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FLIGHT TRAINING SUPPLEMENT

for

SportStar

Light Sport Aircraft

Summary

1. Introduction

1.1 Purpose of this Manual

This Pilot flight training supplement was carefully prepared by the test pilots, flight instructors, and test engineers of Evektor-Aerotechnik – the manufacturer of the Sportstar light sport aircraft. These individuals have significant experience with the airplane's flight qualities and performance, as well as information on the design, manufacture, and testing of this airplane.

This Manual provides the instructors and pilot-students with information on the Sportstar specific features and characteristics, which will help them to learn to fly with in the airplane or transition to it from another plane.

This supplement does not propose to substitute for more comprehensive handbooks explaining a theory and aerodynamic of flying, weather theory, airport operations, airspace classification, navigation etc.
It is highly recommended that pilot-students refer for such information to the handbooks listed in Section 1.2 - Recommended Reading, any other suitable aeronautical publications, or available information on Internet.

In any case, we greatly appreciate any comments and suggestions that you might have to improve this Supplement.

We wish you enjoyable flying in the Sportstar!

The Sportstar manufacturer

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1.2 Recommended Reading

[1] Aircraft Operating Instructions for SPORTSTAR Light Sport Aircraft:, Document No. S2004AOIUS, Date of Issue July 22, 2004 or latest

[2] Aircraft Maintenance and Inspection Procedures for SPORTSTAR Light Sport Aircraft, Document No. S2004AMIPUS, Date of Issue July 22, 2004 or latest.

[3] FAA-H-8083-25 Pilot's Handbook of Aeronautical Knowledge, 2003, U.S. Department of Transportation

[4] FAA-H-8083-3 Airplane Flying Handbook, Revised 1999, U.S. Department of Transportation

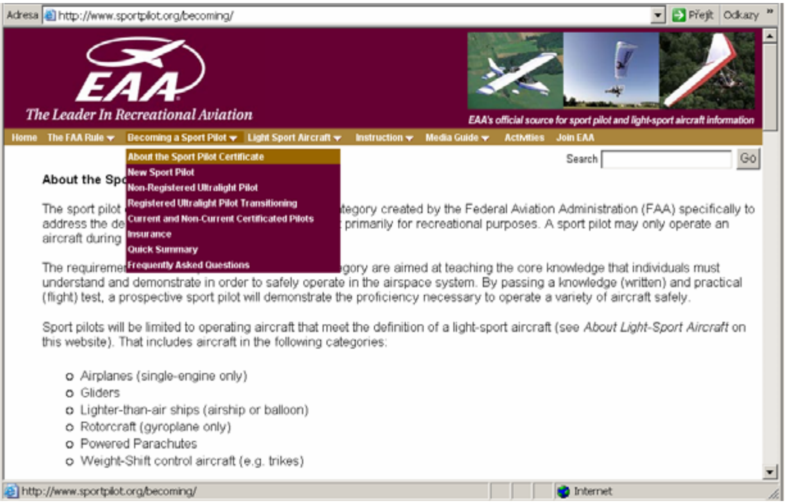
[5] Certification of Aircraft and Airmen for the Operation of Light-Sport Aircraft (Final Rule), issued by FAA, Doc. No. 4910-13, Effective September 1, 2004

[6] Standard Specification for Design and Performance of a Light Sport Airplane, designation F 2245-04 or latest

1.3 Recommended Links

Visit the Evektor-Aerotechnik home page on http://www.evektor.cz to see the latest news from the Sportstar manufacturer.

The best information sources on light sport aircraft category are: http://www.sportpilot.org and http://www.eaa.org



2. Description of Sportstar Light Sport Airplane

The SPORTSTAR aircraft has been designed to comply with all applicable requirements of Light Sport Aircraft category, recently established in USA.

2.1 Light Sport Airplane Definition

(taken from reference [5])

- Maximum gross takeoff weight-**1,320 lbs** (599 kg.), **1,430 lbs**. if float equipped.
- Lighter-than-air light-sport aircraft maximum gross weight-660 lbs (300 kg.)
- Maximum stall speed**-51 mph** (45 knots)
- Maximum speed in level flight with maximum continuous power (VH)- **138 mph** (120 knots)
- Two-place maximum (**pilot and one passenger**)
- **Day VFR** operation only (unless the aircraft is equipped per FAR 91.209 and the pilot holds at least a Private Pilot certificate and a minimum of a third-class medical).
- Single, non-turbine engine only
- Fixed or ground adjustable propeller
- Unpressurized cabin
- Fixed landing gear
- Repositionable landing gear for seaplanes allowing the wheels to be rotated for amphibious operation.
- Can be manufactured and sold ready-to-fly under a new Special Light-Sport aircraft certification without FAR Part 23 compliance. Aircraft must meet ASTM (American Society of Testing and Materials, Int'l) consensus standards. Aircraft under this certification may be used for sport and recreation, flight training, and aircraft rental.
- Can be licensed Light-Sport Aircraft Experimental if kit- or plans-built. Aircraft under this certification may be used only for sport and recreation and flight instruction for the owner of the aircraft.
- Can be licensed Light-Sport Aircraft Experimental if it was kit- or plans-built and operated as an ultralight trainers. Application must be submitted within 36 months after the effective date of the rule.
- Will have FAA registration-"N" number.

- Aircraft category and class includes: Airplane (Land/Sea), Gyroplane, Airship, Balloon, Weight-Shift-Control (Trike Land/Sea), and Powered Parachute.
- U.S. or foreign manufacture of light-sport aircraft is authorized.
- Aircraft with a standard airworthiness certificate that meet above specifications may be flown by sport pilots. However, that airworthiness certification category will not be changed to a light-sport aircraft. Holders of a sport pilot certificate may fly an aircraft with a standard airworthiness certificate if it meets the definition of a light-sport aircraft.

2.2 Sportstar Brief Description

The SPORTSTAR is light sport aircraft built by Evektor-Aerotechnik, a certified aircraft manufacturer from the Czech Republic, which has more than 35 years experience in aircraft industry.

The Sportstar is all-metal, low-wing monoplane of semimonocoque construction with side-by-side seat arrangement and dual controls. The airplane is fitted with a tricycle landing gear with the steerable nose wheel. The standard power unit consists of four-cylinder four-stroke engine Rotax 912 (80 or 100hp) and on-ground adjustable propeller, WOODCOMP KLASSIC 170/3/R. Optionally, other engines and propellers may be installed. The airplane's maximum takeoff weight (MTOW) is 1213 lbs. (550 kg).

Refer to the Aircraft Operating Instructions and Aircraft Maintenance and Inspection Procedures for more details on the Sportstar technical data, description of systems, limitations, equipment installed in a particular airplane, and for other required information.

3. Flight training

3.1 Introduction to Flight Training

It is highly recommended that any pilot-student obtain all necessary information on pilot training requirements in your country, prior to beginning pilot training. Such information pertinent to Light Sport Aircraft category may be found on web address http://www.sportpilot.org or other web locations. Some of the information available on that address is provided in section 3.2 of this manual.

We also highly recommend reading the FAA Publication FAA-H-8083-3, Airplane Flying Handbook, Revised 1999, issued by U.S. Department of Transportation to get information on:

- Choosing a flight school in the USA
- Instructor/student relationship
- Role of the FAA
- Study materials
- Collision avoidance
- Phases of Pilot Training

and to get other useful information not provided in this Flight Training Supplement.

3.2 About the Sport Pilot certificate

The sport pilot certificate is a new pilot certification category created by the Federal Aviation Administration (FAA) specifically to address the desire of individuals wishing to fly aircraft primarily for recreational purposes. A sport pilot may only operate an aircraft during daylight hours (civil twilight).

The requirements to earn a pilot certificate in this category are aimed at teaching the core knowledge that individuals must understand and demonstrate in order to safely operate in the airspace system. By passing a knowledge (written) and practical (flight) test, a prospective sport pilot will demonstrate the proficiency necessary to operate a variety of aircraft safely.

Sport pilots will be limited to operating aircraft that meet the definition of a light-sport aircraft. That includes aircraft in the following categories:

- **Airplanes (single-engine only) – your SPORTSTAR**
- Gliders
- Lighter-than-air ships (airship or balloon)
- Rotorcraft (gyroplane only)
- Powered Parachutes
- Weight-Shift control aircraft (e.g. trikes)

3.2.1 Sport pilot applicant

A sport pilot applicant must:

- Be a minimum of 16 years of age to become a student sport pilot (14 for glider)
- Be 17 years of age before testing for a sport pilot certificate (16 for gliders).
- Be able to read, write, and understand the English language.
- Hold either a valid airman's medical or a valid U.S. driver's license as evidence of medical eligibility (provided you do not have an official denial or revocation of medical eligibility on file with FAA).

3.2.2 Medical Certification

To obtain a sport pilot certificate you must have either an FAA airman medical certificate or a current and valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the

Federal government, provided you do not have an official denial or revocation of medical eligibility on file with FAA..

You then must comply with the restrictions placed on whichever method you choose. For example, if you choose to use your driver's license as your medical certificate, you must comply with all restrictions on that license. In addition, and this is very important, you must not act as a pilot- in-command of an aircraft if you know or have reason to know of any medical condition that would make you unable to operate the aircraft in a safe manner.

However, a pilot who has had his or her last medical "denied" or "revoked" by FAA will be required to obtain a special issuance medical (or alternative evidence of medical eligibility under a separate procedure being developed by FAA) before being allowed to base his or her medical fitness solely on driver's license requirements.

3.2.3 Restrictions on a sport pilot certificate:

- no flights into Class A airspace, which is at or over 18,000' MSL;
- no flights into Class B, C, or D airspace unless you receive training and a logbook endorsement;
- no flights outside the U.S. without advance permission from that country(ies)
- no sightseeing flights with passengers for charity fund raisers;
- no flights above 10,000' MSL;
- daytime flight only; no night flights
- no flights when the flight or surface visibility is less than 3 statute miles;
- no flights unless you can see the surface of the earth for flight reference;
- no flights if the operating limitations issued with the aircraft do not permit that activity;
- no flights contrary to any limitation listed on the pilot's certificate, U.S. driver's license, FAA medical certificate, or logbook endorsement(s);
  no flights while carrying a passenger or property for compensation or hire (no commercial operations);
- no renting a light-sport aircraft unless it was issued a "special" airworthiness certificate;

any qualified and current pilot (recreational pilot or higher) may fly a light-sport aircraft;

- a light-sport aircraft may be flown at night if it is properly equipped for night flight and flown by a individual with a private pilot (or higher) certificate who has a current and valid FAA airman's medical certificate.

See other areas of website http://www.sportpilot.org for more detailed information on obtaining a sport pilot certificate, including sport pilot instruction, and on the light-sport aircraft category.

3.2.4 New Sport Pilots

If you are an aviation enthusiast seeking your first pilot certificate, the sport pilot certificate provides the easiest and least costly way to fly for fun and recreation.

EAA (www.eaa.org) and its affiliate, the National Association of Flight Instructors (NAFI, www.nafinet.org), stand ready to assist you in this experience. Visit the websites to learn more about the opportunities and experiences flying offers.

To earn a sport pilot certificate, one must:

- Be at least 16 to become a student sport pilot (14 for glider).
- Be at least 17 to test for a sport pilot certificate (16 for gliders).
- Be able to read, write, and understand English.
- Hold a current airman's medical certificate or a current and valid U.S. driver's license as evidence of medical eligibility (provided the FAA didn't deny, revoke, or suspend the pilot's last medical certificate application).
- Pass an FAA sport pilot knowledge test.
- Pass a FAA sport pilot practical (flight) test.

The minimum required training time for the airplanes are 20 hours

The following table, taken directly from the FAA's final sport pilot rule, details the training requirements for a new pilot seeking a sport pilot certificate. It provides information about the training requirements for Airplane category of light-sport aircraft.

In addition to this flight training, a new sport pilot will be required to study the required aeronautical knowledge (ground school course) for a sport pilot and pass a knowledge (written) test.

If you are applying for a sport pilot certificate with...	Then you must log at least...	Which must include at least...
(a) Airplane category and single-engine land or sea class privileges,	(1) 20 hours of flight time, including at least 15 hours of flight training from an authorized instructor in a single-engine airplane and at least 5 hours of solo flight training in the areas of operation listed in §61.311,	(i) 2 hours of cross-country flight training, (ii) 10 takeoffs and landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport; (iii) One solo cross-country flight of at least 75 nautical miles total distance, with a full-stop landing at a minimum of two points and one segment of the flight consisting of a straight-line distance of at least 25 nautical miles between the takeoff and landing locations, and (iv) 3 hours of flight training on those areas of operation specified in §61.311 preparing for the practical test within 60 days before the date of the test.

3.2.5 Airman Certification - Operating Privileges and Limitations

This chart, taken directly from FAA's final sport pilot & light-sport aircraft rule, provides a quick summary of the privileges allowed to ultralight pilots and holders of various pilot certificates.

Airman Certification - Operating Privileges and Limitations						
	Ultralight Pilot	Sport Pilot	Recreational Pilot	Private Pilot	CFI - Sport Pilot	CFI
Day	Yes	Yes	Yes	Yes	Yes	Yes
Night	No	No	No	Yes	No if exercising sport or recreational pilot privileges	Yes
VFR-visibility 3 miles or more	Yes	Yes	Yes	Yes	Yes	Yes
VFR-visibility less than 3 miles	Yes	No	No	Yes	No if exercising sport or recreational pilot privileges	Yes
IFR	No	No	No	Yes with instrument rating	No without an instrument rating	Yes with instrument rating
Passenger carriage	No	Yes - One Passenger	Yes - One Passenger	Yes	Yes	Yes
Compensation	No	No	No	Limited	Limited if exercising sport or recreational pilot privileges; Yes otherwise	Yes
Class A airspace	Yes with ATC authorization	No	No	Yes with instrument rating	No if exercising sport or recreational pilot privileges; Yes otherwise	Yes with instrument rating
Class B, C, D	Yes with ATC	Yes with	Yes with	Yes	Yes	Yes

Airman Certification - Operating Privileges and Limitations						
	Ultralight Pilot	Sport Pilot	Recreational Pilot	Private Pilot	CFI - Sport Pilot	CFI
airspace	authorization	training	training		(additional training may be required)	
Class E, G airspace	Yes	Yes	Yes	Yes	Yes	Yes
> 10, 000 MSL	Yes	No	No	Yes	No if exercising sport or recreational pilot privileges. Yes otherwise	Yes
< 10, 000 MSL	Yes	Yes	Yes	Yes	Yes	Yes
Cross country	Yes	Yes	Yes with training	Yes	Yes (for recreational pilot additional training is required)	Yes
> 120 knots CAS	No	No	Yes	Yes	No if exercising sport pilot privileges. Yes otherwise	Yes
< 87 knots CAS	Yes	Yes	Yes	Yes	Yes	Yes
> 87 knots CAS	Yes	Yes with training	Yes	Yes	Yes (additional training may be required)	Yes

3.2.6 Airman Certification-Privileges for Which Additional Training Is Required

Airman Certification-Privileges for Which Additional Training Is Required						
	Ultralight Pilot	Sport Pilot	Recreational Pilot	Private Pilot	CFI - Sport Pilot	CFI
Added Cat/Class Privilege	N/A	Yes	N/A	N/A	N/A	N/A
Make and Model Privilege	N/A	Yes	N/A	N/A	N/A	N/A
Added Cat/Class Rating	N/A	N/A	Yes	Yes	N/A	Yes
Class B, C, and D	No	Yes	Yes	No	Yes if exercising sport or recreational pilot privileges	No
> 87 knots CAS	No	Yes	No	No	Yes if exercising sport or recreational pilot privileges	No
Cross country	No	No	Yes	No	Yes if exercising recreational pilot privileges	No
IFR	N/A	N/A	N/A	Yes	N/A	Yes
Tail wheel	No	Yes	Yes	Yes	Yes	Yes
High-Performance	N/A	N/A	N/A	Yes	N/A	Yes
Complex	No	N/A	Yes	Yes	N/A	Yes
High Altitude	No	N/A	N/A	Yes	N/A	Yes
Type	N/A	N/A	N/A	Yes	N/A	Yes
Towing	No (additional training required if operating under Part 103 exemption)	N/A	N/A	Yes (additional experience required)	N/A	N/A
Sales demo	No	No (N/A if aircraft salesman)	No (N/A if aircraft salesman)	Yes (additional experience required)	N/A	N/A

Airman Certification-Privileges for Which Additional Training Is Required						
	Ultralight Pilot	Sport Pilot	Recreational Pilot	Private Pilot	CFI - Sport Pilot	CFI
Agricultural (non-commercial)	N/A	No	No	No	N/A	N/A
Charitable Flights	N/A	N/A	N/A	Yes (additional experience required)	N/A	N/A
Provide Flight Training	No (additional training required if operating under part 103 exemption)	N/A	N/A	N/A	Yes	Yes

4. Flight Training on SPORTSTAR

4.1 Sportstar Purpose of Use

As already stated in Introduction of this manual the SPORTSTAR meets the Light Sport Aircraft category requirements as described in reference [5] and [6].

The airplane is intended primarily for sport and recreation, cross-country flying and flight training. The Sportstar limitations are stated in section 3. Always refer to the Aircraft Operating Instructions (reference [1]) of each particular Sportstar to see all its valid limitations.

The uses for the Sportstar also depends on the category and airworthiness certificate issued to the airplane:

1. The factory built Sportstar to which a special light-sport airworthiness certificate was issued, may be used for sport and recreation, flight training, or rental.
2. The Sportstar built from a kit could get an experimental airworthiness certificate, and may be used only for sport and recreation, and flight training.
3. You could get also an experimental airworthiness certificate to operate a light-sport aircraft, if it previously had been issued a special, light-sport aircraft airworthiness certificate and you do not want to comply with the operating limitations associated with a special light-sport certificate. For example, you could do this if you wanted to alter the aircraft without the manufacturer's authorization, or you choose not to comply with the mandatory safety-of flight actions. You could use these aircraft only for sport and recreation, and flight training.

Refer to reference [5] Certification of Aircraft and Airmen for the Operation of Light-Sport Aircraft (Final Rule), issued by FAA, Doc. No. 4910-13, Effective September 1, 2004 or latest for more details on Light Sport Aircraft category and its limitations.

4.2 Sportstar limitations

4.2.1 Introduction

The limitations below are for your information. Always refer to the Aircraft Operating Instructions [1] of the specific aircraft you intend to fly for a complete list of limitations.

4.2.2 Operating Limitations

The aircraft is limited to non-aerobatic flight in conditions with no icing. Flight is normally according to VFR (visual flight rules) but IFR (instrument flight rules) operation is possible if the required instrumentation is installed and the pilot is so qualified.

4.2.3 Approved Maneuvers

The SPORTSTAR is approved for the following maneuvers:

- steep turns up to bank angle of 60°
- climbing turns
- lazy eights
- stalls (except for steep stalls)
- normal flight maneuvers

WARNING

AEROBATICS as well as INTENTIONAL SPINS are prohibited !

4.2.4 Airspeed Limitations

	Speed	KIAS	mph IAS	Meaning
V_{NE}	Never exceed speed	146	168	Do not exceed this speed at any time.
V_{NO}	Maximum structural cruising speed	103	118	Do not normally exceed this speed. If this speed is exceeded, do so only in smooth air and even then only with caution
V_A	Maneuvering speed	86	99	Do not make full or abrupt control movement above this speed, because under certain conditions the aircraft may be overstressed by full control movement.
V_{FE}	Maximum flap extended speed	70	81	Do not exceed this speed with any amount of flap extended.

4.2.5 Limit Load Factors

Maximum positive limit load factor.......4.0

Maximum negative limit load factor ....-2.0

4.2.6 Wind Limitations – Take Off and Landing

Maximum demonstrated headwind	24 kts	28 mph
Maximum demonstrated crosswind	10 kts	12 mph
Maximum demonstrated tailwind	6 kts	7 mph

Refer to the Aircraft Operating Instructions [1] for all limitations of the aircraft.

4.2.7 Recommended Entry Speeds

4.2.7.1 Climb

Climbing speed up to 50 ft
(flaps in take-off pos. - 15°) ....55 KIAS .... 63 mph IAS

Best rate-of-climb speed V_Y
(flaps in take-off pos. - 15°) ....55 KIAS .... 63 mph IAS

Best rate-of-climb speed V_Y
(flaps retracted - 0°)........................62 KIAS .... 71 mph IAS

Best angle-of-climb speed V_X
(flaps in take-off pos. - 15°) ....52 KIAS .... 60 mph IAS

Best angle-of-climb speed V_X
(flaps retracted - 0°)........................56 KIAS .... 64 mph IAS

4.2.7.2 Landing

Approaching speed for normal landing
(flaps in landing position - 30°) .....48 KIAS .... 55 mph IAS

4.3 Ground Training

Prior to his/her initial flight in a Sportstar it is essential for the pilot to be familiar with:

- Aircraft Operating Instructions [1]
- Aircraft Maintenance and Inspection Procedures [2]
- Manuals supplied with installed equipment (COM, NAV, IC, recovery system, etc.)
- radio procedures
- airport frequency
- airport conditions (current weather, runway and circuit pattern in use)
- airspace restrictions
- NAV procedures

4.4 Sportstar Cockpit Layout

It is essential for the pilot to be familiar with the aircraft cockpit layout and arrangement and use of controls, instruments and equipment.

Refer to the Aircraft Operating Instructions [1], Aircraft Maintenance and Inspection Procedures [2] and manuals supplied with your specific installed equipment.

The picture below shows an example of a Sportstar cockpit. Refer to your Aircraft Operating Instructions supplement for your specific cockpit layout and instrument panel.

4.4.1 Open the Canopy

Prior to entering the cockpit the canopy must be unlocked, the key withdrawn and the canopy opened. The canopy weight is counterbalanced by two gas struts that reduce the force required. The strut force may decline in cold weather or with age.

Picture: 1 Unlocking the canopy


Picture: 2 Use the key to unlock the canopy lock


Picture: 3 Turn the lock lever and slightly open the canopy


Picture: 4 Remove the key

4.4.2 Entering the Cockpit

You may enter the cockpit after unlocking and opening the canopy. See the pictures below for recommended entering steps. DO NOT STEP areas at the wing trailing edge are marked with red placards.

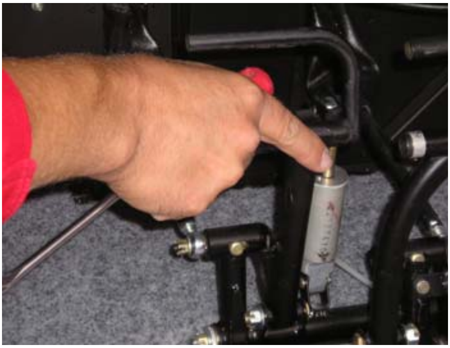


WARNING!

Exercise caution when the wing is wet or slippery with ice or snow. Grasp the back of the seats or the cockpit sills to assist getting into the seat safely.

NOTE
If the aircraft is equipped with adjustable pedals it is best to make the adjustment before sitting in the seat. Adjustment from the sitting position is very difficult.

Picture: 1
Push the locking pin sideways.



Picture: 2
Push or pull the pedal into desired position.

4.4.3 Sitting Position

Ensure the position of the rudder pedals is comfortable and allows full deflection of the rudder when strapped in. Pilots with short legs may need a cushion to bring them closer to the pedals.

When seated with seatbelts fastened you should be able to fully deflect the stick in all directions and reach all the necessary controls. Small pilots may require cushions to place them closer to controls and tall pilots may need to remove the middle part of the seat upholstery. It is possible to have the factory move the rudder pedals forward 100mm for very tall pilots.

To be most effective the lap portion of the seatbelt should be tightened first. Ensure the belt is quite snug around the lower pelvis. Tighten the shoulder straps only enough so that you can insert your fist between the strap and your chest. (see photos on next page).

Strap-in procedure:

4.4.4 Exiting the Cockpit

4.4.5 Sportstar Flight Controls

4.4.5.1 Introduction

The Sportstar belongs to category of aerodynamically controlled airplanes around three axes.

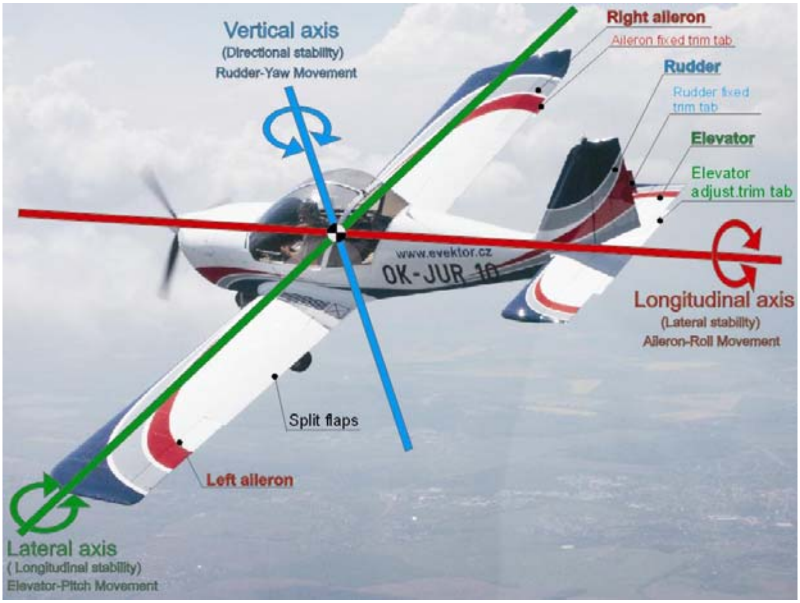
Aerodynamically controlled means, that the flight direction is changed due to aerodynamic effect of air flow that circumfluents the control surfaces which deflection is controlled with the airplane controls.

The three axes are the longitudinal axis, the lateral axis and the vertical axis (see the picture on next page).

The Sportstar's flight control system consists of primary and secondary control system. The primary control system serves to safely control the Sportstar during flight. It includes control of the ailerons, elevator and rudder. Movement of any of these three primary flight control surfaces changes the airflow and pressure distribution over and around the airfoil. These changes affect the lift and drag produced by the airfoil/control surface combination, and allow a pilot to control the Sportstar about its three axes of rotation.

The secondary control system consists of the wing flaps control and elevator trim tab control.

The picture on the next page shows the Sportstar control surfaces, movement, axes of rotation, and type of stability.



Primary control surface	Airplane movement	Axes of rotation	Type of stability
Aileron	Roll	Longitudinal	Lateral
Elevator	Pitch	Lateral	Longitudinal
Rudder	Yaw	Vertical	Directional

4.4.5.2 Primary controls

The Sportstar is controlled in all three axes by dual controls in the cockpit. Pitch and roll movements are controlled by a conventional stick with a grip that is dependent on the type of trim control that is installed. Yaw is controlled by the rudder pedals that are also linked individually to each brake.

Flight control checks on the ground should include checking for movement in the proper direction and full travel in all directions. Full deflection of the rudder will cause the nose to move because the pedals are connected to the nose wheel steering. Any noises heard during the flight control checks should be investigated; lubrication of control system joints might be required.

4.4.5.2.1 Longitudinal Control – Elevator Control system

Picture: Longitudinal control (control stick) aft- airplane climbs

Elevator deflection with control stick fully aft

Picture: Longitudinal control (control stick) forward- airplane descends

Elevator deflection with control stick fully forward

4.4.5.2.2 Lateral control – Aileron Control System

Picture: Stick deflected left – airplane banks and turns left

And corresponding up deflection of the left aileron (the right one deflected down)

Picture: Stick deflected right – airplane banks and turns right

And corresponding up deflection of the right aileron (the left one deflected down)

4.4.5.2.3 Directional Control – Rudder Control System

Picture: Left rudder pedal deflected forward– airplane yaws and banks left

And corresponding deflection of rudder to the left.

Picture: Right rudder pedal deflected forward– airplane yaws and banks right

And corresponding deflection of rudder to the right.

4.4.5.3 Secondary Controls

4.4.5.3.1 Trim Control

The elevator trim tab control lever is located between the seats (provided the airplane is not fitted with an electric trim system controlled with buttons on control stick). Moving the trim lever forward trims the airplane Nose down, moving it rearward trim the airplane Nose up. The trim lever neutral position coincides approximately with the Takeoff position of wing flap control lever. i.e. if you set the flap lever to takeoff position and set the trim lever to same position than the airplane is trimmed for takeoff. You do not need to precisely set the trim control lever position. Even with improper setting of trim the control stick forces are easily manageable.

Picture: Green elevator trim tab control lever set to Nose heavy position

Picture: Trim tab deflected in Nose heavy position

Picture: Green elevator trim tab control lever set to Tail heavy position

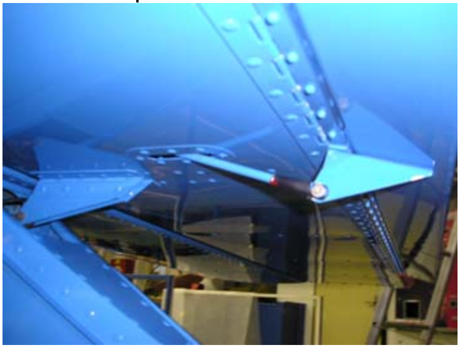
Picture: Trim tab deflected in Tail heavy position

As a customer option, the airplane may be equipped with an electric longitudinal control trim system . When installed, there is an extension on the control stick with buttons to set trim tab deflection. Relative position of the trim tab is indicated to the pilot by a trim position indicator on instrument panel. The trim tab is deflected by a servo.

Picture: Electric trim system control handle

Picture: Trim tab position indicator on instrument panel

Picture: Elevator upper skin with a square cover of trim servo



Picture: Elevator lower skin with a rod connecting the tab to servo

4.4.5.3.2 Wing Flaps System

The flap handle is located between the seats. The flaps are retracted when the handle is pushed fully down toward the seat. The handle is moved by first applying a little downward pressure on the handle, depressing the button at the end of the handle and then pulling up. The maximum speed for any amount of flap extension is 70 kts (81 mph.) The handle can be set to any of three extension positions:

- 1st notch for 15° (take off position)
- 2nd notch for 30° (normal landing)
- 3rd notch for 50° (minimum roll landing).

Picture: Wing flap control lever located between the seats

Picture: Lock button on lever face

Picture: To extend flaps, first apply a little downward pressure on the handle and then press the button

Picture: Set the lever to desired position. The lever should be automatically locked in that position

4.4.5.3.3 Nose Wheel Steering

The nose wheel steering system is connected to the rudder pedals by push-pull rods. The maximum deflection of the nose wheel is 15° left or right of centre. The diameter of turn at full deflection is 15m and with some assistance with brakes it can be as tight as 10m.

Picture: Deflection of left rudder pedal-the airplane turns to the left

and corresponding deflection of nose wheel

Picture: Deflection of right rudder pedal-the airplane turns to the right

and corresponding deflection of nose wheel

4.4.6 Instrument Panel

Instruments are normally grouped together as follows:

- Flight instruments - left side
- Electrical switches and circuit breakers - lower left side
- COM/NAV controls - centre
- Engine controls - centre
- Engine instruments - right side
- Power outlet – right side

Picture: Instrument panel

4.4.7 Instruments Markings

Instrument marking is normally indicated by colour coded arcs and radial marks. A red line indicates maximum permissible value, a yellow arc indicates a range of increased caution or time limitation, and a white arc on the ASI indicates the normal operating range with flaps extended. All analog instruments should be checked prior to flight to ensure pointer indicates 0 except the manifold pressure and altimeter. The manifold pressure should indicate approximately 1 and the altimeter should indicate the field elevation when the correct altimeter setting is set.

Picture: Airspeed indicator marked with color coded arcs

Picture: Detail view of engine analogue instruments-color markings

4.4.8 Engine Controls

4.4.8.1 Throttle Lever

The throttle includes a Vernier knob type control mechanism. For fine throttle adjustments, such as those used for glide path control on final approach or during taxi, the throttle can be increased/decreased by turning the knob clockwise/counter-clockwise. This movement will allow for very small throttle corrections. For coarse corrections such as those used for increasing throttle to maximum for take off or overshoot, the button on the end of the throttle is depressed (see photo) and the throttle pushed in as required.

The throttle system is spring loaded to go to the maximum throttle open position if the throttle cables fail. Therefore, as soon as the button is depressed the throttle will tend to increase with only slight pressure. When making a coarse throttle movement in this manner there will still be more throttle travel available when you have pushed the throttle all the way in or pulled it all the way out. The correct technique is to make the coarse correction by pushing or pulling and then turn the Vernier knob to get the last little bit of travel in the throttle. This is particularly important when decreasing to idle because the engine will not go to the lowest idle position if you just pull the throttle all the way out. The scew portion of the Vernier control is made of plastic so do not use excessive force when turning it or you may strip the threads.

A friction control knob is used to hold the throttle in position and is located at the forward end of the throttle shaft at the instrument panel. Turn it clockwise to increase friction, counter-clockwise to reduce friction.

Picture: Throttle lever set for idle

Picture: : Throttle lever set for max. power

Picture: Gentle adjustment of engine power

Picture: Rough setting of engine power

Picture: Friction wheel of throttle lever

4.4.8.2 Choke

The choke is usually required on the first start of the day or when the temperature is near 0°C or lower. To activate, pull the choke handle out and turn it counter-clockwise to about the 10 o'clock position (if such a type of choke lever is installed). When the engine starts, allow it to run with full choke for 30 sec to 1 minute and then slowly reverse the procedure and push the handle in fully. The engine may hesitate or stop while doing this so increase the throttle slightly to keep the engine running. Make small throttle adjustments to avoid increasing the RPM above the recommended maximums stated in the Aircraft Operating Instructions section on engine starting. Ensure the choke is completely off before take off is attempted.

Picture: Choke control lever (push-pull type)

4.4.9 Indicator Lights and Alarms

The instrument panel is equipped with several indicator lights:

Charging indicator light. This light should illuminate after switching the Master switch on and indicates that the installed battery is not charged. The light should fade after starting the engine, when the charging voltage reaches approximately 12V (the battery starts to be charged by the alternator) and should go out completely when approximately 13V is reached. If the charging indicator light illuminates in flight, it may indicate a failure of the alternator or that the battery is discharged and alternator is unable to power installed instruments and charge the battery as well.

Picture: Charging indicator lamp

If a stall warning is installed in your airplane, the function of that system may be tested prior to flight. Switch on the Master switch and gently lift the stall warning flap on the wing leading edge. You should hear a sound signal from the cockpit.

Also some instruments may have their own warning lights, e.g. the fuel qty indicator may have a light to indicate minimum fuel qty.

4.4.10 Fuel Selector

The fuel selector is located between the seats and is painted red for quick identification. When the selector is in OFF position, the fuel is closed. When the selector is in LEFT position, engine is fed from the left tank (position for take-off and landing). When the selector is in RIGHT position, the engine is fed from the right tank (position is selected alternately during flight). The selector is normally only OFF for long periods when the aircraft is not in use and for fire emergency actions.

Picture: Fuel selector in closed position

Picture: Fuel selector in left tank position

Picture: Fuel selector in right tank position

4.4.11 Fuel Tank Drain Valve

The fuel drain valve is located at the bottom of the each wing. Place the fuel receptacle under the valve and open the drain valve. If there is contamination in the fuel, drain out as much as is necessary to clear the contamination.

Picture: Placard-arrow marking location of drain valve

Picture: Fuel tank drain valve on the bottom of the each wing.

4.4.12 Rudder Pedals

Rudder pedals may be either fixed or optionally 3-position adjustable. Adjust pedals before sitting in the seat and ensure both pedals are set to the same position. Brakes may be actuated by putting pressure on the top of the individual rudder pedal. Brakes are normally installed on the left pedals and may be installed on the right pedals as an option. For new aircraft the rudder pedals can be set 100mm forward by the factory to accommodate a very tall pilot.

Picture: Dual rudder pedals with toe-brake pedals on the top.

4.4.13 Toe-brake Pedals

The toe-brake pedals are connected to the top of rudder pedals. It is recommended that you have your heels rested on the cockpit floor and foot placed on pedal in comfortable position i.e. to not have the foot unnaturally deflected too far forward or rearward. The toe-brake pedals are standardly provided to the pilot, optionally available for co-pilot.

Picture: Natural foot position

Picture: Foot during braking – tip-toe pushes on the toe-brake pedal

4.4.14 Carburetor Heat

If installed, the carb heat knob is a push-pull control that delivers heated air to the carburetor when selected on (pulled out.) Selecting carb heat on will reduce the engine speed by about 200-250 RPM. Use as per directions in Chapter 3 of the Aircraft Operating Instructions. The carb heat knob is on the left side of the instrument panel.

Picture: Carburetor heat control knob (on the right)

4.4.15 Heating

If installed, the cockpit heat knob is a push/pull knob that delivers heat to the cockpit when the control is pulled out. The warm air inlet is on the left side of the cockpit. To cut off the warm air, push the control in. The cockpit heat knob is located on the left side, outboard of the carb heat knob.

4.4.16 Defrost

If a defroster system is installed, a blower can blow air over the windshield to clear moisture when the control knob is turned on. The control is on the left side of the instrument panel. First, activate cockpit heating and then pull the defrost control to bring heated air to windshield.

4.4.17 Master Switch

The master switch is located on the instrument panel to the right of all the other electrical services. When the master is turned ON and the engine is OFF all selected services and the engine instruments operate on battery power. Once the engine starts, electrical power is supplied to all systems by the alternator and the battery is also recharged. If a "Hobbs" metre is installed it begins to record airframe time as soon as the master switch is turned on.

Picture: Master switch

4.4.18 Ignition Switch

The ignition switch is located on the lower centre of the instrument panel. The switch has 5 positions:

- OFF both circuits are off
- R only the right circuit is operating
- L only the left circuit is operating
- BOTH both circuits are operating
- START the starter circuit is energized

Picture: Ignition switch

4.4.19 Switches

Electrical services may be switched on or off while airborne. With a low battery charge they should be left OFF to leave all available power for the start. Gyro type instruments should be turned ON after the start to give them time to erect. Turning OFF an electrical system may be required in flight if an electrical fire occurs.

Picture: Switches

4.4.20 Circuit Breakers

The circuit breakers are under the instrument panel on the left side, just below labels that identify each one. The ACCUM label identifies the master bus. If a circuit breaker pops out it may be reset once; if it pops again the circuit should be considered unserviceable and another reset should not be attempted.

WARNING !

Never attempt to hold the circuit breaker in. Doing so could overload the circuit and cause an electrical fire.

Picture: Circuit breakers under the instrument panel

Picture: Popped breakers

4.4.21 Parking Brake

If installed, the yellow parking brake handle is located between the seats, below and forward of the flap handle. The system is designed to lock the wheels for a short term; for long periods the aircraft should be chocked and tied down. The parking brake is activated by first putting pressure on the brake pedals and then pulling the brake handle up. This isolates the system and retains whatever pressure was applied by the pedals.

WARNING !

Ensure sufficient pressure is applied to the brakes prior to selecting the parking brake ON. Once the brake is set, further application of toe pressure will have no effect on the brakes because the system is isolated. If the aircraft starts to move while the parking brake is ON the throttle must be reduced to idle immediately, the parking brake selected OFF, and brakes applied in order to stop the movement.


Picture: Parking brake OFF


Picture: Parking brake ON

4.4.22 Canopy Lock

The canopy lock is located at the rear of the canopy frame and incorporates an external lock that is key operated. Prior to flight the pilot must ensure that the canopy is securely closed by checking:

a) the guide pins located under the canopy sides fit into the holes in the cockpit sill (for big bubble canopy only);
b) the guide brackets at the rear lower edge of both sides of the canopy fit inside the fixed portion of the canopy;
c) the locking lever is rotated forward and snaps into the locked position (see photo.)


Picture 1: Closing the canopy from within


Picture 2: Closing the canopy from within


Picture 3: Closing the canopy from within


Picture 4: Closing the canopy from within

Picture: Holes to fit the side center pins of big-bubble canopy

4.4.23 Headsets

The headset sockets are located behind the right seat. The left headset must be plugged into the left pair of sockets and the right headset into the right pair because the radio transmits only the input from the left sockets when the left seat transmit button is pressed and the same for the right seat transmit button. If not plugged in correctly the pilot will not be able to transmit using the mic button on his stick.

If there is the big-bubble canopy on your airplane, it is recommended that you wear the headsets prior to closing that canopy. There is a reinforcing lateral tube of the canopy frame which, when you open the canopy after the flight, will pull on the headset headset if the headset cables are over the lateral tube.

Picture: Headset jacks connected to the sockets behind the right seat back. The two left are for co-pilot headset

Picture: Headset hung on rear canopy hook

4.4.24 Side Sliding Windows

Sliding windows on the lower forward edges of the canopy are optional. With respect to drawing the most air into the cockpit, opening the small flap is more effective than opening the whole window. If the whole window is to be opened the small flap must be closed to prevent damage to it.

Picture: Side sliding windows

4.4.25 Windshield Venting

Two holes are provided for ventilation in the forward lower portion of the canopy. Rotate the selector to the desired position.

Picture: Windshield venting

4.4.26 Optional Equipment

We highly recommend you to familiarize yourself with information provided in the manuals of installed instruments and equipment (COMM, IC, Transponder, GPS, Fuel flow computer, etc.).

4.4.27 Ballistic Recovery System

If a BRS is installed the control handle is located on the lower right side of the instrument panel. The handle is normally locked on the ground and the red "REMOVE BEFORE FLIGHT" flag must be removed as part of the pre-take off check.

WARNING !

Pilots should keep clear of the BRS location on the forward left side of the fuselage because the system contains a ballistic charge.

Picture: Ballistic system ejection lever

Picture: A cover of cutout for ballistic system


Picture: Ballistic system rear stabilizing cable guided on port side of fuselage to a rear suspension

4.5 Pre-flight Inspection

The pre-flight inspection of Sportstar airplane is described in Aircraft Operating Instructions, section 4. Normal procedures, par. 4.4 Preflight inspection.

4.6 Engine Starting

1. Prior to starting the engine, the parking brake should be released if installed in your airplane. This is achieved by pushing the lever down. The parking brake must be released before starting because the activation of the parking brake disengages the toe brakes. This means that, if the aircraft starts to move after starting the engine, the pilot will be unable to use full braking with the toe brakes to stop the aircraft. Once the parking brake has been released, the toe brakes are fully engaged and the full braking power should be available. We also recommend that there is plenty of room in front of the airplane before starting. There should be adequate room in front of the airplane to not only move forward, but also to turn if necessary. The airplane should not be facing an enclosed area (near a wall , fence or people etc.)
2. Apply pressure to the toe brakes at least two times after releasing the parking brake. There should be equal resistance pressure on both brakes. This indicates that there is fluid in both brake lines and that no leakage has occurred. If there is a lack of resistance pressure on either brake (it is very easy to press the toe brake to the full braking position without the resistance), this indicates that fluid leakage may have occurred. In such a case, the brake system may not be properly functioning. Do not start the engine if this is occurring.
3. Set the fuel selector to the LEFT position. To move selector from OFF (closed) position it necessary pull the safety button on the fuel selector, turn the handle from the OFF position to the left and then release safety button.
4. Turn the master switch to the ON position.
5. Visually check the fuel quantity displayed on the fuel gauge. Confirm that there is enough fuel for the intended flight plus adequate reserve.
6. Visually check the battery charge indicated on the voltmeter. The indicated voltage should be between 12 and 12.5 V. If the voltmeter is indicating a lower charge, this indicates that the battery is low and you may not be able to start the engine (the battery must be recharged).

7. If starting a cold engine, activate the choke. The choke lever if located on the instrument panel next to the throttle lever. Pull the choke lever out and turn it in order to lock it in place (if such a type of choke lever is installed). If starting a warm engine, then leave the choke lever in the fully forward position (choke deactivated).

8. Set the throttle to the idle position. If the engine is cold, then pull the throttle fully rearward by pressing the thumb button, and then turn the throttle counter-clockwise. Avoid turning the throttle with too much pressure as the plastic thread can be damaged. If the engine is warm, then use the same technique to set the throttle to idle, then turn the throttle one half turn in the clockwise direction (at a slightly increased idle). The minimum RPM at idle recommended by Rotax is 1400, however, the airplane manufacturer sets the idle RPM to approximately 1600-1700 RPM.

   ATTENTION: Since the engine has a reduction gear which is equipped with a shock absorber , special attention should be paid to the following:

   To prevent impact load , start the engine with the throttle in the idle position or at the most, at 10% open. Also, to prevent impact load, when reducing power and then adding power right afterwards, note the following: After having reduced the power, wait at least 3 seconds before increasing power again.

9. Switch on the anti-collision beacon. Also switch on the position lights on the wingtips is installed. This would warn bystanders in the vicinity to be cautious. However, do not leave the lights on for a long time before starting the engine as they will drain the battery and possibly make starting the engine more difficult.

10. Hold the control stick aft of the neutral position.

11. Apply pressure to the toe brakes in order to use full braking power available.

12. Check that the area in the vicinity of the propeller is free and that no people are coming towards the airplane. Do not start the engine if people are coming towards the airplane.

13. Place the left hand on the throttle and the right hand on the key which should be inserted into the ignition switch.

14. Turn the key fully clockwise to the START position. As soon as the engine starts, release the key and it should return to the BOTH position. Do not leave the starter activated for longer than 10 seconds. Allow the starter to cool down for 2 minutes before re-attempting to start the engine.

15. Immediately after the engine starts, visually check the oil pressure. Within 10 seconds the oil pressure should reach 4.5 to 5.0 bars for a cold engine. For very cold engines the oil pressure should reach 6.0 to 7.0 bars. If the oil pressure rises as high as 6.0 to 7.0 , then the rpm should not be increased. In this case, keep the engine at idle and allow it to warm up. Also, the rpm should not be increased if the oil pressure is below 2.0 bars (30 psi).

    As the oil temperature warms up, the oil pressure decreases and this allows for a higher rpm. If the oil pressure does not increase within the 10 seconds, as mentioned before, then the engine must be shut down. Failure for the oil pressure to rise means that the engine is not being lubricated and can seize. One reason that the oil pressure gauge may not indicate a rise within 10 seconds is that the oil pressure sensor is faulty, however there are much more serious mechanical problems which can cause the oil pressure gauge to not indicate a rise. Such problems will have to be inspected and the proper maintenance performed before the engine can be started again.

    The Rotax manufacturer recommends to check if the oil pressure has risen within 10 seconds and to monitor the oil pressure. Increase of the engine rpm is only permitted at steady rpm readings above 2.0 bars (30 psi). During an engine start with low oil temperatures, continue to monitor the oil pressure as the increased resistance in the suction lines could cause another drop in oil pressure.

    Note: If the oil temperature rises more than 120 degrees Celsius (e.g. during a prolonged climb), then it is not recommended to suddenly reduce the power to idle because the lubrication will be disrupted momentarily. (The oil is too thin). The oil pressure regulator needs time to restart to operate. Therefore, the throttle should be reduced gradually and not suddenly.

16. Deactivate the choke if it is still on.

As soon as the engine is running smooth , deactivate the choke. Push the choke lever forward gradually and not suddenly.

17. Warm up the engine.
    If the engine has been started at a cold temperature , then keep the rpm between 2000 to 2200 and allow the engine to warm up for 1 to 2 minutes to achieve a smooth run.

    Then, the rpm can be increased to 2500 in order to achieve the minimum oil temperature of 50 degrees Celsius. During the engine warm up, the cylinder head temperature (CHT) will start to rise before the oil pressure does. Once the oil pressure reaches 50 degrees Celsius, then the static run-up test for the aircraft can be conducted by selecting the right and left ignitions individually.

18. Static Run-up test.
    The minimum oil temperature for this is 50 degrees Celsius.

    Do not carry out the static run-up test with the aircraft on a rough surface (e.g. small stones or sand). The propeller rotation creates a suction below it, which can lift contamination into the prop. This can cause damage to the blades. In light wind conditions, the aircraft does not need to be pointed into the wind, however if wind speeds are above 3 m/s (6 knots), the aircraft should be pointed into the wind during the static run-up.

    Increase the engine rpm to 4000 by turning the throttle clockwise, then check both ignitions individually by the following procedure. Note that the rpm is at 4000 with both ignitions on. Then switch the ignition key to the right position, and note the rpm (The maximum allowable drop in rpm is 300, e.g. the rpm can not fall below 3700). Then return the ignition key to the BOTH position, and note again that the rpm is at 4000. Then switch the ignition key to the left position and note the rpm (The maximum allowable drop is 300 e.g. the rpm can not fall below 3700). The rpm that was observed while running on the right position and the rpm that was observed while running on the left position should be compared. The difference between these two rpm settings can not differ by more that 120 rpm.

19. Visually check that the oil pressure is within the green arc on the oil pressure gauge (between 2.0 to 5.0 bars for the normal operating range).

20. Check the voltmeter and confirm that the battery is charged (e.g. the voltage should between 13.0 to 13.5 volts).

21. Conduct acceleration and deceleration tests.

    This test must only be done with full braking power. Using wheel chalks is highly recommended, as well as having two people assist, by holding each wing tip at a point on the leading edge where there is a wing rib.

    The area ahead of the airplane must be free. Do not carry out this test on a rough or loose surface (e.g. such as small stones or sand etc.) because the suction created under the propeller can lift contamination into the propeller and cause damage. In light wind conditions, the airplane does not need to be pointed into the wind, however if the wind speed is more than 3 m/s (6 knots), then the airplane should be pointed nose into the wind.

    If an in-flight adjustable prop is installed on your airplane, then the propeller pitch should be set to the take-off position (minimum pitch).

    Reduce the throttle lever to idle , press the button on the lever and push the throttle fully forward.

    Then turn the throttle clockwise to achieve maximum power. At the maximum power setting, read the tachometer and note the rpm. The rpm achieved will depend on the type of prop installed and the propeller pitch setting.

    Then reduce power to idle and check that the engine runs smoothly and can maintain 1600 to 1700 rpm at minimum idle (the idle rpm set by the Airplane manufacturer).

4.7 Taxiing

4.7.1 Introduction

The Sportstar is equipped with tricycle landing gear with a steerable nose wheel controlled by the push-pull rods connected to the foot pedals. The main wheels are equipped with the hydraulic brakes operated by the toe brake pedals on the rudder pedals. Directional control can be achieved by means of the steerable nose wheel, by differential pressure on the main brakes or by a combination of both.

Every flight will involve manoeuvring the aircraft on the ground, to and from the active runway. Because of this, one must thoroughly understand and be proficient in taxi procedures.

When taxiing, pay attention to obstructions, persons, airport equipment and signaling devices (flags, airfield lights etc.). When taxiing, also be cautious of airfield lights. Airport lighting can be particularly hard to see in tall grass. If you are taxiing at a controlled airport, you must establish two way communication with the proper ATC facility and receive clearances. When taxiing at an uncontrolled airport, then verify the current status of the airport's communication requirements. Some uncontrolled airports require two way communication where as others allow NORDO traffic.

Monitor ground frequencies in order to help locate other taxiing aircraft. When manoeuvring onto the active runway, pay special attention to the landing path to make sure that no other aircraft are landing. Also make sure that no other aircraft are entering the active runway.

Taxiing may be used for the pre take-off checks, however it is much safer to save the pre take-off checks for when the aircraft is stopped. This way the pilot can devote their full attention to taxiing the airplane, monitoring other taxiing traffic and maintaining a lookout for obstructions.

The wing flap positions have no effect on the Sportstar's taxiing characteristics. However if taxiing at a high speed the pilot should take into account that the lift off speed is lower with flaps fully extended. If taxiing at a high speed, with full flaps and where there is a bump on the surface e.g. Grass runway, then the aircraft may be come airborne when it travels over the bump.

Do not apply main wheel brakes un-intentionally when taxiing (toe brakes).

4.7.2 Checks during taxiing

1. Check that the parking brake (if installed) is released (otherwise the toe-brake pedals are disengaged).
2. Set the throttle to the idle position. The airplane should not start to move after releasing the toe-brake pedals with the power set to idle.
3. Switch on the radio, intercom, transponder to standby, Navigation instruments and other required instruments and equipment (position lights , beacon etc.)
4. When taxiing at a controlled airport, contact the appropriate ATC frequency and get a clearance.
5. Visually check that the area is free in the direction of taxiing.
6. Release the toe-brake pedals.
7. Turn the throttle lever to smoothly increase engine power. The airplane should slowly start to move. The rpm required to make the airplane move forward depends on the condition of the taxiway surface (higher on a grass runway than on a paved runway).
8. After the airplane starts to move you can decrease engine speed so that the airplane taxis at a slow speed. The recommended taxi speed is less than 15 km/h, 8 knots.
   Recommended rpm for taxiing is within 2000 to 2500 rpm. The speed of taxiing should always be adjusted to suit the conditions of the airport (runway condition, width, free area, persons etc.)
9. It is recommended to turn on all gyroscopic instruments (artificial horizon etc.) if installed. This will allow them to start to rotate and stabilize the rotation of the gyros. If a GPS is installed it is also recommended to switch it on in order to have enough time to find satellites. Normally , the flight route is already programmed into the GPS.

4.7.3 Taxiing on Concrete Runway

The taxi speed can go as high as 27 knots, 50 km/h, 31mph when taxiing on a wide concrete runway where there is no risk of collision with obstructions or persons and there will be no tight turns. Any attempt to make a tight turn at a high speed can tip the airplane and/ or result in loss of directional control .

When taxiing at lower speeds no exceptional handling with the control stick is necessary because the track of the landing gear is wide enough to prevent the airplane from tipping. We recommend to hold the stick slightly forward during taxiing to increase the nose wheel loading. It is also recommended that the longitudinal trim be set to a slightly nose heavy position (moved forward). This is recommended especially on a slippery surface or on a wet runway after the rain because during a turn, if there is not enough pressure on the nosewheel (the control stick is pulled back) the airplane could slide towards the outside of the turn and the radius of the could unintentionally become larger.

Also, when taxiing against a strong wind with the control stick held back, the pressure on the nosewheel could be lightened due to aerodynamic forces on the horizontal tail unit. This can reduce the efficiency of the nosewheel during turns.

When taxiing in crosswinds at slow speeds it is not necessary to use aileron correction because the track of the landing gear is wide enough to prevent the airplane from tipping.

When turning the airplane during taxiing, one must always slow the plane down before making a tight turn. This prevents the airplane from tipping and/ or skidding. The tighter of a turn that is required, the slower that the airplane must be traveling. If you intend to execute a turn of a large radius then the taxi speed may be as high as 8-11 knots, 15-20 km/h, 9-15 mph, but if the pilot intends to execute a tighter turn then the taxi speed must be slowed down to a walking speed. When slowing the airplane down, if braking is applied to late, or too hard, then the airplane brakes may lock the wheels and cause a skid. As already mentioned , ailerons are not required, only deflecting the rudder pedals into the required direction of the turn is needed.

Since the nosewheel steering is directly connected with push-pull rods to the rudder control system and also because the nosewheel gear leg has zero track, the nosewheel steering is relatively sensitive. This should be considered during operations, especially at the beginning when you are not familiar with the Sportstar and the efficiency of it's nosewheel steering. Therefore , relatively small inputs are required for directional control and during turns.

If a turn of the lowest possible radius is required, then slow down the airplane or stop it. Use full deflection of the rudder pedal into the required direction of the turn and using the same foot, apply brake to the inside of the turn with the toe brake. Then gradually add power by throttle until the airplane starts to turn.

4.7.4 Taxiing on Grass Runway

Taxiing on a grass runway is affected by grass height. It is not recommended to taxi into grass that is too high (over 2/3 ft 200 mm) because of risk of damage to the prop blades. Also the surface of the airplane can become contaminated (landing gear, engine cowlings, wing and the lower part of the fuselage etc.). Theses impurities are hard to clean after they dry during flight.

The roughness of the surface of a grass runway is also a factor. If many bumps are encountered, this can reduce the comfort level in the airplane due to vibration. In such a case it is recommended to taxi very slow (at maximum, the speed of a slow walk).

When taxiing on a grass runway with wave like shapes on the surface of the grass, the speed can be higher than a slow walk but not enough to become launched airborne by the wave like contours of the grass.

More rpm is usually required to start moving and continue to taxi on a grass runway, than on a paved surface.

The technique required for turning on the ground on a grass runway is not much different from the technique used for turning on a paved surface. Attention should be paid when turning on wet grass (during or after rain, dew, etc.). During such conditions, the chances of sliding during braking is increased. Experienced pilots may utilize a controlled skid to execute a tight turn.

4.7.5 Taxiing at Low Speeds

With the throttle lever reduced to idle release the toe-brake pedals, the airplane should not start to move.

Then slowly add engine power by turning the throttle clockwise or press and hold the thumb button on the throttle and slowly push forward the throttle. Be ready with your feet to be able to immediately activate the toe-pedals. After the airplane starts to move, check the brakes function. Reduce the throttle to idle and apply pressure to the toe-brake pedals, the airplane should stop. If you feel the efficiency of the brakes is unsatisfactory then stop the engine and inspect the brake system.

If the airplane starts to move very fast, then immediately reduce the throttle lever to idle and apply pressure to the toe-brake pedals to stop the airplane. After the airplane stops, repeat the test once again, this time starting with the throttle set to idle and adding power slowly by turning the throttle clockwise.

Do not brake against power during taxiing. Taxiing speed is controlled with power and if braking is required, then first reduce the power, then apply the brakes. It is a common student error to taxi with a higher power setting while at the same time, use brakes to control the speed. This is the aeronautical equivalent of driving a car and pushing both the accelerator and the brake at the same time.

When yellow centerline stripes are on the taxiway, adhere to them unless necessary to clear airplanes or obstructions.

4.7.6 Taxiing at High Speeds

Since the nose wheel steering of the Sportstar is relatively sensitive, even small deflections of the rudder pedals can cause quick changes of direction while taxiing. This is particularly true when taxiing at higher speeds so you should be very cautious and use the rudder pedals smoothly when changing direction.

As the taxiing speed increases, a larger radius of turn is required to maintain stability. Heavy braking at high speeds can cause the wheels to lock. This may result in a skid to the side, particularly if one brake is used more heavily than the other side. The intensity of the braking is a major factor in determining if the airplane will skid or not.

4.7.7 Turning With The Nose Wheel Steering

After the airplane starts to taxi, control the direction of taxiing by rudder control. The rudder control is connected with the nose wheel steering. Another way to turn the airplane is by applying brakes in the direction of the desired turn, however, it is not recommended to use the brakes continuously. Rather than continuously riding the brakes to control the speed of the airplane, it is better to apply brakes occasionally only. After the airplane starts to move, gradually increase the rpm to between 2000 to 2500 rpm to achieve a taxi speed of walking.

Turn the throttle to maintain the desired speed of taxiing and maintain direction while taxiing by the nose wheel steering. Greater deflection of the rudder pedals is required while taxiing at slow speeds and smaller deflections are required at higher speeds.

4.7.8 Turning With The Main Wheel Brakes

The pilot can use the main wheel brakes to reduce the taxiing speed or to turn tighter (refer to the recommendations in the previous text).

To execute a turn of the smallest possible radius, reduce the throttle lever to idle or increased idle, fully deflect the rudder pedal in the desired direction of turn (left pedal for a left turn), and apply the brake on the corresponding wheel (left wheel for a left turn). Then slowly increase rpm (up to 3000 to 4000 rpm) until the airplane starts to turn. Then rpm according to desired rate of turning.

Sudden and/or brisk deflections of the rudders may cause the airplane to tip , skid or loose directional control.

4.7.9 Taxiing on Rough Terrain

When taxiing on a rough runway or over a irregularity on the surface (e.g. a ditch between runways), then do it very slowly to so the landing gear or it's attachment doesn't get damaged. Also if the airplane is allowed to tip, then there is a chance of the wingtip striking the ground. Also, the tail may strike the ground if the airplane is oscillated longitudinally.

The height and the shape of a bump in the ground will determine the best way to taxi over it. The pilot's familiarity with the bump is a factor as well in determining the best way to taxi over it.

If you intend to taxi over a ditch between the runways, then you should choose the most shallow spot possible to cross. However, if the ditch appears to be too deep, do not attempt to cross it because the spring action of the nose gear can cause the airplane to rock which can cause a propeller strike. Crossing a deeper ditch must be done very slowly and at an angle not exceeding 45 degrees in order to avoid prop damage.

4.7.10 Taxiing on Wet Runway

When taxiing on a wet runway, it is recommended to taxi at a slower speed. During flight tests when using a wet, paved runway, at slow speeds, no negative handling qualities or lack of braking deficiencies was discovered. If the windshield becomes fogged up due to high humidity, opening the side windows will help. Also, if the airplane is equipped with windshield defogging or defrosting, this system can help.

Also, the pilot can wipe the windshield. Do not start, or continue to taxi if the visibility is poor.

4.7.11 Taxiing on Snow

When taxiing in recently fallen snow, more engine power is required to start the airplane rolling and to keep it moving due to higher resistance against the tires. The brakes should be applied more gently in snow to avoid the tires locking up and causing a skid. Be careful not to injure yourself when entering or exiting the airplane , especially if frozen or packed.

If the snow is frozen and there are icy spots on the runway, then always taxi very slowly and apply the engine power very gently as well as the brakes.

The direction of the airplane at higher speeds should be controlled by the rudder pedals without using the brakes to avoid the risk of putting the airplane into a skid. If such a situation occurs, then release the toe brake pedals, reduce the throttle lever to idle and lose the speed.

On snow always taxi at low speed to avoid the risk of a skid because the efficiency of the nose wheel is reduced due to lower traction on snow and the wheel may slip. There is also a risk of a skid in the case of heavy braking of the main wheels.

More engine power will be required to start and continue taxiing in deeper snow. Especially in the case of prolonged taxiing in deep snow, for example, from the hangar to the take-off position, it is necessary to monitor the temperatures. The pilot must verify that oil and cylinder head temperatures are within limits and do not overheat the engine. If wheel spats are mounted on the airplane , they could be damaged in deep snow.

4.7.12 Crosswind Taxiing

The crosswind can affect the directional control of the airplane, so the control system should be used to eliminate the airplane weather cocking tendency.

However, the Sportstar is equipped in the tri-cycle gear configuration and the tendency to weather cock is less than that of a tail wheel configuration. The main wheels being located farther aft and also the friction of the nose wheel helps to resist the tendency to weather cock.

A quartering crosswind can cause the upwind wing to have a tendency to rise. This tendency is eliminated by the aileron system (by placing the upwind aileron up). Since the Sportstar is a low-wing monoplane, its wing is not too affected by quartering crosswinds. The effect of applying aileron is slight. Pushing on the control stick causes a higher loading of the nose wheel which increases the efficiency of the nose wheel steering during turns.

Downwind taxiing requires less engine power after the initial ground roll has begun , because the wind will be pushing the airplane forward. To avoid overheating the brakes when taxiing downwind, keep engine power to a minimum.

The Sportstar airplane was tested during certification for maximum crosswind and headwind component to safely takeoff and land using average pilot technique and skill. On the basis of these tests and also from the experience gained from servicing the airplane the limitations shown in Aircraft Operating Instructions for SPORTSTAR Light Sport Aircraft were established.

4.8 Take-off Roll

After having maneuvered to the take–off position on the active runway, report your position to the Control Tower if you were previously requested to do so.

Whenever possible, the take-off should be conducted into the wind. The Aircraft Operating Instructions does indicate that take-offs are permitted with crosswinds and even with slight tailwinds, however there are specific limitations in the manual.

The tail wind limit is 6 knots (3m/s), however, a skilled pilot is able to take off and land with the Sportstar even at 10 knots (5m/s). However, this also depends on the length and the surface of the runway. It is even possible to take off with a tail wind of 14 knots (7m/s) from a flat concrete runway, however even 6 knots (3m/s) may be too much if starting from a grass runway.

The crosswind limit is 10 knots (5 m/s) which is easy for the average skilled pilot, a well trained pilot may safely take off and land at 20 knots (10m/s). When an unskilled pilot starts under a strong crosswind there is always a real risk of wing tip hitting against the ground (the Sportstar is a low wing monoplane).

Note. Landing in a strong crosswind is more critical. The airplane rotates at lower speeds than it lands at. During landing there are two ways to eliminate drift; sideslip and crab. In the sideslip the pilot lowers the upwind wing in order to eliminate drift, however, in strong crosswinds there is a danger of the wingtip hitting the ground. The crab method uses the airplane’s heading to eliminate drift. During this manoeuvre, the pilot turns the airplane’s heading into the wind in order to align the airplane’s flightpath on the center of the final approach path.During this manoeuvre, the pilot must align the airplane just before touchdown and the timing must be very precise. Immediately after the airplane is aligned, the airplane should touchdown. If the airplane is aligned too early, then the airplane may drift downwind before touching the runway.

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4.9 Takeoff

4.9.1 Checks Prior to and at the Takeoff

1. Reduce the throttle lever to 2000 rpm (increased idle).
2. Extend the wing flaps to the takeoff position (15 degrees).

   The airplane is capable of taking off even with the flaps set to other positions:

   The takeoff run distance with flaps retracted will be the longest.

   The takeoff with flaps fully extended is the shortest, however acceleration after rotation is required to achieve the necessary speed of 54 KIAS, 100 km/h, 62 mph. After the necessary speed is achieved , the flaps should be slowly retracted.
3. Set the trim lever to be coaxial with the flap lever (in neutral position).

   If the electric trim system is installed in your airplane, set the trim slightly to the nose heavy position (the third diode from the top should flash).
4. Prevent the airplane from moving using the toe-brake pedals.
5. Check that the choke is closed (choke lever fully forward).
6. Check the indications on the engine instruments:
   - Oil temperature should be above 50 degrees C.
   - Cylinder head temperature should be above 50 degrees C.

   (The oil requires more time to warm up than the CHT, so if the oil temperature is above 50 degrees C, then the CHT is probably above 50 degrees as well).
   - Battery charging on voltmeter (over 13V).
   - That fuel quantity indicated on fuel gauge is enough for the intended flight. We do not recommend to do a flight with the minimum fuel quantity indicated the flashing warning light of fuel gauge (if installed).
7. Check that the COMM is switched ON.

8. Switch on the transponder if installed in your airplane, set the code assigned by the Air Traffic Control or required by flight rules in your country.

9. Set on the altimeter the QNH provided from the tower controller and the altimeter should indicate your airport elevation. If you are on an uncontrolled airport and do not know the QNH, then set on the altimeter the pressure which will indicate your airport elevation.

10. Visually check that the voltmeter indicates 0.

11. Visually check, that the airspeed indicator indicates 0 airspeed.

12. Switch on the switches on the instrument panel necessary to switch on the desired instruments:

    - Gyro instruments such as artificial horizon, T/B indicator etc. It is recommended to switch on the Gyro instruments prior to starting to taxi so that they will have enough time to stabilize the rotation of the Gyros.

    - If an auxiliary fuel pump is installed then switch it on using a switch on the instrument panel. (switch off the pump after take-off and after you reach an altitude of 150m / 450 ft altitude).

    - Due to safety it is recommended to switch on the wing position lights (beacons) and landing light(s) installed in your airplane to make it more visible.

13. Check that the fuel selector is in LEFT position. It may happen that a pilot that flew this airplane before you closed the fuel selector as they are used to doing. Then if you started a warm engine , there could still be enough fuel in the hoses for taxiing and possibly even take-off. In such a case as this there could be an engine failure after take-off at low altitude.

14. Check that the safety harnesses are tightened.

15. Thoroughly check that the canopy is closed and locked. Not only visually but check it also by hand to make sure that the lock is indeed locked. If the big-bubble canopy with reinforcing longitudinal and lateral tube is mounted on your airplane then check as well that the side pins are properly fitted into the holes through the fuselage sides.

16. If necessary ask for take-off clearance.
17. Apply full power (press and hold the button on the throttle and push it fully forward and then turn slightly turn the throttle clockwise).
18. Pull the control stick slightly aft of the neutral position.
19. Release the toe-brake pedals and the airplane will start to move and accelerate. Keep a lookout on the runway ahead in order to maintain directional control, do not have you attention on the instruments during this period of time. (The approximate time for take-off is 7 seconds!) . During the take-off roll, there is a tendency for the airplane to turn left, due to the propeller slipstream hitting the tail unit. Initially, during the take off run until the nose wheel lifts off, the left turn tendency can be corrected by the nose wheel steering. After rotation, when the nose wheel lifts off (with the control stick slightly aft of the neutral position), the pilot can correct the left turning tendency by a gradual deflection of the right rudder pedal (the required rudder pedal deflection is about 2 inches, 50mm).
20. Maintain direction of the take-off roll and gradually and gently pull the control stick back until the nose wheel lifts off and then, as the airplane reaches higher speeds and the horizontal tail unit becomes more effective, slightly move the stick forward to stop the nose wheel from lifting too high. However, do not overcorrect by pushing the control stick too much forward which will cause the nosewheel to hit the ground. The wheel should be held approximately 1/3 ft (10cm) above the ground.
21. If you conduct a crosswind take-off you should eliminate the crosswind by deflection of the rudder pedal downwind and simultaneously the aileron control (control stick) should be deflected against the wind (e.g. left crosswind requires to be eliminated byright rudder pedal deflection and control stick to the left movement. A right crosswing requires smaller deflection of the right rudder pedal (you eliminate the left turn tendency of the airplane) and if the right crosswind is stronger, then left rudder pedal deflection may be necessary and control stick movement to the right.

The take-off distance will be longer if you execute a tail wind take-off, however the pilot technique does not differ from the one used for the headwind take-off.

The airplane starts to leave the ground at a speed of around 65 km/h IAS 35 KIAS, 65 km/h, 40 mp/h and its nose has a slight tendency to continue in pitching up. The pilot shall eliminate that by moving the control stick slightly forward to bring the airplane into the phase for acceleration to reach a safe speed for climbing. After reaching the airspeed of approximately 59-62 KIAS, 110-115 km/h, 68-71 mph gradually pull the control stick back to transit to climbing (the stick should be pulled back at a rate which will maintain the speed i.e. to not increase or decrease the speed).

You may be surprised by a relatively fast take-off roll and liftoff of the airplane (within 7 seconds). Especially at the beginning, when you familiarize yourself with the Sportstar we recommend for you to practice the take-off roll and transition to the climb not with full power setting but with power slightly reduced (throttle lever set to between ½ up to ¾ of its full travel) to have more time to execute all phases of takeoff (takeoff roll, lift off, acceleration, transition to the climb and the climb).

22. If you start with a crosswind then there are two ways to eliminate drift:

    a) To deflect rudder pedal downwind (left crosswind- right rudder pedal) and move aileron control towards the upwind (left crosswind- stick to the left). The airplane will bank against the wind and its longitudinal axix will maintain runway direction.

    b) wind drift may be eliminated after liftoff during the phase of acceleration by deflection of the upwind rudder pedal (left crosswind-left pedal) and then neutralize the rudder control. The airplane will then turn into the wind and then fly yawed into the wind. There will be a angle between the departure path and the airplane's heading because the airplane is flying into the wind. However this technique can be a bit risky because if the airplane is turned into the wind too soon after lift-off and the airplane looses height and touches the ground again while turned into the wind (a "crab" landing), the landing gear and the airplane in such a case could be damaged.

23. The wheels continue to rotate after liftoff from the ground and moderate vibration of the airplane may occur if the wheels (tires) are not balanced. If this is caused by the main wheels then apply pressure to the toe-brakes for a short period of time to stop the wheels rotating. This technique of course cannot be used for the nose wheel. Braking the wheels to stop vibrations immediately after takeoff is not recommended during winter because if the takeoff run had been started in slush or wet snow, the early braking would stop the centrifugal force of the tires turning. This centrifugal force will help to clean the slush off of the wheels. If the water stays on the wheels, it could later freeze up at low temperatures.
24. Slowly retract the flaps after you reach approximately 150 ft(50m) of height above ground (slowly to prevent the airplane from rocking).
25. Adjust the power by the throttle lever as needed-you can climb at maximum Takeoff power (5800 rpm) for 5 minutes. When a fixed or ground adjustable prop is installed you will not be able to reach this rpm so you are not limited by that time, however observe oil and cylinder head temperatures to make sure that they do not exceed the limits.
26. Adjust the elevator trim as necessary.
27. Climb to desired altitude.

The best rate of climb speeds vary with altitude and may be found in the Aircraft Operating Instructions (Flight Manual) in section 5. Performance. For the Sportstar the best rate of climb speed is around 62 KIAS, 115 km/h, 71 mph. After retracting the wing flaps you are not limited by the maximum flap extended speed VFE 70 KIAS, 130 km/h, 81 mp/h thus you can climb even faster.

If an in-flight variable pitch prop is installed in your airplane (which is not permitted in the LSA category), then with the propeller pitch control, set the takeoff angle (minimum pitch). After setting minimum rpm, the engine speed may reach up to 5800 rpm during a climb. The engine must not be at 5800 rpm for longer than 5 minutes, so then the pilot can reduce the rpm to 5500 by selecting a coarser pitch. 5500 rpm is the maximum continuous power for the Rotax 912. At this engine rpm you may climb without restriction, however you must monitor the oil and cylinder head temperatures.

You can of course reduce engine power by the throttle lever as needed to decrease the engine speed.

During the climb , switch off the auxiliary fuel pump (if installed) and landing lights as well (landing lights are used to increase the airplane's visibility during the takeoff).

4.9.1.1 Short Field Takeoff

If you need to execute the shortest possible takeoff then set the wing flaps to the Landing 1 position (30 degrees) or Landing 2 (50 degrees fully extended). The elevator trim lever should be set to a position to be parallel with the flap control when set for takeoff (15 degrees).

The airplane will liftoff at a lower speed and take less distance to liftoff. After liftoff it is necessary to push the control stick slightly forward and allow the airplane to accelerate and reach a higher speed and during this acceleration phase the flaps should be slowly set to the "normal" Takeoff position (15 degrees) and a transition to a climb may begin when the airplane reaches a speed between 59-65 KIAS, 110-120 km/h, 68-75 mph.

4.10 Climb

The wing flaps should be retracted after takeoff at 150 ft (50m) of height above ground and you should have a speed of around 62 KIAS, 115 km/h, 71 mph. This is the best rate of climb speed at which the airplane climbs at more than 750 ft/min at 2000 ft IAS. After achieving the best rate of climb speed, adjust the trim control force and make climbing more comfortable.

Refer to the Aircraft Operating Instructions (Airplane Flight Manual), Section 5. Performance for the best rate of climb speeds at various altitudes of International Standard Atmosphere (ISA).

If your airplane is fitted with an in-flight variable pitch prop, the pitch set for takeoff is minimum. In this case the maximum allowable time at maximum takeoff power is 5 minutes and then you must reduce the engine power by selecting a coarser pitch or by reducing power with the throttle. Then the maximum continuous power is 5500 rpm.

If there is a fixed pitch prop or a ground adjustable prop in your airplane, then the engine speed even at full throttle does not exceed 5500 rpm (maximum continuous power). In this case you are not limited by the duration of the climb as in the case of an in-flight adjustable prop. However, oil temperature and pressure and cylinder head temperatures should be monitored from time to time to keep the engine operating within its limits, as stated hereafter.

You must monitor from time to time the oil temperature and pressure and the cylinder head temperatures, especially during a longer climb, to check whether the engine is operating within its limits (there are color coded arcs marked on oil temperature and CHT gauge, the green arc is for the normal operating range, the yellow arc marks the temperature range which requires caution - you should not operate the engine within the yellow arc for a long period of time). If temperatures approach the end of the yellow arcs marked by a red radial, then you should lower the angle of climb, reduce engine power and increase airspeed to allow better engine cooling.

The Sportstar angle of incidence is relatively high during a climb at full power and you may be surprised by that, especially if you have flown mainly General Aviation aircraft (e.g. Cessna etc.). Steep angles of climb occur in this category of aircraft (Ultralight or Light Sport) equipped with a powerful engine (e.g. Rotax 912). You may also be surprised by how fast the airplane lifts off the ground. (appox. 7 seconds).

Slight deflection of the right rudder pedal to eliminate engine torque moment will probably be required to maintain a straight climb.

If you started in a crosswind then you can deflect the appropriate rudder pedal yaw the airplane into the wind and then neutralize the rudder control. The airplane will climb yawed in a straight line of flight.

If you need to execute a turn in a climb then apply pressure to the rudder pedal for the desired direction of turn (left pedal for a left turn) and simultaneously move the control stick in the same direction. Then neutralize the foot and hand control. It is important to maintain airspeed during a turn (it should not decrease!).

4.10.1 Transition from a Climb to a Descent

In the case of a longer climb which has resulted in the engine temperatures being in the yellow arcs, it is not recommended to suddenly reduce the engine power to idle and transit to a descent, because engine lubrication will be interrupted for a certain period of time. Therefore the throttle lever should be pulled back gradually and not suddenly.

4.10.2 Transition from a Climb to Level Flight

A transition to level flight will usually follow after climbing. To do it gradually push the control stick forward (do not reduce the power at first!), bring the airplane to level flight and then let it reach the required airspeed (e.g. cruise airspeed is about 90 KIAS, 170 km/h, 105 mph), and when the cruise airspeed is achieved reduce the engine power by the throttle lever so that the airplane will maintain the desired airspeed or engine rpm (e.g. 5000 rpm or up to the max. continuous 5500). Finally adjust the elevator trim as necessary. It is also useful to lock the throttle lever by means of its friction wheel at the instrument panel to avoid unprompted movement of the lever followed by a power change.

4.11 Level Flight

Altitude, direction and airspeed are the flight parameters to be kept during straight and level flight.

About 90% of your lookout should be paid to the observation of the airplane attitude against the horizon. Remember the airplane nose position on the horizon after stabilizing the airplane. Monitor deviations from that position and use short inputs to eliminate wing banking. A position of bank indicator ball indicates to you if the airplane is flying correctly or in a skid or a slip. To correct a skid , slightly apply pressure to the rudder on the Same side as the ball. Deviation from the desired heading may also be seen on the magnetic compass.

Any changes of engine speed affect the airplane pitch attitude and may be corrected by longitudinal control or elevator trim, then the trim should be adjusted to stabilize flight.

10% of your lookout should be used to pay attention to your flight and engine instruments (look at them from time to time).

Use the elevator trim to balance longitudinal control forces, no change of pitch should occur in stable air after the release of the control stick. Since the airplane is fitted with a fixed (ground adjustable) trim of aileron control (trim tab on the right aileron) there is only a narrow airspeed range (cruise) within which the airplane is laterally balanced. The aileron trim tab deflection may be adjusted on the ground. If the airplane banks to the right in flight, then bend the tab slightly up.

You can find the level flight performance in Section 5. of the Aircraft Operating Instructions (Airplane Flight Manual):

- Calibrated airspeeds CAS at the set engine speed and given flight altitude (with the altimeter set to the standard pressure 1013 hPa, 29.92 inHg) and at a manifold pressure (boost) in case of in-flight variable pitch prop (refer to the text below).
- Table of IAS-CAS-TAS speeds at set engine speed and given flight altitude.
- Table of airspeeds, fuel consumption, endurances and ranges.

If an in-flight variable pitch prop is installed in your airplane, then the engine power (rpm) may be set either by the throttle lever or by setting the propeller pitch. Thus you get an infinite number of combinations of engine power settings by means of throttle and prop pitch setting, Therefore a manifold pressure indicator should be installed on the instrument panel is the airplane is equipped with an in-flight variable pitch prop. It is valuable to set the required engine regime. You will use the throttle lever to set the recommended manifold pressure displayed on the gauge (pressure is shown in Section 5. of the Aircraft Operating Instructions) and then use the propeller pitch control to set the pitch that will give you the required engine speed. The airplane manufacturer test performance of airplane with in-flight variable pitch prop at 3 various altitudes and in each case at 3 various manifold pressures to get data for the Aircraft Operating Instructions. However you may find better engine power settings for your airplane during its operation.

Alternately switch fuel selector from LEFT to RIGHT position to ensure even fuel pumping from both tanks.

During long term level flight it is recommended to pay attention not only to navigation but also to monitor from time to time the engine parameters such as oil temperature, oil pressure, cylinder head temperature, battery charging on voltmeter and fuel quantity.

If you fly in turbulent air then it is not required to make continual adjustments with the throttle lever for every small change caused by the turbulence. Instead, use the flight controls for that. If there is a tendency for the airplane to climb in the turbulence, then push the control stick forward to help correct this tendency. If the airplane has a tendency to descend, pull the stick back. Only in the case of extreme turbulence when the airplane has a strong tendency to climb or descend, use the throttle lever to change engine power and eliminate that tendency.

4.11.1 Transition from Level Flight to a Climb

At first add power by the throttle lever and then pull the control stick to go into a climb , stabilize airspeed and adjust elevator trim as necessary.

4.11.2 Transition from Level Flight to a Descent

Pull the throttle lever to reduce engine power and airspeed and then push the control stick to go into a descent. Adjust descent angle by pulling or pushing the control stick to achieve the desired descent airspeed and finally, trim the airplane (especially in a long descent).

If you are flying in level flight at a high engine power (rpm) and push the control stick prior to reducing power , then it is possible to exceed the engine speed limit. Therefore watch the tachometer to not exceed 5800 rpm.

4.12 Turns

4.12.1 Level Flight Turns

The first fundamental action prior to beginning any turn is to look into the airspace in the direction which you intend to turn and check that there is no other air traffic in the area or approaching towards it. It is also very important to listen to the communications on a given frequency and monitor air traffic within your proximity.

You can enter a turn from any cruise power setting, the turn radius will depend on the airspeed and the angle of bank. Keep in mind that the angle bank should not exceed 60 degrees which is an airplane limitation shown in Aircraft Operating Instructions. Also keep in mind that the stall speed increases in a turn.

As mentioned above a turn radius depends on your airspeed and bank. If you turning with more than 30 degrees angle of bank then it will be necessary to increase engine power because of the airplane tendency to slow down due to aerodynamic drag. It will probably be necessary to apply full power to execute a level turn of 60 degrees angle of bank. So watch the airspeed during turns at high angles of bank. The load factor in a turn at a stabilized 60 degree angle of bank reaches 2g and the stall speed in this turn is 1.41 times higher than in level flight, which means for the Sportstar an increase of the stall speed from 42 to 59 KIAS (from 78 to 110 km/h, from 48 to 68 mph) with the wing flaps retracted. A risk of a stall in a turn would be higher if you execute a steep turn at low airspeeds and fly into turbulence.

To enter into a turn apply pressure to the appropriate rudder pedal (left for a left turn) and simultaneously and proportionally to the rudder deflection move the aileron control in the same direction (control stick to the left for a left turn). Neutralize the foot and hand control after you reach the desired angle of bank. The ball in the bank indicator should be in the middle position if the turn is executeed properly. If it moves sideways then the rudder pedal on the side of the ball should be pushed (ball to the left – more left pedal) and airplane bank should be adjusted.

To maintain the airplane's pitch attitude with the nose on the horizon during a turn, it is necessary to eliminate the airplane's tendency to pitch up or down which is due to the gyroscopic moment caused by the engine (prop) rotation and the airplane yawing. So to maintain level flight the control stick should be slightly pulled when turning left and slightly pushed when turning right.

Do not watch the flight instruments during the turn but the airspace ahead of you and try to maintain the same position on the horizon when looking at the front edge of the upper engine cowling which should show the same indication as an artificial horizon instrument (if installed).

If you want to level off from a turn on a pre-selected heading then you must start recovery early so that the airplane heading after having leveled off will be in the required direction (roughly 30 degrees early). To recover from a turn apply rudder pressure against the direction of the turn (right rudder pedal to recover from a left turn) and simultaneously recover bank using the aileron control. If you do it correctly then the ball of the bank indicator should stay in the middle position. To recover from a steep turn onto the desired heading you should start the recovery earlier than in the case of a shallow turn at a low speed.

4.12.2 Climbing Turns

It will be necessary to increase the engine power by the throttle lever to execute a climbing turn without loosing airspeed. Pilot technique to execute and level off from a climbing turn does not differ than that one used in level turns. There is not the same extra available power in a climbing turn than in a level turn, so this must be considered in order to avoid a turning stall.

4.12.3 Descent Turns

When turning always adhere to the fundamental to first take a good lookout in the direction of the turn and check that it is free of other air traffic. If you turn in a descent then it is necessary to make sure that there is enough airspeed to be sufficient especially at higher angles of bank up to 60 degrees. A turn conducted at the maximum bank angle of 60 degrees should be executeed at an airspeed of around 80 KIAS, 150 km/h, 93 mph (not at 65 KIAS, 120 km/h, 75 mph!). It is also important when executing steeper descending turns to not tighten the turn in order to avoid airplane entry into a spiral dive in which airspeed and load factor are increasing and even blackout may occur.

4.13 Descent

4.13.1 Straight Descent Flight

If you descending straight then the descent angle depends on the entry altitude at which you begin the descent, the level off altitude at which you terminate the descent and how fast you want to descend. According to these factors, you should adjust the angle of descent, airspeed and power setting. If you descend at idle power setting with the throttle level fully back, then you can descend even up to the never exceed speed VNE 146 KIAS, 270 km/h, 168 mph (marked by the red line on the airspeed indicator). However, consider that the engine will be cooled very quickly and its temperatures (oil and CHT) will decrease. It is possible that if the engine is allowed to overcool like this all the way to the airport and then a Balked Landing Procedure is carried out, the engine may not respond immediately and may not reach full power when required. As well engine lubrication is worse at low oil temperatures. Therefore a long descent at idle is not recommended but a descent at a slightly increased idle.

When selecting the airspeed to descend at, the turbulence should be taken into consideration. In smooth air the descent speed can be much faster than in turbulent air. In turbulent air it is recommended to reduce the airspeed. The angle of descent cab be adjusted by pulling or pushing the control stick to reach the desired airspeed and then trim the airplane longitudinally (especially in a long term descent). The forces on the control stick in the Sportstar are relatively light , so a short term descent without re-trimming is not a problem.

During a descent monitor oil and cylinder head temperature from time to time and if the temperatures are approaching the lower limits then reduce the angle of descent and the airspeed by slightly pulling the control stick back and then set the throttle level to a slightly increased idle in order to keep the engine warm.

Check airspeed and altitude from time to time so that when you are approaching the altitude that you want to level out at, you can begin the level off in advance. This way , by beginning the level out in advance , at a slightly higher altitude, there is less chance of descending right through the altitude that you want to level out at.

The wing flaps must be retracted when descending above a speed of VFE 70 KIAS, 130 km/h, 81 mph (white arc on ASI), below VFE it is permitted to descend even with the flaps fully extended. The rate of descent will be around 1400 ft/min (7 m/s).

The best glide ratio of the Sportstar is approx. 9:1 and is achieved with the wing flaps retracted, at idle and at an airspeed of 57 KIAS, 105 km/h, 65 mph, when the rate of descent varies around 630 ft/min (3.2 m/s).

If you need to loose altitude as fast as possible , then instead of slipping it is recommended with the Sportstar to fully extend the wing flaps and glide at 65 KIAS, 120 km/h, 75 mph.

When the angle of descent is too steep be careful of loose items in your baggage compartment or on the next to make sure that nothing will fall forward and injure you or block the control system. As well when flying in turbulence loose items might be elected from the baggage compartment and injure you.

When descending at idle it is not necessary to apply pressure to the right rudder pedal to eliminate engine reaction moment (as is necessary in a climb), just slightly deflect the left pedal to keep the ball of the turn indicator in the middle. This is because a fixed trim tab attached to the rudder, which the deflection is set for cruise regime within 4800-5000 rpm.

4.13.2 Power off Descent

Gliding with power off is easy with the Sportstar and no exceptional pilot technique or control forces are needed, airplane controllability and maneuverability is fully kept. Optimum gliding speed is 57 KIAS, 105 km/h, 65 mph with the wing flaps retracted.

4.13.3 Intentional In-flight Engine Shutdown

If you would like to switch off the engine in flight then pull the throttle lever fully back to idle (press the button with your thumb, pull the throttle back and turn the throttle knob fully anticlockwise), slow the airplane to 59 KIAS, 110 km/h, 68 mph. Then switch off the ignition by turning the ignition key fully anticlockwise. The prop will continue in rotation (wind-milling regime). To fully stop the rotation of the prop it will be necessary to pull the control stick until the airspeed drops to approximately 49 KIAS, 90 km/h, 56 mph and the prop should stop. Then slightly push the control stick forward to go into a descent at 57-59 KIAS, 105-110 km/h, 65-68 mph. The propeller usually does not begin to turn below 70 KIAS, 130 km/h, 81 mph however above this speed it does.

4.13.4 In-flight Engine Starting

If you want to re-start the engine in-flight, then add some power i.e. turn the throttle lever knob slightly clockwise and then turn the ignition key fully clockwise and release it. The engine should start. If you would like the engine to start from the prop rotation then turn the ignition key to the BOTH position (both ignition circuits on) and push the control stick to increase the airspeed until the prop is rotating and re-starts the engine. The airspeed at which the engine will be restarted depends on the prop that has been installed and lies within 81 KIAS, 150 km/h, 93 mph to approx. 108 KIAS, 200 km/h, 124 mph.

4.14 Slips

Executing a slip as a maneuver to loose altitude with the Sportstar is not as effective as using the flaps to loose altitude, i.e. by setting them to Landing position 2 – 50 degrees (Landing position 1 – 30 degrees is recommended for a normal landing).

During practice of slips it is recommended to climb to a sufficient altitude (3000 ft), then choose a direction which you will try to keep during the slip, pull the throttle lever back to reduce to idle, slow the airplane down to below 70 KIAS, 130 km/h, 81 mph, fully extend the wing flaps (otherwise the slip will be shallow), adjust longitudinal trim and go into the slip.

If you try to slip left i.e. left wing down, then gradually apply pressure to the right pedal all the way to its stop and simultaneously move the aileron control (control stick) to the left. Control surface deflections should be such as to hold the direction of flight. During a slip to the left where there is full application of the right rudder, a certain amount of left control stick deflection is required to keep straight. So if you apply during a left slip a decreased application of the left stick, the airplane will have a tendency to yaw to the right and to keep the direction straight you will be required to decrease the deflection of the right pedal or increase the deflection of the control stick to the left.

If you are going to use a slip as a maneuver to loose height before landing in spite of the recommendation to use flaps instead, then choose the slip direction according to the wind direction i.e apply pressure to the downwind rudder and simultaneously move the control stick into wind. Recover fro the slip at 60-80 ft / 20-25 m above ground (a higher airspeed requires more altitude) i.e. neutralize the hand and foot controls to maintain the required heading and to eliminate wind drift.

There is a risk when slipping with a small fuel reserve, especially during a long slip with some engine power, of engine failure due to fuel starvation, because may gravitate during a slip to the outside of the fuel tank outlet.

The minimum trim speed with flaps fully extended lies between 49-54 KIAS, 90-100 km/h, 56-62 mph, so if you would slip in this configuration at a lower speed the airplane may not be fully trimmable and you will feel a slight non-balanced force, however it is easily correctable. If you would release the control stick, then the airplane will drop the nose down and the airspeed will start to increase very fast. (Do not exceed VFE 70 KIAS, 130 km/h, 81 mph with extended flaps).

4.15 Landing

4.15.1 Landing in Calm Wind or a Headwind

When landing straightforward from a descent (from a long final without executing a circle), then slow down below 70 KIAS, 130 km/h, 81 mph in order to be within the flap extension speed, then set them within the Landing position 1 (30 degrees) or extend them fully (Landing position 2 – 50 degrees) if a short field landing is necessary. Reduce power with the throttle lever to a slightly increased idle of approx. 2200-2300 rpm (the throttle lever should not be locked before landing to be able to quickly add power in case of emergency). Slow down the airplane to 62 KIAS, 115 km/h, 71 mph and trim the airplane.

Start the roundout at approximately 20-30 ft (7-10 m). Slowly pull the control stick back in order to bring the airplane from descent to level flight at approx. 1 ½ ft (0.5 m) above the runway. Height is estimated from the position of the airplane nose against the horizon and not by looking under the wing, so some training is necessary. Even a small change of airplane pitch is clearly recognizable against the horizon.

After you descend to the height of 1 ½ ft (0.5 m) above ground, turn the throttle lever knob fully anticlockwise to reduce power down to idle. By reducing power the airplane slows down and continuation of the back pressure on the control stick is required to hold the height of 1 ½ ft (0.5 m) above ground. The airplane will gradually loose airspeed until the main wheels touchdown on the runway. If you do this well, then the wheels will touch down on the ground when the airplane looses lift. Touchdown speed lies within 38 KIAS, 60-70 km/h, 37-43 mph depending on the airplane weight (the touchdown speed will be at a higher speed at a higher weight) and wing flap setting (lower speed with the flaps extended). Keep in mind to not use the brakes during touchdown (do not apply pressure to the toe-brakes during touchdown).

After the touchdown, continue to hold the back pressure on the control stick to keep the nose wheel above the ground (this way you can preserve the nose wheel). Use the rudder control to maintain direction of the landing roll. As the airplane slows down, the nose wheel naturally touches down. After that move the control stick back to the neutral position or slightly forward to load the nose wheel thus increasing its efficiency during steering. The direction of the landing roll may then be controlled by the nose wheel steering. Apply the wheel brakes to shorten the landing roll distance.

4.15.2 Braked Landing Run

Avoid unintentional braking during touchdown (do not place tip toes on the toe-brake pedals at touchdown).

You can start braking to shorten the landing roll distance after the nose wheel touches down on the ground. The intensity of the braking depends on the pressure that you apply to the toe-brake pedals with the tip toes. If a very short landing roll is required then start applying the brakes immediately after touchdown, the nose wheel in this case will touch down and its steering due to higher speed is more sensitive, therefore use smaller deflections of the rudder control pedals to maintain the required direction on the runway.

4.15.3 Downwind Landing

The basic difference between a downwind landing and a normal landing, which is executed up wind, is that a larger distance of runway will be required in a downwind landing. This should be taken into consideration when planning a downwind landing.

Another difference is the recommended flap setting. While the Landing position 1 (30 degrees) is recommended for normal upwind landings or extending them fully to Landing position 2 (50 degrees) when a short field landing is required (a higher rate of descent and a faster roundout), then for downwind landings we recommend to extend the flaps only to the Takeoff position (15 degrees) or leave them retracted.

You will have a higher ground speed when landing downwind and this must be considered when choosing a runway. Landing with a high ground speed on a bumpy grass runway is less comfortable and the stress on the landing gear is higher than when landing on a flat concrete runway.

If the airplane slightly bounces after touchdown then do not push the control stick forward to try to bring the airplane back to the runway, but move the stick slightly forward and then gradually pull it back to repeat the touchdown. If the airplane bounces too much it is possible to add power , repeat the circuit pattern and landing.

4.15.4 Crosswind Landing

There are two piloting techniques used during crosswind landings.

The first pilot technique consists of yawing the airplane so that the longitudinal axis is pointed into the wind by applying pressure to the appropriate rudder pedal (for a right crosswind-the right rudder pedal) and simultaneously and proportionately move the aileron control into the wind (for a right crosswind – the control stick to the right), i.e. first you should execute a shallow turn into the wind and then neutralize the hand and foot controls. The airplane nose will not be directed at the runway , but yawed into the wind, however the airplane glidepath would be in the direction of the runway due to wind drift (the airplane will fly yawed against the runway). The angle of yaw should be appropriate to the crosswind velocity. If the yawed airplane continue to be blown off course towards the downwind side, then the angle of yaw, or the “crab” angle must be increased (slightly apply more pressure towards the upwind side). If the airplane begins to drift upwind, then the angle of yaw must be decreased.

The approach speed during a crosswind does not differ from a normal approach and should be approximately 59-62 KIAS, 110-115km/h, 68-71 mph. Start the roundout at approximately 20-30 ft (7-10 m) with the airplane still yawed. Slowly pull back on the stick so that the airplane, still yawed, slowly goes from the descent phase to level flight 1 ½ ft (0.5 m) above ground. Then at this height, turn the throttle knob anticlockwise to reduce the engine power to idle. By reducing the engine power, the airplane slows down an the back pressure on the control stick will be required in slightly increasing amounts to steadily hold the height of 1 ½ ft (0.5 m) above ground. The airplane will slow down step by step. Just prior to touchdown (some training is required for this), the rudder pedal on the downwind side should be applied to align the airplane with the runway centre-line and both main wheels should touch the ground simultaneously. If you do not align the airplane with the centre-line of the runway and the airplane is permitted to touch the runway yawed into the wind (a “crab” landing), then there is a risk of damaging the tires, wheels or the whole landing gear. Yaw recovery prior to touchdown is also needed to center the nose wheel.

It is necessary after a touchdown on both wheels to eliminate wind drift and keep the required direction of the landing roll by using the rudder control. To do this you can apply pressure on the downwind rudder (a right crosswind, when hitting the tail will turn the airplane to the right and therefore you must apply pressure to the left pedal) and simultaneously move the aileron control (control stick) towards the upwind side (for a right crosswind – apply pressure to the left pedal and simultaneously move the stick to the right). Rudder pedal and control stick deflections should be proportionate to the wind velocity. Slowly pull back the control stick back to hold the nose wheel above the ground as long as possible and the airplane will slowly loose speed.

Just before the nose wheel naturally touches the ground it is necessary to neutralize the rudder pedals to center the nose wheel (the downwind rudder was applied), but the control stick should be held deflected towards the upwind side. If you do not neutralize the rudder pedals and center the nose wheel, then when the nose wheel touches the ground the airplane will turn to the side. If you neutralize the rudders too early, then the airplane will have a tendency to turn towards the upwind side. Hold the control stick towards the upwind side until the airplane stops. As mentioned before in the chapter on taxiing, deflection of the aileron control when taxiing in a crosswind does not have a significant effect on the Sportstar (low-wing monoplane) and moreover the airplane has a wide main wheel track. However holding the aileron control towards the upwind side is recommended to form the proper habits, which will be useful when flying other aircraft types, especially high- wings.

We recommend to you, especially at the beginning when you are not familiar with the Sportstar flight qualities or do not have the proper pilot skills from another type of low-wing, to execute the first couple of landings on a grass runway, which may also absorb possible pilot errors better than a concrete runway.

The second pilot technique used during crosswind landings is to apply pressure to the rudder on the downwind side and move the aileron control towards the upwind side (a right crosswind requires left rudder application and simultaneous movement of the control stick to the right). The airplane will respond in banking towards the upwind side, however its tendency to turn to the upwind side is eliminated by applying the rudder on the downwind side (as used during a slip). The airplane's nose will be directed towards the center-line (unlike landing in a crab). The amount of rudder and control stick deflection should be in proportion with the wind velocity i.e. a heavier wind requires more deflection. It is very important when using this landing technique, especially during heavy crosswinds of more than 14 knots (7 m/s), to consider the amount of bank angle of the wings, so there will not be a wing tip striking the ground at the touchdown. You should consider the angle of bank when landing at an airfield with some lateral slope. Use the lateral and directional control to keep the direction of the glide path with the runway center line. Start the roundout using the standard pilot technique at a height of 20-30 ft (7-10 m), slightly increased engine power is recommended (not idle). Keep the rudder pedal deflected towards the downwind side and the aileron control deflected towards the upwind side. Execute roundout and then gradually pull the throttle lever back to reduce the engine power to idle (you can do this already during the roundout) and still keep the rudder pedal deflected towards the downwind side and the control stick towards the upwind side (the airplane is still banked so consider the wing tip position). The airplane will land at first on one of the main wheels and then on the second one. Still keep the rudder pedal deflected towards the downwind side and the control stick deflected towards the upwind side. Slightly pull back on the control stick during the landing roll to keep the nose wheel above the ground as long as possible and neutralize the rudder pedal just at the moment when the nose wheel starts to naturally touch the ground.

4.15.5 Short-Field Landing

If you want to conduct the shortest landing possible, then there are two ways to conduct the final approach.

The first way consists of a steep approach at idle power setting , flaps fully extended, airspeed between 51-54 KIAS, 95-100 km/h, 59-62 mph, the roundout will be relatively fast and immediately after the main wheels touchdown the control stick should be pushed slightly forward to allow the nosewheel to touch down as well and then maximum braking must immediately start.

The second way consists of a shallow approach to the threshold with some power (approx. 3000 rpm), with the flaps fully extended. However , make sure that there are no obstructions in the glide path! This is a real danger that if you do not reach the threshold in case of an engine failure. Reduce engine power at the threshold and land with maximum braking. After you gain some experience you can reduce engine power even before the threshold depending on the height above ground and touch down just behind the threshold.

Due to safety it is recommended to use the first approach technique i.e. a steep approach to the runway is preferred over a shallow approach with power with power.

4.15.6 Soft-Field Landing

If you need to land on a soft field you should have your seat belts and harnesses tight and try to touch down at the lowest possible speed so fully extended flaps are recommended. Hold the airplane in level flight at 1 ½ ft (0.5 m) above ground as long as possible until it touches down on the main wheels. Then keep in mind that due to increased drag on the main wheels normally encountered on a soft field , a nose down pitching moment immediately takes effect thus the nose wheel will have a tendency to touch the ground as well. Maximum braking will probably not be required due to the increased drag on the main wheels.

4.15.7 Accuracy Landing

Accuracy Landing to a desired pre-selected point requires above all, thorough experience and training, knowledge of the airplane qualities (e.g. rate of descent with given flap settings etc.) and finally, knowledge of the conditions under which the landing is being executed.

4.16 Airport Traffic Patterns

4.16.1 Objectives of Traffic Patterns Practice

There are several reasons why circuit patterns are one of the most important phases of flight training:

- Practicing of pilot techniques during the takeoff and the landing, which are the most critical phases of flight.
- Practicing of takeoffs and landings with all of the wing flap settings.
- Completing of important checks which must be done before takeoff, during the takeoff, after takeoff, on the downwind, on the base leg, on final approach etc.
- Practicing maintaining airspeed and listening to the air traffic.
- Assessment of the lift off moment.
- Practicing the techniques during rotation , to lift the nose wheel and lift off.
- Experiencing the airplane's characteristics after takeoff.
- Pilot technique during the acceleration and during the climb.
- Assessment of the glide angle during final approach.
- Assessment of distances and heights.
- Elimination of wind drift.
- Pilot technique during the roundout.
- Assessment of the right moment to flare out.
- Assessing the amount of back pressure required during the flare out and while holding off the runway waiting for the touchdown.

During the ground preparation for the flight , acquaint yourself with the conditions on the airfield i.e. get the communication frequency , look for direction of traffic patterns , pattern shapes , circuit heights , presence of surrounding obstructions, find if there are some noise limits on the airport which may limit the engine power to be used for the takeoff etc. You can get this information from the control tower or from aviation information publications (AIPs) or otherwise.

4.16.2 Taxiing and Entering the Active Runway

After having stopped at the holding point for the active runway:

Complete the pre-takeoff checks. If there is a very short distance between the apron and the active runway holding point, then the pre-takeoff checks can be done while the airplane is still on the apron. However these checks are normally completed at the holding bay of the active runway. By completing the pre-takeoff checks prior to entering the active runway, you will not delay or block the traffic for so long. The checks to be done prior to takeoff have already been discussed, so they will not be repeated. You can also find these checks in the Aircraft Operating Instructions (Flight Manual).

Before entering the active runway, request a clearance from the control tower (if you are operating at a controlled airport) and report to them what your intentions are i.e. stay in the circuit pattern. If you operate at a non-controlled airport then you are not required to ask for clearances, it is just a matter of reporting your intentions to the traffic by means of a traffic frequency (COMM).

After having received a clearance to do so, enter the active runway and taxi to the takeoff position. When the runway to be used is chosen, consideration should be given to the current wind direction, runway length and any other conditions at the field which may preclude the use of any of the runways.

When holding on the active runway at the takeoff position, report to the control tower that you are holding at the takeoff position (if it was required by the control tower to report at the position for takeoff). Now there is one last opportunity to do any final checks before takeoff.

4.16.3 Takeoff Run

At the takeoff position, with the airplane aligned with the runway center-line, pull the lever to cage the artificial horizon if installed and also set on the directional gyro the exact magnetic heading of the runway. An advantage of using the directional gyro is that it will indicate your correct flight direction while you are in the circuit pattern, which unlike a magnetic compass will not be affected by inertia forces, turbulences etc.(the gyro scale turns smoothly).

Now you are ready for takeoff and can request for takeoff clearance from the control tower.

If a flight hour meter is installed in your airplane and you want to measure the air time then start the timer before the brake release.

After you get takeoff clearance apply full power with the throttle lever and release the toe-brake pedals..

4.16.4 Takeoff and Transition to the Climb

The take off and the transition to the climb are all listed in greater detail in previous chapters, which includes adding power, releasing the brakes, when the airplane starts to move and the takeoff run, the liftoff, acceleration, the transition to the climb and the climb itself.

Retract the wing flaps at approximately 150 ft (50 m) above ground..

4.16.5 Climb

According to local procedures and conditions at the airport and circuit procedure, it may be necessary to reduce power after takeoff because the Sportstar’s climb performance is very high (the rate of climb is above 880 ft/min) and you would reach the required circuit height very soon (the first turn after takeoff is usually done at 300ft/100m and the circuit height is usually 1000 ft /300m).

4.16.6 1st Turn

The first turn follows the climb after takeoff phase and is usually executed at 300ft/100m, but its altitude may change due to local procedures, conditions and requirements. Climb at the optimum speed of 62 KIAS, 115km/h, 71 mph and execute first turn with a 15 degrees angle of bank. The turn should be done with 90 degrees of heading change i.e. after having turned you should be perpendicular with the runway direction. You can check the direction by a quick look at the magnetic compass or the directional gyro. If the circuit pattern is practiced in calm wind conditions, then the direction of the turn would not be affected by the wind. However, these conditions occur so rarely that the wind should be taken into consideration when making the turns , which will cause the airplane to drift, thus the airplane will either be turned with a radius that is too large , or with a turn radius that is too small if the wind is not taken into consideration. The takeoff is usually executed into the wind , so the first turn is intentionally not turned the full 90 degrees of heading change. The heading is left slightly into the wind because the airplane will track along the ground in a direction which is perpendicular to the direction of the runway. After having made the turn , it is useful to find a point on the horizon in which to hold the heading until the second turn after takeoff is made.

Always remember to lookout for other traffic on the inside and on the outside of the turn before making this turn.

4.16.7 The Crosswind Leg

Between the first and the second turn continue to climb in order to reach the appropriate circuit altitude (usually 900ft/300m) and level the airplane off from the climb. Push the control stick forward to accelerate and when the engine speed reaches approximately 4500 rpm (81 KIAS, 150km/h, 93 mph), slightly reduce power to stabilize the required cruise speed and rpm, trim the airplane longitudinally and switch off the auxiliary fuel pump if installed in your airplane.

4.16.8 2nd Turn

Before arriving at the position to make the second turn, again keep a good lookout for traffic both on the inside and on the outside of the turn to make sure that no other aircraft are arriving. Listening to the air traffic communication helps you to monitor the surrounding air traffic. The particular position and distance from the runway to be maintained during the second turn (and for the other turns as well), should be determined by the specific procedures in effect for the airport that you are flying at and also by you so that you will be able to glide back to the runway in case of engine failure. A method for estimating the gliding distance is too use the wingtip. The wings must be level in order to use this technique and it can only be used with high wings and not low wings. If, when the wings are level, the runway is under the wingtip, this means that the airplane is within gliding distance of the runway and if the runway is above the wingtip then the airplane is not within gliding distance of the runway.

After having made the second turn at 15 degrees angle of bank and 90 degrees of heading change you may visually check the heading by a quick look at the compass or the directional gyro. The airplane should be directed parallel with the runway after the second turn i.e. you should not fly toward or away from the airport (a normal circuit pattern is rectangular however due to local regulations and conditions another shape may be necessary). A constant altitude must be maintained.

4.16.9 The Downwind Leg

The pre-landing checks can be completed when the airplane is approximately in the middle of the runway. Visually check at the airport, the runways and the base leg to make sure that they are all free of traffic. Check that the correct pressure on the altimeter is set (QNH), check altitude, fuel quantity, engine parameters are within the normal range (green arc), apply pressure several times to the toe-brake pedals and tighten the safety harnesses. If required report your position to the control tower.

4.16.10 3rd Turn (Base leg)

At a pre-selected position, execute the base leg turn using a 30 degree angle of bank toward the airport. The angle of bank during the base leg turn can be higher than in the first and second turns so that you are able to turn quicker and get the required checks completed. If you are close enough to the airport to be able to glide back to the runway in case the engine fails, then reduce the power to idle after executing the base leg turn. If you are too far away then reduce the power less. After having reduced the power, gradually pull the control stick back to maintain level flight until the airspeed slows down to approximately 65 KIAS, 120 km/h, 75 mph and then extend the wing flaps to the takeoff position (15 degrees). The maximum flap extended speed is 70 KIAS, 130 km/h, 81 mph. After extending the flaps correct the angle of descent by increasing or decreasing engine power and trim the airplane longitudinally.

4.16.11 Base Leg

Continue to the 4th turn (final approach leg) at 62-65 KIAS, 115-120 km/h, 71-75 mph and visually check that the airspace is clear and no planes are arriving to runway from outside (an airplane on long final). And again, listening of communication is helpful to have survey on traffic at the airport.

4.16.12 4th Turn (Final Approach Leg)

Execute the 30 degree turn to the final approach leg taking into consideration the wind direction so that the turn is completed into the direction of the runway. If there is a tail wind between the 3rd and 4th turn (i.e. crosswind to the runway direction), then start 4th turn early otherwise the wind drift will take you beyond the center-track of the final approach course and an additional turn will be required to bring you back to the center-track of the final approach course. After finishing the turn, correct the airplane heading so that the nose of the airplane is directed at the runway center line and then level the wings. If you turned too wide or if you turned inside of the center-track of the approach, then execute additional shallow turns to bring the airplane to the center-track of the final approach course. Use of the aileron control (no rudder) is enough to do it.

Now execute final approach leg checks i.e. extend the flaps to Landing position 1 (30 degrees) or to Landing position 2 (50 degrees) if a short field landing will be necessary. Correct the angle of descent as necessary either by fully extending the flaps and then pushing the control column forward to maintain airspeed or by adding more engine power and trimming the airplane longitudinally.

In this phase of flight , pay more attention to controlling the airplane's attitude against the horizon and the height above ground then looking at the instruments. Just only check very quickly to make sure that there is enough airspeed (62 KIAS, 115 km/h, 71 mph). Be sure that the surrounding airspace is free , especially at non-controlled airfields.

4.16.13 Final approach and landing

The circuit pattern segment: Final approach and landing itself is the same as described in the chapter which deals with landing.

For training purposes we recommend for you full stop landing. If the airfield is long enough, then after the airplane stops, the pre-takeoff checks can be done and another takeoff can be done followed by another circuit. If , during the last landing , too much runway was used up to safely make another takeoff , then after the airplane comes to a complete stop, taxi back to the chosen takeoff point. Here, complete the pre-takeoff checks and proceed with the next circuit.

It is useful to practice at first, takeoffs and landings with proper flap settings (take position 15 degrees for takeoff, Landing position for landing) and then proceed with flaps set to other positions (e.g. flaps retracted or fully extended at the takeoff etc.). This way, you will gain experience on how the flight characteristics are affected by the different flaps settings and practice pilot techniques to conduct short field takeoff and short field landings with flaps fully extended etc.

4.16.14 Follow-through

If you intend to execute a "Touch and Go" i.e. follow-through, then after the airplane and its nose wheel touch the ground, set the flaps to the takeoff position (they were probably in Landing position 1 or 2), set the trim lever to neutral (to be parallel with the flap control lever), glance quickly to see if the engine parameters are in the normal range, apply full power and immediately execute the following takeoff phases (liftoff, acceleration and climb). The phases of lift off , acceleration and climb will happen faster due to a higher airspeed at the start of the takeoff.

4.17 Slow Flight Airplane Characteristics

4.17.1 Introduction

This chapter provides the recommended procedures for the safe operation of the Sportstar at airspeeds less than cruise. It describes flight at minimum controllable airspeed; and information on stall and spin recognition, characteristics, and recovery.

Slow flight is defined as any speed in the range from just above the stall to just below the best endurance speed. This range is typically 3-5 KIAS above the stall speed. You should be capable of flying the aircraft in this speed range because you pass through it on every take off and every landing. Practising it at altitude will give you the confidence to positively and accurately fly the aircraft in this range when close to the ground.

4.17.2 Minimum Safe Speed

It may become necessary to fly at the minimum safe speed in order to get to a landing spot with an emergency problem like engine overheat, damaged canopy, etc. Minimum safe speed is defined as the stall warning speed + 10%. If no stall warning system is installed, the minimum safe speed is the stall speed for the given configuration + 5KIAS + 10%. For stall speeds refer to the Aircraft Operating Instructions (Flight Manual) Section 5 Performance.

4.17.3 Slow Flight Entry

You may enter slow flight from at or above the best endurance speed. If above, throttle back and as the airspeed bleeds off, raise the nose to maintain level flight. As the airspeed approaches 46 KIAS increase throttle to maintain airspeed and level flight. If you start from the best endurance speed, just pull back on the stick slowly and watch the airspeed bleed off. As it approaches 46 KIAS increase throttle to maintain airspeed and level flight. You will need about 5000 RPM to hold the aircraft level and trimming will help considerably to maintain altitude. If any altitude is lost it will be very difficult to regain and maximum power may be required.

4.17.4 Maneuvering during Slow Flight

Control surface effectiveness is reduced at slow speed so you will have to use larger than normal stick and rudder inputs and aircraft response will be slower. Do not exceed 15° of bank during practice because you are very close to the level stall speed and the turning stall speed is higher. Keep the ball in the centre and avoid full rudder input to prevent inadvertent spin entry. Power requirement is quite high with the flap up configuration and with flaps down it is even greater so practice with flap up.

4.17.5 Flight in Turbulence

Flight in turbulence is a compromise between staying below V_A to prevent a sudden gust from causing an overstress condition and having enough speed to be able to keep adequate control of the aircraft when a decreasing performance gust occurs. A speed of about 65 KIAS will accomplish this – it would take a huge gust to put you above V_A or below V_S, and a gust that large would indicate you shouldn't be airborne anyway. The correct technique is to set the throttle for this speed, and try to maintain level flight. Don't chase the airspeed and if you lose or gain altitude, simply climb or descend slowly to regain your original altitude.

4.18 Stalls

4.18.1 Safety considerations – Pre-stall Check

1. HEIGHT…..adequate to allow recovery by 2000 ft AGL. Typical altitude lost in recovery seldom exceeds 200 ft so plan accordingly.
2. AREA…..use a suitable practice area. This does not include anywhere near an airfield or traffic circuit. If the training area is heavily used and there is a common frequency transmit intentions to other aircraft in the area.
3. SECURITY…..ensure loose articles secure, harness tight, canopy locked and windows closed.
4. ENGINE…..temperatures and pressures in the green, prop pitch full fine.
5. LOOKOUT…..do a couple of clearing turns to ensure no other aircraft are in the vicinity. Look below your altitude too.

4.18.2 Level Power-off Stalls

As you are doing your clearing turns (last item in the pre-stall check) reduce the throttle so that your speed drops to about 55-60 KIAS, 100-110 km/h, 65-70 mph. This will allow you to get into the manoeuvre right away rather than wait while you slow down after rolling out of the turn. Once you are straight and level, set the flap configuration and reduce the throttle to idle. Retrim. To remain level you will have to slowly pull back on the stick and as soon as you do that the airspeed will decrease. Try to keep the stick neutral with respect to the ailerons and keep the ball in the centre. If one wing wants to drop try to stop it with opposite RUDDER, not aileron. If you have some aileron input in at the stall point, the other wing will drop first ie small right aileron input, left wing will drop, and vice versa. The slower you get the more you will have to pull back on the stick, even to the point that the stick is all the way back, and it happens fairly quickly so be prepared to pull all the way. The nose attitude will be abnormally high.

As you approach the stall point you will feel a "burble" in the controls and this is the result of the airflow over the wing beginning to detach from the wing surface and change from laminar (smooth) flow to turbulent flow. The controls will be very sloppy. At the stall point the nose will fall and the amount will depend on the severity of the stall. If it stalls from a very nose high attitude the stall will be quite pronounced and the nose will drop through the horizon. If the entry was from a more shallow attitude the nose may only drop slightly below the horizon.

The first action in the recovery is to release the back pressure. This usually means put the stick forward to the neutral position. If you ever feel yourself rising in the seat it means you have pushed the stick too far forward and the nose has dropped further than it needs to and you will loose more altitude than necessary during the recovery.

As soon as the nose drops the stall is effectively broken because the angle of attack is now below the critical angle. However, you cannot yet pull back on the stick to regain level flight. Push the throttle in full, let the speed build to about 65 KIAS (120 km/h, 75 mph) and then smoothly pull back to level flight. If you try to pull too soon and too vigorously you could induce a secondary stall.

If the wing dropped at the stall point, resist the urge to pick it up with aileron and use only rudder (left wing down, use right rudder and vice versa) to level the wings. Because it is so natural to use aileron this is extremely hard to do, even for experienced pilots, but it is a must to avoid inducing a deeper stall on the lower wing. In fact, if you did everything wrong ie pulling up without letting the speed build up, not getting the throttle to full, and trying to lift the low wing with aileron, you probably will induce a spin.

On recovery with flaps extended ensure you do not exceed the maximum speed with flaps extended (70 KIAS, 130 km/h, 81 mph)

If the stick is held fully back at the stall the aircraft will usually start to swing laterally with increasing amplitude and possibly enter a deep stall which is initially uncontrollable. If the air is smooth the swing may not occur and the aircraft is fully controllable. Recovery in both cases is to simply release the back pressure and let the speed build up when normal flight may be regained.

4.18.3 Stall Warning

The change in flight characteristics as you approach the stall are not readily detectable. The light burble may not be noticed by an inexperienced pilot and as long as the pilot has not pulled the stick back all the way, the aircraft is fully controllable going into the stall. A stall warning system is available as an option and a warning horn will sound when the speed gets to within 5-10 KIAS (10-19 km/h, 6-12 mph) of the stall speed.

4.18.4 Wing Level PowerOn Stalls

The Sportstar angle of incidence is quite high, especially at full power, during a power-on stall. To enter the stall, pull the nose up smoothly to 10-15° above the horizon and set the throttle to maximum. Right rudder will be required to overcome the left yawing moment created by the engine and some left aileron will be required to keep the wings level. Continue pulling the nose up just enough to gradually reduce the speed toward the stall.

When the nose drops push the stick forward to neutral or slightly forward of neutral. The throttle is already at full power and recovery of flying airspeed is very quick. Usually the left wing drops at the point of stall so pick it up with rudder initially and then with aileron as the speed builds.

If you pulled up too rapidly on entry you could easily overshoot the angle where the stall would normally occur and the airspeed would drop off very quickly and there you are with the nose quite high and no airspeed. If that happens, neutralize the stick and let the natural forces take over until the nose eventually goes below the horizon. At that point the aircraft will once again be fully controllable and you can resume normal flight. Centralizing the controls is essential – even small aileron inputs can put you into a spin when you are below the stall speed.

If you decide not to carry out the stall after setting the initial attitude and push forward to level flight with enough force to feel negative G, the engine will probably quit and anything loose in the cockpit will float up to the canopy. Pulling back on the stick will recovery from this uncomfortable situation.

4.18.5 Turning Flight Stalls

There are normal and accelerated turning flight stalls. The difference between them is the speed reduction gradient, which is usually 1 knot, 2 km/h, 1 mph per second for normal stalls and 3-5 knots, 5-9 km/h, 3-6 mph per second for the accelerated ones. Refer to Aircraft Operating Instructions (Airplane Flight Manual), Section 5. Performance for stalling speeds of coordinated 30° banked turns.

4.18.6 PowerOff Turning Flight Stalls

Enter a stabilized (ball in the center) turn and begin to pull the control stick with required gradient. Maintain bank during turn. An impending stall in the Sportstar is not clearly indicated by vibrations of the airplane or shaking of the control stick, but experienced pilots should feel softening of the control system. There is no general rule about which wing will drop first, if any. The bank may increase, decrease or stay the same and the stall itself will be shown by the airplane's downward motion. Generally speaking, the stalls in clean configuration (flaps up) are more comfortable than stalls with the flaps extended. Recovery from that stall can be accomplished by releasing the back pressure or adding power and the airplane will promptly increase airspeed and recover from the stall. If the airplane has a tendency to increase bank, then move the stick forward, add some power if need be, and then press the opposite rudder pedal (left wing down-right pedal). After the airplane accelerates use aileron to correct bank.

4.18.7 PowerOn Turning Flight Stalls

Stalls in a left turn are worse than stalls in a right turn because of engine torque, while in a right turning stall the aircraft bank will decrease towards level and this tendency is evident even prior to stall.

Generally speaking the less comfortable would be a stall in a left turn at full power, flaps fully extended.

4.18.8 Accelerated Stalls

As already explained the speed reduction gradient during accelerated stalls is higher (3-5 knots, 5-9 km/h, 3-6 mph per sec.) i.e. the accelerated stalls are executed by a quicker and stronger pull of the stick. An accelerated stall is indicated by a significant drop of airplane's nose below horizon, while in normal stalls, the airplane usually moves downward with very little nose drop.

4.18.9 Conclusion

The stall characteristics are not significantly affected by of elevator trim position, which only affects control forces you can feel in the stick prior to a stall.

The airspeed which the airplane should reach for non-problematic stall recovery varies around 54 KIAS, 100 km/h, 62 mph. During stall recovery, once the aircraft reaches 54 KIAS, 100 km/h, 62 mph, full normal control authority is available.

For all stalls, reducing the back pressure is enough to lower the angle of attack (AOA) below the critical AOA and break the stall. After that either nose down movement or power addition is required to increase speed and resume normal flight conditions.

4.19 Spins

WARNING!

AEROBATICS as well as INTENTIONAL SPINS are prohibited!

The SPORTSTAR design is based on very light airplane called EV-97 VLA HARMONY (type certified according to JAR-VLA) and ultralight airplane EV-97 EUROSTAR (type certified e.g. according to UL-2, BfU, BCAR S and further regulations).

Both these types have been spin tested – Harmony against JAR-VLA 221 requirements and Eurostar against BCAR S 221. Spinning. The spin requirements of both regulations are identical:

(a) The airplane must be able to recover from a one turn spin or a 3 second spin, whichever takes longer, in not more than one additional turn, with the controls used in the manner normally used for recovery. In addition -

(1) For both the flaps-retracted and flaps-extended conditions, the applicable airspeed limit and positive limit maneuvering load factor may not be exceeded;

(2) There may be no excessive back pressure during the spin or recovery; and

(3) It must be impossible to obtain uncontrollable spins with any use of the controls. For the flaps-extended condition, the flaps may be retracted during recovery.

Both the EV-97 Eurostar and EV-97 VLA Harmony, which were the design basis for the Sportstar, demonstrated very good spin characteristics. At forward C.ofG. the airplanes did not enter into a spin but into a spiral, at aft C.ofG. spinning was possible. To recover from the spin, it was enough to move the stick to the neutral position and both models immediately recovered from the spin. Full opposite rudder was not necessary. Although the Sportstar has a slightly longer wing span and wider tilting canopy than above mentioned and spin tested models, good spin characteristics may be anticipated because the Sportstar has the same very stall characteristics as both these models and the same C.of G. range.

4.20 Emergency Procedures Practice

The emergency procedures are discussed in Section 3. of the Aircraft Operating Instructions (Airplane Flight Manual). The following procedures may be used for practicing engine failures in particular phases of flight.

4.20.1 Engine Failure Practice

Engine failure in any flight phase is simulated by pulling the throttle lever to idle. Never shut down the engine to practise engine failures! For training purposes select a landing area that is long enough that you can simulate the threshold at about 1/3 of the way from the real threshold. If you do this and make a mistake that would make you land short you can always continue to touchdown to get the maximum training value.

Ensure aerodrome traffic and/or the Air Traffic Controller are aware of your intentions to practice engine failure procedures. Pull the throttle lever to idle at the chosen phase of the takeoff (run, acceleration, transition to climb, climb) to simulate engine failure.

WARNING!

If a failure of the engine was a no-duff emergency that was not caused by a closed fuel selector or zero fuel, then do not continue the flight even if your attempt to restart the engine was successful. Land at the nearest airport, and, check the powerplant and fuel system to find the reason for the engine failure and remedy it prior to next flight.

4.20.2 Engine Failure During Takeoff

Generally speaking there are the following reasons for aborting a take off:

- engine failure or power loss due to some failure of the engine or component
- engine failure due to closed fuel selector
- engine failure due to insufficient quantity of fuel

4.20.2.1 Emergency Procedures

The exact procedures to follow for engine failure depend on height at which the engine failed. The basic rule is always to immediately push the control stick forward to reach higher airspeed and go into descent and not into a stall and then you can extend wing flaps (if you have enough time) as for landing. Keep in mind that the Sportstar is a light aircraft which has low inertia and loses airspeed relatively quickly. Therefore immediate movement of the control stick forward is necessary to avoid a stall.

1. If the aircraft is less than 10m above ground when the engine fails the stick cannot be pushed too far forward and airspeed cannot likely be increased because there just isn't enough altitude available. It would be more like an initial stick forward followed soon after by aft stick as you enter the roundout.

2. If the engine fails below 50m (150ft), then you must land straight ahead or slightly to one side of the runway. Push the stick forward to reach higher airspeed and go into descent, then extend the flaps as required and land either straight forward or slightly to one side of the runway. In no case try to restart the engine (you have no time!) or turn back to the airport!

3. If the engine fails between 50-120m (150-400ft), push the stick forward to reach a higher airspeed and go into a descent, extend flaps as required and turn up to 90° (more height allows a greater turn) to land on a runway or a field close to the airport.

4. If the height above ground is 80m (250ft) then at first push the stick forward, choose area for landing, direct the airplane to that area and now you should have some time to look for the cause of the engine failure i.e. check the fuel selector is LEFT or RIGT, emergency fuel pump ON (if installed) and try to restart the engine by turning ignition key fully clockwise. If this attempt fails, land in the chosen area. If the engine starts, land at the runway.

5. If the engine fails above 120m (400ft), then immediately push the stick forward to increase airspeed and go into descent, extend flaps as required and turn up to 180° to return to the airport. The correct actions are:

- start a turn back to the runway. The direction of turn is crucial – you must turn into any crosswind. This will allow you to turn less than 180° degrees because you will be turning upwind and when you roll out you let the crosswind blow you toward the runway. If you turn downwind you will have to turn more than 180° to get back to runway centreline and then make another turn to get lined up on the runway. The direction of turn should be considered before take off so that when the engine failure happens you do not have to make any decisions and can react immediately.

- maintain the best glide speed 57 KIAS and ensure flaps are UP. This should be simultaneous with starting the turn because the typical mistake is for the pilot to allow the airspeed to decrease in the turn to the point of stall, use a bit too much rudder to increase the turn rate and the aircraft enters a spin from which recovery is impossible. The crash is usually fatal.

- once rolled out and pointed at the runway, maintain the glide speed. This is very difficult to do if it appears uncertain to you that you will be able to make the runway because the natural tendency is to raise the nose in this situation. However, remember that the best glide speed means that for any other speed you will not travel as far across the ground. So if you think you won't make it and raise the nose to stretch your glide you are guaranteeing that you will not glide as far as possible.

- use flap as required to land. Do not put it all down at once because you may cause yourself to land short. Put flap down in stages and only when you can really tell that you are high – that way you should never over commit yourself and end up short.

- be prepared for the downwind landing, particularly if the wind is strong. Your ground speed will be higher at touchdown and the nose wheel steering will be much more sensitive. Raise the flap after touchdown to get more weight on the wheels for braking.

The effect of increasing wind strength is to make this manoeuvre easier because the wind keeps you closer to the runway as you climb out. However, a stronger wind will mean a higher ground speed on touchdown.

It cannot be stressed enough that this is a critical manoeuvre and when started at the minimum height demands precision execution and only a well trained and current pilot can do it successfully.

4.20.2.2 Engine Failure During Takeoff Roll

If the engine fails during takeoff roll, pull the throttle lever to idle and stop the airplane with brakes. Then check that you did not forget to open fuel selector. If this was cause of engine failure, open it and repeat the takeoff. Also check that the fuel quantity is enough for intended flight. If an emergency fuel pump is installed in your airplane then check it is ON. If the fuel selector was LEFT or RIGHT, fuel quantity sufficient and emergency fuel pump was ON and the engine nevertheless failed, then do not try to repeat the takeoff. Taxi back to hangar to conduct a thorough inspection of fuel system to find the cause of the engine failure (impurities or debris in fuel system etc.). Finally conduct engine test run to check engine and fuel system proper function.

When practicing engine failure during the takeoff roll, you should choose a starting point close to the runway threshold, so that a rest of the runway will be long enough to safely stop the airplane. During the takeoff roll, after the nose wheel unsticks from the ground, suddenly reduce the throttle lever to idle to simulate engine failure.

Pilot technique is the same as used for a normal landing i.e. do not push the control stick forward but keep it in neutral or pull it smoothly and slowly to keep the nose above ground until it naturally touches down, and use the rudder control to maintain direction. After the nose wheel is in contact with ground, start to apply brakes to stop the airplane.

You may of course, practice as short a landing roll as possible. To accomplish this after engine failure simulation, you should slightly (not strongly) push the control stick forward to force the nose wheel to touch down and simultaneously start to brake.

Be careful at higher speeds, because the nose wheel steering is more sensitive.

4.20.2.3 Engine Failure During Acceleration

If you intend to practice engine failure during acceleration after lift off then you can pull the throttle to idle at 1m (3ft) above ground. Pilot technique is the same as during roundout i.e. smoothly and gradually pull the control stick until the airplane touches down. Do not pull the control stick too fast to avoid ballooning and also, do not push the stick!

In this situation you could be coming close to the end of the runway so you will have to stop quickly. Lower the nose to the runway immediately and start braking. If you go off the runway avoid hitting obstacles with the fuselage and let the wings absorb any such impacts.

4.20.2.4 Engine Failure During Transition to Climb

Engine failure at this phase of takeoff is the most critical because the airplane angle of pitch is too high, airspeed is also high (around 62 KIAS, 115 km/h, 71 mph, but the airplane is still near the ground, so if you push the control stick too much you risk that the airplane will quickly enter into descent. You would not have enough time to pull the control stick and roundout and the airplane would hit the ground on the nose wheel at high speed, which may cause nose wheel damage, damage of the propeller, engine cowling and engine.

Therefore you must push the control stick only in such extent, that the airplane will go into shallow descent and immediately begin to pull the control stick smoothly and slowly to regularly roundout and land. It is very important in this phase of takeoff, especially when practicing an engine failure, that the rest of runway ahead of the airplane is long enough to touch down and stop the airplane safely. There must be no obstructions (trees, fences, cross road etc.) just behind the runway but a cleared area or field without obstructions, so there will be no risk of airplane damage or injury if it is impossible to stop the airplane on runway. To simulate engine failure during transition to climb, pull the throttle lever suddenly to idle at height 5-10 m (15-30ft) above ground.

If it happens that the engine really fails in operation in this phase of takeoff, and there is no risk of hitting an obstruction on runway or behind it, then switch off ignition (turn the key fully anticlockwise), switch off also Master switch, if there is enough time to do it.

4.20.2.5 Engine Failure During Climb

If the engine fails during climb phase of takeoff, prior to first turn, then a further pilot technique depends on height at which this happened. During training, try to simulate engine failure both near the ground and at higher altitude. The emergency procedures to be used in these cases have been already discussed in the chapter 4.20.2.1.

The basic rule is always to immediately push the control stick forward to reach higher airspeed and go into descent and not into a stall and then, if there is enough time, you can adjust angle of descent by extending wing flaps. Keep in mind as already mentioned, that the Sportstar is light aircraft having low inertia thus loses airspeed very fast. Therefore immediate movement of control stick forward after engine failure is needed to avoid stall.

4.20.3 Engine Failure in the Circuit

4.20.3.1 General comments

Not all pilots fly their circuits to the same parameters such as height, distance out and speed and therefore only general comments can be made about the options a pilot has. However, in general, whenever an engine failure occurs above 500 ft in the circuit the pilot should do the following:

1. turn toward the runway. Turning to the runway may mean going for an intersecting runway as opposed to the departure runway. The wind direction will be an important factor in this decision.
2. acquire and maintain the best glide speed and make sure the flaps are up. This will give you the most time to make a decision on what you are going to do. Make sure you hold that speed all the way to final approach to maximize ground travel and minimize the potential to stall.
3. decide what you are going to do.
4. inform circuit traffic that you have an engine failure and what your intentions are.
5. when it comes time to lower flap, do so in stages. Lowering flap all at once could put you into a low situation and make you land short. It is far better to land long and go off the end at low speed than to land short at high speed.
6. If the runway is long enough, plan to land up to 1/3 past the threshold. Then if you make a mistake you can still land on pavement short of your intended touchdown.

A corollary that falls out of this discussion is that you should fly circuits as tight as local procedures allow and then you should practice engine failures from several different positions. When you do this you start with all the advantages – no surprise, probably already have a plan, and no pressure because you have a good engine to get you out of trouble. However, when it happens for real it is a big surprise and the psychological pressure on you, knowing you only have one chance at success, is huge. If you weren't thinking about it you have to make a plan that includes wind consideration. Another unexpected factor is that a stopped prop or a spinning prop on a dead engine creates more drag than you have ever had from a prop spinning at idle when you practised your last engine failure and your glide ratio will be less than what you are used to. It all adds up to the requirement to be very conscious of "what do I do if…" at all times and practice engine failure procedures whenever you can.

4.20.3.2 Engine failure During Crosswind Flight

If the engine fails in this phase of takeoff, then you should be able to return to the airport from which you started, because of sufficient height above the ground. So when training this emergency situation, pull suddenly the throttle lever to idle to simulate engine failure between first and second turn after takeoff, the immediately push the control stick forward to reach airspeed about 62 KIAS, 115 km/h, 71 mph and execute next 120-150 degree turn towards the airport. If you started with strong upwind and there is a risk that you will over fly the airport, then do not turn towards the airport but on the contrary turn away the airport and then execute another turn towards the airport. You will loose some height by this maneuver and will arrive to the airport from longer distance so would not over fly the airport even when landing downwind.

After you will push the control stick and bring the airplane to runway heading, then check fuel pressure if a fuel pressure gauge is installed in your airplane, check that the fuel selector is LEFT or RIGHT, fuel quantity sufficient. If this everything is OK and the engine failed then do not try to restart the engine, because a fuel hose may be ruptured and there is a risk if fire!

Finally you should always report real emergency to tower controller (if there is enough time to report it).

When descending back to the airport, extend flaps as needed to correct angle of descent. If you started with strong upwind then keep in mind you will land with strong tailwind i.e. you will touch down at higher speed.

4.20.3.3 Engine Failure During Downwind

If the engine fails in this phase of circuit pattern, then you will have probably enough height to safely land back at the airport because the circuit height is usually 300m (1000ft).

The further emergency procedure depends on whether the engine failed just after the second turn or before 3rd turn. If it happens just after second turn then you will probably land downwind i.e. against direction of your takeoff. If this happened before 3rd turn you can land upwind as usually. So when intend to practice this emergency, suddenly pull the throttle lever to idle in chosen moment at downwind phase, push immediately the control stick forward to not slow down below 62 KIAS, 115 km/h, 71 mph, turn towards the airport (not away from the airport because you are already too farand should not be able to glide back to the airport) and according to conditions such as distance from airport, altitude, wind, runway length, fields close to runway etc. decide, whether you shall land downwind or have enough altitude to execute base leg, final approach and landing upwind i.e. in the same direction as you executed the takeoff.

After you direct the airplane towards the airport, do not extend the wing flaps, this should be only done if you are sure to reach the airport. So when the airplane glides in direction of runway and you are sure to reach the threshold you can extend flaps as needed.

After you pushed the control stick and directed the airplane towards the airport you should check fuel pressure if fuel pressure gauge is available, that the fuel selector is LEFT or RIGHT and fuel quantity enough. And that Master switch and ignition (key in Both position) is ON. And again, if everything this was OK, it is not recommended to restart the engine because a fuel hose may be ruptured and there will be a hazard of fire. In such case, it is better to turn off all electrical appliances, ignition and close (OFF) the fuel selector. Perhaps if you recognize that you are not able to reach the airport, try to restart the engine to help you go back. Finally report the real emergency to tower controller.

WARNING!

If the engine really fails in flight and this was not due to closed fuel selector and/or insufficient fuel quantity, do not continue to your destination. In the event you were able to restart the engine land as soon as possible at nearest airport and find and remedy engine failure cause prior to next flight!

One of the most common pilot error during emergencies at low heights above ground is that the pilots have tendency to not use bank when turning, because they afraid of hitting ground with the wing tip), so they try to turn using only the rudder control. This is dangerous especially at low airspeeds because there is a risk of entry into a spin. So you should always have enough airspeed about 62 KIAS, 115 km/h, 71 mph (the pilots have also tendency to pull the stick to slow down near the ground) and try to turn with proper bank and rudder deflection i.e. ball of turn indicator in the middle.

4.20.3.4 Engine Failure at Base leg

If the engine fails in this phase, then push the control stick immediately forward to not slow down below 62 KIAS, 115 km/h, 71 mph and direct the airplane as shortest way as possible back to the airport. If the engine fails in this phase of landing there is a risk, of being too far from the runway threshold or too low, such that you will not be able to reach runway and will be obliged to land in a field close to the airport or at cleared area. Practicing patterns will help you to gain experience in estimating whether you will or not reach a runway under certain conditions such as distance from runway, altitude, wind direction and velocity, etc.

So when considering these conditions, decide whether you will land at the runway or at some field in front of the runway (clearway). According to that, adjust angle of descent by extending wing flaps and land in chosen area. Then report necessity to emergency land to tower controller.

4.20.3.5 Engine Failure after 4th Turn or During Final

If an engine failure occurs at final approach leg, when you have already low height above ground, then there is always a risk that you will be short, not able to reach the runway threshold, thus obliged to land short of the runway. The first rule in such case is always to push the control stick to not loose the airspeed which should be about 62 KIAS, 115 km/h, 71 mph, then you can increase gliding ratio by slowly retracting the flaps (slowly to not lose height), switch off all instruments, ignition, master switch, close the fuel selector and report that emergency to tower controller. If you practice this emergency, then always simulate engine failure so that to be able to reach runway and land safely, otherwise the airplane may be damaged and you injured.

4.20.3.6 Balked Landing

A pilot technique to be used at balked landing depends on phase of landing at which you decide to abort it and repeat it.

If you decide to abort landing at final approach, when the airspeed should be around 62 KIAS, 115 km/h, 71 mph, flaps extended, then change the control stick force gradually and increase engine power to maintain airspeed and transit to climb, being careful to not slow down . After the climb is stabilized you may retract the wing flaps. Then trim the airplane longitudinally. Repeat circuit pattern and landing.

If you continue the climb with the flaps still fully extended , do not forget that best rate of climb speed with this flap setting is 49 KIAS, 90 km/h, 56 mph and is lower than with flaps retracted (62 KIAS, 115 km/h, 71 mph). For more detailed performance data refer to Aircraft Operating Instructions (Airplane Flight Manual), Section 5. Performance, where you can find climbing charts of your airplane with given propeller and engine.

Applicable airworthiness requirements usually require the minimum climb gradient with flaps extended, for light Sport Aircraft it must be greater than 1:30, the Sportstar achieves 1:9 which is three times better.

If you decide to abort landing at roundout, then quickly apply full power by pressing the button of throttle lever and pushing the lever forward and simultaneously move the control stick forward to correct the control stick forces. The stick should be pushed a bit more than in previous case (aborting at final), so that the airspeed will not decrease. By applying engine power, the airplane will transit from descent phase to climb phase and after greater height is reached, slowly retract the flaps and adjust longitudinal trim. Repeat circuit pattern and landing.

If you decide to abort landing just prior to touch down (an obstruction on runway etc.), and if that obstruction is too far from the airplane, add full power, accelerate to 59 KIAS, 110 km/h, 68 mph and go into climb, retract slowly wing flaps, monitor airspeed to not slow down, adjust trim and repeat circuit pattern and landing on a clear runway.

If an obstruction is too close then immediately apply full power and go into climb and again, but the airspeed must not decrease. In the climb slowly retract the wing flaps and trim the airplane. Repeat circuit pattern and landing on another runway or behind that obstruction if rest of runway is long enough to stop the airplane safely.

You can of course execute a shallow turn to fly around that obstruction, however be careful to not hit the ground with the wing tip (shallow bank only).

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