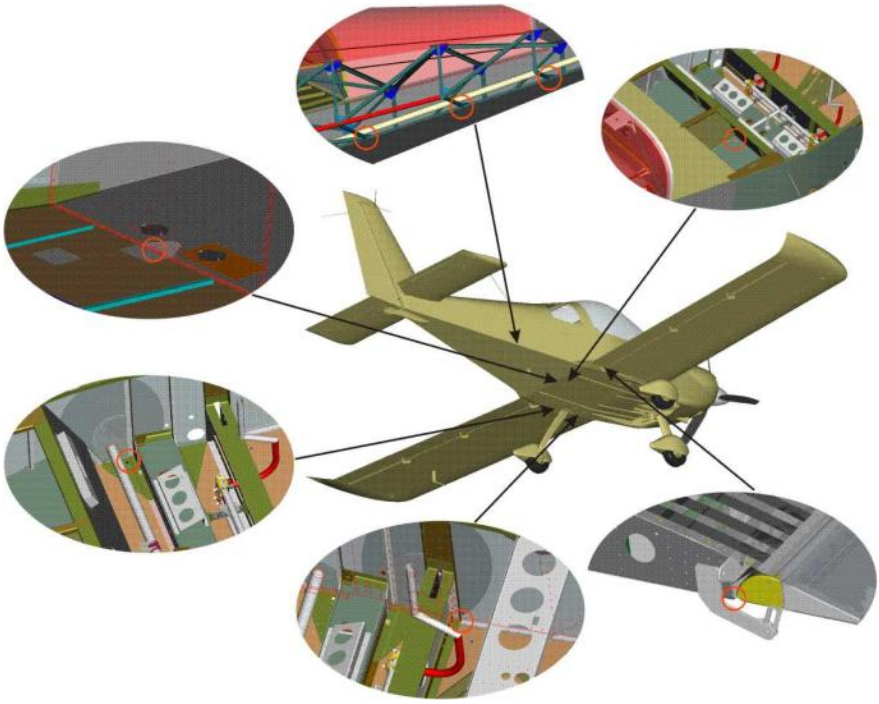


Figure 7-1 Draining system – fuselage

Figure 7-2 Draining system – lower engine cowling – hole between air inlets

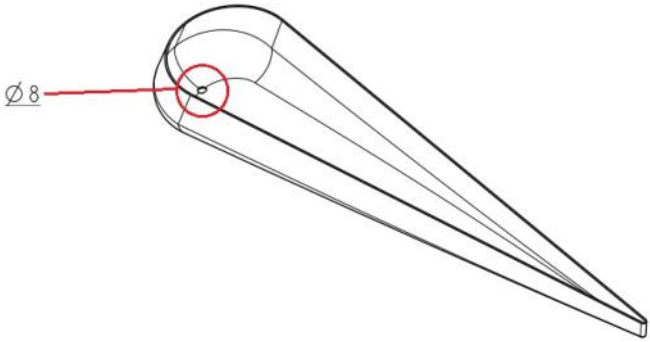


Figure 7-3 Draining system – bottom rudder fairing

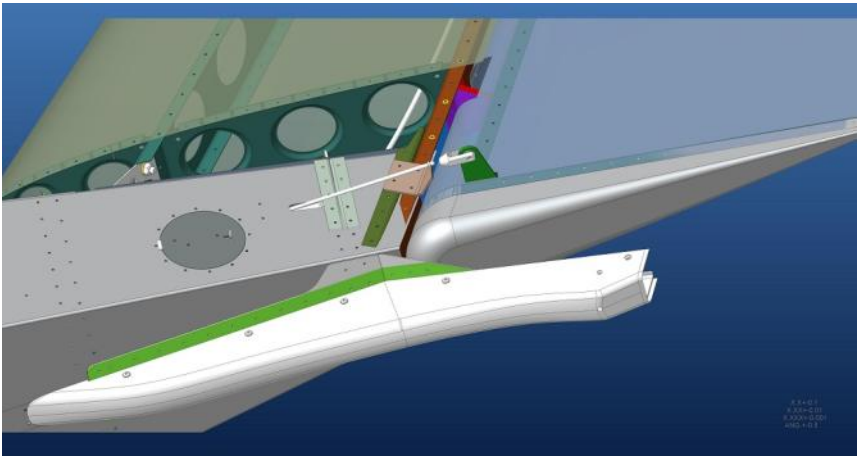


Figure 7-4 Draining system – tail skid aerodynamic fairing

7.4.2 Access hatches

Access hatches are illustrated in figure 7-5 and described below.

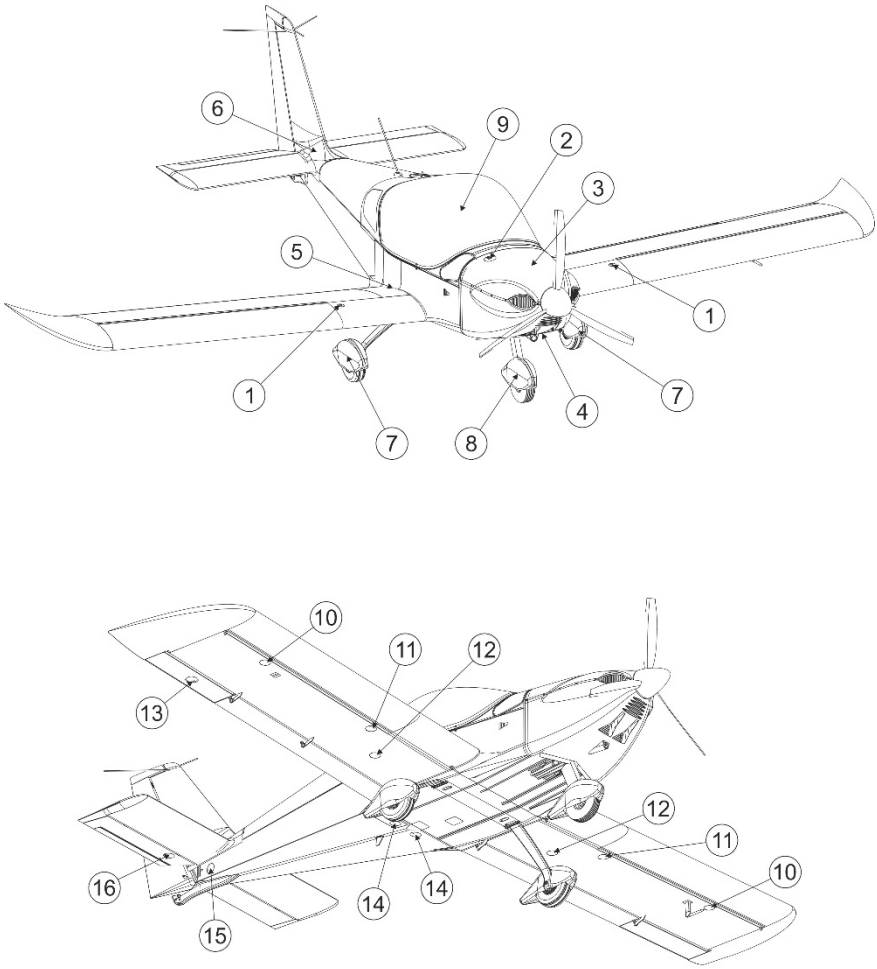


Figure 7-5 Access hatches

Access hatches

1 Covers of the left and right fuel tank mouths, equipped with locks

2 Cover of the oil tank mouth (the oil level dipstick)

3 Upper engine cowling

4 Lower engine cowling

5 Wing root cover, left and right

6 Fuselage tail cover; it covers root part of the stabilizer and of the vertical stabilizer

7 Main landing gear wheel fairings

8 Front landing gear wheel fairing

9 Cover of the hole for the inspection of the antennas, located in the cockpit behind the seats, on the wall separating the cockpit from the tail part of the fuselage

10 Covers of the hole for the inspection of the aileron pull-push rod, located at the bottoms of the right and left wings

11 Cover of the hole for the inspection of the aileron pull-push rod, located at the bottoms of the right and left wings

12 Cover of the hole for the inspection of the bracket of the flap pull-push rod, located at the bottoms of the left and right wings.

13 Cover of the aileron's trim tab servo drive, located on the lower side of the right aileron

14 Covers of the holes for the inspection of the bracket of the elevator pull-push rod and Bowden cable, located at the bottom of the fuselage, behind the cockpit

15 Cover of the hole for the inspection of the bracket of the elevator pull-push rod and of the Bowden cables are located on both sides of the fuselage's tail, under the stabilizer

16 Cover of the elevator trim tab servo drive, located on the lower side of the right half of the elevator

7.5 Overview of equipment

Engine:	Engine Rotax 912 S / ULS
Propeller:	NEUFORM CR3-65-(IP)-47-101.6
Engine instruments:	EMS Dynon Skyview (locked screen section) with backup battery
Flight instruments:	Airspeed indicator Winter 7423, 160kts (ETSO) Altimeter Winter 4550, 20 000 ft (ETSO) Magnetic compass CM24 (ETSO) EFIS Dynon Skyview (secondary AIS and ALT indication)
Navigation equipment:	GPS Aera 500 Dynon SV-GPS-250 (sensor for Skyview display)
Radio equipment:	Radio f.u.n.k.e. ATR833 (ETSO) Transponder f.u.n.k.e. TRT800H-OLED (including blind encoder) (ETSO)
Antenna system:	Antenna VHF Comm CI-121 (ETSO) Antenna XPDR AV-74
Electric equipment:	Battery VARTA 519901017 (12V/19Ah) Generator (part of the engine) Main on-board network switches Section switches/circuit breakers Landing Light (if installed)
Fuel installation:	Two wing fuel tanks with the total capacity 100 litres Drain valves Fuel valve ANDAIR FS20b3-B r2 (LEFT, RIGHT, OFF) Electric fuel pump (Pierburg 7.221440.51) Fuel filter (gascolator)
Oil installation:	Oil tank (all Rotax) Oil filter Oil radiator Oil temperature sensor
Cooling system:	Cooling liquid collector (all Rotax) Radiator Thermostat Expansion tank Spill tank
Airframe control instruments:	UFA-900L flaps servo system Two-axis electric trim
Rescue system:	Galaxy High Technology GRS6/600 SD S-LSA

7.6 Instrument panel and control panels of Viper SD - 4

7.6.1 Controls description

The instrument panel consists of a composite frame and three panels, on which instruments and controls are located.

The left panel contains flight instruments (primary barometric airspeed indicator and altimeter as secondary Dynon Skyview EFIS), the ignition control switch, the engine start button, 3 master switches, the generator switch, the battery charging warning light, the fuel pump control light, the EMS alarm light, the starter control light, the landing light control light (if landing light installed) and the air shower.

The central panel contains radio instruments (COMM radio and XPDR,), navigation instrument and section switches/circuit breakers. The magnetic compass is mounted above the central panel

The right panel contains a Dynon Skyview EMS instrument for the control of the engine and airframe parameters, intercom control panel, ELT remote control, an airbox control button (carburettor heat), a cockpit heating control button, a on-board electric socket and the air shower.

The horizontal control panel between the seats contains the engine throttle lever, the choke control button, the hydraulic brakes control lever, the fuel selector and the flaps control.

The control panel located between the pilots' seats, at its back, contains sockets to connect headset cable plugs.

Figure 7-6 Controls location

Table 7-1 Controls

1	Control Stick (2x)
2	Rudder Pedals (2x)
3	Flaps Control
4	Elevator Trim Buttons
5	Aileron Trim Buttons
6	FUEL selector
7	Engine Throttle
8	Choke Control
9	Brake Lever
10	Air Showers
11	Ignition Switch
12	Engine Start Button
13	Generator Switch
14	Master Switch
15	Instrument Switch
16	Airspeed Indicator
17	Altitude Indicator
18	Magnetic Compass
19	Generator Charging Warning Light
20	Electric fuel Pump Indicator
21	EMS Alarm Light
22	Engine Starter Indicator
23	COMM Transceiver Control Panel
24	Headset Socket
25	Push-to-Talk Button
26	INTERCOM Control Panel
27	ATC SSR Transponder Control panel
28	EFIS Screen - Dynon Skyview
29	EMS Screen - Dynon Skyview
30	GPS Aera 500
31	Section Switches + Toggle switch (if landing light installed)
32	ELT Remote Control
33	Cabin Heat Control
34	Carburettor Heat Control
35	Cylinder Heat Control
36	BRS Activation Handle
37	On-Board 12V Electric Socket
38, 39	USB Data Socket (2x – EFIS, EMS)
40	Landing Light Indicator (if installed)

7.7 Dynon Skyview Display Layout Modes

WARNING

The Skyview Synthetic vision is for situational awareness only. Manuevering the aircraft based upon the synthetic vision information is forbidden.

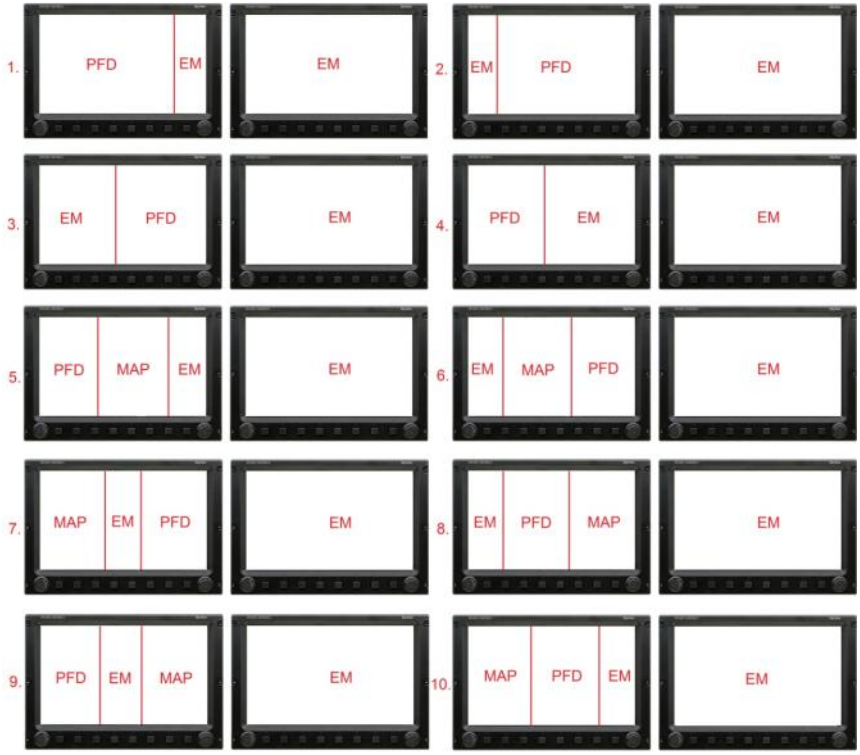
NOTE

Firmware updates are configuration changes and need written approval by TOMARK. According data must be requested and will be provided by TOMARK only.

Exchange, repair or maintenance of the Skyview System must be performed via TOMARK as Dynon will not provide EASA Form 1 or equivalent certificates for approved installation.

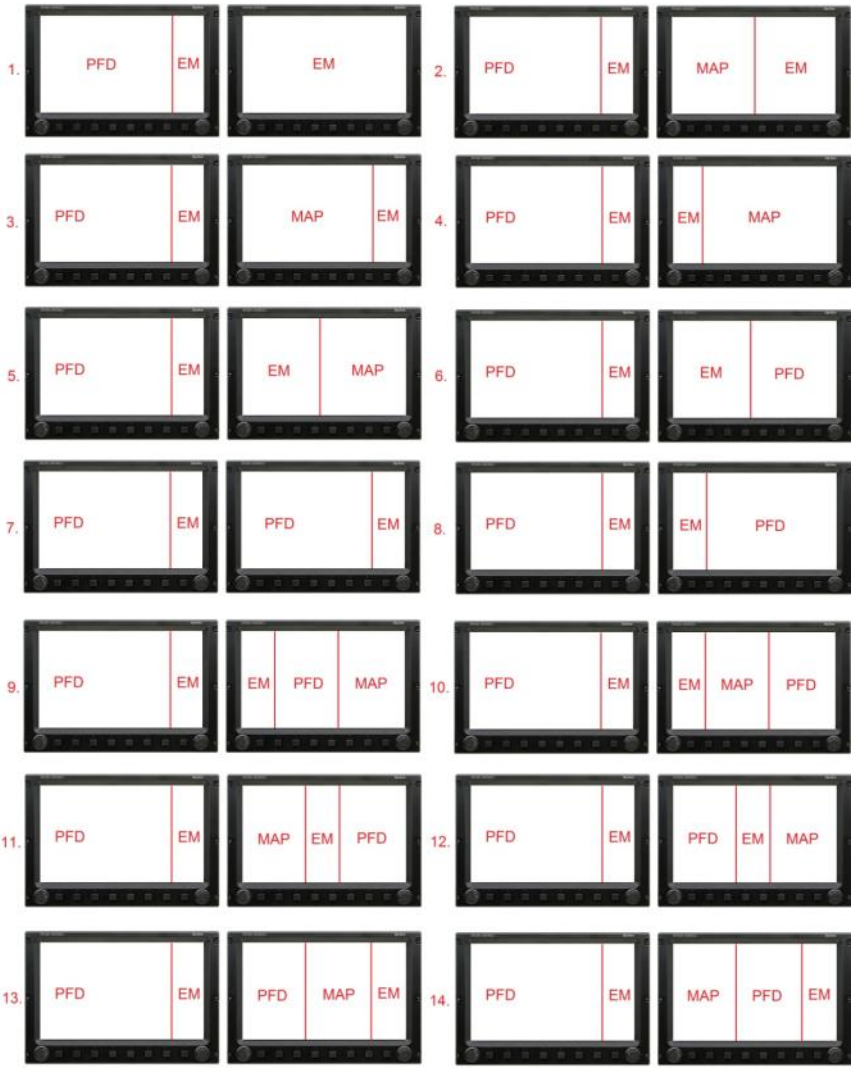
7.7.1 LHS Display Layout Modes

Primary the GPS data is not displayed on the LHS display. It can be switched on manually by pressing MAP button in Layout mode selection. Respectively after pressing Layout button will allow such display variations:



7.7.2 RHS Display Layout Modes

Primary only engine values are displayed on the RHS. Option to switch on Flight information and GPS data is possible. In layout menu switch on PFD or MAP and such display variations are possible:



7.7.3 LHS/RHS display failure

In case of one of the displays failure such display scenarios are available:

7.8 Controls

7.8.1 Control stick

The aeroplane is equipped with dual primary controls. The control sticks control the ailerons and the elevator. The foot control pedals control the rudder and the front landing gear wheel.

The transmission of control to the ailerons and to the elevator is secured by pull-push rods. The transmission of control to the rudder is secured by a pair of Bowden cables.

The control surfaces do not foresee a mass balance according to the current version analysis. The rudder horn is only aerodynamically used.

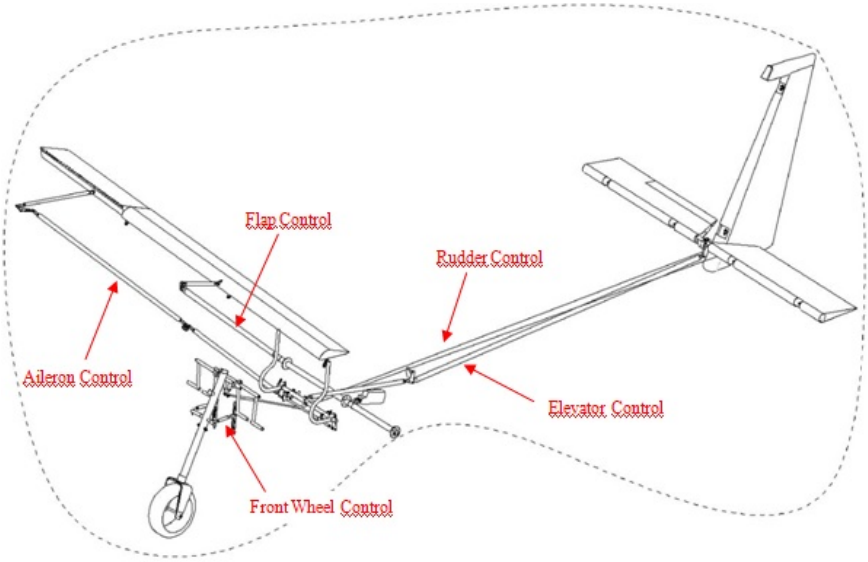


Figure 7-7 Flight control diagram

7.8.2 Flaps

Flaps are controlled electrically by a lever control located on the panel between the pilots' seats. The position of the flaps is indicated by LED diodes. The electric actuator drives a common torsion tube extending/retracting left and right hand side symmetrically.

7.8.3 Trim

The control of the elevator's trim tab and the right aileron´s trim tab is electric, by trim buttons, located on both control sticks. The indicator of the position of the elevator trim tab is shown on BOTH Dynon Skyview instruments within EMS panel.

Table 7-2 Control surface deflections

Aileron deflection angle	up +27° ± 1°		down -16° ± 1°	
Elevator deflection angle	up +25° ± 1°		down -20° ± 1°	
Flap deflection angle	0° ± 2°	15° ± 2°	30° ± 2°	40° ± 2° Not used for normal landing
Rudder deflection angle	left +30° ± 1°		right -30° ± 1°	
Elevator's trim tab deflection angle	up +21° ± 2°		down -33° ± 2°	
Aileron´s trim tab deflection angle	up +28° ± 2°		down -28° ± 2°	

7.9 Engine installation

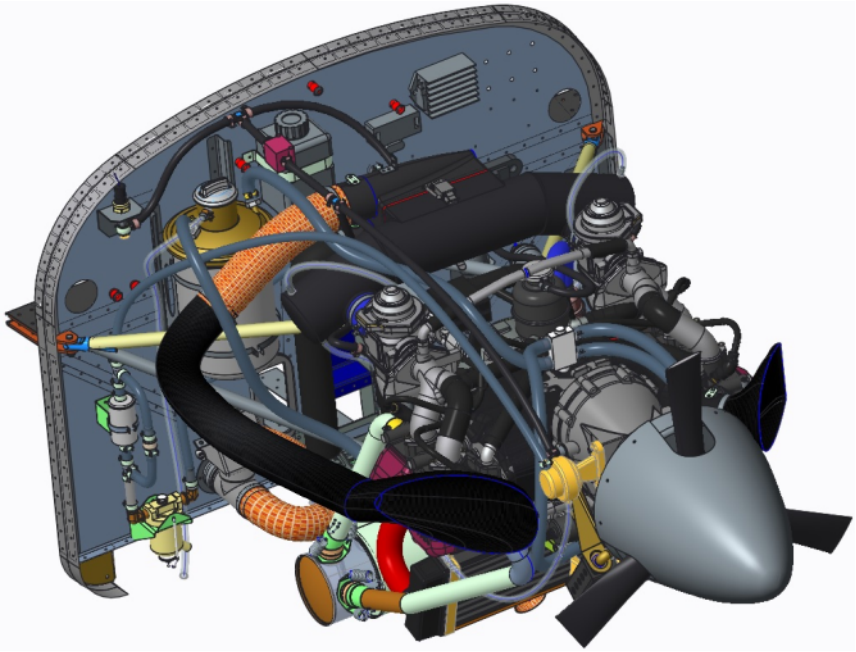


Figure 7-8 Engine unit and airbox air flow

The engine air is taken from one air inlets aft top of engine compartment behind the airbox guided by hoses into the airbox. The air inlet contains an air filter. A carburettor heating function is provided by mixing the air with warm air from close to the exhaust. From the airbox the air is guided by hoses into the carburettors.

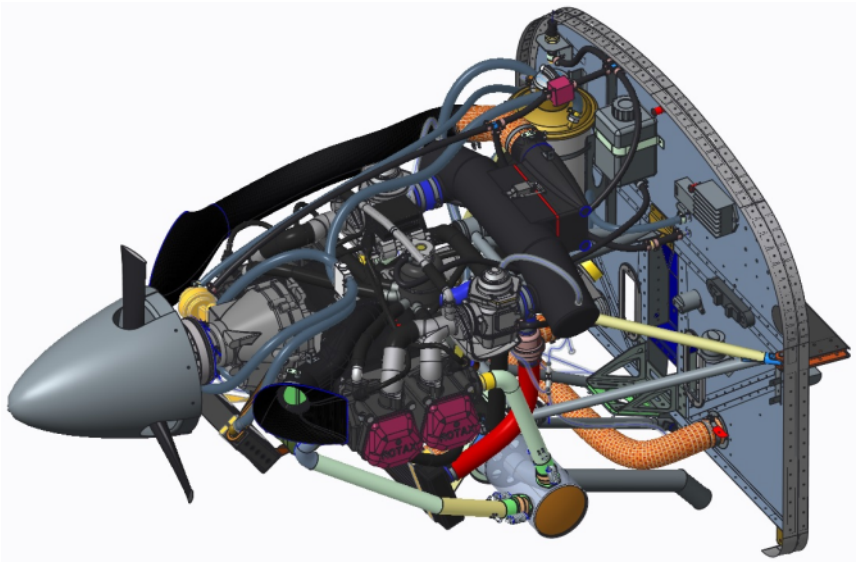


Figure 7-9 Engine unit

NOTE

DO NOT block left inlet (in flight direction)

7.10 Lubrication system

The lubrication system is part of the Rotax 912 engine, which is equipped with lubrication with a crankcase with a built-in reduction valve and an oil pressure sensor.

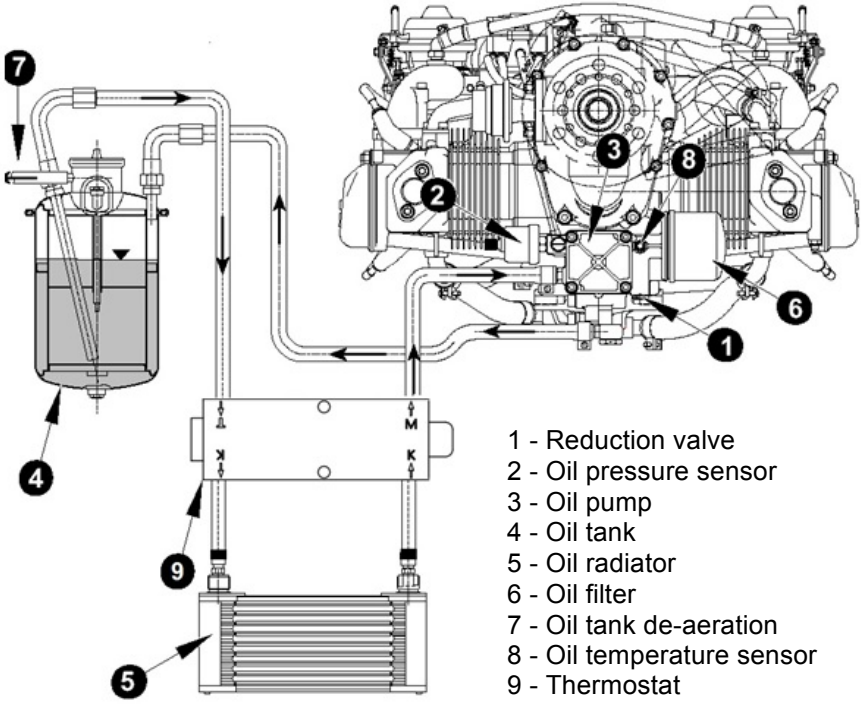


Figure 7-10 Lubrication system diagram

Oil gear pump

It is driven by the camshaft. It is part of the engine.

The oil is sucked in by the pump through the oil radiator from the oil tank and it is pushed through the oil filter into individual lubricated points. The oil from lubricated points gets to the bottom of the crankcase and from there it is pushed by the pistons' pushes into the oil tank.

Oil radiator

It is located at the front of the engine compartment under the reduction gearbox.

Oil tank

It is located in the engine compartment on the firewall; it is metal, equipped with an oil level gauge.

Oil filter

It is located on the left side of the engine, below the reduction gearbox.

Oil system ventilation

The ventilation of the oil system is provided by an outlet on the oil tank and led through the bottom engine cowling under the engine compartment.

Oil temperature sensor

It is located on the body of the pump and it measures the oil temperature on the input. . Electric signal from sensor is led by cable to Dynon system and temperature of oil is indicated on EMS screen.

Thermostat

It is used for regulation of oil temperature and it is located above the engine.

7.11 Engine cooling

The cooling of the ROTAX 912 engine is done by liquid-cooled cylinder heads and by air-cooled cylinders of the engine. The liquid cooling of the valve heads is made by a closed circuit with an expansion and overflow tank.

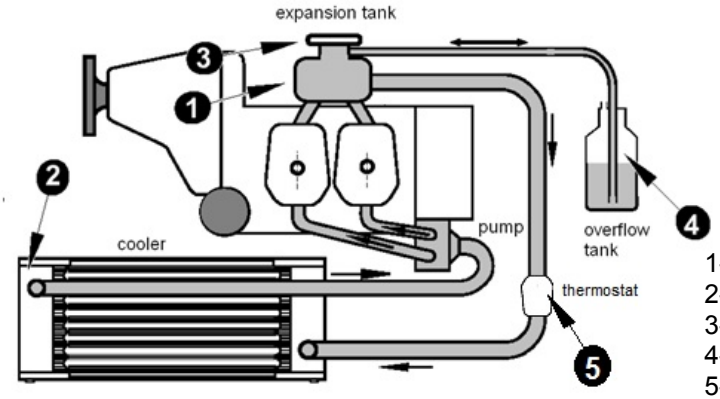


Figure 7-11 Cooling system diagram

Pump

It is part of the engine and it is located on the rear bottom part of the engine. It is driven by the camshaft.

Radiator

It is located at the bottom of the engine compartment, in front of the front landing gear leg.

Collector and expansion tank

They are located in the engine compartment above the engine. The expansion tank is on the firewall and it is plastic.

Overflow tank

The overflow tank is located on the firewall and it is plastic.

Thermostat

Thermostat is located at the left side under airbox chamber. Thermostat is connected into coolant hose that feeds the coolant from expansion tank to radiator.

Cooling liquid

The cooling system has been filled in the factory by a special undiluted cooling liquid Sheron Antifreeze G12++.

More information about choosing the right cooling liquid can be found in the valid issue of the Rotax Service Letter SL-912-016.

The cooling liquid is pumped by the pump driven by the camshaft from the radiator to individual cylinder heads. The liquid is taken from the cylinder heads into a collector. The expansion tank is closed by a plug with a pressure and non-return valve. When the liquid heats up and increases its volume, it opens the overpressure valve and flows into a transparent overflow tank. After the liquid is cooled, it is sucked back into the cooling circuit.

Coolant temperature measuring

Readings are taken on measuring point at hottest cylinder head (depending on installation) The temperature sensors are located in cylinder head 2 and 3. Electric signals from sensors are led by cables to Dynon system and temperature of coolant for two readings is indicated on EMS screen.

7.12 Fuel system

Fuel tanks

They are integrated in the airplane's wings and equipped with drain valves and floats sensing the fuel level.

Fuel tanks are equipped with fuel gauges. Electric signals from sensors of fuel gauges are led by cables to Dynon system and readings of fuel quantity for two fuel tanks are indicated on EMS screen.

Recommend to not fill individual tanks more than 90% of their maximum volume at outside temperature exceeding 25°C in order to avoid excessive spillage due to thermal expansion.

Main fuel pump

The fuel pump, which is part of the engine's equipment, secures the supply of fuel into the engine.

Electrical fuel pump

The second fuel pump supports the fuel flow. The fuel pump indication light at the panel only indicates the electrical power supply of the fuel pump. Monitor the fuel pressure indication on the EMS to confirm working order of the electrical fuel pump.

After switching off the fuel pump, fuel pressure will drop for a few seconds, until the fuel pressure is normalized again. Monitor fuel pressure on the EMS after switching OFF the electric fuel pump.

Fuel filter

Part of the fuel system is fuel filter (gascolator "classic style" 10580 by ACS Products Co.). It is located in the engine compartment on the fuel inlet hose at the firewall.

FUEL selector

It allows switching the fuel take from the left or right fuel tanks. If necessary, it allows closing the supply of fuel into the engine. It is located on the panel between the pilot seats. For engine start always choose the fuel tank with higher volume of fuel. If both are full, use the left tank. The FUEL selector does not co-switch the return line.

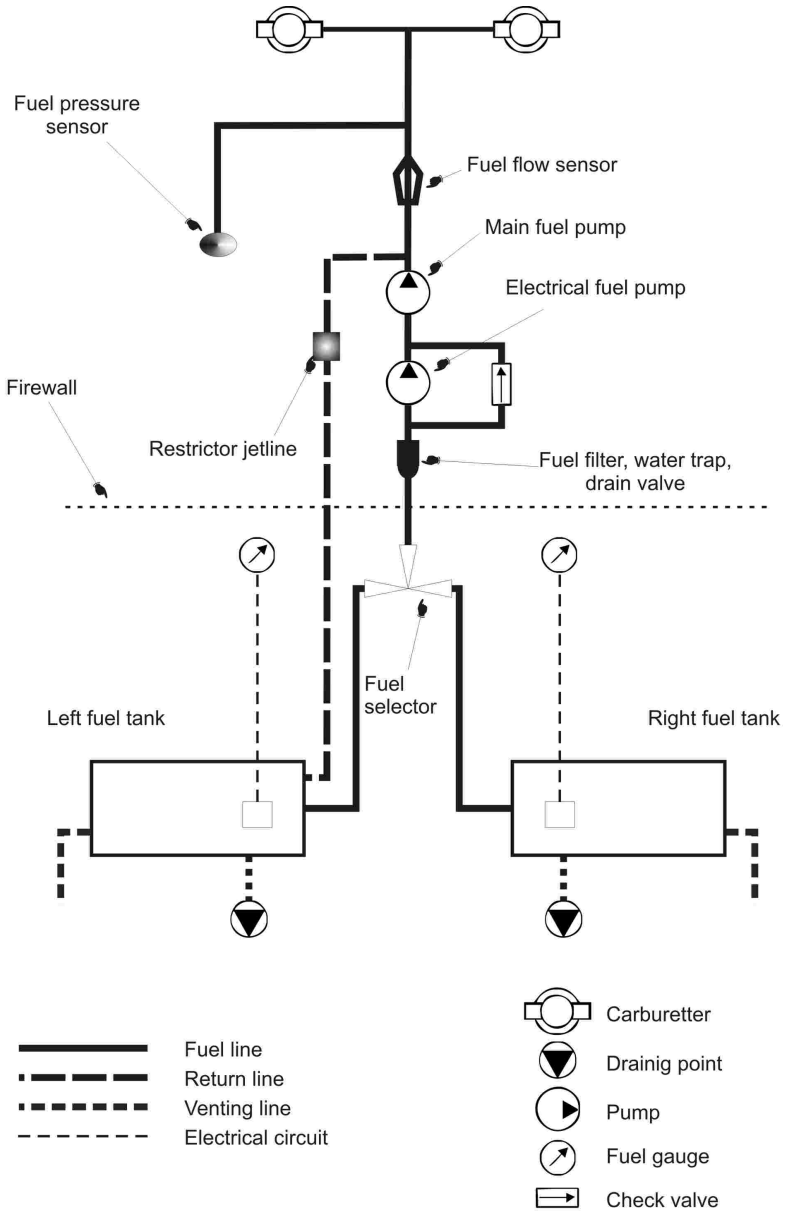


Figure 7-12 Fuel system diagram

7.13 Engine RPM (power) control

A throttle lever and a choke lever are used for the control of the engine's power. The engine throttle lever is located on the panel between the pilot seats, above the brake lever and it controls the throttle plates of the two carburettors.

The choke control allows starting of a cold engine and it is located on the central panel beside brake lever. To switch on it needs to be pulled and held for required time till engine runs uniformly.

7.14 Braking system

The brakes of the main landing gear are single-circuit, disc friction ones, controlled hydraulically. The system is provided by Kaspar.

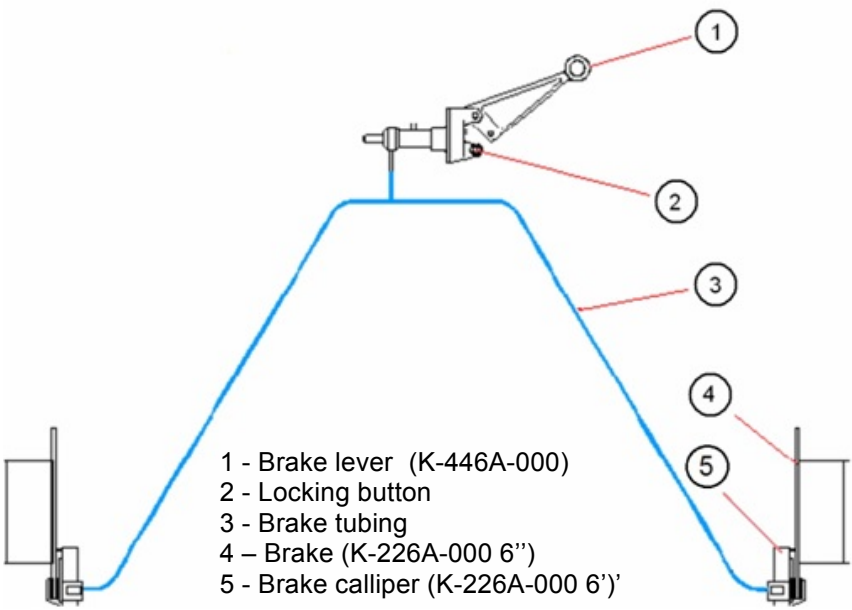


Figure 7-13 Braking system diagram

Brake control

They are controlled by pressing downwards on the brake leaver, located below the engine throttle lever on the panel between pilot seats.

Both wheels of the main landing gear brake simultaneously, without the possibility of braking individual wheels.

NOTE

If brake power is not sufficient to keep the wheels from rolling at full throttle on a level hard surface the brake must be serviced.

Brake Lock

For the locking of the brake lever in the braked position there is a button located on the left side of the brake cylinder bracket. To release the wheel brake, push the brake button downwards; the locking pin will release the brake from the locked position.

NOTE

Do not park the aircraft with brake locking!
Make use of wheel chocks.

The parking brake power in locked position varies with brake pad wear and brake fluid level. Monitor movement of the aircraft during high power run ups or engine checks. Additional braking might be necessary to prevent the aircraft from moving.

7.15 Pitot-static system

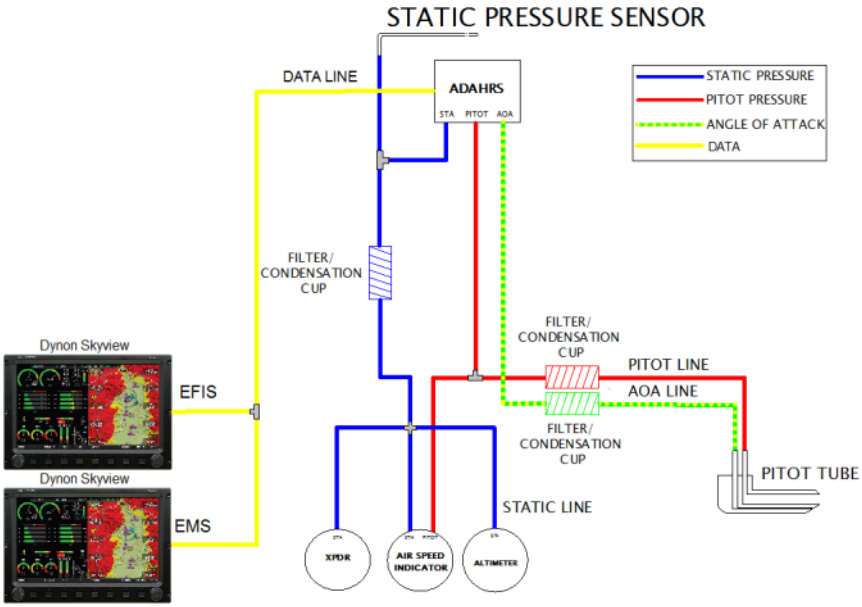


Figure7-14 Pitot-static diagram

The Pitot-tube is located at the bottom of the left wing.

The total pressure from the Pitot-tube is fed to the ADAHRS and to the barometric airspeed indicator.

The angle of attack (AOA) pressure is fed to the ADAHRS.

The static pressure is sensed by a static pressure sensor mounted at the top of the vertical stabilizer. The static pressure is fed to the ADAHRS, to the analogue airspeed indicator, to the analogue altimeter and to the blind altimeter of the transponder.

Barometric and heading data are transmitted from ADAHRS to the EFIS and EMS in digital form via DataBus.

7.16 Electric system

The system use 12V DC. It is supplied by an in-built-in AC generator with a rectifier (12V / 22A DC).

Battery

The battery (VARTA) is an auxiliary source of electric energy, located in the engine compartment on the firewall. It is accessible after the removal of the upper engine cowling.

3 Main switches

They switch and safeguard section switches that connect individual circles to on-board network.

Engine ignition

The capacitor, contact-free ignition is controlled by a switch-box on the left instrument panel. The ignition is part of a generator located at the back of the engine's body.

Starter

The starting circuit is controlled by the starter button, located on the left instrument panel.

Signalling

A regulator/generator failure is signalled by a red warning light on the left hand side instrument panel.

Trim

The control of the elevator's trim tab and the right aileron´s trim tab is electric, by trim buttons, located on both control sticks. The indicator of the position of the elevator trim tab is shown on BOTH Dynon Skyview instruments within the EMS panel.

Flaps

They are controlled by a lever electric controller, located on the central panel between the pilot seats. Part of the controller is a LED indicator of the position of the flaps.

If the flap lever does not match the flap position while engaging the flap section switch, it will not reset any flap position, unless the lever has been positioned in the matching flap lever position.

A flashing LED of the flap position indication signals that the flap control unit has been power cycled. In this condition the flap must be moved to another position and back.

Radio

The transmission function is controlled by a push-to-talk switch on the control stick of the commander's seat and by a push-to-talk switch on the control stick of the co-pilot seat.

Electric current protection

The electric system consists of electric circuits protected by circuit-breakers and the main 125 A melting fuse.

Landing Light (if installed)

Landing light is used for better visibility of the airplane while approaching on the airport. It is supplied by generator when toggle switch SOCKET 12V / LANDING LIGHT is switched to the LANDING LIGHT position. Before switching the toggle switch to LANDING LIGHT position, the SOCKET 12V / LANDING LIGHT section switch must be switched ON

Table 7-3 Current circuits protected by circuit breakers:

Section switch / Circuit	Name of circuit	Current protection
MAIN CIRCUIT BREAKERS		
1	MASTR	60 A circuit breaker
2	INSTR	30 A circuit breaker
3	GENERTR	2 x 30 A circuit breaker
SECTION CIRCUIT BREAKERS		
1	EMS, Warning Lights, Oil Pressure Sensor, Voltmeter,	4 A circuit breaker
2	INTRCM	1 A circuit breaker
3	RADIO	4 A circuit breaker
4	EFIS	5 A circuit breaker
5	FUEL PUMP	3 A circuit breaker
6	STARTER POWER	4 A circuit breaker
7	FLAPS	5 A circuit breaker
8	TRIM	1 A circuit breaker
9	GPS	3 A circuit breaker
10	XPDR	2 A circuit breaker
11	NAV LIGHTS	3 A circuit breaker
12	STROBE	5 A circuit breaker

13	SOCKET 12V If installed: SOCKET 12V /LANDING LIGHT	1 A circuit breaker
MELTING FUSES ON THE FIREWALL		
1	Regulator input current fuse	25 A melting fuse
2	Charging indicator	1 A melting fuse
3	Ammeter shunt fuse	1 A melting fuse
4	Ammeter shunt fuse	1 A melting fuse
5	Generator fuse	2 x 30 A melting fuse
6	Battery fuse	125A melting fuse

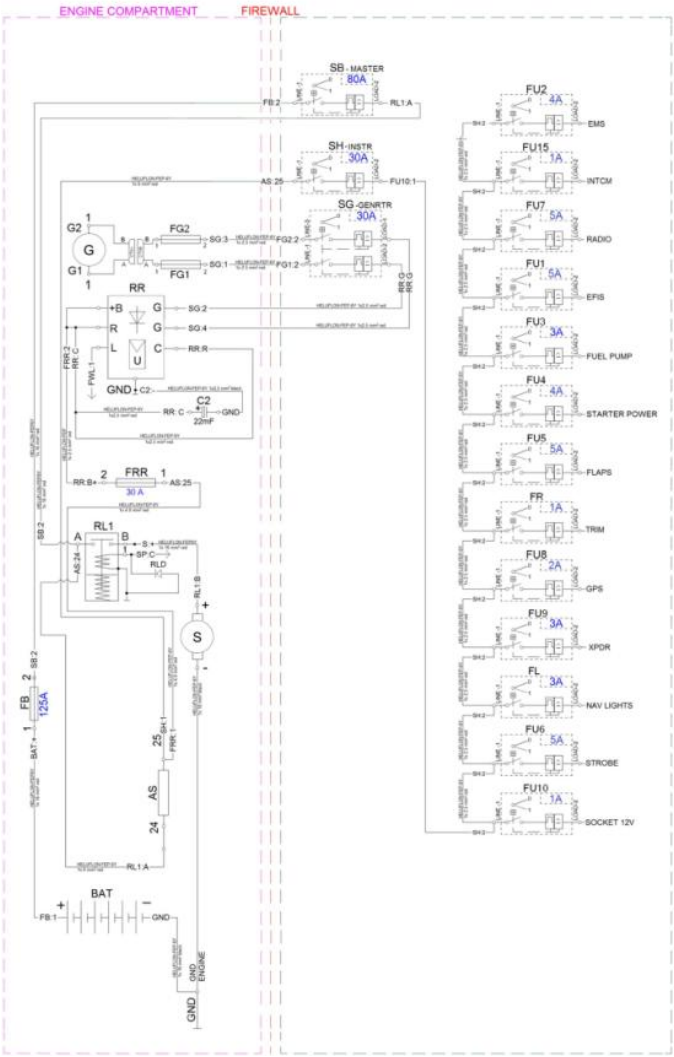


Figure 7-16 On board electric power net

Avionics instrument interconnection

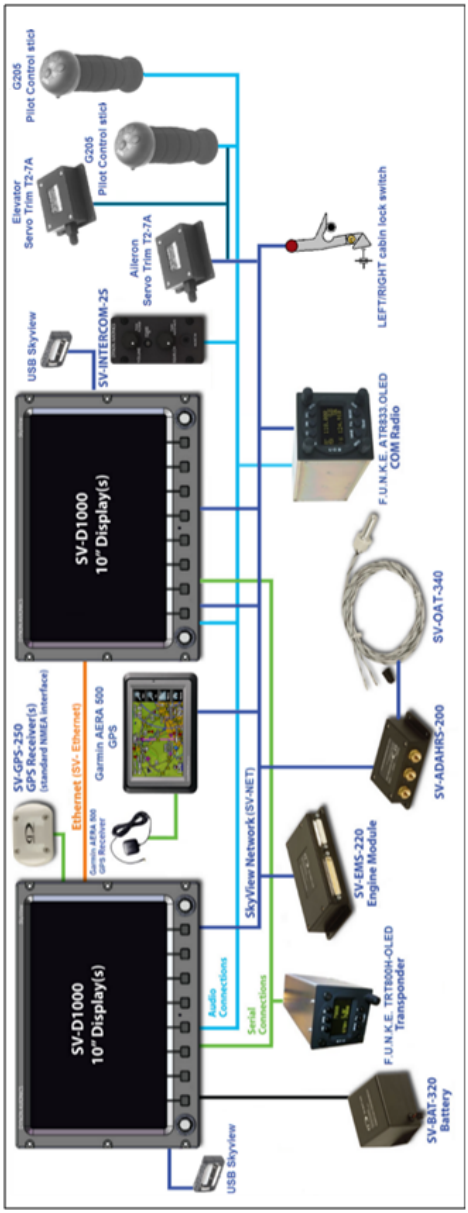


Figure 7-17 Avionics instrument interconnection

7.17 Aircraft Emergency Parachute System (AEPS)

The aircraft is equipped with an AEPS manufactured by Galaxy High Technology and is of GRS 6/600 SD S-LSA type.

The ballistic launching (rocket) and the parachute are installed in front of the instrument panel. The handle is in front of the pilot (see section 7.6 – note 37) but can be reached also by the co-pilot.

The attachments of the parachute to the aircraft are located one at the upper end of the nose gear strut close to the interface to the firewall and fuselage frame/beams. The other two are located at each side of the fuselage next to the landing gear strut interface.

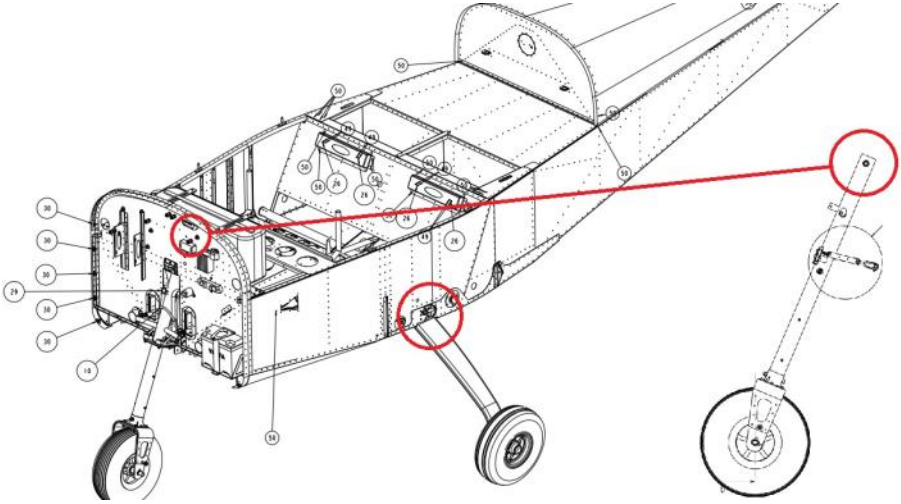


Figure 7-18 AEPS attachments points diagram

Figure 7-19 AEPS rocket

Figure 7-20 AEPS canopy container with packed chute

7.18 Cockpit ventilation and heating

The ventilation of the cockpit of Viper SD-4 RTC is designed as a ram pressure one.

The air entering through the inlets located on the sides of the cockpit is directed by plastic tubes above the instrument panel to ensure the blowing of the air against the canopy, which will prevent moisture condensation on it and to two air showers located on left and right instrument panels.

Canopy glass ventilation is supplied by two inlets located on the both sides of the back side of the canopy frame. The airflow is led to outlets located on the front part of the cabin frame and is controllable by two manually controlled vents located at the sides of canopy frame

The canopy is equipped with ventilation windows on the sides.

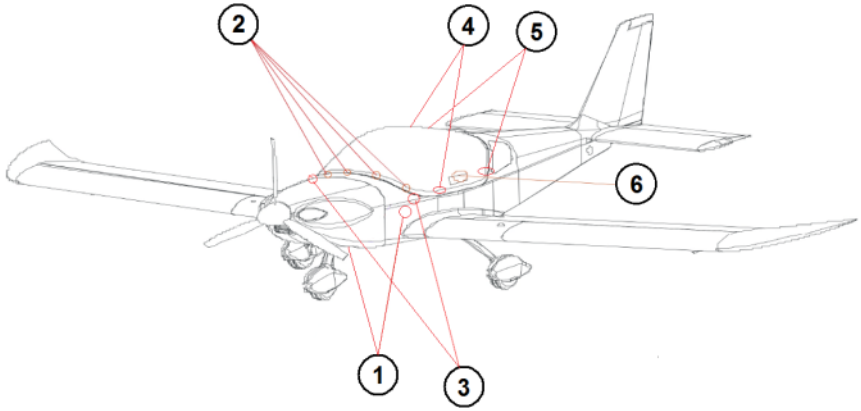


Figure 7-21 Ventilation scheme diagram

1. Cockpit air inlets
2. Blow holes above the instrument panel
3. Air showers located on left and right instrument panels
4. Air inlets for canopy ventilation
5. Manually controlled valves
6. Ventilation windows

The heating of the cockpit is provided by collecting warm air from about the exhaust area. This heat is directed by a rubber hose via a firewall to the cockpit. It is controllable via a control button located on the right side of the instrument panel.

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Section 8
HANDLING, SERVICE & MAINTENACE

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8.1 Ground handling

CAUTION

It is prohibited to pull or push the airplane by propeller blades, flaps, ailerons or tail surfaces.

8.1.1 Anchoring - parking of the airplane

The airplane has to be anchored if it is parked outside a hangar in an open area, or if there is a strong wind or a storm.

- Main switches OFF
- Section switches OFF
- Turn switch keys OFF
- Fuel selector OFF.
- Lock the control surfaces with control surface locks or fix stick in the PULL position with the seat belts.
- Cover the canopy with a cloth.
- Anchor the airplane with ropes or chains at anchoring points.
- Insert covers on both Pitot-static and static sensor
- Insert control surface blocks

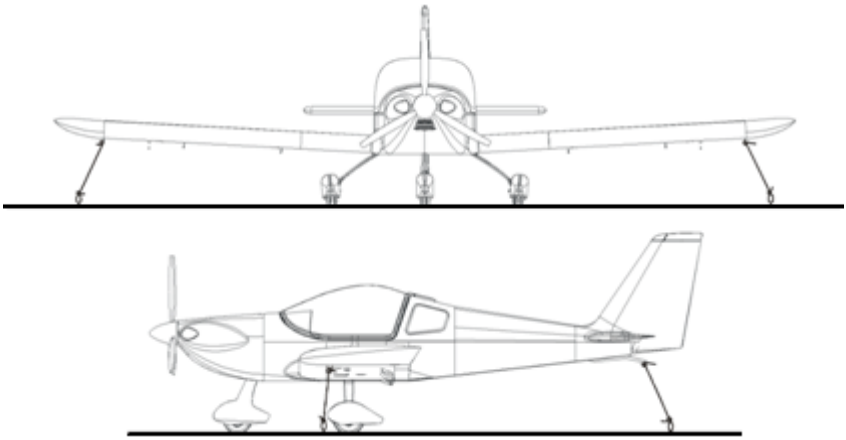

Figure 8-1 Anchoring of the airplane

CAUTION

Do not expose the cockpit to intense sunlight. There is a risk of the overheating of electronic instruments and damage to the plastic parts of the cockpit. When parking the airplane, cover the canopy with a canopy cover.

8.1.2 Towing of the airplane

It is possible to move the airplane on the ground with a towing bar specially supplied for that, or by pushing the airplane (use “step” area of the wing to push). If it is necessary to lift the front wheel, it is possible to do so by pulling the tail skid to the ground.

8.1.3 Jacking

Since the empty weight of this aircraft is relatively low, two people can lift the aircraft easily. First of all prepare two suitable supports to support the aircraft. It is possible to lift the aircraft by handling the following parts:

- By pushing the fuselage rear section down in the place of a bulkhead the fuselage front section may be raised and then supported under the firewall.
- By holding the fuselage rear section under a bulkhead the fuselage rear may be raised and then supported under that bulkhead.
- To lift up a wing, push from underneath that wing only at the main spar area. Do not lift up a wing by handling the wing tip.

8.2 Cleaning and Care

8.2.1 Cleaning of the canopy

Detailed description of canopy cleaning is described in “Professional Maintenance for Acryl Glass Products” that is part of supporting airplane documentation.

8.2.2 Cleaning of coated parts

The surfaces of metal sheet and laminate parts have durable coating. Under normal conditions it is necessary to preserve the surface of the airplane with polishing pastes used normally for the preservation of car bodies. During regular daily maintenance clean the airplane with clean water with the possible use of a detergent suitable for car bodies. After the washing, wipe the surface of the airplane dry.

CAUTION

It is forbidden to use other solvent-based cleaning agents for the cleaning of coated parts of the airplane.

8.2.3 Cleaning of the interior

Remove the rough dirt from the cockpit by vacuum cleaning. Clean the artificial leather covers by a cloth soaked with clean water. Clean fabric covers by vacuum cleaning and by a suitable agent for wet vacuum cleaning of car seat covers.

CAUTION

It is forbidden to use other solvent-based cleaning agents for the cleaning of coated parts of the interior.

8.2.4 Care for the landing gear

In the case it gets dirty, clean the landing gear with lukewarm water with added detergent. If the wheels of the landing gear are equipped with fairings, clean them from inside by a thrust of water.

CAUTION

It is forbidden to use other solvent-based cleaning agents for the cleaning of coated parts of the landing gear.

8.2.5 Care for the propeller

The propeller and the hub must always be kept clean in order to guarantee a faultless visual inspection during the daily checks.

There is no need for any other maintenance than the daily checks.

Clear water is ideal for cleaning. You may add some washing-up liquid and use a soft sponge. The plastic surface should be polished with car polish from time to time.

CAUTION

It is forbidden to use other solvent-based cleaning agents for the cleaning of the propeller.

8.3 Servicing operating fluids

8.3.1 Filling and draining of fuel

In the case of a higher stored volume and longer storage period it is necessary to carry out a visual check of a sample for possible content of water and/or mechanical impurities every day. In normal operation during a pre-flight inspection drain sludge from the fuel tank through the drain valve of the fuel tank by draining a small amount fuel into a prepared container. Check the fuel filter visually for the content of mechanical impurities. Transport the fuel to be filled in a way that prevents its degradation by impurities or water.

The types of fuel for the operation are specified in more detail in the operation handbook for Rotax.

The following fuels may be used:

MOGAS	
European standard	EN 228 Super1 [1)]
	EN 228 Super plus [1)]
Canadian standard	CAN/CGSB-3,5 Grade 3 [2)]
US standard	ASTM D 4814
AVGAS	
US standard	AVGAS 100LL (ASTM D910)

[1)] min. RON 95
[2)] min. AKI 91

The AVGAS 100LL petrol, with its higher content of led, stresses valve seats more, forms more sediments in the lubrication system and carbonates more. Use this fuel only in the event of problems with the fuel evaporation or if no other type of fuel is available.

You can find more information about the choosing of the right fuel in the valid issue of the Service Information SI-912-016.

There are no special specified procedures for the filling of the plane with fuel. Be careful not to splash the airplane's coating or canopy. After the filling, close the fuel tank well and lock it.

Use the drain valve of the fuel tank for the draining the fuel.

CAUTION

At outside air temperatures exceeding 25 °C, do not fill individual fuel tanks at more than 90 % of their maximum volume.

NOTE

Drain the fuel only in a place and into containers specified for that in order to prevent the contamination of the environment.

8.3.2 Filling of oil

When procuring, storing, filling and/or adding, check the type of oil to be used and its viscosity specifications. In order to do that, follow the instructions of the engine's manufacturer and oil producer. In the case of a higher stored quantity, check the storage period and oil samples for possible impurities. Transport and store the oil to be filled in a way that prevents its contamination.

For the lubrication of the ROTAX 912S/ULS engine use only oils marked according to API – SG or higher. ROTAX 912 S/ ULS has been filled in the factory by the Shell Advance Ultra 4 10W – 40 oil.

Filled oil quantity .....3 litres
Minimum oil quantity .....2 litres
Oil consumption .....0.06 litres/h

You can find more information for the selection of suitable lubricant in Service Information SI-912-016 latest issue.

There are no special specified procedures for the filling of the oil. Be careful not to splash it on the engine compartment or canopy. Add oil only up to the maximum level notch.

CAUTION

The replacement of the oil may only be done by a person qualified as the airplane's maintenance technician.

8.3.3 Filling of coolant

In the case of long out of service time check the coolant's expiry date. In the case of a longer-term storage, check the coolant for possible impurities before filling it.

When checking, adding or replacement of the coolant, proceed in line with the instructions specified in the operation manual for the Rotax 912 S/ULS engine. By the manufacturer the cooling system has been filled with SHERON Antifreeze Ultra G12++ (water based cooling).

Do not use waterless coolant with this aircraft.

See further instruction on applicable coolant liquids in SI-912-016 latest issue.

Transport and store the coolant in a way that prevents its contamination.

There are no special specified procedures for the filling of the coolant. Be careful not to splash it on the engine compartment or canopy. Add the coolant only up to the maximum notch.

CAUTION

The replacement of the coolant may only be done by a person qualified as the airplane's maintenance technician.

8.3.4 Brake fluid

Check the expiry date of the brake fluid in the case of for long out of service time. In the case of a longer-term storage check the liquid visually for possible water and/or impurities before filling it.

For the adding and replacement of the brake fluid we recommend use of the DOT3 HD 230 Liquid, Standards: ISO 4925 DOT3 SAEJ 1703F, FM VSS 116.

The brake fluid should be replaced in two-year intervals (see also TOM-TC-01-AMM latest issue).

CAUTION

The replacement of the brake fluid may only be done by a person qualified as the airplane's maintenance technician.

8.4 Maintenance of the battery

An acid type VARTA 12V/19Ah battery, which does not require special maintenance, has been installed in the airplane.

Routine maintenance of the battery includes the checking of the level of recharging, check of the condition of the terminals and their treatment and the cleaning of the battery's surface. When the temperatures of the surrounding air drop below 0 °C, demount the battery from the airplane and store it in a warm and dry room. In the case of longer-term storage, recharge the battery to its full capacity.

CAUTION

Carry out the recharging of the battery and its maintenance only away from the airplane.

8.5 Break in operation

8.5.1 Engine

It does not require any special anti-corrosion treatment. Only in extreme climatic conditions and after a very long time break the following measures are recommended:

Preservation of the engine:

- Heat up the engine and replace the oil.
- Leave the engine running at an increased idle and with demounted air filter inject into the carburettors about 30 cm2 of preservation oil, and then switch off the engine.
- Empty the float chambers.
- Coat the carburettor control with oil.
- On a cold engine blind all openings – exhaust pipe, deaeration and air filters against dirt and moisture.
- Apply preservation oil on metal parts.

De-preservation of the engine:

- Remove all blinds.
- Clean the sparking plugs.
- If the preservation has been done no earlier than a year before, it is not necessary to replace the oil. After a longer break, each year repeat the preservation procedure.

WARNING

There is a risk of injury from the rotating propeller!

8.5.2 Propeller

It does not require any special anti-corrosion treatment.

The propeller and the hub must always be kept clean in order to guarantee a faultless visual inspection during the daily checks.

Clear water is ideal for cleaning. You may add some washing-up liquid and use a soft sponge. The plastic surface should be polished with car polish from time to time.

There is no need for any other maintenance than the daily checks.

8.6 Inspections

Regular and thorough maintenance is a condition for a reliable and safe operation of the airplane. The airplane's lifetime as a whole includes the lifetimes of its key parts, which are the airframe, the engine and the propeller.

8.6.1 Airframe

Periodic inspections

Operation hours	Type of inspection	To be done by
Pre-flight inspection		Pilot or designated mechanic / technician
25 hours	After first 25 operating hours	Authorized service centre
100 hours / 1 year *	After each 100 operating hours	AMO Approved maintenance organisation

* - whichever occurs first

Inspection after the first 25 hours – warranty inspection.

In order to demonstrate continued airworthiness, the engine and airframe must be inspected after the ***first*** 25 hours of operation.

A periodic inspection after each 100 hours or 1 x in 12 months, whichever occurs first.

8.6.2 Rotax 912 S/ULS engine

The engine is approved with the aircraft and continued airworthiness is provided by TOMARK. For all engine related issues refer to TOMARK accepted documentation. Referenced documents this AFM and according AMM of the Viper SD-4 RTC can be considered accepted by TOMARK.

Detail information about inspection can be found in the Aircraft Maintenance Manual. The aircraft Maintenance Manual uses reference to the Rotax Maintenance Manual for engine type 912 series (Ref. No. MML-912).

The engine's lifetime is not specified. After 2000 hours or 15 years.

Periodic inspections of the Rotax 912S/ULS engine

Operation hours	Type of inspection	Performed by
25 hours	After first 25 operating hours	Authorized service centre
100 hours / 1 year *	After each 100 operating hours	AMO
200 hours	After each 200 operating hours	AMO
600 hours	After each 600 operating hours	AMO
Every 5 years	Replacement of parts defined in MAINTENANCE MANUAL (Line Maintenance) for Rotax Engine Type 912 Series, latest issue Chapter 05-10-00 point 2.1) Time limits for rubber parts and point 2.2) Time limit for fuel pump	AMO
2 000 hours / 15 years *	Overhaul	AMO

* - whichever occurs sooner

8.6.3 Propeller NEUFORM

The propeller is approved with the aircraft and continued airworthiness is provided by TOMARK. For all propeller related issues refer to TOMARK accepted documentation. Referenced documents this AFM and according AMM of the Viper SD-4 RTC can be considered accepted by TOMARK.

Periodic inspections of the NEUFORM CR3-65 (IP) 47-101.6

Operation hours	**Type of inspection**	**To be done by**
Pre-flight inspection		Pilot or designated mechanic / technician
25 hours	After first 25 operating hours or after each new installation	Authorized service centre
100 hours / 1 year *	After each 100 operating hours	AMO
1 500 hours	Technical check	TOMARK (in cooperation with Neuform)

* - whichever occurs sooner

There is no life limit for the propeller. The propeller is subject of periodic inspections at the airplane manufacturer or his partner`s service centre and propeller manufacturer or his authorized partner.

8.7 Maintenance of instruments and devices

Carry out the maintenance of instruments and devices in line with the applicable instructions provided by TOMARK.

During the periodic inspections check the instruments and devices for apparent damage and damaged marking and check whether the limits specified by the instruments are sufficiently readable and in line with specified values of this AFM.

8.8 Identification of causes of faults and their elimination

During the operation of the airplane, the following faults may occur:

8.8.1 Engine

The engine will not start

Possible cause	*Solution*
Starter section switch off	Switch the ignition ON.
Closed FUEL selector	Switch it to tank with more fuel.
Clogged fuel filter	Clean the fuel filter (or replace it).
Empty fuel tank	Fill it up.
The starter's RPM is low, the battery is flat	Recharge the battery.
The starter`s RPM is low (winter period)	Use a low viscosity oil. Pre-heat the engine.
A warmed-up started to loses power	Leave it to cool down sufficiently.

After being started, the engine runs irregularly and gives out smoke

Possible cause	*Solution*
Switched on choke	Switch the choke OFF

Low oil pressure

Possible cause	*Solution*
Too little oil in the oil tank	Check the oil level and add oil if necessary

Engine detonations

Possible cause	*Solution*
The engine is overheated	Cool down at about 2,000 RPM

Engine rattles when loaded

Possible cause	*Solution*
The fuel is low-octane	Fill up fuel a higher octane fuel

Difficult to start the engine at low temperatures

Possible cause	*Solution*
Low RPM to start	Heat up the engine.
The battery is flat	Recharge the battery.
High oil pressure	If the gauge shows 7 bar at cold start, it does not always indicated a fault.
Too low oil pressure after starting a cold engine	Too high resistance in the suction oil piping at low temperatures. Stop the engine and heat up the oil.

8.8.2 Propeller

Vibrations from the propeller in flight or on the ground

Possible cause	*Solution*
Loss of the propeller aerodynamic balance	Stop engine and contact AMO Check whether all propeller blades are adjusted to the correct angle.

NOTE

For propeller trouble shooting always contact TOMARK or approved maintenance organisations (AMO).

8.9 Spare parts

Spare parts must to be supplied with EASA Form 1 by TOMARK.

Transponder and Radio can be supplied directly (with Form 1) by f.u.n.k.e.

Dynon hardware and software (any) needs to be supplied by TOMARK POA and no direct delivery by Dynon is approved.

In specific cases the engine can be replaced directly by an approved version of the ROTAX engine (delivered with Form 1 issued by ROTAX). Note that TOMARK must to be contacted and approval for engine exchange must to be coordinated by TOMARK.

CAUTION

The airplane's manufacturer is not liable for the damage occurred on the airplane or its units that was caused by the use of unsuitable or degraded operation filings or by the use of unsuitable, non-original parts or accessories or by non-professional interventions during its control, operation or maintenance.

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Section 9
Supplements

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