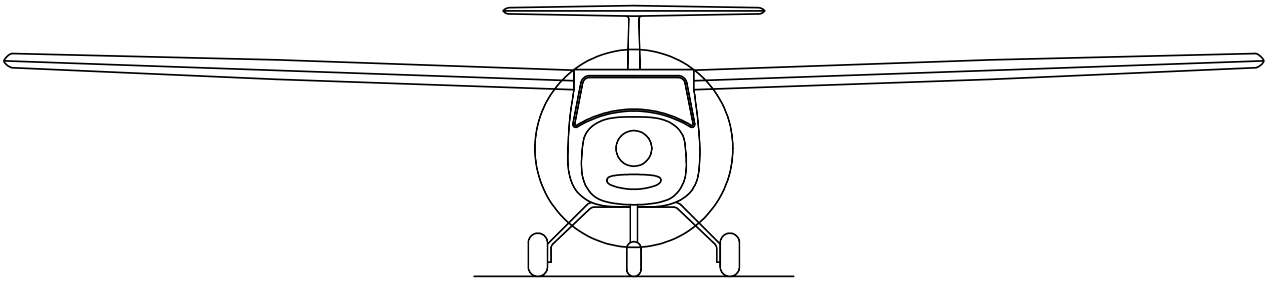
PIPISTREL

# Pilot's Operating Handbook and Flight Training Supplement

**applies to ALPHA Trainer LSA**
**equipped with Rotax 912 (80 HP) engine**



## REVISION 8

**(11th August, 2015)**

Aircraft Registration Number: 24-8507

Aircraft Serial Number: 648 AT 912 LSA

**This publication includes the material required to be supplied to the pilot by ASTM F2245, F2279 & F2295**

## WARNING!

This document MUST be present inside the cockpit at all times.
Should you sell this aircraft make sure this document is given to the new owner.

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# Performance - Specifications

| ALPHA Trainer | 80 hp Rotax 912 |
|---|---|
| stall speed (flaps extended) | 37 kts (68 km/h) |
| stall speed (flaps retracted) | 43 kts (80 km/h) |
| cruise speed (5300 RPM) | 108 kts (201 km/h) |
| maximum horizontal speed at sea level | 120 kts (222 km/h) |
| VNE | 135 kts (250 km/h) |
| standard endurance 108 knots cruise | 3.0 hours + 30 min reserve |
| standard range at 108 knots cruise | 324 NM (600 kms) |
| fuel flow at 108 knots cruise speed (typical) | 3.6 gph (13.6 l/h ) |
| best speed for max endurance | 90 knots 4900-5000 rpm |
| max endurance at 90 knots | 3.6 hours + 30 min reserve |
| takeoff - ground roll - at MTOM | 558 ft (170 m) |
| takeoff total distance over 50 ft obst. at MTOM | 869 ft (265 m) |
| landing distance over 50 ft obst. | 1510 ft (460 m) |
| absolute ceiling at MTOM | 18,000 ft (5500 m) |

**NOTE** The above performance figures are based on airplane weight at 1212 lbs, standard atmospheric conditions, level hard-surfaced dry runways and no wind. They are calculated valued derived from flight test conducted by Pipistrel LSA s.r.l., under supervision of CAA of Republic of Slovenia and under carefully documented conditions. Figures may vary based upon numerous factors (surface condition, temperature, water on wing, etc).

| ALPHA Trainer | 80 hp Rotax 912 |
|---|---|
| maximum weight takeoff | 1212 lbs (550 kg) |
| maximum weight landing | 1212 lbs (550 kg) |
| standard empty weight | 615 lbs (279 kg) |
| payload without fuel | 597 lbs (271 kg) |
| payload with full fuel | 518 lbs (235 kg) |
| baggage allowance, maximum (baggage area floor limit) | 55 lbs (25 kg) |
| baggage allowance, typical with full fuel | 22 lbs (10 kg) |
| fuel capacity, total | 13.2 US gal (50 l) |
| fuel capacity, usable | 12.7 US gal (48 l) |
| fuel weight full | 79.4 lbs (36 kg) |
| oil capacity (oil bottle) | 3.1 quarts |
| engine | Rotax 912 80 hp |
| propeller | FP02-80, Diameter 1650 mm |

# Noise levels

According to independent testing performed by German LBA-LTF noise regulations the airplanes, the equivalent exhibited noise measures 55.8 dBa. Noise is measured on the ground when the airplane overflies at 500 ft at full power, at speed of best climb. Measures have been taken to make the cockpit exceptionally quiet on the inside as well.

# Coverage

The Pilot's Operating Handbook (POH) in the airplane at the time of delivery from Pipistrel LSA s.r.l. contains information applicable to the ALPHA Trainer airplane and to the airframe designated by the serial number and registration number shown on the Title Page. All information is based on data available at the time of publication. Continued airworthiness is according to ASTM F2295, information is available below.

This POH consists of ten sections that cover all operational aspects of a standard equipped airplane. Section 10 contains the supplements which provide amended operating procedures, performance data and other necessary information for airplanes conducting special operations and/or are equipped with both standard and optional equipment installed in the airplane. Additional supplements are individual documents and may be issued or revised without regard to revision dates which apply to the POH itself. The Log of Effective Pages should be used to determine the status of each supplement.

# Revision tracking, filing and identifying

Pages to be removed or replaced in the Pilot's Operating Handbook are determined by the Log of Effective pages located in this section. This log contains the page number and revision level for each page within the POH. As revisions to the POH occur, the revision level on the effected pages is updated. When two pages display the same page number, the page with the latest revision shall be used in the POH. The revision level on the Log Of Effective Pages shall also agree with the revision level of the page in question. As an alternative to removing and/or replacing individual pages, the owner can also print out a whole new manual in its current form, which is always available from www.pipistrel.eu.

Revised material is marked with a vertical double-bar that will extend the full length of deleted, new, or revised text added to new or previously existing pages. This marker will be located adjacent to the applicable text in the marking on the outer side of the page. The same system is in place when the header, figure, or any other element inside this POH was revised. Next to the double-bar, there is also a number indicative to which revision the change occurred in. A list of revisions is located at the beginning of the Log Of Effective Pages

Pipistrel is not responsible for technical changes/updates to OEM manuals supplied with the aircraft (eg. radio, transponder, GPS etc...)

# Online updates, service notice tracking & airworthiness reporting

To receive and report Issues and anomalies identified by the aircraft owner or maintainer during the operation or maintenance of this aircraft or to report content errors in this manual then please log into the Owner's section of the Pipistrel website where you can report service difficulties and receive updates and information relevant to service and airworthiness of your aircraft.
Go to: www.pipistrel.eu and log in the top right corner of the page with:

**Username: owner1** **Password: ab2008**

# Index of revisions

The table below shows the revisions which were made from the original manual release to this date. Always check with your registration authority, Pipistrel USA (www.pipistrel-usa.com) or Pipistrel LSA s.r.l (www.pipistrel.eu) that you are familiar with the current release of the operation-relevant documentation which includes this POH.

| Designation | Reason for Revision | Release date | Affected pages | Issuer |
|---|---|---|---|---|
| Preliminary | / | 15 November, 2011 | / | Tomazic, Pipistrel LSA s.r.l. |
| Preliminary | | 2nd January 2012 | Various Review Before Release | Coates, Pipistrel LSA s.r.l. |
| Release | Revision 1 | 19th March 2012 | Various Review Before Release | Coates, Pipistrel LSA s.r.l. |
| Revision 2 | Added Section 10, Language US English | 19th December 2012 | All and added Section 10 | Coates, Pipistrel LSA s.r.l. |
| Revision 3 | Specification changes | 22nd July 2013 | Several | Coates, Pipistrel LSA s.r.l. |
| Revision 4 | Specification changes | 13th August 2013 | Several | Coates, Pipistrel LSA s.r.l. |
| Revision 5 | Reordering of chapters to comply with ASTM F2746-12 | 31st January 2014 | ALL | Coates, Pipistrel LSA s.r.l. |
| Revision 6 | Small Changes | 31st March 2015 | Cover, 5-5 and 9-6 | Coates, Pipistrel LSA s.r.l. |
| Revision 7 | Change operating temperature | 24th April 2015 | Cover, 2-5 | Coates, Pipistrel LSA s.r.l. |
| Revision 8 | Changes | 11th August 2015 | Cover, i-2, 1-4, 1-5, 2-5, 4-5, 4-7, 5-2. | Coates, Pipistrel LSA s.r.l. |
| | | | | |
| | | | | |

# Warnings, Cautions and Notes

Safety definitions used in the manual:

**WARNING!** **An operating procedure or technique that may result in personal injury or loss of life if not followed.**

**CAUTION!** **An operating procedure or technique that may result in damage to equipment if not followed.**

**NOTE** **An operating procedure or technique needing special emphasis.**

# Log of Effective Pages

Use to determine the currency and applicability of your POH. Pages are affected by the current revision are marked in bold text in the Page Number column.

| Page number | Page Status | Rev. number | Page number | Page Status | Rev. number |
|---|---|---|---|---|---|
| Cover | Revised | 8 | 5-1 | Revised | 5 |
| i-1 | Revised | 5 | 5-2 | Revised | 8 |
| i-2 | Revised | 8 | 5-3 | Revised | 5 |
| i-3 | Revised | 5 | 5-4 | Revised | 5 |
| i-4 | Revised | 5 | 5-5 | Revised | 6 |
| i-6 | Revised | 5 | 5-6 | Revised | 5 |
| i-7 | Revised | 5 | 6-1 | Revised | 5 |
| 0-1 | Revised | 5 | 6-2 | Revised | 5 |
| 0-2 | Revised | 5 | 6-3 | Revised | 5 |
| 1-1 | Revised | 5 | 6-4 | Revised | 5 |
| 1-2 | Revised | 8 | 6-5 | Revised | 5 |
| 1-3 | Revised | 5 | 6-6 | Revised | 5 |
| 1-4 | Revised | 8 | 7-1 | Revised | 5 |
| 1-5 | Revised | 8 | 7-2 | Revised | 5 |
| 1-6 | Revised | 5 | 7-3 | Revised | 5 |
| 2-1 | Revised | 5 | 7-4 | Revised | 5 |
| 2-2 | Revised | 5 | 7-5 | Revised | 5 |
| 2-3 | Revised | 5 | 7-6 | Revised | 5 |
| 2-4 | Revised | 5 | 7-7 | Revised | 5 |
| 2-5 | Revised | 8 | 7-8 | Revised | 5 |
| 2-6 | Revised | 5 | 7-9 | Revised | 5 |
| 2-7 | Revised | 5 | 7-10 | Revised | 5 |
| 2-8 | Revised | 5 | 7-11 | Revised | 5 |
| 3-1 | Revised | 5 | 7-12 | Revised | 5 |
| 3-2 | Revised | 5 | 8-1 | Revised | 5 |
| 3-3 | Revised | 5 | 8-2 | Revised | 5 |
| 3-4 | Revised | 5 | 8-3 | Revised | 5 |
| 3-5 | Revised | 5 | 8-4 | Revised | 5 |
| 3-6 | Revised | 5 | 8-5 | Revised | 5 |
| 4-1 | Revised | 5 | 8-6 | Revised | 5 |
| 4-2 | Revised | 5 | 9-1 | Revised | 5 |
| 4-3 | Revised | 5 | 9-2 | Revised | 5 |
| 4-4 | Revised | 5 | 9-3 | Revised | 5 |
| 4-5 | Revised | 8 | 9-4 | Revised | 5 |
| 4-6 | Revised | 5 | 9-5 | Revised | 5 |
| 4-7 | Revised | 8 | 9-6 | Revised | 6 |
| 4-8 | Revised | 5 | 9-7 | Revised | 5 |
| 4-9 | Revised | 5 | 9-8 | Revised | 5 |
| 4-10 | Revised | 5 | 9-9 | Revised | 5 |

# Log of Effective Pages (continued)

| Page number | Page Status | Rev. number | Page number | Page Status | Rev. number |
|---|---|---|---|---|---|
| 9-10 | Revised | 5 | | | |
| 9-11 | Revised | 5 | | | |
| 9-12 | Revised | 5 | | | |
| 9-13 | Revised | 5 | | | |
| 9-14 | Revised | 5 | | | |
| 10 - extras | Revised | 5 | | | |
| Checklist | Revised | 5 | | | |

## CAUTION!

This manual is valid only if it contains all of the original and revised pages listed above.

Each page to be revised must be removed, shredded and later replaced with the new, revised page in the exact same place in the manual.

## IMPORTANT !

This Pipistrel ALPHA Trainer aircraft is sold globally in more than 40 countries. Many countries have their own individual requirements for information required to be shown in an aircraft manual. This manual is the only official manual for the ASTM-LSA version, published by Pipistrel, in some countries it may be necessary to add supplements or inserts to comply with local regulations, these are listed in Section 10 if required.

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# Table of contents

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# 1 General

# Introduction

This manual contains all information needed for appropriate and safe use of ALPHA Trainer.

**IT IS MANDATORY TO CAREFULLY STUDY THIS MANUAL PRIOR TO USE OF AIRCRAFT**

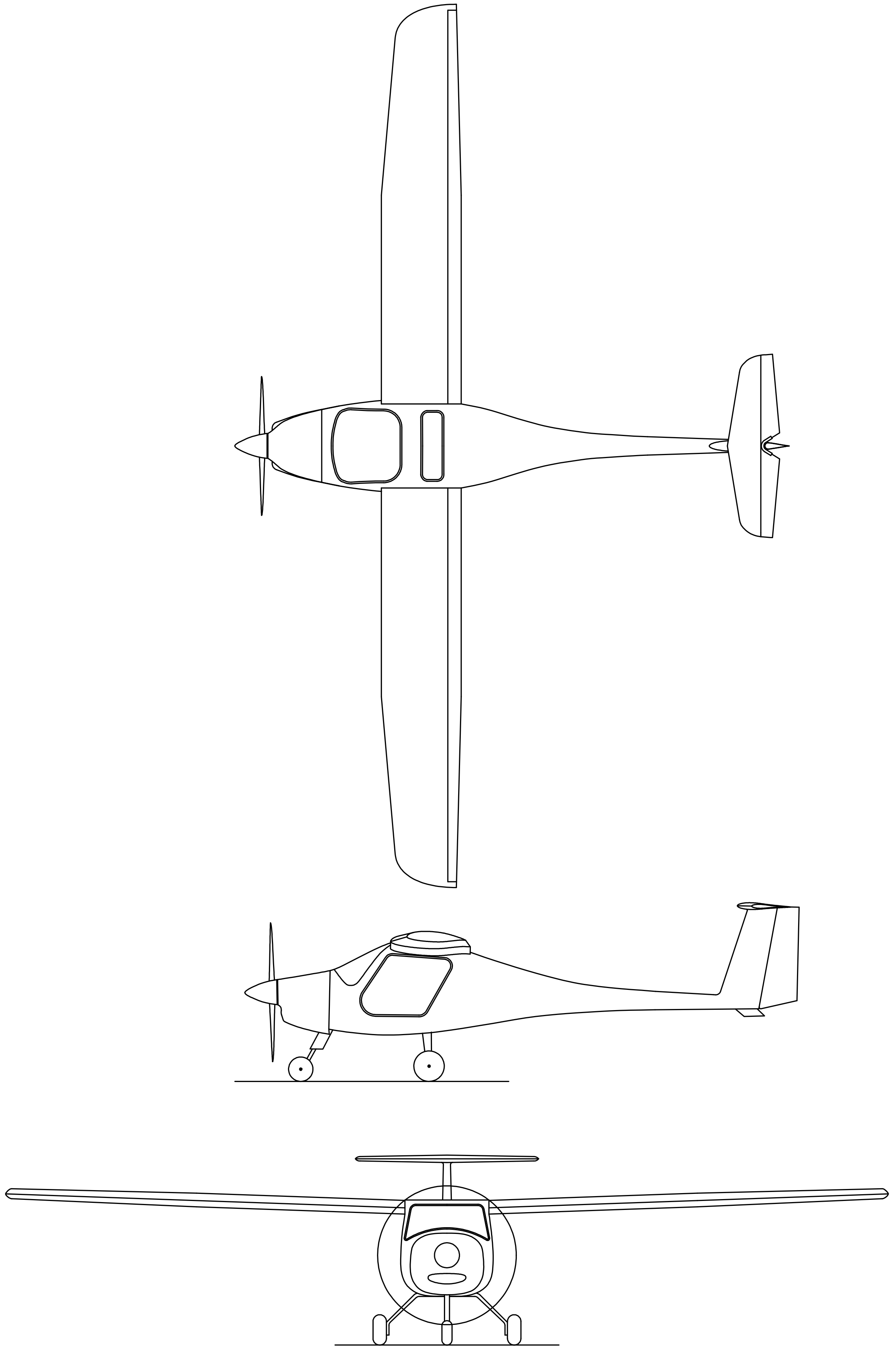
Pipistrel LSA s.r.l is not responsible for any damage or injury resulting from not following the instructions contained in this manual.



# Technical brief

| PROPORTIONS | ALPHA Trainer |
|---|---|
| wing span | 34’ 6” (10.5 m) |
| length | 21’ 4” (6.5 m) |
| height | 6” 9’ (2.05 m) |
| wing surface | 102.4 sqft (9.51 $m^2$) |
| vertical fin surface | 11.8 sqft (1.1 $m^2$) |
| horizontal stabilizer and elevator surface | 11.6 sqft (1.08 $m^2$) |
| aspect ratio | 11.8 |
| positive flap deflection (down) | 0°, 15°, 25° |
| center of gravity (MAC) | 25% - 38% |
| propeller - fixed | FP02-80, Diameter 1650 mm |

# 3-view drawing



# Powerplant, fuel, oil

**Engine manufacturer: ROTAX**
**Engine type: Rotax 912  (80 HP)**

**Data below is data relevant for pilot. Consult the original Rotax engine manuals for all other details.**

## The engine

| **TEMPERATURE °C / ROTAX ENGINE** | **912 80 HP** |
|---|---|
| cylinder head temp. (CHT); minimum, working, highest | 80; 110; 120 |
| max. CHT difference | / |
| exhaust gas temperature (EGT); normal, max. | 650-885; 900 |
| max. EGT difference | 30 |
| cooling fluids temperature (WATER); minimum, highest | 50; 120 |
| oil temperature (OIL TEMP); minimum, normal, highest | 50; 90-110; 140 |
| **RPM, PRESSURE** | **912 80 HP** |
| oil pressure (OIL PRESS); lowest, highest bar (psi) | 1.0; 6.0<br>(14.5; 87.0) |
| engine revolutions (RPM); max continuous | 5500 |
| RPM on ground; max. allowable 5 min | 5800 |
| magneto check at (RPM) | 4000 |
| max. single magneto drop (RPM) | < 300 |

## Fuel and oil

| **ROTAX ENGINE** | **912 80 HP** |
|---|---|
| **recommended fuel** | unleaded super, grade 87 and up, no alcohol content preferred |
| **also approved fuels** | leaded* or AVGAS 100 LL* |
| **recommended oil** | API SJ SAE 10W-50 |
| **oil capacity typical 3 quarts** | check dipstick |

***Engine life may be reduced. Should you be forced to use this kind of fuel, change of engine oil every**
**50 flight hours is crucial. Please consult the manufacturer on which type of oil to use.**

**IMPORTANT!**
Four-stroke engines should only be powered by unleaded fuel, for lead sedimentation inside the engine shortens its life. Provided you are unable to use unleaded fuel, make sure engine oil and the oil filter are replaced every 50 flight hours.

**NOTE!** Use of fuel with alcohol (ethanol) content is permitted in line with Rotax recommendations.

**NOTES**
The fuel gauge is equipped with marking for fuel status in fractions of fuel tank capacity. Electric fuel indication (gauge on instrument panel) may not be reliable at all times. Pilot caution is advised.

When fuelling or de-fuelling, verify that the vent tube remains unobstructed from contamination.

# Propeller

| ALPHA Trainer | Propeller |
|---|---|
| **Rotax 912 (80 HP)** | Pipistrel FP02-80, Diameter 1650 mm |

# Engine instrument markings

| Instrument | Red line (minimum) | Green arc (normal) | Yellow arc (caution) | Red line (maximum) |
|---|---|---|---|---|
| Tachometer (RPM) | 1600 | 1600-5500 | 5500-5800 | 5800 |
| Oil temperature | 50°C | 90-110°C | 110-140°C | 140°C |
| | (122°F) | (194-230°F) | (230-266°F) | (266°F) |
| Cylinder head temp. | / | | 110-120°C | 120°C |
| | | | (230-248°F) | (248°F) |
| Oil pressure | 1.0 bar (14.5 psi) | | | 6.0 bar (87.0 psi) |

# Weights

## ALPHA Trainer weights

| WEIGHT | ALPHA Trainer |
|---|---|
| standard empty weight | 615 lbs (279 kg) |
| max. takeoff weight (MTOM) | 1212 lbs (550 kg) |
| fuel capacity (full) | 13.2 US gal (50 l) |
| fuel capacity (usable) | 12.7 US gal (48 l) |
| max. fuel weight allowable | 79.4 lbs (36 kg) |
| payload with full fuel | 518 lbs (235 kg) |
| minimum combined cockpit crew weight | 121 lbs (55 kg) |
| luggage weight | depends on equipment and operational configuration; maximum 55 lbs (25 kg) |

**WARNING!** MTOM must be kept at or below 1212 lbs. Pay special attention to luggage and fuel weight, as these are the applicable masses on the airframe that have an influence on center of gravity. Exceeding baggage weight limits can shift aircraft's balance to the point when the flight becomes uncontrollable! More information on baggage allowance can be found in chapter "Weight and Balance".

# Center of gravity range

- Aircraft's safe center of gravity position ranges between 25% and 38% of mean aerodynamic chord.
- Center of gravity point ranges between 10.5 '' and 14.5'' backwards of the datum. Datum is wing's leading edge at fuselage root.

# G-load factors

max. positive wing load: + 4 G
max. negative wing load: – 2 G

All parts have been tested to a safety factor of a minimum 1.875, meaning they were subjected to at least a load of 7.5 G

# 2 Limitations

# Introduction

This section includes operating limitations, instrument markings and basic placards necessary for the safe operation of the airplane, it's engine, standard system and standard equipment.
The limitations included in this section have been approved by target Authority.
Observance of these operating limitations is required by law.

# Airspeed limitations

| | Velocity | IAS [kts (km/h)] | Remarks |
|---|---|---|---|
| **VS** | Stall speed Clean | **43** (80) | Stall speed flap up. |
| **VS0** | Stall speed Landing configuration | **37** (68) | Stall speed flaps full. |
| **VFE** | Max. velocity flaps extended | **70** (130) | Do not exceed this speed with flaps extended (+15, +25 degrees). |
| **VA** | Design manoeuvring speed | **86** (160) | Do not make full or abrupt control movements above this speed. |
| **VNE** | Velocity never to be exceeded | **135** (250) | Never exceed this speed in any operation. |
| **VNO** | Velocity normal operating | **108** (201) | Maximum structural cruising speed in turbulent air. |

## Airspeed indicator markings

| MARKING | IAS [kts (km/h)] | Definition |
|---|---|---|
| **White band** | **37 -70** (65 - 130) | Full Flap Operating Range. Lower limit is the maximum weight VS0 in landing configuration. Upper limit is maximum speed permissible with flaps extended. |
| **Green band** | **43 -108** (83 - 201) | Normal Operating Range Lower end is maximum weight VS1 at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed. |
| **Yellow band** | **108 - 135** (201 - 250) | Maneuver the aircraft with caution in calm air only. |
| **Red line** | **135** (250) | Maximum speed for all operations. VNE |
| **Blue line** | **76** (140) | Best climb rate speed (Vy) |
| / | **58** (108) | Best angle of climb speed (Vx) |

# Powerplant limitations

**Engine manufacturer: ROTAX**
**Engine type: Rotax 912 UL2 (80 HP)**

**Data below is data relevant for the pilot. Consult the original Rotax engine manual for all other details.**

## The engine

| TEMPERATURE °C / ROTAX ENGINE | 912 UL2 (80 HP) |
|---|---|
| cylinder head temp. (CHT); minimum, working, highest | 80; 110; 120 |
| max. CHT difference | / |
| exhaust gas temperature (EGT); normal, max. | 650-885; 900 |
| max. EGT difference | 30 |
| cooling fluids temperature (WATER); minimum, highest | 50; 120 |
| oil temperature (OIL TEMP); minimum, normal, highest | 50; 90-110; 140 |
| **RPM, PRESSURE** | **912 (80 HP)** |
| oil pressure (OIL PRESS); lowest, highest | 1.0; 6.0 |
| engine revolutions (RPM); on ground recommended | 5500 |
| RPM on ground; max. allowable | 5800 |
| ignition check at (RPM) | 4000 |
| max. single magneto drop (RPM) | 300 |

## Fuel and oil

| ROTAX ENGINE | 912 UL2 (80 HP) |
|---|---|
| recommended fuel | unleaded super, grade 87 and up |
| also approved fuels | leaded* or AVGAS 100LL* |
| recommended oil | API SJ SAE 10W-50 |

***Shorter maintenance intervals are imposed. Should you be forced to used this kind of fuel, change of engine oil every 50 flight hours is crucial. Please consult the manufacturer on which type of oil to use.**

**IMPORTANT!**
Rotax four-stroke engines should be powered by unleaded fuel whenever possible, lead accumulation inside the engine shortens its life. Should you be forced to use 100 LL fuel because unleaded ethanol free fuel is unavailable, make sure engine oil and the oil filter are replaced every 50 flight hours.

**NOTE! Use of fuel with alcohol (ethanol) content is permitted in line with Rotax recommendations.**

## Propeller

| ALPHA Trainer | Propeller |
|---|---|
| **with Rotax 912 UL2 (80 HP)** | Pipistrel FP02-80 diameter 63" (1620 mm) |

## Engine instrument markings

| Instrument | Red line (minimum) | Green arc (normal) | Yellow arc (caution) | Red line (maximum) |
|---|---|---|---|---|
| Tachometer (RPM) | 1600 | 1600-5500 | 5500-5800 | 5800 |
| Oil temperature | 50°C | 90-110°C | 110-130°C | 140°C |
| | (122°F) | (194-230°F) | (230-266°F) | (284°F) |
| Cylinder head temp. | / | | 110-120°C | 120°C |
| | | | (230-248°F) | (248°F) |
| Oil pressure | 1.0 bar (14.5 psi) | | | 6.0 bar (87.0 psi) |

# Weights

## ALPHA Trainer weights

| WEIGHT | ALPHA Trainer |
|---|---|
| **max. takeoff weight (MTOM = MTOW)** | 1212 lbs (550 kg) |
| **minimum combined cockpit crew weight** | 121 lbs (55 kg) |
| **baggage area** | 55 lbs (25 kg) absolute limit. Always verify baggage allowance with a Center of Gravity calculation. |

**WARNING! MTOM must be kept at or below 1212 lbs. Pay special attention to luggage and fuel weight, as these are the applicable masses on the airframe that have an influence on center of gravity. Exceeding baggage weight limits can shift aircraft's balance to the point when the flight becomes uncontrollable! More information on baggage allowance can be found in chapter "Weight and Balance".**

# Center of gravity range

- Aircraft's safe center of gravity position ranges between 25% and 38% of mean aerodynamic chord.
- Center of gravity point ranges between 10.5'' and 14.5'' backwards of the datum. Datum is wing's leading edge at fuselage root.

# G-load factors

**max. positive airframe load: + 4 G**

**max. negative airframe load: – 2 G**

All parts have been tested to a safety factor of a minimum of 1.875, meaning they were subjected to at least a load of 7.5 G

# Service ceiling, OAT, crosswind

Service ceiling is. 18,000 ft. Maximum outside temperature for operation is 122° Fahrenheit (50° Celcius). Maximum crosswind component is 18 kts.

# Maneuver limits

**ALPHA Trainer is approved as a Light Sport Aircraft and is intended for recreational and instructional flight operations. In the acquisition of various pilot certificates certain maneuvers are required and these maneuvers are permitted in this airplane.**

### Following Non-aerobatic maneuvers are permitted as defined:

- Power-on and -off stalls not below 1500 feet (450 meters) above ground level.
- Power on and off lazy eights not below 1500 feet (450 meters) above ground level, entry speed 90 kts
- Steep turns with initial speed of 80 kts.
- Chandelle manoeuvres not below 500 feet (150 meters) above ground level, entry speed 105 kts.
- Spin initiation and recovery (at most 180° in actual spinning manoeuvre).

**WARNING! Aerobatic maneuvers, including full developed spins, are prohibited.**

**CAUTION! Intentional flying with both cabin doors open is prohibited. Flying with one door open in flight is approved with airspeeds up to 60 kts, flying with one door removed is approved without changes to the limitations of the normal operational envelope.**

# Kinds of operations

**ALPHA Trainer is approved for DAY - NIGHT* - VFR operations only. Flight into known icing conditions is prohibited.**
*Night operations are only allowed if the aircraft complies with your local regulations and you hold the required pilot endorsements.

**WARNING! Should you find water drops on the airframe during preflight check-up at temperatures close to freezing, you may expect icing to appear in flight.**

# Minimum equipment list (DAY - VFR)

- Placards, checklist, this POH
- Airspeed indicator (functional), Altimeter (functional), Compass (functional)
- Tachometer (RPM), EGT indication (functional), CHT indication (functional), OIL temp. Indication (functional), OIL press. indication (functional)
- 12 V Main battery (functional), Alternator (functional) Safety belts (2x), Fuel shut-off valve (functional)

# Fuel limitations

| FUEL | ALPHA Trainer |
|---|---|
| fuel capacity (full) | 13.2 US gal (50 l) |
| fuel capacity (usable - all flight conditions) | 12.7 US gal (48 l) |
| unusable fuel | 0.5 US gal (2 l) |
| max. fuel weight allowable | 79.4 lbs (36 kg) |

**WARNING! Takeoff is prohibited if there is less than 1.5 USgal or when unsure about the fuel quantity on board for any reason.**

**NOTE! Use of fuel with alcohol (ethanol) content is permitted in line with Rotax recommendations.**

## NOTES

**Maximum full capacity is indicated only through the fuel filler neck on fuselage, by visual check. At the same time, verify that the vent tube remains unobstructed from contamination.**

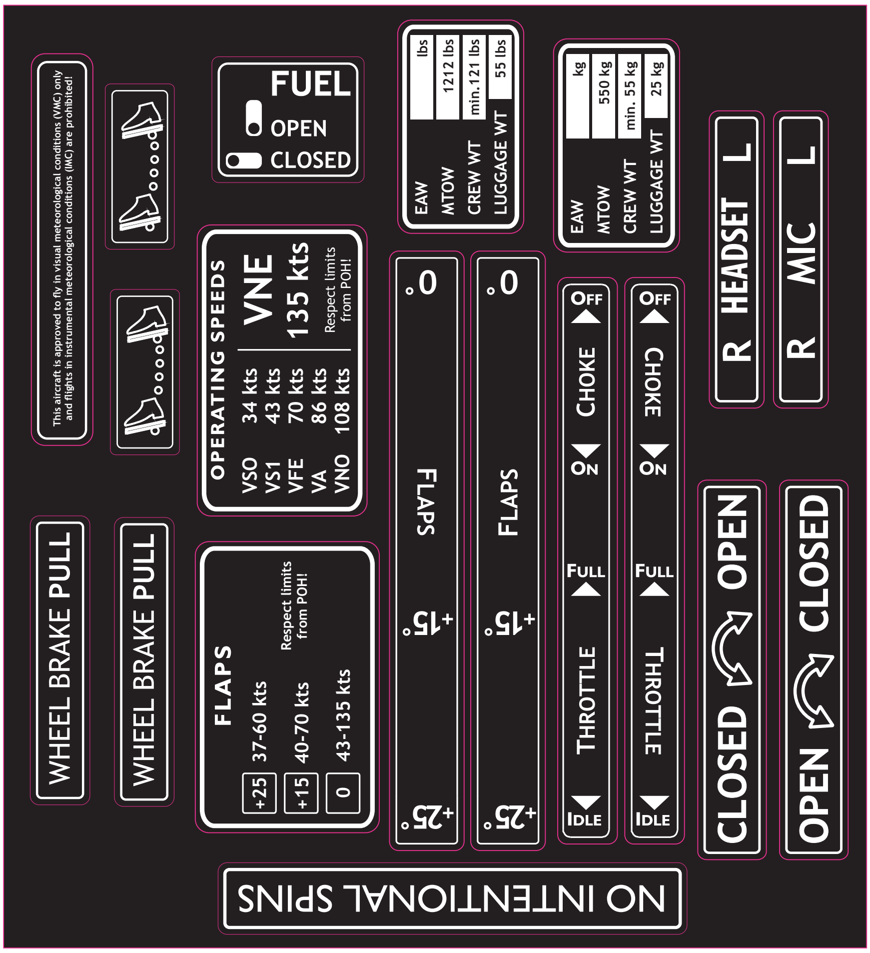
# Other restrictions

### Due to flight safety reasons it is forbidden to:

- fly in heavy rainfall;
- fly during thunderstorm activity;
- fly in a blizzard;
- fly according to instrument flight rules (IFR) or attempt to fly in zero visibility conditions (IMC);
- fly when outside air temperature (OAT) reaches 55°C (130°F) or higher;
- perform aerobatic flying;
- take off and land with flaps retracted
  (landing with flaps retracted is permitted only in case of very strong winds,
  but is not to be performed as a normal procedure)
- the 12 Volt power outlet is not approved to supply power to flight-critical communication or navigation devices.

# Placards


This aircraft is equipped with a rocket powered ballistic rescue system.
This aircraft is equipped with a rocket powered ballistic rescue system.
PASSENGER WARNING
This aircraft was manufactured in accordance with Light Sport Aircraft airworthiness standards and does not conform to standard category airworthiness requirements
MOGAS RON95 or AVGAS 100LL
MAX 1.2 bar MAX 18 psi
MAX 0.8 bar MAX 12 psi
MAX 1.8 bar MAX 26 psi
MAX 1.8 bar MAX 26 psi
CLOSED OPEN
OPEN CLOSED
FUEL QTY 50 l (13.2 USgal)
use automotive fuel
min 87 octane grade, max 10% ethanol content
WARNING
ROCKET FOR PARACHUTE
DEPLOYMENT INSIDE
ROCKET GAS
EXHAUST
ATTENTION!
ROCKET INSIDE
EGRESS
DANGER
EXPLOSIVE
FUEL/WATER DRAIN VALVE
CLOSE
OPEN
OPEN
CLOSED
PULL FOR PARACHUTE DEPLOYMENT
WARNING! When using AVGAS 100 LL, change oil and oil filter every 50 hrs
80 % ANTIFREEZE
+ 20 % WATER
3.5 l OIL
Refer to ROTAX manual


This aircraft is approved to fly in visual meteorological conditions (VMC) only and flights in instrumental meteorological conditions (IMC) are prohibited!
FUEL
OPEN
CLOSED
EAW lbs
MTOW 1212 lbs
CREW WT min.121 lbs
LUGGAGE WT 55 lbs
EAW kg
MTOW 550 kg
CREW WT min. 55 kg
LUGGAGE WT 25 kg
OPERATING SPEEDS
VSO 34 kts
VS1 43 kts
VFE 70 kts
VA 86 kts
VNO 108 kts
VNE 135 kts
Respect limits from POH!
FLAPS
0
+15
+25
FLAPS
0
+15
+25
OFF
CHOKE
ON
OFF
CHOKE
ON
R HEADSET L
R MIC L
WHEEL BRAKE PULL
WHEEL BRAKE PULL
FLAPS
+25 37-60 kts
+15 40-70 kts
0 43-135 kts
Respect limits from POH!
FULL
THROTTLE
IDLE
FULL
THROTTLE
IDLE
CLOSED OPEN
OPEN CLOSED
NO INTENTIONAL SPINS

# 3 Emergency procedures

# Introduction

This section provides information for coping with emergencies that may occur. Emergencies caused by airplane or engine malfunctions are extremely rare if proper preflight inspections and maintenance are practiced. Enroute weather emergencies can be minimized or eliminated by careful flight planning and good judgment when unexpected weather is encountered. In any emergency, the most important task is continued control of the airplane and maneuvering to execute a successful landing.

# Stall recovery

First reduce angle of attack by pushing the control stick forward, then

**1. Add full power (throttle lever in full forward position).**
**2. Resume horizontal flight.**

# Spin recovery

ALPHA Trainer is constructed in such manner that it is difficult to be flown into a spin, and even so only at aft center of gravity positions. However, once spinning, intentionally or unintentionally, react as follows:

**1. Set throttle to idle (lever in full back position).**
**2. Apply full rudder deflection in the direction opposite the spin.**
**3. Lower the nose towards the ground to build speed (stick forward).**
**4. As the aircraft stops spinning neutralise rudder deflection.**
**5. Slowly pull up and regain horizontal flight.**

ALPHA Trainer tends to re-establish normal flight by itself usually after having spinned for a mere 90°-180°.

**WARNING! Keep the control stick centered along its lateral axis (no aileron deflections throughout the recovery phase! Do not attempt to stop the aircraft from spinning using ailerons instead of rudder!**

**WARNING! After having stopped spinning, recovering from the dive must be performed using gentle stick movements (pull), rather than overstressing the aircraft.**
**However, VNE must not be exceeded during this maneuver.**

When the aircraft has the wings level and flies horizontally, add throttle and resume normal flight.

# Engine failure

## Engine failure during takeoff

Ensure proper airspeed first (100 km/h / 55 kts) and land the aircraft on the runway heading, avoiding obstacles in your way. Set fuel shut-off valve to OFF and set master switch to OFF position .

**WARNING! DO NOT CHANGE COURSE OR MAKE TURNS IF THIS IS NOT OF VITAL NECESSITY! After having landed safely, ensure protection of aircraft and vacate the runway as soon as possible to keep the runway clear for arriving and departing traffic.**

## Rough engine operation or engine failure in flight

First ensure proper airspeed (120 km/h / 64 kts), then start analyzing terrain underneath and choose the most appropriate runway or site for landing out.

**Provided the engine failed aloft, react as follows:**
Make sure the master switch is in the ON position, magneto switches both set to ON and fuel valve OPEN. Attempt to restart the engine. If unsuccessful, begin with the landing out procedure immediately.

# Emergency landing / Landing off airport

**1. Shut off fuel valve.**
**2. Master switch OFF.**
**3. Approach and land with extreme caution, maintaining normal airspeeds.**
**4. After having landed leave the aircraft immediately.**

The landing our airport maneuver MUST be preformed with regard to all normal flight airspeed parameters.

# Engine fire

## Engine fire on ground

This phenomenon is very rare in the field of sport aviation. However, if an engine fire occurs on ground, react as follows:

**1. Shut fuel valve (OFF).**
**2. Come to a full-stop, engage starter and set throttle to full power (lever full forward).**
**3. Disconnect the battery from the circuit (pull battery disc. ring on the switch column)**
**4. Master switch OFF immediately after the engine has stopped.**
**5. Abandon the aircraft and start the fire extinguishing.**

**WARNING! After the fire has been extinguished DO NOT attempt to restart the engine.**

## Engine fire in flight

**1. Shut fuel valve OFF and set magnetos to OFF.**
**2. Set full power (throttle lever in full forward position).**
**3. Disconnect the battery from the circuit (pull battery disc. ring on the switch column)**
**3b. Keep avionics ON and master ON as required, on approach set both OFF.**
**4. Set ventilation for adequate breathing. Keep in mind that oxygen intensifies fire.**
**5. Perform side-slip (crab) maneuver in direction opposite the fire.**
**6. Perform emergency landing out procedure.**

# Smoke in cockpit

Smoke in cockpit  is usually a consequence of electrical wiring malfunction. As it is most definitely caused by a short circuit it is required that the pilot reacts as follows:

**1. Avionics OFF. This enables unobstructed engine operation while at the same time disconnects all other electrical devices from the circuit. Verify that the 12 V socket is OFF as well.**
**2. Disconnect the battery from the circuit (pull battery disconnection ring on the instrument panel's switch column).**
**3. Land as soon as possible.**

In case you have trouble breathing or the visibility out of the cockpit has degraded severely due to the smoke, open the cabin door and leave it hanging freely. Flying with the door open, do not, under any circumstances exceed 110 km/h / 60 kts.

# Carburetor icing

**First noticeable signs of carburetor icing are rough engine noises and gradual loss of power.**

Carburetor icing may occur even at temperatures as high as 10°C (50°F), provided the air humidity is increased.

**Should you be suspecting carburetor icing to take place, descend immediately into warmer and/or less humid air!**
**In case of complete power loss perform emergency landing out procedure.**

# Electrical system failure

**The engine will continue to function due to the onboard alternator and battery. In case of battery failure, be aware that the engine can keep running, however a re-start will not be possible. In event of alternator failure, the battery will support the onboard avionics. In event of double power source failure, use analogue on-board instruments and land normally.**

# Flutter

Flutter is defined as the oscillation of control surfaces. It is most cases caused by abrupt control deflections at speeds close or in excess of VNE. As it occurs, the ailerons, elevator or even the whole aircraft start to vibrate violently.

**Should flutter occur, increase angle of attack (pull stick back) and reduce throttle immediately in order to reduce speed and increase load (damping) on the structure.**

**WARNING! Fluttering of ailerons or tail surfaces may cause permanent structural damage and/or inability to control the aircraft. After having landed safely, the aircraft MUST undergo a series of check-ups performed by authorized service personnel to verify airworthiness.**

# Exceeding VNE

**Should the VNE be exceeded, reduce airspeed slowly and continue flying using gentle control deflections. Land safely as soon as possible and have the aircraft verified for airworthiness by authorised service personnel.**

# Ditching

**Should you be forced to land in a body of water, use the same emergency procedure as above for the "Emergency landing / Landing out" case. In addition, make sure to open both doors fully before hitting the water, as well as disconnect the battery from the circuit (pull ring on electrical panel). Touch the water with the slowest possible speed, possibly from a high-flare situation.**

# Icing/Pneumatic instrument failures

**Turn back or change altitude to exit icing conditions. Consider lateral or vertical path reversal to return to last "known good" flight conditions. Maintain VFR flight!**

**Set cabin heating ON. Watch for signs of icing on the pitot tube. In case of pneumatic instrument failures, use the GPS (optional) information to reference to approximate ground speed. Plan the landing at the nearest airport, or a suitable off airport landing site in case of an extremely rapid ice build-up.**
**Maneuver the airplane gently and leave the wing flaps retracted. When ice is built up at the horizontal stabilizer, the change of pitching moment due to flaps extension may result of loss of elevator control. Approach at elevated speeds (70 kts, also if using the GPS as a reference).**

**WARNING! Failure to act quickly may result in an unrecoverable icing encounter.**

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# 4 Normal procedures

# Daily inspection

The daily inspection matches the preflight inspection.

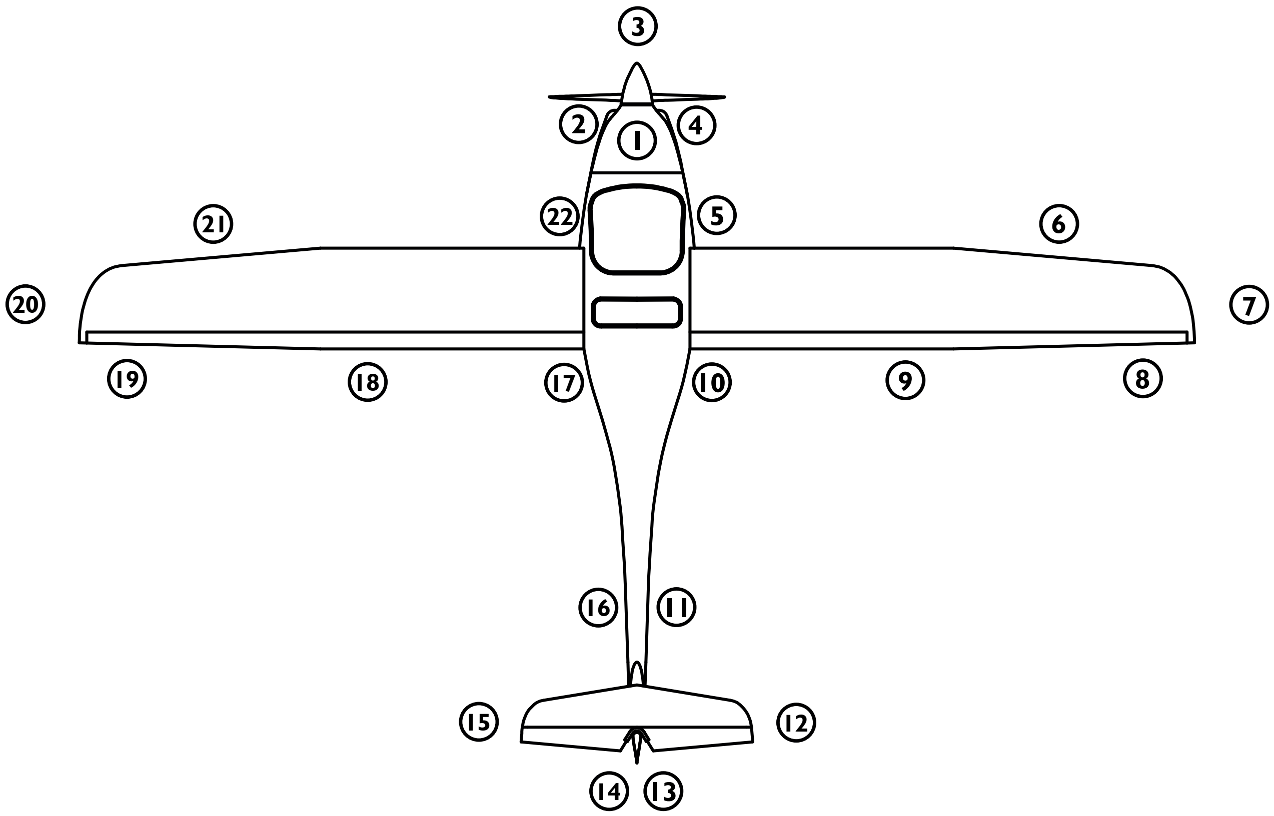
# Preflight inspection

**WARNING! Every single inspection mentioned in this chapter must be performed prior to EVERY FLIGHT, regardless of when the previous flight took place!**

**The person responsible for the preflight inspection is the pilot, who is required to perform the check-up in the utmost thorough and precise manner.**

**Provided the status of any of the parts and/or operations does not comply with conditions stated in this chapter, the damage MUST be repaired prior to engine start-up. Disobeying this instructions may result in serious further damage to the plane and crew, including injury and loss of life!**

## Schematic of preflight inspection




**1** Engine, engine cover
**2** Gascolator
**3** Spinner, Nose wheel
**4** Propeller
**5** Undercarriage, RH wheel
**6** Right wing - leading edge
**7** Right wingtip, lights
**8** Right wing - trailing edge
**9** Right wing - contnd
**10** Fuselage (RH side)
**11** Fuselage, continued (right)
**12** Hor. tail surfaces (right)
**13** Vert. tail surfaces (right)
**14** Vert. tail surfaces (left)
**15** Hor. tail surfaces (left)
**16** Fuselage, continued (left)
**17** Fuselage (LH side)
**18** Left wing - contnd
**19** Left wing - trailing edge
**20** Left wingtip, lights
**21** Left wing - leading edge
**22** Undercarriage, LH wheel

# Engine, engine cover ①

**Cooling fluid level:** half way to the top

**Oil quantity:** within designated limits

**Throttle, choke and oil pump wires:** no mechanical damage, smooth and unobstructed movement

**Radiators and hoses:** no mechanical damage and/or leakage, air filters clean and intact

**Exhaust pipes and muffler:** firmly in position, no cracks, springs intact and in position, rubber dumpers intact

**Fuel and/or oil leakage:** no fluid on hoses, engine housing or engine cover

**Reduction gearbox:** check for eventual oil leakage, all bolts and plugs attached firmly

**Fasteners and engine cover screws:** tightened, engine cover undamaged

# Gascolator ②

Drain approximately 1 cup of fuel and check for contamination.

# Spinner ③

**Spinner:** no mechanical damage (e.g. cracks, impact spots), screws tight
**Bolts and nuts:** secured
**Nose wheel:** grab aircraft's propeller and push it towards the ground to verify proper nose wheel suspension operation. Then lift the nose wheel off the ground and check for nose leg strut free play.
**Bolts:** fastened
**Tire:** no cracks, adequate pressure
**Wheel fairing:** undamaged, firmly attached, clean (e.g. no mud or grass on the inside)

# Propeller ④

**Hub and blades:** no mechanical damage (e.g. cracks), both immaculately clean
**Bolts and nuts:** secured

# Undercarriage, wheels ⑤ ㉒

**Bolts:** fastened
**Landing gear strut:** no mechanical damage (e.g. cracks), clean
**Wheel:** no mechanical damage (e.g. cracks), clean
**Wheel axle and nut:** fastened
**Fluid line (hydraulic brakes):** no mechanical damage and/or leakage
**Tire:** no cracks, adequate pressure

## Wings' leading edge ⑥㉑

**Surface condition:** pristine, no cracks, impact spots, no paint and/or edge separations
**Pitot tube:** firmly attached, no mechanical damage or bending. Remove protection cover and make sure it is not blocked or full of water.
**Wing drain holes:** make sure they are not blocked and clean accordingly.

## Wingtip, lights ⑦⑳

**Surface condition:** pristine, no cracks, impact spots or bumps, no paint separations

## Wings' trailing edge ⑧⑲

**Surface condition:** pristine, no cracks, impact spots, no paint and/or edge separations
**Mylar sealing tape between wing and aileron:** undamaged and in position
**Aileron:** pristine surface, no cracks and/or impact spots, no paint abnormalities and edge separations, no vertical or horizontal free play, smooth and unobstructed deflections

## Fuel reservoir cap ⑨⑱

**Fuel reservoir cap:** fastened. Make sure the vent pipe is completely clean.

## Fuselage, antenna, rescue parachute cover ⑩⑰

**Self-adhesive tape:** in position, no separations
**Controls' cap, antenna:** firmly attached

## Fuselage, continued ⑪⑯

**Surface condition:** pristine, no cracks, impact spots or bumps, no paint separations

## Horizontal tail surfaces ⑫⑮

**Surface condition:** pristine, no cracks, impact spots or bumps, no paint and/or edge separations
**Hinges:** no free play in any direction
**Central securing screw on top of the horizontal stabilizer:** fastened and secured
**Self-adhesive tape covering the gap between horizontal and vertical tail surfaces:** in position
**Elevator:** smooth and unobstructed up-down movement, no side-to-side free play

## Vertical tail surfaces ⑬⑭

**Vertical fin bottom part:** no cracks, impact spots or paint separations along main chord
**Surface condition:** pristine, no cracks, impact spots or bumps, no paint separations
**Hinges:** no free play in any direction
**Rudder cable endings:** intact, bolts in position

**CAUTION! Preflight inspection should be performed following stations 1 through 22!**

## Cockpit preflight inspection

**Instrument panel and instruments:** checked
**Battery disconnection lever:** in position for battery operation (lever deflected towards the firewall)
**Master switch OFF:** no control lights and/or electronic instrument activity
**Master switch ON:** generator fail light on (engine not running!)
**Make sure you have set all instruments to correct initial setting.**
**Main wing spars and connectors:** no visible abnormalities of metal parts, spars, pins and bolts; all bolts and nuts in position and tightened
**Fuel hoses, pitot-static lines and electrical cables:** correctly connected and in position
**Safety belts:** undamaged, verify unobstructed harness opening; fastening points intact
**Doors and windshield:** perfect closing at all three points, smooth opening, hinges firmly attached; glass immaculately clean with no cracks.
**Flap handle:** button spring firm, locking mechanism working properly, smooth movement along full deflections, no free play or visible damage.
**Radio wiring:** test the switches, check connectors and headset, perform radio check
**Battery (some models):** firmly in position, joints clean with wires connected
**Emergency parachute release handle (optional):** safety pin removed.
**Elevator trim:** verify travel and set neutral before start-up.
Make sure unobstructed access is provided.

# Normal procedures and recommended speeds

To enter the cabin first lift the door all the way to the bottom wing surface. The silver knob will grab and secure the glass door in position. Sit onto the cabin's edge and support your body by placing hands onto this same cabin edge. Drag yourself into the seat, lifting only one leg over the stick for best position. Immediately after having sat into the seat, check rudder pedals' position to suit your size and needs. The position of pedals is adjustable also during flight.
To close the door, gently pull the silver knob and allow the door to fall into the vertical position. Check for obstructions at the lower and side connection points. With a gentle inwards pressure, rotate the handle into the over center position (slightly past horizontal)
Caution! Failure to fully rotate handle can cause inadvertent door opening in flight due to aircraft vibration and result in door damage:
Caution! If a door needs to be opened in flight, (for example to retrieve a seatbelt strap), firmly grasp the handle so as to not allow the door to raise uncontrolled up into the airflow.
Fasten the safety belts according to your size.
Adjust the rudder pedals according to your required legroom. Sit inside the cockpit and release the pressure off the pedals. Pull the black knob in front of the control stick to bring the pedals closer to you. To move the pedals further away, first release the pressure of the pedals, then pull on the knob slightly (this will release the lock in the mechanism). Now push the pedals forward using with your feet, while keeping the black adjustment knob in your hand.

**WARNING! The safety harness must hold you in your seat securely. This is especially important when flying in rough air, as otherwise you may bump into the tubes and/or spars overhead. Make sure you tighten the bottom straps first, then shoulder straps.**

# Engine start-up

## Before engine start-up

**CAUTION! To ensure proper and safe use of aircraft it is essential to familiarize yourself with engine's limitations and engine manufacturer's safety warnings. Before engine start-up make sure the area in front of the aircraft is clear. It is recommended to start-up the engine with aircraft's nose pointing into the wind.**

Make sure the fuel quantity is sufficient for the planned duration of flight.
Make sure the pitot tube is uncovered and rescue parachute safety pin removed.
Engage wheel brakes. If equipped with the parking brake, engage parking brake.

## Engine start-up

Make sure fuel valve is OPEN and master switch in OFF position, Avionics switch OFF.
Should the engine be cold, apply choke (lever full back).
Set master switch ON, Set both magnetos ON, engage engine starter and keep it engaged until the engine starts. Verify fuel pressure within limits. Then set avionics switch ON.
Set throttle to 2500 RPM.
Slide the choke lever forward gradually.

**CAUTION! When the engine is very cold, the engine may refuse to start. Should this occur, move the choke handle fully backwards and hold it there for some 20 seconds to make mixture richer.**

## Engine warm-up procedure

The engine should be warmed-up at 2500 RPM up to the point working temperature is reached.

Warming-up the engine you should:
1 Point aircraft's nose into the wind.
2 Verify the engine temperature ranges within operational limits.

**CAUTION! Avoid engine warm-up at idle throttle as this causes the spark plugs to turn dirty and the engine to overheat.**

With wheel brakes engaged and control stick in full back position, first set engine power to 4000 RPM in order to perform the ignition check. Set the ignition switches OFF and back ON one by one to verify RPM drop of not more than 300 RPM.
When the ignition check has been completed, add full power (throttle lever full forward) and monitor engine's RPM. Make sure they range between maximum recommended and maximum allowable RPM limits.

Note that engine does not reach 5800 RPM on ground. Engines are factory set to reach maximum ground RPM of 5300 - 5500 at sea level at 25 degrees Celsius. Maximum ground RPM may vary depending on the season and service elevation.

**CAUTION! Should engine's RPM be lower than the recommended on ground amount (min. 5000 RPM) or in excess of maximum allowable RPM on ground (5800) during this maneuver, check engine and wiring for correct installation.**

# Taxi

Release parking brake if set and release the handbrake. Taxing technique does not differ from other aircraft equipped with a steerable nose wheel. Prior to taxiing it is essential to check wheel brakes for proper braking action.

In the case you expect taxi a long way, take engine warm-up time into account and begin taxiing immediately after engine start-up. Warm-up the engine during taxiing so the engine does not overheat because of prolonged ground operation.

## Holding point

Make sure the temperatures at full power range are within operational limits.
Make sure the safety belts are fastened and doors closed and secured at all three closing points.
For short field operations set flaps to 2nd position (+25 degrees, flap handle full up). For all other operations select 1st position (+15°).
Power idle.

**CAUTION! Should the engine start to overheat because of long taxi and holding, shut down the engine and wait for the engine temperatures drop to reasonable values. If possible, point the aircraft's nose into the wind. This will provide radiators with airflow to cool down the engine faster.**

# Take-off and initial climb

Before lining-up verify the following:

**Parking brake / brakes :** disengaged (full forward)
**Fuel valve:** fully open
**Fuel quantity:** sufficient
**Safety belts:** fastened
**Cabin doors:** closed securely
**Trim handle:** in neutral position or slightly forward
**Flap handle:** 2nd position (flap handle full up), when using long runways use of +15 deg flaps for takeoff is also permissible.
**Runway:** clear

Now release brakes, line up and apply full power.
Verify engine RPM at full throttle (5300 - 5500 RPM).

**CAUTION! Keep adding power gradually.**

**WARNING! Should engine RPM not reach more than 5000 RPM when at full throttle, ABORT TAKE-OFF IMMEDIATELY, come to a standstill and verify systems.**

Start the takeoff roll pulling the control stick one third backward and lift the nose wheel off the ground as you accelerate. Reaching 40-43 kts (75-80 km/h ), gently pull on the stick to get the aircraft airborne.

**CAUTION! Crosswind (max 18 kts) takeoff should be performed with control stick pointed into the wind. Special attention should be paid to maintaining runway heading!**

## Initial climb

When airborne, engage brakes momentarily to prevent in-flight wheel spinning.
Accelerate at full power and later maintain proper climbing speed.
As you reach 60 kts (110 km/h) above 150 ft (50 m), set flaps to 1st stage, reaching 70 kts (130 km/h) at 300 ft (100 m) retract flaps. Reduce RPM by 10% or below 5500 RPM and continue climbing at 76 kts (140 km/h).
Adjust the trim to neutralize the stick force if necessary.
Remember to keep the temperatures and RPM within operational limits during climb out.

**CAUTION! Reduce power and lower nose to increase speed in order to cool the engine down if necessary.**

Should you be climbing for a cross-country flight, consider climbing at 100 kts (185 km/h) as this will greatly increase your overall travelling speed.
Reaching cruise altitude, establish horizontal flight and set engine power to cruise (5300 RPM).

# Cruise

As horizontal flight has been established, verify on-board fuel quantity again.
Keep the aircraft balanced while maintaining desired flight parameters.

Check engine operation and flight parameters regularly! Recommended cruise is at 5300 RPM, with an expected fuel burn of around 13.6 lph (3.6 USgal) per hour.

## Cruising in rough conditions

Should you experience turbulence, reduce airspeed below VNO and continue flying with flaps retracted.

**CAUTION! In rough air, reduce engine power if necessary to keep airspeed below VNO.**

# Descent and final approach

Descent at speeds at or below VNO and flaps retracted.

For approach reduce speed to 70 kts (130 km/h) and set flaps to 1st position before turning to base leg.
Adjust engine power to maintain proper airspeed. Set trim to neutralise stick force if necessary.
During the descent monitor temperatures and keep them within operational limits.

**CAUTION! During the descent engine power MUST be reduced. Should you be forced to descend at idle power, make sure you keep adding throttle for short periods of time, not to turn the spark plugs dirty.**

On final, set flaps to 2nd position.
Align with the runway and reduce power to idle.
Maintain an airspeed of 55 kts (102 km/h).
Use throttle to control your descent glide path, otherwise control your attitude and crab if necessary.

**CAUTION! Crosswind landings require higher final approach speeds to ensure aircraft's safe maneuverability. Increase the approach speed by 1 kts for every 1 kts of crosswind component e.g. in case of 5 kts crosswind component, increase the approach speed by 5 kts.**

# Roundout and touchdown

**CAUTION! See chapter "Performance" for landing performance.**

Roundout and touchdown (flare) occurs at following airspeeds:

| | |
|---|---|
| **Calm air, aircraft at MTOM** | **40 kts (75 km/h) IAS** |
| **Rough air, aircraft at MTOM (incl. strong crosswinds up to 34 km/h (18 kts))** | **42 kts (78 km/h) IAS** |

**CAUTION! Land the aircraft in such a manner that the two main wheels touch the ground first, allow the nose-wheel touchdown only after speed has been reduced below 25 kts. When lowering the nose wheel to the runway the rudder MUST NOT be deflected in any direction (rudder pedals centered).**

When on ground, start braking action holding the control stick in full back position. Steer the aircraft using rudder only. Provided the runway length is sufficient, come to a complete standstill without engaging the brakes holding the control stick slightly backwards as you slow down.

# Crosswind approach and roundout

**CAUTION! Crosswinds prolong landing runway length due to elevated airspeed that should be used, see previous page.**

Performing a crosswind landing, the wing-low method should be used. When using the wing-low method it is necessary to gradually increase the deflection of the rudder and aileron to maintain the proper amount of drift correction.

**WARNING! If the crab method of drift correction has been used throughout the final approach and roundout, the crab must be recovered before the touchdown by applying rudder to align the aircraft's longitudinal axis with its direction of movement.**

# Balked landing

Add full power, establish Vy, retract flaps as required.

# Parking

Come to a complete standstill by engaging the wheel brake. Re-check RPM drop by switching ignition OFF and back ON, one by one. Leave the engine running at idle RPM for a minute in order to cool it down.
Set avionics switch OFF, all green switches OFF, then both magnetos OFF. Master switch OFF.

Insert parachute rescue system handle's safety pin. Apply parking brake. Open cabin door, unfasten safety belts and exit the cockpit. Chock the wheels and secure the pitot tube by putting on a protection cover.
It is recommended to shut the fuel tank valve.

# Restarting the engine in flight

This procedure applies only for restarting the engine following an intentional unpowered flight.

Reduce speed to 50 kts (90 km/h)
Apply normal engine start-up procedure.

Engine restart in flight is possible up to service ceiling altitude of 18,000 ft.

Should the engine cool down during unpowered flight, apply choke. Always start the engine at idle throttle.

**CAUTION! Do not add full power while the engine is still cool. Fly at lower airspeeds at low power engine setting to warm it up instead (e.g. 50 kts (90 km/h) at 3000 RPM).**

# 5 Performance

# Introduction

This section provides information on aircraft's airspeed calibration, stall speeds and general performance. All data published was obtained from test flight analysis using average flying skills.

ALPHA Trainer has demonstrated adequate engine cooling performance at ambient temperatures of 45°C (113 F). This is not to be regarded as the limit temperature, however temperatures higher than the mentioned may have adverse effects on engine cooling and overall performance.

# Airspeed indicator calibration (IAS to CAS)

Pitot tube's mounting point and construction makes IAS to CAS correction values insignificant. Therefore pilots should regard IAS to be same as CAS. **IAS = CAS.**

## Stall speeds

Stall speeds at MTOM (1210 lbs / 550 kg) for ALPHA Trainer are as follows:

| | |
|---|---|
| **flaps retracted; 0° (retracted):** | **43 kts (80 km/h)** |
| **flaps in 1st position; +15° (down):** | **39 kts (72 km/h)** |
| **flaps in 2nd position: +25° (down):** | **37 kts (68 km/h)** |

# Take-off performance

All data published in this section was obtained under following conditions:

aircraft at MTOM
elevation: sea level
wind: calm
runway: hard runway
Data extrapolated for ICAO standard atmosphere

| ALPHA Trainer | ALPHA Trainer |
|---|---|
| **takeoff ground roll at MTOM** | 459 ft |
| **takeoff runway length (over 50 ft/15 m obstacle)** | 738 ft |

**Notes**
In order to meet the data for takeoff runway length over 50 ft obstacle maintain Vx (58 kts, 108 km/h) after take-off.

Soft (grass) runways increase the published take-off performance data by 20%.

Takeoff runway length may vary depending on the wind, temperature, elevation and wing & propeller surface condition.

# Effect of elevation

The table below provides data about the effect of elevation on takeoff runway length.

| **elevation ft (m)** | 0 | 1650 (500) | 3280 (1000) | 4920 (1500) |
|---|---|---|---|---|
| **atmosph. pressure (inHg)** | 29.92 | 28.17 | 26.52 | 24.95 |
| **atmosph. pressure (hPa)** | 1013 | 954 | 898 | 845 |
| **outside temperature (°C)** | 15,0 | 11,7 | 8,5 | 5,2 |
| **outside temperature (°F)** | 59 | 53 | 47 | 41 |
| | **Takeoff ground roll [ft]** | | | |
| **ALPHA Trainer** | 555 | 700 | 870 | 1090 |
| | **Takeoff distance over 50 ft / 15 m obstacle [ft]** | | | |
| **ALPHA Trainer** | 870 | 1035 | 1295 | 1420 |

**WARNING: Calculating take-off performance in Hot Atmosphere, it is mandatory to consider the takeoff runway length prolongs as follows: $L = 1,10 \cdot (L_h + L_t - L_0)$.**
**Abbreviations are as follows:**
**$L_h$ = takeoff runway length at present elevation, ISA standard conditions**
**$L_t$ = takeoff runway length at sea level at same temperature/wind as on the given location,**
**$L_0$ = zero wind takeoff runway length at 15°C at sea level.**
**e.g. if outside temperature is 25°C and you are on 500 m elevation, your takeoff runway length will be: $L = 1,10 \cdot (L_h + L_t - L_0) = 1,10 \cdot (205\ m + 215\ m - 180\ m) = 264$ meters.**

# Effect of the wind

Wind (head, cross or tailwind) affects aircraft's ground speed (GS).

Headwind on takeoff or landing causes the takeoff and landing distance length to shorten as the GS is smaller during these two flight stages. The opposite holds true for tailwind on takeoff and landing as tailwind prolongs takeoff and landing distances significantly.

**Headwind** shortens takeoff and landing distances by 25 feet (8 meters) with every 3 kts (5 km/h) of wind increase (e.g. provided there is a 6 kts (10 km/h) headwind on takeoff and landing, distances will be approximately 50 ft (16 meters) shorter than ones published in the manual).

**Tailwind** prolongs takeoff and landing distances by 60-65 feet (18-20 meters) with every 3 kts (5 km/h) wind increase (e.g. provided there is a 6 kts (10 km/h) tailwind on takeoff or landing, distances will be approximately 120-130 feet (36-40 meters) longer then ones published in the manual).

**WARNING! Tailwind affects takeoff and landing performance by more than twice as much as headwind does.**

The table below provides data about the effect of headwind (+) and tailwind (-) on takeoff runway length (referenced for sea level conditions, airplane at MTOM). Relative effect is maintained at any elevation.

| **windspeed (kts)** | -6 | -4 | -2 | 0 | 4 | 8 | 12 |
|---|---|---|---|---|---|---|---|
| | **Takeoff runway length [ft]** | | | | | | |
| **ALPHA Trainer** | 680 | 645 | 605 | 555 | 525 | 495 | 480 |
| | **Takeoff distance over 50 ft / 15 m obstacle [ft]** | | | | | | |
| **ALPHA Trainer** | 1130 | 1065 | 965 | 870 | 810 | 760 | 720 |

## Effect of outside temperature

The table below provides data about the effect of outside temperature on takeoff runway length. Data is referenced for sea level performance at MTOM.

| temperature (°F) | 59 | 68 | 77 | 86 | 95 |
|---|---|---|---|---|---|
| | | | **Takeoff runway length [ft]** | | |
| **ALPHA Trainer** | 555 | 670 | 820 | 935 | 1020 |
| | | | **Takeoff distance over 50 ft / 15 m obstacle [ft]** | | |
| **ALPHA Trainer** | 870 | 965 | 1045 | 1280 | 1410 |

| temperature (°C) | 32 | 41 | 50 |
|---|---|---|---|
| | | **Takeoff runway length [ft]** | |
| **ALPHA Trainer** | 960 | 1090 | 1220 |
| | | **Takeoff distance over 50 ft / 15 m obstacle [ft]** | |
| **ALPHA Trainer** | 1360 | 1460 | 1620 |

# Climb performance

| ALPHA Trainer | ALPHA Trainer |
|---|---|
| **best climb speed** | 76 kts (140 km/h) |
| **best climb rate at MTOM, sea level** | 1220 fpm (6.1 m/s) |
| **climb rate at 100 kts (185 km/h), sea level** | 800 fpm (4.0 m/s) |

## Effect of outside temperature

Every 5 degrees Celsius (10 F) of OAT increase versus the ISA, the climb rate decreases by 60 fpm (0.3 m/s).

## Effect of altitude

The table below provides data about the effect of elevation on climb rate at best climb speed $V_y$ at MTOM

| ALPHA Trainer | ALPHA Trainer |
|---|---|
| **0 m** (0 ft) | 1220 fpm (6.1 m/s) |
| **500 m** (1600 ft) | 1180 fpm (5.9 m/s) |
| **1000 m** (3300 ft) | 1100 fpm (5.5 m/s) |
| **1500 m** (5000 ft) | 1020 fpm (5.1 m/s) |

**Note:** climb rate is measured at max continuous power (5500 RPM) of the engine with flap retracted at Vy and MTOM.

Climb performance may vary depending on, temperature, altitude, humidity and wing & propeller surface condition.

# Cruise

Aircraft at MTOM, recommended cruise power of 5300 RPM in ISA and sea level altitude, flaps retracted:

| ALPHA Trainer | ALPHA Trainer |
|---|---|
| **cruise airspeed** | 108 kts (200 km/h) |

Best economy cruising level or the ALPHA Trainer is 6000 ft. There, cruise performance is equivalent or better than above due to IAS-TAS relation, but fuel consumption is lower.
At these parameters the fuel burn is around 3.6 USgal (13.6 l) per hour. For detailed fuel consumption determination for various cruising regimes consult the Rotax 912/S Operators manual.

## Effect of outside temperature

Every 10 degrees Celsius of OAT increase versus the IAS, the cruising speed at 5300 RPM decreases by 3 kts.

# Descent

Reference sink rate, with flaps set to 2nd position measures 440 fpm (2.2 m/s) at 50 kts (92 km/h), power idle.

| ALPHA Trainer | ALPHA Trainer |
|---|---|
| **sink rate at 50 kts (92 km/h) full flaps** | 440 fpm (2.2 m/s ) |

## The glide

**The glide is defined as unpowered wings-level flight at speed providing best lift over drag ratio or minimum sink rate.**

Should the engine become inoperative in flight, as a result of either intended or unintended actions, and it cannot be restarted, react as follows:

**Establish wings-level flight at the speed providing best lift over drag ratio,** if you desire to glide the greatest distance from a given altitude.

**Establish wings-level flight at speed providing minimum sink rate**, if you desire do stay airborne the longest. This may come in handy in case you will be forced to give way to other aircraft or if you simply need time to determine the most appropriate site to land out on.

| ALPHA Trainer | ALPHA Trainer |
|---|---|
| **minimum sink speed** | 58 kts (108 km/h) |
| **minimum sink rate, flaps +15 deg** | 460 fpm (2.3 m/s) |
| **best lift/drag ratio speed** | 64 kts (118 km/h) |
| **best lift over drag ratio , flaps +15 deg** | 17:1 |

**CAUTION: If the engine fails, especially in climb, the aircraft always loses some 100 feet (30 meters) of altitude before reaching best glide speed in wings-level unpowered flight.**

# Landing performance

Final approach speed should always be 55 kts (102 km/h) with full flaps. Landing runway length may also vary depending on the elevation, gross weight, touchdown velocity, wind direction and how aggressive the braking action is.

In following conditions: aircraft at MTOM, airport at sea level, wind calm; the landing roll measures 410 feet (125 meters). Should you be flying solo, the length shortens by another 30 feet (10 meters). Total landing distance over 50 ft / 15 m obstacle measures 1510 feet (460 m).

Landing roll increases by 10 % for every 2000 ft increase of density altitude increase.
Total landing distance increases by 2% for every 2000 ft increase of density altitude increase.

**CAUTION! Minimum recommended runway length for approaches is 500 m (1640 feet) with no obstacles inside the 3 deg glideslope area and runway heading in order ensure safe flying activity. Use of shorter strips should be considered a major exception and requires a lot of skill, heavy use of slipping until the last moment before touchdown and is performed at own risk.**

# Crosswind takeoffs/landings

Maximum allowed crosswind speed on takeoff and landing with flaps in 2$^{nd}$ position is 18 kts. The runway length required is increased by 10 % for every 5 kts of crosswind component.

# 6 Weight and balance

# Introduction

This section describes the procedure for establishing the basic empty weight and moment of the airplane. Sample calculations are provided for reference.
Specific information regarding the weight and arm for this airplane as delivered from the factory can be found in the aircraft documentation folder, look for Weight and Balance Report.

**WARNING! It is the responsibility of the pilot to make sure the airplane is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.**

# Weighing procedure

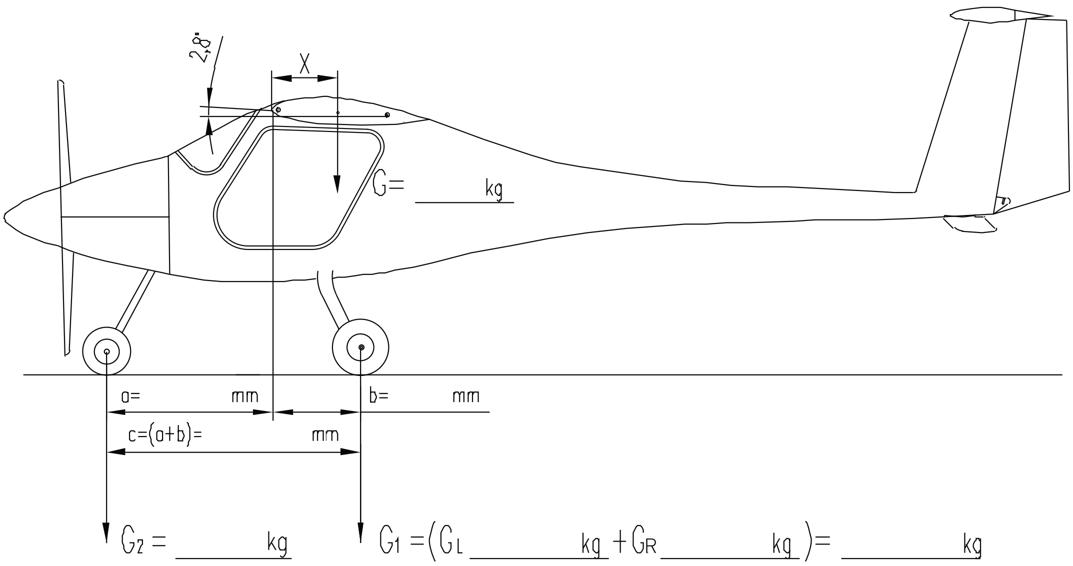
Make sure all listed aircraft parts and appliances are installed and in position.
Remove all other objects (e.g. tools, rugs, tie downs and other items ...).
Empty fuel tanks except for the unusable fuel, inflate tires to recommended operating pressures.
Fill up engine oil to the top marking.
Retract flaps and leave control surfaces centered.
Level the aircraft inside a closed space - use the provided airfoil template at lower side of the wing close to the wing root and make sure its straight edge is level (horizontal).
Once leveled, read the scale readings and subtract eventual tare weight.
Now record all readings and fill out the bottom table.

Datum is wing's leading edge at wing root. Calculate the lever arm of CG using this formula:

**Lever arm of CG (X) = (($G_1$ / G) x c) - a**

## Weighing form

| Weighing point and symbol | Scale reading | Tare | Nett |
|---|---|---|---|
| right main wheel ($G_R$) | | | |
| left main wheel ($G_L$) | | | |
| $G_1 = G_R + G_L$ | | | |
| nose wheel ($G_2$) | | | |
| total ($G = G_R + G_L + G_2$) | | | |



# Equipment list

Aircraft's empty weight data is unique for each and every ALPHA Trainer delivered. The owner is responsible for keeping the equipment list up to date  Fill out according to actual status.

**ALPHA Trainer**

**Serial number:**

**Registration number:**

**Installed equipment:**

# Determination of CG

| | Weight (kg) | Weight's lever arm (inch) | Moment (inch x lbs) | Remarks |
|---|---|---|---|---|
| **Basic cfg. empty weight** | | | | |
| **Baggage** | | 46 | | |
| **Instruments** | | - 12.5 | | minus!!! |
| **Pilots** | | 10.3 | | |
| **Fuel** | | 44 | | |

**CAUTION! Each newly installed part or appliance must be registered in the upper table. Also, new total weight and lever arm of CG values must be entered and position of CG re-determined. Furthermore, the moment must be recalculated. This is rather easy to do. First multiply the new part's weight by it's lever arm measured from the reference point (wing's leading edge). Then sum up all momentums and divide the sum by the new total weight.**

**WARNING! Aircraft's safe center of gravity position ranges between 10.5" and 14.5" aft of datum and is not critically affected by cockpit crew weight.**

**WARNING! Absolute safe measure for the amount of luggage is 55 lbs. The actual amount of luggage you can safely transport depends on the center of gravity of empty aircraft. See next pages.**

# Sample c.g. calculation

## Guidelines

Gtotal is the total mass of empty aircraft. All calculations can be performed with aircraft empty weight and empty weight center of gravity (c.g.), as the pilots sits directly below the center of gravity and do not cause the c.g. to be shifted.

**WARNING! Both pilots' weight do not influence c.g. or their influence is insignificant. However, baggage and/or fuel can influence the c.g. severely and may cause the aircraft to become uncontrollable!**

## Basic CG formulas and calculation

Read thoroughly. Note also that the basic c.g. at 287 mm will be used purely as an example.

First, weigh the aircraft according to the procedure described in this chapter and write down values of G1 (sum of scale readings at main wheels) and G2 (scale reading at tail/front wheel). Then calculate the position of c.g. in millimeters (mm) from the datum (wing's leading edge at wing root).

Use the following formula:

$$CG_{mm} = \frac{G1_{back}\ x\ c}{G_{total}} - a = \frac{G1_{back}\ x\ 1525mm}{G_{total}} - 1020mm = 287mm$$

where:
**G2back** is the sum of scale readings at both main (back) wheels,
**Gtotal** is the sum of G1 and G2back (G1+G2back), a.k.a. aircraft empty weight
**a** is the distance from nose wheel axis to wing's leading edge,
**b** is the distance from main wheel axis to wing's leading edge,
**c** = **(a+b)** is the sum of both distances above.

Second, determine the c.g. position in percentage (%) of Mean Aerodynamic Chord (MAC) with following the formula:

$$CG_{\%MAC} = \frac{CG_{mm} - R}{MAC} \times 100 = \frac{287mm - 43mm}{897mm} \times 100 = 28.4\%$$

where:
**CGmm** is the position of CG in millimeters (mm),
**R** is the difference between wing's leading edge and MAC's leading edge (43 mm),
**MAC** is the Mean Aerodynamic Chord (897 mm).

## Fuel and CG

The fuel shifts the CG backward, however the aircraft is factory tuned so that a fuel load of fuel and luggage the CG stays forward of the aft allowable limit. Similarly, when the fuel quantity is empty and there is no baggage on board, the CG is backwards of the forward allowable limit. In every case, the fuel does not shift the CG out of limits.

# Baggage and CG

The amount of baggage you can carry in the baggage behind the seats is limited by the center of gravity of the empty aircraft (pilots' weight does not significantly influence c.g.) and by the MTOM.

To calculate how much the c.g. shifts because of added baggage into the solid baggage compartment or the baggage behind the seats use the following formula:
where:

$$CG_{with\ bags} = \frac{(G_{total}\ x\ CG_{mm}) + (G_{bags}\ x\ L_{mm})}{G_{total} + G_{bags}} = \frac{(292kg\ x\ 287mm) + (10kg\ x\ 1160mm)}{292kg + 10kg} = 316mm$$

**Gtotal** is the aircraft empty weight,
**CGmm** is the position of CG of empty aircraft in millimeters (mm),
**Gbags** is the weight of the baggage,
**Lbags** is the lever arm from the datum to baggage area (1160 mm).

Again, express the new c.g. in percentage of MAC:
where:

$$CG_{(+bags)\%MAC} = \frac{CG_{with\ bags} - R}{MAC}\ x\ 100 = \frac{316mm - 43mm}{897mm}\ x\ 100 = 31.6\%$$

**CGwith.bags** is the position of CG now with bags in millimeters (mm),
**R** is the difference between wing's leading edge and MAC's leading edge (43 mm),
**MAC** is the Mean Aerodynamic Chord (897 mm).

We now have the data of c.g. of the sample aircraft with 10 kgs (22 lbs) of baggage. You can recalculate the formulas using the weights and c.g. of your empty aircraft and the planned amount of baggage for your flight.

**CAUTION: The baggage weight limitations in this manual represent fool-proof limits for safe operation, even without special c.g. calculation. However, the actual baggage weight limitation is different of each individual aircraft and can be determined using the above formulas. The decision of how much baggage to carry on a flight is the pure responsibility of the pilot in command!**

**WARNING!** Always make sure that the baggage is placed fixed inside the baggage area. Movements of baggage in-flight will cause shifts of center of gravity!

**WARNING! Do not, under any circumstances attempt to fly the aircraft outside the allowable c.g. limits! Allowable c.g. range is between 10.5" and 14.5", measured from the wing's leading edge backwards.**

**WARNING! Maximum takeoff weight (MTOM) MUST NOT, under any circumstances, exceed 1212 lbs (550 kg).**

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# 7 Description of Aircraft & Systems

# Introduction

The Pipistrel ALPHA Trainer is a 34' 6" wingspan, two-seat T-tail high-wing airplane made almost entirely of composite materials.

The undercarriage is a robust tricycle type with two main, brake equipped, wheels mounted on a u-piece composite strut and a steerable nose wheel.

ALPHA Trainer features flaperons, meaning that one movable surface on each wing acts both as the flap and the aileron.
Flaps offer 3 settings: retracted, +15 deg and + 25 deg.

Full dual main flight control levers make ALPHA Trainer ideal for initial as well as for advanced flight training. All aileron, elevator and flap controls are connected to the cabin controls using self-fitting push-pull tubes. Rudder is controlled via cables. The elevator trim is electric.

All aircraft ship with H type safety belts attached to the fuselage at three mounting points. Rudder pedals can be adjusted before and also in-flight to suit your size and needs.

The Fuel tank is located in the fuselage with the fuel shut-off valve located in the cockpit. The gascolator is located beneath the lower engine cover. Refuelling can be done by pouring fuel through the fuel filler neck on the fuselage or by using an electrical fuel pump via the single point refuelling valve on the bottom of firewall.

All glass surfaces are made of 2 mm anti UV GE tinted Lexan, which was specially developed not to shatter or split on impact.

Main wheel brakes are hydraulically driven disc type and activated via a cockpit hand-lever. The hydraulic brake fluid used is DOT 3 or DOT 4.

Cabin ventilation is achieved through special vents fitted onto glass doors, cabin heating and windshield defrost/demist, is provided utilizing hot air from the engine.

The propeller is a fixed pitch two-blade design.

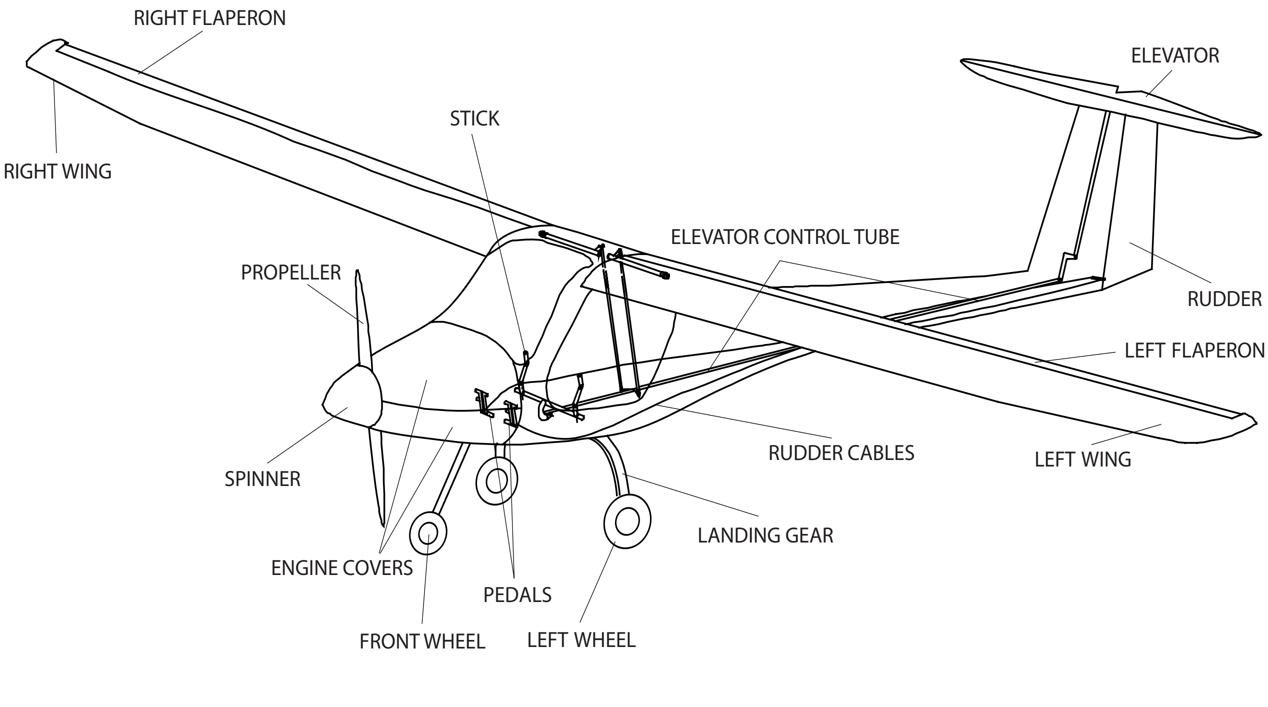
The electric circuit enables the pilot to test individual circuit items and to disconnect the battery from the circuit, should there be a distress situation.

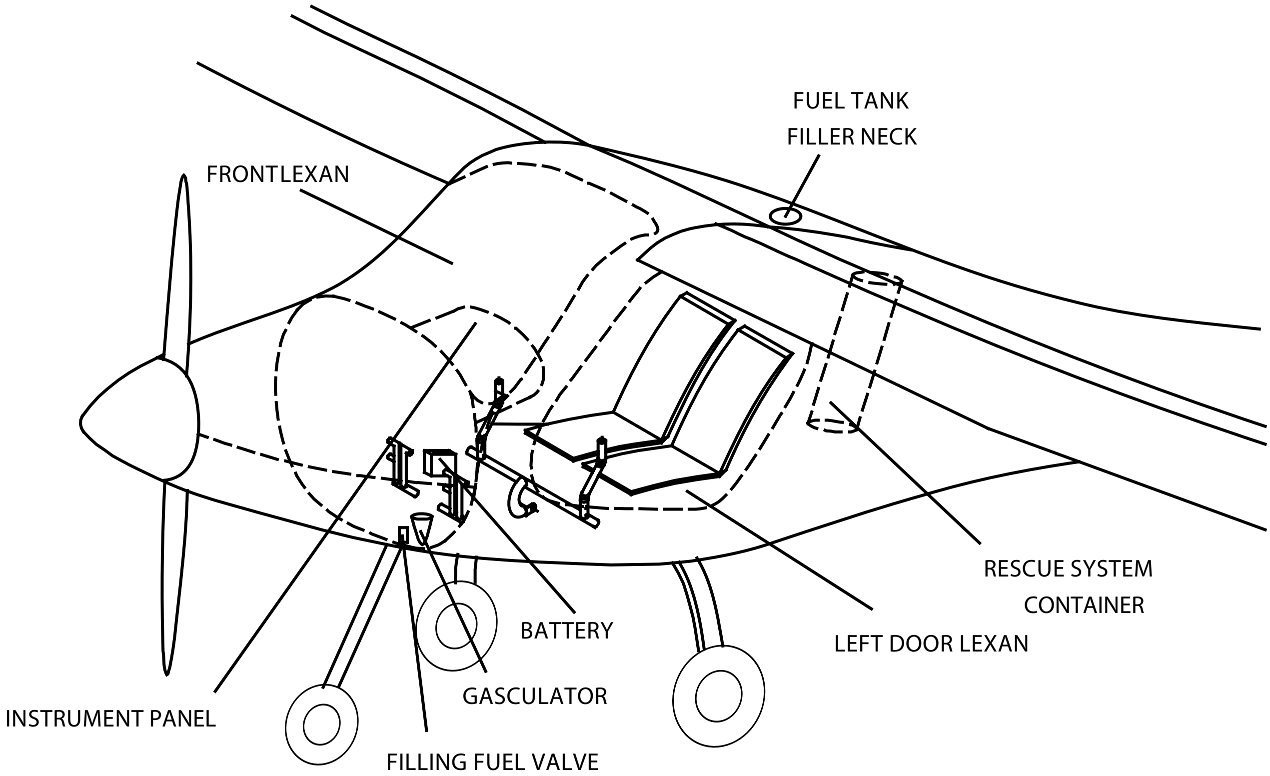
Navigational (NAV) lights, anti collision (AC) lights and the landing (LDG) light are installed.

The firewall is reinforced with heat and noise insulation.

Instruments come installed with operational limits pre-designated.

Parachute rescue system is fitted and located in aft fuselage.






Composite parts are made of:

| | |
|---|---|
| **fabric:** | GG160, GG200, GG300, 90070, 92120, 91125, 92140, 92145, KHW200 |
| **roving:** | NF24 |
| **foam:** | 55kg/m3, 75 kg/m3 PVC 3mm, PVC 5 mm, PVC 8mm |
| **GFK:** | 3 mm, 5 mm, 7 mm of thickness |
| **paint:** | acrylic paint |
| **firewall** | glass-aluminium sandwich |

Metal parts used are:

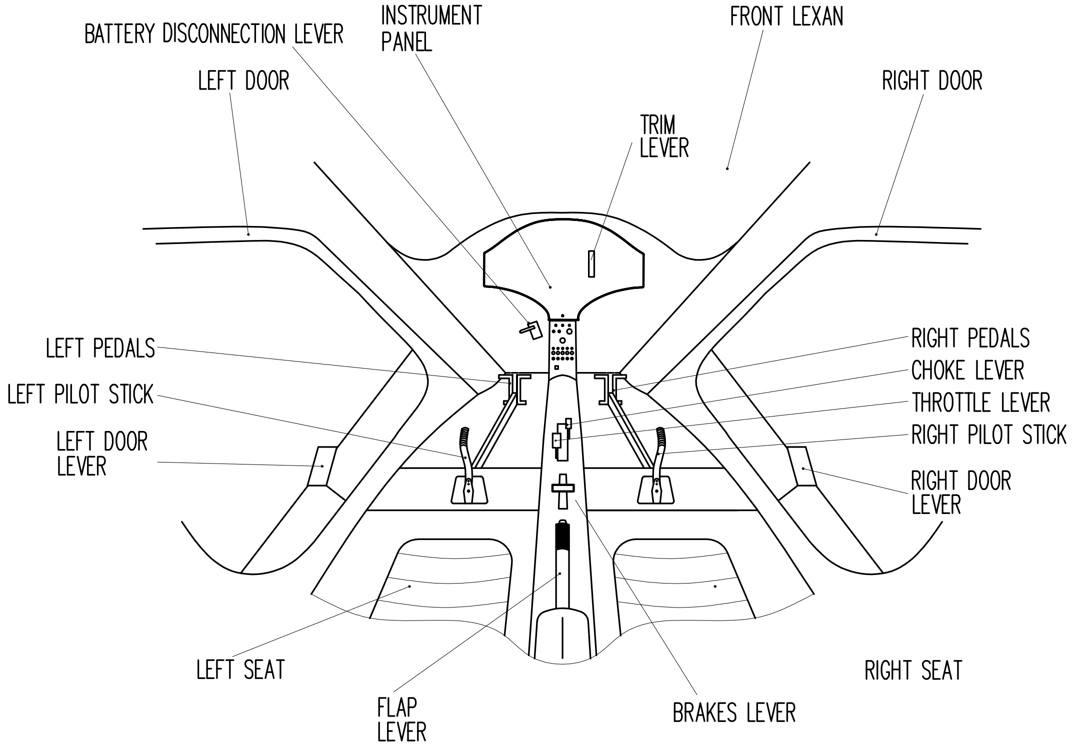
| | |
|---|---|
| **tubes:** | materials: Fe0146, Fe 0147, Fe0545, Fe1430, AC 100, CR41 and LN9369 |
| **sheet metal:** | materials: Fe0147 and Al 3571 |
| **rods:** | materials: Fe 1221, Fe 4732, C4130, Al 6082, CR41 in Al 6362 |
| **cable:** | AISI 316 |
| **bolts and nuts:** | 8.8 steel |

All composite parts are made of glass, carbon and kevlar fiber manufactured by Interglas GmbH and Sigratex carbon.

**All parts have been tested at safety factor of a minimum 1.875.**
**All composite parts are made in molds, therefore no shape or structural differences can occur.**
**All parts and materials used in ALPHA Trainer are also being used in the glider and general aviation industry and all comply with aviation standards.**

# Cockpit controls

ALPHA Trainer cockpit levers are divided into two groups:




**Individual control levers:** pilot stick and rudder pedals

**Dual control levers:** throttle lever, handbrake lever, choke lever, flap lever, trim lever, door handles, battery disconnection lever/ring and emergency parachute release handle.

# Typical Instrument panel

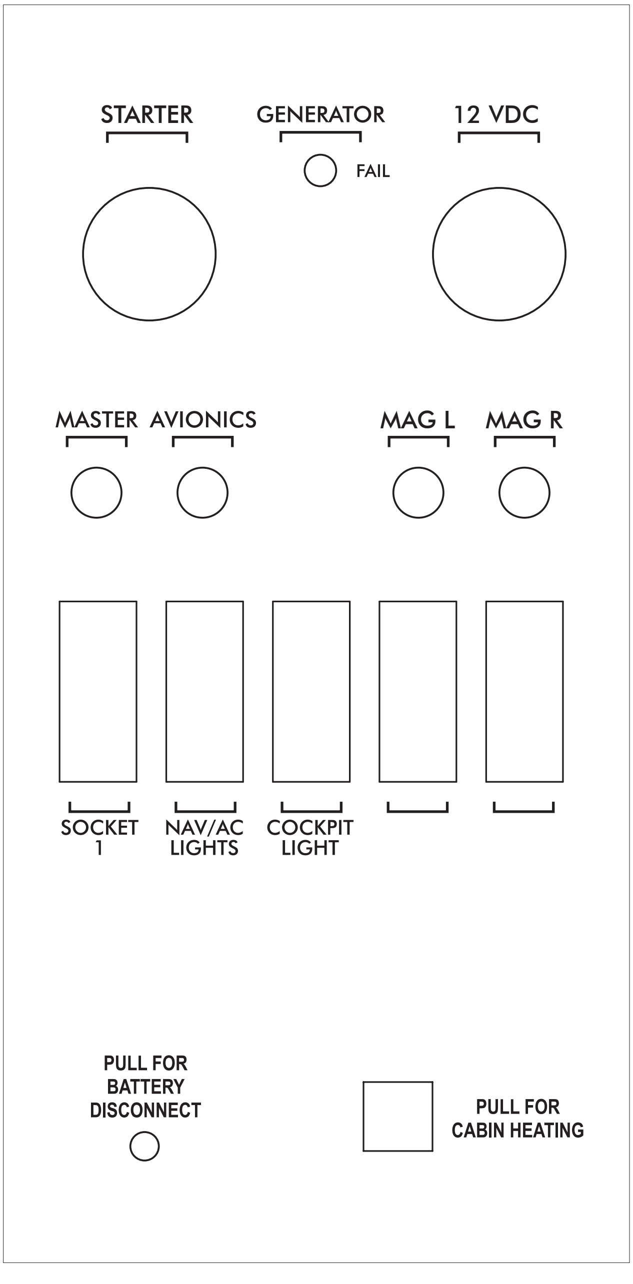
The instrument panel is fitted with analogue gauges for: airspeed, altitude, engine parameters (RPM, EGT, CHT, COOLANT TEMPERATURE, OIL TEMP, OIL PRESS, FUEL QTY gauge, Fuel pressure gauge ICOM A210 Radio, Garmin GTX 327 Transponder and the Garmin AERA 500 GPS. Instructions on how to use individual equipment (COM, GPS) are found in individual equipment manuals, as supplement to this POH. The gauges are round, 80 mm or 57 mm diameter, with the GPS being a touchscreen unit. Radio is a modern lightweight unit, features full intercom and dual PTT connections.

## Cockpit electrical system panel:

Characteristic are the separate master switch, avionics switch and engine starter push-button, separate magneto control. Fuses are located in the illuminated rectangular toggle switches, as well as wired behind the avionics switch to each of the electrical avionics loads (COM, XPDR, GPS).

Correct sequences of use of the cockpit electrical panel is as follows:

Engine start-up: MASTER ON - MAG (L&R) ON - START ENGINE - AVIONICS ON - INDIVIDUAL SWITCHES (AS DESIRED)
Engine shut-down: INDIVIDUAL SWITCHES OFF - AVIONICS OFF - MAG (L&R) OFF - ENGINE OFF - MASTER OFF.



# Undercarriage

The undercarriage is a tricycle type with two main, brake equipped, wheels mounted on struts and a steerable nose wheel. The nose wheel steers through rudder pedals

| | |
|---|---|
| **distance between main wheels:** | 63 inch (1.6 m) |
| **distance between main and nose wheel:** | 60 inch (1.52 m) |
| **tire, 8 ply:** | 4,00'' x 6'' (main wh.), 4,00'' x 4'' (nose wh.) |
| **tire pressure:** | 24 psi - 28 psi (main wh.), 18 psi (nose wh.) |
| **brakes:** | disk type, driven by brake lever centrally located in cockpit |
| **brake fluid:** | DOT 3 or DOT 4 |

Parking brake function is applied using a lock-latch on the handbrake lever. To apply the parking brake, pull handbrake lever firmly, hold it engage and use the lock-latch to activate parking brake function. To release, simply release the lock-latch, and push handbrake lever to full forward position.

# Seats and safety harnesses

Seats have no stiff internal structure and can therefore be folded forward easily for access to aft fuselage. The seat has one position, whereas the pedals are adjustable. Custom made seats are available for ordering. All ALPHA Trainer ship with H type safety harness attached to the fuselage at three mounting points.

# Pitot-Static system

The pitot tube is attached to the bottom side of the right-hand wing. Pitot lines lead through the inside of the wing all the way to the instrument panel.

# Power plant

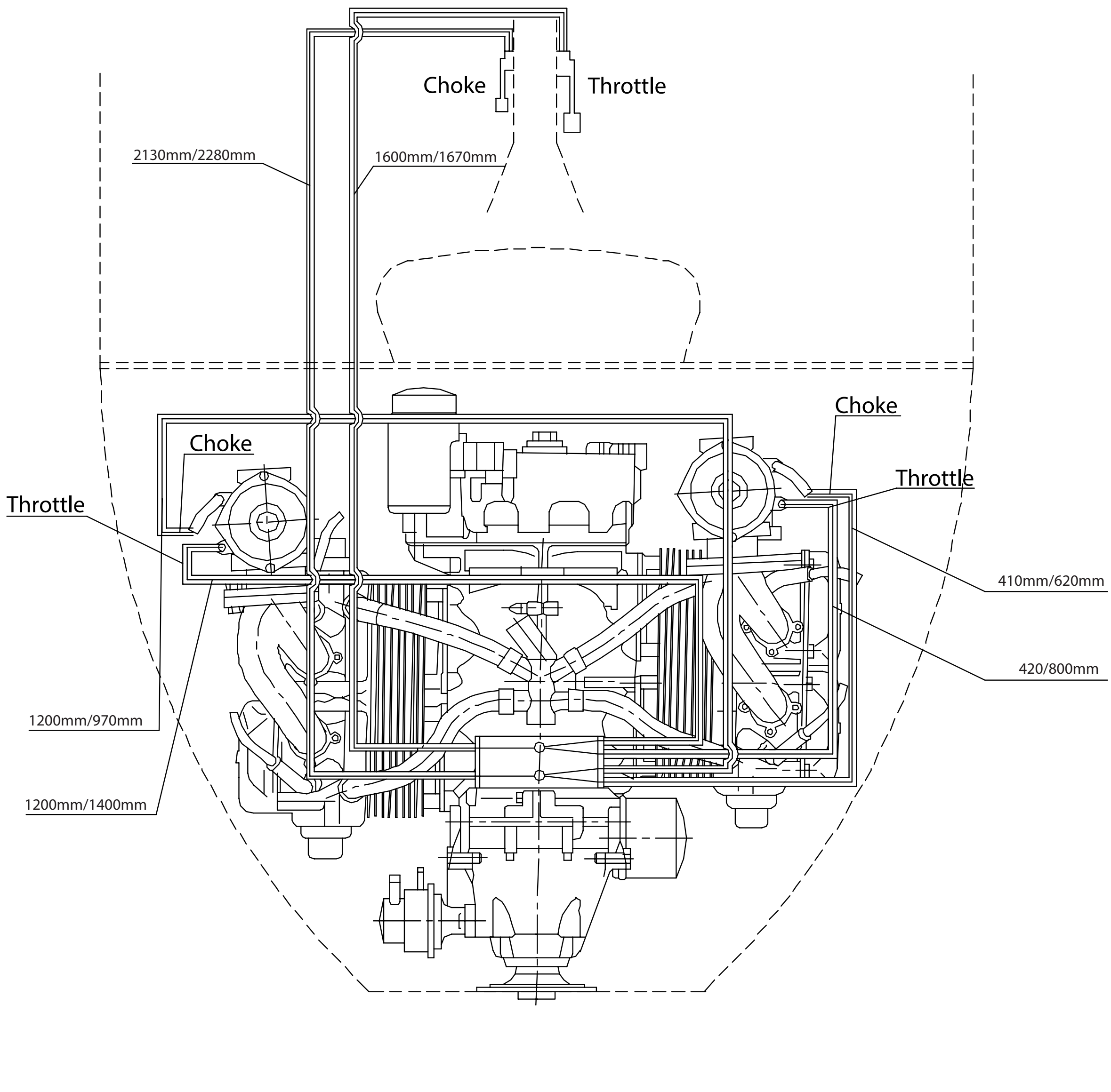
ALPHA Trainer is equipped with Rotax 912 (80 HP) engine.

## Engine description:

| Engine: | ROTAX 912 80 HP (4-stroke boxer, four cylinders, 1211 cm³) twin carburated - dual electronic ignition |
|---|---|
| cooling: | crank case air-cooled, cylinder heads water-cooled - own radiator and pump, other moving parts oilcooled - own radiator and pump |
| lubrication: | centrally oiled - own oil pump and radiator |
| reduction gearbox: | integrated |
| reduction ratio: | 1 : 2.27 |
| el. generator output power: | 250 W at 5500 RPM |
| starter: | electric |
| engine power: | 80 HP at 5800 RPM |
| battery: | 12 V, 10 Ah |

All metal cables used are fire resistant, kept inside bowdens i.e. self-lubricating flexible tubes.

## Schematic of throttle and choke control



## Propeller type:

| | |
|---|---|
| **Pipistrel FP02-80 (for Rotax 912 80 HP):** | two blade, fixed pitch propeller, diameter 63 ʺ (1620 mm) |

# Fuel system

| | |
|---|---|
| **description:** | vented fuselage fuel tank refueling opening on top/side of fuselage |
| **fuel shutoff valve:** | one, located in cockpit |
| **gascolator:** | filter equipped with drain valve |
| **fuel capacity:** | 13.2 US gal - 50 litres |
| **unusable fuel:** | 0.5 US gal - 2 litres |
| **fuel filter:** | inside the gascolator |
| **boost pump:** | electrical, linked to master switch (always on with master ON) |

All fuel hoses are protected with certified glass-silicon rubber. ALPHA Trainer’s fuel system features fuel return circuit into the fuel tank.

There is an electric - gauge style fuel quantity indication for the pilot.

**NOTE:** The actual fuel consumption/flow and fuel quantity remaining are calculations based on engine rpm and manifold pressure. These settings are to be used as a guide only and are NOT to be relied apon for the safe operation of the aircraft. If in doubt confirm the fuel quantity remaining before flight.

Draining of water and/or particles is carried out by draining the contents of the gascolator, installed below the bottom engine cowl and reachable through a dedicated placarded opening. Unscrew the discharge valve and drain at least 1 cup of fuel in a transparent canister, verify for water/particle contamination. Always fasten the drain valve before flight!

When using the single point fuel valve, found below the draining opening (placarded), make sure you have closed it before flight. The single point fuel valve can either be used for fuelling the aircraft by using a pump and container, or for discharging all of the fuel on board before disassembling the aircraft.

# Electrical system

| | |
|---|---|
| **description:** | dual electronic ignition. Standard, 12 V circuit charges the battery and provides power to all appliances and instruments. |
| **master switch:** | toggle switch type |
| **avionics switch:** | toggle switch type, powers all electrical avionics. |
| **magneto switches:** | separate Left (MAG L), Right (MAG R) |
| **other switches:** | fused and equipped with control lights (switch illumination) |
| **battery:** | 12 V, 10 Ah |
| **measured power consumption of some electrical loads:** | Nav/Strobe lights: 1 (steady) - 2 (peak) A , Cockpit light: 0.5 A, Radio & Transponder, EFIS, Please consult item's operating manual |

The electrical system uses simplified architecture. Characteristic are separate magneto toggle switches and a switch-type master switch. Avionics switch is separate.
There are individual fused rocker switches used to control individual electrical loads (lights, etc.), apart from electrical avionics.

Alternator (AC) is integral to the engine and provides up to 170 Watts at 5500 RPM. It is connected to the rectifier with an output of 14 V (DC).

Correct sequence of use for the new type of cockpit electrical panel is are as follows:

**Engine start-up: MASTER ON - START ENGINE - AVIONICS ON.**
**Engine shut-down: AVIONICS OFF - ENGINE OFF - MASTER OFF.**

The electrical system itself includes three solenoids, one activated by the master switch, the second activated by the avionics switch and the starter engage. All electrical loads, apart from the 12 V socket and the Pitot heat, are connected to the avionics bus via push-pull circuit breakers. For loads, which are engaged and disengaged more often, fused rocker switches are used (12 V socket, NAV lights, LDG light, etc.) All other loads (e.g. avionics) receive power as soon as the Avionics switch is ON. The avionics switch has no function when the master switch is OFF. The starter engage button is also disabled when the master switch is OFF.

## Battery disconnection system

On the ALPHA Trainer, the main battery can be disconnected from the circuit.
There are two handles in the cockpit used to operate the battery disconnection, the battery disconnection lever and the battery disconnection ring. The battery disconnection lever, which is a red flag-type lever is found on the firewall above the main battery on the left-hand side of the cockpit. This lever has an attached wire which leads to the battery disconnection ring on the instrument panel's switch column.
To disconnect the battery from the circuit, simply pull the battery disconnection ring on the instrument panel's switch column.
To reconnect the battery back to the circuit, use the flag-type lever on the firewall.
Deflect the lever so that its flag end points towards the firewall. Having done this correctly, you will feel the flag-lever lock into position.
Battery reconnection can be done in-flight as well (e.g. following a successfully rectified emergency situation) but only from the left-hand seat, since you cannot reach the flag-lever from the right-hand side of the cockpit.

# Engine cooling system

## Rotax 912 (80 HP) cooling system

The Rotax 912 engine's cylinders are air-cooled, the cylinder heads water-cooled. The cooling-air intake is located on the right-hand bottom part of the engine cover.

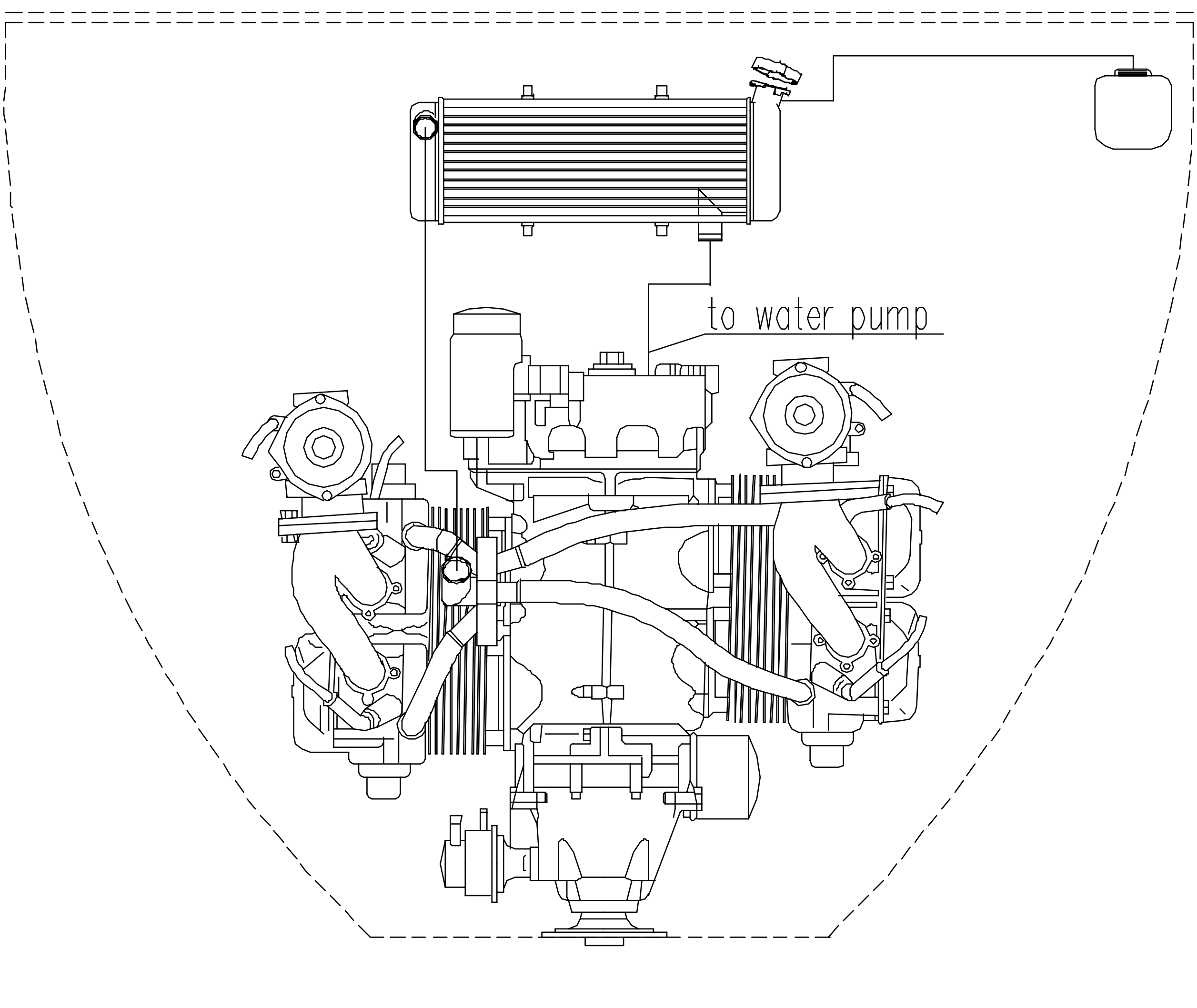
Cylinder heads are water-cooled. The water pump forces water through the radiator. The engine does not feature a thermostat valve. The overflow tank fluid level must always be inside the designated limits!

The engine does not feature a cooling fan, therefore cooling is entirely dependent on moving air currents and airspeed.

**CAUTION! You are strongly discouraged from leaving the engine running at idle power when on ground for extended periods of time.**

The manufacturer recommends use of cooling fluids used in car industry diluted in such a manner that it withstands temperatures as low as - 20°C/ -4°F

### Schematic of engine cooling system

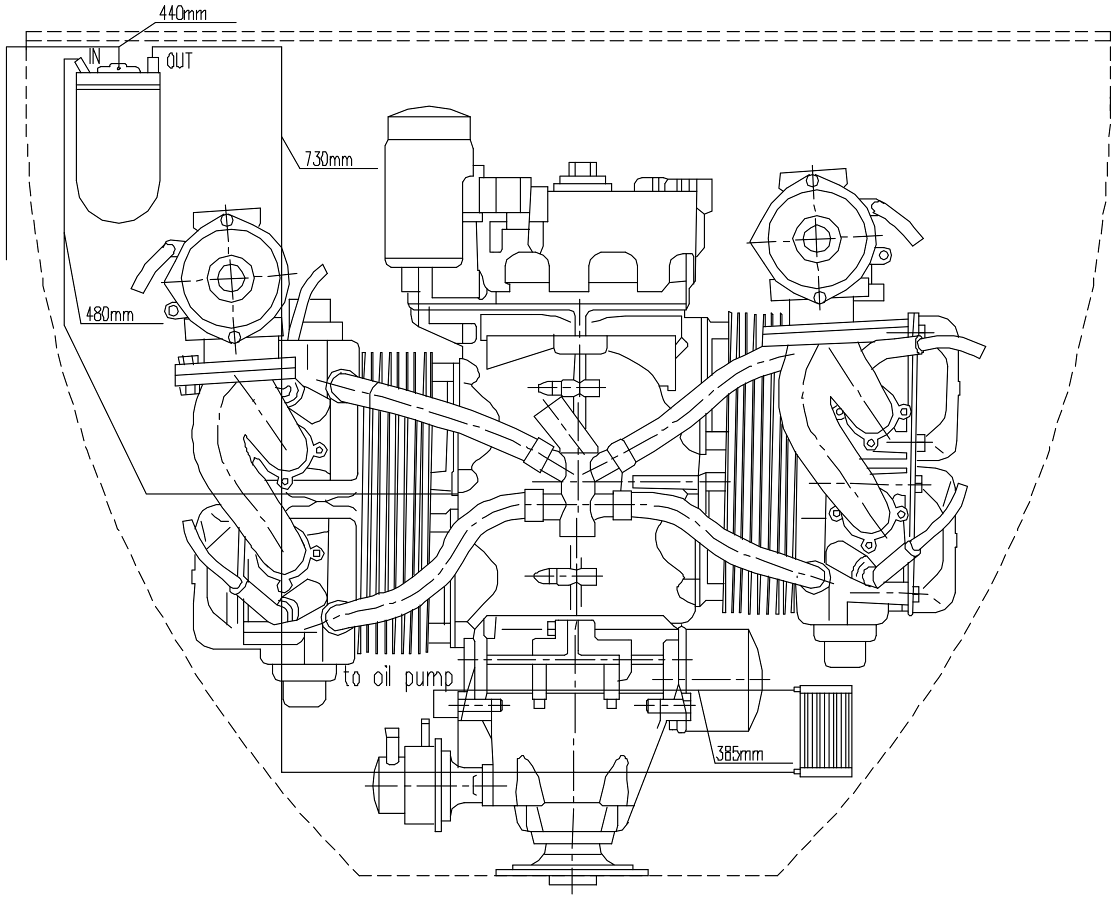


# Engine lubrication system

**Rotax 912** is a four-stroke engine, equipped with a dry sump and lubricated centrally with use of its own oil pump. All the oil needed is located inside a separate canister. When the engine is running, the oil cools itself passing through a radiator. Oil quantity can be checked visually with a oil dip stick. Make sure the oil quantity is within limits at all times.

**CAUTION! Oil temperature, pressure and quality is strictly defined and must not, under any circumstances, vary from its safe values.**

## Schematic of engine lubrication system




# Wheel brake system

Wheel brakes are disc, hydraulic type, actuated together by pulling on the common handbrake lever.

Hydraulic brake fluid used for hydraulic type brakes is DOT 3 or DOT 4.

Parking brake function is engaged using a lock-latch on the handbrake lever. To apply the parking brake, pull handbrake lever firmly, hold it engage and use the lock-latch to activate parking brake function. To release, simply release the lock-latch, and push handbrake lever to full forward position.

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# 8 Handling and maintenance

# Special inspections

## After having exceeded VNE or landed in a rough manner:

Check the undercarriage, fuselage & wing surfaces and main spars for abnormalities. It is highly recommended to have the aircraft verified for airworthiness by authorized service personnel.

## Clicking noise overhead

The wings are factory fitted to the fuselage to make a tight fit at approximately 80 F. When exposed to low temperatures, materials shrink. Therefore, flying in the winter or in cold temperatures, you may encounter "click-clack" like noises above your head. The remedy for this unpleasant noises is to add washers, typically of 0,5 mm thickness in-between wing and fuselage. Washers must be added both at rear and front bushings at one side of the fuselage only!

**WARNING! It is mandatory to consult the manufacturer or authorised service personnel before applying washers!**

# Draining and refueling

Whenever draining or refueling make sure master switch is set to OFF.

## Draining the fuel system

The gascolator is located beneath the bottom engine cover on the left hand side of the fuselage.
To drain the fuel system, open the drain valve on the gascolator. Drain approximately 1/2 cup of fuel.
Try to prevent ground pollution by collecting the fuel with a canister.
To close the valve simply turn it in the opposite direction. **Do not use force or special tools!**

**CAUTION! Always drain the fuel system before you have moved the aircraft from a standstill to prevent mixing of the fuel and eventual water or particles.**

## Refuelling

**CAUTION! Before refueling it is necessary to ground the aircraft!**

Refuelling can be done by pouring fuel through the fuel tank opening on top/side of the fuselage or by using the single point fueling valve on the lower firewall.

### Refuelling using the electrical fuel pump:

First, make sure that the fuel shut-off valve is open.
Connect one end of the fuel pump to the valve beneath the bottom engine cowl. Submerge the other end of the fuel pump, which has a filter attached, into the fuel container.
Engage the fuel pump by engaging the 12 V socket switch on the instrument panel.
After refueling it is recommended to eliminate eventual air pockets from inside the fuel system. To do that, drain some fuel with both fuel valves fully open.
Also, leave the engine running at idle power for a couple of minutes prior to taking-off and test the engine at full power for a minimum of 30 seconds.
Should you be experiencing slow refueling with the electrical fuel pump, you should replace the fil-

ter below the pump casing. You can use any fuel filter for this application.
It is recommended to use additional plastic tubes attached to the vents and leading to the ground in order to avoid over-spills of fuel onto the airframe when filling the tanks completely.

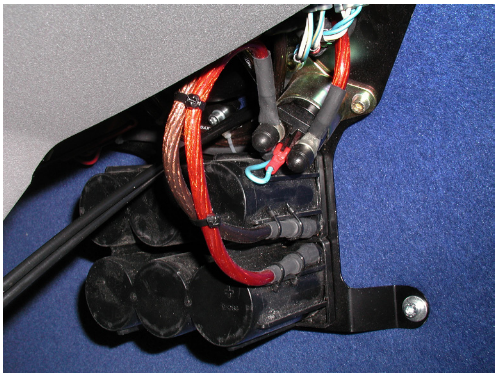
**CAUTION! Use authorized plastic containers to transport and store fuel only! Metal canisters cause water to condensate on the inside, which may later result in engine failure.**

# Connecting Auxiliary power supplies

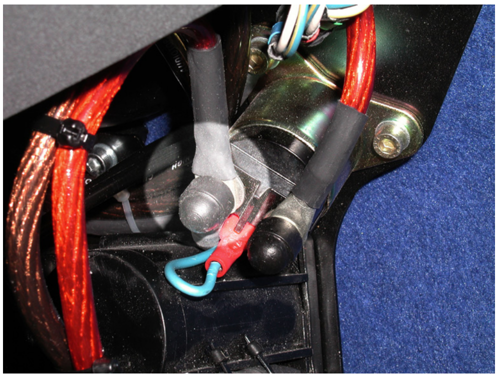
Should you be unable to start the engine due to a weak battery, auxiliary power supplies can be connected to help starting the engine.

## Battery's & Relay's location

## Battery (black) & Relay (top-right)



## Top-left nipple (c. positive (+) wire here)



## Exhaust (connect negative (-) wire here)

To connect an auxiliary power supply use battery connector cables with clamps at either ends.
Connect the negative (-) wire to aircraft's exhaust (sticking out below the engine cowling).
The positive (+) wire leads inside the cockpit to the relay mounted top-right of the aircraft's battery on the firewall. This relay has 3 nipples; the positive (+) wire must be connected to the upper-left nipple, the only one to which 2 cables are connected to.
After you have connected the wires correctly, start the engine normally by pressing the starter button in the cockpit.

**WARNING! The pilot must be in cockpit when starting the engine. The person who will disconnect the cables after the engine has started must be aware of the danger of spinning propeller nearby.**

# Tie down

Point the aircraft into the wind and retract flaps fully. Chock all three wheels. Put an extra rope around the tail-cone and into the slot between the propeller and the spinner. When using rope of a non-synthetic material, leave sufficient slack to avoid damage to the aircraft, should the ropes contract. To tie down the tail, tie a rope through the tail skid and secure it to the ground. At the end, cover the pitot tube with a protection cover.
Mechanical towing is prohibited at all times.

# Storage

The aircraft should ideally be stored in a hangar. For increased in-hangar maneuverability use of original push-cart is recommended.
The parachute rescue system is installed in your aircraft, so make sure the activation handle safety pin is inserted every time you leave the aircraft.
Also, disconnect the battery from the circuit to prevent battery self-discharge (pull battery disconnection ring on the instrument panel's switch column) during storage period.

# Cleaning

Use fresh water and a soft piece of cloth to clean the aircraft's exterior. If you are unable to remove certain spots, consider using mild detergents. Afterwards, rinse the entire surface thoroughly.
Lexan glass surfaces are protected by an anti-scratch layer on the outside. Always use fresh water only to clean the glass surfaces, not to damage these protection layers and coatings.
To protect the aircraft's surface (excluding glass surfaces) from the environmental contaminants, use best affordable car wax.

The interior is to be cleaned with a vacuum cleaner.

# Keeping your aircraft in perfect shape

## Precautions

1) Eliminate the use of ALL aggressive cleaning solutions and organic solvents, also the window cleaning spray, benzene, acetone, aggressive shampoos etc.

2) If you must use an organic solvent (acetone) on small areas remove certain glue leftovers or similar, the surface in question MUST be polished thereafter. The only section where polishing should be avoided is the edge on the wing where the sealing gasket is applied.

3) When flying in regions with a lot of bugs in the air, you should protect the leading edges of the airframe before flight (propeller, wings, tail) with Antistatic furniture spray cleaner: "Pronto (transparent), manufacturer: Johnson Wax (or anything equivalent) – Worldwide", approximate price is only $3 USD / €3 EUR for a 300 ml spray bottle. Using such spray, do not apply it directly onto the wing but into a soft cloth instead (old T-shirts are best).
4) After having finished with flight activity for the day, clean the leading edges of the airframe as soon as possible with a lot of water and a drying towel (chamois, artificial leather skin). This will be very easy to do if you applied a coat of Pronto before flight.

## Detailed handling (Airframe cleaning instructions)

### Every-day care after flight
Bugs, which represent the most of the dirt to be found on the airframe, are to be removed with clean water and a soft cloth (can be also drying towel, chamois, artificial leather skin). To save time, soak all the leading edges of the airframe fist. Make sure to wipe ALL of the aircraft's surface until it is completely dry at the end.
Clean the propeller and the areas with eventual greasy spots separately using a mild car shampoo with a wax.

**CAUTION! Do not, under any circumstances attempt to use aggressive cleaning solutions, as you will severely damage the lacquer, which is the only protective layer before the structural laminate.**

When using the aircraft in difficult atmospheric conditions (intense sunshine, dusty winds, coastline, acid rains etc.) make sure to clean the outer surface more thoroughly.

If you notice you cannot remove the bug-spots from the leading edges of the aircraft, this means the lacquer is not protected any more, therefore it is necessary to polish these surfaces.

**CAUTION! Do not, under any circumstances attempt to remove such bug-spots with abrasive sponges and/or rough polishing pastes.**

### Periodical cleaning of all outer surfaces with car shampoo

Clean as you would clean your car starting at the top and working your way downwards using a soft sponge. Be careful not to use a sponge that was contaminated with particles e.g. mud, fine sand) not to grind the surface. While cleaning, soak the surface and the sponge many, many times. Use a separate sponge to clean the bottom fuselage, as is it usually more greasy than the rest of the airframe. When pouring water over the airframe, be careful not to direct it over the fuel reservoir caps, wing-fuselage joining section, parachute rescue system straps and cover, pitot tube, tail static probe and engine covers.

Always rinse the shampooed surfaces again before they become dry! Thereafter, wipe the whole of the aircraft dry using a drying towel, chamois or artificial leather skin.
Also, clean the Mylar seals on the wing and tail control surfaces. Lift the seals gently and insert ONE layer of cloth underneath, then move along the whole span of the seal. Ultimately, you may wish to apply Teflon grease (in spray) over the area where the seal touch the control surfaces.

## Polishing by hand

Use only the highest quality polishing compounds WITHOUT abrasive grain, such as Sonax Extreme or similar. Start polishing on a clean, dry and cool surface, never in the sunshine!
Machine polishing requires more skills and has its own particularities, therefore it is recommended to leave it to a professional.

## Cleaning the Lexan transparent surfaces

It is most important to use really clean water (no cleaning solutions are necessary) and a really clean drying towel (always use a separate towel ONLY for the glass surfaces). Should the glass surfaces be dusty, remove the dust first by pouring water (not spraying!) and gliding your hand over the surface. Using the drying towel, simply glide it over the surface, then squeeze it and soak it before touching the glass again. If there are bugs on the windshield, soak them with plenty of water first, so less wiping is necessary. Ultimately, dry the whole surface and apply JT Plexus Spray ($10 USD / €10 EUR per spray) or at least Pronto antistatic (transparent) spray and wipe clean with a separate soft cotton cloth.

# 9 Appendix

# Parachute rescue system: use, Handling and servicing (9-1)

## System description

The GRS rocket charged parachute rescue system provides you with a chance to rescue yourself from an unexpected situation.
The system is placed inside a durable cylinder mounted on the right hand side of the baggage compartment. Inside this cylinder is the parachute which stored inside a deployment bag with a rocket engine underneath.
This brand new design deploys a canopy that is not gradually drawn from the container, exposed to distortion by air currents, but it is safely open after 0,4 to 0,7 seconds in distance of 50-60 ft above the aircraft. It is carried there in a special deployment bag, which decreases the risk of aircraft debris fouling the canopy.
The parachute rescue system is activated manually, by pulling the activation handle mounted on the back wall above. After being fired, the man canopy is open and fully inflated in about 3.2 seconds.

**WARNING! Activation handle safety pin should be inserted when the aircraft is parked or hangared to prevent accidental deployment. However, the instant pilot boards the aircraft, safety pin MUST be removed!**

## Use of parachute rescue system

### Typical situations for use of the parachute rescue system are:

- structural failure
- mid-air collision
- loss of control over aircraft
- engine failure over hostile terrain
- pilot incapacitation (incl. heart attack, stroke, temp. blindness, disorientation...)

### Prior to firing the system, provided time allows:

- shut down the engine and set master switch to OFF (key in full left position)
- shut the fuel valve
- fasten safety harnesses tightly
- protect your face and body.

**To deploy the parachute jerk the activation handle hard to a length of at least 15" towards the instrument panel.**

Once you have pulled the handle and the rocket is deployed, it will be about two seconds before you feel the impact produced by two forces. The first force is produced by stretching of all the system. The second force follows after the inflation of the canopy from opening impact and it will seem to you that the aircraft is pulled backwards briefly. The airspeed is reduced instantly and the aircraft now starts to descent underneath the canopy.

As a pilot you should know that the phase following parachute deployment may be a great unknown and a great adventure for the crew. You will be getting into a situation for the first time, where a proper landing and the determination of the landing site are out of your control.

**CAUTION! Should you end up in power lines (carrying electrical current), DO NOT under any circumstances touch any metal parts inside or outside the cockpit. This also applies to anyone attempting to help or rescue you. Be aware that anyone touching any part of the aircraft while standing on the ground will probably suffer mayor injury or die of electrocution. Therefore, you are strongly encouraged to confine your movements until qualified rescue personnel arrives at the site to assist you.**

After the parachute rescue system has been used or if you suspect any possible damage to the system, do not hesitate and immediately contact the manufacturer!

# Handling and servicing

Prior to every flight all visible parts of the system must be checked for proper condition. Special attention should be paid to corrosion on the activation handle inside the cockpit. Also, main fastening straps on the outside of the fuselage must be undamaged at all times.
Furthermore, neither system, nor any of its parts should be exposed to moisture, vibration and UV radiation for long periods of time to ensure proper system operation and life.

**CAUTION! It is strongly recommenced to thoroughly inspect and grease the activation handle, preferably using silicon spray, every 50 flight hours.**

## All major repairs and damage repairs MUST be done by the manufacturer or authorized service personnel.

For all details concerning the GRS rescue system, please see the "GRS - Galaxy Rescue System Manual for Assembly and Use".

# Training/Familiarization Supplement (9-4)

*This chapter has been written to assist owners/pilots/instructors of ALPHA Trainer on their quest to learn how to safely and efficiently fly this aircraft in addition to the information already assembled in the rest of this POH. This section will cover most operations the aircraft offers in an order established in section Normal procedures and recommended speeds. Please consider what follows as an add-on to that chapter.*

## Engine start-up

First and foremost **make sure you have sufficient fuel quantity on board** for the desired length of flight. If you are not completely confident there is enough, step out of the aircraft and add more fuel into the tanks. There is an old aviators' saying: *"The only time you have too much fuel is when you are on fire."*

**When engaging engine starter, wheel brakes MUST be engaged.** To keep your propeller in perfect shape, avoid starting up on areas where there are small stones on the ground. Those little stones can easily be picked up by the propeller causing damage to the blades.

**Warming up must be conducted below 2500 RPM.** When reaching safe operational engine temperatures, verify maximum engine ground RPM. **Hold the stick back completely and slowly(!) add throttle to full power, then verify RPM.**

## Taxi

Taxiing with the ALPHA Trainer is rather simple considering the steerable nose wheel. It is recommended you **taxi slowly**, up to 10 km/s (5 kts), while holding the stick back fully to ease the pressure of the nose wheel.

**During taxiing monitor engine temperatures.** Due to low airflow around the radiators the CHT and Oil temperature will rise during long taxi periods. If you are holding position, do not leave throttle at idle. It is better you have some 2500 RPM as this will provide some airflow from the propeller to the radiators and the temperatures will not rise so quickly. **Should you see engine temperatures exceed safe operational values, shut off the engine, point the aircraft's nose into the wind and wait for the temperatures to reduce.**

## Take off and initial climb

Having checked and set all engine and aircraft parameters, you should be ready for take off by now. **Reverify fuel valve is open. Trim lever should be in the middle.**

**Start the take-off roll gradually.** Keep adding throttle smoothly and slowly to full power. There are two reasons for this. First, you change flight stage from zero movement to acceleration slowly; this provides you with time to react to conditions. Second, especially if taking-off from a gravel runway, this method of adding full throttle will prevent the little stones on the runway to damage the propeller. Extremely short runways are an exception. There you should line up the aircraft, set flaps to 2$^{nd}$ stage, step on the brakes, apply full power and release the brakes.
**As you start to move, pull the stick 1/3 of elevator's deflection backwards** to ease the pressure on the nose wheel and lift it off the runway slightly. **Do not use full back deflection as this will cause the aircraft's tail to touch the ground.**

**When the nose wheel has lifted off the ground, there is nothing else but to hold the same pitch attitude and the aircraft will become airborne.** Crosswind take-offs, depending on wind strength, require a little bit of aileron deflection into the wind. **Remember, wings must stay level throughout ground-roll, rotation and initial climb!**

**Having lifted off the ground, gently push the stick forward just a bit to accelerate.** At some 110 km/h (60 kts) set flaps to 1st stage, at 130 km/h (70 kts) set them to neutral.

# Climb

A comfortable setting for climb is flaps in zero/neutral position, speed of 76 kts (140 km/h) at or slightly below 5500 RPM. In summer time or **when outside temperature exceeds 85° F (30**°C) you should **consider climbing at some 85 kts (160 km/h)** to provide more airflow to the engine radiators. Trim the aircraft for comfortable stick forces.

# Cruise

**Make sure flaps are retracted.** A comfortable cruise setting is 5300 engine RPM.

**Cruising fast, do not kick-in rudder for turns!** Above 85 kts (160 km/h) the rudder becomes almost insignificant in comparison to aileron deflections when it comes to making a turn. **Cruising fast, it is important to fly coordinated (ball in the middle) as this increases efficiency and decreases side-pressure onto vertical tail surfaces. Also, pay attention to turbulence. If you hit turbulence at speeds greater than VNO, reduce power immediately and pull up the nose to reduce speed.**

If flying a traffic pattern, set engine power so that airspeed does not exceed 150 km/h (80 kts).

# Descent

Descending with the Alpha Trainer is the stage of flight where the most care should be taken. The aircraft is aerodynamically clean and builds up speed very fast.

**Start the descent by reducing throttle and keep your speed below VNO.**
During initial descent it is recommended you trim for a 10 kts lower speed than the one you decided to descent at. Do this for safety. In case you hit turbulence simply release forward pressure on the stick and the aircraft will slow down.

**Also, keep in mind you need to begin your descent quite some time before destination.** A comfortable rate of descent is 500 fpm (2.5 m/s). So it takes you 2 minutes for a 1000 ft (300 m) drop. At 105 kts (200 km/h) this means 3.6 NM for each 1000 ft drop.

**Entering the traffic pattern the aircraft must slow down.** In order to do this, hold your altitude and reduce throttle to idle. Gradually slow down to below 80 kts (150 km/h), then set proper engine RPM to maintain speed of 70 kts (130 km/h). Trim the aircraft for comfortable stick forces.

**Before turning to base-leg, reduce power to idle and set flaps to 1st stage at 70 kts (130 km/h).** Once out of the turn, reduce speed towards 60 kts (110 km/h). Power remains idle from the point of turning base all the way to touch-down. If you plan your approach this way, you will always be on the safe side - even if your engine fails, you will still be able to safely reach the runway!

**Turn to final at 55 kts (100 km/h). When in runway heading, set flaps to 2nd stage.** Use the throttle to obtain the desired descent path (if applicable).

# Roundout (Flare) and touchdown

**Your speed should be a constant 55 kts (100 km/h) throughout the final with the descent path constant as well.** At a height of 10 meters (25 feet) start a gentle flare and approach the **aircraft must touch down with the main (back) wheels first,** so that you will not bounce on the runway. After touchdown, operate the rudder pedals if necessary to maintain runway heading and try to have the nose wheel off the ground for as long as possible. When the nose wheel is to touch the ground, rudder pedals MUST be exactly in the middle not to cause damage to the steering mechanism. **While braking, hold the stick back fully!** Once you have come to a standstill, retract flaps all the way to normal 0° position (handle full down).

**Should you bounce off the runway after touch-down, do not, under any circumstances, push stick forward.** Bouncing tends to reduce by itself anyhow.

Crosswind landings, depending on the wind speed, require some sort of drift correction. Most efficient is the low-wing method, where you are to lower the wing into the wind slightly and maintain course by applying appropriate rudder deflection. You can also try the crab method.

# Crosswind landings on paved runways (asphalt, concrete, tarmac...)

**In this case, special attention must be paid to straightening the aircraft before touchdown** in order not to damage the undercarriage because of increased surface grip on impact.
Should the crosswind component be strong (8 kts and over), it is recommended to gently **flare in such a manner, that one of the main wheels touches-down an instant before the other** (e.g. if there is crosswind from your left, the left wheel should touch down just before the right wheel does). This way the undercarriage almost cannot be damaged due to side forces on cross-wind landings.

# Landing in strong turbulence and/or gusty winds

First of all **airspeed must be increased** for half of the value of wind gusts (e.g. if the wind is gusting for 6 kts , add 3 kts to the final approach speed). In such conditions I would also recommend to only **use 1st stage of flaps for increased maneuverability. In very strong winds (20 kts and more), use retracted flaps for the complete approach and roundout.**

# Balked landing

Add full power, establish Vy, retract flaps as required.

# Parking

Nothing special to add here. Taxi to the apron with flaps retracted (minimum lift). Again, taxi slow for reasons mentioned under "Taxi". **Come to a standstill, shut down the engine, insert the parachute rescue system activation handle's safety pin**. It is recommended to shut the fuel tank valve.

# Conversion tables (9-8)

## Kilometers per hour (km/h) - knots (kts) - meters per sec. (m/s)

| km/h | kts | m/s | km/h | kts | m/s | km/h | kts | m/s |
|---|---|---|---|---|---|---|---|---|
| 1.853 | 1 | 0.37 | 63.00 | 34 | 18.34 | 124.16 | 67 | 36.15 |
| 3.706 | 2 | 1.07 | 64.86 | 35 | 18.88 | 126.01 | 68 | 36.69 |
| 5.560 | 3 | 1.61 | 66.71 | 36 | 19.42 | 127.87 | 69 | 37.23 |
| 7.413 | 4 | 2.15 | 68.56 | 37 | 19.96 | 129.72 | 70 | 37.77 |
| 9.266 | 5 | 2.69 | 70.42 | 38 | 20.50 | 131.57 | 71 | 38.31 |
| 11.11 | 6 | 3.23 | 72.27 | 39 | 21.04 | 133.43 | 72 | 38.86 |
| 12.97 | 7 | 3.77 | 74.12 | 40 | 21.58 | 135.28 | 73 | 39.39 |
| 14.82 | 8 | 4.31 | 75.98 | 41 | 22.12 | 137.13 | 74 | 39.93 |
| 16.67 | 9 | 4.85 | 77.83 | 42 | 22.66 | 198.99 | 75 | 40.47 |
| 18.53 | 10 | 5.39 | 79.68 | 43 | 23.20 | 140.84 | 76 | 41.01 |
| 20.38 | 11 | 5.93 | 81.54 | 44 | 23.74 | 142.69 | 77 | 41.54 |
| 22.23 | 12 | 6.47 | 83.39 | 45 | 24.28 | 144.55 | 78 | 42.08 |
| 24.09 | 13 | 7.01 | 85.24 | 46 | 24.82 | 146.40 | 79 | 42.62 |
| 25.94 | 14 | 7.55 | 87.10 | 47 | 25.36 | 148.25 | 80 | 43.16 |
| 27.79 | 15 | 8.09 | 88.95 | 48 | 25.90 | 150.10 | 51 | 43.70 |
| 29.65 | 16 | 8.63 | 90.80 | 49 | 26.44 | 151.96 | 82 | 44.24 |
| 31.50 | 17 | 9.17 | 92.66 | 50 | 26.98 | 153.81 | 83 | 44.78 |
| 33.35 | 18 | 9.71 | 94.51 | 51 | 27.52 | 155.66 | 84 | 45.32 |
| 35.21 | 19 | 10.25 | 96.36 | 52 | 28.05 | 157.52 | 85 | 45.86 |
| 37.06 | 20 | 10.79 | 98.22 | 53 | 28.59 | 159.37 | 86 | 46.40 |
| 38.91 | 21 | 11.33 | 100.07 | 54 | 29.13 | 161.22 | 87 | 46.94 |
| 40.77 | 22 | 11.81 | 101.92 | 55 | 29.67 | 163.08 | 88 | 47.48 |
| 42.62 | 23 | 12.41 | 103.77 | 56 | 30.21 | 164.93 | 89 | 48.02 |
| 44.47 | 24 | 12.95 | 105.63 | 57 | 30.75 | 166.78 | 90 | 48.56 |
| 46.33 | 25 | 13.49 | 107.48 | 58 | 31.29 | 168.64 | 91 | 49.10 |
| 48.18 | 26 | 14.03 | 109.33 | 59 | 31.83 | 170.49 | 92 | 49.64 |
| 50.03 | 27 | 14.56 | 111.19 | 60 | 32.37 | 172.34 | 93 | 50.18 |
| 51.80 | 28 | 15.10 | 113.04 | 61 | 32.91 | 174.20 | 94 | 50.12 |
| 53.74 | 29 | 15.64 | 114.89 | 62 | 33.45 | 176.05 | 95 | 51.26 |
| 55.59 | 30 | 16.18 | 116.75 | 63 | 33.99 | 177.90 | 96 | 51.80 |
| 57.44 | 31 | 16.72 | 118.60 | 64 | 34.53 | 179.76 | 97 | 52.34 |
| 59.30 | 32 | 17.26 | 120.45 | 65 | 35.07 | 181.61 | 98 | 52.88 |
| 61.15 | 33 | 17.80 | 122.31 | 66 | 35.61 | 183.46 | 99 | 53.42 |

# knots (kts) - meters per second (m/s)

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0 | 0.51 | 1.02 | 1.54 | 2.05 | 2.57 | 3.08 | 3.60 | 4.11 | 4.63 |
| **10** | 0.51 | 5.65 | 6.17 | 6.66 | 7.20 | 7.71 | 8.23 | 8.74 | 9.26 | 9.77 |
| **20** | 10.28 | 10.80 | 11.31 | 11.83 | 12.34 | 12.86 | 13.37 | 13.89 | 14.40 | 14.91 |
| **30** | 25.43 | 15.94 | 16.46 | 16.97 | 17.49 | 18.00 | 18.52 | 19.03 | 19.54 | 20.06 |
| **40** | 20.57 | 21.09 | 21.60 | 22.12 | 22.63 | 23.15 | 23.66 | 24.17 | 24.69 | 25.20 |
| **50** | 25.72 | 26.23 | 26.75 | 27.26 | 27.76 | 28.29 | 28.80 | 29.32 | 29.83 | 30.35 |
| **60** | 30.86 | 31.38 | 31.89 | 32.41 | 32.92 | 33.43 | 33.95 | 34.46 | 34.98 | 35.49 |
| **70** | 36.00 | 36.52 | 37.04 | 37.55 | 38.06 | 38.58 | 39.09 | 39.61 | 40.12 | 40.64 |
| **80** | 41.15 | 41.67 | 42.18 | 42.69 | 43.21 | 43.72 | 44.24 | 44.75 | 45.27 | 45.78 |
| **90** | 46.30 | 46.81 | 47.32 | 47.84 | 48.35 | 48.87 | 49.38 | 49.90 | 50.41 | 50.90 |

# meters per second (m/s) - feet per minute (100 ft/min)

| m/sec. | | 100 ft/min | m/sec. | | 100 ft/min | m/sec. | | 100 ft/min |
|---|---|---|---|---|---|---|---|---|
| 0.50 | 1 | 1.96 | 10.66 | 21 | 41.33 | 20.82 | 41 | 80.70 |
| 1.01 | 2 | 3.93 | 11.17 | 22 | 43.30 | 21.33 | 42 | 82.67 |
| 1.52 | 3 | 5.90 | 11.68 | 23 | 45.27 | 21.84 | 43 | 84.64 |
| 2.03 | 4 | 7.87 | 12.19 | 24 | 47.24 | 22.35 | 44 | 86.61 |
| 2.54 | 5 | 9.84 | 12.75 | 25 | 49.21 | 22.86 | 45 | 88.58 |
| 3.04 | 6 | 11.81 | 13.20 | 26 | 51.18 | 23.36 | 46 | 90.53 |
| 3.55 | 7 | 13.78 | 13.71 | 27 | 53.15 | 23.87 | 47 | 92.52 |
| 4.06 | 8 | 15.74 | 14.22 | 28 | 55.11 | 24.38 | 48 | 94.48 |
| 4.57 | 9 | 17.71 | 14.73 | 29 | 57.08 | 24.89 | 49 | 96.45 |
| 5.08 | 10 | 19.68 | 15.24 | 30 | 59.05 | 25.45 | 50 | 98.42 |
| 5.58 | 11 | 21.65 | 15.74 | 31 | 61.02 | 25.90 | 51 | 100.4 |
| 6.09 | 12 | 23.62 | 16.25 | 32 | 62.92 | 26.41 | 52 | 102.3 |
| 6.60 | 13 | 25.51 | 16.76 | 33 | 64.96 | 26.92 | 53 | 104.3 |
| 7.11 | 14 | 27.55 | 17.27 | 34 | 66.92 | 27.43 | 54 | 106.2 |
| 7.62 | 15 | 29.52 | 17.78 | 35 | 68.89 | 27.94 | 55 | 108.2 |
| 8.12 | 16 | 31.49 | 18.28 | 36 | 70.86 | 28.44 | 56 | 110.2 |
| 8.63 | 17 | 33.46 | 18.79 | 37 | 72.83 | 28.95 | 57 | 112.2 |
| 9.14 | 18 | 35.43 | 19.30 | 38 | 74.80 | 29.46 | 58 | 114.1 |
| 9.65 | 19 | 37.40 | 19.81 | 39 | 76.77 | 29.97 | 59 | 116.1 |
| 10.16 | 20 | 39.37 | 20.32 | 40 | 78.74 | 30.48 | 60 | 118.1 |

# ICAN (international committee for air navigation) temperatures, relative pressure, relative density and CAS to TAS correction factors as related to altitude

| Altitude | | Temperature | | Relative pressure | Relative density | Cor. factors |
|---|---|---|---|---|---|---|
| feet | metres | °C | °F | | | |
| -2.000 | -610 | 18.96 | 66.13 | 1.074 | 1.059 | 0.971 |
| -1 | -305 | 16.98 | 62.56 | 1.036 | 1.029 | 0.985 |
| 0 | 0 | 15 | 59 | 1 | 1 | 1 |
| 1.000 | 305 | 13.01 | 55.43 | 0.964 | 0.971 | 1.014 |
| 2.000 | 610 | 11.03 | 51.86 | 0.929 | 0.942 | 1.029 |
| 3.000 | 914 | 9.056 | 48.30 | 0.896 | 0.915 | 1.045 |
| 4.000 | 1219 | 7.075 | 44.73 | 0.863 | 0.888 | 1.061 |
| 5.000 | 1524 | 5.094 | 41.16 | 0.832 | 0.861 | 1.077 |
| 6.000 | 1829 | 3.113 | 37.60 | 0.801 | 0.835 | 1.090 |
| 1.000 | 2134 | 1.132 | 34.03 | 0.771 | 0.810 | 1.110 |
| 8.000 | 2438 | -0.850 | 30.47 | 0.742 | 0.785 | 1.128 |
| 9.000 | 2743 | -2.831 | 26.90 | 0.714 | 0.761 | 1.145 |
| 10.000 | 3090 | -4.812 | 23.33 | 0.687 | 0.738 | 1.163 |
| 11.000 | 3353 | -6.793 | 19.77 | 0.661 | 0.715 | 1.182 |
| 12.000 | 3658 | -8.774 | 16.20 | 0.635 | 0.693 | 1.201 |
| 13.000 | 3916 | -10.75 | 12.64 | 0.611 | 0.671 | 1.220 |
| 14.000 | 4267 | -12.73 | 9.074 | 0.587 | 0.649 | 1.240 |
| 15.000 | 4572 | -14.71 | 5.507 | 0.564 | 0.629 | 1.260 |
| 16.000 | 4877 | -16.69 | 1.941 | 0.541 | 0.608 | 1.281 |
| 17.000 | 5182 | -18.68 | -1.625 | 0.520 | 0.589 | 1.302 |

# meters (m) to feet (ft) conversion table

| meters (m) | | feet (ft) | meters (m) | | feet (ft) | meters (m) | | feet (ft) |
|---|---|---|---|---|---|---|---|---|
| 0.304 | 1 | 3.280 | 10.36 | 34 | 111.5 | 20.42 | 67 | 219.81 |
| 0.609 | 2 | 6.562 | 10.66 | 35 | 114.8 | 20.72 | 68 | 223.09 |
| 0.914 | 3 | 9.843 | 10.97 | 36 | 118.1 | 21.03 | 69 | 226.37 |
| 1.219 | 4 | 13.12 | 11.27 | 37 | 121.3 | 21.33 | 70 | 229.65 |
| 1.524 | 5 | 16.40 | 11.58 | 38 | 124.6 | 21.64 | 71 | 232.94 |
| 1.828 | 6 | 19.68 | 11.88 | 39 | 127.9 | 21.91 | 72 | 236.22 |
| 2.133 | 7 | 22.96 | 12.19 | 40 | 131.2 | 22.25 | 73 | 239.50 |
| 2.438 | 8 | 26.24 | 12.49 | 41 | 134.5 | 22.55 | 74 | 242.78 |
| 2.743 | 9 | 29.52 | 12.80 | 42 | 137.7 | 22.86 | 75 | 246.06 |
| 3.048 | 10 | 32.80 | 13.10 | 43 | 141.1 | 23.16 | 76 | 249.34 |
| 3.352 | 11 | 36.08 | 13.41 | 44 | 144.3 | 23.46 | 77 | 252.62 |
| 3.657 | 12 | 39.37 | 13.71 | 45 | 147.6 | 23.77 | 78 | 255.90 |
| 3.962 | 13 | 42.65 | 14.02 | 46 | 150.9 | 24.07 | 79 | 259.18 |
| 4.267 | 14 | 45.93 | 14.32 | 47 | 154.1 | 24.38 | 80 | 262.46 |
| 4.572 | 15 | 49.21 | 14.63 | 48 | 157.4 | 24.68 | 81 | 265.74 |
| 4.876 | 16 | 52.49 | 14.93 | 49 | 160.7 | 24.99 | 82 | 269.02 |
| 5.181 | 17 | 55.77 | 15.24 | 50 | 164.1 | 25.29 | 83 | 272.31 |
| 5.48 | 18 | 59.05 | 15.54 | 51 | 167.3 | 25.60 | 84 | 275.59 |
| 5.791 | 19 | 62.33 | 15.84 | 52 | 170.6 | 25.90 | 85 | 278.87 |
| 6.096 | 20 | 65.61 | 16.15 | 53 | 173.8 | 26.21 | 86 | 282.15 |
| 6.400 | 21 | 68.89 | 16.45 | 54 | 177.1 | 26.51 | 87 | 285.43 |
| 6.705 | 22 | 72.17 | 16.76 | 55 | 180.4 | 26.82 | 88 | 288.71 |
| 7.010 | 23 | 75.45 | 17.06 | 56 | 183.7 | 27.12 | 89 | 291.99 |
| 7.310 | 24 | 78.74 | 17.37 | 57 | 187.0 | 27.43 | 90 | 295.27 |
| 7.620 | 25 | 82.02 | 17.67 | 58 | 190.2 | 27.73 | 91 | 298.55 |
| 7.948 | 26 | 85.30 | 17.98 | 59 | 193.5 | 28.04 | 92 | 301.83 |
| 8.220 | 27 | 88.58 | 18.28 | 60 | 196.8 | 28.34 | 93 | 305.11 |
| 8.530 | 28 | 91.86 | 18.59 | 61 | 200.1 | 28.65 | 94 | 308.39 |
| 8.830 | 29 | 95.14 | 18.89 | 62 | 203.4 | 28.90 | 95 | 311.68 |
| 9.144 | 30 | 98.42 | 19.20 | 63 | 206.6 | 29.26 | 96 | 314.96 |
| 9.448 | 31 | 101.7 | 19.50 | 64 | 209.9 | 29.56 | 97 | 318.24 |
| 9.750 | 32 | 104.9 | 19.81 | 65 | 213.2 | 29.87 | 98 | 321.52 |
| 10.05 | 33 | 108.2 | 20.12 | 66 | 216.5 | 30.17 | 99 | 324.80 |

# air pressure as related to altitude

| altitude (m) | pressure (hPa) | pressure (inch Hg) | altitude (m) | pressure (hPa) | pressure (inch Hg) |
|---|---|---|---|---|---|
| -1000 | 1139.3 | 33.6 | 1300 | 866.5 | 25.6 |
| -950 | 1132.8 | 33.5 | 1350 | 861.2 | 25.4 |
| -900 | 1126.2 | 33.3 | 1400 | 855.9 | 25.3 |
| -850 | 1119.7 | 33.1 | 1450 | 850.7 | 25.1 |
| -800 | 1113.2 | 32.9 | 1500 | 845.5 | 25.0 |
| -750 | 1106.7 | 32.7 | 1550 | 840.3 | 24.8 |
| -700 | 1100.3 | 32.5 | 1600 | 835.2 | 24.7 |
| -650 | 1093.8 | 32.3 | 1650 | 830 | 24.5 |
| -600 | 1087.5 | 32.1 | 1700 | 824.9 | 24.4 |
| -550 | 1081.1 | 31.9 | 1750 | 819.9 | 24.2 |
| -500 | 1074.3 | 31.7 | 1800 | 814.8 | 24.1 |
| -450 | 1068.5 | 31.6 | 1850 | 809.8 | 23.9 |
| -400 | 1062.3 | 31.4 | 1900 | 804.8 | 23.8 |
| -350 | 1056.0 | 31.2 | 1950 | 799.8 | 23.6 |
| -300 | 1049.8 | 31.0 | 2000 | 794.9 | 23.5 |
| -250 | 1043.7 | 30.8 | 2050 | 790.0 | 23.3 |
| -200 | 1037.5 | 30.6 | 2100 | 785.1 | 23.2 |
| -150 | 1031.4 | 30.5 | 2150 | 780.2 | 23.0 |
| -100 | 1025.3 | 30.3 | 2200 | 775.3 | 22.9 |
| -50 | 1019.3 | 30.1 | 2250 | 770.5 | 22.8 |
| 0 | 1013.3 | 29.9 | 2300 | 165.7 | 22.6 |
| 50 | 1007.3 | 29.7 | 2350 | 760.9 | 22.5 |
| 100 | 1001.3 | 29.6 | 2400 | 756.2 | 22.3 |
| 150 | 995.4 | 29.4 | 2450 | 751.4 | 22.2 |
| 200 | 989.4 | 29.2 | 2500 | 746.7 | 22.1 |
| 250 | 983.6 | 29.0 | 2550 | 742.1 | 21.9 |
| 300 | 977.7 | 28.9 | 2600 | 737.4 | 21.8 |
| 350 | 971.9 | 28.7 | 2650 | 732.8 | 21.6 |
| 400 | 966.1 | 28.5 | 2700 | 728.2 | 21.5 |
| 450 | 960.3 | 28.4 | 2750 | 723.6 | 21.4 |
| 500 | 954.6 | 28.2 | 2800 | 719 | 21.2 |
| 550 | 948.9 | 28.0 | 2850 | 714.5 | 21.1 |
| 600 | 943.2 | 27.9 | 2900 | 709.9 | 21.0 |
| 650 | 937.5 | 27.7 | 2950 | 705.5 | 20.8 |
| 700 | 931.9 | 27.5 | 3000 | 701.0 | 20.7 |
| 750 | 926.3 | 27.4 | 3050 | 696.5 | 20.6 |
| 800 | 920.0 | 27.2 | 3100 | 692.1 | 20.4 |
| 850 | 915.2 | 27.0 | 3150 | 687.7 | 20.3 |
| 900 | 909.0 | 26.9 | 3200 | 683.3 | 20.2 |
| 950 | 904.2 | 26.7 | 3250 | 679.0 | 20.1 |
| 1000 | 898.7 | 26.5 | 3300 | 674.6 | 19.9 |
| 1050 | 893.3 | 26.4 | 3350 | 670.3 | 19.8 |

# ICAO standard atmosphere

| h (m) | h (ft) | T (°C) | T (°K) | $T/T_0$ | p (mmHg) | p (kg/m²) | $p/p_0$ | r (kgs²/m⁴) | g (kg/m⁴) | d | 1/S d | $V_s$ | $n*10^6$ (m²/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -1000 | -3281 | 21.5 | 294.5 | 1.022 | 854.6 | 11619 | 1.124 | 0.137 | 1.347 | 1.099 | 0.957 | 344.2 | 13.4 |
| -900 | -2953 | 20.8 | 293.8 | 1.020 | 844.7 | 11484 | 1.111 | 0.136 | 1.335 | 1.089 | 0.958 | 343.9 | 13.5 |
| -800 | -2625 | 20.2 | 293.2 | 1.018 | 835 | 11351 | 1.098 | 0.134 | 1.322 | 1.079 | 0.962 | 343.5 | 13.6 |
| -700 | -2297 | 19.5 | 292.5 | 1.015 | 825.3 | 11220 | 1.085 | 0.133 | 1.310 | 1.069 | 0.967 | 343.1 | 13.7 |
| -600 | -1969 | 18.9 | 291.9 | 1.013 | 815.7 | 11090 | 1.073 | 0.132 | 1.297 | 1.058 | 0.971 | 342.7 | 13.8 |
| -500 | -1640 | 18.2 | 291.2 | 1.011 | 806.2 | 10960 | 1.060 | 0.131 | 1.285 | 1.048 | 0.976 | 342.4 | 13.9 |
| 400 | -1312 | 17.6 | 290.6 | 1.009 | 796.8 | 10832 | 1.048 | 0.129 | 1.273 | 1.039 | 0.981 | 342 | 14.0 |
| 300 | -984 | 16.9 | 289.9 | 1.006 | 787.4 | 10705 | 1.036 | 0.128 | 1.261 | 1.029 | 0.985 | 341.6 | 14.1 |
| 200 | -656 | 16.3 | 289.3 | 1.004 | 779.2 | 10580 | 1.024 | 0.127 | 1.249 | 1.019 | 0.990 | 341.2 | 14.3 |
| 100 | -328 | 15.6 | 288.6 | 1.002 | 769.1 | 10455 | 1.011 | 0.126 | 1.237 | 1.009 | 0.995 | 340.9 | 14.4 |
| 0 | 0 | 15 | 288 | 1 | 760 | 10332 | 1 | 0.125 | 1.225 | 1 | 1 | 340.5 | 14.5 |
| 100 | 328 | 14.3 | 287.3 | 0.997 | 751.0 | 10210 | 0.988 | 0.123 | 1.213 | 0.990 | 1.004 | 340.1 | 14.6 |
| 200 | 656 | 13.7 | 286.7 | 0.995 | 742.2 | 10089 | 0.976 | 0.122 | 1.202 | 0.980 | 1.009 | 339.7 | 14.7 |
| 300 | 984 | 13.0 | 286.0 | 0.993 | 133.4 | 9970 | 0.964 | 0.121 | -1.191 | 0.971 | 1.014 | 339.3 | 14.8 |
| 400 | 1312 | 12.4 | 285.4 | 0.991 | 724.6 | 9852 | 0.953 | 0.120 | 1.179 | 0.962 | 1.019 | 338.9 | 14.9 |
| 500 | 1640 | 11.1 | 284.7 | 0.988 | 716.0 | 9734 | 0.942 | 0.119 | 1.167 | 0.952 | 1.024 | 338.5 | 15.1 |
| 600 | 1969 | 11.1 | 284.1 | 0.986 | 707.4 | 9617 | 0.930 | 0.117 | 1.156 | 0.943 | 1.029 | 338.1 | 15.2 |
| 700 | 2297 | 10.4 | 283.4 | 0.984 | 699.0 | 9503 | 0.919 | 0.116 | 1.145 | 0.934 | 1.034 | 337.8 | 15.3 |
| 800 | 2625 | 9.8 | 282.8 | 0.981 | 690.6 | 9389 | 0.908 | 0.115 | 1.134 | 0.925 | 1.039 | 337.4 | 15.4 |
| 900 | 2953 | 9.1 | 282.1 | 0.979 | 682.3 | 9276 | 0.897 | 0.114 | 1.123 | 0.916 | 1.044 | 337 | 15.5 |
| 1000 | 3281 | 8.5 | 281.5 | 0.977 | 674.1 | 9165 | 0.887 | 0.113 | 1.112 | 0.907 | 1.049 | 336.6 | 15.7 |
| 1100 | 3609 | 7.8 | 280.8 | 0.975 | 665.9 | 9053 | 0.876 | 0.112 | 1.101 | 0.898 | 1.055 | 336.2 | 15.8 |
| 1200 | 3937 | 7.2 | 280.2 | 0.972 | 657.9 | 8944 | 0.865 | 0.111 | 1.090 | 0.889 | 1.060 | 335.8 | 15.9 |
| 1300 | 4265 | 6.5 | 279.5 | 0.970 | 649.9 | 8835 | 0.855 | 0.110 | 1.079 | 0.880 | 1.065 | 335.4 | 16.0 |
| 1400 | 4593 | 5.9 | 278.9 | 0.968 | 642.0 | 8728 | 0.844 | 0.109 | 1.069 | 0.872 | 1.070 | 335 | 16.2 |
| 1500 | 4921 | 5.2 | 278.2 | 0.966 | 634.2 | 8621 | 0.834 | 0.107 | 1.058 | 0.863 | 1.076 | 334.7 | 16.3 |
| 1600 | 5249 | 4.6 | 277.6 | 0.963 | 626.4 | 8516 | 0.824 | 0.106 | 1.048 | 0.855 | 1.081 | 334.3 | 16.4 |
| 1700 | 5577 | 3.9 | 276.9 | 0.961 | 618.7 | 8412 | 0.814 | 0.106 | 1.037 | 0.846 | 1.086 | 333.9 | 16.6 |
| 1800 | 5905 | 3.3 | 276.3 | 0.959 | 611.2 | 8309 | 0.804 | 0.104 | 1.027 | 0.838 | 1.092 | 333.5 | 16.7 |
| 1900 | 6234 | 2.6 | 275.6 | 0.957 | 603.7 | 8207 | 0.794 | 0.103 | 1.017 | 0.829 | 1.097 | 333.1 | 16.9 |
| 2000 | 6562 | 2 | 275 | 0.954 | 596.2 | 8106 | 0.784 | 0.102 | 1.006 | 0.821 | 1.103 | 332.7 | 17.0 |
| 2100 | 6890 | 1.3 | 274.3 | 0.952 | 588.8 | 8005 | 0.774 | 0.101 | 0.996 | 0.813 | 1.108 | 332.3 | 17.1 |
| 2200 | 7218 | 0.7 | 273.7 | 0.950 | 581.5 | 7906 | 0.765 | 0.100 | 0.986 | 0.805 | 1.114 | 331.9 | 17.3 |
| 2300 | 7546 | 0.0 | 273.0 | 0.948 | 574.3 | 7808 | 0.755 | 0.099 | 0.976 | 0.797 | 1.120 | 331.5 | 17.4 |
| 2400 | 7874 | -0.6 | 272.4 | 0.945 | 576.2 | 7710 | 0.746 | 0.098 | 0.967 | 0.789 | 1.125 | 331.1 | 17.6 |
| 2500 | 8202 | -1.2 | 271.7 | 0.943 | 560.1 | 7614 | 0.736 | 0.097 | 0.957 | 0.781 | 1.131 | 330.7 | 17.7 |
| 2600 | 8530 | -1.9 | 271.1 | 0.941 | 553.1 | 7519 | 0.727 | 0.096 | 0.947 | 0.773 | 1.137 | 330.3 | 17.9 |
| 2700 | 8858 | -2.5 | 270.4 | 0.939 | 546.1 | 7425 | 0.718 | 0.095 | 0.937 | 0.765 | 1.143 | 329.9 | 18.0 |
| 2800 | 9186 | -3.2 | 269.8 | 0.936 | 539.3 | 7332 | 0.709 | 0.094 | 0.928 | 0.757 | 1.149 | 329.6 | 18.2 |
| 2900 | 9514 | -3.8 | 269.1 | 0.934 | 532.5 | 7239 | 0.700 | 0.093 | 0.918 | 0.749 | 1.154 | 329.2 | 18.3 |

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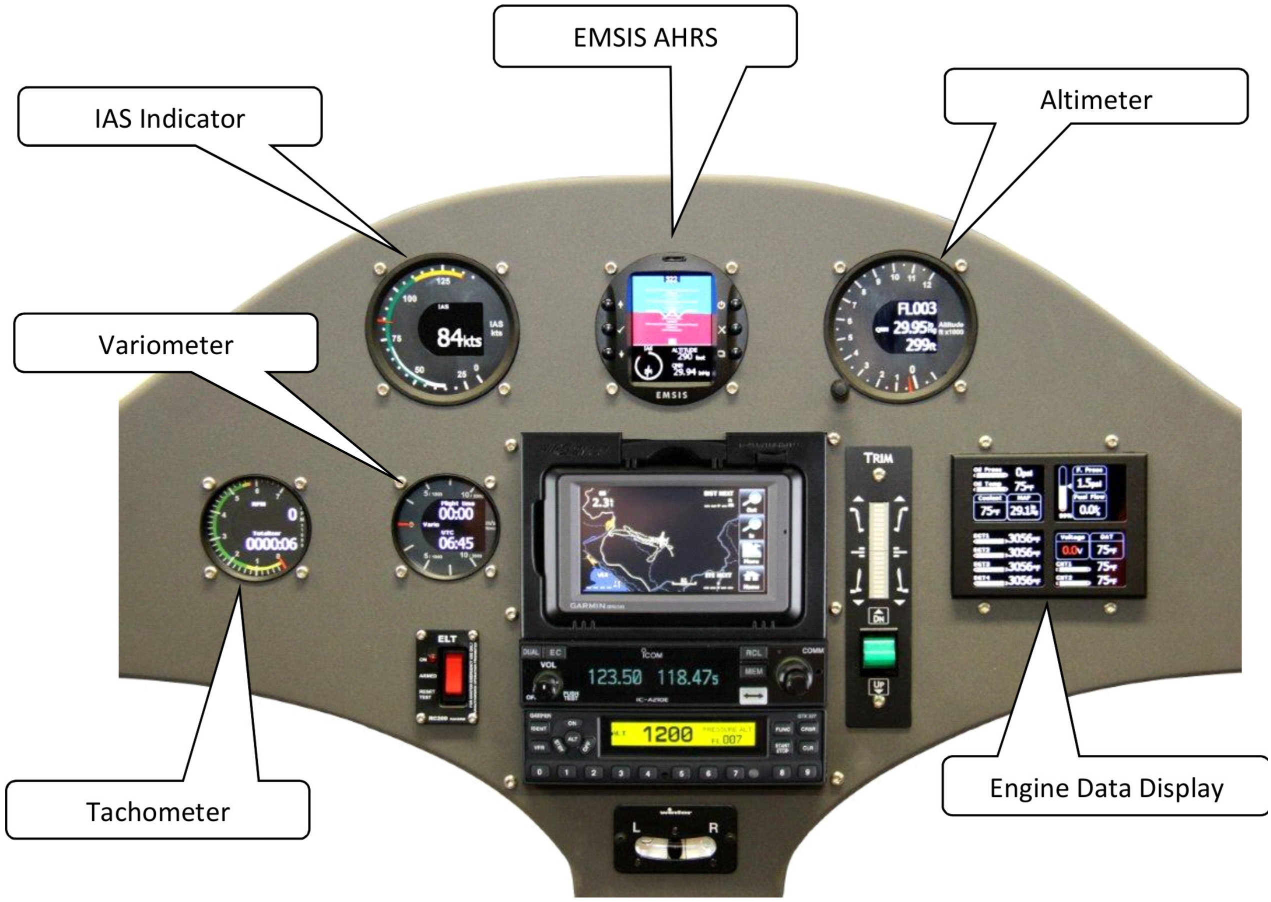
# 10 Supplements

## Operators Manual for the LX Instrument Suite (10-1)

# Pipistrel ALPHA Trainer

## Operators Manual for the LX Instrument Suite

### Fitted to the Pipistrel ALPHA Trainer with Air Data, Engine monitoring and AHRS


EMSIS AHRS
IAS Indicator
Altimeter
Variometer
Tachometer
Engine Data Display

# System description

The LX Navigation Instrument system consists of following instruments:

• EMSIS AHRS - 80 mm (3 1/8") unit with artificial horizon and air data source;
• DAQU engine monitoring box (mounted behind instrument panel);
• LX Cluster engine data display;
• IAS indicator - 80 mm (3 1/8");
• Altimeter - 80 mm (3 1/8");
• Variometer - 57 mm (2¼");
• RPM and hour meter - 57 mm (2¼").

All instruments are electronic devices connected to the main system electrical bus. They have a familiar needle display recognized immediately by older pilots as well as large digital numbers which are easy to read in all conditions. The only unit which is connected to the airplane Pitot and Static source is EMSIS AHRS.

## 1 EMSIS AHRS


The EMSIS AHRS is a 80 mm (3 1/8") instrument and is the central part of the LX instrument system; it and the other instruments turn on immediately after main power is applied.
The display is divided into three parts, the upper part displays your track heading (derived from in-built GPS) the larger middle section is an artificial horizon indicator and the lower part shows IAS, altitude and QNH.
QNH always matches the value which is set on the altimeter. The altimeter has the QNH adjustment knob which is shared between both instruments.
Description of commands…

- Long press on pitch zeroing;
- Short press on increasing of backlight;
- Short press on decreasing of backlight;
- Micro SD slot for future updates.

**Safety Instructions!**
**Keep the unit powered during flight, otherwise engine data and air data will be lost from the displays until power is re-applied.**

## 2 IAS Indicator

The IAS instrument is a 80 mm (3 1/8“) unit which consists of a familiar mechanical needle and a large OLED digital display. Both the needle display and the digital indicator show the indicated airspeed in knots. Green, yellow and white bars indicate the different airspeed limitations.

Never exceed the VNE which is clearly marked with a red line.


## 3 Altimeter

The Altimeter is a 80 mm (3 1/8“) unit which shows aircraft altitude based on QNH.

The Altimeter consists of familiar mechanical needle which shows the altitude from zero up to 12000 feet.

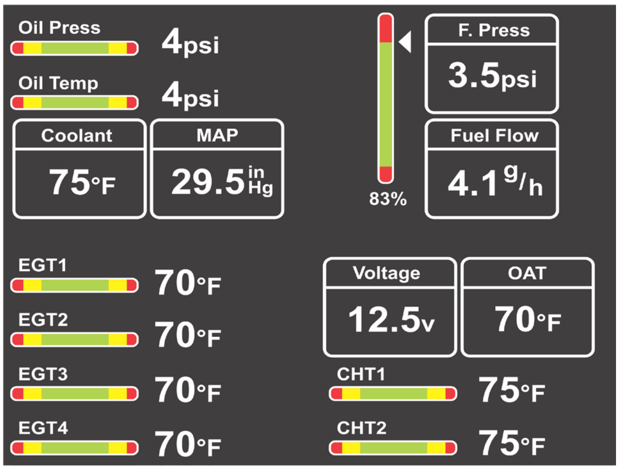
The large OLED digital display shows altitude in feet, FL (flight level) and QNH in InHg. The QNH is adjusted by rotating the knob as shown in the picture. This knob also adjusts the QNH on the EMSIS instrument.


## 4 Variometer

The Variometer is a 57 mm (2¼“) unit and consists of a familiar needle and OLED digital display. The needle shows if the aircraft is climbing or descending.
The scale is calibrated from 0 up to ± 2000 ft/min.
The large OLED digital display shows
- Flight time
- UTC

Note: There are no adjustments on this instrument by the pilot. UTC time is obtained through GPS signal, flight time resets to zero after each flight.

## 5 LX Cluster Engine Data Display




The LX Cluster Engine Data Display is used for monitoring the engine operating parameters. The only exception is fuel tank indicator which indicates fuel tank status in percentage fuel remaining ranging from - 0% (empty) up to 100% (full). Most indicators have multicolored bars to show the preferred operating temperature. The red bar defines the out of limit status and exceeds the Rotax recommended limitations. The LX engine data display shows most settings with colored bars and digital numbers.

The LX Cluster Engine Data instrument displays the following readings….

- Oil Pressure
- Oil temperature
- Water Temperature
- Manifold pressure
- CHT – 1 & 2
- EGT – Cylinders 1, 2, 3 & 4
- Fuel Pressure
- Instant fuel flow
- Fuel % remaining
- Battery voltage
- Outside air temperature

NOTE: The actual fuel consumption/flow and fuel quantity remaining are calculations based on engine rpm and manifold pressure. These settings are to be used as a guide only and are NOT to be relied upon for the safe operation of the aircraft. If in doubt confirm the fuel quantity remaining before flight.

## 6 RPM Meter - Tacho


The RPM indicator is 57 mm (2¼”) unit which displays the current engine revolutions with both a familiar mechanical needle as well as a large OLED digital display.

Color arcs display the operating limitations of the Rotax 912 UL2 engine.

|End |

# ALPHA Trainer checklist

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## Before start-up

| | |
|---|---|
| Fuel system drain | PERFORMED |
| Doors | CLOSED |
| Rudder pedals & hear rest position | SET |
| Seat belts | FASTENED |
| Parachute rescue system safety pin | REMOVED |
| Pitot tube protection cover | REMOVED |
| Brakes | SET |
| Flaps | 2nd POSITION |
| Battery switch | ON (PUSH) |
| Instruments | CHECKED |

## Engine start-up

| | |
|---|---|
| Area in front of aircraft | CLEAR |
| Fuel valve | OPEN |
| Throttle | IDLE |
| Choke | AS REQUIRED |
| Master switch | ON |
| Magnetos | ON |
| AC lights | ON |

## After start-up

| | |
|---|---|
| Warm up at | 2500 / 3500 RPM |
| Magneto RPM drop | VERIFIED, MAX 300 RPM |
| Engine & Propeller check | RPM within limits |
| Avionics switch | ON |
| COM, NAV | SET |

## Before takeoff

| | |
|---|---|
| Fuel valve | OPEN |
| Doors | CLOSED |
| Flight controls | CHECKED |
| Flaps | 2nd POSITION |
| Elevator trim | SET NEUTRAL |

## After takeoff

| | |
|---|---|
| Elevator trim | SET |
| Flaps | UP |

## Descent - Approach

| | |
|---|---|
| Throttle | IDLE |
| Flaps | NEUTRAL |
| Instruments | SET |

## Landing

| | |
|---|---|
| Throttle | IDLE |
| Flaps | 2nd POSITION |

## Shutdown

| | |
|---|---|
| Brakes | SET |
| Flaps | RETRACTED |
| AC lights | OFF |
| Magnetos | OFF |
| Avionics switch | OFF |
| Master switch | OFF |
| Fuel valve | CLOSED |

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# Warranty statement

Warranty applies to individual parts and components only.
Pipistrel LSA s.r.l. does not offer any guarantee for damage caused by every day use of the product or goods. Pipistrel LSA s.r.l. does not guarantee for the lost profit or other financial or non-financial damage to the client, objects or third party individuals .

# Warranty voids:

- in case that the customer has not ratified the General Terms of ownership with his/her signature;

- in case the aircraft or the equipment is not used according to the Pipistrel LSA s.r.l. instructions or aircraft manual and supplemental sheets;

- in case when the original additional and/or spare parts are replaced with non-original parts;

- in case additional equipment is fitted without Pipistrel LSA s.r.l. prior knowledge;

- in case the purchased goods were changed or modified in any way;

- in case when the defect is caused by user's deficient maintenance, inappropriate care and/or cleaning, user's negligent handling, user's inexperience, due to use of product and/or its individual parts or components in inadequate conditions, due to prolonged use of the product or goods, due to product and/or parts' over-stressing (even for a short duration), due to the fact a repair was not carried out by Pipistrel d.o.o. nor by its authorized personnel;

- in case parts that become worn out by every day use (e.g. the covers, pneumatics, electric instruments, electric installation, bonds and bindings, cables, brake plates, capacitors, cooling devices, various pipes, spark-plugs, exhaust systems…)

- the owner must ensure regular engine check-outs and maintenance. Some maintenance work that are demanded by the engine manufacturer must be carried out at Rotax's authorized service centers.

**If the conditions above are not complied with warranty is void.**

Pipistrel LSA s.r.l.

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