Zlin Aviation s.r.o.
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Czech Republic

ULM/LSA Aircraft

SAVAGE

Classic/Cruiser/Cub/Bobber

MAINTENANCE MANUAL

Airplane Serial Number:	
Airplane Registration Number:	

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In compliance with ASTM Standard F2483-05

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LOG OF REVISIONS

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1	Extended content	24-Apr-2009	SG	PR
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LIST OF EFFECTIVE PAGES

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NC	All	Initial issue	01/02/2006	PR	PR
1			24/04/2009	SG	PR
2	All	General re-arrangement, improved page numbering, extended content.	23/01/2013	LC	PR
3					

Section 0 – INTRODUCTION

0.1 TABLE OF CONTENTS

0.2 SCOPE

This manual has been written by Zlin Aviation sro in accordance with the standards of ASTM F2483.
This document defines the content and structure of the maintenance manual for Savage LSA Aircrafts models Classic, CUB, Cruiser, manufactured by Zlin Aviation sro, and its components while operated as Light Sport Aircraft. It also establishes guidelines for the qualifications to accomplish the specified maintenance tasks on U.S. certificated Savage LSA Aircrafts.

For the SAVAGE airplanes that are not under LSA rules and when the figure of a LSRMA is not issued, all the maintenance procedures designated to a LSRMA have to be made by a Zlin Aviation s.r.o. authorized technician if it is not against the national rules of the State of registration of the airplane.

NOTE: *Zlin Aviation sro, cannot through this manual address all of the safety concerns associated with the use of this document. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of any regulatory limitations prior to use.*

0.3 REFERENCED DOCUMENTS

ASTM Standards:

- F 2245 Specification for Design and Performance of a Light Sport Airplane
- F 2295 Practice for Continued Operational Safety Monitoring of a Light Sport Airplane

Federal Standards:

- 14 CFR Part 21.190 Issue of a Special Airworthiness Certificate for a Light-Sport Category Aircraft
- 14 CFR Part 43 – Maintenance, Preventive Maintenance, Rebuilding, and Alteration
- 14 CFR Part 65 – Certification: Airmen Other Than Flight Crewmembers
- AC 43.13-1B - Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair

Technical documents:

- Rotax Line Maintenance Manual: Ref. MML912
- Rotax Heavy Maintenance Manual: Ref. MMH912

0.4 TERMINOLOGY - DEFINITIONS

1. Annual Condition Inspection – detailed inspection accomplished once a year on a LSA in accordance with instructions provided in the maintenance manual supplied with the aircraft. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation.
2. *A&P* – airframe and powerplant mechanic as defined by 14 CFR Part 65 in the U.S. or equivalent certification in other countries.
3. *FAA* – United States Federal Aviation Administration.
4. *CAA* – Civil Aviation Authority of third countries in general.
5. *Heavy Maintenance* – any maintenance, inspection, repair, or alteration a manufacturer has designated that requires specialized training, equipment, or facilities.
6. *Line Maintenance* – any repair, maintenance, scheduled checks, servicing, inspections, or alterations not considered heavy maintenance that is approved by the manufacturer and is specified in the manufacturer's maintenance manual.
7. *LSA (Light Sport Aircraft)* – aircraft designed in accordance with ASTM Standard specification F2245, under the jurisdiction of Committee F37 Light Sport Aircraft.
8. *LSA Repairman Inspection* – U.S. FAA certificated repairman (light sport aircraft) with an inspection rating, defined by 14 CFR Part 65, authorized to perform the annual condition inspection on experimental light sport aircraft, or an equivalent rating issued by other civil aviation authorities.
9. *Discussion* – Experimental LSA do not require the individual performing maintenance to hold any FAA airman certificate in the U.S.
10. *LSA Repairman Maintenance* – U.S. FAA certificated repairman (light sport aircraft) with a maintenance rating as defined by 14 CPR Part 65, authorized to perform line maintenance on aircraft certificated as special LSA aircraft. Authorized to perform the annual condition/100-hour inspection on an LSA, or an equivalent rating issued by other civil aviation authorities.
11. *Maintenance Manual(s)* – manual provided by an LSA manufacturer or supplier that specifies all maintenance, repairs, and alterations authorized by the manufacturer.
12. *Major Repair, Alteration, or Maintenance* – any repair, alteration, or maintenance for which instructions to complete the task excluded from the maintenance manual(s) supplied to the consumer are considered major.
13. *Manufacturer* – any entity engaged in the production of an LSA or component used on an LSA.
14. *Minor Repair, Alteration, or Maintenance* – any repair, alteration, or maintenance for which instructions provided for in the maintenance manual(s) supplied to the consumer of the product are considered minor.
15. *Overhaul* – maintenance, inspection, repair, or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacturer of the product.
16. *Overhaul Facility* – facility specifically authorized by the aircraft or component manufacturer to overhaul the product originally produced by that manufacturer.
17. *Repair Facility* – facility specifically authorized by the aircraft or component manufacturer to "repair the product originally produced by that manufacturer.
18. *14 CFR*-Code of Federal Regulations Title 14 Aeronautics and Space also known as the "FARs" or Federal Aviation Regulations.

19. *100-hour inspection* – same as an *annual condition inspection*, except the interval of inspection is 100 h of operation instead of 12 calendar months. This inspection is utilized when the LSA is being used for commercial operations such as flight instruction or rental, or both.
20. *Airworthy:* is when an aircraft or one of its component parts meets its type design and is in a condition for safe operation.

Achronims:

1. *QAP* – Quality Assurance Program
2. *QAM* – Quality Assurance Manual
3. *AMM* – Aircraft Maintenance Manual
4. *QAR* – Quality Assurance Record
5. *POH* – Pilot's Operating Handbook
6. *SA* – Safety Alert
7. *SB* – Service Bulletin
8. *LSRMA* – Light Sport Repairman
9. *FTD* – Field Technical Director
10. *ZA* – Zlin Aviation sro

0.5 SIGNIFICANCE AND USE

The purpose of this maintenance manual is to provide guidance to owners, mechanics, airports, regulatory officials, and aircraft and component manufacturers who may accomplish maintenance, repairs, and alterations on the Savage Classic, Cruiser or CUB Light Sport Aircraft.

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Section 1 – AIRCRAFT MAINTENANCE MANUAL

1.1 GENERAL

Zlin Aviation sro developed this aircraft maintenance manual which contains the information that a trained mechanic will need to maintain the aircraft in an airworthy condition. The Aircraft Maintenance Manual was prepared to meet the ASTM F2483 Standard Specification requirements. This maintenance manual is divided into chapters. The chapter numbering information appears at the header and foot of each page.

The format of the manual is designed to be familiar to aircraft mechanics.

This manual does not show part numbers and cannot be used alone for ordering spare parts.
The wiring schematic that has been included in the manual is for general information purposes only. Aircraft might have optional equipment for which there are specific drawings that will either be included with the aircraft's documentation on delivery or be available from Zlin Aviation sro or Sportair USA.

Please carefully read this manual and the POH, along with the Engine Maintenance Manual before using the aircraft.

The LSA Airplane Savage is a sturdy aircraft, easy to maintain, and with the help of this manual you will be able to apply correct procedures. Eventual or any further modifications or variations will be advised through bulletins and alerts (SA, SB, Notifications). For further information or explanation contact ZLIN AVIATION s.r.o. or call the local distributor of your country.

Because of the fact this manual contains information that will be useful to any future owners of this aircraft, it is must be considered an integral part of the aircraft.

1.1.1 SPECIFICATIONS AND DATA

Technical Description

The Savage is a single engine, high wing, two seat tandem Light Sport Aircraft of classical design. It is built in the Czech Republic (Zlin Aviation sro) and in Italy (Zlin Aviation Italia srl) in full compliance with the regulations in force in both Countries, and to the requirements of the ASTM Consensus Standards for Light Sport Aircraft. The manufacturing organization between the two companies if fully covered in the company's QAP and explained and described in the company's QAM.

Dimensions	CLASSIC/BOBBER	CRUISER	CUB
Wing span	931 cm (366.5 in)	945 cm (372 in)	939 cm (369.7 in)
Length	639 cm (251.6 in)	651 cm (256.3 in)	640 cm (252 in)
Height	203 cm (79.9 in)	203 cm (79.9 in)	203 cm (80 in)
Wing surface area	14,2 m^2 (152.85 sq ft)	14,2 m^2 (152.85 sq ft)	14,2 m^2 (152.85 sq ft)
Wing chord	156 cm (61.4 in)	156 cm (61.4 in)	156 cm (61.4 in)
Cabin width	69 cm (27.2 in)	69 cm (27.2 in)	67 cm (26.3 in)

Weights (ULM-VDS)	CLASSIC/BOBBER	CRUISER	CUB
Max take-off weight	600kg (992 lbs)	600 kg (992 lbs)	600 kg (992 lbs)
Empty weight	288 kg (633.6 lbs)	291 kg (640 lbs)	296 kg (652 lbs)
Payload	162 kg (356.4 lbs)	159 kg (349.8 lbs)	154 kg (339.5 lbs)
Max wing loading	39,4 kg (86.9 lbs)	39,4 kg (86.9 lbs)	39,4 kg (86.9 lbs)
Load factor, limit	+4 -2	+4 -2	+4 -2

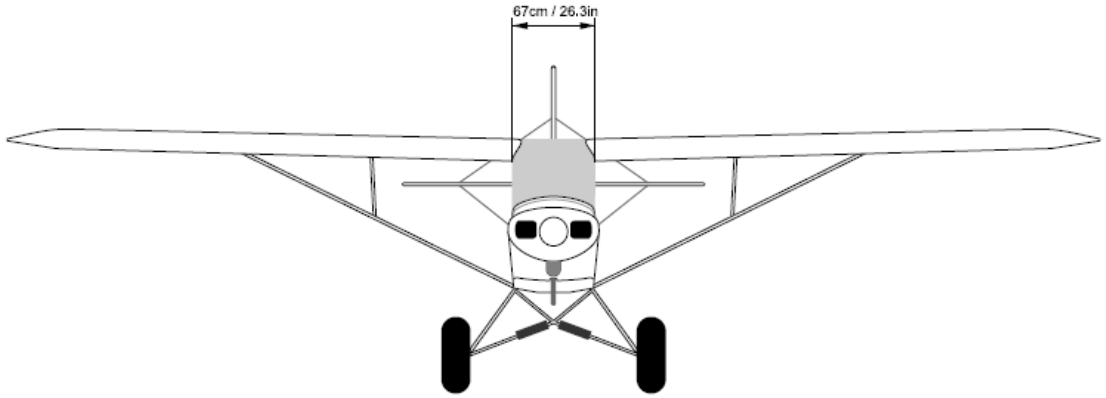
NOTE: Performance specifications are outlined in the POH.

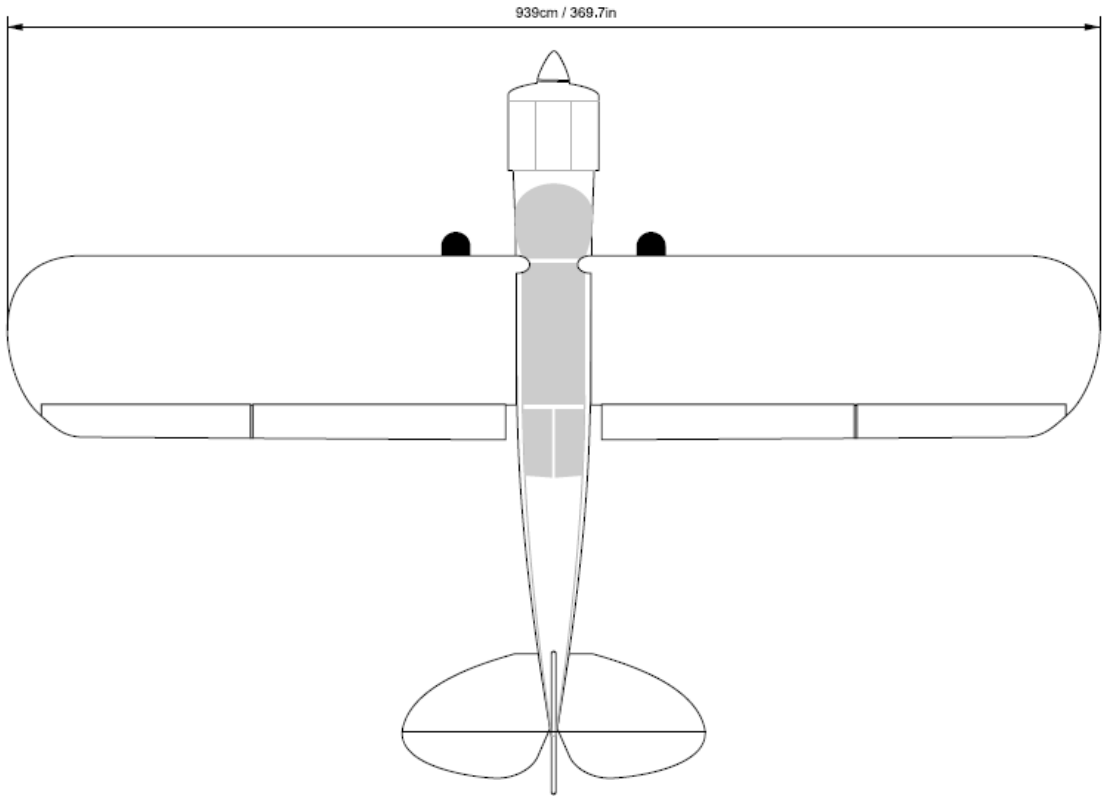
Difference between Classic, Cub, Cruiser, Bobber

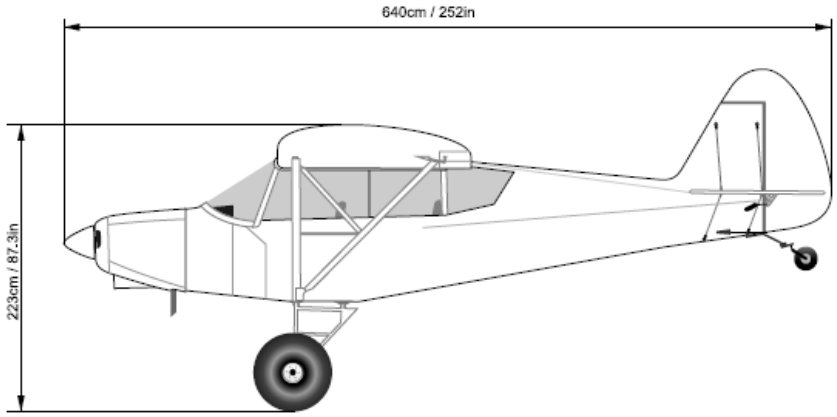
- Aesthetic differences in the cowling design (CUB has a metal sheet cowling instead of composite);
- Different panel housing;
- Slightly different instrument panel;
- Bending angle of the front lexan varies
- Different shape of landing gear
- Design of the bottom fuselage part
- Different window design
- Different wing tips design

NOTE: wings and profile, fuselage, controls, main constructive aspects etc. are the same for all models. There are no maintenance aspects that make one model different from the other (others than the materials of the cowling which need different processes for minor repairs.

Three view drawing:







1.1.2 EQUIPMENT LIST

Zlin Aviation sro retains the approval authority of any items installed in all Savage aircrafts. Therefore the following master list of equipment must be enforced as the only approved items for installation on the aircraft without further authority. No substitutions are allowed without written approval by the Manufacturer or the U. S. Field Technical Director.

In the following table there is a typical list of components that the owner or operator might change or upgrade (S= Standard, O= Optional).

ITEMS	Source or manufacturer	Model/comments	S/O
Engine and accessories			
Engine	BRP / Rotax	912 UL	S
	BRP / Rotax	912 ULS	O
	Zlin Aviation	912 UL Super turbo 120hp	O
	BRP/Rotax	914	O
Water radiator/s	Zlin Aviation		S
Oil cooler	Zlin Aviation		S
Auxiliary fuel pump	Zlin Aviation		O
Cabin heater	Zlin Aviation		O
Propeller	Aerobat	72"x66SCR and 79”x52 SCR	S
Propeller	GT	GT-130/135	S
Propeller	Warp Drive	c03HRC	O
Tires			
8.00 x 6” Tundra	Zlin Aviation		S
21” 8.00-6” 4 ply Aeroclassic	Zlin Aviation		O
26” Goodyear	Zlin Aviation		O
26”-29”-31” Alaskan Bushwheels	Zlin Aviation	With Zlin installation kit	O
Landing gear			
Standard shape, covered Uncovered for CUB)	Zlin Aviation	Standard Layout differs depending from Savage model	S
Step on landing gear	Zlin Aviation		O
Reinforced landing gear	Zlin Aviation		O
6” HD Extended	Zlin Aviation		O
Reinforced tail leaf	Zlin Aviation		O
Matco tailwheel	Zlin Aviation		S
Baby bushwheel tailwheel assembly	Zlin Aviation		O
Heavy duty Beringer brakes and rims with single or dual caliper	Zlin Aviation/Beringer		O
AOSS System	Zlin Aviation		O
Aerodynamic bungee cover	Zlin Aviation		O
Axels for skis	Zlin Aviation		O
Skis	Zlin Aviation		O
Amphibious floats kit	Zlin Aviation		O

Composite wheel pants	Zlin Aviation	For Cruiser Only	O
Airframe			
Complete wood floorboard	Zlin Aviation		O
Ballistic parachute	Zlin Aviation	Junkers softpack	O
Door key lock	Zlin Aviation		O
Towing hook system	Zlin Aviation		O
Parking brake	Zlin Aviation		O
Rigid baggage compartment	Zlin Aviation	For CUB only	O
Demountable co-pilot stick	Zlin Aviation		O
Extended fuel tank	Zlin Aviation		O
Electric trim	Zlin Aviation		O
Cessna style trim manual actuator	Zlin Aviation		O
Strobe Lights	Zlin Aviation		O
Landing Light	Zlin Aviation		O
Instruments and avionics			
RPM - Hour meter	Zlin Aviation		S
Oil pressure	Zlin Aviation		S
Oil temperature	Zlin Aviation		S
CHT	Zlin Aviation		S
EGT	Zlin Aviation		O
MAP	Zlin Aviation		O
Fuel pressure	Zlin Aviation		O
IAS	Zlin Aviation		S
Altimeter	Zlin Aviation		S
Variometer	Zlin Aviation		S
Slip Indicator	Zlin Aviation		S
Compass	Zlin Aviation		S
Radio	Xcom/Filser/ Becker		O
Trasponder	Filser/Becker		O
GPS	Avmap – Garmin		O
iPad + dock	Zlin Aviation		O
iPhone/iPod + dock	Zlin Aviation		O
iMonitor wireless EMS system	Zlin Aviation		O
Low voltage warning light	Zlin Aviation		O
PS Engineering PM1000II intercom	Zlin Aviation		O
ELT	ACK – Ameriking		O

Note: some items in the previous list, in the section Instrument and avionics, are described as "Zlin Aviation", which does not mean that ZA is the manufacturer. For their nature, and availability, they can be of different brands (most commonly Falcon Gauge, York Avionics, Speedcom, Starcompany, Airtime): the substitution of one instrument for one of another brand but analog technology and specifications, can provide satisfactory results. Even if the change at first sight has no consequence on CG or other aspects, we encourage the owner to take contact with ZA, our US dealer, or a FTD before attempting any modification or change in the equipment.

1.1.3 SOURCE TO PURCHASE PARTS

Spare parts can be ordered from different sources depending on its nature. We list here a simplified list of sources, and we encourage the owner to contact with ZA anytime a question arises about the compatibility of a product or consumable. A separate list for sources for disposable replacement parts can be found in the next paragraph. Different sources when the source indicated is not ZA, do not necessarily imply incompliance.
Parts from ZA are accessible through the entire dealer network which is kept up to date in the website http://www.zlinaero.com/eng/dealers.php

For spare parts ordering, ZA can be easily contacted at customer.service@zlinaero.com

Type - Category	Source
Structural welded parts	ZA
General assemblies, control surfaces, controls	ZA
Materials for major repairs	Contact ZA: major repairs are not authorized.
Covering supplies for minor repairs	Aircraft Spruce
Struts	ZA
Hardware	Aircraft Spruce/ZA
Instruments/Avionics	ZA
Ballistic safety Parachute	ZA
Skis	ZA
Floats	ZA
Tires/wheel assemblies	ZA
Landing gears	ZA
Propellers	ZA
Engine related	ZA/Rotax
Composite/plastic parts and fairings	ZA

1.1.4 LIST OF DISPOSABLE REPLACEMENT PARTS

The following table shows a list of commonly replaced parts with its source.

Item	Reference number	Source/brand
Oil Filter	825-701	Rotax
Air filter	SP2704/SP2706/RU2760	K&N
Fuel filters/fuel lines		ZA
Tires and tubes		ZA
Brake pads		ZA
Brake oil	DOT-4	Auto Spare store
Brake cylinder O Rings		ZA
Rubber Shock absorbers		ZA

1.1.5 ENGINE SPECIFICATIONS

Engine Manufacturer: BRP Powertrain GmbH (Former Rotax GmbH).
Standard Engine Model: 912 UL
Optional Engine Model: 912 ULS
Optional Engine Model: 914 115hp or Zlin 912 Super 120hp (turbo versions)

Engine Type 912 ULS: Normally-aspirated, liquid/air-cooled, dry sump, mechanical reduction drive, dual carburetor-equipped, four-cylinder, four-stroke, electronic dual ignition, horizontally-opposed cylinders with 73.91 cu.in. displacement.
Horsepower Rating and Engine Speed: 912UL: 80 BHP at 5800 RPM
Horsepower Rating and Engine Speed: 912ULS: 100 BHP at 5800 RPM

NOTE: refer to Engine Operators Manuals (Ref: OM-912) for official specifications and operational limits.

Description	**912 ULS**
Bore	84 mm (3,31 in)
Stroke	61 mm (2,40 in)
Displacement	1352 mm3 (82,5 in3)
Compression rate	10,5:1

GENERAL LIMITS OF OPERATION

Operating speeds and limits (912 ULS)

Speed
Take-off speed.....5800 1/min (5min.)
Max. continuous speed.....5500 1/min
Idle speed.....approx. 1400 1/min

Performance ISA (International Standard Atmosphere):
Take-off performance.....73,5 kW at 5800 1/min
Max. continuos performance.....69 kW t 5500 1/min

Acceleration
Limit of engine operation at zero gravity and negative « g » conditions
Max.....5 seconds at max. -0,5 g

Oil pressure
Max.....7 bar
Caution: for short period admissible at cold start
Min.....0,8bar(12psi)(below 3500rpm)
Normal.....2,0-5,0bar (29-73 psi)(above 3500rpm)

Oil temperature
Max.....130°C.....(266°F)
Min.....50°C.....(120°F)
Normal operating temperature.....approx. 90 – 110°C...(190-230°F)

Coolant
See engine operators manual

In use of conventional coolant:
Coolant temperature:(coolant exit temperature)
Max.....120°C (248°F)

Cylinder head temperature:
Max.....135° (275°F)
Permanent monitoring of coolant temperature and cylinder head temperature is necessary.

In use of waterless coolant:
Cylinder head temperature:
Max.....135°C (275°F)
Permanent monitoring of cylinder head temperature is necessary.

Engine start, operating temperature:
Max.....50°C.....(120°F)
Min.....-25°C.....(-13°F)

Fuel pressure
Max.....0,4bar.....(5,8 psi)
Min.....0,15bar.....(2,2 psi)
Warning: exceeding the max admissible fuel pressure will over-ride the float valve of the carburators and to engine failure.

FUEL

Approved Fuel Grade: 92 Unleaded Automobile Fuel, "Auto gas" (Yellow)
Approved *Alternate* Fuel Grade: 100LL Aviation Fuel, "Avgas" (Blue)

CAUTION:
100LL Avgas is only to be used as an **alternate fuel type** if 92 octane unleaded auto fuel is not available. Due to the high lead content, the use of 100LL Avgas is restricted to less than 30% of engine time. See the latest Rotax engine operational supplement for more detailed fuel specifications and information.

1.1.6 WEIGHT AND BALANCE INFORMATION

Note: *see Savage Aircraft Pilot's Operating Handbook, section 6, for more complete information.*

Introduction

The Center of Gravity (C.G.) on an airplane is the point at which the plane would hang in balance, were it suspended in midair*. This point is determined by weighting the airplane empty and then calculating the center of gravity. The empty airplane center of gravity location is then expressed in inches from a datum line (an arbitrary point). This will remain a fixed position unless the empty weight is altered. If that occurs, a new empty weight C.G. will have to be calculated. Loading the airplane with fuel, people, baggage, and other accessories also alters the C.G. Therefore, the payload placed in the airplane has to be calculated to determine a new C.G. for the loaded airplane. The Empty Airplane Weight and Balance C.G. information is completed by an engineer and is a part of an airplane's permanent documents. The C.G. Range is a part of this data. It is expressed as Forward C.G. Limit and Aft C.G. Limit. The airplane's Loaded C.G. must fall somewhere between these two limits to insure that the airplane can be balanced safely during flight with the trim or flight controls. Operating outside of these limits will reduce the control authority of the flight controls and induce instability. C.G. and C.G. Range Limits are expressed in inches from the datum line. On the Savage airplane it is the back face of the propeller.

The Weight and Balance data is to remain on board the airplane for all flight operations.

CG Data

To determine the airplane's Loaded C.G. it is necessary to know the following data:

1. Airplane Empty Weight (obtained from W&B Document);
2. Basic Empty Weight C.G. and Moment (obtained from W&B Document);
3. Payload Weight (fuel, pilot, passenger, and baggage weights are determined by the pilot);
4. Station (distance [arm] between each loaded item and the datum line);
5. Moment (each payload weight multiplied by its arm).

The engineering contractor determined that the Forward C.G. Limit and Aft C.G. Limit is between **74.0 – 80.7** in from the datum line.
1 inch=2,54 cm. limit in cm :**188-205**
The Datum Line is the front face of the engine's propeller flange.

CG Calculations

Place the leveled airplane with all three tires on the scales.
*To level the airplane, lift the tail till the elevator is in the horizontal position.
Proceed with the weighting and then record the weight exerted on each wheel scale. Calculate the moment by multiplying the scale weight of each wheel multiplied by its arm (distance in inches from the datum line) and record.

Work Form example

EMPTY WEIGHT (Includes Oil)			
Description	**Weight**	**Arm**	**Moment**
Main Landing Gear L	306,25	60,62	18564,875
Main Landing Gear R	306,25	60,62	18564,875
Pilot	0	66.90	0
Fuel	0	75,98	0
Passenger	0	99,61	0
Baggage Compartment	0	120,87	0
Parachute	0	144,87	0
Tail Wheel	56	233,46	13073,76
Totals	668,5		50203,51
Aircraft Gross Weight Limit 1235 lbs			
Moment /Weight=CG	75,10		
Datum Location-Front Face of Engine's Propeller Flange			
Acceptable CG Range	**74.0 - 80.7**		
Engine METO 100 HP /12=8.4 Gallons			
Savage Classic Serial Number 0121			04/10/2007

MOST FORWARD			
Description	**Weight**	**Arm**	**Moment**
Main Landing Gear L	306,25	60,62	18564,875
Main Landing Gear R	306,25	60,62	18564,875
Pilot	170	66.90	11373
Fuel 8.4 Gals	50,4	75,98	3829,392
Passenger	0	99,61	0
Baggage Compartment	8	120,87	966,96
Parachute	0	144,87	0
Tail Wheel	56	233,46	13073,76
Totals	896,9		66372,862
Aircraft Gross Weight Limit 1235 lbs			
Moment /Weight=CG	**74,00**		
Datum Location-Front Face of Engine's Propeller Flange			
Acceptable CG Range	**74.0 - 80.7**		

IMPORTANT: Solo may require ballast added to baggage compartment. Complete weight and balance prior to flight.

MOST REARWARD			
Description	**Weight**	**Arm**	**Moment**
Main Landing Gear L	306,25	60,62	18564,875
Main Landing Gear R	306,25	60,62	18564,875
Pilot	170	66.90	11373
Fuel 18 Gallons	108	75,98	8205,84
Passenger	170	99,61	16933,7
Baggage Compartment	45	120,87	5439,15
Parachute	0	144,87	0
Tail Wheel	56	233,46	13073,76
Totals	1161,5		92155,2
Aircraft Gross Weight Limit 1235 lbs			
Moment /Weight=CG	**79,34**		
Datum Location-Front face of engine's propeller flange			
Acceptable CG Range	**74.0 - 80.7**		
Savage Classic Serial Number 0121			04/10/2007

Method

1. Multiply each item's weight times its arm in inches to find the moment. Record each on its respective line.
2. Add all the weights and moments and record each on its respective total line.
3. Divide the total moment by the total weight and the result is the C.G. Index in inches from the datum line.
4. Determine that the airplane's Loaded C.G. falls within the applicable limits (Forward C.G. Limits and Aft C.G. Limits).

1.1.7 TIRE INFLATION PRESSURES

Main Standard Tire **Tundra Tire 8.00 6”**	Max 16psi Min 13psi	1.10bar 0.9bar
Matco Tailwheel	32psi	2.2bar
Alaskan Bushwheels	6/12 psi (See manual provided ABI-TIRE-ICA)	

1.1.8 APPROVED OILS AND CAPACITIES

See Rotax 912 ULS Operators Manual section 2.5

Oil: Motorcycle oil of a registered brand gear additives. If using aircraft oil, than only blended one.

Caution: at the selection of suitable lubricants refer to the additional information in the service information SI-912-016, latest edition.
Link: http://www.flyrotax.com/portaldata/5/dokus/d05289.pdf

Oil specification

Use only oil with API classification “SG” or higher!

Due to the high stresses in the reduction gears, oils with gear additives such as high performance motor cycle oils are required.

Because of the incorporated friction clutch, oils with friction modifier additives are suitable as this could result in a slipping clutch during normal operation.

Heavy duty 4-stroke motor cycle oils meet al the requirements. These oils are normally no mineral oil but semi- or fully synthetic oils.

Oils for Diesel engine are due to **insufficient high temperature properties and additives which favour clutch slipping, generally unsuitable.**

Caution: if the engine is mainly run on AVGAS more frequent oil changes will be required. See service Information SI-912-016, latest edition.

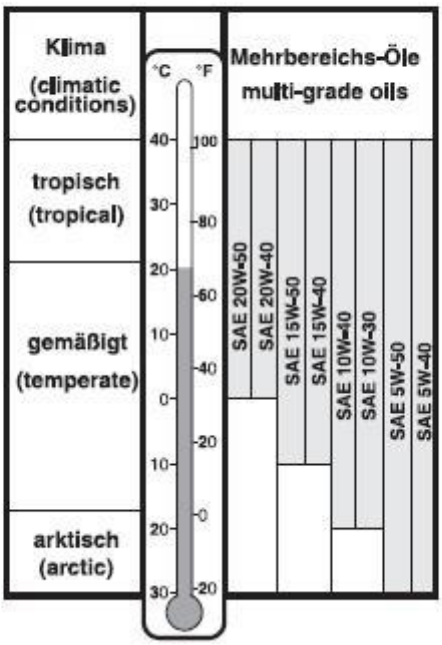
Engine Coolant: refer to Rotax 912 ULS Operators Manual section 2.3

Oil viscosity:

Use of multi-grade oils is recommended.

Note: multi-viscosity grade oils are less sensitive to temperature variations than single grade oils. They are suitable for use throughout the seasons, ensure rapid lubrication of all engine components at cold start and get less fluid at higher temperatures.

Since the temperature range of neighboring SAE grades overlap, there is no need for change of oil viscosity at short duration of ambient temperature fluctuations.



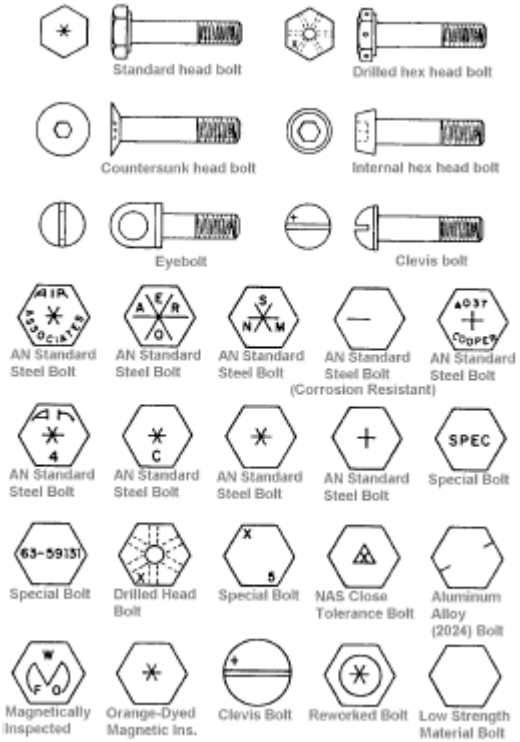
1.1.9 RECOMMENDED FASTENER TORQUE VALUES

For more in depth information please refer also to FAA Advisory Circular AC43..13 Chapter 7.
For additional information about turnbuckle installation and inspection, or control cables and nicopress installation and inspection, refer to chapter 1.3.6 Control cables and pulleys.

IDENTIFICATION. Aircraft bolts may be identified by code markings on the bolt heads. These markings generally denote the material of which the bolt is made, whether the bolt is a standard AN-type or a special-purpose bolt, and sometimes include the manufacturer.

AN standard steel bolts are marked with either a raised dash or asterisk, corrosion resistant steel is marked by a single dash, and AN aluminum-alloy bolts are marked with two raised dashes.

LOCKING OR SAFETYING OF BOLTS.
Lock or safety all bolts and/or nuts, except self-locking nuts. Do not reuse cotter pins or safety wire.



DEFINITIONS

Torque: The importance of correct torque application cannot be overemphasized. Undertorque can result in unnecessary wear of nuts and bolts, as well as the parts they secure. Overtorque can cause failure of a bolt or nut from overstressing the threaded areas. Uneven or additional loads that are applied to the assembly may result in wear or premature failure. The following are a few simple, but important procedures, that should be followed to ensure that correct torque is applied.

NOTE: Be sure that the torque applied is for the size of the bolt shank not the wrench size.

Running Torque: The average torque developed after the fastener is at least one full thread through the nut, but prior to the tightening of the joint (also called self-locking torque, locking torque, friction drag torque).

Assembly Torque: The torque required by design engineering in order to create the desired axial load on the bolt/nut assembly (also called tightening torque or installation torque).

When nuts are to be secured to fasteners by means of cotter pins or lock wire, the low side of the specified torque range shall be approached for tightening. If necessary, tightening shall be continued until the next slot aligns with the hole. Nuts shall not be loosened to obtain the required alignment. The maximum torque shall not be exceeded.
Threaded fasteners which have been torqued above the maximum value specified shall not be backed off and re-torqued but shall be removed, rejected and rendered unserviceable.

If there is any doubt a fastener has been under-torqued, the nut shall be backed off one complete rotation (360°) maximum and retightened to the specified value; the bolt, screw or stud must not be allowed to rotate.

Bolt Installation

Bolts should be installed with the head forward, upward, or outward to the extent possible. Bolts typically are not installed with the head toward the rear, bottom, or inside except where clearance or access issues require such installation, or when specifically directed to do so by manufacturer's instructions.

AN Bolts Torque

See AC43.13.1B Table 7-1 and text for more information.

TENSION NUTS
AN-365 AND AN-310

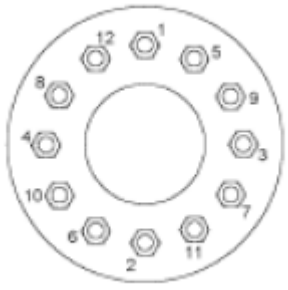
BOLT	THREAD SIZE	IN. LBS
8-36	8-36	12 TO 15
AN3	10-32	20 TO 25
AN4	1/4-28	50 TO 70
AN5	5/16-24	100 TO 140
AN6	3/8-24	160 TO 190
AN7	7/16-20	450 TO 500
AN8	1/2-20	480 TO 690
AN9	9/16-18	800 TO 1000
AN10	5/8-18	1100 TO 1300
AN12	3/4-16	2300 TO 2500

SHEAR NUTS
AN-364 AND AN-320

BOLT	THREAD SIZE	IN. LBS
8-36	8-36	7 TO 9
AN3	10-32	12 TO 15
AN4	1/4-28	30 TO 40
AN5	5/16-24	60 TO 85
AN6	3/8-24	95 TO 110
AN7	7/16-20	270 TO 300
AN8	1/2-20	290 TO 410
AN9	9/16-18	480 TO 600
AN10	5/8-18	600 TO 780
AN12	3/4-16	1300 TO 1500

Circular Torque Pattern

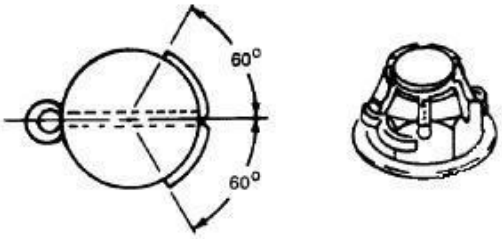
Follow the indicated torque pattern when applicable (ex. Propeller)



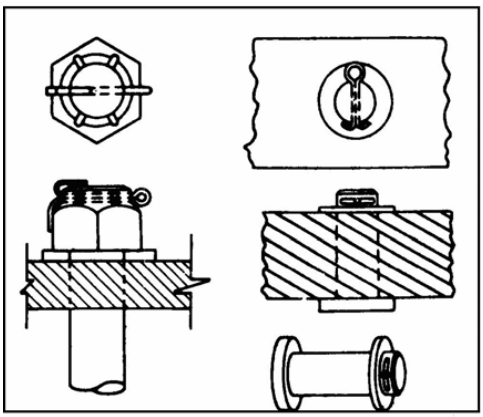
TYPICAL CIRCULAR PATTERN TORQUING SEQUENCE

Cotter Pins

Securing by cotter pin is used for bolts subject to rotation. They are used because they can be removed and reinstalled quickly. The diameter of the cotter pin should be the largest size that will fit the slot in the castle nut or the hole in the bolt. To prevent injury the ends of the cotter pin should be bent over the nut and firmly flat against each face of the nut then rolled and tucked.



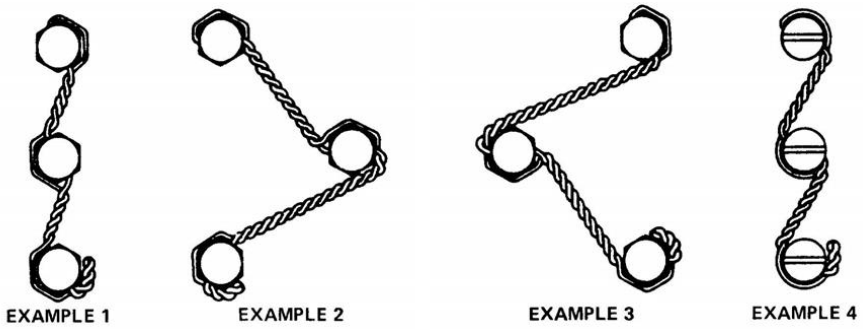
Cotter pin removal is very easy: by means of a flat screwdriver straighten up the bent ends of the cotter pin and take the cotter pin out of the hole with small pliers.



When securing castle nuts, always use new cotter pins. Shift the new cotter pin into the hole in the bolt and bend the cotter pin ends as shown in the figure.

Safety Wire

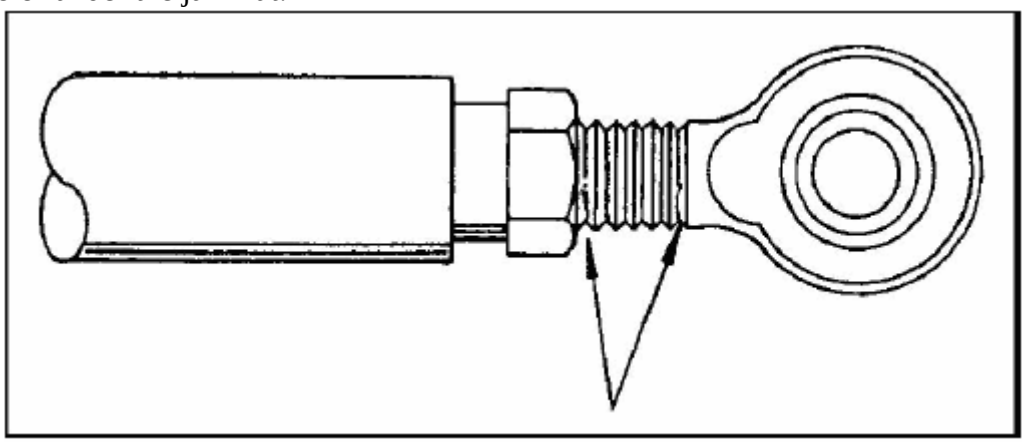
Procedure of bolt joint securing is by stainless steel wire having diameter of 0.032".
The installation of safety wire is not intended to retain bolt or nut torque. It is installed to prevent disengagement of screws, nuts, bolts, and other parts for added safety. Do not confuse aluminum wire with stainless steel wire. Wire should only be stainless steel, do not use common wire or ferrous metal which can rust or be attracted by magnetic portions of the aircraft.
Drilled bolts or screws do not need to be safety wired if they are installed with self-locking nuts. Safety wire must be installed in a manner that will prevent the tendency of the part to loosen or rotate. Safety wire ends are a safety hazard unless they are bent under and inward toward the part to avoid sharp or projecting ends. Safety wire must not be nicked, kinked, or mutilated. When cutting off the end of the twisted wire, leave at least four to six completer turns (1/2" to 5/8") of wound wire to complete a loop.



Examples of correct direction for drilled bolt safety wire

Eyebolts Inspection

Cracks and subsequent failures of rod ends usually begin at the thread end near the bearing and adjacent to or under the jam nut.



Typical locations for rod end cracks

1.1.10 GENERAL SAFETY INFORMATION

There are many hazards inherently present when performing any maintenance task on this aircraft. To minimize the risk to both yourself and others, begin by thinking through each task that is to be performed before starting any work. Use common sense, think of ways to avoid these hazards. Remember also that many accidents happen because of carelessness. Be sure to also use the right tool for the task at hand and to use the proper personal protective equipment. Such equipment may include, but is not limited to:

- Eye protection
- Gloves
- Hearing protection – ear plugs or muffs
- Protective footwear with non-slip soles

You should also keep on hand a suitable fire extinguisher, absorbent material to contain spills, an eyewash bottle, and a general-purpose first aid kit.
It is also advisable to have on hand the material safety data sheet (MSDS) for all products and chemicals that will be used during the servicing of the aircraft.

Also follow those rules to prevent accidents:

- Secure the aircraft properly in order to be sure that the aircraft will remain stationary the entire length of the operation – unintended damage could result from an improperly secured aircraft.
- Accidental starting of the engine is very dangerous, remove always the key from the instrument panel and take care that no one could start the engine.
- The activated handing of the parachute must be locked to avoid involuntary activation.
- Never operate the engine with untrained personnel around – everyone who is essential to be in the area should be reminded that a spinning propeller may be lethal yet almost invisible.
- Remove any loose clothing, such as neckties and scarves. Tuck in your shirt and secure any long hair to prevent them from becoming tangled in power tools.
- Disconnect the negative lead from the battery when doing any electrical work that does not involve troubleshooting the electrical systems. This will reduce the risk of a short circuit or even a fire.
- The lead acid battery will emit hydrogen gas when charging, which is highly flammable.
- Any nearby source of ignition such as sparks or an open flame can result in an explosion. Keep all ignition sources away from the battery.
- Aviation gasoline is also highly flammable. When working with the fuel system, always work in a well-ventilated environment. Any nearby source of ignition such as sparks or an open flame can result in a fire or explosion. Keep all ignition sources away. Always ground the airframe to a suitable earth ground during fueling/defueling operations to reduce the risk of a static discharge ignition source.
- When working with the landing gear, always support the aircraft properly with jacks. Do not work underneath the aircraft unless it is properly supported.
- Pay attention to not left foreign object inside the airplane, during the maintenance you must have a list of all material that you are using for the inspection, to be sure that no parts are left inside the airplane.

1.1.11 FLIGHT SAFETY ISSUES REPORTING INSTRUCTIONS

Zlin Aviation has put in place an online reporting system for any Safety of Flight or Service Difficulty issue that the owner or operator might encounter.
You can easily report by entering our website in www.zlinaero.com , > Owner Area, and then by filling the second form, the one called "Service Reports". The correspondent Company Department will receive the communication and act consequently.

Alternatively, the company can be contacted using the e-mail customer.service@zlinaero.com or by any other mean as found in the "Contacts" section of our website.

See also Section 7 of this Manual for Continued Airworthiness Instructions.

1.2 Inspections

1.2.1 GENERAL

This section is intended to serve as a guide for a the person performing the maintenance tasks (certified airframe and powerplant mechanic, owner, LSRMA) to perform routine maintenance on the aircraft. It is the responsibility of the owner and/or the operator to maintain the aircraft in an airworthy condition and ensure that all applicable Safety Directives, Safety Alerts, and Service Bulletins have been complied with. For USA registered Aircrafts, it is the responsibility of the owner and/or the operator to ensure that the airplane is inspected as specified in Parts 43 and 91 of the Federal Aviation Regulations. This inspection guide is not intended to replace the good judgment of a certified airframe and powerplant mechanic.
The guide will make reference to service information provided by other vendors, such as the manufacturer of the engine. The persons performing the maintenance on the aircraft must ensure that they have the latest editions of these publications. This guide will not make reference to revision levels of vendor publications.

Inspection Groups and Criteria

Visual Inspection: Visual inspections will normally apply to those areas, surfaces, and/or items that become visible by the removal or opening of access doors, panels, fairings, or cowlings. Visual Inspection criteria will normally consist of, but are not limited to the following criteria:

- Moving Parts

Proper operation, correct alignment, security, sealing, cleanliness, lubrication, adjustment, tension, travel, condition, binding, excessive wear, cracking, corrosion, deformation, and any other apparent damage.

- Fabric Covered Parts

Security, condition, cleanliness, wear, cracking, obstruction of drainage or vent holes, deformation, heat deterioration, fluid saturation, and any other apparent damage.

- Metal Parts

Security, condition of finish, cleanliness, distortion, fatigue cracks, cracked welds, corrosion, and any other apparent damage.

- Fuel and Hydraulic Oil Lines and Hoses

Cracks, dents, kinks, loss of flexibility, deterioration, obstruction, chaffing, improper bend radius, cleanliness, security, and any other apparent damage.

- Electrical Wiring

Cleanliness, loose, corroded, or broken terminals, chaffed, broken, or worn insulation; security; heat deterioration, and any other apparent damage.

- Bolts and Nuts

Fretting, wear, damage, stretch, proper torque and safety wiring.

- Filters and Screens

Filters and screens shall be removed, cleaned, inspected for contamination, or replaced as applicable.

- Fuel Tank Areas

Evidence of leaks, corrosion,

Operational Inspection
An operational inspection is a check intended to determine that a component or system is fulfilling its intended purpose. The operational inspection does not require quantitative tolerance.

Functional Inspection
When called for by an inspection task, a functional inspection is a quantitative check to determine if one or more functions of a component perform within specified limits. The functional inspection is a comparative examination of a component or system against a specific standard.

CONDITION INSPECTION TASKS

If the aircraft is registered in the United States, ASTM F2483 requires that all LSA category airplanes must undergo a complete inspection at least once every 12 calendar months. An authorized maintenance person, as described in ASTM F2483, must perform this inspection. A signed and dated record must be maintained as each inspection task is completed. When the last task of the inspection has been completed, the Inspection Report is to be signed off in the log book/maintenance record. The inspection items to be covered in the condition inspection are identical to the 100-hour Inspection items. The inspection interval to the next condition inspection may not exceed twelve calendar months.

PERIODIC INSPECTION TASKS

If the aircraft is operated commercially (for hire) in the United States, it must also have an inspection every 100 flight hours. The 100-hour interval between inspections should never be exceeded by more than 10 hours, and then only if additional time is required to reach a place where the inspection can be satisfactorily accomplished. Additionally, the time the interval was exceeded must be included as flight hours in the next 100-hour interval. Inspection tolerances cannot be accumulated.

ZLIN AVIATION S.R.O. considers the inspections described in the following chapters as mandatory/obligatory to ensure the safe operation of the Savage Aircraft. Therefore strictly follow instructions as hereunder.

SCHEDULE OF INSPECTIONS

- Daily inspection
- Every 50 hours or 6 months (whichever comes earlier)
- Every 50 hours or 12 months (whichever comes earlier)
- Every 100 hours or 12 months (whichever comes earlier)
- Every 200 hours or 18 months (whichever comes earlier)
- Every 600 hours
- Every 1200 hours.
-Every 2000 hours

1.2.2 Daily inspection

Note: *make sure that after the inspections, aircraft is free of any tools, parts and debris, and reinstall all access doors, panels, fairing and so on, that have been removed for the inspection.*

ENGINE

See engine maintenance manual, in addition make these control Conduct checks on cold engine only!!!	Level of certification
Check for leaks in the engine bay. No spots on hoses.	Owner
Check throttle and choke control cable ends securing devices and check cable condition.	Owner
Inspect entire engine, such as bolts or nuts for security, check sleeves security and caps for correct torque.	Owner
Check exhaust system and stacks for correct security and condition.	Owner
Check engine mount and supporting bolt structures and check inert gas condition gauge (if fitted).Check rubber shock mounts for condition.	Owner
Check air filters, carburettors, and fuel line clamps. (Change air filter if it is necessary).	Owner/ LSRMA
Check oil, water, and fuel piping for condition and security.	Owner
Check fuel, oil and water hoses condition.	Owner
Check water radiator condition and cooling fluid level. Check the plastic bottle	Owner
Check oil radiator condition.	Owner
Oil quantity: within designated limits	Owner
Reduction gear box: check for eventual oil leakage. All bolts attached firmly	Owner
Fasteners and engine covers screws .tightened ,engine cover undamaged	Owner
Check the level of the hidraulic brake fluid .	Owner
Inspect the spark plug cables and plugs.	Owner
Inspect rubber intake hose connection of the carburators.	Owner
If removed for any reasons, control to have locked the cap of oil and water sys.	Owner
Inspect if installed, the heater system for condition.	Owner
Inspect and clean if necessary the firewall	Owner
Inspect the engine solenoid and all the electric cables and connections	Owner

PROPELLER

See propeller maintenance manual. In addition make these control:	Level of certification
Check for damage and cracks on the propeller.	Owner
Check for damage, wearing, or nicks or indentations on propeller metal leading edge.	Owner
Check spinner condition and installation and screws.	Owner
Check bolts and metal plate used to fix the prop to the engine.	Owner
With magnetos off, control for excessive play into the gear box, moving just a little the propeller. Eventually check the engine's manual for comments about this point.	Owner

Wings, Control Surfaces, Fuselage, external Cabin

	Level of certification
1 Check windshield for dust, cracks or dents. Check fuel filler caps for security 2 Check on the wings that all vortex generators are present correctly fixed (if installed). Check the right door and hinges. Pins and cotter pins used to fix the door.	Owner
3 Check wing, fuselage and tail surfaces fabric. Clean and remove any mud or foreign objects or deposits.	Owner
4 Check wing lift struts and their attachments for damage, deformation, denting and oxidation and ensure attachment bolts are correctly torqued.	Owner
5 Check trailing edges, wing tips, strobes (if installed), ailerons, flaps, leading edges for damages, security, rod connections, bolts and nuts and free movements for normal operation. Check for status the gap seals over the flaps. Check pitot tube. Check the universal joints (and the bolts and nuts) connecting the leading edges to the fuselage.	Owner
6 Check for damage or free play in stabilizers, rudder and trim control system (pins, cable and spring). Check all the pins and cotter pins. Check for right movements and for the correct connection between the push pull tube and horn coming from the cabin and connected to the elevators with two uniball and two bolts (with castle nuts and pins). Control the two aluminium triangles connecting the steel horn of the elevator push pull tube to the elevators itself. Check for security bolts of these two triangles (one for each elevator). 7 Check under the stabilizers that vortex generators are correctly fixed (if installed). Check the gap seal for good adherence.	Owner
8 Check rudder horizontal cables .Open the bottom rear inspection plate and check for rudder cables and pulleys near the rudder.	Owner
9 Check tail surface wire truss.	Owner
10 Control the area inside the battery compartment. Battery and battery box for security. Electric cables for connections and rust. No lost objects into the fuselage. Inspection door: closed and fixed after the control.	Owner
11 Check tail wheel attachment to the fuselage. If necessary lubricate wheel axle. Check tire condition and air pressure inside. Check the two tailwheel springs.	Owner
12 Check tail wheel operation .Check closely the main bolt of the tailwheel for security and play and the bolts used to fix the leaf spring to the fuselage.	Owner
13 Check the four main bolts connecting the trailing and leading edges to the fuselage. To do this open the door and check from inside the cabin, the bolts and the nuts.	Owner

Landing gear

	Level of certification
Check tire condition and pressures. Check wheel fairing if installed	Owner
Check landing gear structures, attachments, bolts, for condition and correct torque. Check oil fitting on the brake pumps for leakages. Check wheels for status and axle bolt.	Owner
Check bungee cords conditions	Owner
Check telescope safety wires.	Owner
Check AOSS system assembly if present (follow AOSS manual)	Owner

Controls-Seats-Seat belts

	Level of certification
1 Check aileron wires, pulleys, and turnbuckles for integrity, security and correct tension. Check the connection between the two ailerons cables, positioned behind the second seating. Check the vertical arm welded on the torque tube, and the bolt and castle nut (and pin) used to connect together the two mentioned ailerons cables. Check that all the wire cables are correctly working inside the pulley and that have not slipped outside of it. Refer to chapter 2.3.2.1 STEEL WIRE CABLES AND PULLEYS	Owner
2 Check aileron wires upper joins and pulleys. Check that all the wire cables are correctly working inside the pulley and that have not slipped outside of it	Owner
3 Check aileron wires lower joins and pulleys. Check that all the wire cables are correctly working inside the pulley and that have not slipped outside of it	Owner
4 Check flap cable and bungee. Pins and cotter pins. Check all the line of control cable from the flap lever to the bungees. Test the normal operation of the flap system using the flap lever.	Owner
5 Check the pedals. Rod connections (nr.04) between pedals, bolts, nuts and pins. Check the spring below the main seating, connected to the rear pedals. Check the turnbuckles of the rudder cables, pulleys and cables for condition. Check the correct assembling of the brake pumps. Check for oil leaking.	Owner
6 Check the sticks, rod connections, bolts, castles nuts and pins. Check the correct movements of the whole system. Control the universal hinge (two stainless steel U profiles) connecting the horizontal aluminium push pull tube coming from the torque tube, to the elevator aluminium push pull tube below the baggage compartment. Control the bolts (nr. 03) that are connecting all the mentioned system (universal joint). Check the connections (bolts, joints and nuts) of the whole push pull tubes inside the fuselage up to the elevators.	Owner
7 Check throttle assembly, bolts, connecting rod, cables, and smooth operation.	Owner
8 Check for seats belts integrity and connecting bolts.	Owner
9 Check the seats (structure integrity, connections bolts, cleaning)	Owner
10 Check the trim lever for security. Check the correct operation of the trim system	Owner

Cabin - general

	Level of certification
1 Check for dust, oil leaking, or damages on the floorboard. Clean and remove lost objects from the bottom of the fuselage.	Owner
2 Check the air vents for correct operations	Owner
3 Secure the second seat belt if flying solo	Owner
4 Control the baggage compartment for objects and weight and balance. Secure the baggage	Owner
5 Control for security the activation handle and stiffness of the security system if installed.	Owner
6 Control the handles of the door closure system	Owner
7 Check for security the four nuts and bolts connecting the engine mount to the firewall	Owner
8 Control rivets and screws, lexan conditions.	Owner

Fuel System

	Level of certification
1 Check for damage and/or leaks in aircraft interior and exterior.	Owner
2 Complete a proper purge to ensure fuel is not contaminated with water or other foreign material.	Owner
3 Check fuel filter condition, (if necessary replace with a new one.)	Owner /LSRMA
4 Ensure vent holes and orifices are free and clear.	Owner
5 If necessary, fill to proper level for flight plus required fuel reserve.	Owner
6 Check fuel caps are correctly locked and secured.	Owner
7 Check the fuel valve OPEN before starting the engine.	Owner

Avionics and Electrical System

	Level of certification
1 Check battery voltage	Owner
2 Check all wiring and terminals for deterioration or damage.	Owner
3 Check the correct fixation of radio/transponder/gps, antennas, cable. Check the breakers.	Owner

Instruments

	Level of certification
1 Check for deterioration, damage, or moisture invasion.	Owner
2 Make sure instrument glasses are clean.	Owner
3 Check for correct calibration. (If not they must be repaired, serviced, or re-calibrated, before any next flight)	Owner /LSRMA
4 Ensure Pitot tube and static ports are free.	Owner
5 Check for correct adhesive arcs on instruments	Owner
6 Control the correct push pull movement of the choke and heater system	Owner

1.2.3 50 (fifty) Hours or 6 (six) Months Inspection
(Whichever comes earlier)

Note: *make sure that after the inspections, aircraft is free of any tools, parts and debris, and reinstall all access doors, fairing, seats and so on, removed for the inspection.*
Complete entries in log book, service publications lists, or any other required records

General: Clean up entire aircraft and check all inspection doors or openings.

Engine

See engine maintenance manual. In addition make these controls:	Level of certification
1 Remove engine cowling and check engine general condition.Check engine mount and supporting bolt structures and check inert gas condition gauge (if fitted).Check rubber shock mounts for condition and the L aluminium profile that supports the engine. Check for securing all the bolts and nuts or safety wire.	LSRMA
2 Check for leaks in the engine bay. No spots on hoses. Inspect entire engine, such as bolts or nuts for security, check sleeves security and caps for correct torque.	LSRMA
3 Check oil, water, and fuel piping for condition and security. Inspect oil and cooling liquid tanks for condition, ensure vent holes are free and clean.	Owner
4 Eliminate any oil marks, verify accessories attachments are secure. Oil quantity: within designated limits. Check oil radiator and his aluminium box. Control fixation and shock absorber. Control the correct fixation of the oil tank to the firewall.	Owner
5 Check muffler and exhaust system for fractures, corrosion. In event exhaust gas residue is found, it is obvious fractures or cracks have occurred and the entire muffler and exhaust system must be dismantled and any abnormalities repaired before any future flight is contemplated.	LSRMA
6 Check water radiator condition and cooling fluid level. Check the plastic transparent bottle.	Owner
7 Inspect rubber intake hose connection of the carburetors.	LSRMA
8 Check throttle and choke control cable ends securing devices and check cable condition.	Owner
9 Check air filters, carburetors, and fuel line clamps. (Change air filter if it is necessary).	LSRMA
10 Check the level of the hydraulic brake fluid.	Owner
11 Inspect the spark plug cables and plugs (see engine manual)	Owner
12 If removed for any reasons, control to have locked the cap of oil and water system.	Owner
13 Inspect the heater system for condition (if installed). Inspect the wrap around the muffler and the opening valve attached to the firewall	Owner
14 Inspect and clean if necessary the firewall	Owner
15 Inspect the engine solenoid and all the electric cables and connections	LSRMA
16 Reduction gear box: check for eventual oil leakage. All bolts attached firmly	LSRMA
17 Lube throttle and choke control cables in the cabin with light grease	Owner

Propeller

See propeller maintenance manual. In addition make these control:		Level of certification
1	Check propeller bolts. Verify attachment bolts are in good condition and correctly torqued.	LSRMA
2	Check propeller blades and metal leading edge for condition, indentation, stone chips. Any major damage noted will prevent any further flight until damage is rectified and/or propeller replaced.	LSRMA
3	Check for the perfect distance of each blade from a fix point, like the end terminal of the muffler. Switch off the magnetos. Turn the prop and verify both the blades distance from the same point.	LSRMA
4	Check spinner condition and installation	LSRMA
5	With magnetos off, control for excessive play into the gear box, moving just a little the propeller.	LSRMA

Wings, Control Surfaces, Fuselage, external Cabin

		Level of certification
1	Check windscreens and all windows for cleanliness and damage. Ensure door hinges are in good condition. Lube hinges.	Owner
2	Check door looking system for security	Owner
3	Inspect the dacron covering fabric for damages or crack on the external paint.	Owner
4	Clean the external bottom of the fuselage from oil or dust.	Owner
5	Inspect for condition the engine cowling and spinner.	Owner
6	Visual inspection of the top of the wing. Clean and check for damages.	Owner
7	Check the aluminium plate riveted and glued over the leading edge, for any bending along all his length.	Owner
8	Check access panel security.	Owner
9	Check bolts and nuts security and correct torque on wing support struts.	LSRMA
10	Check bolts and attachments, wing leading and trailing edges to fuselage.	LSRMA
11	Check the struts for bending, damages. Bolts and nuts for correct torque. Check the jury struts for any damage, dust. Check bolts/ nuts	LSMRA
12	Inspect the correct fixation of the strobes if installed. Check the electrical connections, opening the round inspection door near the strobes	Owner
13	Ensure ailerons and flap hinge pins and rod connections are correctly fastened and locked.	LSRMA
14	Check for security bolts and nuts of the universal joint, connecting the fuselage to the rear leading edge.	LSRMA
15	Control that adhesive gap seals over the flaps are still effective and glued	Owner
16	Verify the tail surface supporting struts and attachment pins to fuselage are secured and in good condition. Verify cables conditions.	LSRMA
17	Check vertical stabilizer (fin) attachment pins to fuselage, stabilizer-elevators pins and locking pins for security. Check rudder control	LSRMA

	cables, attachments, and rudder pins. Verify horizontal trip pins secure. Verify trim control cable attachment and return spring tension (if your model is so equipped).	
18	Control for tightness the vertical bolt and nut(inside and on the rear of the fuselage), that secures the push pull aluminium tube to the welded horn that connects to the elevators.	LSRMA
19	Check the status of the two uniball connecting the elevator horn above described to the elevators. Check nuts and cotter pins.	LSRMA
20	Check the two aluminium triangles, connecting the elevator horn (from push pull alumium tube) to the elevators. Check bolts and safety wires.	LSRMA
21	Control that adhesive gap seals over the elevators are still effective and glued	Owner
22	Inspect the battery box, for correct fixation. Check the bolts and nuts	Owner
23	Check the welded connection structure, below the battery box, connecting the two push pull tubes for the elevator control. Check for play, correct movement and bolts and nuts. Check the cotter pins.	LSRMA
24 25	Clean the inside rear bottom of the fuselage. Apply lubrication grease or light oil on all moving part joints on the controls, hinges and rod end bearings, and on the horizontal stabilizer fitting.	Owner

Landing gear

		Level of certification
1	Check main landing gear attachment bolts for security.	LSRMA
2	Verify tires are correctly inflated and tires abrasion.	LSRMA
3	Check bungee rubbers for condition, and lube with a silicon base product.	LSRMA
4	Check brakes for action, corrosion, check brake reservoir oil level. If necessary purge if there is air in the system.	LSRMA
5	Check the wheels for bending or damages. Remove the wheels and check bearings.	LSRMA
6	Check for tightness the big nut securing the wheels to the axles. This nut has to be changed if already removed 3 times.	LSRMA
7	Check the telescopes. Inspect bolts and nuts. Check the security steel cables near the elastic bungee. Inspect for corrosion or damages. Remove the dust or oil residual if present	Owner
8	Inspect for excessive play for the two bolts securing each telescopes	LSRMA
9	Check the axles for bending	LSRMA
10	Check tail wheel attachments for security and check tail wheel and all the bolts for excessive play or defects. Lube tail wheel swivel components. NOTE: In case that landing cycles are higher than “one per hour”, make this control when you will reach the 50th landing also if the flying hours are less than 50.	LSRMA
11	Check tail wheel tire pressures and check steering spring tension. Verify all bolts are correctly secured.	LSRMA
12	Check tail wheel spring leaves for fractures, damage, or deformation.	LSRMA

13	Lube axels and bearing with lubrication grease	Owner

Flight controls, seats, seat belts

		Level of certification
1 2	Check all control stick system and all pedal system for condition. Check all the bolts, free correct movement and bolts and nuts. Check cotter pins.	LSRMA
3	Lube the crank placed behind the rear seat.	Owner
4	Check cable turnbuckles for security and locking.	LSRMA
5	Inspect aileron control cables and lube them with an acceptable lubricating oil.	LSRMA
6	Inspect all flap control system and lube it.	Owner
7	Inspect flap control cables, turnbuckles and bungee.	LSRMA
8	Check trim control friction and security. Lube as required.	LSRMA
9	Check bolts securing the entire elevator control system.	LSRMA
10	Inspect condition of the elevator universal joint placed behind the rear seat.	LSRMA
11	Verify there is no free play or excessive friction in the control system - pedals and lube them.	LSRMA
12	Note - If necessary adjust ailerons.	LSRMA
13	Note - If necessary adjust flaps	LSRMA
14	Inspect seating for conditions. Clean and repair if necessary.	LSRMA
15	Inspect for correct movement and work the throttle system .	
16	Inspect all steel control cables carefully in the area of the pulleys for condition and eventual abrasion. Substitute in case of damage.	Owner/ LSRMA
17	Check the control pulley for conditions	

Cabin - generals

		Level of certification
1	Check instruments condition, hoses, and switches efficiency.	LSRMA
2	Remove any dirt as accumulated in the cabin and ensure cleanliness between fabric cover and fuselage frame. Check for dust, oil leaking, or damages on the floorboard. Clean and remove lost objects from the bottom of the fuselage.	OWNER
3	Remember to inspect the fuselage lower beam near the tail for deterioration, corrosion and./or deformation due to heavy landing damage.	LSRMA
4	Check tightness of the 4 (four) bolts that connect engine mounts with the fuselage.	LSRMA
5	Control for security the activation handle and stiffness of the security system if installed.	LSRMA
6	Check for security the four nuts and bolts connecting to the firewall, the engine mount	LSRMA
7	Control the handles of the door closure system	Owner
8	Control rivets and screws lexan conditions.	Owner
9	Check seats and safety belts for security. Bolts and nuts. Check baggage condition and attachments for security.	LSRMA

Fuel System

	Level of certification
1 Check for damage and/or leaks and stains in airplane interior and exterior.	Owner
2 Complete a proper purge to ensure fuel is not contaminated with water or other foreign material.	Owner
3 Check fuel filter condition, (if necessary replace with a new one.)	Owner/ LSRMA
4 Ensure vent holes and orifices are free and clear.	Owner
5 If necessary, fill to proper level for flight plus required fuel reserve.	Owner
6 Check fuel caps are correctly locked and secure.	Owner
7 Check the fuel valve OPEN before to switch on the engine.	Owner

Radio and Electrical System

	Level of certification
1 Check battery voltage	Owner
2 Check all wiring and terminals for deterioration or damage.	Owner
3 Check the correct fixation of radio, antennas, cables. Check the breakers.	Owner

Instruments-Engine running check after inspection

Instruments:	Level of certification
1 Check for deterioration, damage, or moisture invasion.	Owner
2 Make sure instrument glasses are clean.	Owner
3 Check for correct calibration. (If not they must be repaired, serviced, or re-calibrated, before any further flight is contemplated.)	Owner/ LSRMA
4 Ensure Pitot tube and static ports are free.	Owner
5 Check for correct adhesive arcs on instruments	Owner
6 Control the correct push pull movement of the choke and heater system	Owner

Engine running check after inspection

		Level of certification
1	Check fuel pump,	LSRMA
2	Check fuel pressure and fuel level gauges,	LSRMA
3	Check oil pressure and temperature,	LSRMA
4	Check generator,	LSRMA
5	Check parking brake if present.	LSRMA
6	Check magnetos,	LSRMA
7	Check magneto drop and note RPM variation. Check also for dead cut at idle.	LSRMA
8	Check throttle control operation, paying attention to engine response at power changes.	LSRMA

1.2.4 50 (fifty) Hours or Annual Condition Inspection
(Whichever comes first)

Note: *make sure that after the inspections, aircraft is free of any tools, parts and debris, and reinstall all access doors, fairing, seats and so on, removed for the inspection.*
Complete entries in log book, or any other required records

Level of certification: LSRMA

You must make a visual check of all stainless steel plates and cables (16 pieces steel plates and 08 steel wiring) used to fix the stabilizers.
Visually check for cracks in the area of the holes and in the bending zone.
Too little tension in the steel wiring for the horizontal stabilizer creates little vibrations that can harm the steel plates.
Make sure the cables have the right tension.
Note this check in your maintenance manual

1.2.5 100 Hours or Annual Condition Inspection

(Whichever comes first)

Note: *make sure that after the inspections, aircraft is free of any tools, parts and debris, and reinstall all access doors, fairing, seats and so on, removed for the inspection.*
Complete entries in log book, or any other required records

In addition to all the inspections required at 50 hours, the following must also be inspected.

General

	Level of certification
Control log books and flying books for any records	Owner

Fuselage-Wings

1 Clean the entire aircraft and open all panels to allow access for inspection.	Owner
2 Check aircraft external covering for rents, tears, in the fabric covered parts.	LSRMA
3 Check windscreen and all windows for condition. Verify all glasses correctly open and close, and ensure door hinges are in good condition. Grease hinges.	Owner
4 Check wing support attachment pins and bolts for correct torque and no abnormal play	LSRMA
5 Inspect wing covering, check leading and trailing edges for damage or deformation.	LSRMA
6 Inspect aileron and flap hinges and attachments. Check attachment pins for security and locking.	LSRMA
7 Inspect spar compression rod attachments. These attachments are fastened with steel bolts which must be inspected for wear or corrosion. Even in the case of minute wear, replacement must be carried out immediately.	LSRMA
8 Check wing compression rods attachment plates for wear or corrosion.	LSRMA
9 Verify the tail surface attachment pins and supporting struts are secure and in good condition.	LSRMA
10 Inspect the fuselage lower beam adjacent to the tail for corrosion damage or deformity through heavy landing.	LSRMA

Cabin

	Level of certification
1 Check pilot and passenger seats for security condition. Inspect safety belt connections and attachments.	LSRMA
2 Check instruments for condition and all attachments, hoses and switches for efficiency.	LSRMA
3 Remove any dirt accumulated in cabin between fuselage frame and fabric covering.	Owner
4 Check bottom of the cabin structure for corrosion	LSRMA
5 Verify aileron and flap cables, splices and pulleys and turnbuckles for condition and security.	LSRMA
6 Check fuel piping and change fuel filters. Check all unions secure and correctly torqued.	LSRMA
7 Check flap recovery rubbers and command lever and bolt. Free from excessive play.	LSRMA
8 Check throttle lever for freedom of movement. Check friction control is in good condition and working.	LSRMA
9 Inspect the bolt used to fix the trim lever	LSRMA

Engine

See engine maintenance manual. In addition make these control:	
1 Verify oil, water, fuel, tubing clamps.	LSRMA
2 Check engine mount bolts, verify rubber dampers are not damaged or seized and are correctly secured.	LSRMA
3 Check muffler springs for security.	LSRMA
4 Check regulator-electric starter-engine bonding harness.	LSRMA
5 Check and adjust if necessary throttle and choke cables for correct operation.	LSRMA

Propeller

	Level of certification
1 Check propeller and its attachment bolts.	LSRMA
2 Check blades and the leading edge condition for chipping, indentations, excessive wear.	LSRMA
3 Check spinner for security and alignment.	LSRMA
4 Balance the prop if necessary	LSRMA

Landing gear

	Level of certification
1 If it is found the tires are wearing unevenly , reverse them with the aim of evening up the wear rate.	LSRMA
2 Verify the main gear clamping bolt attachments are secure.	LSRMA
3 Verify tire pressures are correct.	LSRMA
4 Check braking action. If required purge (bleed). Ensure hydraulic reservoir oil level is correct. Check wheels bearings	LSRMA
5 Check tail wheel connections for excessive free play or faults. Lubricate junction pin.	LSRMA

Controls

	Level of certification
1 Check pedals and control stick condition.	LSRMA
2 Lube the crank located behind the rear seat.	LSRMA
3 Control all controls. Free from any excessive play.	LSRMA

1.2.6 200 (two hundred) Hours or 18 (eighteen) Months Inspection
(Whichever comes first)

Note: *make sure that after the inspections, aircraft is free of any tools, parts and debris, and reinstall all access doors, fairing, seats and so on, removed for the inspection.*
Complete entries in log book, AD lists, or any other required records

In addition to the checks carried out on the daily, 50 hour and 100 hour inspections, the following checks are mandatory.

Fuselage Wings

	Level of certification
Check the fuselage main welds at the wing connections, landing gear, pedals, hinges and engine mount, for stress cracking. Note any displacement of paint that would indicate a problem exists.	LSRMA

Engine

See engine maintenance manual. In addition make these control	Level of certification
1 Check engine mount aluminium plates.	LSRMA
2 Check oil, water, and brake fluid tanks for security and unions are correctly torqued.	LSRMA
3 Verify firewall condition. Any deformation would indicate heavy landing damage and must be referred to the approved maintenance organization for further inspection and action/rectification.	LSRMA
4 Verify muffler and exhaust system condition for security and defects. Rectify if necessary.	LSRMA

Propeller

See propeller maintenance manual

Cabin- general

	Level of certification
1 Change the flap bungee	LSRMA
2 Change landing gear bungees if necessary	LSRMA
3 Change rubber intake hose connection of carburators if necessary	LSRMA

1.2.7 600 (six hundred) Hours Inspection

Note: *make sure that after the inspections, aircraft is free of any tools, parts and debris, and reinstall all access doors, fairing, seats and so on, removed for the inspection.*
Complete entries in log book, or any other required records

In addition to all previous inspections the following must be carried out.

Engine

See engine maintenance manual. In addition make this control	Level of certification
Advise the idle and synchronize the carburetors.	LSRMA
Change the rubber intake hose connection for carburators	LSRMA
Change all the throttle cables	LSRMA
Balance the propeller	LSRMA

Controls-generals-Wings

	Level of certification
Check and adjust control cable for stiffness, security, and freedom of movement. Rectify and adjust as required.	LSRMA
Change all the wing struts bolts	LSRMA
Change all the landing gear bolts	LSRMA

Fuselage

	Level of certification
1 Dismantle the wing from the fuselage, check all attachments and attachment bolts for condition and wear. Any free play must be eliminated and if necessary fit new wing connection bolts.	LSRMA
2 Check wing support struts for security, damage, and corrosion.	LSRMA
3 Check wing forward and rear spars for condition, security and corrosion.	LSRMA
4 Check fuselage for deformation and corrosion.	LSRMA
5 Check tail surfaces, attachments, for security damage and/or corrosion.	LSRMA
6 Check electrical wiring contained in the fuselage. Check strobe lights for correct operation (if fitted). Check landing light for correct operation. Replacement bulb if necessary.	LSRMA

Landing gear

	Level of certification
1 Dismantle main landing gear and tail wheel leaf spring to verify condition and the presence of any free play. If required, replace main landing gear attachment bolts and locking devices.	LSRMA
2 Dismantle main wheel for cleaning. Check tires for defects, abrasions, cracking. Clean main wheel hub and bearings and re-grease/lube.	LSRMA
3 Change bungee	LSRMA
4 Check shock absorber tube condition and lube.	LSRMA

1.2.8 1200 (One thousand two hundred) Hours Inspection

Note: *make sure that after the inspections, aircraft is free of any tools, parts and debris, and reinstall all access doors, fairing, seats and so on, removed for the inspection.*
Complete entries in log book or any other required records

In addition to the previous inspections carried out the following must be done at 1200 hours total airframe time.

	Level of certification
Repeat all previous inspection schedules, and in particular the 600 hour inspection.	LSRMA
Remove all aircraft external fabric and examine the fuselage frame for corrosion and oxidization evidence. Clean, rectify, and re-paint fuselage. Dismantle, clean, all tanks, i.e. fuel, oil, water, and hydraulic reservoir.	LSRMA

Engine

See engine maintenance manual.

Propeller

See propeller maintenance manual.

1.2.9 2000 (Two thousand) Hours Inspection

In addition to cumulative inspections, engine must undergo complete overhaul.
See engine manual, and refer to an authorized Rotax service center.

1.3 Structures

1.3.1 Fuselage

The Fuselage consists of a true space framed designed structure made up of TIG welded 4130 aeronautical steel tubing. All welds are visually inspected and further checked with the aid of penetrant liquids. The fuselage is then treated for anti corrosion with specific primers. As an option tubes may be further protected against corrosion with an oil-based internal coating (it is a factory option, not mandatory, offered to customer when the order is placed). Access to the cockpit is done via a single door on the right side of the fuselage that opens upward (or optionally via two doors, one on each side). The cockpit provides ample space for the pilots. Good visibility and ergonomic seats and controls make flying comfortable and safe even over long distances. Type approved 4 point seat belts increase the overall sensation of safety provided by the Savage. The fuselage is covered with a 3.6oz Dacron fabric which is UV treated and finished with polyurethane paint. Windshield and windows are made of Lexan F 5006. (Wash only with water!)
The Savage features a complete set of dual controls except for the flap and trim controls. There is an ample storage compartment behind the passenger seat.

On the fuselage right side there is a large removable panel giving inspection access to the battery box and the complete tail internal structure. There is a removable panel giving access to tail control cables, pulleys, and the push rod connecting the control stick to the elevator. It is located in the rear bottom of the fuselage, near the tailwheel section. Under the horizontal right tail surface there is a small removable panel giving access to the tail leaf spring locking pin

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

1.3.2 Wings

The wings are of the rectangular type with rounded wing tips. The airfoil is a modified 4412. The structure is made up of two tubular spars in aeronautical aluminium alloy (doubled on the inside where necessary) and a classically designed system of compressors and diagonals. Each wing consists of 10 bays and a wing tip and 11 ribs attached to the tubular structure. Each wing root contains a welded aluminium tank containing 9 gallons of fuel (or more with extender fuel tank option). The in-tank fuel gauge is visible to both pilots from inside the cockpit. The wing is covered with 3.6oz Dacron fabric, which is sewed to the ribs on both the upper and the lower wing surface.
Wing struts and jury struts are of extruded aviation grade alloy.

There are some easily removable round inspection panels kept in place by a spring allowing inspection of the wing attachment connections and optional strobe lights.

The flaps can be set to 3 different positions with a maximum extension of 35 degrees. The employed alloys are of the 2024-6061/T6 type. All nuts and bolts are of aircraft quality (AN). All the engineering documentation concerning load tests and studies was completed with the aid of sophisticated software such as the French Catia (Dassault) and Nastran.

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

For small fabric repair (patch holes and similar), refer to section 2.3.3.3 of this manual.

1.3.3 Empennage

The tail (vertical fin and horizontal fins) is cruciform and consists of TIG welded 4130 tubing, corrosion protected, and covered with a fabric skin. The rudder is connected to a swivel tail wheel for ease of taxiing. The left elevator incorporates the mechanical (or electrical) trim surface. The horizontal fins with attached elevators can be folded upwards for storage or transport by trailer. Ample control surface area provides positive control about all axes. The stainless steel cables (2,5mm diameter) holding the stabilizer on place need to be carefully checked and maintained following instructions in 2.3.2.1.

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

For small fabric repair (patch holes and similar), refer to section 2.3.3.3 of this manual.

1.3.4 Landing gear

The Savage uses the classic conventional landing gear arrangement (tail wheel). The main gear wheels are fitted with independently controlled hydraulic toe brakes. Landing shock absorption is provided by standard aircraft elastic cord design with a steel safety cable to prevent over-extension or major consequences in case of bungee failure. The tail wheel is equipped with a self release mechanism which allows it to swivel freely to reduce the turning radius.

Optional extended gear is just longer, but for the inspections point of view has no difference.

Alaskan Bushwheels or 26" Goodyear tires can be fitted to allow rough terrain operations (optional), as well as Baby Bushwheel as tail wheel (see master equipment list). Follow specific OEM instructions provided with those upgrade for special care of those tires.

Special hydraulic suspension system "AOSS System" can be installed optionally on the Savage (any model). Follow installation and maintenance instructions provided with the system.

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

1.3.5 Control surfaces

For rudder and elevator, see section “Empennage”.

Ailerons and flaps are of traditional metal sheet riveted construction. Ailerons are cable actuated with the cloche, while flaps are mechanically actuated with a Bowden, by moving the flap lever located on the side of the seat, on the floorboard. The flap lever has a spring latch system that holds the flap in the selected position.

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

For metal sheet repair see 2.3.3.1.

For control cables and pulley control see 2.3.2.1.

1.4 Engine

Zlin Aviation supplies with each LSA Aircraft all the original manuals supplied by BRP Powertrain GmbH/Rotax, for the operation and line/heavy maintenance as well as overhaul of the 912 UL and ULS engine series.

The Rotax Operators Manual (Ref: OM-912), specifies all pertinent information for daily checks and operation instructions.

See the engine maintenance manual for the instruction about maintenance, repair and overhaul.
In addition a LSRMA or A&P have to make a visual control for cracks or damages of the following parts:

- Fittings of the coolant radiator
- Fittings for oil radiator
- Oil and water radiators
- Muffler and tubes
- Shock absorbers
- L aluminium profiles
- Fuel tubes and fittings

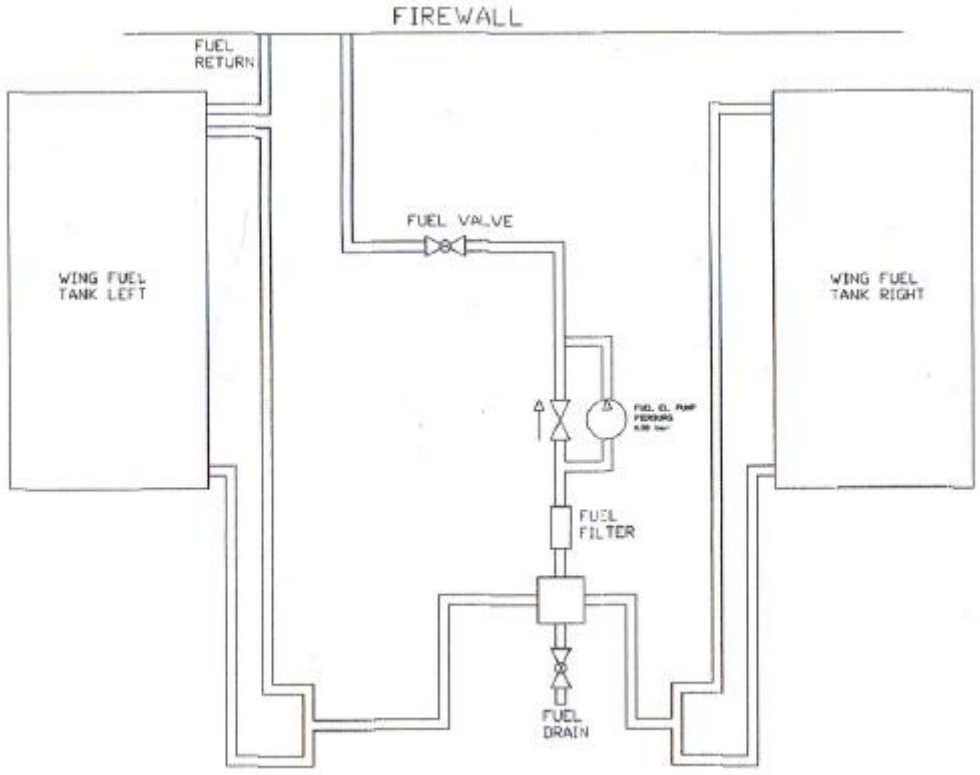
NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

1.5 Fuel System

General description

There are two aluminium fuel tanks. The total capacity is 18 gallons (17 usable). They are located into the wings between the first and the second rib of each wing. Each fuel tank has two fuel outputs. One on the front and one on the rear of each tank. This will allow enough flow of fuel to the engine, also in case of little amount of fuel into the tank and long descend (low nose attitude). Certified fuel hoses from each fuel tank, join together in the very bottom of the fuselage (below the rear seating, in the right side).
This joint has also a fuel selector that allows to drain outside of the plane the necessary amount of fuel to be checked before take off (see the inspections list).
There is a shut off valve accessible to the pilot while wearing a set belt of harness.
After this valve the rubber hose will prosecute up to the engine. Just below the rear seating (right position) it is located the fuel filter. Below and in front of the left rear control pedal, there is located the main fuel selector valve. The rubber hose continues through the firewall up to the engine fuel pump located into the engine compartment. All fuel lines are properly supported and protected from vibration and wear.

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.



1.6 Propeller

Refer to the propeller manufacturer instructions for proper maintenance.

Propellers approved for Savage Aircraft are:

Approved propellers are:
- GT (Tonini) Fixed Pitch Wooden GT-130/135.
- AEROBAT 72"x66SCR and 79”x52 SCR
-Warp Drive three blade 72RW3HPL914

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact the manufacturer.

1.7 Utility systems

Vent system

The airplane is equipped with 2 (two) snap vents situated in the right window (standard) and in the left window (optional).

The snap vents must be checked for cracks and function prior of every flight.
In case of cracks or malfunction, snap vents must be replaced by a LSRMA or A&P.

Auxiliary 12V source (optional)

The airplane is equipped with a 12 V source situated on the left side of the pilot seating and/or on the left side of the passenger seating.

During the 50 (fifty) hours inspection, a LSRMA or A&P have to follow these items for the inspection:
check that the source is correctly fixed
check the system for correct function
check the integrity of the cables

Engine mount gauge (optional)

The airplane is equipped with a pressure gauge in the engine mount.
Prior of every flight, the Owner or the pilot (if are not the same person) have to check the pressure in the engine mount to be sure that there are not any cracks on welding detected by a lost of pressure in the pressurized system.

A LSRMA or A&P have to check the system during the 50 hours inspection.

Heater system (optional)

The airplane is equipped with an heater system that is activated by the pilot using a push-pull cable on the instrument panel.

A LSRMA or A&P have to check the system during the 50 hours inspection.

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

1.8 Instruments and Avionics

Follow original Avionics or Instruments instructions for maintenance or checks. Replace defective instruments or avionics only with approved instruments.

1.9 Electrical System

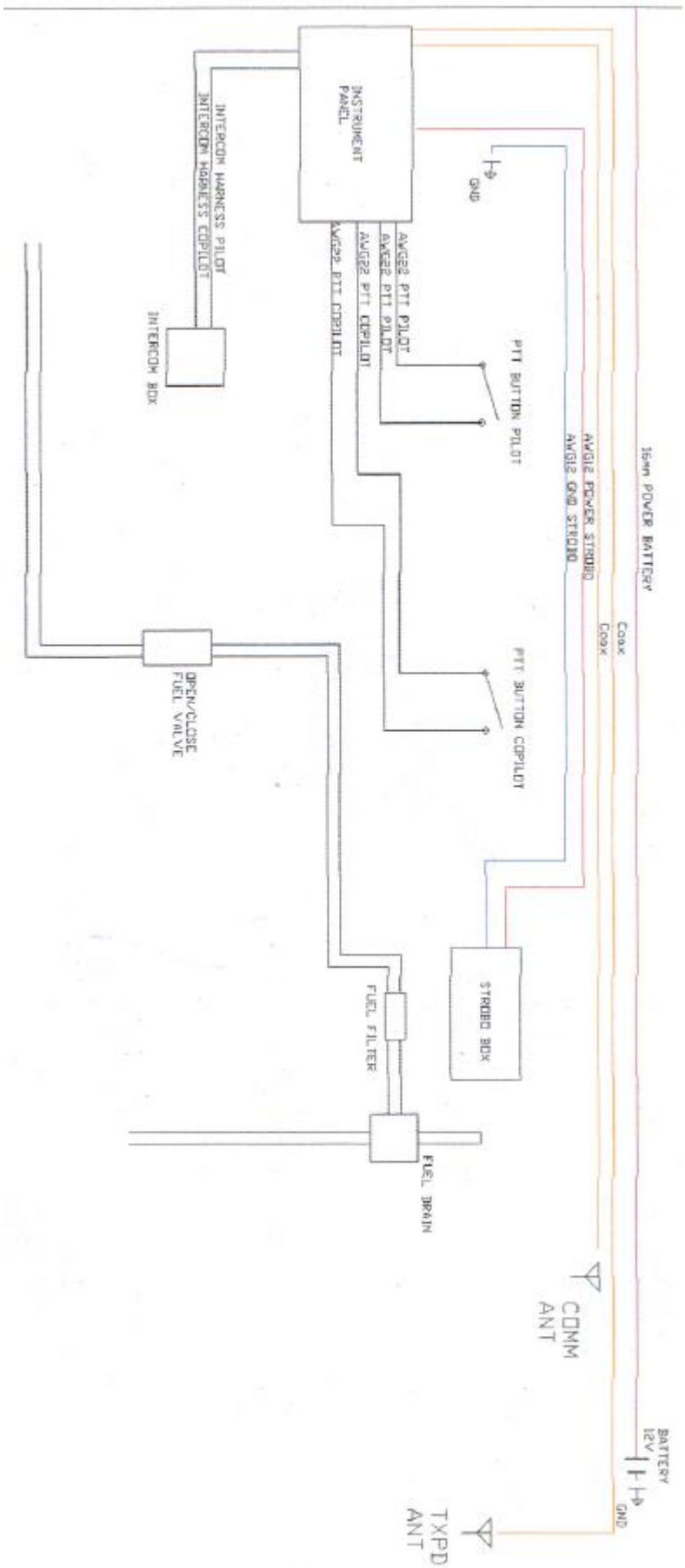
1.9.1 General

The satisfactory performance of an aircraft is dependent upon the continued reliability of the electrical system. Damaged wiring or equipment in an aircraft, regardless of how minor it may appear to be, cannot be tolerated. Reliability of the system is proportional to the amount of maintenance received and the knowledge of those who perform such maintenance. It is, therefore, important that maintenance be accomplished using the best techniques and practices to minimize the possibility of failure.

1.9.2 Description

The Electrical system consists of a dry-cell type, 12 volt battery mounted aft in the fuselage; a generator internal to the Rotax engine; a voltage regulator mounted to the firewall; a master solenoid mounted to the battery box; and, switches and instruments mounted in the panel. Information on the regulator and alternator are available in the engine manual. Basic engine and flight instruments that are factory installed should refer to the manufacturer's installation and repair procedures. Any qualified maintenance repairman, A & P, or FAA certified avionics shop may maintain in accordance with the ASTM standards.

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.


INSTRUMENT PANEL
INTERCOM HARNESS PILOT
INTERCOM HARNESS COPILOT
INTERCOM BOX
GND
AWG22 PTT PILOT
AWG22 PTT PILOT
AWG22 PTT COPILOT
AWG22 PTT COPILOT
PTT BUTTON PILOT
AWG12 POWER STROBO
AWG12 GND STROBO
15ah POWER BATTERY
Coax
Coax
PTT BUTTON COPILOT
OPEN/CLOSE FUEL VALVE
FUEL FILTER
STROBO BOX
FUEL DRAIN
COMM ANT
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GND
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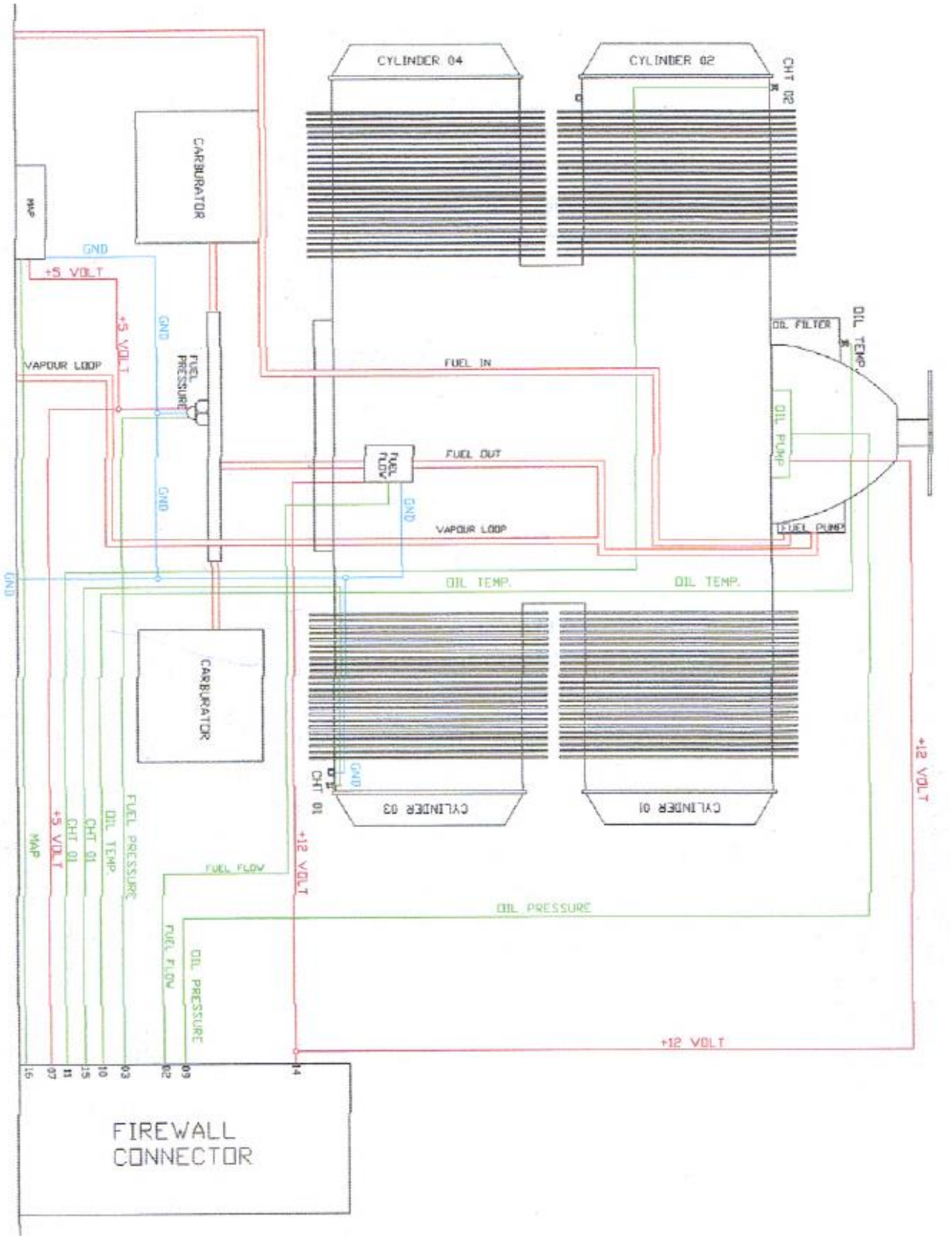
CYLINDER 04
CYLINDER 02
CHT 02
CARBURATOR
MAP
GND
+5 VOLT
VAPOUR LOOP
FUEL PRESSURE
FUEL IN
FUEL OUT
FUEL FLOW
OIL FILTER
OIL TEMP.
OIL PUMP
FUEL PUMP
CARBURATOR
CHT 01
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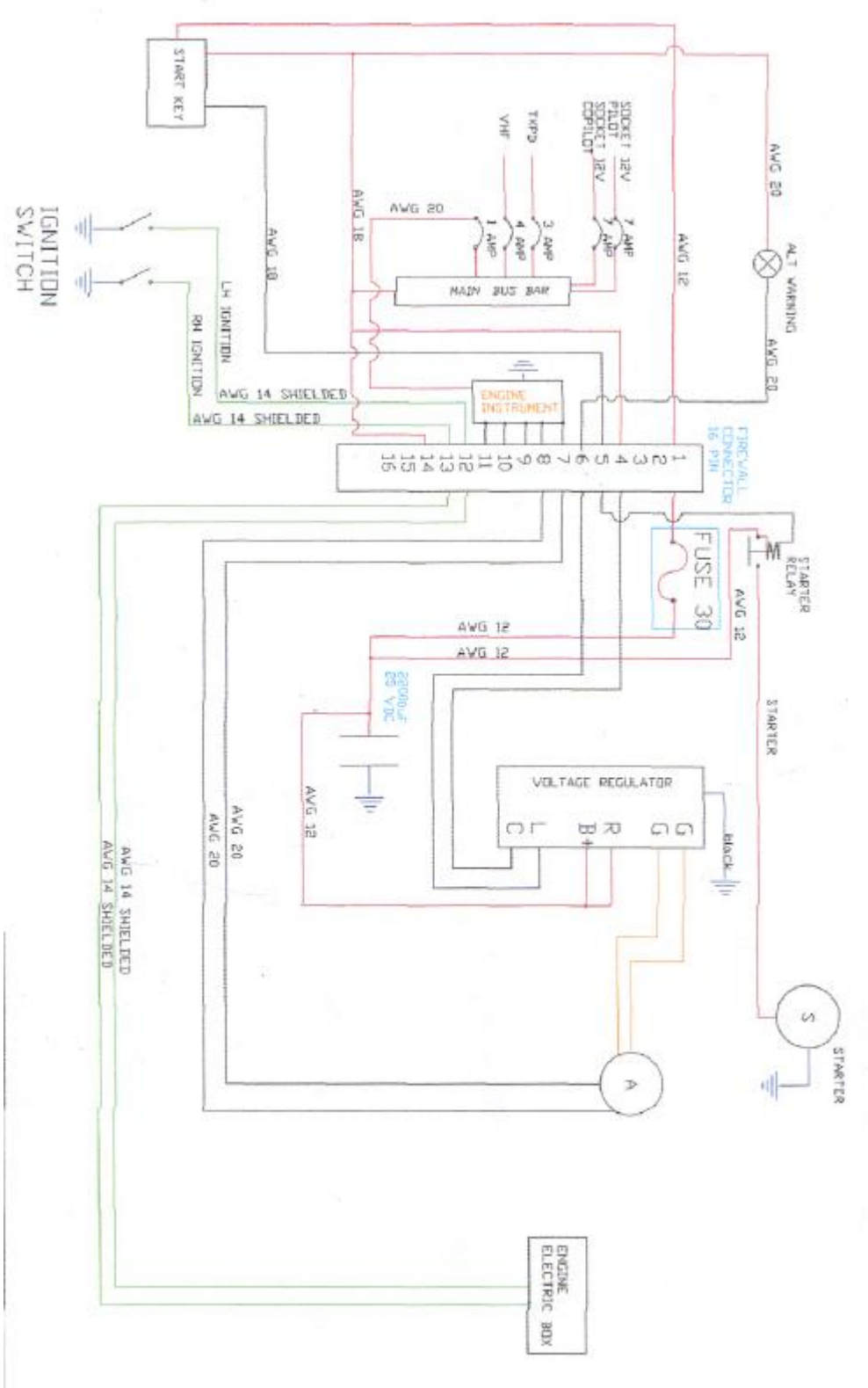
CYLINDER 01
+12 VOLT
OIL PRESSURE
FIREWALL
CONNECTOR


START KEY
IGNITION SWITCH
LH IGNITION
RH IGNITION
AWG 14 SHIELDED
AWG 14 SHIELDED
AWG 18
AWG 10
AWG 20
VHF
TXPD
SOCKET 12V PILOT
SOCKET 12V COPILOT
1 AMP
4 AMP
3 AMP
7.5 AMP
MAIN BUS BAR
AWG 12
AWG 20
ALT WARNING
AWG 20
ENGINE INSTRUMENT
FIREWALL CONNECTOR 16 PIN
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
FUSE 30
STARTER RELAY
M
AWG 12
AWG 12
AWG 12
2200uF 25 VDC
AWG 12
VOLTAGE REGULATOR
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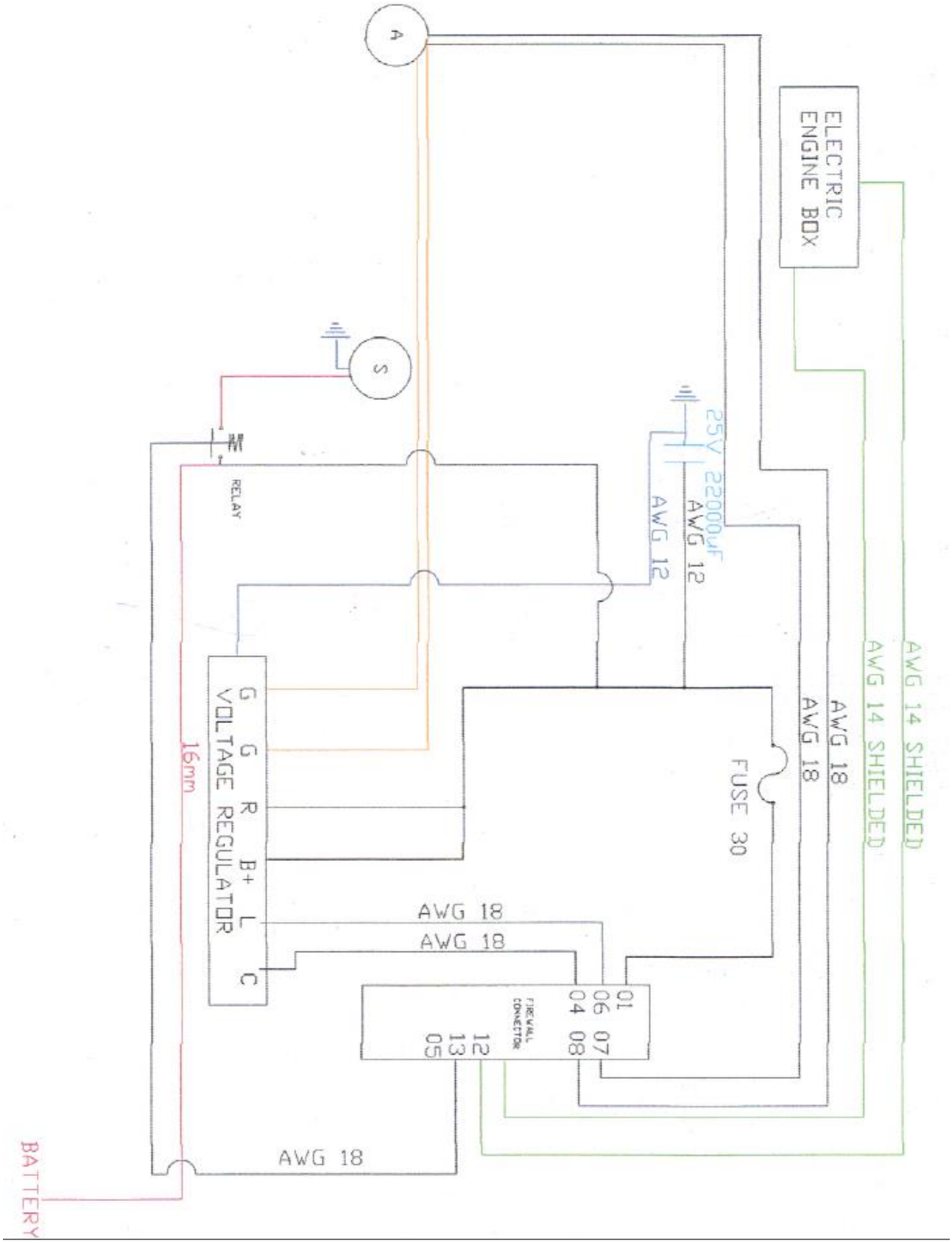
STARTER
AWG 20
AWG 20
AWG 14 SHIELDED
S
STARTER
A
ENGINE ELECTRIC BOX



Refer to FAA AC 43.13-1B Chapter 11 for the inspection and care of Aircraft Electrical Systems.

1.9.3 INSPECTION AND OPERATION CHECKS OF ELECTRICAL SYSTEM

Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. Adjust, repair, overhaul, and test electrical equipment and systems in accordance with the recomendations of our scheduled maintenance intervals.
Replace components of the electrical system that are damaged or defective with identical parts, with Zlin Aviation's approved equipment.

A list of suggested problems to look for and checks to be performed are:

- **Damaged,** discolored, or overheated equipment, connections, wiring, and installations.
- **Excessive heat** or discoloration at high current carrying connections.
- **Misalignment** of electrically driven equipment.
- **Poor electrical bonding** (broken, disconnected or corroded bonding strap) and grounding, including evidence of corrosion.
- **Dirty equipment** and connections
- **Improper, broken,** inadequately supported wiring and conduit, loose connections of terminals, and loose ferrules.
- **Poor mechanical** or cold solder joints.
- **Condition of circuit breaker** and fuses.
- **Insufficient clearance** between exposed current carrying parts and ground or poor insulation of exposed terminals.
- **Broken or missing safety wire,** broken bundle lacing, cotter pins, etc.
- **Operational check** of electrically operated equipment such as motors, inverters, generators, batteries, lights, protective devices, etc.
- **Ensure** that ventilation and cooling air passages are clear and unobstructed.
- **Voltage check** of electrical system with portable precision voltmeter.
- **Condition** of electric lamps.
- **Missing safety shields** on exposed high voltage terminals (i.e., 115/200V ac).

1.9.4 CLEANING AND PRESERVATION

Annual cleaning of electrical equipment to remove dust, dirt, and grime is recommended. Suitable solvents or fine abrasives that will not score the surface or remove the plating may be used to clean the terminals and mating surfaces if they are corroded or dirty. Only cleaning agents that do not leave any type of residue must be used.
Components must be cleaned and preserved in accordance with the aircraft handbooks or manufacturer's instructions. Avoid using emery cloth to polish commutators or slip rings because particles may cause shorting and burning. Be sure that protective finishes are not scored or damaged when cleaning. Ensure that metal-to-metal electrically bonded surfaces are treated at the interface with a suitable anti-corrosive conductive coating, and that the joint is sealed around the edges by restoring the original primer and paint finish. Connections that must withstand a highly corrosive environment may be encapsulated with an approved sealant in order to prevent corrosion.

CAUTION: Turn power off before cleaning.

1.9.5 BATTERY ELECTROLYTE CORROSION

Corrosion found on or near lead-acid batteries can be removed mechanically with a stiff bristle brush and then chemically neutralized with a 10 percent sodium bicarbonate and water solution. For Nickel Cadmium (NiCad) batteries, a 3 percent solution of acetic acid can be used to neutralize the electrolyte. After neutralizing, the battery should be washed with clean water and thoroughly dried.

1.10 Structural Repair

NOTE: no major repair or alteration, as outlined in ASTM 2483, are authorised at this time. For eventually obtaining engineering approval for any major repair or alteration, contact Zlin Aviation.

1.11 Painting and coatings

Savage aircrafts are covered with standard dacron fabric. The covering procedure is absolutely traditional, as outlined in different specific literature, and is described in chapter 2.3.3..3. Trained A&P or LSRMA should be able to repair a tear on the dacron without any particular problems.
Little or bigger tears in fabric covering need at first to be cleaned from the external finishing paint. In case for example of an L-shaped tear, you have to clean an area around the L tear of about 3 inches along the tear.
Only later you can glue a finishing tape (pinked edged) over the cleaned area. Later this tape will be brushed, manually at least 4 times, before to be painted with final desired paint. You can use a standard Poly-Brush product or similar product.
We use the PPG system and components for final painting. A complete list of components and colour codes is available on request .These components should be available locally in your town, or ZA can supply them. They are polyurethane type components. The use of our elastic component, will avoid the risk of any crack in the final paint during the years.
You can clean your plane as you would clean your car starting from the top and working your way downwards using a soft sponge and a car shampoo. Don't use a sponge that could be contaminated with particles e.g.bud, fine sands etc). This will avoid to grind the surface. Use a separate sponge to clean the bottom of the fuselage, since it is normally more greasy than the rest of the plane. Don't direct the water over the fuel reservoir caps, wing fuselage joining section etc..Always water the shampooed surface again before they become dry. Thereafter wipe the whole of the aircraft dry using a drying towel, or a leather skin.
For the lexan use only clean water and really clean drying towel. If the surface are dusty (dacron and fuselage), remove at first the dust with clear water.
Write to our customer service department to receive a complete list of components for your reparation or service, at customer.service@zlinaero.com

For surface preparation you can also refer to the book “How to Cover An Aircraft Using the Poly-Fiber System”: ZA does not use Poly Fiber products but recognizes the process and materials to be an acceptable method for performing repairs on the Savage Aircraft.

Use the following instructions for preparing a surface for painting, after the minor repair has been performed following instructions of other chapters.

Preparation of metal

1. Sand surfaces with 180-320 grit sandpaper & very fine red Scuffpads.
2. Degrease components with DX330 per manufacturer’s instructions.
3. Mix and apply PPG Metal Primer DX1787 and DX1788 per manufacturer’s instructions.
4. Allow primer to dry at 140°F for 20 minutes.
5. Sand primed surface. Use 400 grit sandpaper in areas where DUHS will be used, or 600 grit sandpaper where PolyTone will be used.

Preparation of composites

1. Degrease components with an alcohol based cleaner per manufacturer's instructions.
2. Sand with 400 grit sandpaper, blow and tack off.

Preparation of fabric

Smooth any edges with a small iron. Use dry 400-grit sandpaper to smooth tape and double edges and remove surface dust bumps. 3M 8500 Sealant or equivalent can be used to cover seams in corners, as needed.

Painting

The final finish is either a polyurethane DUHS paint from PPG (as used and endorsed by ZA) or PolyTone paint.
Mix the DUHS paint in accordance with the PPG's application guide, adding the Plasticizer.
Spray the first coat with a HVLP gun with a 30-50 psi inlet pressure. Allow first coat to become hand slick, then apply a second coat.
After a minimum of 15 minutes (or after the paint has flashed off), bake the surface for a minimum of 30 minutes @ 120°F ±10° or air dry at 70°F for approximately eight hours.

1.12 Feedback form

Maintenance, Service and Safety Report

Owners are welcome to send their Service Reports, or any comments or difficulties in relation also with the use of this manual, by filling the Service Report Form in the Owner Area of our website. In alternative fill this form and send this information below to: servicereports@zlinaero.com

Date:

Current contact information:

Name _____

Address _____

Telephone _____

Cell Phone _____

Email _____

The airplane is used for:

(___) **Trainers** ------ Flight school or other activity which involves a large number of take-offs, landings and power changes per flight hour (. . .)

(___) **Personal Use** - Operated for recreational purposes

(__) **Low Use** ------- Less than . . . . flight hours per month

(___) **Special Use** --- Rentals, aerial advertising, aerial photography (please specify)

Describe any safety of flight or significant service issue:

Attached pages if required

Section 2 – Line Maintenance, Repairs and Alterations

2.1 Authorization to perform line maintenance

Authorization to Perform—The holder of an LSA repairman certificate with either an inspection or maintenance rating is generally considered the minimum level of certification to perform line maintenance of Zlin Aviation LSA Savage aircrafts. The examples listed below are not considered as restrictions against the performance of such tasks by an owner who is authorized to perform said task by the FAA.

Typical Tasks Considered as Line Maintenance Include:
1. 100-hour inspection, (See Section 1.2)
2. Annual condition inspection, (See Section 1.2)
3. Servicing of fluids,
4. Removal and replacement of components for which instructions are provided in the maintenance manual.
5. Repair of components and structure for which instructions are provided in the maintenance manual and which do not require additional specialized training.

100- Hour inspection and Annual Condition Inspection are described in Section 1.2 of this Manual, and Authorization to Perform the tasks is described there, in accordance with ASTM F2483.

Guidance for accomplishing such maintenance, repairs, alterations, and inspections is contained in this manual and should be accomplished in accordance with the practices described in FAA Advisory Circular 43.13.

2.2 FAA Authorization to perform line maintenance

The tasks listed in this Manual, and considered to be Minor Maintenance, Repairs, or Alteration tasks - as defined in ASTM F2483 Section 3.1.12 - and may be performed by the Pilot/Owner and who is the holder of an FAA Sport Pilot, Recreational Pilot, Private Pilot, Commercial, or Airline Transport Pilot Certificate.

2.3 Line Maintenance Tasks

2.3.1 SERVICING OF FLUIDS

This information gives the general servicing procedures and maintenance practices that are to be used when servicing the airplane.

For additional detailed information concerning unit servicing of the engine, refer to the applicable chapters of the Engine Manual.

For tire pressure information see Chapter 1.1.7.

The intervals specified in this section are considered adequate to meet average requirements under normal operating conditions. It is advisable to shorten the service and maintenance intervals when operating under abnormal environmental conditions, such as high humidity and moisture, salt water environments, dusty atmospheric conditions and extreme temperature ranges. In salt water areas, special care should be taken to keep the engine, accessories, and airframe clean to help prevent oxidation.

Lubrication table

AREA	Lubrication area	Interval	Lubricant
Engine	Throttle control cable	50h	Light oil
	Choke control cable	50h	Light oil
	Hot air control cable if present	50h	Light oil
Main landing gear	Axels and bearings	50h	Lubricant grease
	Main upper bolts (attachment to fuselage)	50h	Lubricant grease
	Telescopes, middle	Annual	Lubricant grease
	Cabane and telescope upper and lower attachments	50h	Lubricant grease
Tailwheel	Tailwheel swivel and bearings	50h	Lubricant grease
Fuselage	Flap pivot points (not the Teleflex!)	50h	Lubricant grease
	Pivot points	50h	Lubricant grease
	Elevator control horn/eyebolts	50h	Lubricant grease
	Elevator control push-pull tube connections inside the fuselage	50h	Lubricant grease
	Pedals and all metal moving parts (as seats, door hinges)	50h	Lubricant grease
Empennage	Elevator and rudder hinge pins	50h	Lubricant grease
	Trim tab hinge pins	50h	Lubricant grease
Wings	Hinge pins and rod end bearings on ailerons and flaps (not the teleflex!)	50h	Lubricant grease

2.3.2 REMOVAL AND REPLACEMENT OF COMPONENTS

For aircraft assembly instructions (wings, tail surfaces, etc…), please follow instructions detailed in QAP-RTF-API (Assembly procedure Instructions) manual.

2.3.2.1 STEEL WIRE CABLES AND PULLEYS

The following is a partial extract from FAA AC 43.13-1B.

REPLACEMENT OF CABLES.
Replace control cables when they become worn, distorted, corroded, or otherwise damaged. If spare cables are not available, prepare exact duplicates of the damaged cable. Use only manufacturer's approved cables and materials of the same size and quality as the original.

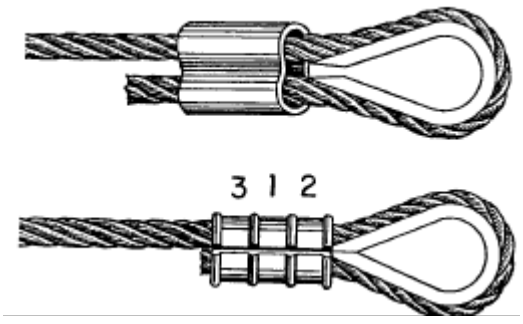
Location of Splices.
Locate splices so that no portion of the splice comes closer than 2 inches to any fair-lead or pulley. Locate connections at points where jamming cannot occur during any portion of the travel of either the loaded cable or the slack cable in the deflected position.

Cutting and Heating. Cut cables to length by mechanical means. The use of a torch, in any manner, is not permitted. Do not subject wires and cables to excessive temperature. Soldering the bonding braid to the control cable is not permitted.

Ball-and-Socket Type Terminals. Do not use ball-and-socket type terminals or other types for general replacement that do not positively prevent cable untwisting, except where they were utilized on the original installation by the aircraft manufacturer.

Substitution of Cable. Substitution of cable for hard or streamlined wires will not be acceptable unless specifically approved by a representative of the FAA.

Thimble-Eye Splice. Before undertaking a thimble-eye splice, initially position the cable so the end will extend slightly beyond the sleeve, as the sleeve will elongate somewhat when it is compressed. If the cable end is inside the sleeve, the splice may not hold the full strength of the cable. It is desirable that the oval sleeve be placed in close proximity to the thimble points, so that when compressed, the sleeve will contact the thimble as shown in the figure. The sharp ends of the thimble may be cut off before being used; however, make certain the thimble is firmly secured in the cable loop after the splice has been completed. When using a sleeve requiring three compressions, make the center compression first, the compression next to the thimble second, and the one farthest from the thimble last.



CABLE SYSTEM INSPECTION

Aircraft cable systems are subject to a variety of environmental conditions and deterioration. Wire or strand breakage is easy to visually recognize. Other kinds of deterioration such as wear, corrosion, and/or distortion are not easily seen; therefore, control cables should be removed periodically for a more detailed inspection.

All control cables must be inspected **DAILY** for broken wires strands. Any cable assembly that has one broken wire strand located in a critical fatigue area must be replaced.

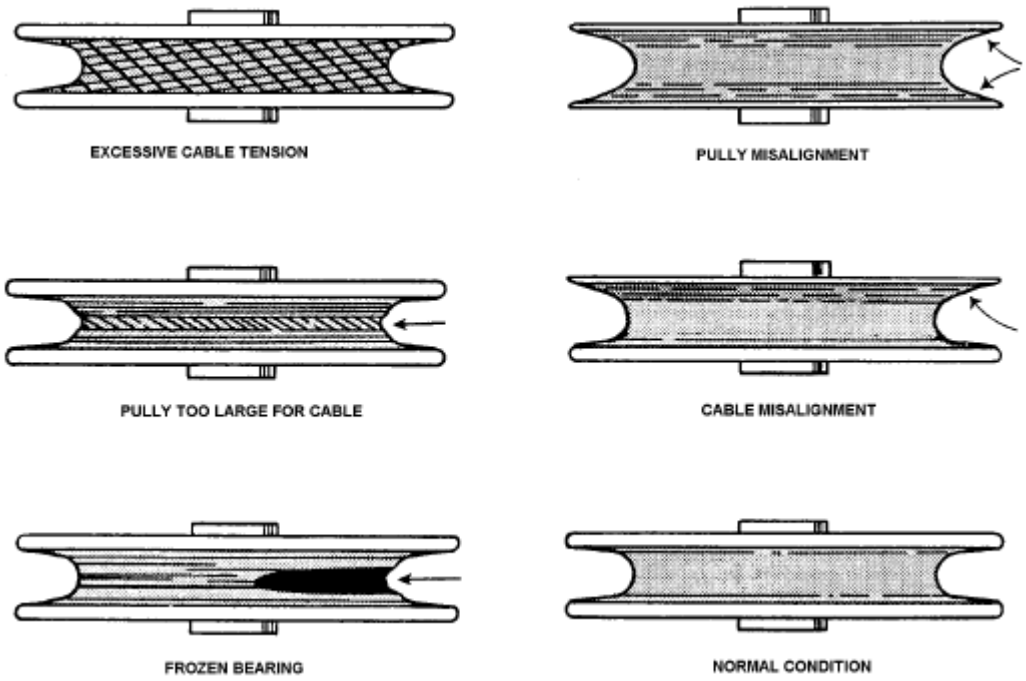
A critical fatigue area is defined as the working length of a cable where the cable runs over, under, or around a pulley, sleeve, or through a fair-lead; or any section where the cable is flexed, rubbed, or worked in any manner; or any point within 1 foot of a swaged-on fitting.

Close inspection in these critical fatigue areas,
must be made by passing a cloth over the area to snag on broken wires. This will clean the cable for a visual inspection, and detect broken wires if the cloth snags on the cable. Also, a very careful visual inspection must be made since a broken wire will not always protrude or stick out, but may lie in the strand and remain in the position of the helix as it was manufactured. Broken wires of this type may show up as a hairline crack in the wire. If a broken wire of this type is suspected, further inspection with a magnifying glass of 7 power or greater, is recommended. Figure shows a cable with broken wires that was not detected by wiping, but was found during a visual inspection. The damage became readily apparent when the cable was removed and bent as shown in figure.

Examine cable runs for incorrect routing, fraying, twisting, or wear at fair-leads, pulleys, antiabrasion strips, and guards. Look for interference with adjacent structure, equipment, wiring, plumbing, and other controls. Inspect cable systems for binding, full travel, and security of attaching hardware. Check for slack in the cable system by attempting to move the control column and/or pedals while the gust locks are installed on the control surfaces. With the gust locks removed, actuate the controls and check for friction or hard movement. These are indications that excessive cable tension exists.

Inspect pulleys for roughness, sharp edges, and presence of foreign material embedded in the grooves. Examine pulley bearings to ensure proper lubrication, smooth rotation; and freedom from flat spots, dirt, and paint spray. During the inspection, rotate the pulleys, which only turn through a small arc, to provide a new bearing surface for the cable. Maintain pulley alignment to prevent the cable from riding on the flanges and chafing against guards, covers, or adjacent structure. Check all pulley brackets and guards for damage, alignment, and security.

Various cable system malfunctions may be detected by analyzing pulley conditions. These include such discrepancies as too much tension, misalignment, pulley bearing problems, and size mismatches between cables and pulleys. Examples of these condition are shown in the figure.



Inspect fair-leads for wear, breakage, alignment, cleanliness, and security. Examine cable routing at fair-leads to ensure that defection angles are no greater than 3° maximum. Determine that all guides and anti-abrasion strips are secure and in good condition.

CORROSION AND RUST PREVENTION. To ensure a satisfactory service life for aircraft control cables, use a cable lubricant to reduce internal friction and prevent corrosion.

CABLE MAINTENANCE. Frequent inspections and preservation measures such as rust-prevention treatments for bare carbon steel cable areas, will help to extend cable service life. Where cables pass through fair-leads, pressure seals, or over pulleys, remove accumulated heavy coatings of corrosion-prevention compound. Provide corrosion protection for these cable sections by lubricating with a light coat of grease or general purpose, low-temperature oil.

2.3.2.2 SAFETY WIRE INSTALLATION TO TURNBUCKLES

The following is a partial extract from FAA AC 43.13-1B.

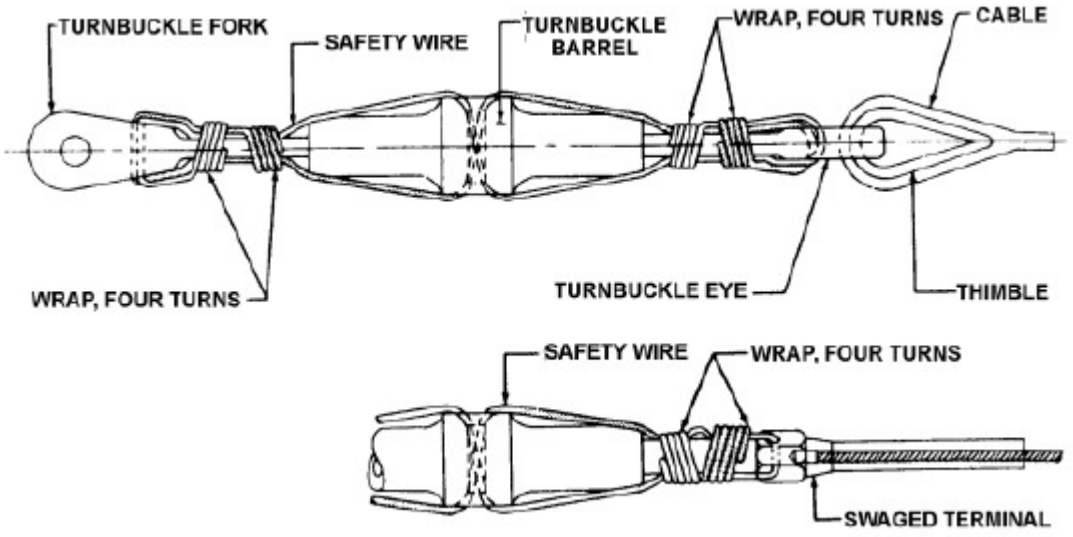
Before securing turnbuckles, threaded terminals should be screwed into the turnbuckle barrel until no more than three threads of either terminal are outside the barrel. After the turnbuckle has been adjusted for proper cable tension, two pieces of safety wire are inserted, half the wire length into the hole in the center of the turnbuckle barrel. The safety-wires are bent so that each wire extends half the length of the turnbuckle on top and half on bottom. The ends of the wires are passed through the hole in the turnbuckle eyes or between the jaws of the turnbuckle fork, as applicable. The wires are then bent toward the center of the turnbuckle and each wire is wrapped around the shank four times, binding the wrapping wires in place as shown in the figure below.

a. When a swaged terminal is being secured, one wire is passed through the hole in the terminal and is looped over the free end of the other wire and both ends wrapped around the shank. All lock wire used in the safetying of turnbuckles should be carbon steel, corrosion-resistant steel, nickel-chromium iron alloy (inconel), nickel-copper alloy (monel) or aluminum alloy. For safety cable diameter of safety wire size and material, refer to table 7-8.

b. Care should be exercised when safety wiring, particularly where corrosion will present a problem, because smaller wire sizes tend to crack when twisted.

Cable Size	Type of Wrap	Diameter of Safety Wire	Material (Annealed Condition)
1/16	Single	0.040	Copper, brass.[1]
3/32	Single	0.040	Copper, brass.[1]
1/8	Single	0.040	Stainless steel, Monel and "K" Monel.
1/8	Double	0.040	Copper, brass.[1]
1/8	Single	0.057 min.	Copper, brass.[1]
5/32 and greater.	Double	0.040	Stainless steel, Monel and "K" Monel.[1]
5/32 and greater	Single	0.057 min.	Stainless steel, Monel or "K" Monel.[1]
5/32 and greater	Double	0.0512	Copper, brass.

[1]Galvanized or tinned steel, or soft iron wires are also acceptable.



2.3.3 REPAIR OF COMPONENTS

2.3.3.1 REPAIR OF NON STRUCTURAL SHEET METAL PARTS

Level of Certification

Non-structural sheet metal repairs are to be accomplished by: a certificated LSA Repairman; Maintenance Rated and FAA certified LSA Pilot /Owner; or a suitably qualified and experienced FAA certified A&P Mechanic.

Authorized Non-Structural Sheet Metal Repairs

Damage to non-structural sheet metal parts may be repaired using the techniques of FAA Aircraft Circular 43.13. Chapter 4, Section 4.

Repairs to primary or secondary structures by others than ZA' are not authorized.

2.3.3.2 REPAIR OF NON STRUCTURAL COMPOSITE MATERIALS

Level of Certification

Non-structural composite materials repairs are to be accomplished by: a certificated LSA Repairman; Maintenance Rated and FAA certified LSA Pilot /Owner; or a suitably qualified and experienced FAA certified A&P Mechanic.

Authorized Non-Structural Composite Materials Repairs

Damage to non-structural composite materials parts may be repaired using the techniques of FAA Aircraft Circular 43.13. Chapter 3, Section 1.

Repairs to primary or secondary structures by others than ZA' are not authorized.

2.3.3.3 REPAIR OF MINOR FABRIC DAMAGES

APPROVED FABRIC REPAIR MATERIALS

Description	**Supplier**
Methyl Ethyl Ketone (MEK)	Local Supplier
Poly-Fiber	Poly-Fiber Aircraft Coating
Poly-Tak	Poly-Fiber Aircraft Coating
Poly-Brush	Poly-Fiber Aircraft Coating
Poly-Spray	Poly-Fiber Aircraft Coating
Flat Rib Lace Cord	Poly-Fiber Aircraft Coating
LOCTITE Depend 330 Adhesive	Local Supplier

INSPECTION OF FABRIC

The polyester fabric used is very durable and its longevity depends on maintaining the coating in good shape. Ultraviolet radiation (in other words, direct sunlight) is the main cause of deterioration of the fabric. The fabric is treated at the factory to protect it from this type of radiation.

The fabric covering meets the requirements of TSO C-15d/AMS which stipulates that the minimum breaking strength of the fabric should be at least 56 lbs. Testing fabric requires skill and experience and should only be performed by a qualified person who has experience in this matter.

The aircraft has been covered using a process that is proprietary to Zlin Aviation sro. It is similar to the Poly-Fiber Aircraft coating process, more commonly referred to as the Stits method.

FABRIC REPAIRS

The decision to repair damage on the fabric or whether to replace the covering on the part will depend upon the extent of the damage and should take into account the aesthetics of the repair. These repairs require the use of an iron to shrink the fabric. It is very important that only a good quality clothing iron be used.

SIZE OF REPAIR AREA

 If the length of the damaged area is 8 inches or more, the patch must overlap the old fabric by at least 2 inches. Repairs longer than 8 inches require at least a 2 inch wide finishing tape over the seams. These tapes should be centered over the seam of the patch.

 If the length of the damaged area is less than 8 inches in length, the patch must overlap the old fabric by at least 1 inch. Finishing tapes are not required over the glued seams unless the patch is on top of the wing.

 For small fabric repairs such as stick or stone damage, where the holes are ½ inch long or less, a patch of already doped and painted fabric with the edges pinked can be used. An overlap of at least ½ inch of patch material over ½ inch of old fabric on all sides is required and it must be secured with Loctite Depend 330 Adhesive or a suitable equivalent.

PATCH REPAIR LESS THAN 8 INCHES

(a) Trim any ragged edges.
(b) Lay an un-shrunk piece of material over the hole and trace the outline of the patch with a #2 pencil. Make sure to allow for enough overlap as explained earlier. Note that square or rectangular patches are preferable. Cut out the patch with pinking shears.
(c) Mask off the area outside the patch leaving an extra half-inch or so of working room around the contour of the patch.
(d) Peal the polyurethane paint off and clean all the coatings inside the masked area with MEK down to the bare fabric.
(e) Glue the patch to the old fabric with Poly-Tak and allow it to dry.
(f) With an iron set to 225ºF, smooth the glued areas.
(g) Heat-shrink the area of the patch over the hole with a 350ºF iron. This acts as a shrinking panel to re-tighten the fabric in the area of the repair. Use a piece of cardboard as a shield to keep the iron off the glued areas, if needed.
(h) Poly-Brush requires two applications. Each application consists of 2 coats.

- The first coat should be brushed on to penetrate the fabric.
- After the first coat has flashed off, apply the second coat by brushing or spraying

on then allow it to dry.

- If finishing tapes are needed, attach them with Poly-Brush.
- Smooth the finish tapes with a hot iron.
- Make a second application of Poly-Brush (2 coats) allowing it to flash off in between coats. The Poly-Brush may all be brushed on if it is a small patch or sprayed if it is larger or in a high visibility area.

(i) Make 2 applications of Poly-Spray.
(j) For the first application;

- Blow and tack off the covering to be sure it is as dust free as possible.
- Spray or brush the first coat of Poly-Spray. Allow to dry for approximately 15 minutes
- Spray or brush the second coat of Poly-Spray and make sure it is dry before sanding.

(k) For the second application;

- Smooth any edges, which may be sticking up, using a small hot iron.
- Smooth tape and doubler edges using dry 320 grit sandpaper to remove surface dust bumps.
- Blow and tack off the covering to be sure it is as dust free as possible.
- Spray or brush the third coat of Poly-Spray and let dry for approximately 15 minutes.
- Spray or brush the fourth coat of Poly-Spray and let dry completely before sanding.

(l) Paint to match original paint

PATCH REPAIR MORE THAN 8 INCHES

(a) For large fabric repairs such as a wing tip, start at the last good rib, or at a convenient location close to the damaged area, removing the old finish tapes.
(b) Cut the rib laces.
(c) Clean off all the coatings with MEK down to the fabric so that there is at least a 2 inch overlap over the rib.
(d) Glue a whole new piece of fabric to cover the wingtip with a 2 inch overlap over the rib area.
(e) Heat shrink.
(f) Apply the first application of Poly-Brush as described previously.
(g) Secure the fabric to the rib, in the same manner it was previously, by rib stitching or with broad-head pop rivets. For rib stitching see the instructions at the end of the Section.
(h) Apply tapes as described previously.
(i) Apply the second application of Poly-Brush as described previously.
(j) Then apply Poly-Spray as described previously.
(k) Paint to match original paint.

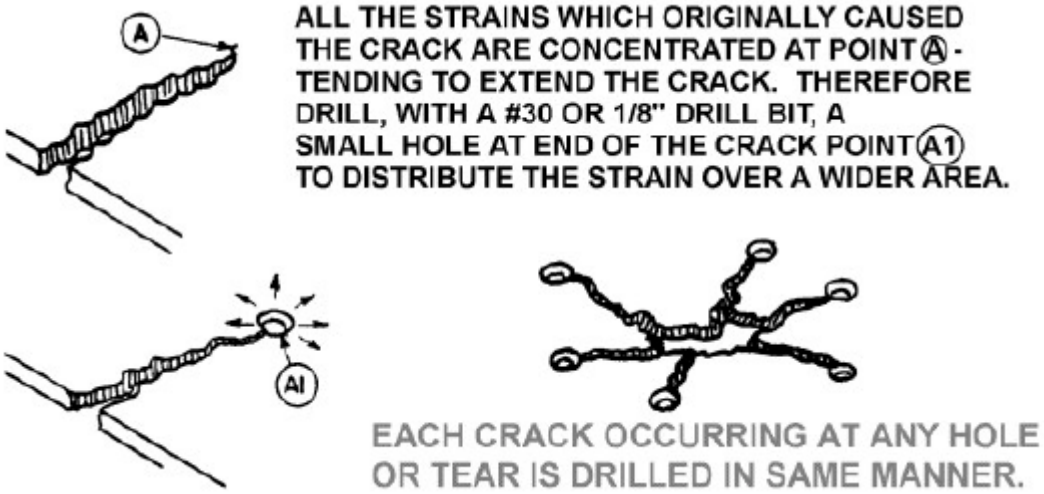
STITCHING

For precise instructions regarding covering and stiching methods, please refer to AC 43.13-1B Chapter 2.

2.3.3.4 STOP DRILLING OF CRACKS

This is an extract of FAA AC 43.13-1B Chapter 3.

Replace, rather than repair extensively damaged transparent plastic, whenever possible, since even a carefully patched part is not the equal of a new section, either optically or structurally. At the first sign of crack development, drill a small hole with a # 30 or a 1/8-inch drill at the extreme ends of the cracks as shown in figure 3-21. This serves to localize the cracks and to prevent further splitting by distributing the strain over a large area. If the cracks are small, stopping them with drilled holes will usually suffice until replacement or more permanent repairs can be made. The following repairs are permissible; however, they are not to be located in the pilot's line of vision during landing or normal flight.



CLEANING AND POLISHING TRANSPARENT PLASTIC.
Plastics have many advantages over glass for aircraft use, but they lack the surface hardness of glass and care must be exercised while servicing the aircraft to avoid scratching or otherwise damaging the surface.

a. Clean the plastic by washing it with plenty of water and mild soap, using a clean, soft, grit-free cloth, sponge, or bare hands. Do not use gasoline, alcohol, benzene, acetone, carbon tetrachloride, fire extinguisher or deicing fluids, lacquer thinners, or window cleaning sprays. These will soften the plastic and cause crazing.

b. Plastics should not be rubbed with a dry cloth since this is likely to cause scratches, and also to build up an electrostatic charge that attracts dust particles to the surface. If after removing dirt and grease, no great amount of scratching is visible, finish the plastic with a good grade of commercial wax. Apply the wax in a thin even coat and bring to a high polish by rubbing lightly with a soft cloth.

c. Do not attempt hand polishing or buffing until the surface is clean. A soft, open-type cotton or flannel buffing wheel is suggested. Minor scratches may be removed by vigorously rubbing the

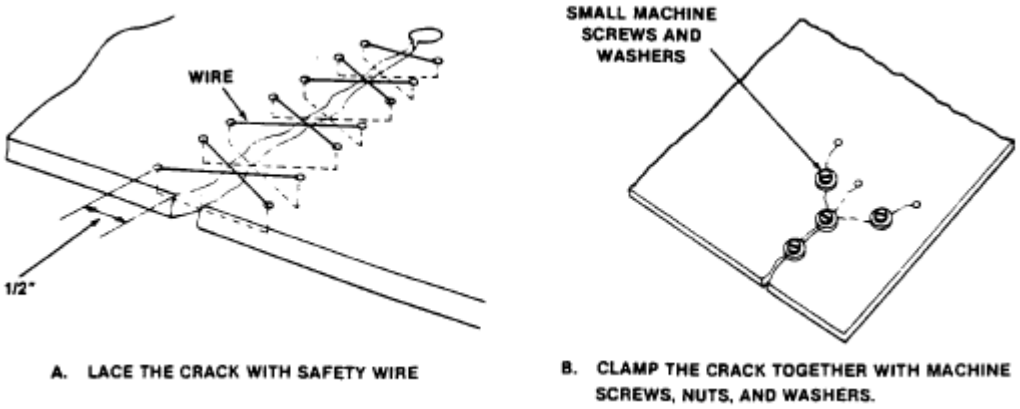
affected area by hand, using a soft clean cloth dampened with a mixture of turpentine and chalk, or by applying automobile cleanser with a damp cloth. Remove the cleaner and polish with a soft, dry cloth. Acrylic and cellulose acetate plastics are thermoplastic. Friction created by buffing or polishing too long in one spot can generate sufficient heat to soften the surface. This condition will produce visual distortion and should be avoided.

REPLACEMENT PANELS. Use material equivalent to that originally used by the manufacturer of the aircraft for replacement panels. There are many types of transparent plastics on the market. Their properties vary greatly, particularly in regard to expansion characteristics, brittleness under low temperatures, resistance to discoloration when exposed to sunlight, surface checking, etc. Information on these properties is in MIL-HDBK-17A, Plastics for Flight Vehicles, Part II□Transparent Glazing Materials, available from the Government Printing Office (GPO). These properties are considered by aircraft manufacturers in selecting materials to be used in their designs and the use of substitutes having different characteristics may result in subsequent difficulties.
Contact ZA for detailed specifications on materials used on Savage Aircrafts.

INSTALLATION PROCEDURES.
When installing a replacement panel, use the same mounting method employed by the manufacturer of the aircraft. While the actual installation will vary from one type of aircraft to another, consider the following major principles when installing any replacement panel.
Never force a plastic panel out of shape to make it fit a frame. If a replacement panel does not fit easily into the mounting, obtain a new replacement or heat the whole panel and reform. When possible, cut and fit a new panel at ordinary room temperature.
In clamping or bolting plastic panels into their mountings, do not place the plastic under excessive compressive stress. It is easy to develop more than 1,000 psi on the plastic by over-torquing a nut and bolt. Tighten each nut to a firm fit, then back the nut off one full turn (until they are snug and can still be rotated with the fingers).
In bolted installations, use spacers, collars, shoulders, or stop-nuts to prevent tightening the bolt excessively. Whenever such devices are used by the aircraft manufacturer, retain them in the replacement installation. It is important that the original number of bolts, complete with washers, spacers, etc., be used. When rivets are used, provide adequate spacers or other satisfactory means to prevent excessive tightening of the frame to the plastic.

WINDSHIELD REPAIR
Minor Repairs. There are times, however, when a windshield may be cracked and safety is not impaired. In that case, repairs can be made by stop-drilling the ends of the crack with a # 30 drill (1/8 inch) to prevent the concentration of stresses causing the crack to continue. Drill a series of number 40 holes a half-inch from the edge of the crack about a half-inch apart, and lace through these holes with brass safety wire (see figure 3-24) and seal with clear silicone to waterproof.
Temporary Repairs. One way to make a temporary repair is to stop-drill the ends of the crack, and then drill number 27 holes every inch or so in the crack. Use AN515-6 screws and AN365-632 nuts with AN960-6 washers on both sides of the plastic. This will hold the crack together and prevent further breakage until the windshield can be properly repaired or replaced.
Permanent Repairs. Windshields or side windows with small cracks that affect only the ppearance rather than the airworthiness of a sheet, may be repaired by first stop-drilling the ends of the crack with a # 30 or a 1/8-inch drill. Then use a hypodermic syringe and needle to fill the crack with polymerizable cement such as PS-30 or Weld-On 40, and allow capillary action to fill the crack completely. Soak the end of a 1/8-inch acrylic rod in cement to form a cushion and insert it in

the stop-drilled hole. Allow the repair to dry for about 30 minutes, and then trim the rod off flush with the sheet.



A. LACE THE CRACK WITH SAFETY WIRE

B. CLAMP THE CRACK TOGETHER WITH MACHINE SCREWS, NUTS, AND WASHERS.

Polishing and Finishing. Scratches and repair marks, within certain limitations, can be removed from acrylic plastic. No sanding that could adversely affect the plastic's optical properties and distort the pilot's vision should be done on any portion of a windshield.
(1) If there are scratches or repair marks in an area that can be sanded, they may be removed by first sanding the area. Use 320- or 400-grit abrasive paper that is wrapped around a felt or rubber pad.
(2) Use circular rubbing motions, light pressure, and a mild liquid soap solution as a lubricant. After the sanding is complete, rinse the surface thoroughly with running water. Then, using a 500-grit paper, continue to sand lightly. Keep moving to higher grit paper and sand and rinse until all of the sanding or repair marks have been removed.
(3) After using the finest abrasive paper, use rubbing compound and buff in a circular motion to remove all traces of the sanding.
Cleaning. Acrylic windshields and windows may be cleaned by washing them with mild soap and running water. Rub the surface with your bare hands in a stream of water. Follow with the same procedure but with soap and water. After the soap and dirt have been flushed away, dry the surface with a soft, clean cloth or tissue and polish it with a windshield cleaner especially approved for use on aircraft transparent plastics. These cleaners may be purchased through aircraft supply houses.
Waxing. A thin coating of wax will fill any minute scratches that may be present and will cause ain to form droplets that are easily blown away by the wind.

PROTECTION. Acrylic windshields are often called "lifetime" windshields, to distinguish them from those made of the much shorter-lived acetate material. However, even acrylic must be rotected from the ravages of the elements.
a. When an aircraft is parked in direct sunlight, the windshield will absorb heat and will actually become hotter than either the inside of the aircraft or the outside air. The sun will cause the inside of a closed aircraft to become extremely hot, and this heat is also absorbed by the plastic windshield.
b. To protect against this damage, it is wise to keep the aircraft in a hangar. If this is not possible, some type of shade should be provided to keep the sun from coming in direct contact with the windshield. Some aircraft owners use a close-fitting, opaque, reflective

2.3.4 ALTERATIONS

COMPLIANCE WITH MANUFACTURER'S SERVICE DIRECTIVES

When service directives are issued, they will be in the form described in Section 7 of this manual. These will be sent to the owner/operators in the most current ZA database and will be in the form of Safety Alerts, Service Bulletins, and Notifications. All issued Service Directives are published online and readily accessible in the Owner Area of the www.zlinaero.com website.

SECTION 3 – HEAVY MAINTENANCE, REPAIRS AND ALTERATIONS

3.1 Authorization to perform heavy maintenance, repair and alterations

No heavy maintenance, major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

3.2 Heavy Maintenance Tasks (Not authorized at this time)

- Removal and Replacement of Components
- Repair of Components or Aircraft Structure
- Alterations of Components or Aircraft Structure

4 OVERHAUL

4.1 AUTHORISATION TO PERFORM OVERHAUL

No overhauls as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time. Overhauls can only be performed by Zlin Aviation sro.

For engine overhaul, refer to the engine manual for a list of Rotax approved service centers.

SECTION 5 – MAJOR REPAIRS AND ALTERATIONS

5.1 Authorization to perform major repairs and alterations

No major repairs or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

SECTION 6 – TASK-SPECIFIC TRAINING

6.1 Zlin Aviation Savage Aircraft specific training

6.2 Type specific trainings:

6.2.1 Rotax maintenance course
6.2.2 EAA Sport Air Fabric Covering Course

SECTION 7 – SAFETY DIRECTIVES

7.1 CONTINUED AIRWORTHINESS INSTRUCTIONS

The following is an extract from ZA document QAP-CA-OSMM (Operational Safety Monitoring Manual).

Availability of Safety Information
The owner is responsible for reading and complying with all notices issued by Zlin Aviation regarding safety of flight and continued airworthiness, and for complying with all applicable aviation authority regulations in regard to maintaining the airworthiness of the **Light Sport Aircraft Savage** owned by him.
The latest safety of flight information regarding the **Light Sport Aircraft Savage** may always be obtained at **www.zlinaero.com,** in the Owner Area > Download Area.
URL: http://www.zlinaero.com/eng/ownerarea.php

Alternatively, owners can also find the appropriate latest information in the website http://icub.aero/, page "For owners", but official and most updated information is to be considered the one of the manufacturer's website.

Instructions for maintenance and continued airworthiness
The Standard reference document for the maintenance of any Savage Aircraft is the Maintenance Manual (QAP-MAM), delivered with any Savage Aircraft. Owner is required to respect all described scheduled intervals to keep his aircraft airworthy. Any changes to the Maintenance Manual, will be notified to the owners via the already described means of communications, and latest versions of the Manuals will be made available for download in the Owner Area of the website.

When and if corrective action is determined by **Zlin Aviation** to be warranted, **Zlin Aviation** will issue a notice to the owner/operator containing:

1) A title which indicates its required priority to the owner:
a) **"SAFETY ALERT"** for notifications that require immediate action.
b) "**SERVICE BULLETIN"** for notifications that do not require immediate action but do recommend future action.
c) **"NOTIFICATION"** for notifications that do not necessarily recommend future action but are primarily for promulgation of continued airworthiness information.

2) Date of emission, effect, and time and other general limitations for completion of any required corrective action.

3) The make, model and serial number of the Savage Aircraft to which the notice refers.

4) A number that uniquely identifies the notice.

5) Number of page and total pages

The owner is responsible for ensuring that any needed corrective action is completed as specified in a notice, or by the next scheduled annual inspection. The owner shall also inform Zlin Aviation upon completion of any prescribed corrective action following a notice, using either the specific Form in the Owners Area of the website (Service Report Form, select option Attestation of Corrective Action Taken), or by filling and sending via e-mail (to: servicereports@zlinaero.com) or mail the form entitled Attestation of Corrective Action Taken provided in the next pages.
Should an owner/operator not comply with any mandatory service requirement, the Light Sport Aircraft Savage owned by him shall be considered not in compliance with applicable ASTM

standards and may be subject to regulatory action by the presiding aviation authority.

Service difficulties and safety of flight issues

In the unlikely event that any unforeseen maintenance, service or safety difficulty arises with the aircraft, which could potentially threaten its continued airworthiness *or* about which the owner would like to communicate with Zlin Aviation, the company has created a specific online **SERVICE REPORTS Form** to fill in the Owner Area of the website, which allows to fully categorize, describe, and support with attached pictures the communication, ensuring also that it will be straight delivered to the responsible department of the company for immediate evaluation.
Alternatively, owners will find a similar for in the next pages, called “Maintenance, Service and Safety Report form” for sending a completed copy to Zlin Aviation via email to servicereports@zlinaero.com or postal service as described previously.

Issues will be addressed immediately and Zlin Aviation will remain in contact with the owner through all phases, to the completion of whatever correction is found necessary and the airplane’s restored/continued airworthiness.

Requirement for providing alternative data and contact details for Continued Airworthiness

In relation with the requirement for providing data location and contact information for recovery of certification documentation, should Zlin Aviation sro lose its ability to support the make and model of Savage Aircraft, at this stage we suggest to refer to the dealer from which the aircraft has been purchased, or eventually any other major dealer are or have been approved assembly and service stations for Savage Aircrafts. This information can be recovered from the zlinaero.com dealer section searching in archive.org website. If the nature of the circumstances that would lead to this situation allow it, Zlin Aviation would release more precise information on this matter.

Zlin Aviation sro ensures complete compliance with the ASTM Operational Safety Risk Assessment Procedure provided in the Annex to Standard 2295, including the guidelines for determining potential consequences as described by the terms Catastrophic, Hazardous, Major and Minor Effect, the terms Trainers, Personal Use, and Special Use for differentiating between categories of Operational Use, etc., and the Safety Risk Factor will be computed via the formula: Safety Effect x Operational Use x Percentage Use by Population + Number of Occurances + Event Versus Population + Time Between Events.