



# TL-2000 *Sting S4*

## AIRCRAFT MAINTENANCE MANUAL

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Dear Sting Owner:



Congratulations on the purchase of your Sting S4! You will find your new TL-ULTRALIGHT aircraft very enjoyable, extremely economical, and easy to maintain. The Sting S4 is the ideal Light Sport Airplane. It is fast, economical, pleasing to the eye, and user friendly. We at TL Aircraft are certain that your Sting will give you hours and hours of leisure flying and enjoyment. With this Aircraft Maintenance Manual (AMM), we hope to help inform you about the design and operation of your aircraft.

This AMM is to be used as a guide to assist the pilot to safely use the Sting S4 aircraft. The contents are not intended to be a final authority and although proofed extensively they are still not considered error free. Therefore, the pilot in command is the final authority for the safe operation of the aircraft. Should there be any questions or errors found in your reading this manual please contact us immediately and we will issue a clarification. Please study and become familiar with this AMM and the respective manuals for the engine, propeller and rescue system.

Thank you again for your business. We look forward to a continuing satisfied customer relationship. Feel free to contact us if you have any questions or comments regarding your Sting aircraft.

Fly safe! Fly fun!

*Jiri Tlustý*

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## 0 INTRODUCTION

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## 0.2 Notes, Cautions, and Warnings

Throughout this manual, small boxes are inserted reading **Note**, **Caution**, or **Warning**. These are items which require particularly close attention for special conditions or procedures.

### NOTE

**This text box emphasizes specific operating conditions, steps in a procedure, helpful hints or useful advice.**

### CAUTION

**This text box represents danger to equipment or operation. By not observing the cautions, the result could be the destruction of equipment and possibly personal danger and injury.**

### WARNING

**This text box represents a hazardous situation. Warnings are used to call attention to operating procedures or conditions which, if not strictly observed, may result in personal injury or death.**

Every owner, pilot, operator, or maintainer of the Sirius should become familiar with the entire text of this Aircraft Maintenance Manual (AMM). It also incorporates *only* some references from Rotax<sup>®</sup>, the engine manufacturer, DUC or Woodcomp<sup>®</sup>, the propeller supplier, and Galaxy<sup>®</sup>, the installed aircraft parachute system. Please refer to the latest edition of those manufacturer manuals for specific and complete detailed maintenance procedures of each aircraft system.

### CAUTION

**The Sting S4 is intended for sport and recreational purposes only. This aircraft meets the standard specification Design and Performance (D&P) established by the American Society for Testing and Materials (ASTM) Document F 2245-04, and it is therefore restricted by that guideline. The aircraft does not comply with any FAA Part 22, or 23 certification processes. Compliance with regulations placed upon the airplane category should be strictly adhered to by the owner and any operator.**

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**NOTE**

**This AMM is valid only if the user complies with any changes that may be issued at a later date. Any pages affected by a change should be removed and replaced with the effective pages immediately.**

If this manual is found not to be current, revisions missing or pages removed contact our USA Customer Service location for replacements.

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# 1. GENERAL INFORMATION

## 1.1 Introduction

Section 1 contains general information regarding manual organization, descriptive data, abbreviations, the Master Equipment List, 'feed-back' forms for the aircraft and this manual as well as current warranty information.

This manual is written to conform to the ASTM F2483, Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft. Maintenance and operation of major components, engine, emergency parachute system, propeller, avionics or other installed equipment is provided in the appropriate manufacturer manuals which are included with the aircraft. Any conflicts in this manual should be superseded by the appropriate manufacturer's manual.

### 1.1.1 Scope

This document defines the content and structure of the maintenance manual for the TL Ultralight, sro Sting S4 aircraft and it's components while operated as light sport aircraft.

### 1.1.2 Safety

TL Ultralight, sro cannot 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.

### 1.1.3 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

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### 1.1.4 Definitions

14 CFR—Code of Federal Regulations Title 14 Aeronautics and Space also know as the “FARs” or Federal Aviation Regulations.

100-hour inspection—same as an annual condition inspection, except the interval of inspection is 100 hours of operation instead of 12 calendar months. This inspection is utilized when an LSA aircraft is being used for commercial operations such as flight instruction or rental, or both.

Alteration—any change to the airframe or aircraft component part after the initial design and production acceptance testing by TL Ultralight, sro to the applicable ASTM standards that is not described in the TL Ultralight, sro maintenance manual.

Annual condition inspection—detailed inspection accomplished once a year on an LSA aircraft in accordance with instructions provided in the maintenance manual. The purpose of the inspection is to look for any wear, corrosion, damage or conditions of use that would cause an aircraft to not be in a condition for safe operation.

A&P—airframe and power plant mechanic as defined by 14 CFR Part 65.

FAA—United States Federal Aviation Administration.

Heavy maintenance—any maintenance, inspection, or repair, that TL Ultralight, sro has designated that requires specialized training, equipment, or facilities.

Line maintenance—any repair, maintenance, scheduled checks, servicing, inspections not considered heavy maintenance that is approved by TL Ultralight, sro and is specified in TL Ultralight, sro’s maintenance manual.

LSA (light sport aircraft)—aircraft designed in accordance with ASTM standards under the jurisdiction of Committee F37 Light Sport Aircraft.

LSA repairman inspection—U.S. FAA-certificated repairman (light sport aircraft) with an inspection rating as 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. Experimental LSA aircraft do not require the individual performing maintenance to hold any FAA airman certificate in the U.S.

LSA repairman maintenance—U.S. FAA-certificated repairman (light sport aircraft) with a maintenance rating as defined by 14 CFR Part 65, authorized to perform line maintenance on aircraft certificated as special LSA aircraft. Authorized to perform the annual condition/100-h inspection on an LSA, or an equivalent rating issued by other civil aviation authorities.

Maintenance manual (AMM)—manual provided by an TL Ultralight, sro that specifies all maintenance or repairs authorized by TL Ultralight, sro.

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Major repair or maintenance—any repair or maintenance for which instructions to complete the task are excluded from the maintenance manual supplied to the consumer are considered major.

Manufacturer—any entity engaged in the production of an LSA or component used on an LSA.

Minor repair or maintenance—any repair or maintenance for which instructions are provided in the TL Ultralight, sro maintenance manual are considered minor.

Modification—any change to the airframe or aircraft component part after the initial design and production acceptance testing by TL Ultralight, sro to the applicable ASTM standards that is not described in the TL Ultralight, sro maintenance manual.

Overhaul—maintenance, inspection, or repair that is only to be accomplished by the TL Ultralight, sro or a facility approved by the original manufacturer of the product.

Overhaul facility—facility specifically authorized by the FAA or TL Ultralight, sro or component manufacturer to overhaul the product originally produced by that manufacturer.

Repair facility—facility specifically authorized by the FAA or TL Ultralight, sro or component manufacturer to repair the product originally produced by that manufacturer.

### 1.1.5 Maintenance and Repair

***Inspection or Repair, —Each of the inspections or repairs outlined in the maintenance manual specifically list:***

- (1) Recommended special tools to accomplish the task, if any
- (2) The parts needed to perform the task, if any
- (3) Type of maintenance, line (L), heavy (H), or overhaul (OV)
- (4) The level of certification needed to accomplish the task, owner (ON), (light sport aircraft) inspection (RI), (light sport aircraft) repairman (RM), FAA approved A&P (A&P), FAA or TL Ultralight repair station,
- (5) Detailed instructions and diagrams if needed to perform the task, and
- (6) Confirmation by signature to verify the task was accomplished properly.

*Repairs and Alterations*—TL Ultralight, sro may refer to other repair and alteration manuals such as the FAA’s AC for the detailed instructions to accomplish tasks outlined in the maintenance manual.

*Level of Certification*—When listing the level of certification needed to perform a task, TL Ultralight, sro shall use one of the following descriptors.

*Owner (ON)*—Items that can be expected to be completed by a responsible owner who holds a pilot certificate but who has not received any specific authorized training.

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FAA regulations authorize SLSA aircraft owners who hold at least a sport pilot certificate to perform maintenance as outlined in 14 CFR Part 43.

*LSA Repairman Inspection (RI)*—Items that can be expected to be completed on an ELSA by a responsible owner, which holds an FAA repairman certificate (light sport aircraft), with an inspection rating or equivalent.

*A&P (A&P)*—Items that can be expected to be completed by a responsible individual who holds an FAA mechanic certificate with airframe or power plant ratings, or both, or equivalent.

*Task Specified*—Items that can be expected to be completed by a responsible individual who holds either a mechanic certificate or a repairman certificate and has received task specific training to perform the task.

Therefore the symbol (**ON**) indicates a maintenance function that can be performed by an owner or higher skilled level. The symbol (**A&P**) indicates maintenance to be performed by an A&P or a Repair Station. Indicated at each task by the following designation(s); (**ON-RI-RM-A&P**) and level of maintenance, (**L-H-OV**) see 1.1.6.

*Task Not Specified*—The aircraft is to be maintained, serviced and repaired in accordance with this manual and the equivalent maintenance manual provided by the manufacturer of all other components not manufactured by TL Ultralight, sro. In the absence of specific instructions for a repair in one of the above mentioned maintenance manuals, and where such repairs are not restricted by these manuals or listed as **Overhaul, Alteration, Modification or Major Repair**, such repairs may be completed by an FAA qualified A&P mechanic. Such repairs must be coordinated with the TL Ultralight U. S, Field Technical Director, in accordance with standard maintenance practice described by FAA Advisory Circular 43.13 and use all available resources including exploded parts views for guidance.

### 1.1.6 Line Maintenance and Repairs (L)

*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 TL Ultralight LSA aircraft. 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,
2. Annual condition inspection,
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.
6. Compliance with a TL Ultralight, sro service directive when the repairman is listed as an authorized person to accomplish the work described.

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### 1.1.7 Heavy Maintenance and Repairs (H)

*Authorization to Perform*—The holder of an FAA mechanic certificate with airframe or power plant rating(s), or both, or an LSA Repairman maintenance that has received additional task specific training for the function to be performed is generally considered the minimum level of certification to perform heavy maintenance of TL Ultralight, sro LSA aircraft.

***Typical Tasks Considered as Heavy Maintenance include:***

Removal and replacement of components for which instructions are provided in the maintenance manual or service directive instructions, such as:

Complete engine removal and reinstallation in support of an engine overhaul or to install a new engine,

Remove and replacement of engine cylinders, pistons, or valve assemblies, or a combination thereof,

Primary flight control cables/components,

Landing gear assemblies.

Repair of components for which instructions are provided in the maintenance manual or service directive instructions,

Structural repairs of components or aircraft structure, or both, for which instructions are provided in the maintenance manual or service directive instructions.

### 1.1.8 Overhaul (OV)

*Authorization to Perform*—Only TL Ultralight, sro or the FTD may overhaul an LSA component or they may authorize the overhaul of an LSA component to be performed by a competent facility. No FAA certification is required to be an LSA approved overhaul facility.

*Overhaul Manual*—A separate overhaul manual in addition to the TL Ultralight, sro maintenance manual is required to perform the overhaul of an LSA aircraft or LSA aircraft component.

**Typical components that are overhauled include:**

1. Engines,
2. Carburetors/fuel systems,
3. Starters/alternators/generators,
4. Instruments,
5. Propellers
6. Ballistic parachute systems.

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### 1.1.9 Alteration, Modification or Major Repair

Any alteration, modification or major repair made to TL Ultralight, sro aircraft after the initial design and production acceptance testing to applicable ASTM standards, initial airworthiness inspection and sale to a consumer must be evaluated by TL Ultralight relative to the requirements of the applicable ASTM design and production acceptance specification(s) as well as the aerodynamic, structural, electrical, or flight safety conditions.

No changes may be made to any TL Ultralight, sro aircraft without prior written approval of TL Ultralight, sro. Any changes made without TL Ultralight, sro written approval will void the aircraft airworthiness certificate.

TL Ultralight, sro may authorize another TL Ultralight, sro approved entity to perform the evaluation of an alteration, modification or major repair who shall provide a written affidavit that the aircraft being altered will still meet the requirements of the applicable ASTM design and performance specification after the alteration.

TL Ultralight, sro or another TL Ultralight approved entity that performs the evaluation shall provide written instructions and diagrams on how, who, and the level of certification needed to perform the alteration, modification or major repair.

The instructions must be approved by TL Ultralight, sro or the local FTD and must include ground and flight testing that complies with the original ASTM production acceptance testing standard, as appropriate, to verify the alteration, modification or major repair was performed correctly and the aircraft is in a condition for safe operation.

TL Ultralight, sro or another TL Ultralight approved entity that performs the evaluation shall provide information to the owner of the aircraft for the documentation of the alteration, modification or major repair in the aircraft's records.

### 1.1.10 Task-Specific Training

TL Ultralight, sro may require type-specific training in order to accomplish a task in either the maintenance manual or in an authorization for a major repair, maintenance, or alteration. The FAA does not give approval to these task-specific training programs for SLSA. TL Ultralight, sro may specify any task-specific training it determines is appropriate to accomplish a task.

#### Examples of task-specific training include:

1. Engine manufacturer heavy maintenance or overhaul school, or both,
2. Instrument installation or repair course
3. Parachute manufacturer replacement course
4. Aircraft manufacturer course.

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### 1.1.11 Safety Directives

An SLSA aircraft may have a Safety Directive issued against an aircraft or component part by the manufacturer. TL Ultralight, sro will issue any directive as outlined in the applicable ASTM continued airworthiness specification.

SLSA and components installed on SLSA's do not have Airworthiness Directives issued against them. If an AD is issued against a type-certificated product that may be incorporated into special light sport aircraft, TL Ultralight, sro will issue a safety directive in accordance with ASTM Standard F 2295 to provide instructions on how to address the safety defect outlined in the AD on component in the specific SLSA.

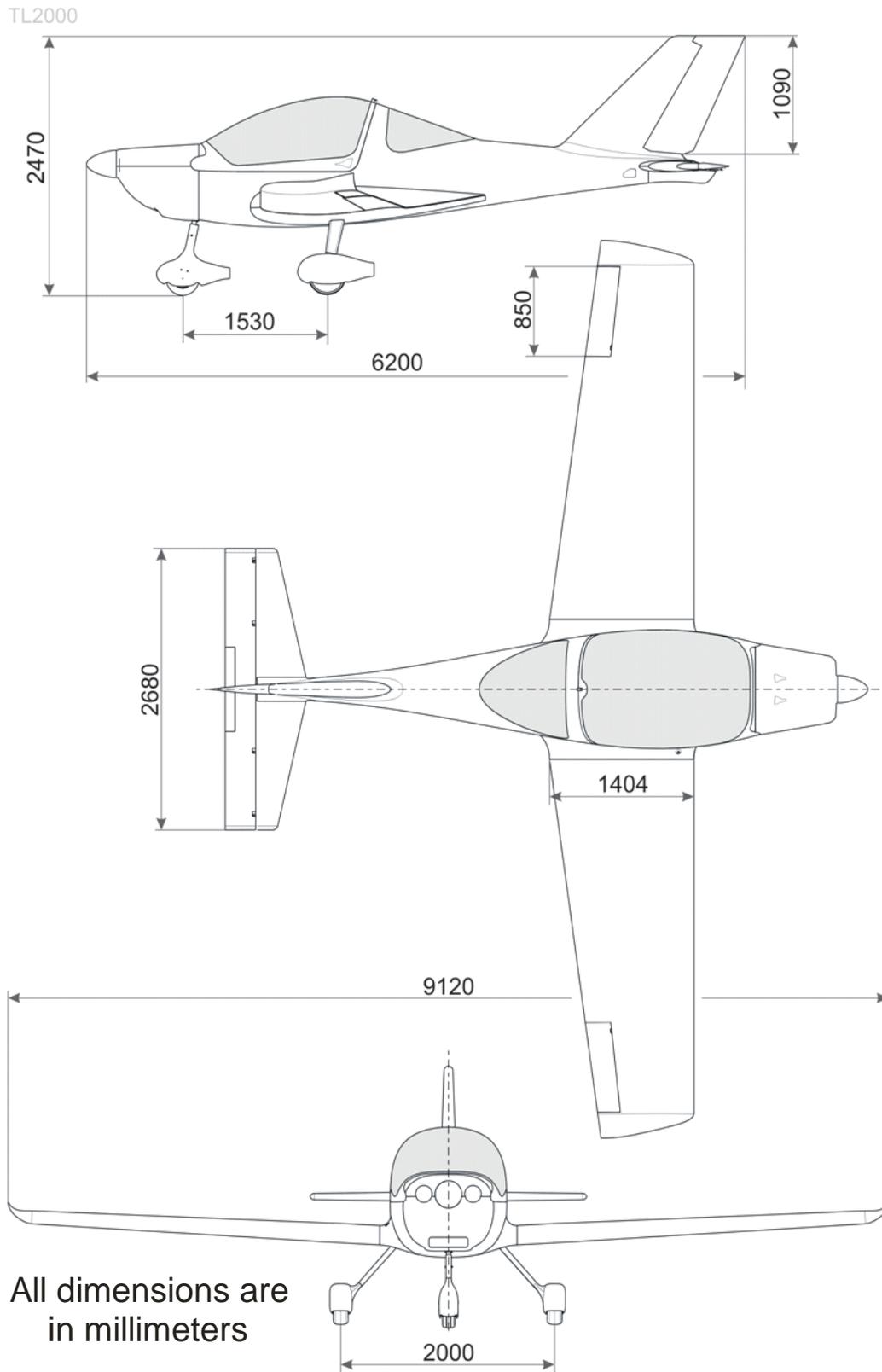
TL Ultralight, sro will provide applicable instructions to comply with any safety directive, which will include:

1. A list of the tools needed to accomplish the task,
2. A list of the parts needed to perform the task,
3. Type of maintenance, line, heavy, overhaul,
4. Certification level needed to accomplish the task, **RI, RM, A&P**.
5. Detailed instructions and diagrams as needed to perform the task,
6. Method to test/inspect to verify the task was accomplished properly.
7. Service directives are considered mandatory tasks in order to maintain a condition of safe operation and compliance with the applicable original ASTM design specification. Service directives are not considered mandatory for experimental LSA's in the United States.

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### 1.1.12 Views, dimensions



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### 1.1.13 Aircraft Specification

The TL-2000 Sting S4 is a full three axis, low wing, two place, side-by-side seating, tricycle landing gear aircraft with a steerable nose wheel. The primary aircraft structure is carbon fiber and fiberglass UV resistant reinforced laminate with an inner foam core creating a 'sandwich' layered construction between each ply.

Various options are available such as the Rotax 912ULS, tinted canopies and other avionics or interior selections. Therefore your aircraft may vary from the descriptions in this manual. Please check with your local dealer if you have any specific questions not addressed here.

#### Basic dimensions

Length: **20 ft. 4 in.**  
Cabin width: **44 in.+**  
Wing span: **29 ft. 11 in.**  
Height: **6 ft. 4 in.,**

#### Areas

Wing: **119,479 ft<sup>2</sup>**  
Flap: **18.6 ft<sup>2</sup>**  
Aspect ratio: **7.26**  
Glide ratio: **12:1**

Gross weight: **1320 lbs**

### 1.1.14 Engine Specification

4-cylinder, 4-stroke liquid/air cooled engine with opposed cylinders, dry sump forced lubrication with separate oil tank, automatic adjustment by hydraulic valve tappet, 2 carburetors, mechanical fuel pump, electronic dual ignition, electric starter, propeller speed reduction unit.

**CAUTION**

**For actual and complete information see the Maintenance Manual for ROTAX Engine Type 900 Series supplied with the aircraft.**

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## Operating speeds and limits:

Engine Type	Rotax 912 UL	Rotax 912 ULS
<i>Speed:</i>		
Take-off speed	5800 1/min (5 min.)	5800 1/min (5 min.)
Maximum continuous speed	5500 1/min	5500 1/min
Idle speed	ca. 1400 1/min	ca. 1400 1/min
Performance (ISA): (International Standard Atmosphere)		
Take-off performance	59,6 kW (80 BHP) at 5800 1/min	73,5 kW (100 BHP) at 5800 1/min
Maximum continuous performance	58 kW at 5500 1/min	69 kW at 5500 1/min
<i>Acceleration:</i>		
Limit of engine operation at zero gravity and in negative "g" conditions, max	5 seconds at max. -0,5 g	5 seconds at max. -0,5 g
Reduction ratio:		
Crankshaft : propeller shaft	2,27 : 1 2,43 : 1 (optional)	2,43 : 1
<i>Oil pressure:</i>		
Maximum	7 bar	7 bar
Minimum	0,8 bar (12 psi) (below 3500 rpm)	0,8 bar (12 psi) (below 3500 rpm)
Normal	2,0 ÷ 5,0 bar (29 ÷ 73 psi) (above 3500 rpm)	2,0 ÷ 5,0 bar (29 ÷ 73 psi) (above 3500 rpm)
<i>Oil temperature:</i>		
Maximum	140°C (285°F)	130°C (266°F)
Minimum	50°C (120°F)	50°C (120°F)
Normal operating temperature	ca. 90 ÷ 110°C (190 ÷ 230°F)	ca. 90 ÷ 110°C (190 ÷ 230°F)
<i>Cylinder head temperature:</i>		
Maximum – reading at observation point of the hotter cylinder head, either no. 2 or no. 3	150°C (300°F)	135°C (284°F)
<i>Engine start, operating temperature:</i>		
Maximum	50°C (120°F)	50°C (120°F)
Minimum	- 25°C (- 13°F)	- 25°C (- 13°F)
<i>Fuel pressure: (Current fuel pump)</i>		
Maximum	0,4 bar (5,8 psi)	0,4 bar (5,8 psi)
Minimum	0,15 bar (2,2 psi)	0,15 bar (2,2 psi)

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### 1.1.15 Propeller Specifications

## CAUTION

**For actual and complete information read the Maintenance Manual for DUC Propeller supplied with the aircraft.**

<b>Propeller Manufacturer</b>	DUC Hélices company
<b>Propeller Model Number</b>	Three-blade SWIRL, Right
<b>Number of Blades</b>	3
<b>Propeller Diameter</b>	1660 mm (65.51 in)
<b>Propeller Type</b>	"Ground Adjustable" - variable pitch
<b>Recommended Blade Pitch Angle Setting ( Rotax 912 UL)</b>	20°
<b>Recommended Blade Pitch Angle Setting ( Rotax 912 ULS)</b>	24°

### 1.1.16 Structural Materials

**Non-metal materials:**

No.	Material Description	Supplier	Supplier article number
1	<b>Epoxy resin L-285</b>	Skolil kompozit s.r.o.	
2	<b>Hardener 285</b>	Skolil kompozit s.r.o.	
3	<b>Hardener 287</b>	Skolil kompozit s.r.o.	
4	<b>Hardener C</b>	Havel Composites CZ s.r.o.	
5	<b>Epoxy flakes BAUMWOLLEFLOCKEN</b>	Skolil kompozit s.r.o.	L+R0025
6	<b>Epoxy flakes GLASS Bubbles Q-Cell 2106</b>	Skolil kompozit s.r.o.	L+R0026
7	<b>Helmipur 46 022</b>	FH Technik spol. s.r.o.	146022.0110.01
8	<b>Harter 49533</b>	FH Technik spol. s.r.o.	149534.0324.01
9	<b>Fiber glass fabric SKLOTEX st. 1080</b>	Skolil kompozit s.r.o.	112
10	<b>Fiber glass fabric SKLOTEX st. 0235</b>	Skolil kompozit s.r.o.	119.1
11	<b>Fiber glass fabric Interglas 90070</b>	GRM Systems s.r.o.	
12	<b>Fiber glass fabric 92110</b>	Skolil kompozit s.r.o.	117.11
13	<b>Fiber glass fabric 92125</b>	Skolil kompozit s.r.o.	116.4

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14	<b>Fiber glass fabric 92145 UD Interglass</b>	Skolil kompozit s.r.o.	
15	<b>Carbon fabric UD 177gr.</b>	Skolil kompozit s.r.o.	052.39
16	<b>Carbon fabric CT – U 175</b>	GRM Systems s.r.o.	40045
17	<b>Carbon fabric 41090 1K</b>	Skolil kompozit s.r.o.	042
18	<b>Carbon fabric 43 200 TT kepr</b>	Skolil kompozit s.r.o.	040.012
19	<b>Carbon fabric 200 g/m2 – kepr 2/2</b>	GRM Systems s.r.o.	20011
20	<b>Roving glass EC 12 2340 816(45)</b>	Skloplast a.s. Trnava	
21	<b>Roving carbon T 700SC 12k-50C</b>	Skolil kompozit s.r.o.	
22	<b>Divinycell H60</b>	Skolil kompozit s.r.o.	3H4008000000
23	<b>Alkamid</b>		
24	<b>Poly JARID (Silon)</b>	PolyPLASTY s.r.o.	VV 08197

#### Metal materials:

No.	Material Description	Source of mechanical properties
1	<b>Steel 11 323</b>	ČSN 41 1323
2	<b>Steel 11 353</b>	ČSN 41 1353
3	<b>Steel 11 523</b>	ČSN 41 1523
4	<b>High-tensile steel 15 130.1</b>	ČSN 41 5130.1
5	<b>Chromium – molybdenum steel</b>	4130
6	<b>Stainless steel 17 153</b>	ČSN 41 7153
7	<b>Stainless steel EN ISO 9445</b>	EN 10088-2
8	<b>Aluminium alloy 42 4201.61</b>	ČSN 42 4201.61
9	<b>Aluminium alloy 42 4254.61</b>	ČSN 42 4254.61
10	<b>Bronze EN CW-617N CuZn40Pb2</b>	ČSN EN 1412
11	<b>Bronze EN CW-CuSn8</b>	ČSN EN 1412

#### 1.1.17 Aircraft and engine approved equipment

The latest list of approved equipment for TL aircraft is published at our website:

***[www.sting.aero/owners](http://www.sting.aero/owners)***

Changes and additions to the master equipment list will be issued as structural, dynamic, electrical, loading, weight/balance, and system component performance testing and analysis is completed.

Manufacturers are encouraged to submit requests to the U. S. Field Technical Director for additions to the equipment list. Such requests must explain proposed benefits to our customers, documentation of all aspects of the item under consideration, samples and anticipated effect on existing components/systems, as well as with a written program describing the methods of both ground and flight testing necessary for approval.

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TL Ultralight must remain and retain the approval authority of any items installed in the TL2000 Sting S4 series aircraft. Therefore the latest edition of the Master Equipment List must be enforced as the only approved items for installation on the aircraft without further authority. No substitutions are allowed without a proper testing program previously approved under the written authority of TL Ultralight, sro or the U. S. Field Technical Director.

### 1.1.18 List of disposable replacement parts

Type of component	Component	Components marking	Airplane variant	Replacement
Filters	Air filter	Rotax 825 551	all variants	after every 300 hours
		Rotax 825 711	all variants	after every 300 hours
		KN Filters R - 1060	all variants	after every 300 hours
	Fuel filter	Gascolator ACS 10580	all variants	on condition
	Oil filter	Rotax 825012	all variants	after every 100 hours
Hoses	Fuel system hoses	FUB 386 5/11 FUB 386 6/12 FUB 386 8/14	all variants	after every 5 yaers
	Engine cooling system hoses	Rubena 402529	all variants	after every 5 yaers
	Oil hoses	Rotax 956 390	all variants	after every 5 yaers
Rubber parts	Engine mount rubber blocks	Rubena 40757 / 042757	all variants	after every 5 yaers
	Carb. bracket rubber blocks	Rubena 40795	all variants	after every 5 yaers
	Ignition rubber block	Rotax	all variants	after every 5 yaers
	Wheel tires	size 400 x 100	Sting Sport, Sting S3	on condition
		size 300 x 100	Sting Sport, Sting S3	on condition
size 15 x 6		Sting S4	on condition	
size 11 x 4		Sting S4	on condition	
Brake system parts	Brake pads	DIAFRICT 2057163605590	400 x 100 mm wheels	on condition
	Brake disc	TL	400 x 100 mm wheels	on condition

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Brake system parts	Brake pads	DIAFRICT 2057163607170 and 2057163607180	400 x 100 mm size wheels	on condition
	Brake disc	S4-350_000_00- 1	15 x 6 size wheels	on condition
Metal parts	Metal plates under the engine	STING-15-2-2	all variants	after every 300 hours
Engine parts	Ignition sparks	see the current Operator's Manual for all version of ROTAX 900 series		
Fluids	Oil	see the current Operator's Manual for all version of ROTAX 900 series		
	Cooling fluid	see the current Operator's Manual for all version of ROTAX 900 series		
	Braking fluid	DOT 4 or DOT 5	all variants	after every 2 yaers

### CAUTION

**For the current and complete information regarding list of disposable replacement engine and propeller parts see the Maintenance Manual for ROTAX Engine Type 900 Series and the Manual for Propeller supplied with the aircraft.**

#### 1.1.19 Weight and Balance Information

Section includes the allowed center of gravity positioning and weight ranges and center of gravity position determination procedure allowing safe aircraft operating.

All aircraft are structurally and aerodynamically engineered for certain load conditions which result from specific weights and forces anticipated to occur in normal operations within the specified flight envelope. An Aircraft's handling qualities and structural integrity may be seriously compromised if the weight and balance limits are exceeded in normal operations.

It is the pilot's responsibility to make sure the weight and balance limits are not exceeded as to weight, its location, distribution and security prior to any flight.

#### Definitions:

**Arm:** The horizontal distance expressed in inches from the reference datum plane to the center of gravity (CG) of an item or location along the fuselage.

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**NOTE**

**Units of measurements and weights must be consistent for each set of calculations and in the same system of units, i.e., pounds and inches, or kilograms and centimeters.**

**Ballast:** A specific amount of weight attached in a specific location, which can be temporarily or permanently installed in an aircraft, to help bring its Center of Gravity within the required limits. If temporary ballast must be used for certain operations, the exact amount and its location must be placarded on the instrument panel within clear view of the pilot. The use of Ballast increases Empty Weight and reduces Useful Load.

**Basic Empty Weight:** The standard empty weight plus the weight of any additionally installed or optional equipment.

**Basic Empty Weight Center of Gravity.** The c.g. of an aircraft in its basic empty weight condition, and is an essential part of the weight and balance record.

**Center of Gravity (CG):** A point along an aircraft's longitudinal axis at which all the loads and forces are perfectly concentrated and balanced. It is computed by dividing the total moment by the total weight of the airplane. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.  
(Total Moment / Total Weight = Center of Gravity)

**Center of Gravity Arm** is the arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.

**Center of Gravity Limits** are the extreme forward and aft center of gravity locations (limits) within which the airplane must be operated at any given weight.

**Center of Gravity Range:** The horizontal distance, along an aircraft's longitudinal axis, within which an aircraft has been found to be fully maneuverable at all specified design speeds, weights and loading configurations.

**Datum:** A convenient vertical reference plane along the longitudinal axis of an aircraft from which all horizontal measurements are taken.

**Installed Equipment:** All optional accessories and equipment permanently installed on an airframe or engine at the time of weighing. These items must be included in the "Installed Equipment List" resulting in the Basic aircraft weight. Additions and deletions must be noted in the list each time they are made and new Weight and Balance calculations performed to determine the magnitude and effect of weight change. Ballast, if permanently installed, must also be listed.

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**Maximum and Minimum Weights:** Due to balance, structural and aerodynamic considerations, maximum, or minimum, weights for certain locations on the aircraft are specified. For example, the pilot's minimum (100Lbs) and maximum (240Lbs) weight is be specified for some operations. The same is true for baggage, cargo, fuel, and any other disposable or variable loads.

**Maximum Forward and Maximum Aft C.G. Locations:** A specified forward most and rear most Center of Gravity location, along the aircraft longitudinal axis. These Center of Gravity location limits are expressed in inches from a convenient reference (forward tip of the propeller spinner) on the aircraft.

**Reference or Datum Plane:** An imaginary vertical plane located on the forward tip of the propeller spinner from which all horizontal distances are measured for balance purposes.

**Standard Empty Weight:** The weight of a standard airplane, including unusable fuel, full engine operating fluids, and full engine oil reservoir.

**Station:** A vertical location along the airplane fuselage horizontal axis given in terms of the distance from the reference datum plane.

**Tare:** The weight of chocks, blocks, stands, etc. used when weighing an airplane, and is included in the scale readings. Tare is deducted from the scale reading to obtain the actual (net) airplane weight.

**Useful Load:** The total amount of weight available for pilot, passengers, baggage, cargo and in-flight usable fuel. The difference between the maximum ramp weight and the basic empty weight. (Maximum Ramp Weight – Basic Empty Weight = Useful Load) The useful load will be reduced by the installation of additional equipment.

**Weight:** Actual individual weight of each item such as airframe, crew, fuel, baggage, cargo, etc. in pounds or kilograms

**Empty Weight:** The actual weight of the individual aircraft, including the structure, power plant, fixed equipment, any fixed ballast, unusable (in-flight) fuel, and coolant. Original Empty Weight is determined by actually weighing each new aircraft before it is flown.

Any time a Major Alteration, Modification or Repair (WHICH MUST BE APPROVED IN WRITING BY THE MANUFACTURER.) is performed on the aircraft; a new Empty Weight must be determined by either weighing the aircraft again, or by accurate calculation of the weight changes and their effect on Empty Weight Center of Gravity (EWCG) location.

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Major Alteration or Modification results from the addition, deletion, or redistribution of existing equipment and accessories, or from a repair which results in a significant increase of weight of the airframe or engine. For example, addition or removal of floats, skis, battery, radios, installation of a additional fuel tank(s) or engine change, painting the airframe, installation of heavier wheels and tires, etc.

**Maximum Gross Weight:** The maximum total weight for which an aircraft's structure and performance have been approved for normal operations by its manufacturer. It is the maximum weight (Empty Weight plus useful load) at which an aircraft can be safely operated. Maximum Takeoff Weight must never exceed the published Gross Weight.

**Useful Load:** The difference between the maximum ramp weight and the basic empty weight. Maximum Ramp Weight – Basic Empty Weight = Useful Load The total amount of weight available for pilot, passengers, baggage, cargo and in-flight usable fuel.

**Moment:** The product of the weight of an item multiplied by its arm.  
(Weight x Arm = Moment)

**Loading Chart:** Used to calculate the actual Center of Gravity location of a ready to fly aircraft. Care must be taken not to exceed the Maximum/Minimum Weight and Balance Limits stipulated for the aircraft. These limits are determined by structural, stability and control considerations throughout the aircraft speed range.

**Procedure:**

All permanent equipment, options, and accessories should be installed on the aircraft prior to weighing. All equipment options and accessories installed in the aircraft must be listed on the "Installed Equipment List". That list becomes part of Weight and Balance Documents.

Be sure to remove any loose equipment, tools, etc. from the aircraft prior to weighing.

Sometimes it is necessary to adjust or reduce fuel, cargo, or passenger weights to remain at or below Maximum Allowable Gross Weight. Temporary or permanent ballast is sometimes necessary to bring the CG within specified limits. However, the Maximum Allowable Gross Weight should not be exceeded under any circumstances

The fuel tank should be empty except for unusable fuel. If the fuel tank is not empty, then the exact amount of usable fuel in the tank must be determined. Usable fuel weight and its moment must be deducted from the Empty Weight calculations before EWCG can be accurately determined.

Oil and coolant tanks and reservoirs must be properly filled before weighing. These and any other liquids necessary for normal operations are considered part of an aircraft's empty weight.

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For best results, weigh indoors. The scales must be calibrated correctly and must be set on level ground.

Any equipment placed on the scales when weighing the aircraft, such as chocks or blocks, should be weighed separately and the weight deducted from the scale reading.

Measurements for the exact horizontal distance from Datum plane to center of spindles of all wheel axles are included. These are recorded as measurements on "Empty Weight and Balance Calculations"

The aircraft must be weighed in a level flight attitude, both longitudinally (front to back) and laterally, as shown in the as shown in the Moment Arm Drawing Data Sheet.

Place a scale under each wheel of aircraft for all future weighing. If only one scale is used, be sure to level the wheels not being weighed before taking the scale readings. Remember, the aircraft must be in proper level flight attitude to ensure accuracy.

### Empty weight center of gravity calculations

Complete each horizontal line of calculations by multiplying Weight from the scale by the Arm to find the Moment.

Total the Weight and Moment columns.

Divide the Total Empty Moment by the Total Empty Weight to determine the Empty Weight CG location, from the Datum plane

In the example the EWCG is 80.83 inches aft of Datum. This distance is also known as the Empty Weight Arm.

### Typical empty weight calculations for the Sting aircraft

ITEM	WEIGHT	ARM	MOMENT
NOSE WHEEL	152	32.8"	4986
LEFT GEAR	327	94.2"	31130
RIGHT GEAR	326	94.2"	31035
<b>TOTALS</b>	805	83.4	67151

Therefore the aircraft Empty Weight Center of Gravity (EWCG) Location =  
 $67151 \text{ (Total Moment)} / 805 \text{ (Empty Weight)} = 83.4 \text{ inches}$   
 aft of Datum Plane

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## Loaded weight and balance calculations

Complete the Loaded CG calculations as was done in the Sample Weight CG Chart.

The Empty Weight, the Empty Weight Arm, and the Empty Moment are shown in the Loading Chart Weight and Balance Work Sheet.

Write in the actual Fuel weight for each tank location for your aircraft load condition. Fuel weight is calculated at 6 pounds per U.S. gallon. The maximum weight for the Main fuel tank at 20.5 gallons is 120 pounds. If installed, the maximum weight for the Wing aux tanks at 6 gallons each side, 12 gallons total, is 72 pounds. Multiply the fuel weight times the Arm shown in each row to obtain the moment for each tank

Write in the actual weight of Pilot1 and Pilot2, in the case of two occupants. Be sure not to exceed the individual maximum recommended weights for the seat load.

Multiply the occupant weight times the Arm shown in each row to obtain the moment for each seat location.

Write in the actual weight of the baggage in all three locations, pilot side storage, copilot side storage and aft deck area. Multiply the total baggage weight times the Arm shown in the row to obtain the moment for the baggage.

Total the weights, including the empty aircraft weight which should not exceed 1320 pounds.

Total all the moments, including the empty aircraft moment.

Divide the total moment by the total weight. This is the current CG which should be between 80.2 and 86.7 inches from the Datum plane for the aircraft to be within its weight and balance for this flight loading.

Complete this chart for each of critical test loading conditions to be sure that your final Loaded CG position falls within the allowable CG limits, at all times, for all operations.

## Critical loading conditions

Each of the following eight critical loading conditions should be investigated for each individual aircraft, along with any other possible loading condition which may affect the Weight and Balance envelope of the aircraft. This is particularly important for aircraft operation close to the CG limits.

Be sure the maximum individual weights and the Gross Weight are not exceeded at any time.

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Be sure all loaded items are placed in approved locations aboard the aircraft.

1. **Maximum Pilot1 + Pilot2 Weight, with:**  
**Full Usable Fuel, Maximum Baggage**  
**Full Usable Fuel, Zero Baggage**  
**Zero Usable Fuel, Maximum Baggage**  
**Zero Usable Fuel, Zero Baggage**
  
2. **Minimum Pilot Weight, (100lbs), with:**  
**Full Usable Fuel, Maximum Baggage**  
**Full Usable Fuel, Zero Baggage**  
**Zero Usable Fuel, Maximum Baggage**  
**Zero Usable Fuel, Zero Baggage**

The Loaded CG must fall within the specified Maximum Forward Limit of 80.2" and Maximum Aft Limit of 86.7" for all aircraft.

An aircraft log book entry should be made whenever a Weight Balance calculation is performed, indicating date, and nature of change, results and name of person performing the calculation. (An entry moment arm is included in the sample should any changes be made to the instrument panel.) This document, in its entirety, becomes a part of the Aircraft Legal Documents. It must be kept aboard the aircraft and made available for inspection upon request.

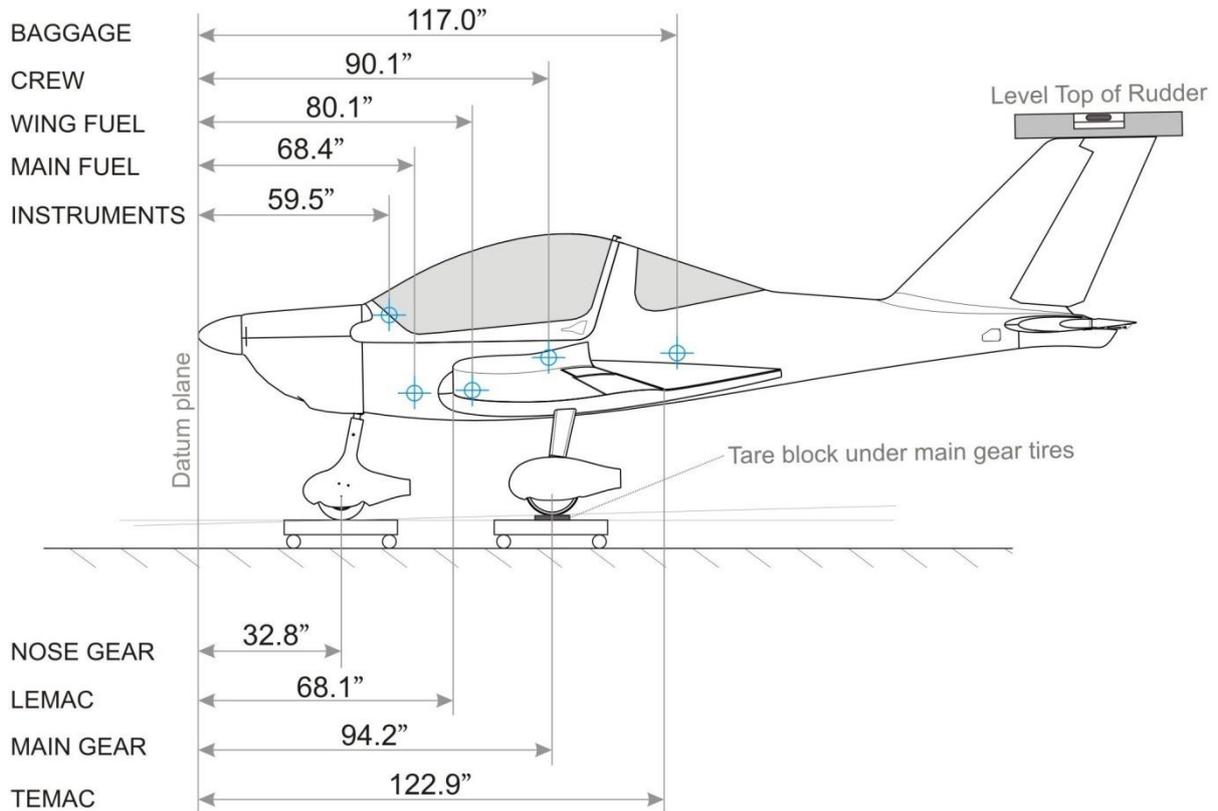
#### **Weight & balance data worksheet notes**

1. **Datum Plane:** Forward tip of nose cone at propeller.
2. **Maximum Forward CG Limit:** 80.2 inches aft of Datum
3. **Maximum Aft CG Limit:** 86.7 inches aft of Datum
4. **Maximum Gross Weight:** 1320 pounds
5. **Maximum Seat Load:** 250 pounds
6. **Minimum Pilot Weight:** 100 pounds
7. **Maximum Main Fuel:** 120 pounds
8. **Maximum Wing Fuel:** 72 pounds
9. **Maximum Baggage Weight:** 55 pounds (40 pounds used for example)

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### Sting moment arm data sheet



## Sample weight & balance data

Sting S4 (NXXXXN)

### **SAMPLE WEIGHT & BALANCE DATA**

**Date:** 31.12.10

**By:** LT

Item	Weight	Arm	Moment
Nose Wheel	152	32.8	4986
Left Gear	327	95.2	31130
Right Gear	326	95.2	31035
Empty A/C	805	83.4	67151
Instruments		59.5	
Main Fuel	120	68.4	7387
Wing Fuel	0	80.1	0
Pilot 1	195	90.1	17119
Pilot 2	175	90.1	15948
Baggage	25	117.0	4680
Totals	1320	85.1	112285

#### CG

LEMAC	22%	34%	TEMAC
68.1	80.2	86.7	122.9

Test 1: Minimum Pilot Weight, with:

a) Full Usable Fuel, Max Baggage =	84.8
b) Zero Usable Fuel, Max Baggage =	85.1
c) Full Usable Fuel, Zero Baggage =	82.7
d) Zero Usable Fuel, Zero Baggage =	84.1

Test 2: Maximum Pilot 1 + Pilot 2 Weight, with:

a) Full Usable Fuel, Max Baggage =	85.3
b) Zero Usable Fuel, Max Baggage = <b>Over Limit!</b>	86.9
c) Full Usable Fuel, Zero Baggage =	83.9
d) Zero Usable Fuel, Zero Baggage =	85.5

### Weight & balance data work sheet

Sting S4 (NXXXN)

#### WEIGHT & BALANCE DATA SHEET

**Date:** \_\_\_\_\_ **By:** \_\_\_\_\_

Item	Weight	Arm	Moment
<b>Nose Wheel</b>		<b>32.8</b>	
<b>Left Gear</b>		<b>95.2</b>	
<b>Right Gear</b>		<b>95.2</b>	
<b>Empty A/C</b>		<b>83.4</b>	
<b>Instrument</b>		<b>59.5</b>	
<b>Main Fuel</b>		<b>68.4</b>	
<b>Wing Fuel</b>		<b>80.1</b>	
<b>Pilot 1</b>		<b>90.1</b>	
<b>Pilot 2</b>		<b>90.1</b>	
<b>Baggage</b>		<b>117.0</b>	
<b>Totals</b>			

#### CG

<b>LEMAC</b>	22%	34%	<b>TEMAC</b>
68.1	80.2	86.7	122.9

*Test 1: Minimum Pilot Weight, with:*

- |  |  |
|--|--|
| <b>a) Full Usable Fuel, Max Baggage =</b>  |  |
| <b>b) Zero Usable Fuel, Max Baggage =</b>  |  |
| <b>c) Full Usable Fuel, Zero Baggage =</b> |  |
| <b>d) Zero Usable Fuel, Zero Baggage =</b> |  |

*Test 2: Maximum Pilot 1 + Pilot 2 Weight, with:*

- |  |  |
|--|--|
| <b>a) Full Usable Fuel, Max Baggage =</b>  |  |
| <b>b) Zero Usable Fuel, Max Baggage =</b>  |  |
| <b>c) Full Usable Fuel, Zero Baggage =</b> |  |
| <b>d) Zero Usable Fuel, Zero Baggage =</b> |  |

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### 1.1.20 Tire inflation pressure

Main wheels: **44 PSI (3,0 bar)**

Nose wheel: **70 PSI (4,8 bar)**

### 1.1.21 Approved Oils and Capacities

#### NOTE

**For approved oil see the current Operator's Manual for all version of ROTAX 900 series. Do not use oil additives. Use quality motorcycle or automotive motor oil. The engine is not approved for aircraft motor oil – for viscosity see Operators's Manual for all version of ROTAX 900 Series.**

Oil capacity: **7.4 liq pt (3,5 l)**

Oil consumption: **max 0.13 liq pt/h (0,06 l/h)**

Prior to checking the engine oil level, run the engine at idle for a few minutes. Then, shut it down. As an alternate method, turn the engine by pulling the propeller over, by hand.

#### WARNING

**Before hand-cranking the propeller, ensure that both ignition switches are in the off position. For safety purposes, always treat a propeller as though the engine could start at any time while cranking.**

#### WARNING

**Never turn the engine backwards (clockwise when viewed from the front to the rear of the aircraft) permanent damage to the engine may result due to loss of oil pressure to critical components.**

Open the access panel on the upper cowling. To check the oil, unscrew the cap of the oil reservoir located at the rear of the firewall. Remove the dipstick to check the oil level. A flattened segment at the end of the dipstick represents the oil capacity range. The top of this segment is the MAX limit and the bottom of the segment is the MIN limit. Ensure the oil level is between these limits, but it must **never** fall below the MIN limit.

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## CAUTION

**100LL Avgas is to be used only as an alternate fuel type if 91 octane auto fuel is not available. The use of 100LL Avgas is restricted to *less than 30%* of engine operation time without additional engine maintenance management.**

To best protect your engine, change the engine oil and replace the oil filter every 25 hours of engine operating time or after cross-country operation with 100LL Avgas.

### Fuel

## NOTE

**For approved fuel see the Operator's Manual for all version of ROTAX 912.**

## CAUTION

**100LL Avgas is to be used only as an alternate fuel type if 91 octane auto fuel is not available. The use of 100LL Avgas is restricted to *less than 30%* of engine operation time.**

Fuel specification: **Premium automotive unleaded that conform to ASTM D 4814**  
**Minimum AKI 89    Rotax 912 UL**  
**Minimum AKI 91    Rotax 912 ULS**

Total fuselage capacity:	<b>20.5 Gals</b>
Wing fuel tanks capacity:	<b>2 x 6 Gals</b>
Total fuel capacity (if wing tanks installed):	<b>32.5 Gals</b>
Total unusable:	<b>1.5 Gals</b>
Fuel consumption:	<b>max. 7.13 US gal/h (27l/h)</b>
Approved fuel grade:	<b>91 Unleaded auto gas (yellow)</b>
Alternate fuel grade:	<b>100LL Avgas (blue) (for <i>less than</i> 30% of engine operation time)</b>

### Fluids

Braking fluid: **DOT 4 Brake fluid or DOT 5, it depends on type of cylinders (see chapter 3.4.17)**

Cooling fluid: **Antifreeze Extra**

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### CAUTION

**Different coolants cannot not mixed, if doubt, drain and replace all of the coolant.**

### 1.1.22 Recommended Fastener Torque Values

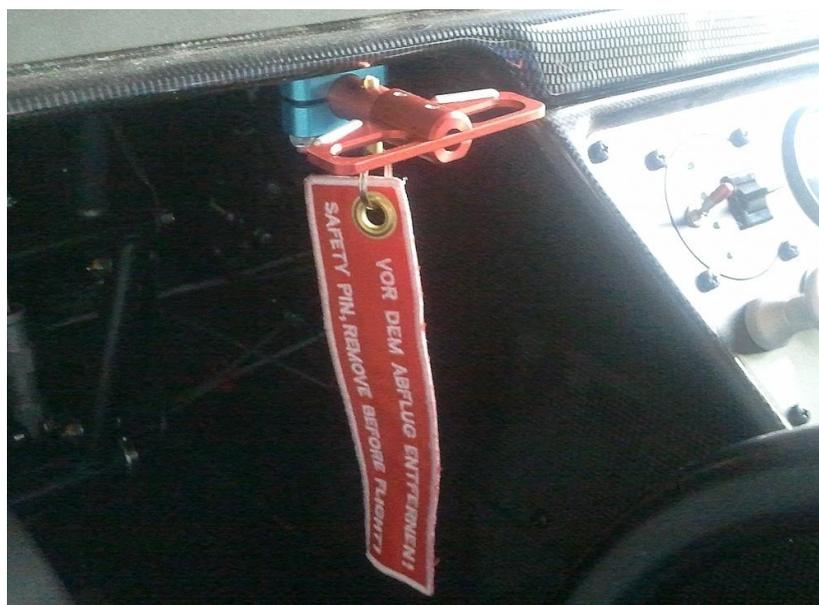
Join	Bolt – Nut			Bolt – Nut (countersunk)	
	M5	M6	M8	M5	M6
Recommended Torques for class 8.8 (ISO 898) fasteners	52 lb-in (5.9 N.m)	89 lb-in (10 N.m)	200 lb-in (22.5 N.m)	52 lb-in (5.9 N.m)	89 lb-in (10 N.m)
For areas with thick bonding seams (cotton + cab-o-sil + resin + hardener)	49 lb-in (5.5 N.m)	80 lb-in (9 N.m)	200 lb-in (22.5 N.m)	40 lb-in (4.5 N.m)	71 lb-in (8 N.m)
Parts of PVC	49 lb-in (5.5 N.m)	80 lb-in (9 N.m)	200 lb-in (22.5 N.m)	49 lb-in (5.5 N.m)	80 lb-in (9 N.m)
Carbon fabric composite packages assemblies	49 lb-in (5.5 N.m)	80 lb-in (9 N.m)	200 lb-in (22.5 N.m)	49 lb-in (5.5 N.m)	80 lb-in (9 N.m)
Plywood bonded into composite	40 lb-in (4.5 N.m)	71 lb-in (8 N.m)	200 lb-in (22.5 N.m)	31 lb-in (3.5 N.m)	62 lb-in (7 N.m)
Glass fiber composite packages	49 lb-in (5.5 N.m)	80 lb-in (9 N.m)	200 lb-in (22.5 N.m)	49 lb-in (5.5 N.m)	80 lb-in (9 N.m)
Metal parts assemblies (steel, stainless steel, aluminum alloys)	53 lb-in (6 N.m)	89 lb-in (10 N.m)	200 lb-in (22.5 N.m)	53 lb-in (6 N.m)	89 lb-in (10 N.m)

### 1.1.23 General Safety Information

## WARNING

**During all service and repair work beware of activating the Ballistic Parachute system rocket.**

Ballistic parachute system activating pin.



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**WARNING**

**An accidental engine start is very dangerous. Ensure that the Ignition Switches and main switch are turned off.**

**1.1.24 Report "Feed Back" Forms**

The following pages contain 'feed-back' reports that are intended to assist the owner in reporting questions, safety issues, service or maintenance issues, parts and assembly performance, incidences and warranty claims which may assist in the safe operation of our aircraft and the use of this manual. Electronic versions are also available by request.

Please copy the form, mail or fax it to the address below. You will receive a confirmation of the receipt and status of your comments.

Send the completed form to: **TL Ultralight, sro**  
**Customer Service**  
**8222 Remount Road**  
**KORK Municipal Airport**  
**North Little Rock, AR 72118**  
**Phone: 501.228.7777**  
**Fax: 501.227.8888**

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<b>Aircraft / Part / Assembly/ Incident Safety Feed Back Form:</b>			
Report Date:	Aircraft N Number:	Aircraft S/N:	
Flight hours:	Report Airport:	Aircraft Airport:	
Conditions: (circle )	1. Periodic Inspection 2. Pre-flight Inspection 3. Engine Start 4. Taxi 5. Take off 6. Climb 7. Level Off 8. Cruise 9. Decent 10. Pattern 11. Approach 12. Landing 13. Other	Notes	
Detailed Description: (Continue on back if required)			
<b>Affected parts/assembly:</b>			
Part Name	Part Number	Time in Service	Total Time
Dealer Name:		Contact:	
Warranty Claim Filed: YES - NO		Claim Number:	
<b>CONTACT INFORMATION</b>			
Owner:			
Address:			
City, State, Zip			
Phone / Fax:			
Email:			
Signature:			Date:

Aircraft Maintenance & Maintenance Manual Feed Back Form:	
Report Date:	
Manual Section: (circle)	<ul style="list-style-type: none"> <li>0. Introduction</li> <li>1. General</li> <li>2. Inspections</li> <li>3. Structures</li> <li>4. Engine</li> <li>5. Fuel System</li> <li>6. Propeller</li> <li>7. Utility Systems</li> <li>8. Instruments and Avionics</li> <li>9. Electrical System</li> <li>10. Painting and Coatings</li> </ul>
Page Number:	
Subject Heading:	
Description: (errata; information conflict; details; photos, etc)	
<b>CONTACT INFORMATION</b>	
Owner:	
Address:	
City, State, Zip	
Phone / Fax:	
Email:	
Signature:	Date:

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**Example of report below, see following page for Warranty Claim Report form.**

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## 2. INSPECTIONS

### 2.1 Introduction

Section 2 contains information pertaining to light maintenance, the weight and balance calculations and periodic inspection lists for the airplane. Included is a illustrated parts list grouped by category and at the end of this section are detailed checklists of the periodic inspections which are meant to be copied and the copy used as a checklist for the inspection. Return the original to this manual.

### 2.2 Airplane files

Certain items must be with the TL-2000 Sting S4 airplane at all times. The following is a list of these items and when they are required:

#### 1. To be carried in the airplane at all times:

1. Aircraft Operating Instructions (AOI)
2. Weight and Balance Data
3. Operating Limitations issued by FAA at airworthiness inspection.
4. Aircraft Airworthiness Certificate (FAA Form 8130-7)
5. Aircraft Registration Certificate (AC Form 8050-3)

#### 2. To be with the pilot during flight

1. Airman Certificate
2. Medical Certificate
3. Aviation Charts

#### 3. To be made available upon request:

1. Airplane Log Book
2. Engine Log Book
3. Propeller Log Book
4. Pilot Log Book

### 2.3 Washing and Cleaning the Airplane

<b>Type of Maintenance</b>	Line	
<b>Level of Certification Required</b>	L/O, RI, RM, A& P	
<b>Tools Required</b>	Vacuum cleaner, Chamois leather	
<b>Materials Required</b>	Lukewarm water, Cleansing agents used for cleaning and protecting automobiles	
<b>Washing and Cleaning Checklist</b>	After each flight day	Once a month



<b>Propeller.</b> Ensure that the Ignition Switches and Main Switch are turned off. Wash and rinse sedentary dirt from the blades of the propeller.	<input type="checkbox"/>	
<b>Canopy.</b> Wash, rinse and polish canopy. Use chamois leather that is rinsed often in clean water.	<input type="checkbox"/>	
<b>Wing, Tail.</b> Wash and rinse the leading edges of the wings and tail areas.	<input type="checkbox"/>	
<b>Fuselage.</b> Clean front part of the cowlings. Clean the bottom part of the body behind the front undercarriage leg.	<input type="checkbox"/>	
<b>Undercarriage.</b> Remove any grass that may have collected on the undercarriage.	<input type="checkbox"/>	
<b>Interior.</b> Clean the interior of the cabin, removing trash from all storage areas.	<input type="checkbox"/>	
<b>Other parts.</b> Clean other parts of the airplane, as needed, especially the upper sides of the wings and openings of the engine.	<input type="checkbox"/>	
<b>Safeguard the airplane.</b> Safeguard the airplane with cleansing agents used for cleaning nad protecting automobiles, including the propeller and any composite parts.		<input type="checkbox"/>
<b>Clean the cabin.</b> Use a vacuum cleaner to clean the cabin, making sure there are no undersirable objects in the back storage area.		<input type="checkbox"/>

Use lukewarm water that is changed often to wash the airplane. First, wash the parts and then dry them off. For cleaning insects off of airplane parts, use the same cleaning agents as used for automobiles.

Before waxing a new airplane, let it dry for approximately one month to allow the finish maximum drying time.

Remark: Cover the Pitot tube while washing the airplane to protect it from water.

## 2.4 Filling the Fuel Tank

### Safety instruction for filling fuel into the airplane tank(s)

- The fuel tank can be filed with fuel only by those individuals who are fully instructed and familiar with all fuel safety instructions.

- It is prohibited to fill the fuel tank during rain, storm, in closed space, when engine is operating or with electric system switched on.
- The person filling the fuel tank must not be wearing polyester clothing or any clothing from a material which creates static electricity.
- Do not smoke, use a cell phone, any static producing device, handle open flame or any electrical device during refueling.

### Procedure of fuel tank filling

- Ground the airplane. The airplane ground point is located on the engine exhaust pipe.
  - Open the fuel tank cap.
- Fill with necessary quantity of fuel.

## CAUTION

**When filling into the airplane, avoid fuel contact with the airplane finish which may cause damage to surface of the airplane.**

- When the airplane is filled with fuel, wipe the filler neck fuel and close the fuel neck filler cap.
- Remove conductive interconnection between the filling device and the airplane.

## WARNING

**When fueling the airplane, ensure the airplane is electrically grounded by verifying that the grounding wire located on the right main gear wheel makes adequate contact with the ground's surface. Also, ensure the fueling container remains adequately grounded to fuel neck ring and nozzle. A ground wire from the refueling container should be attached to the engine exhaust pipe. The exhaust pipe is electrically connected to the aircraft ground system as are all fuel tanks and tank opening ports.**

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Tools Required</b>	Funnel with water separator
<b>Materials Required</b>	
<b>The Fuel Tank filling Checklist</b>	
<b>Electrical appliances.</b> Turn off all electrical appliances, cell phones, ignition circuits and the main switch.	<input type="checkbox"/>



<b>Fuel Selector. Close the fuel selector switch.</b>	<input type="checkbox"/>
<b>Open Fire.</b> Make sure there is no open fire near the airplane, and that no one is smoking near the airplane.	<input type="checkbox"/>
<b>Fire Extinguisher.</b> Have a fire extinguisher close at hand (one suitable for flammable fuels).	<input type="checkbox"/>
<b>Grounding cable.</b> Make sure the grounding cable placed on the right undercarriage leg is reaching the ground.	<input type="checkbox"/>
<b>Fuel cap(s).</b> Unlock and release the fuel cap(s).	<input type="checkbox"/>
<b>Container grounding.</b> Ground the aircraft to the fuel container by a strap to the exhaust pipe.	<input type="checkbox"/>
<b>Funnel placing.</b> Carefully place the approved funnel in the fuel opening. Use a water separator to prevent contamination of the fuel tank.	<input type="checkbox"/>
<b>Fuel filling.</b> Pour the fuel slowly. Pay particular attention to keep fuel off of the airplane when you remove the funnel.	<input type="checkbox"/>
<b>After fueling.</b> After fueling, remove the funnel, replace the tank cap and lock it. Wipe off any spilled fuel.	<input type="checkbox"/>

## 2.5 Engine Visual Inspection

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Tools Required</b>	Screw driver
<b>Materials Required</b>	Fuel filter, Engine Oil, Engine Cooling Fluid
<b>Engine Visual Inspection Checklist</b>	Before each flight day
<b>Switches.</b> Ensure that the Ignition Switches and Main Switch are turned off.	<input type="checkbox"/>
<b>Engine covers.</b> Remove engine covers	<input type="checkbox"/>
<b>Fuel filter.</b> Check for possible contaminants in the fuel filter using the drain tap, and change it if necessary. If you spot pollution in the engine space, carry out a complete inspection or change the fuel filters of the tanks in the wings.	<input type="checkbox"/>

<b>Oil level.</b> Remove the Oil tank cap. Manually turn the propeller until you hear the sound of air leaking into the oil in the oil tank. Check the level of oil and follow the Operator's Manual for all versions of ROTAX 912. Close the oil tank.	<input type="checkbox"/>
<b>Cooling fluid level.</b> Check the level of cooling fluid and follow the Operator's Manual for all versions of ROTAX 912.	<input type="checkbox"/>
<b>Hoses.</b> Look for possible worn places on the hoses especially at places, or where they are connected to or near matallic parts of the engine.	<input type="checkbox"/>
<b>Carburetors.</b> Carefully check the link of the carburetor with the carburetor bowl stirrup. Looseness or slack in the rubber connector at the neck of the carburetor, is cause for replacement even though it has been tightened, take it off and exchange it according to the carburetor manual.	<input type="checkbox"/>
<b>Engine mount.</b> Inspect for cracks, corrosion, loose hardware, chafing by cables, wires, hoses, etc..	<input type="checkbox"/>
<b>Engine covers.</b> Assembly of the engine covers.	<input type="checkbox"/>

## 2.6 First 25h / 50h / 100h / Annual Inspection

### 2.6.1 FAA Required Inspections

As required by Federal Aviation Regulations, all LSA aircraft of U.S. registry must undergo a complete condition inspection ("annual") every twelve calendar months, in addition, every 100 hours of operation when operated in commercial use. It is the responsibility of the owner/operator to assure compliance with all applicable aircraft manufacturer directives.

### 2.6.2 First 25 hour Inspection

The inspection after first 25 flight hours is performed in conjunction with the engine oil and filter change by the airplane owner if he is trained for the airplane's maintenance or by an FAA qualified inspector following the First 25 hour inspection checklist. If the aircraft is used for commercial operation the inspection is performed by an FAA approved A&P. Otherwise, it is made in the manufacturer's service center.

Type of Maintenance	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>First 25 hour Inspection Checklist</b>	After first 25 hour
<b>Engine cowling.</b> Remove engine cowling	<input type="checkbox"/>
<b>Engine covers.</b> Remove engine covers	<input type="checkbox"/>
<b>Engine.</b> Follow the Operator's Manual for all versions of ROTAX 912 for instruction of First 25 hours Inspection.	<input type="checkbox"/>
<b>Pipes and Gascolator.</b> Carefully inspect the tightening of the engine pipes and the state of the fuel gascolator and any filter(s). Clean thr fuel gascolator. Check all places carefully where the pipes are attached to metal parts of the engine.	<input type="checkbox"/>
<b>Wing tanks filters.</b> Disassembly wings and check both wing tanks filters. (see Chapter 3.7.1)	<input type="checkbox"/>
<b>Wings and Engine covers Assembly.</b> Assembly the wings and engine covers	<input type="checkbox"/>

The possibility that dust or other debris may be left in the tank or the fuel system during the manufacturing process cannot be overlooked. Rinsing of the tank and the fuel system prior to cleaning the filter can cause major contamination.

### 2.6.3 Every 50h / 100h / Annual Inspection

The inspection after every 50 flight hours is performed in conjunction with the engine oil and filter change by the airplane owner if he is trained for the airplane's maintenance or by an FAA qualified inspector following the 50 hour inspection checklist. If the aircraft is used for commercial operation the inspection is performed by an FAA approved A&P. Otherwise, it is made in the manufacturer's service center.

If Used for commercial operations, the Annual Condition Inspection and the 100 hour Inspection and maintenance after every 100 hours is performed by an FAA approved A&P. Otherwise, it is made in the manufacturer's service center.

If not used for commercial operations, the Annual Condition Inspection is performed by the airplane owner if he is trained for the airplane's maintenance, by an FAA qualified inspector or by an FAA approved A&P. Otherwise, it is made in the manufacturer's service center.



**The maintenance procedure is as follows:**

- Condition inspection checklist
- Aircraft Records checklist
- Run-up checklist
- Post-Run-up checklist
- Propulsion System checklist
- Fuselage checklist
- Wings checklist
- Empennage checklist
- Landing Gear checklist
- Cabin and Baggage Compartment checklist
- Inspection Completion checklist

**Condition inspection checklist**

<b>Aircraft Model / Serial Number</b>	TL – 2000 Sting S4 /
<b>Registration Number</b>	
<b>Owner’s Name</b>	
<b>Inspector’s Name</b>	
<b>Date of Inspection</b>	
<b>Engine Model / Serial Number</b>	/
<b>Airframe Hours</b>	
<b>Engine Hours</b>	

**Condition inspection checklist**

<b>Inspection Item</b>	<b>50 hour</b>	<b>100 hour</b>	<b>Annual</b>
<b>Aircraft logbooks.</b> Determine total times, times since overhaul and time since last required or recommended maintenance and record on Inspection Coversheet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Safety Directives (SD’s), Airworthiness Directives (AD’s) and Service Bulletins.</b> Check SD’s, AD’s, and Service Bulletins which may need to be complied within the inspection.			<input type="checkbox"/>
<b>Aircraft records.</b> Check for presence and condition of aircraft federal registration form and airworthiness certificate.			<input type="checkbox"/>
<b>Pilot’s Operating Handbook (POH).</b> Make sure that the last revisions of POH, the Equipment List and Weight and Balance forms are in use.			<input type="checkbox"/>



**Run-up checklist**

Type of Inspection	50 hour	100 hour	Annual
<b>ELT battery due</b> (if applicabe):			
<b>Altimeter/Transponder test due</b> (if applicabe):			
<b>Strobe lights test due</b> (if applicabe):			
<b>Systems</b>	<b>Pre - inspection</b>	<b>Post - inspection</b>	
<b>Starter</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Oil pressure (PSI)</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Brakes</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Instrument and Avionics</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Navigation and position lights test</b> (if applicabe)	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Cabin light test</b> (if applicabe)	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Ignition ground test</b> (See Chapter of the Operator's Manual for all versions of ROTAX)	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Oil temperature (°F)</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<div style="background-color: black; color: white; padding: 5px; display: inline-block;"><b>WARNING</b></div> <p><b>Ensure cylinder heads temperature and oil temperature are within limits.</b></p>			
<b>Cabin heat</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Idle RPM</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<div style="background-color: black; color: white; padding: 5px; display: inline-block;"><b>WARNING</b></div> <p><b>Allow engine to cool to 300 ° F (Cylinder heads temperature) before shutdown.</b></p>			
<b>All exterior lights are off</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Check for fuel odors in cabin</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Check for fuel stains on floor</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Check fuel valve off function</b>	<input type="checkbox"/>	<input type="checkbox"/>	



**Post – Run - up checklist**

Inspection Item	50 hour	100 hour	Annual
<b>Flight controls.</b> Check for smooth operation of all flight controls with flaps in retracted and extended positions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Flight controls.</b> Check controls within entire range for binding, play, and unusual sounds.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Wash clean and vacuum the aircraft.</b> See Washing and Cleaning Checklist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Aircraft exterior.</b> Examine the entire aircraft exterior surface for damage, deformation or abrasion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Fairings, access panels, seats, carpets, covers, and spinner.</b> Remove for inspection to ensure access. Check for missing or unscrewed bolts and nuts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Propulsion system checklist**

Inspection Item	50 hour	100 hour	Annual
<b>Engine cowlings.</b> Remove and check engine cowlings for signs of heat damage, leaks or cracks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Engine Compartment.</b> Check all engine compartment components and engine mount for chafing, loose connections, wear, fluid or exhaust leaks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Cleaning.</b> Clean the engine as required in the Maintenance Manual for ROTAX Engine Type 912 Series.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Engine.</b> Inspect all systems as required in the Maintenance Manual for ROTAX Engine Type 912 Series.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Oil cooler.</b> Check oil cooler and radiator for damage or debris.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Cowling ducts.</b> Check cowling ducts for blockage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Engine oil.</b> Check the level of oil and follow the Operator’s Manual for all versions of ROTAX 912.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Induction system.</b> Check connection of manifold between Air filter box and carburetors. Check for fuel leakage nearby carburetors.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Induction air filter.</b> Inspect for cleanliness and condition of sealing surfaces. Replace filter, if damaged.		<input type="checkbox"/>	<input type="checkbox"/>



# Maintenance Manual

Aircraft Type: TL - 2000 Sting S4

## Section 2 - Inspection

<b>Fuel installation.</b> Inspect the fuel installation, hoses, pumps, connections, and supports. Inspect and clean the fuel filters in the engine area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Cabin heater.</b> Check clamps and heater attachments. Check the manifold for holes and attachments.			<input type="checkbox"/>
<b>Engine mount.</b> Inspect for cracks, corrosion, loose hardware, chafing by cables, wires, hoses, etc., and make sure that any flexing item is secured to the engine mount.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Engine mount bolts.</b> Inspect and check engine mount bolts.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Exhaust system.</b> Check the exhaust springs, the pipe system and its attachment for leaks, cracks on the exhaust pipe and welds.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Battery attachment.</b> Inspect for security of mounting and condition. Ensure vent holes are clear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Throttle and choke controls.</b> Check operation of throttle and choke controls.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Spinner.</b> Inspect for cracks, security to propeller. Clean inside of spinner.			<input type="checkbox"/>
<b>Propeller hub.</b> Inspect for cracks, corrosion. Re-torque all mounting bolts, if loos of torque is suspected on any bolt.			<input type="checkbox"/>
<b>Propeller blades.</b> Inspect for play, dents, nicks, craks, corrosion, pitting, and leading edge erosion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Propeller.</b> Check required inspection items detailed in the technical and operational documents of the propeller manufacturer		<input type="checkbox"/>	<input type="checkbox"/>
<b>Foreign Objects.</b> Check engine compartment for foreign objects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Fuselage checklist

Inspection Item	50 hour	100 hour	Annual
<b>Skin surface.</b> Inspect for obvious latent signs of damage, including cracks, holes, buckling. Check drain holes for obstructions. Check condition of paint and cleanliness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Placards.</b> Inspect for presence and condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Canopy.</b> Clean Inspect for cleanliness, cracks, condition, and bonding. Check vent operating. Inspect for operating and fit. Inspect hinges, gas struts, latching mechanisms. Lubricate latching pins.			<input type="checkbox"/>



# Maintenance Manual

Aircraft Type: TL - 2000 Sting S4

## Section 2 - Inspection

<b>Fuel leaks.</b> Inspect the outer skin tank areas for evidence of fuel stains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Static Port.</b> Check static port for evidence of obstructions. Do not apply compressed air to the system, since this will result in damage to the static air flight instruments.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Antennas.</b> Inspect for security and condition.			<input type="checkbox"/>
<b>Aircraft identification tag.</b> Inspect for security and legibility.			<input type="checkbox"/>

### Wings checklist

Inspection Item	50 hour	100 hour	Annual
<b>Wings.</b> Remove wings.		200 hours interval <input type="checkbox"/>	<input type="checkbox"/>
<b>Wing fuel tanks.</b> (if applied) Inspect Check wing leading edge and forward surface of root rib for cracks and fuel leak. Make sure there are no foreign objects within area of the fuel tank. Inspect fuel intake filter for obstruction, the fuel vents, fuel cap, connections for leaks.		200 hours interval <input type="checkbox"/>	<input type="checkbox"/>
<b>Wing skins.</b> Inspect for obvious signs of damage, including cracks, holes, and buckling. Check condition of paint and placards. Check drain holes for obstructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Aileron and flaps hinges.</b> Inspect for security of attachment to wing. Inspect bearing for condition. Lubricate the hinges bearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Ailerons.</b> Inspect skins for damage, looseness, or play in attach bearings, and condition of rod end attachment and lubricate. Check for obstruction of drain holes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Flaps.</b> Inspect skins for condition and signs of debonding. Check hinges for play and attachment to wing and flap. Check flap rod and rod tips for condition, and lubricate. Check for obstruction of drain holes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Flap actuator.</b> Clean and run flaps up and down to check for smooth operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Wing interior.</b> Inspect wing spars, ribs and control system attachment through revision holes in the bottom skin of the wing for signs of cracks or debonding. Inspect visible areas of ribs and other structures.		<input type="checkbox"/>	<input type="checkbox"/>



<b>Wings.</b> Assembly wings		200 hours interval <input type="checkbox"/>	<input type="checkbox"/>
<b>Flap deflection.</b> Ensure that flaps extend equally on each side of the airplane in all configurations. Measure the down deflection on each side. The difference in static deflection should not be greater than 1/8 " (3 mm). Inspect stop switches for operating.		200 hours interval <input type="checkbox"/>	<input type="checkbox"/>
<b>Flight controls.</b> Inspect all push-pull rods, rod end bearings for condition, play, security of attachment and lubricate. Ensure locking is proper where applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Aileron and flaps hinges.</b> Inspect for security of attachment to wing. Inspect bearing for condition. Lubricate the hinges bearing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Pitot tube.</b> Check condition and pitot tube attachment. Check cleanness of air inlet holes of pitot tube.		<input type="checkbox"/>	<input type="checkbox"/>

**Empennage checklist**

Inspection Item	50 hour	100 hour	Annual
<b>Rudder.</b> Visually check surface condition delaminating, deformation, or cracks. Check suspension and security of the rudder upper/lower hinges. Check attachment and security of rudder cables. Check attachment of rudder bell crank to rudder torque tube. Check for obstruction of drain holes. Check for continuity, full and free travel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Rudder angles of deflection.</b> Verify rudder angles of deflection.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Rudder lubrication.</b> Lubricate upper rudder hinge.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Horizontal Stabilizer and Elevator.</b> Inspect for visible damage and evidence of latent damage. Inspect looseness or play in hinges. Check for obstruction of drain holes. Check suspension and free travel of the elevator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Elevator angles of deflection.</b> Verify elevator angles of deflection.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Elevator lubrication.</b> Lubricate elevator hinges.		<input type="checkbox"/>	<input type="checkbox"/>

<p><b>Horizontal Stabilizer.</b> Remove aft tail cone and disconnect controls to the tail. Remove horizontal stabilizer. Check for surface corrosion and cracks main and rear horizontal stabilizer hinge housings and pins. Inspect for corrosion, cracks, damage and looseness elevator driver and elevator driver rivets attachments. Lubricate horizontal stabilizer hinges. Re-install horizontal stabilizer and tail cone.</p>	200 hours interval	<input type="checkbox"/>	
<p><b>Trim tab.</b> Check trim tab operation, condition and hinge. Lubricate hinges.</p>		<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Ailerons angles of deflection.</b> Verify ailerons angles of deflection. Check for continuity, full and free travel.</p>		<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Flight controls.</b> Inspect all push-pull rods, cable, rudder and trim tab control cables, rod end bearings and bellcranks for condition, play, security of attachment and lubricate.</p>		<input type="checkbox"/>	<input type="checkbox"/>

### Landing Gear

Inspection Item	50 hour	100 hour	Annual
<p><b>Visual inspection.</b> Inspect from top to bottom for scratches, cracks, corrosion, signs of overstress and side-loading.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Wheels.</b> Inspect for cracks and corrosion. Check all hardware for signs of loss of torque. Check wheel for free rotation. Inspect tires for splitting, flat spots, wear, and dry-rotting. Check tire pressure, and service as necessary.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Fairings.</b> Inspect for condition, scratches, cracks, and signs of overstress. Clean interior.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Wheel bearings.</b> Inspect for damage, wear, and corrosion. Check bearing for play, binding and bearing protection plate for condition. Replace bearings if necessary.</p>		<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Nose landing gear.</b> Lift up the nose gear and check rotation of the nose gear. Lubricate bearings.</p>		<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Main landing legs.</b> Remove seats and check condition of landing gear legs and attachment points for cracks or damage.</p>		<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Hydraulic brake lines.</b> Inspect brake lines. Check for security and evidence of chafing. Check for leaks.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



<b>Brake calipers, brake pads and brake discs.</b> Clean and inspect for condition, fluid leakage, for cracks and corrosion, security of components. Inspect brake discs for pitting and signs of overheating. Inspect all hardware for signs of loss of torque. Do not lubricate.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Brake fluid reservoir.</b> Inspect for condition, security, and fluid level. Service, if necessary.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Cabin and Baggage Compartment**

Inspection Item	50 hour	100 hour	Annual
<b>Seats.</b> Remove seats bases			<input type="checkbox"/>
<b>Seats inspection.</b> Inspect seat structure for general condition and cracks. Inspect cushions and upholstery for condition.			<input type="checkbox"/>
<b>Fire extinguisher.</b> Remove fire extinguisher (if applicable) and inspect.			<input type="checkbox"/>
<b>Safety belts.</b> Inspect belts for wear, cuts, and broken stitching. Check all buckles for proper locking and release. Check belt attachments to structure.			<input type="checkbox"/>
<b>Avionics and instruments.</b> Check general condition, attachment, and function of the instrument panel, instruments, switches and circuit breakers.			<input type="checkbox"/>
<b>Magnetics compass.</b> Inspect compass correction card for presence and legibility of all headings. Magnetic tools must not be used during this procedure.			<input type="checkbox"/>
<b>Fuel valve.</b> Inspect for operating and signs of fuel leakage.		<input type="checkbox"/>	<input type="checkbox"/>
<b>Starting carb, fuel pump and ventilation.</b> Check function and condition.			<input type="checkbox"/>
<b>Placards.</b> Inspect for presence and condition of all required interior placards.			<input type="checkbox"/>
<b>Ceiling cover.</b> Check condition and attachment of the ceiling cover.			<input type="checkbox"/>
<b>Rudder pedals.</b> Inspect for security, cracks, and play. Lubricate		<input type="checkbox"/>	<input type="checkbox"/>
<b>Parking brake.</b> Inspect for security of mounting and signs of leakage.			<input type="checkbox"/>
<b>Upholstery.</b> Inspect for general condition, attachment, and cleanliness.			<input type="checkbox"/>



<b>Baggage compartment.</b> Inspect baggage aera network for condition and attachment. Inspect baggage compartment for cleanliness.			<input type="checkbox"/>
<b>Aircraft Parachute systém.</b> Check the condition of the chute handle and safety pin for proper fit. Check for proper clearance and freedom from binding of the chute pull (activation) cable. Check the parachute system in accordance with the manufacturer inspection schedule.			<input type="checkbox"/>
<b>Seats.</b> Instal seats		<input type="checkbox"/>	<input type="checkbox"/>

**Inspection Completion**

Inspection Item	50 hour	100 hour	Annual
<b>Fuselage and wings.</b> Make sure aircraft is free of any tools, parts, and debris, and reinstall all access panels, fairings, seats, and so on, removed for the inspection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Engine.</b> Verify that there is oil in the oil tank, cooling liquid in the expansion tank and coolant level in overflow bottle take place between min. and max. mark as required by the Operator's Manual for all versions of ROTAX 912, and engine compartment is free of tools, rags, and debris.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Engine run.</b> Run engine for no more than two minutes at 1400 to 1800. After shutdown, check for leaks at oil filter, and any other components removed during this inspection. Instal cowlings, if no leaks are noted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Aircraft.</b> Operate engine at 2000 to 2500 RPM to warm it up. Operate all aircraft systems to verify proper operation. As engine warms, operate engine systems at appropriate engine speeds and complete all checks listed on Inspection Coversheet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Aircraft records.</b> Complete entries in logbooks, AD and SD compliance lists, and any other required records.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



NOTES:

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### 2.7 Every 300 hour Inspection

This inspection is made after every 300 flight hours, or after five years of operation. The inspection of all stressed parts of the construction is made along with the prescribed repair according to the manufacturer's guide book.

The inspection and maintenance include:

- Inspection after 100 hours
- Removing the propeller
- Inspection of the construction.
- Inspection of the interior of the body and the cabin.
- Outer inspection of the entire airframe.
- Inspection of the steering components.
- Replacement of parts.
- A flight test by the pilot.

**CAUTION**

**This inspection is typically made by the manufacturer's service center or a repair station.**



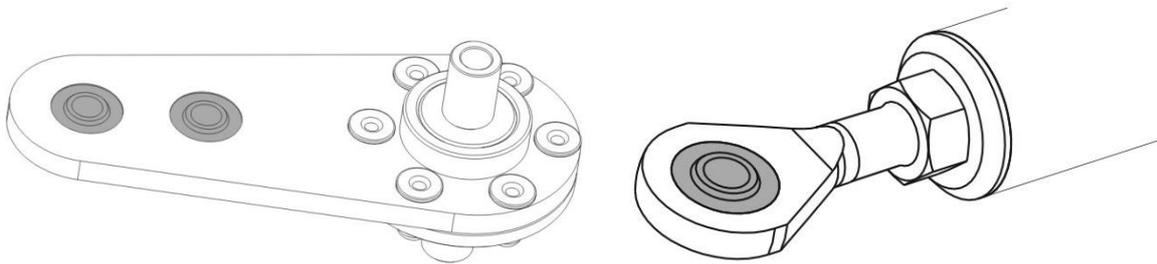
## 2.8 Alterations or Major repairs

### WARNING

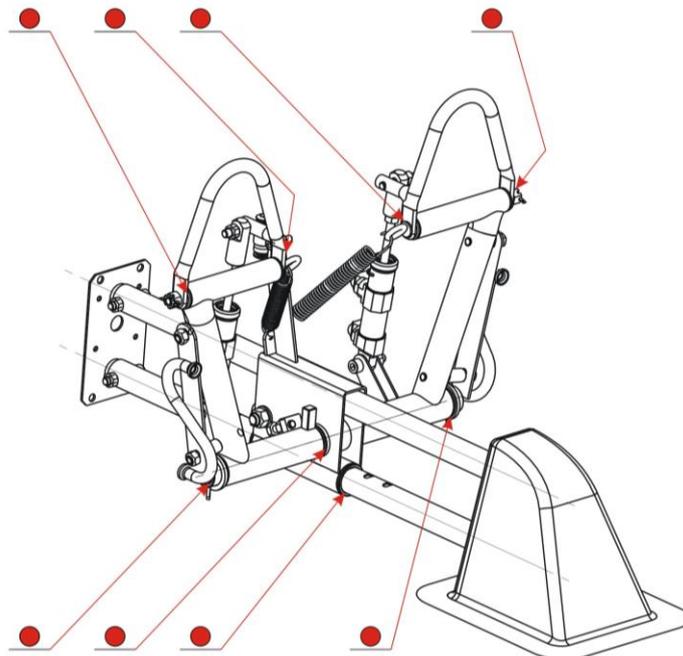
Any alterations or major repairs to the airplane must be approved in writing by the aircraft manufacturer. See Chapter 1, General Information, for more details.

## 2.9 Lubrication program figures

Typical location bearings on the rod end and levers



Foot Pedals - adjustable pedals version



● Lubrication Grease



# Maintenance Manual

Aircraft Type: TL - 2000 Sting S4

## Section 2 - Inspection

Unit	Area of lubrication	Periodic 25 hours	Annual (100 hour)	Lubricant
Engine	Throttle control cable into the engine compartment.	X	X	Light Oil
	Choke control cable into the engine compartment.	X	X	Light Oil
Nose gear	Nose gear leg insertion of the upper strut into the lower yoke. Include the links to the rudder pedals.	X	X	Lubrication Grease
Main gear	Axle Bearings.	X	X	Lubrication Grease
Ailerons	Hinges.	X	X	Lubrication Grease
	Rod end bearings	X	X	Lubrication Grease
	Turning actuator to aileron.	X	X	Lubrication Grease
	Push-pull actuator to aileron.	X	X	Lubrication Grease
Flaps	Hinges	X	X	Lubrication Grease
	Torque tube connectors to actuators	X	X	Lubrication Grease
Tail	Rod end bearing of the elevator control tube.	X	X	Lubrication Grease
	Rudder hinges and bearing.	X	X	Lubrication Grease
	Rudder horn cable shackles	X	X	Lubrication Grease
	Horiz stabilizer fittings and sockets.	X	X	Lubrication Grease
Trim tab	All movable parts on the tail.	X	X	Lubrication Grease
Foot Pedals	All moving parts in the cockpit area	X	X	Lubrication Grease
	Ends of the wing spars and bearing rings.		200X	Lubrication Grease
Structure	Torque ball, wing attach supports (4)		200X	Lubrication Grease
	Ends of the wing spars and bearing rings.		200X	Lubrication Grease



### 3. STRUCTURES

#### 3.1 Introduction

Section 3 describes the structure, subsystems and work to be completed in the removal and installation of subsystems and parts drawings specific to the Sting S4. Some equipment described in this section may not apply to all Sting S4 serial numbers.

#### 3.2 Wing

The wing of TL-2000 Sting S4 consists of right and left wings (made of carbon and fiberglass parts bonded together with structural epoxy resin). The wings are attached to the fuselage by two, interlocking, box-type spars that cross beneath the cockpit and interlock with the opposite wing. These spars in turn are connected by a large over-center locking bolt. An optional six-gallon auxiliary fuel tank may be contained in each wing.

##### 3.2.1 Wings Installation

To install the wings requires two - three persons.

Contact TL-Ultralight or an authorized dealer for the instructions on wing installation, if installing a replacement wing, or a repaired wing.

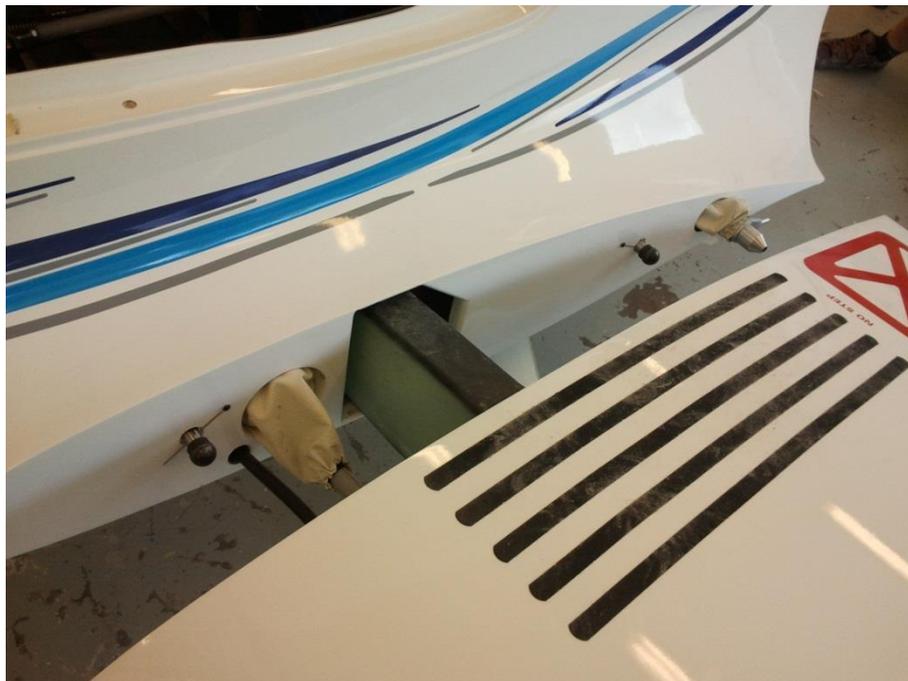
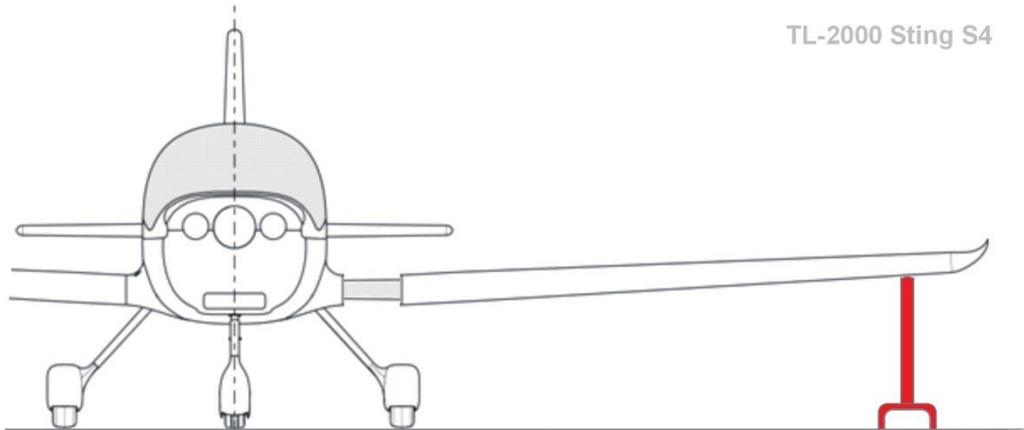
<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Wrench 10,13,16,17 (1pcs) Allen wrench 5 (1pcs) Socket wrench 10,13,16 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Cradles for the wings
<b>Materials Required</b>	Self-locking nuts VM5, 6, 8, 10 (3 pcs, 2pcs, 2pcs, 6 pcs) Plastic grease Mogul G3 F-900 Torque seal



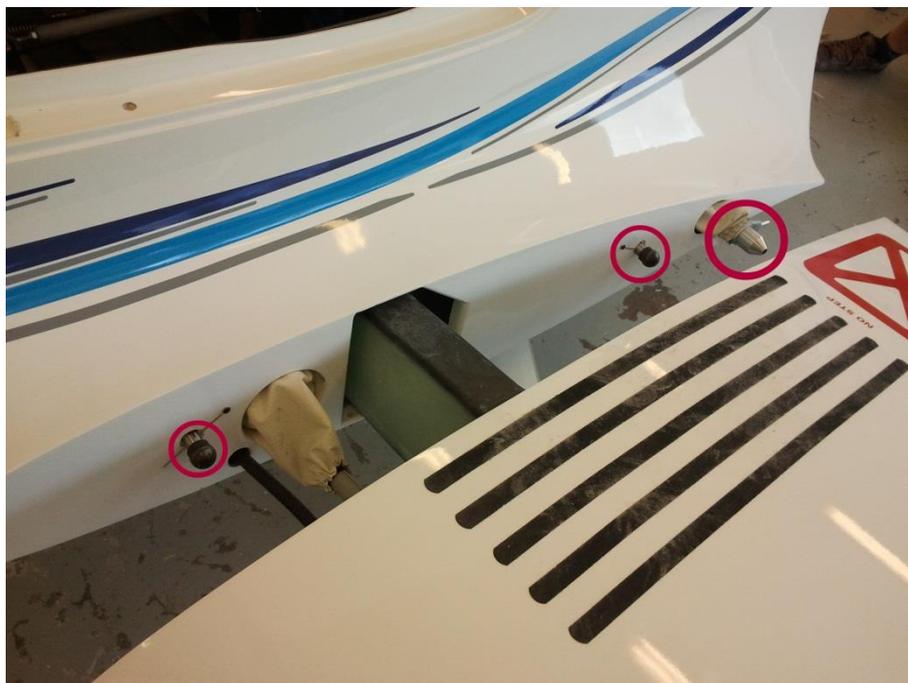
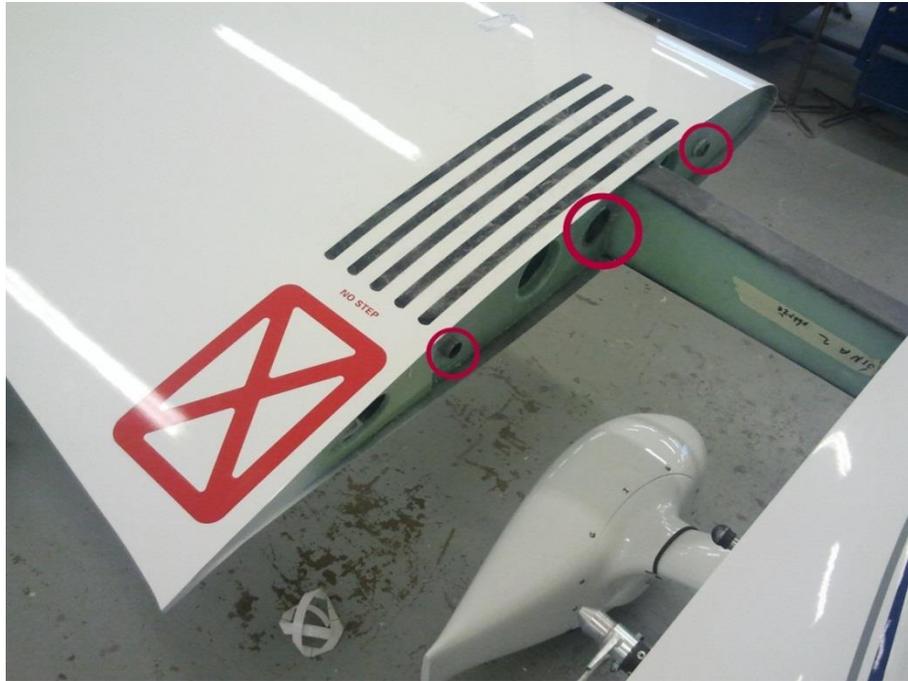
**Wings Installation Checklist**

**1) Aircraft parking.** Prior to installation set the aircraft on the parking brake and remove any obstacle within 16ft area from the fuselage.

**2) Wing preparing.** Insert the wing root spar into the hole in the fuselage. Add support for the end of the wing as shown below.



**2) Lubricating.** Lubricate all metal details with plastic grease before connecting.





**3) Wing inserting.** Slide the wing into the fuselage. Ball on the root spar must fit into the hole.



**NOTE**

**Pay attention to flap drive fit into the backdrop drive flap.**



**4) Pin inserting.** In the hole in the root spar insert the secure pin as shown. Insert in hole and rotate about 180°.





**5) Aileron control connect.** Connect aileron pull rod control.



**6) Connect all wiring.** Connect all electric fuselage – wing wiring if applicable (eg. light electrical wiring)

**7) Connect fuel hose (if wing fuel tank applied).** Connect fuel hose from wing tank to fuselage.

**8) Grounded wire.** Connect grounded wire.

**9) Pitot hose.** Connect the pitot hoses wiring fuselage-right wing.

**10) Seat mount.** Insert back seat and bottom seat.

**NOTE**

**See chapter 3.9.3 Seats for detailed information.**



### 3.2.2 Wings Removal

Drain all the fuel from the wing tanks (if applied) and fuel lines. The process of draining the aircraft should be performed in a ventilated area with fire precautions taken.

The rest of the wing removal process goes in reverse to the wings installation process.

During the wings removal make indications arising of interchangeable parts, so when the subsequent assembly was assembled in the correct position (struts, Flaps drive).

### 3.2.3 Verification Required (wings)

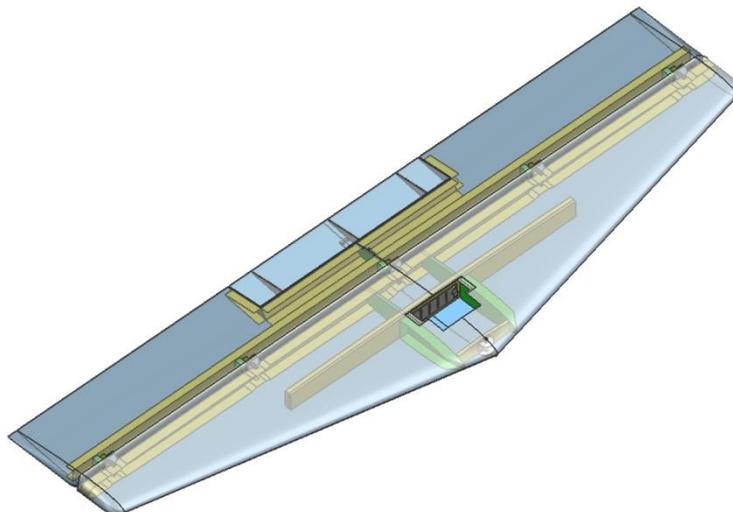
Make sure the main bolt is correctly positioned

Check fuselage and wings for foreign objects.

## 3.3 Empennage

### 3.3.1 Installation of horizontal tail

To the installation of the elevators is two person required.





<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Allen wrench 5 (1pcs) Socket wrench 5,5 ,8,10 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs)
<b>Materials Required</b>	Safety wire 0.032" diameter Self-locking nuts VM3 (2 pcs) Plastic grease Mogul G3 F-900 Torque seal

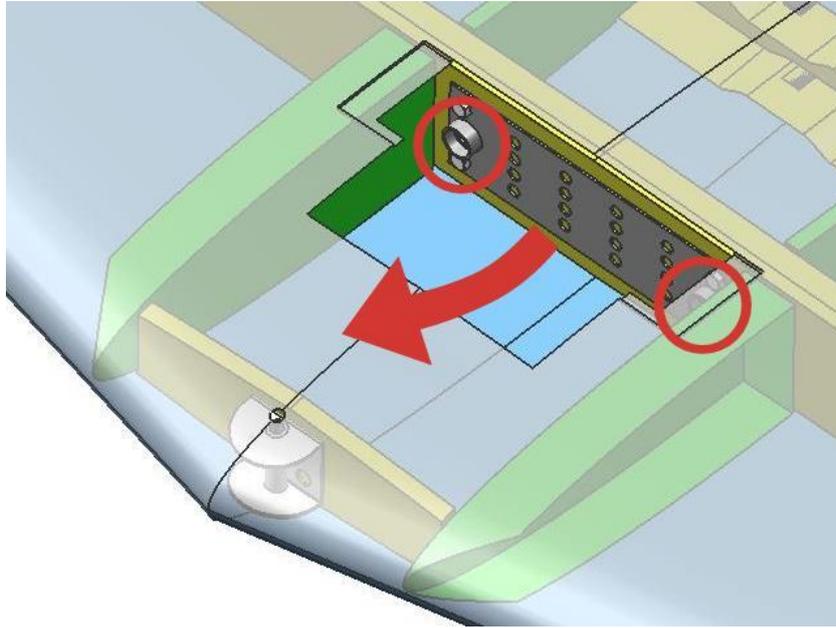
**Horizontal tail Installation Checklist**

**1) Aircraft parking.** Prior to installation set the aircraft on the parking brake and remove any obstacle within 8ft area from the rear part of fuselage.

**2) Lubricating.** Lubricate all metal main and rear hinges interfaces with plastic grease before connecting: Elevator main hinge pins, Main hinge case, Rear hinge case and bearing and bolt on the Elevator drive.

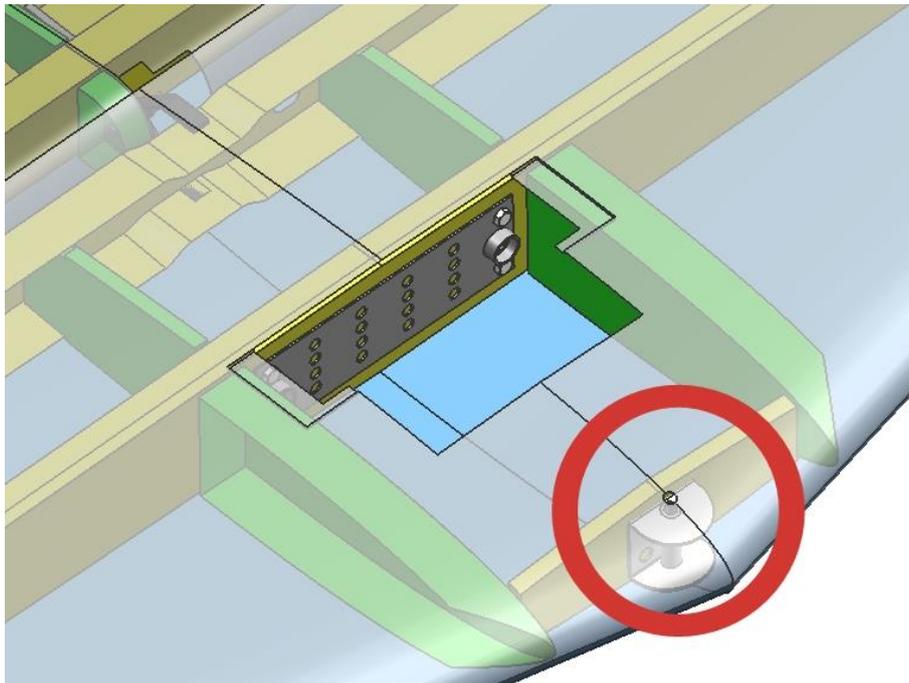
**3) Horizontal tail assembly.** Put the Horizontal tail with the Main hinge cases on Elevator main hinge pins located in the rear part of fuselage. Then push the horizontal tail forward to the stop face on the main hinge pins.





**4) Rear horizontal tail hinge.** Fix the Horizontal tail on the fuselage with the screw M8 x 87 DIN 912 and wedge Stabilizer washer. Secure the screw by the stainless safety wire having diameter of 0.032". The hole for screw is highlighted red.

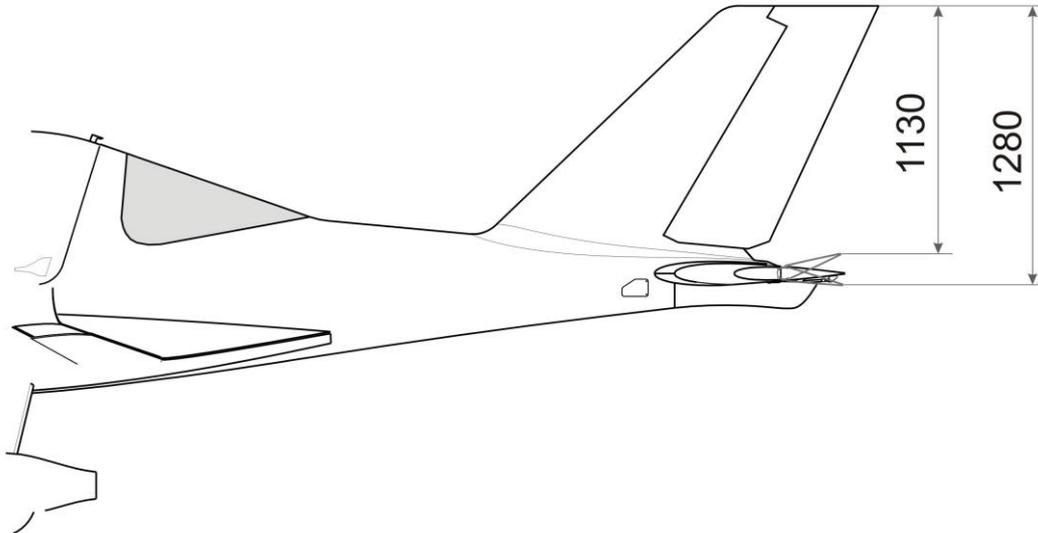




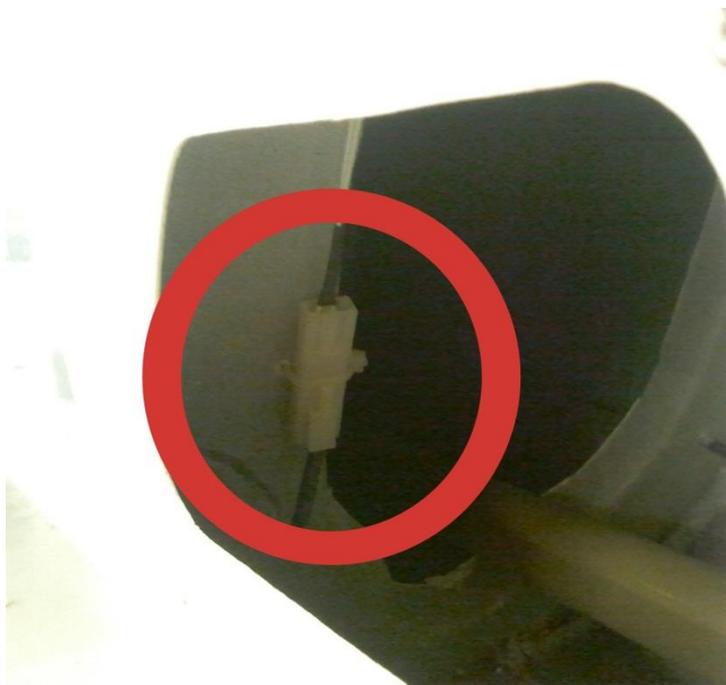
**5) Elevator control connection.** Connect the elevator control connection as shown. Use screw M5 x 25 DIN 912 with washer M6 and castle nut with cotter pin 1,6.



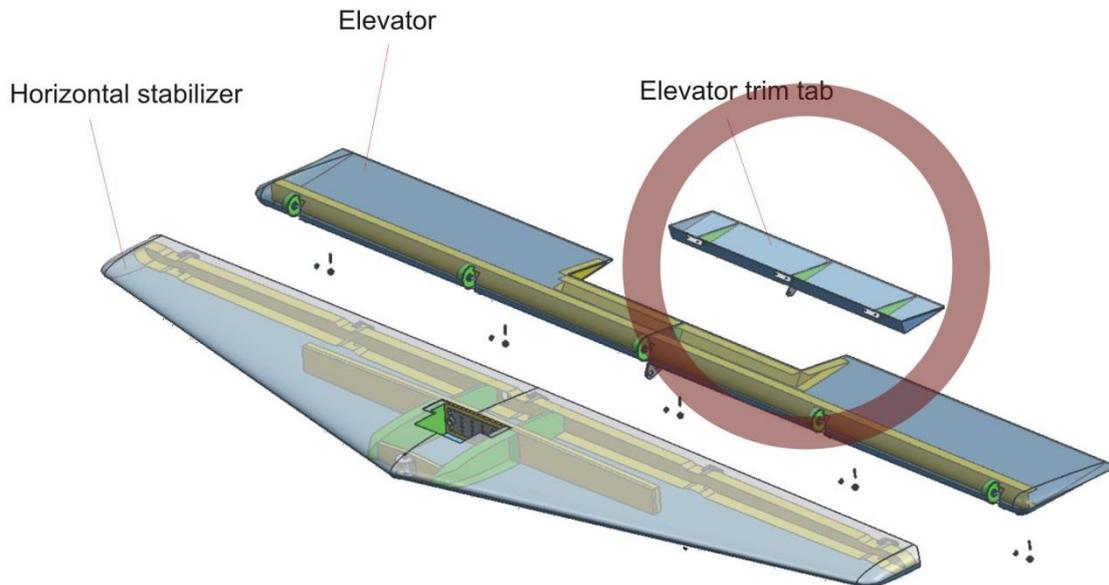
**6) Elevator deflection.** Check angles of deflection of the elevator to within the range as follows ( $\pm 10$  mm /  $\pm 0.4$  in).



**7) Fuselage-to-rudder wiring.** Connect all fuselage-to-rudder wiring, i.e. connect the position lights sockets and plug. Fix wires in the fuselage as shown. Access to the wires is through the rear inspection hole



**8) Trim tab connection.** Connect the Trim tab lever with elevator trim tab as shown. Use phil. Head machine screws M3 x 10 DIN 7985. Use only new self-locking nuts VM3.



**9) Trim tab control connection.** Connect the trim tab with trim tab pull rod drive as shown. Use bold M5 x 20 with washers M5 and castle nuts with cotter pin 1.6.







**10) Trim tab deflection.** Check angles of deflection of the Trim tab. Check Trim tab neutral position. Inspect Trim tab for free travel.

**11) Tail cone cover.** Fix Tail cone cover on the fuselage with twelve slotted mushroom head screws M4 x 12 (905624). Two screws are under the horizontal tail stabilizer and two screws are in the fuselage accessible through the rear inspection hole. See the Picture below. Insert screwdriver in the fuselage as shown for screw bold holding the tail cover.







### 3.3.2 Horizontal tail removal

The rest of the horizontal tail removal process goes in reverse to the horizontal tail installation process.

### 3.3.3 Elevator installation

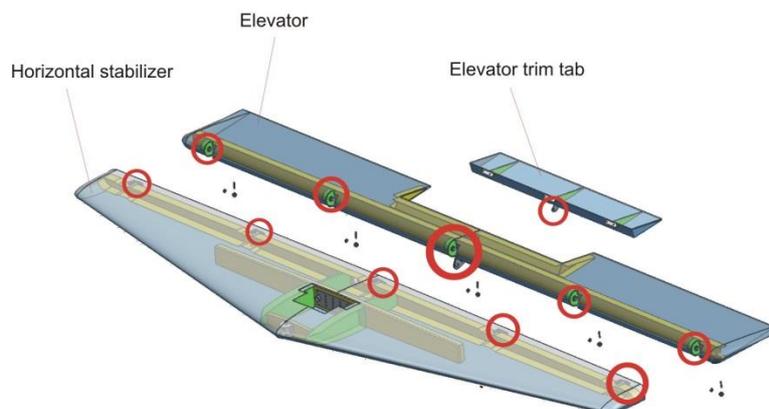
To installation the elevator requires two person.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Allen wrench 5 (1pcs) Socket wrench 8, 10 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs)
<b>Materials Required</b>	Self-locking nuts VM3 (2 pcs) Plastic grease Mogul G3 F-900 Torque seal

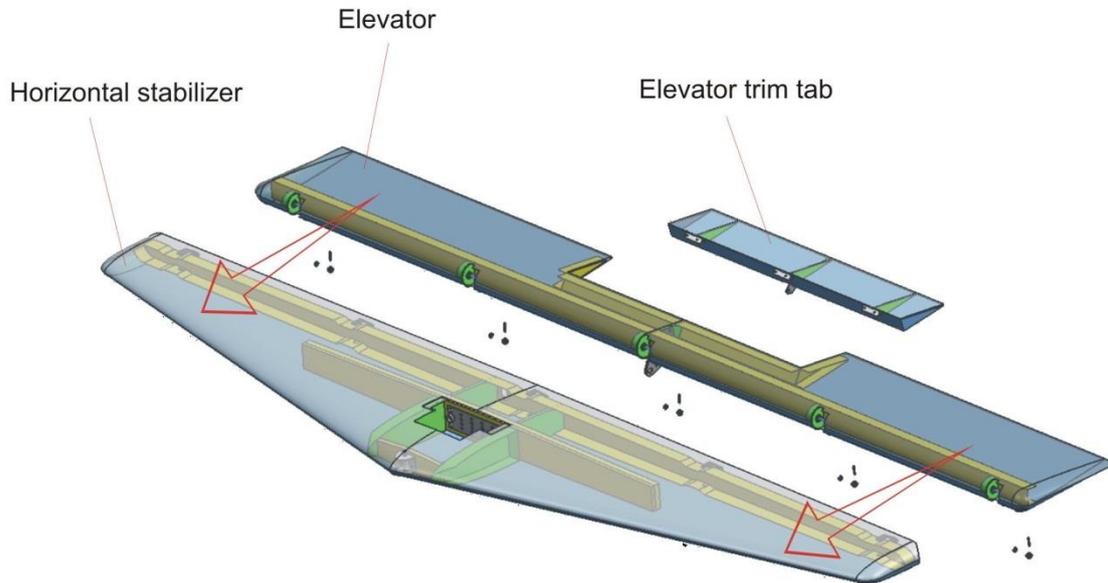
#### Elevator Installation Checklist

**1) Aircraft parking.** Prior to installation set the aircraft on the parking brake and remove any obstacle within 8ft area from the rear part of fuselage if you mount elevator on the aircraft with fixed stabilizer. If you install elevator on non – on the fuselage fixed stabilizer, put stabilizer on the cradles.

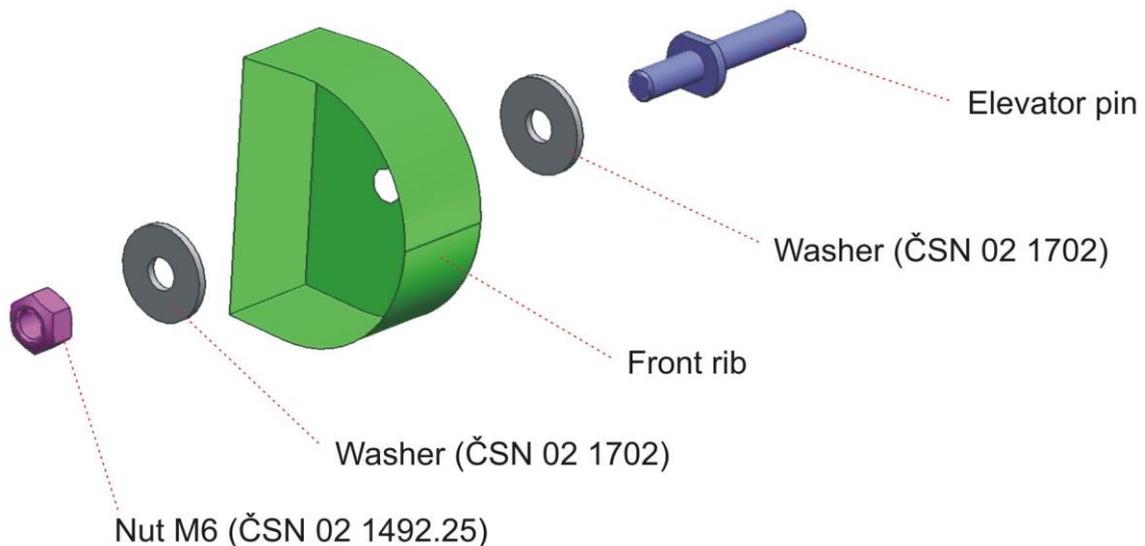
**2) Lubricating.** Lubricate all elevator hinges (on the stabilizer and elevator) with plastic grease before connecting: Elevator hinges and bearing and bolt on the Elevator drive.

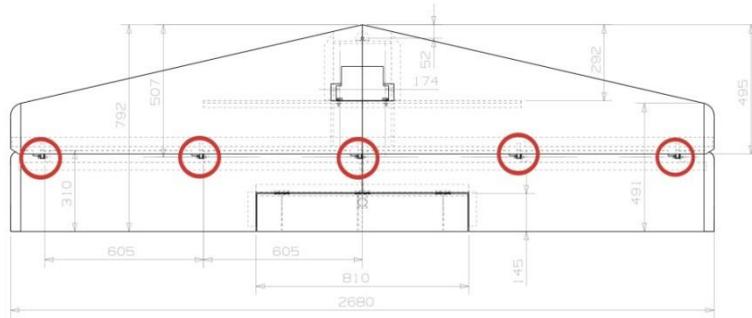


**3) Elevator assembly.** Insert the elevator with the hinges into the stabilizer from the back side.



**4) Elevator assembly.** Fix the Elevator on the Stabilizer with five elevator pins. Use only castle nut M6 with the cotter pin 1,6.



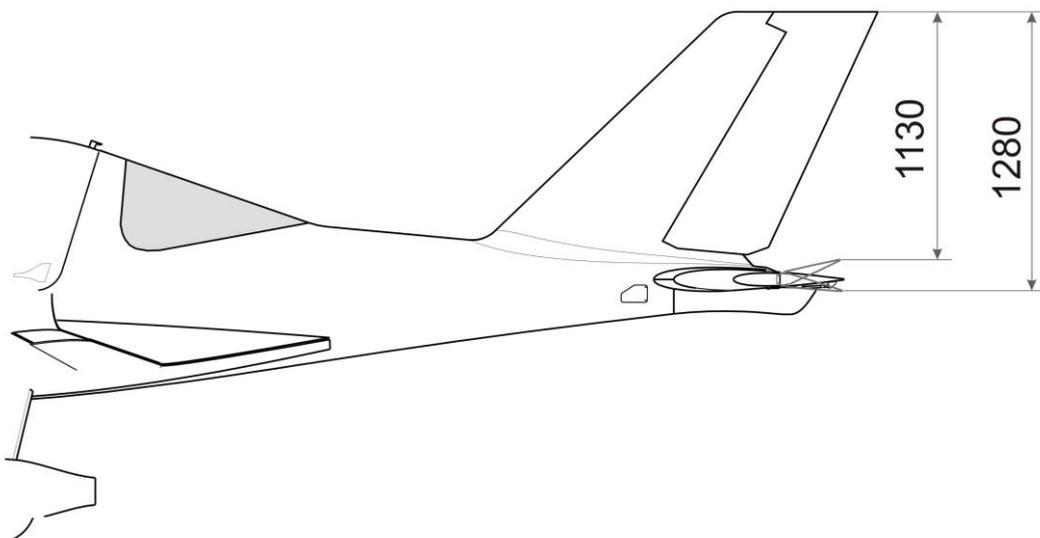


**5) Elevator control connection.** Connect the elevator control connection as shown. Use screw M5 x 25 DIN 912 with washer M6 and castle nut with cotter pin 1,6.

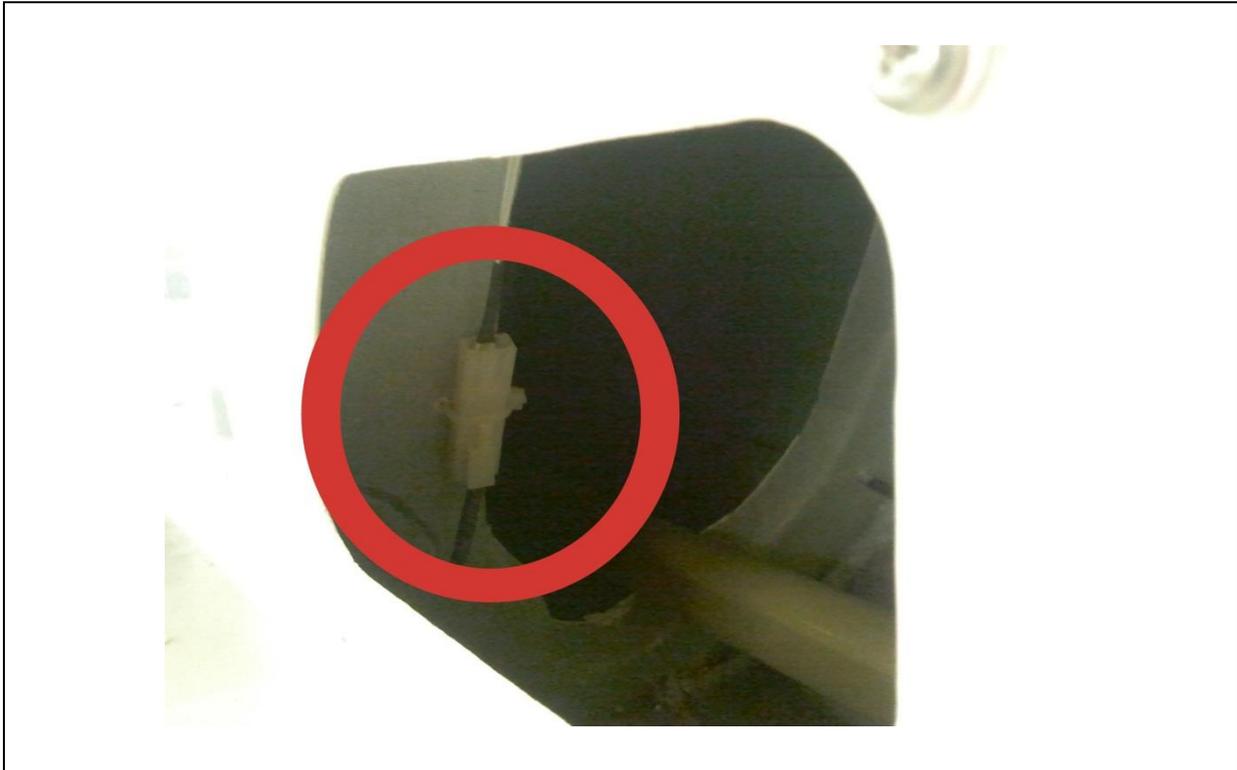




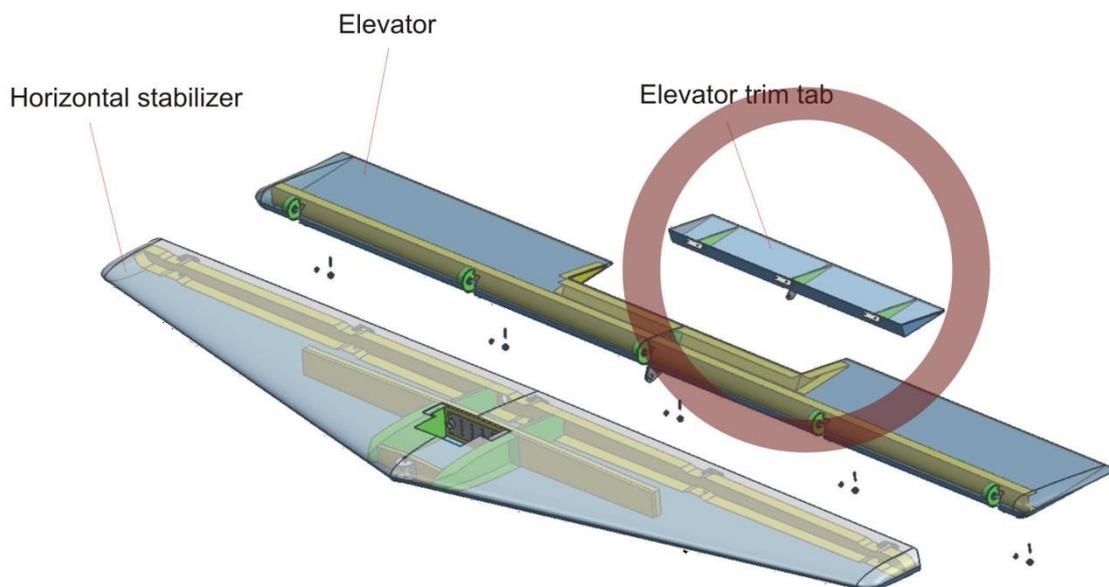
**6) Elevator deflection.** Check angles of deflection of the elevator to within the range as follows ( $\pm 10$  mm /  $\pm 0.4$  in).



**7) Fuselage-to-rudder wiring.** Connect all fuselage-to-rudder wiring, i.e. connect the position lights sockets and plug. Fix wires in the fuselage as shown. Access to the wires is through the rear inspection hole



**8) Trim tab connection.** Connect the Trim tab lever with elevator trim tab as shown. Use phil. Head machine screws M3 x 10 DIN 7985. Use only new self-locking nuts VM3.



**9) Trim tab control connection.** Connect the trim tab with trim tab pullrod drive as shown. Use bold M5 x 20 with washers M5 and castle nuts with cotter pin 1.6.





**10) Trim tab deflection.** Check angles of deflection of the Trim tab. Check Trim tab neutral position. Inspect Trim tab for free travel.

**11) Tail cone cover.** Fix Tail cone cover on the fuselage with twelve slotted mushroom head screws M4 x 12 (905624). Two screws are under the horizontal tail stabilizer and two screws are in the fuselage accessible through the rear inspection hole. See the Picture below. Insert screwdriver in the fuselage as shown for screw bold holding the tail cover.





12) **Rear inspection hole.** Close rear inspection hole by screw M4 x 12 (905624).



### 3.3.4 Elevator Removal

The rest of the elevator removal process goes in reverse to the wings installation process.

### 3.3.5 Verification Required (horizontal tail and elevator)

Make sure the main bolts are not loose (do not rotate).

Check fuselage and horizontal tail for foreign objects.

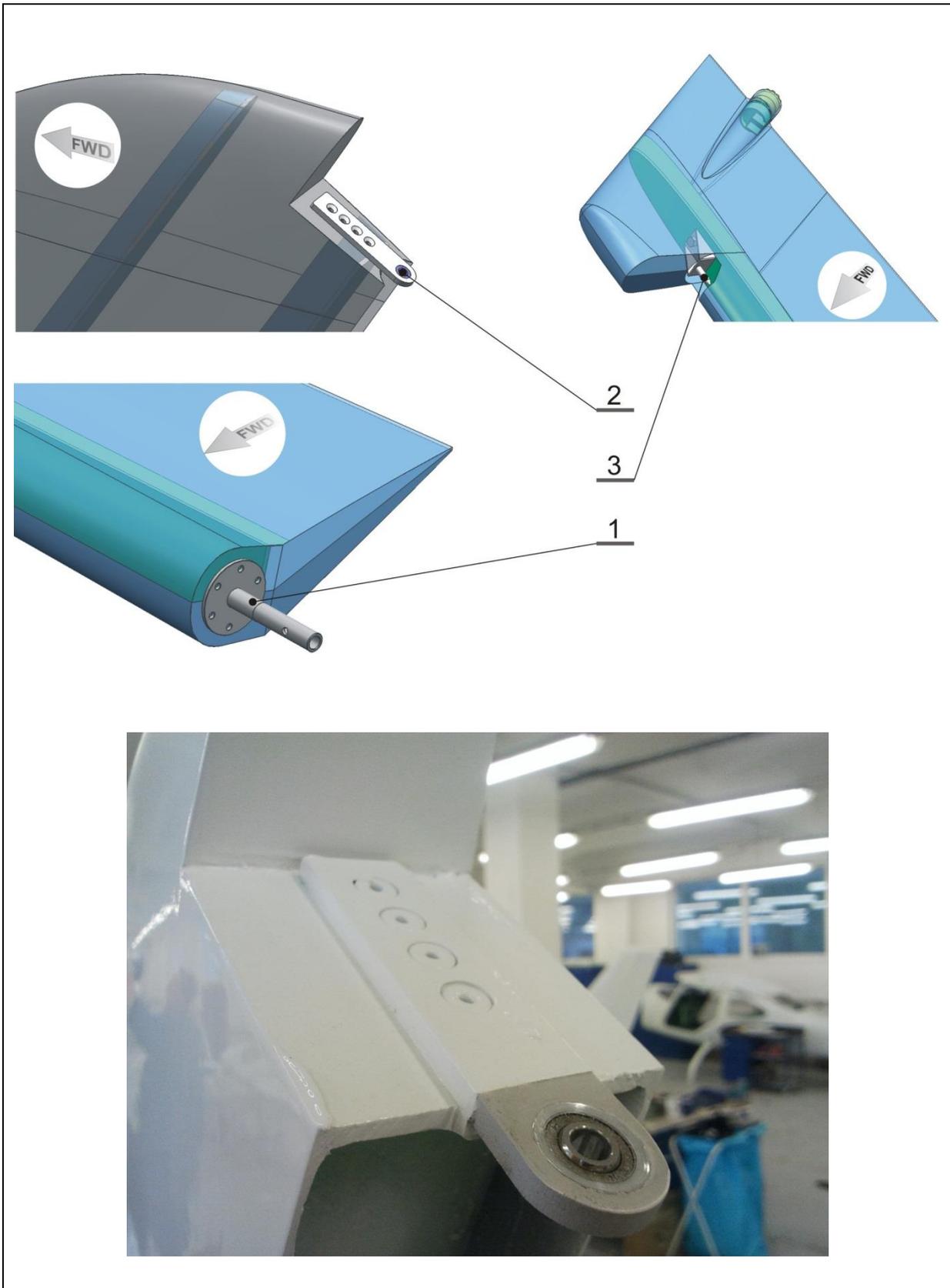
Check elevator and trim tab for free travel.

Secure all bolted connections by the F-900 Torque seal

### 3.3.6 Rudder Installation

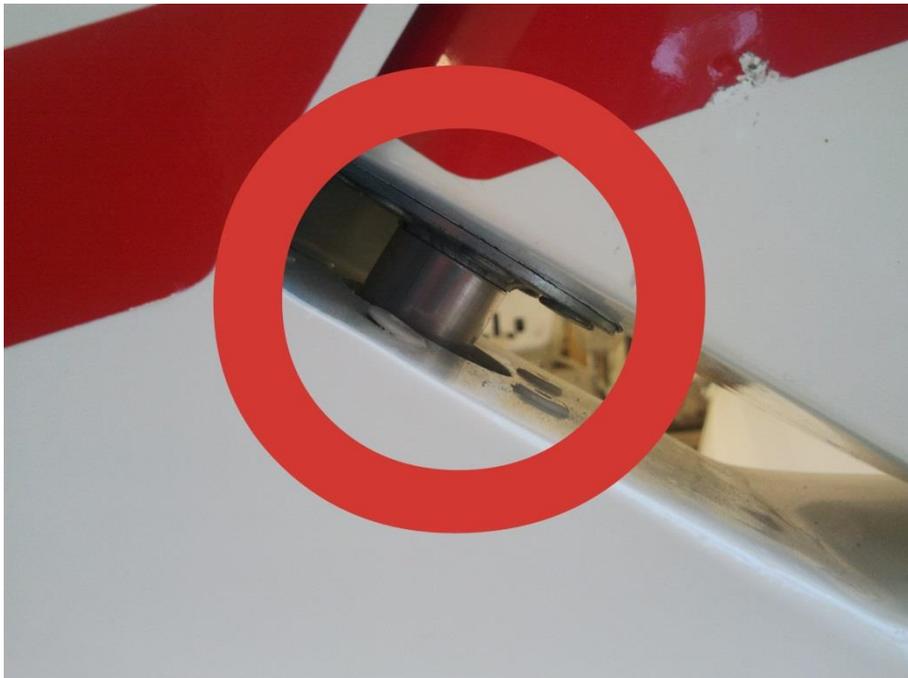
To installation the rudder requires two person.

<b>Type of Maintenance</b>	Line												
<b>Level of Certification Required</b>	L/O, RI, RM, A& P												
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.												
<b>Tools Required</b>	Allen wrench 5 (1pcs) Socket wrench 10 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Hook for rudder springs (1pcs)												
<b>Materials Required</b>	Self-locking nuts VM6 (1 pcs) Plastic grease Mogul G3 F-900 Torque seal												
<b>Rudder Installation Checklist</b>													
<p><b>1) Aircraft parking.</b> Prior to installation set the aircraft on the parking brake and remove any obstacle within 6ft area from the rear part of fuselage.</p>													
<p><b>2) Lubricating.</b> Lubricate rudder upper and bottom hinges with plastic grease before connecting: Bottom mounting axis bearing on the Upper rudder hinge and Upper rudder pin.</p>													
<table border="1" style="width: 100%;"> <thead> <tr> <th>Pos.</th> <th>Part</th> <th>Part number / Norm</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Bottom mounting axis</td> <td>s213_100_00-1</td> </tr> <tr> <td>2</td> <td>Upper rudder hinge</td> <td>s214_100_00-1</td> </tr> <tr> <td>3</td> <td>Upper rudder pin</td> <td>s214_200_00-1</td> </tr> </tbody> </table>		Pos.	Part	Part number / Norm	1	Bottom mounting axis	s213_100_00-1	2	Upper rudder hinge	s214_100_00-1	3	Upper rudder pin	s214_200_00-1
Pos.	Part	Part number / Norm											
1	Bottom mounting axis	s213_100_00-1											
2	Upper rudder hinge	s214_100_00-1											
3	Upper rudder pin	s214_200_00-1											



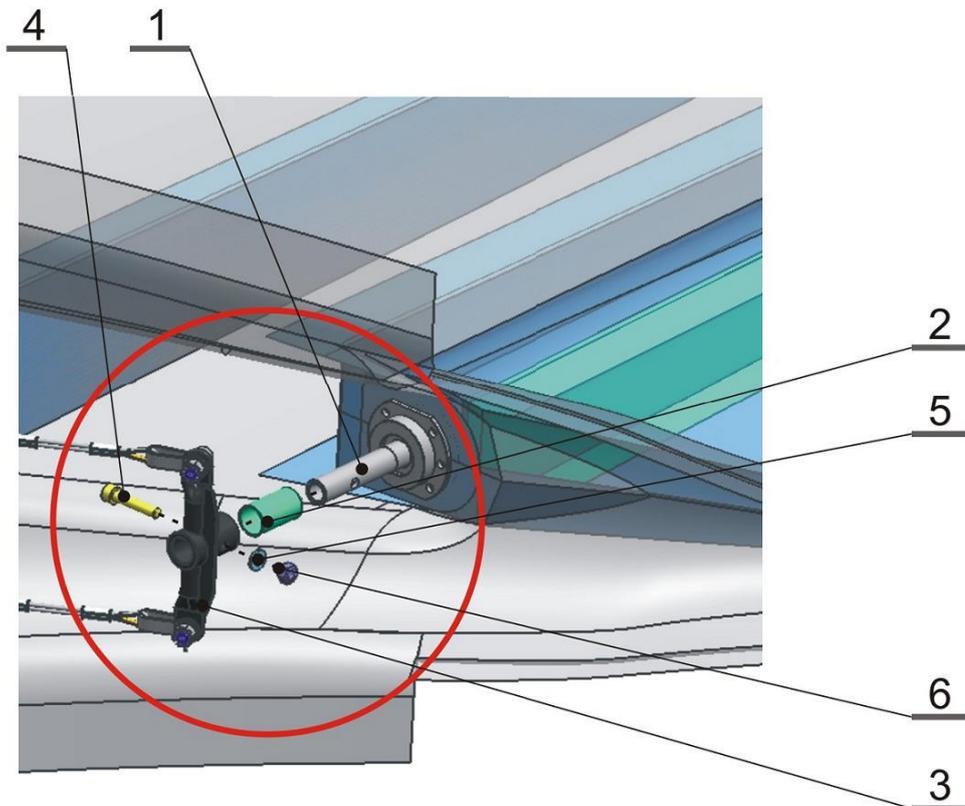
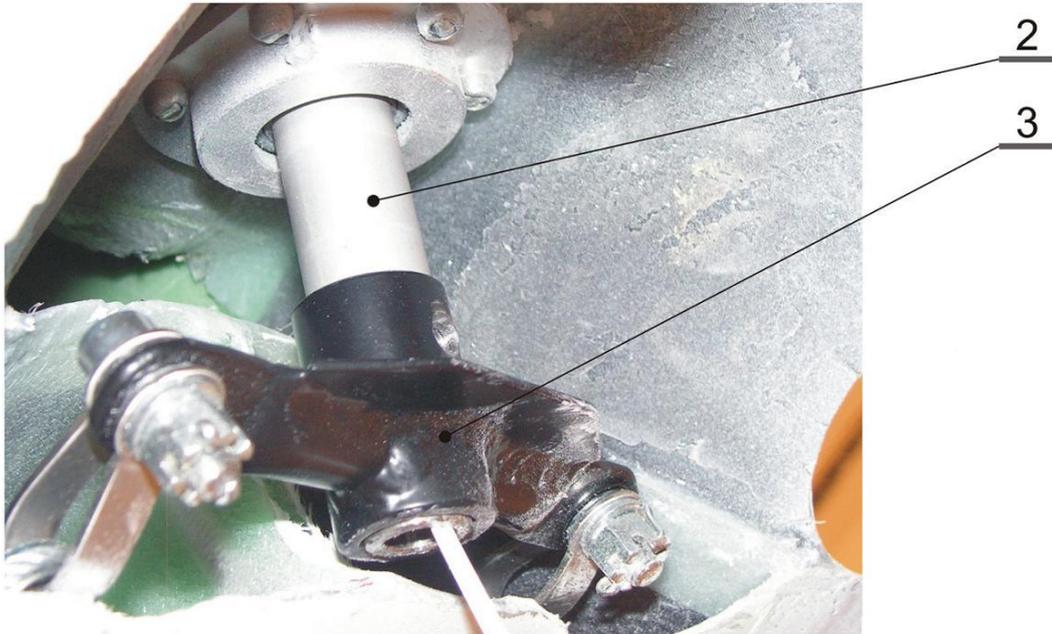


**3) Rudder assembly.** Slip the small spacer on the bottom mounting axis. Put the rudder on the fuselage inserting the bottom mounting axis to the ball bearing the bottom suspension . Then upper rudder attachment, i.e. slip the upper rudder pin on the bearing in the upper rudder hinge.





**4) Rudder balance beam assembly.** Slip the Big spacer on the Bottom mounting axis. Fix the Rudder balance beam on the Bottom mounting axis with screw M6 x 30 DIN 912. Use only new self-locking nuts VM6.



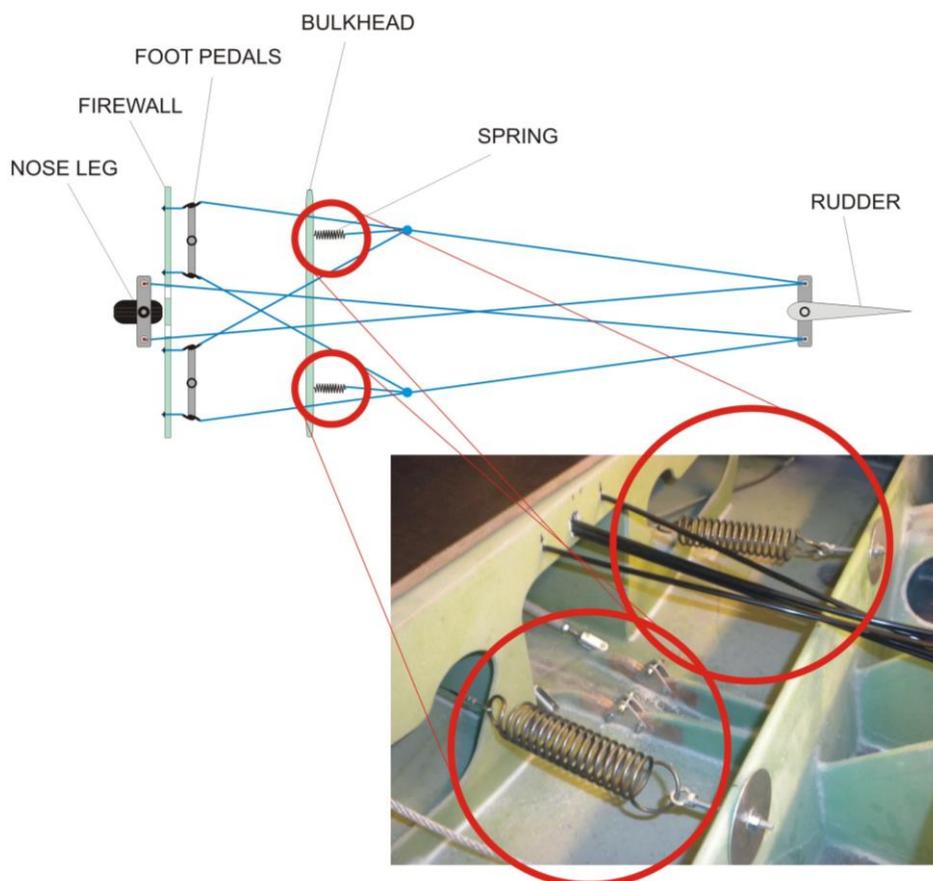


Pos.	Part	Part number / Norm
1	Bottom mounting axis	s213_100_00-1
2	Big spacer	s213_400_00-1
3	Rudder balance beam	s213_500_00-1
4	Screw M6 x 30	DIN 912
5	Washer M6	ČSN 02 1721
6	Self – locking nut VM 6	DIN 980

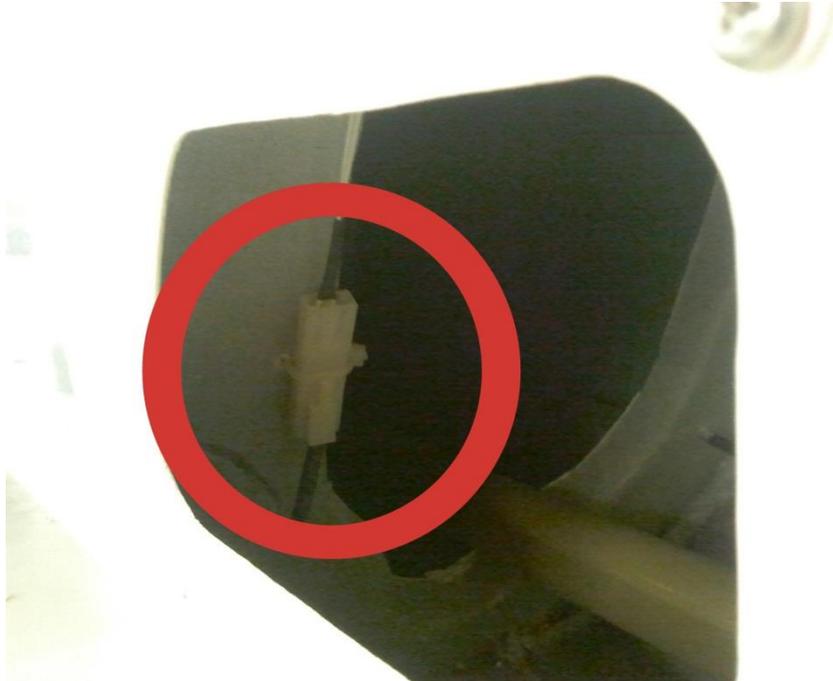
**CAUTION**

During the assembly don't damage the fuselage – to – rudder wiring inside the Bottom mounting axis (especially when inserting the screw M6 x 30).

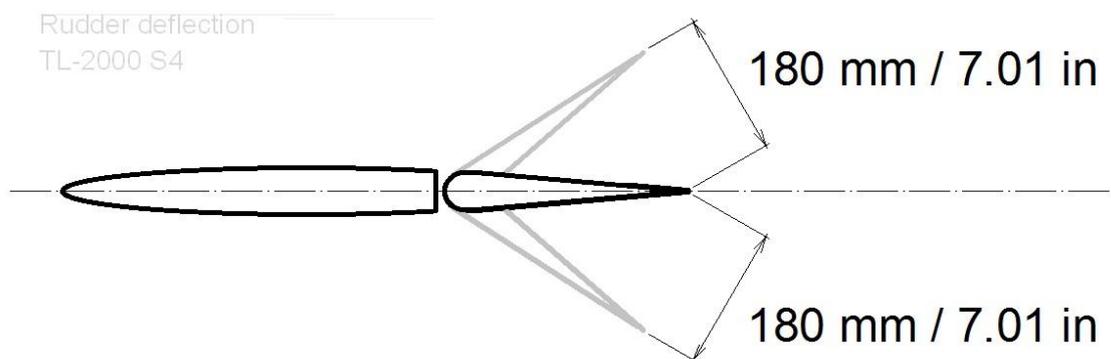
5) **Rudder spring connection.** Connect two Rudder springs to the Fuselage bulkhead. Bulkhead is located behind the crew seats. Use hook for springs tension.



**6) Fuselage-to-rudder wiring.** Connect all fuselage-to-rudder wiring, i.e. connect the position lights sockets and plug. Fix wires in the fuselage as shown. Access to the wires is through the rear inspection hole



**7) Rudder deflection.** Check angles of deflection of the Rudder to within the range 20° left and right ( $\pm 10$  mm /  $\pm 0.4$  in). Inspect Rudder for free travel.



**8) Securing bolted connections.** Secure all bolted connections by the F-900 Torque seal.

**9) Tail cone cover.** Fix Tail cone cover on the fuselage with twelve slotted mushroom head screws M4 x 12 (905624).

	<h1>Maintenance Manual</h1>	Aircraft Type: TL - 2000 Sting S4
		<h2>Section 3 - Structures</h2>

**10) Central console front covers.** Install left and right central console front covers with black phil. pan head machine screw M4 x 12 DIN 7985.

### 3.3.7 Rudder Removal

The rest of the rudder removal process goes in reverse to the wings installation process.

### 3.3.8. Verification Required (rudder)

Make sure the main bolts are not loose (do not rotate).

Check fuselage for foreign objects.

Check elevator, trim tab and rudder for free travel.

Secure all bolted connections by the F-900 Torque seal.

## 3.4 Landing gear

### 3.4.1 Nose gear leg installation

To the nose gear leg installation is one person required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Socket wrench 10, 13, 24 (1pcs, 1pcs, 1pcs) Combination wrench 13 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the wing

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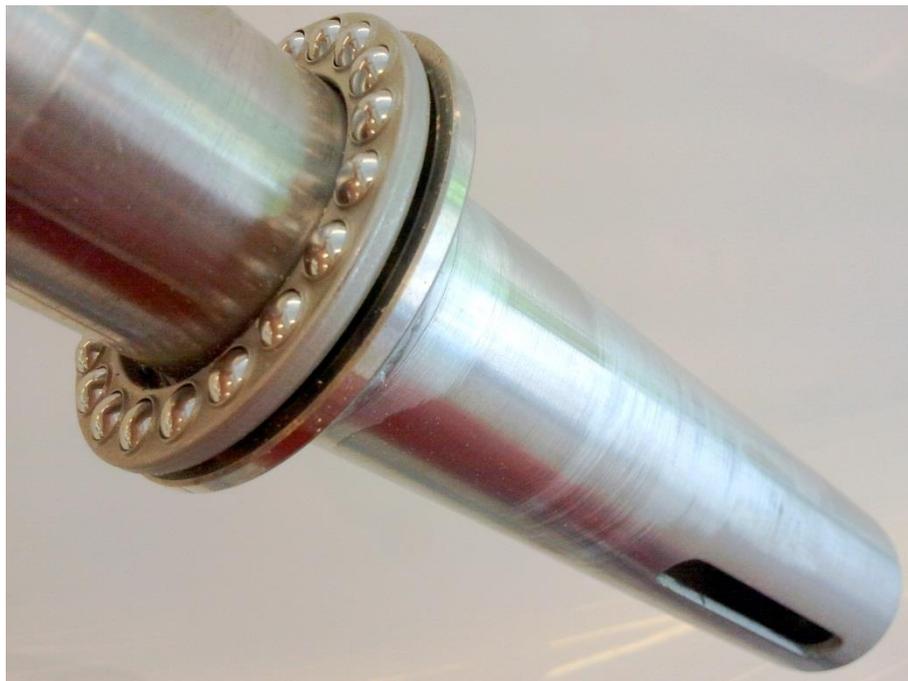


**Materials Required**

Modified self – locking nut M16 (1 pcs)  
Self-locking nuts VM8 (1 pcs)  
F-900 Torque seal

**Nose gear leg Installation Checklist**

**1) Inserting into the bottom hinge.** Nose gear leg slide from the bottom side into the bottom nose leg hinge. Don't forgot under the bottom hinge insert ball bearing. Grease ball bearing and sliding parts.

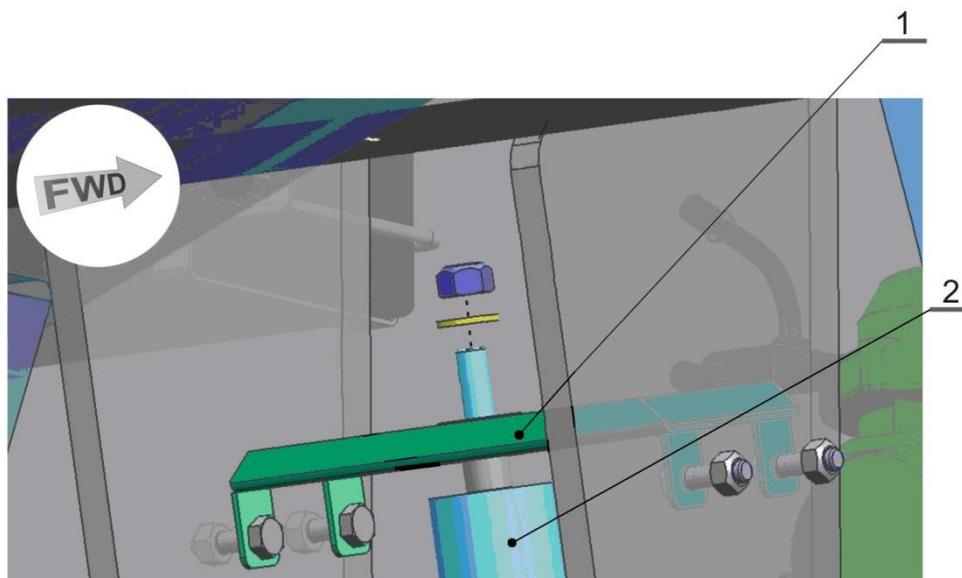


Above the bottom hinge first insert roller bearings, after that balance beam spacer and balance beam.



**2) Inserting into the upper hinge.** The upper part of the nose gear leg insert into the upper nose leg hinge. Under the upper hinge insert the spacer ring. Above upper nose leg hinge screw self-locking nut VM8 DIN 980 with the washer M8 02 1721.

Pos.	Part	Part number / Norm
1	Nose gear leg upper hinge	s424_000_00-1
2	Nose gear leg	s421_000_00-1



**3) Balance beam screw.** Screw the balance beam through the hole in the balance beam by screw M6 x 55 DIN 912 and use self-locking nut VM6 DIN 980 with washer M8 ČSN 02 1721.



**NOTE**

**Location of the balance beam and preparing the hole for screw in the nose gear leg must be prepared by the hole in the engine firewall before montage start.**

**4) Mounting rods.** Install the tensioner rope control to the balance beam. Screw the tensioner sheets on the both ends of the balance beam, using s screw M6 x 20, crown nut M6 ČSN 02 1411 with washer M6 ŠC 02 1721 with cotter pin.





### 3.4.2 Nose gear leg removal

To the nose gear leg removal process goes in reverse to the nose gear leg installation process.

### 3.4.3 Nose gear assembly installation

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Wrench 5 (1pcs) Allen wrench 5 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the fuselage
<b>Materials Required</b>	Self-locking nuts VM12 (2 pcs) Plastic grease Mogul G3 F-900 Torque seal

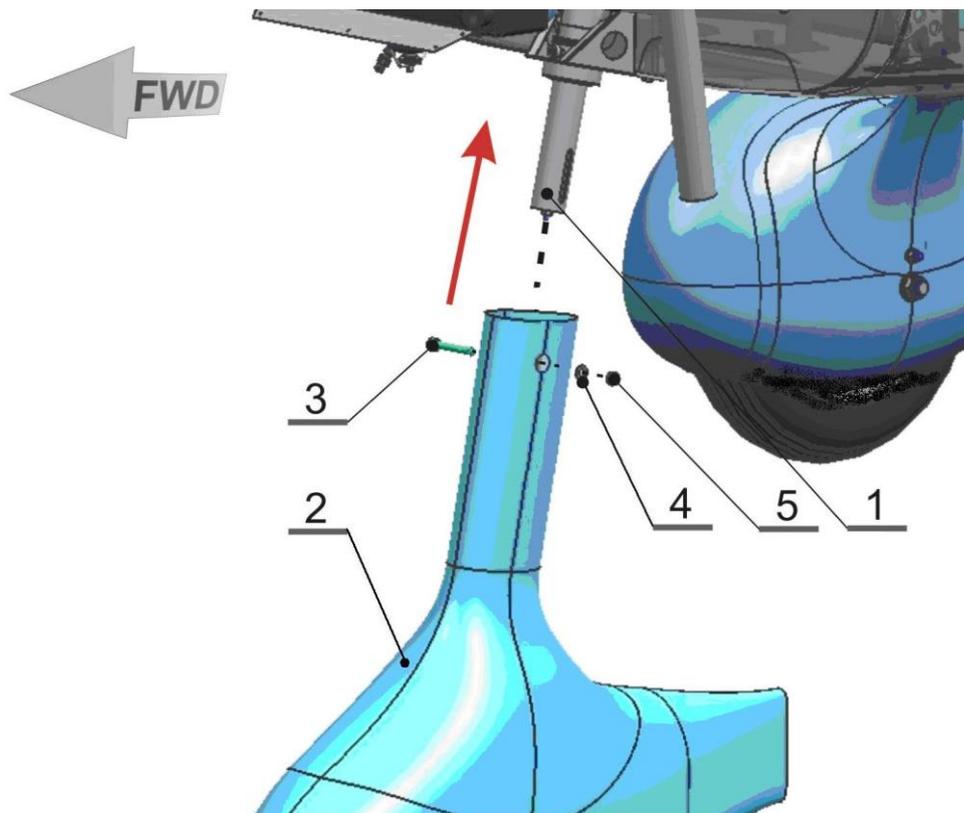
**Nose gear assembly Installation Checklist**

**1) Grease.** Grease by plastic grease Mogul G3 the bottom part of the nose gear leg under the bottom attachment. (Part of the nose gear leg with slotted)

**2) Spring and cylinder spacer.** Into the tube for attaching the fork which is assembled in the assembly, insert the cylinder spacer and steel spring.

**3) Fork assembly installation.** Fork assembly with nose wheel and with tube for attaching the fork with nose wheel part slide on the nose gear leg attached in the the upper hinge and in the bottom hinge on the fuselage. Assembly slide on the leg from the bottom side.

Pos.	Part	Part number / Norm
1	Nose gear leg	s421_000_00-1
2	Nose wheel pant	sn426_000_00-1
3	Screw M8 x 55	DIN 912
4	Washer M8	ČSN 02 1721
5	Self-locking nut VM8	DIN 980





Fork assembly screw by bold M8 x 55 with self-locking nut with washer. Screw through the milled slot in the fixed part of the nose landing gear leg.

**NOTE**

**For passage screw through the leg must compress the spring. It is necessary to push down on the fuselage.**

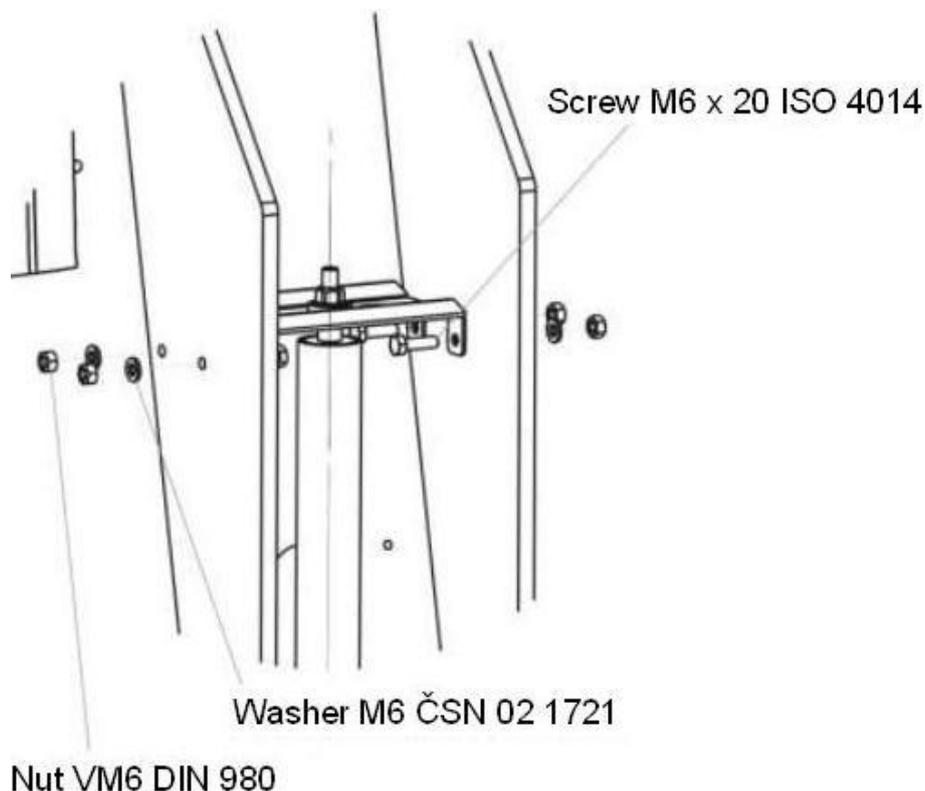
**4) Check.** Push the fuselage to check the functionality of the spring. Check free rotation of nose landing gear leg

### 3.4.4 Nose gear assembly removal

To the nose gear assembly remove process goes in reverse to the nose gear assembly installation process.

### 3.4.5 The upper attachment installation

To installation the upper attachment requires one person

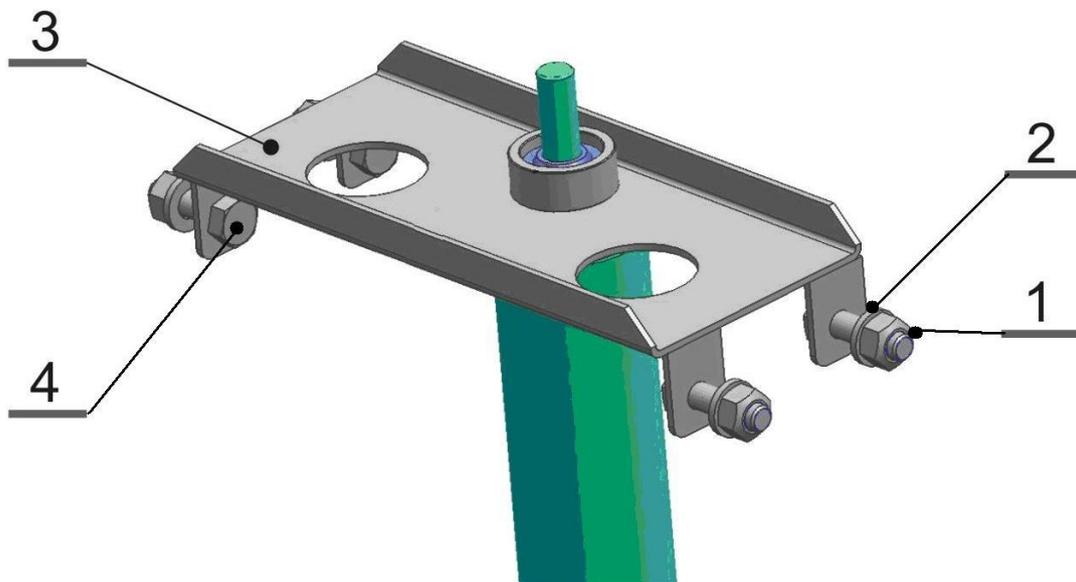




<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Socket wrench 10 (1pcs) Combination wrench 10 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the fuselage
<b>Materials Required</b>	Self-locking nuts VM6 (6 pcs) Plastic grease Mogul G3 F-900 Torque seal

**The upper attachment Installation Checklist**

**1) Upper attachments.** Screw the upper attachment. Use four bolt M6 x 20 ISO 4014 a self-locking nuts VM6 DIN 980 with washers M6 x ČSN 02 1721.





Pos.	Part	Part number / Norm
1	Self-locking nutsVM6	DIN 980
2	Washer M6	ČSN 02 1721
3	Nose gear upper attachments	s424_000_00-1
4	Screw M6 x 20	ISO 4014



### 3.4.6 The upper attachment removal

To the upper attachment remove process goes in reverse to the upper attachment installation process.

### 3.4.7 Nose gear bottom attachment installation

To installation the nose gear bottom attachment are requires two persons.

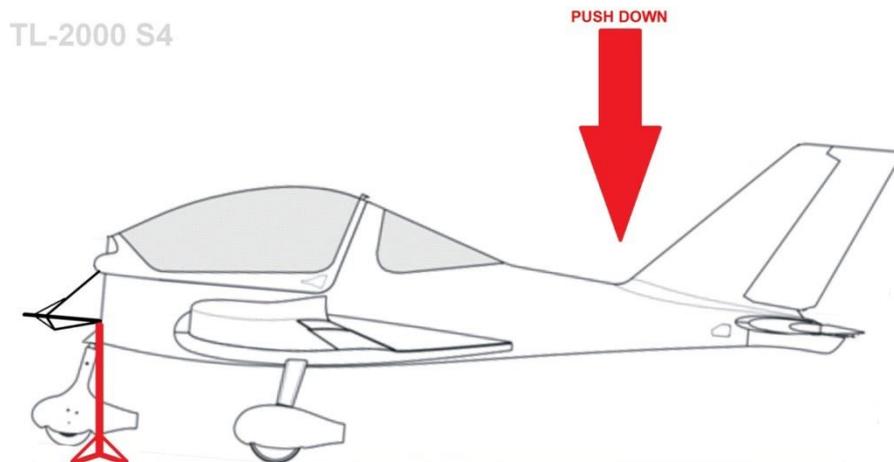
<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.



<b>Tools Required</b>	Socket wrench 10 (1pcs) Combination wrench 10 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the fuselage
<b>Materials Required</b>	Self-locking nuts VM6 (6 pcs) Plastic grease Mogul G3 F-900 Torque seal

**Bottom attachment Installation Checklist**

**1) Preparation.** Before starting, set the parking brake. Remove cowlings, make sure the tail area is clear. Lift the forward fuselage by pushing down the tail at the over horizontal tail main hinge so that is possible insert the support under engine mount firewall attachment. Insert the support securely under engine mount firewall attachments.



**CAUTION**

Do not pushing on the horizontal tail surface.

**CAUTION**

Be careful not to touch the rear fuselage of the ground



**2) Central console front covers removing.** Remove left and right central console front covers fixed by black phil. pan head machine screw M4 x 12 DIN 7985.



**NOTE**

**Place where the mounting hole to Access the screws holding bottom attachment is marked in red.**

**3) Bottom attachment installation.** Fix the Bottom attachment on the fuselage with six screws M6 x 22 ISO 4014. Use only new self-locking nuts VM6. Proceed this installation from pilot area (nuts and washers) which was developed by dismantling the Central console.

**NOTE**

**Nuts and washers are located under the floor in the front part of the pilot cabin (accessible through mounting hole as shown on the picture below).**

Pos.	Part	Part number / Norm
1	Bottom attachment	s423_000_00-1
2	Screw M6 x 22	ISO 4014
3	Washer M6	ČSN 02 1721
4	Self – locking nut VM 6	DIN 980



**4) Central console front covers.** Install back left and right central console front covers with black phil. pan head machine screw M4 x 12 DIN 7985.

### 3.4.8 Nose gear bottom attachment removal

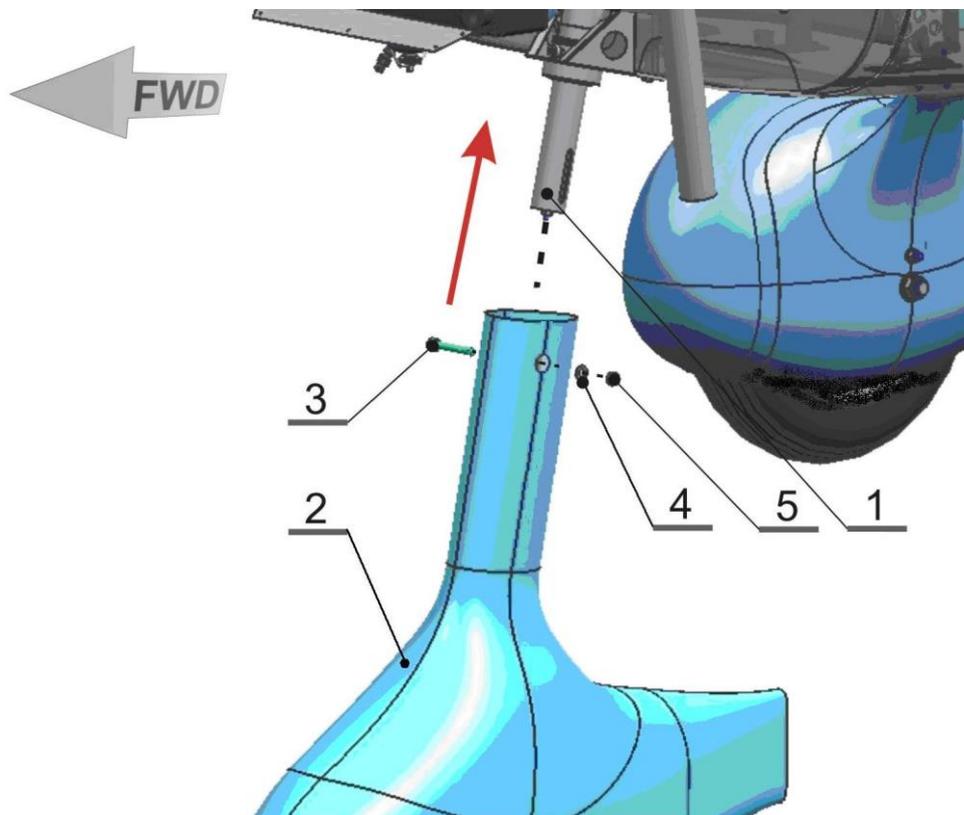
The nose gear bottom attachment removal process goes in reverse to the bottom attachment installation process.

	<h1>Maintenance Manual</h1>	Aircraft Type: TL - 2000 Sting S4
		<h2>Section 3 - Structures</h2>

### 3.4.9 Fork assembly installation

To installation the upper attachment requires one person

<b>Type of Maintenance</b>	Line																		
<b>Level of Certification Required</b>	L/O, RI, RM, A& P																		
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.																		
<b>Tools Required</b>	Wrench 5 (1pcs) Allen wrench 5 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the fuselage																		
<b>Materials Required</b>	Self-locking nuts VM8 Plastic grease Mogul G3 F-900 Torque seal																		
<b>Fork assembly Installation Checklist</b>																			
<p><b>1) Grease.</b> Grease by plastic grease Mogul G3 the bottom part of the nose gear leg under the bottom attachment. (Part of the nose gear leg with slotted)</p>																			
<p><b>2) Spring and cylinder spacer.</b> Into the tube for attaching the fork which is assembled in the assembly, insert the cylinder spacer and steel spring.</p>																			
<p><b>3) Fork assembly installation.</b> Fork assembly with nose wheel and with tube for attaching the fork with nose wheel pant slide on the nose gear leg attached in the upper hinge and in the bottom hinge on the fuselage. Assembly slide on the leg from the bottom side.</p>																			
<table border="1"> <thead> <tr> <th>Pos.</th> <th>Part</th> <th>Part number / Norm</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Nose gear leg</td> <td>s421_000_00-1</td> </tr> <tr> <td>2</td> <td>Nose wheel pant</td> <td>sn426_000_00-1</td> </tr> <tr> <td>3</td> <td>Screw M8 x 55</td> <td>DIN 912</td> </tr> <tr> <td>4</td> <td>Washer M8</td> <td>ČSN 02 1721</td> </tr> <tr> <td>5</td> <td>Self-locking nut VM8</td> <td>DIN 980</td> </tr> </tbody> </table>		Pos.	Part	Part number / Norm	1	Nose gear leg	s421_000_00-1	2	Nose wheel pant	sn426_000_00-1	3	Screw M8 x 55	DIN 912	4	Washer M8	ČSN 02 1721	5	Self-locking nut VM8	DIN 980
Pos.	Part	Part number / Norm																	
1	Nose gear leg	s421_000_00-1																	
2	Nose wheel pant	sn426_000_00-1																	
3	Screw M8 x 55	DIN 912																	
4	Washer M8	ČSN 02 1721																	
5	Self-locking nut VM8	DIN 980																	



Fork assembly screw by bold M8 x 55 with self-locking nut with washer. Screw through the milled slot in the fixed part of the nose landing gear leg.

**NOTE**

**For passage screw through the leg must compress the spring. It is necessary to push down on the fuselage.**

**4) Check.** Push the fuselage to check the functionality of the spring. Check free rotation of nose landing gear leg.

**3.4.10 Fork assembly removal**

The nose gear bottom attachment removal process goes in reverse to the bottom attachment installation process.



### 3.4.11 Main wheel assembly Installation

To installation the main wheel assembly requires two person.



<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Socket wrench 10, 13, 24 (1pcs, 1pcs, 1pcs) Combination wrench 13 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the wing
<b>Materials Required</b>	Modified self – locking nut M16 (1 pcs) Self-locking nuts VM8 (1 pcs) F-900 Torque seal



**Main wheel assembly Installation Checklist**

**1) Preparation.** Before starting, set the parking brake. Remove cowlings, make sure the tail area is clear. Lift the forward fuselage by pushing down the tail at the over horizontal tail main hinge so that is possible insert the support under engine mount firewall attachment. Insert the support securely under engine mount firewall attachment. Then, lift up the fuselage and slide under the fuselage prepared support - the cradle.

**CAUTION**

**When lift the fuselage, pay attention on the elevator.**

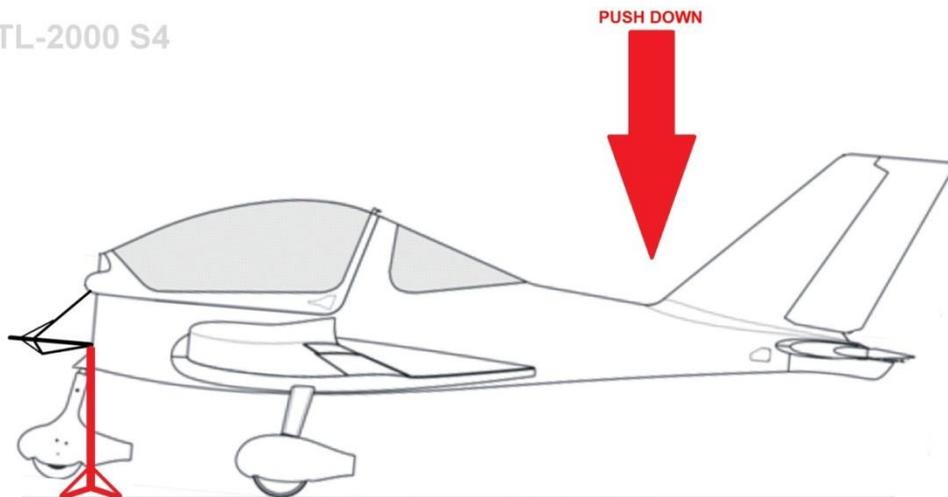
**CAUTION**

**During the lift the fuselage, do not touch the elevator.**

**CAUTION**

**Do not lift fuselage via the elevator.**

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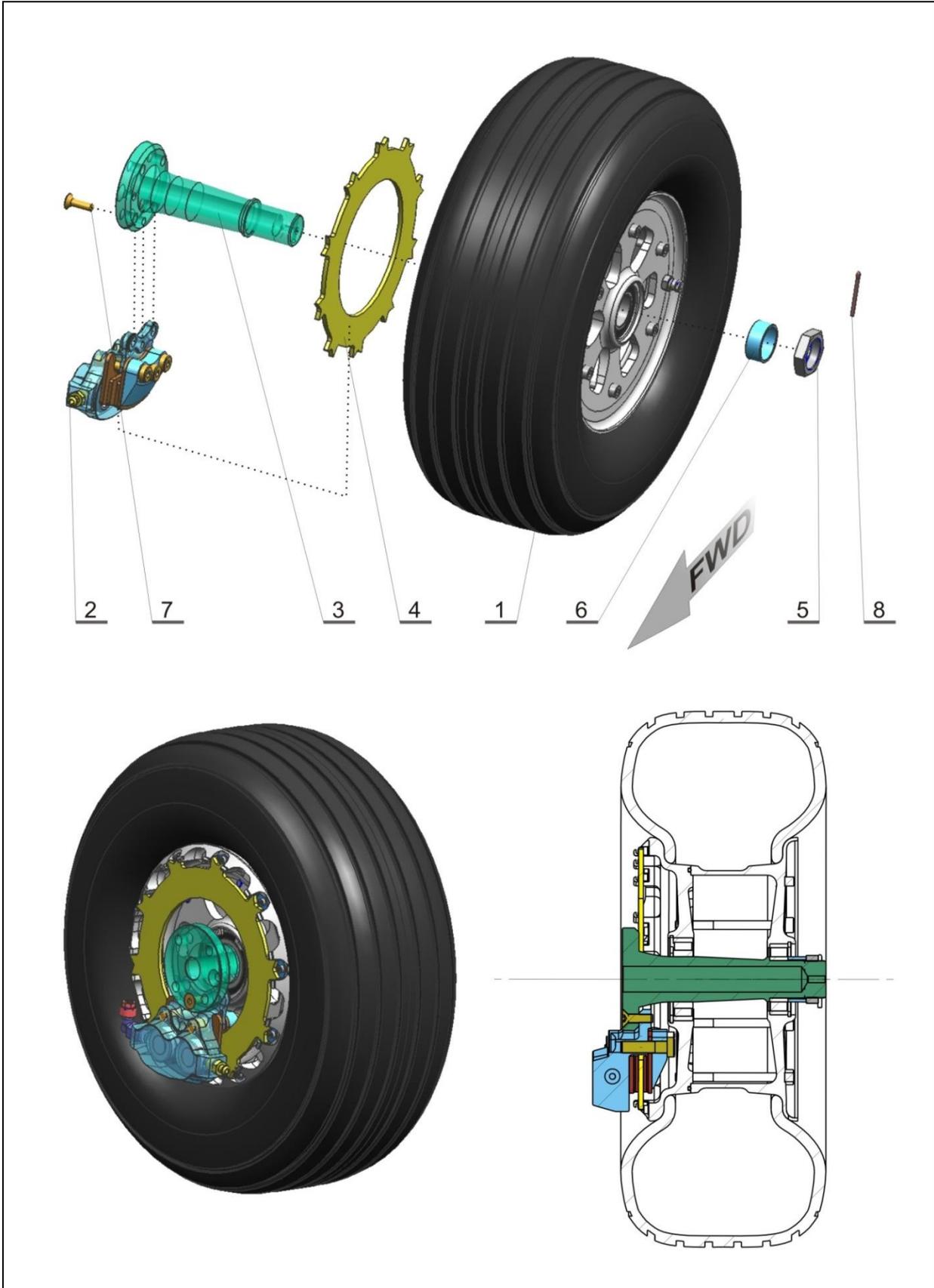






**2) Main wheel assembly.** Assemble the Main wheel assembly according instructions below.

Pos.	Part	Part number / Norm
1	Main wheel	sn411_210_00-1
2	Brake caliper assembly	sn411_220_00-1
3	Main wheel axis	sn411_240_00-1
4	Brake disc	sn411_250_00-1
5	Main wheel nut	sn411_270_00-1
6	Main wheel nut spacer	sn411_280_00-1
7	Screw M6 x 20	
8	Pin 2,5 x 50	ČSN 02 1781

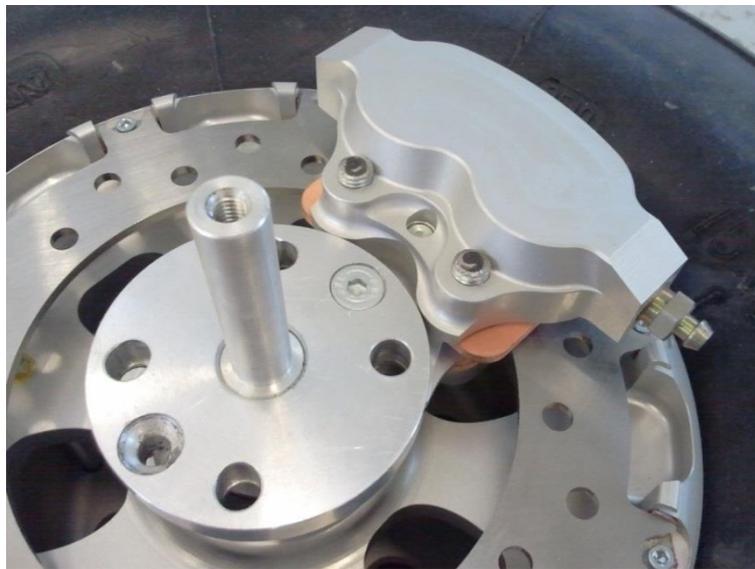




**3) Disc – caliper- axis assembly.** Assemble disc – caliper – axis assembly as shown, it means put the brake disc to the caliper assembly and crew by M6 x 20 to main wheel axis. Bolted connections secured by F900 Torque seal.

**4) Disc – caliper – axis assembly mount to the main wheel.** Insert completely assembly into the wheel, it means wheel and main wheel spacer slide on the main wheel axis and attachment wheel nut by the cotter pin 2.5 x 50.

**5) Brake disc.** Brake disc insert into the slots on the main wheel and secure disc by wire diameter of 1 mm in groove.





**6) Check and ensure connections.** Screw M6 x 20 and main wheel nut secure with cotter pin 2,5 x 50 secure by F900 Torque seal. Check brake disc wire attachment. Check brake disc free moving along the main wheel axis between the uncompressible brake pads.

**7) Rubber edging installation.** On the hole for undercarriage leg on the inner part of main wheel pant install rubber edging.



**8) Main wheel axis assembly.**

Pos.	Part	Part number / Norm
1	Left main undercarriage leg	sn411_100_00-1
2	Wheel assembly, brake disc caliper assembly, main wheel axis assembly	-
3	Wedge axis washer	sn411_230_00-1
4	Main wheel axis catering pin	sn411_260_00-1
5	Inner part of wheel pant	sn411_520_00-1
6	Screw M6 x 16 HEX	ISO 4014
7	Screw M8 x 62 Allen wrench	DIN 912
8	Screw M8 x 67 Allen wrench	DIN 912
9	Washer M6	ČSN 02 1721
10	Washer M8 – large	-
11	Nut M8 self-locking	DIN 980



**9) Inner main wheel pant installation.** Slide the inner part of the main wheel pant to the main undercarriage leg. Put brake hose into the slot on wheel pant.

**NOTE**

**Inner part of main wheel pant must be strung to the main undercarriage leg before main wheel axis assembly.**

**10) Install the main wheel axis centering pin.** Thread wedge axis washer to main wheel axis catering pin. Insert catering pin into the case in the main undercarriage leg.

**11) Main wheel, caliper and axis assembly.** Main wheel, caliper and axis assembly screw on undercarriage leg, it means driven throughout the leg two screws M8x62 (upper) and two screws M8x67 (lower, passes throughout the caliper), throughout main wheel, throughout hose in axis assembly and screw it by self-locking nuts M8 with washer M8. Secure by the F900 Torque seal.

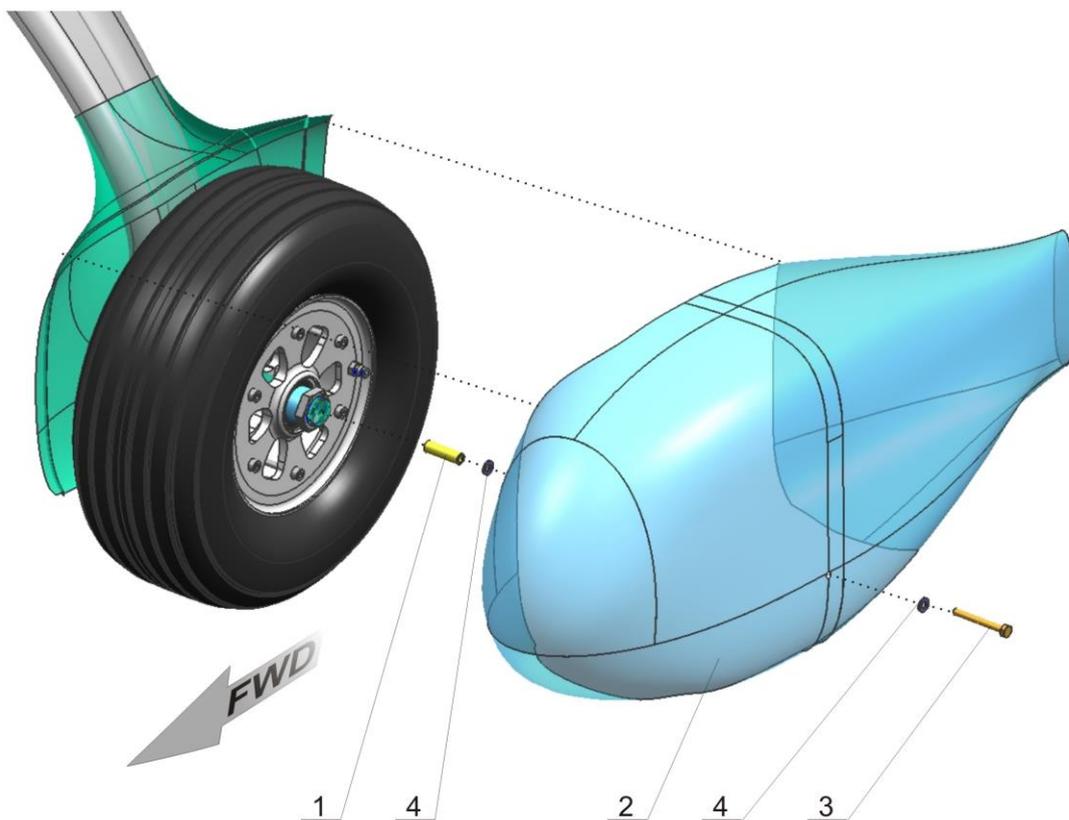
**12) Inner part of the main wheel pant installation.** The inner part of the main wheel pant slide down on the undercarriage leg into correct place and screw by the M6 x 16 with M6 washer.



**13) Check freedom of rotation.** Check the main wheel free rotation. The wheel must rotate freely without any resistance.

**14) Main wheel pant assembly.** Assembly inner and outer part of the main wheel pant (as shown), it means spacing tube and washer screw by M6 x 50. Screw inner and outer part of main wheel pant by the 12 screws M4 x 12. Bolted joints secure by the F900 Torque seal.

Pos.	Part	Part number / Norm
1	Main wheel pant spacing tube	s411_300_00-1
2	Outer part of main wheel pant	s411_510_00-1
3	Screw M6 x 50 HEX	ISO 4014
4	Washer M6	ČS 02 1721





**15) Check freedom of rotation.** Check the main wheel free rotation. The wheel must rotate freely without any resistance. Between the main wheel and main wheel pant must be a hole 12 – 20 mm. Check strength of attachment main wheel pant.

### 3.4.12 Main wheel assembly removal

The Main wheel assembly removal process goes in reverse to the Main wheel assembly installation process.

After disconnection the line of the Brake system prevent draining of brake liquid out of the hose by plugging it up.

	<b>Maintenance Manual</b>	Aircraft Type: TL - 2000 Sting S4
		Section 3 - Structures

### 3.4.13 Main undercarriage leg removal

To remove the main wheel assembly requires two person.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Socket wrench 10, 13, 24 (1pcs, 1pcs, 1pcs) Combination wrench 13 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the wing
<b>Materials Required</b>	Modified self – locking nut M16 (1 pcs) Self-locking nuts VM8 (1 pcs) F-900 Torque seal

#### Main undercarriage leg remove checklist

**1) Preparation.** Before starting, set the parking brake. Remove cowlings, make sure the tail area is clear. Lift the forward fuselage by pushing down the tail at the over horizontal tail main hinge so that is possible insert the support under engine mount firewall attachment. Insert the support securely under engine mount firewall attachment. Then, lift up the fuselage and slide under the fuselage prepared support - the cradle.

**CAUTION**

When lift the fuselage, pay attention on the elevator.

**CAUTION**

During the lift the fuselage, do not touch the elevator.

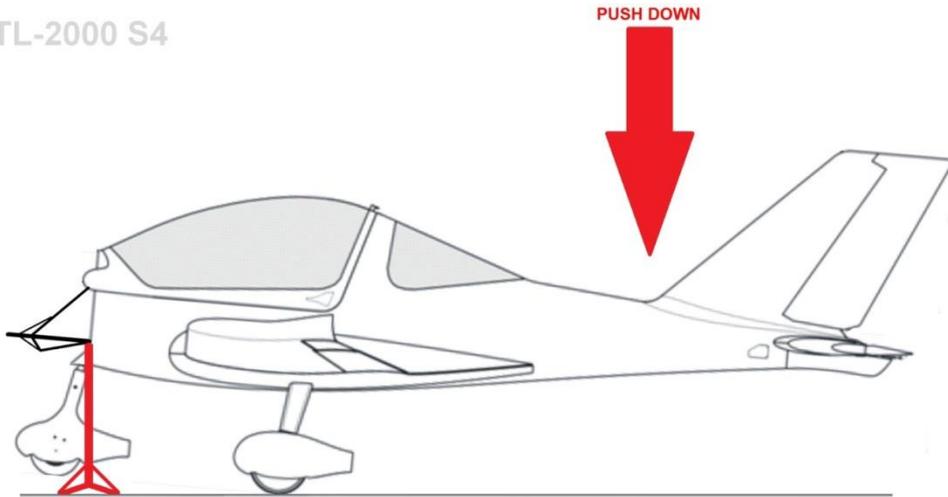
**CAUTION**

Do not lift fuselage via the elevator.

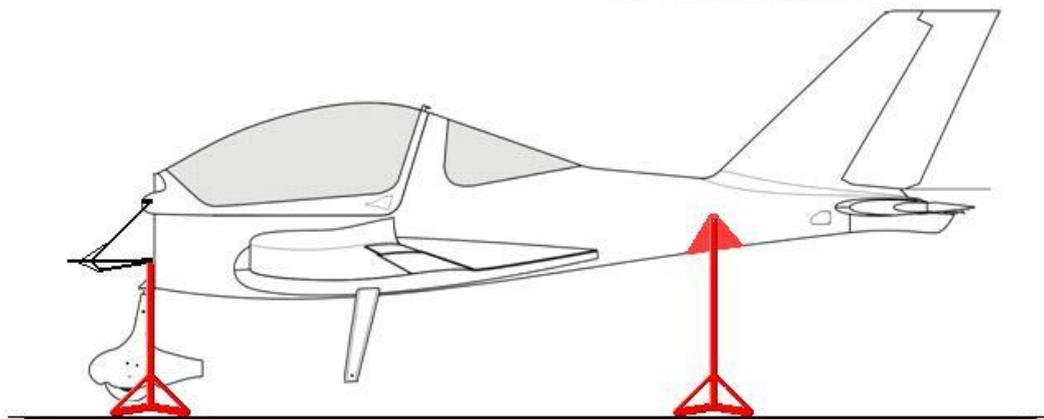
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TL-2000 S4



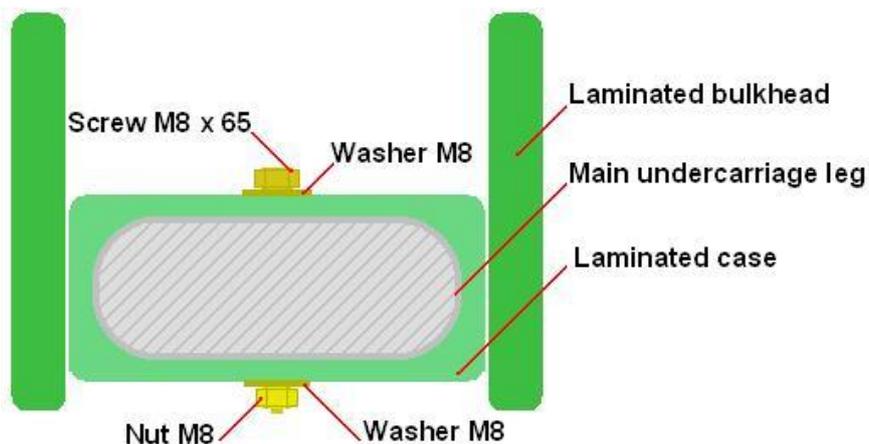
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**2) Seat removal.** Remove the Back seat and the Bottom seat over installed main undercarriage leg. See chapter 3.9.3.

**3) Main undercarriage leg removal.** Main undercarriage leg is attached in the laminated case. Through the case and leg go two screws M8 x 65 with washers M8 and nuts M8.

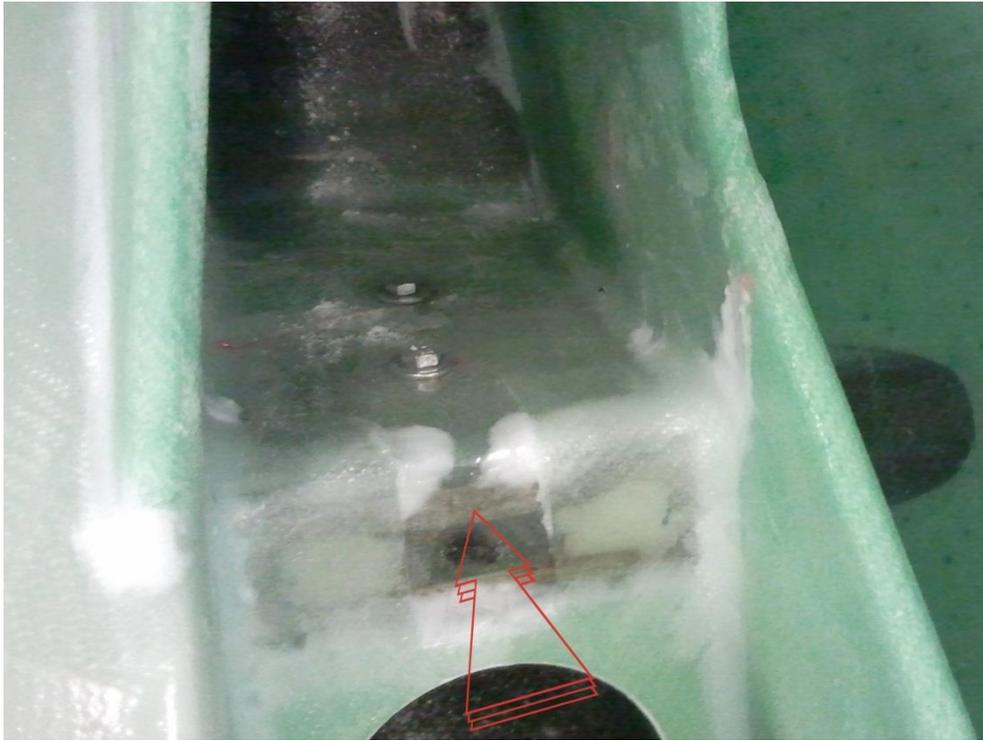


Unscrew two screws (on each main undercarriage leg). Use hammer and knock out the main undercarriage leg out from the case. Knock just only to the main undercarriage legs and not to the laminate.



**CAUTION**

**Knocking only on the place indicated by the arrow**





### 3.4.14 Main undercarriage leg installation

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Socket wrench 10, 13, 24 (1pcs, 1pcs, 1pcs) Combination wrench 13 (1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Support for the wing
<b>Materials Required</b>	Modified self – locking nut M16 (1 pcs) Self-locking nuts VM8 (1 pcs) F-900 Torque seal

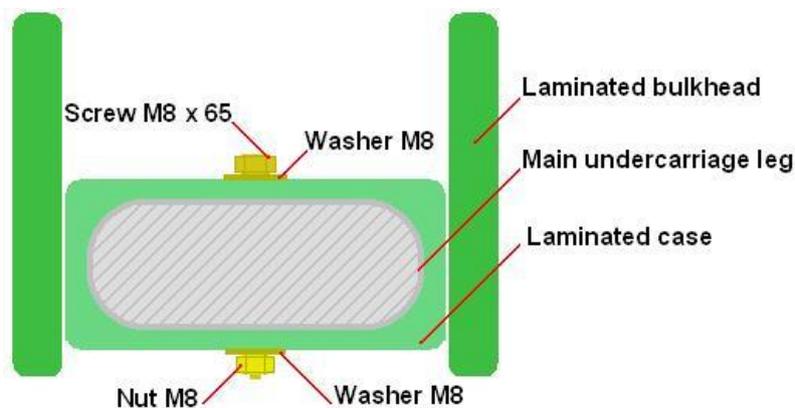
#### Main wheel leg Installation Checklist

**1) Leg installing.** Clean end of the main undercarriage leg from the surface color by the brush paper. Insert end of the main undercarriage leg exactly on the position in the laminate case.

### CAUTION

**The leg must be exactly at the point where was the original leg.**

**2) Leg fixation.** Fix the main undercarriage leg in the case by the screws M8 x 65 with washers M8 and nuts M8.





**3) Seat installation.** Install the Back seat and the Bottom seat back in the cockpit leg.

**4) Gap clog.** Clog the gap between the main undercarriage leg and bottom side of the fuselage using the silicone.

### 3.4.15 Verification Required (Landing gear)

Make sure the main bolts are not loose (do not rotate).

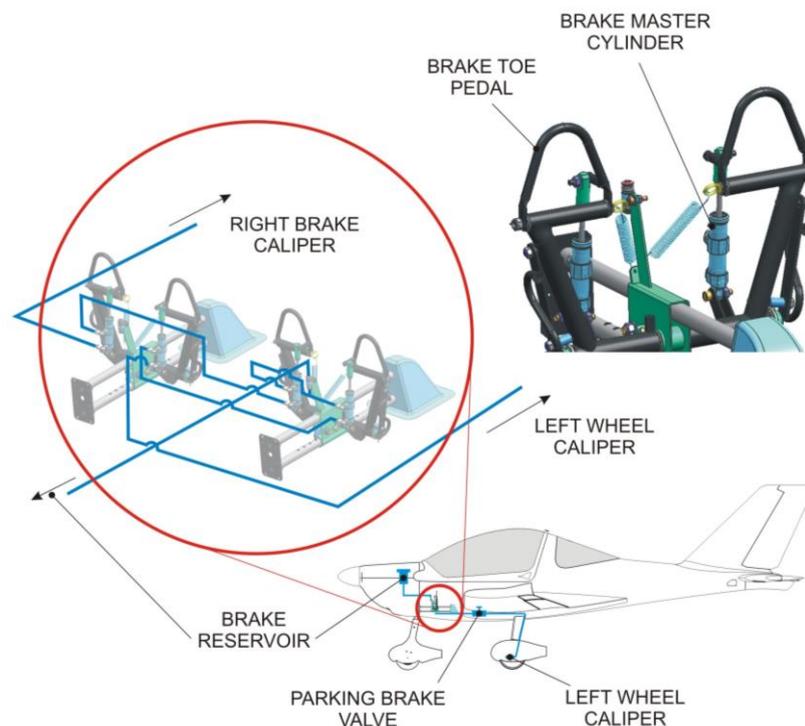
Check fuselage and wheel pants for foreign objects.

Check wheels for free travel.

Secure all bolted connections by the F-900 Torque seal.

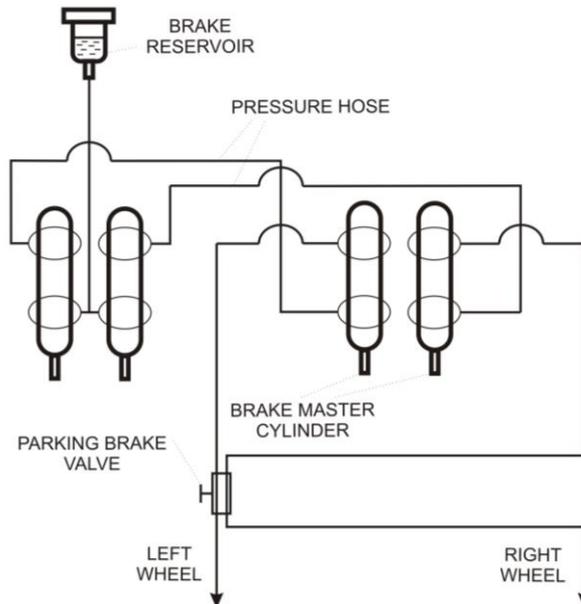
### 3.4.16 Brake system description

The aircraft has two single-rotor, hydraulically-actuated brakes located on the main landing gear, one on each wheel. Each brake is connected to a brake piston cylinder attached to the toe pedals of the rudder pedals.





When the operator presses the left brake pedal, hydraulic pressure is sent down hydraulic line to the left wheel brake pads, which in turn press on both sides of the rotor. The same process also applies the right brake pedal pressure to the right brake rotor.



### 3.4.17 Filling brake system with fluid

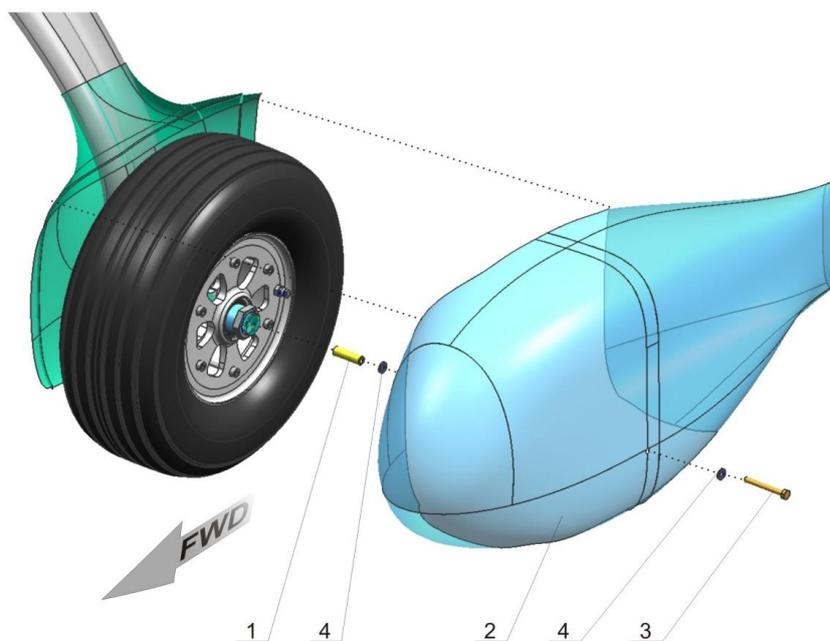
<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Allen wrench 5 (1pcs) Socket wrench 8, 10 (1 pcs, 1pcs) Screwdriver (1pcs) Torque wrench (1pcs) Auxiliary tank Support for the wing Bottle with the stand for brake fluid
<b>Materials Required</b>	Self-locking nuts VM6 (4 pcs) F-900 Torque seal DOT 4 (or DOT 5, it depends on type of cylinders) Brake fluid



**Filling Brake system with Fluid Checklist**

**1) Preparation.** Before starting, set the chocks under the wheels to prevent plane's rolling. Visually check the system for integrity and tightness. Make sure the aircraft is not set on parking brake, i.e. the parking brake valve is open and the handle of the valve is aligned to aircraft longitudinal axle.

**2) Outer part of wheel pant removing.** Remove the outer part of the main wheel pant from the inner part of the main wheel pant. Outer part of wheel pant is fixed with slotted mushroom head screws M4 x 12.



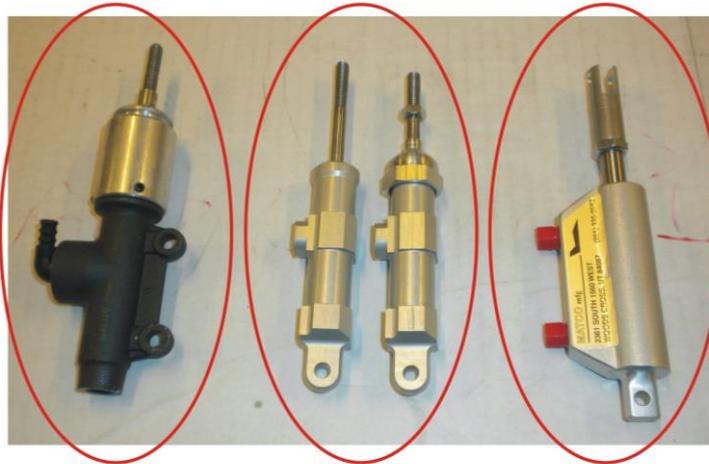
Pos.	Part	Part number / Norm
1	Main wheel pant spacer	s411_300_00-1
2	Outer part of the main wheel pant	s411_510_00-1
3	Screw M6 x 50 HEX	ISO 4014
4	Washer M6	ČSN 02 1721

**3) Brake line interruption.** Disconnect hoses joints under the wheel pant. Blind disconnected hoses.



**4) Brake fluid filling.** Fill brake fluid to the Brake fluid reservoir (bottle) on the Engine mount (on the left side). Brake fluid reservoir is the highest point of the system. Use only the correct type of brake fluid. If are mounted the master cylinders AJP or TL type on the pedal assembly, use DOT 4 brake fluid. When are used the brake master cylinders MATCO type, use DOT 5 brake fluid (see the following figures).

BRAKE MASTER CYLINDERS



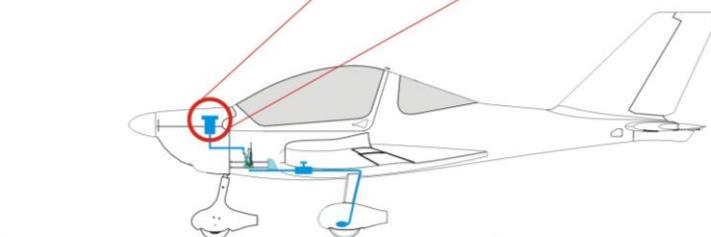
AJP type  
(Use DOT 4 brake fluid)

TL type  
(Use DOT 4 brake fluid)

MATCO type  
(Use DOT 5 brake fluid)

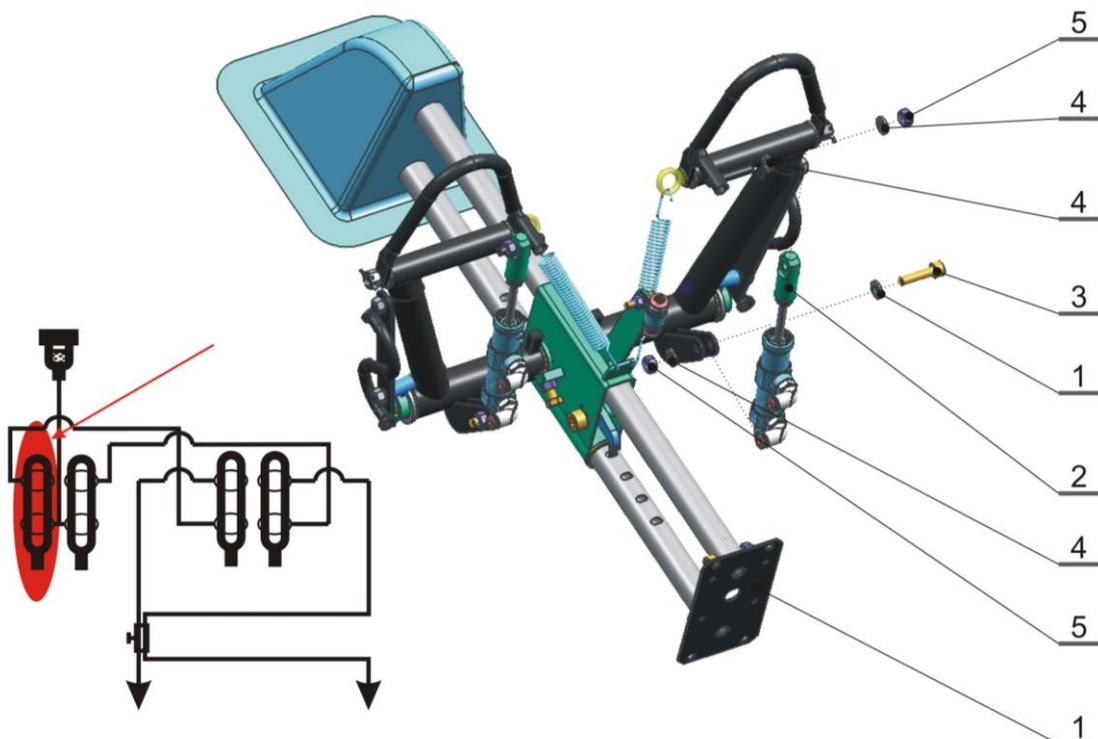
**CAUTION**

**Brake fluid is an aggressive substance, be careful avoid the contact with composite structure and cabin upholstery, otherwise it would damage them.**



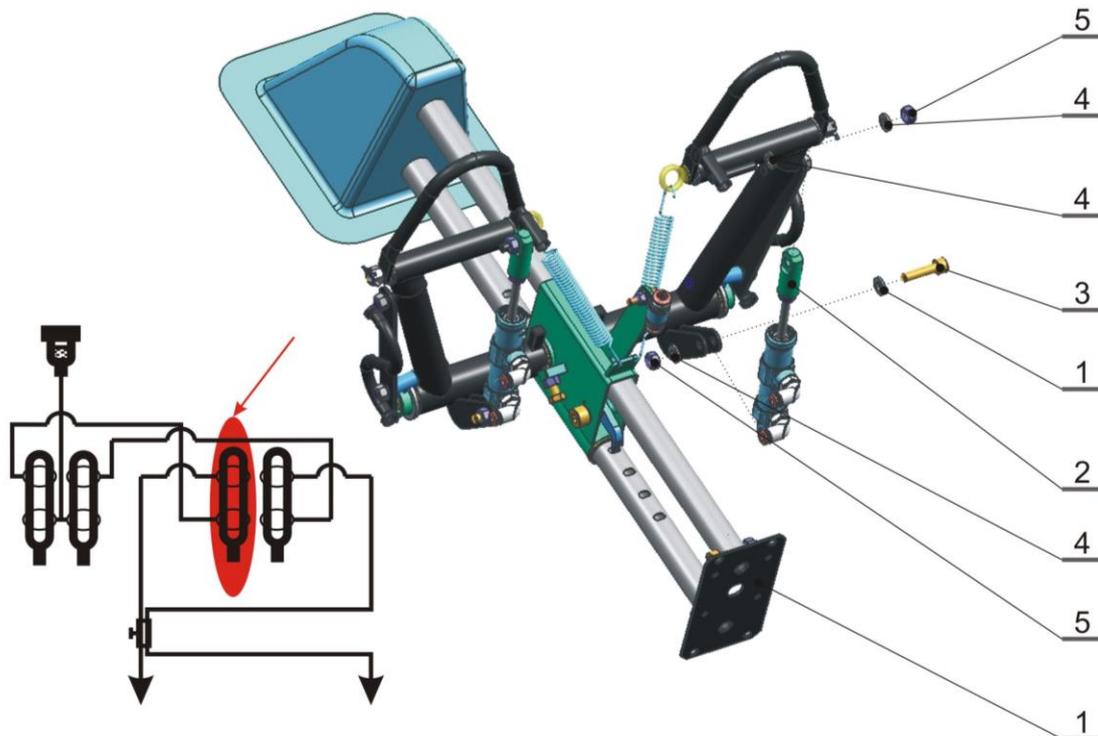
**5) Left pedal brake cylinder venting.** Remove the Brake cylinder from the left Foot pedal assembly (left pilot side for the left wheel line or right pilot side for the right wheel line). Remove blanking from disconnected hoses (blinded in step 3) and hoses end insert into the auxiliary tank so that the brake fluid can freely flow from Brake fluid reservoir through the brake cylinders on the pedals to the auxiliary tank situated under the disconnected hose. Let the brake fluid to flow through the removed brake cylinder and by tilting with the brake cylinder to different positions try to remove any air bubbles from the Brake cylinder. Several times press on the brake toe pedal and try to remove any air bubbles form the brake line. Then install the Brake cylinder back on the Foot pedal assembly. Use only new self-locking nut VM6.

Pos.	Part	Part number / Norm
1	Foot pedal assembly	S4-100_000_00-1
2	Brake cylinder	AJP / TL / MATCO
3	Screw M6 x 25	DIN 912
4	Washer M6	ČSN 02 1721
5	Self – locking nut VM 6	DIN 980



**6) Right pedal brake cylinder venting.** Remove the Brake from the right Foot pedal assembly (right pilot side for the left right line or left pilot side for the left wheel line). Remove blanking from disconnected hoses (blinded in step 3) and hoses end insert into the auxiliary tank so that the brake fluid can freely flow from Brake fluid reservoir through the brake cylinders on the pedals to the auxiliary tank situated under the disconnected hose. Let the brake fluid to flow through the removed brake cylinder and by tilting with the brake cylinder to different positions try to remove any air bubbles from the Brake cylinder. Several times press on the brake toe pedals and try to remove any air bubbles form the brake line. Then install the Brake cylinder back on the Foot pedal assembly. Use only new self-locking nut VM6.

Pos.	Part	Part number / Norm
1	Foot pedal assembly	S4-100_000_00-1
2	Brake cylinder	AJP / TL / MATCO
3	Screw M6 x 25	DIN 912
4	Washer M6	ČSN 02 1721
5	Self – locking nut VM 6	DIN 980

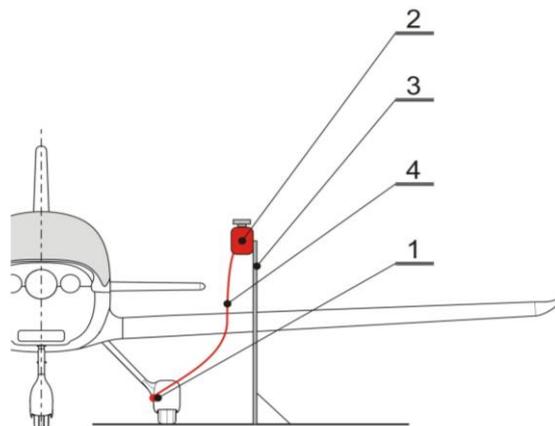




**7) Hose blinding.** Under the wheel pant location blind the disconnected brake system hose leading from the parking brake cylinder.

**8) Bottle with the stand for brake fluid connection.** Connect hose line from the bottle with the stand for brake fluid to under wheel pant disconnected Brake line leading to the main wheel Brake caliper (left pilot side for the left wheel line or right pilot side for the right wheel line). Bottle on the stand must be filled by brake fluid and this bottle must be the highest point of the system.

Pos.	Part	Part number / Norm
1	Brake system line (from disconnected hose to the wheel Brake caliper)	-
2	Brake fluid	DOT 4 or DOT 5
3	Bottle with the stand for brake fluid	-
4	Hose line for brake fluid	-

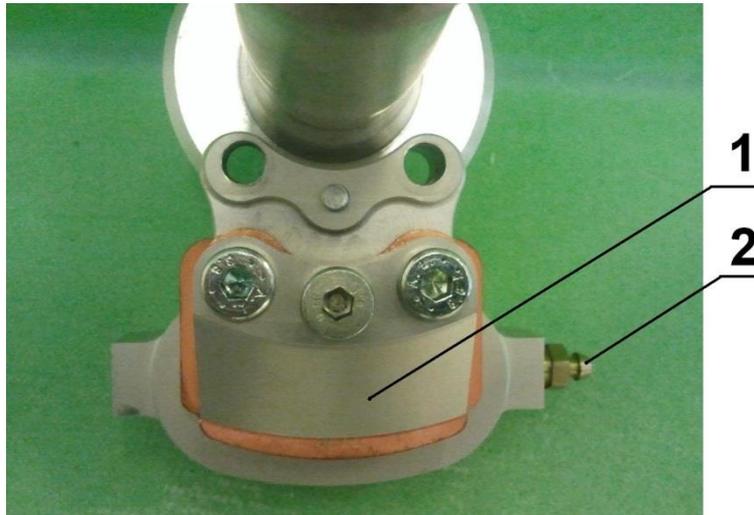


**9) Wheel brake system line venting.** Remove the Drain bolt M8 from the Brake caliper and let the brake fluid freely flow from Bottle on the stand to the auxiliary tank situated under the Brake caliper drain bolt M8. By tilting with the Brake caliper cylinder to different positions try to remove any air bubbles from the Brake caliper.

**NOTE**

**Brake caliper is fixed on the wheel assembly. To remove air bubbles is possible gently tilt the aircraft. If this method fails to remove all air bubbles from the Brake caliper is necessary to remove the wheel assembly and just tilt with it.**

Then install the Brake caliper drain bolt M8 back on the Brake caliper .



**10) Brake line connection.** Connect back hoses joints under the wheel pant.



**NOTE**

During this operation protect both hoses line against intrusion of air bubbles. If during the hoses connection penetrated air bubbles, remove them.



**11) Brake fluid filling.** Fill brake fluid to the Brake fluid reservoir (bottle) on the Engine mount (on the left side). Brake fluid reservoir is the highest point of the system. Remove the Drain bolt M8 from the Brake caliper and let again the brake fluid freely flow from Bottle on the stand trough the brake system line to the auxiliary tank situated under the Brake caliper drain bolt M8. Several times press on the brake toe pedals. Then install back the Brake caliper drain bolt M8 and remove bottle with the stand system.

**14) Brake system function verification.** Check the Brake system function. Check the Parking brake system function. Visually check the system for integrity and tightness.

**15) Wheel pants installation.** Install back the Outer part of wheel pant. Use F-900 Torque seal for wheel pant screw connections.

**NOTE**

**Repeat on the other side of the brake system  
(Second main wheel brake system).**

**3.4.18 Verification Required (Filling Brake System with Fluid)**

Make sure the main bolts are not loose (do not rotate).

Check fuselage and wheel pants for foreign objects.

Check wheels and pedals for free travel.

Secure all bolted connections by the F-900 Torque seal.

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### 3.4.19 Replacing/removal of the Brake pads

To replacing/removal of the Brake pads requires one person.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Socket wrench 10 (1 pcs) Allen wrench (1 pcs ) Screwdriver (1pcs) Torque wrench (1pcs) Needle – nose pliers (1pcs)
<b>Materials Required</b>	F-900 Torque seal Brake pads for replacing

#### Replacing of the Brake pads Checklist

**1) Preparation.** Remove cowlings, make sure the tail area is clear. Lift the forward fuselage by pushing down the tail at the over horizontal tail main hinge so that is possible insert the support under engine mount firewall attachment. Insert the support securely under engine mount firewall attachment. Then, lift up the fuselage and slide under the fuselage prepared support - the cradle.

**CAUTION**

**When lift the fuselage, pay attention on the elevator.**

**CAUTION**

**During the lift the fuselage, do not touch the elevator.**

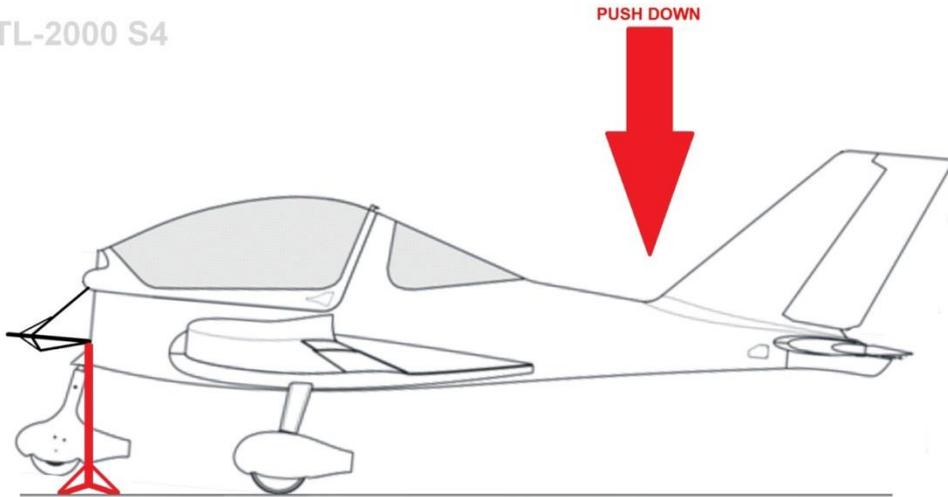
**CAUTION**

**Do not lift fuselage via the elevator.**

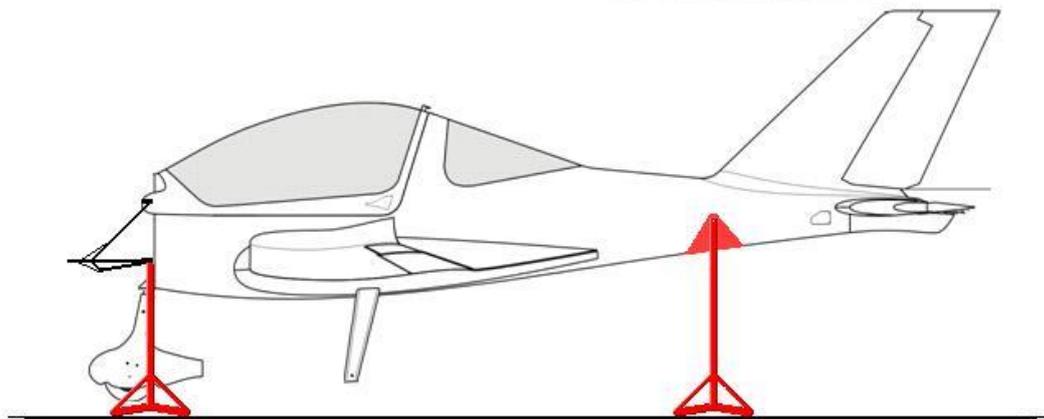
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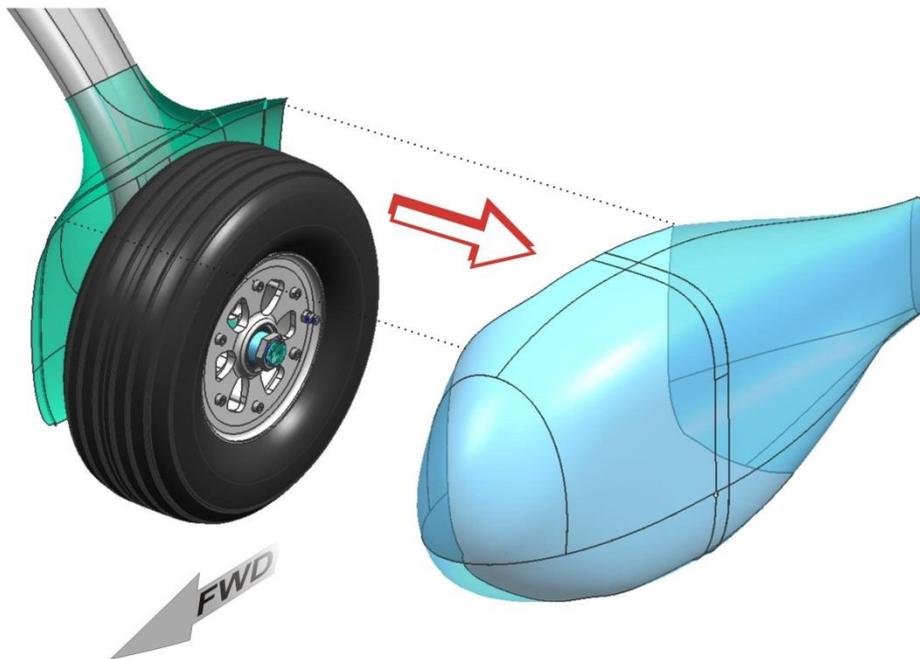


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**2) Remove outer part.** Unscrew connecting outer and inner part of the main wheel pant. Remove outer part of the main wheel pant.





**3) Remove inner part.** Unscrew the highlighted screw. Slide the inner part of the main wheel pant up to undercarriage leg.



**4) Brake disc remove.** Cut the wire holding the brake disc.



**5) Remove main wheel.** Remove cotter pin 2.5 x 50 and unscrew the nut main wheel. Remove main wheel of the main undercarriage leg.

**NOTE**

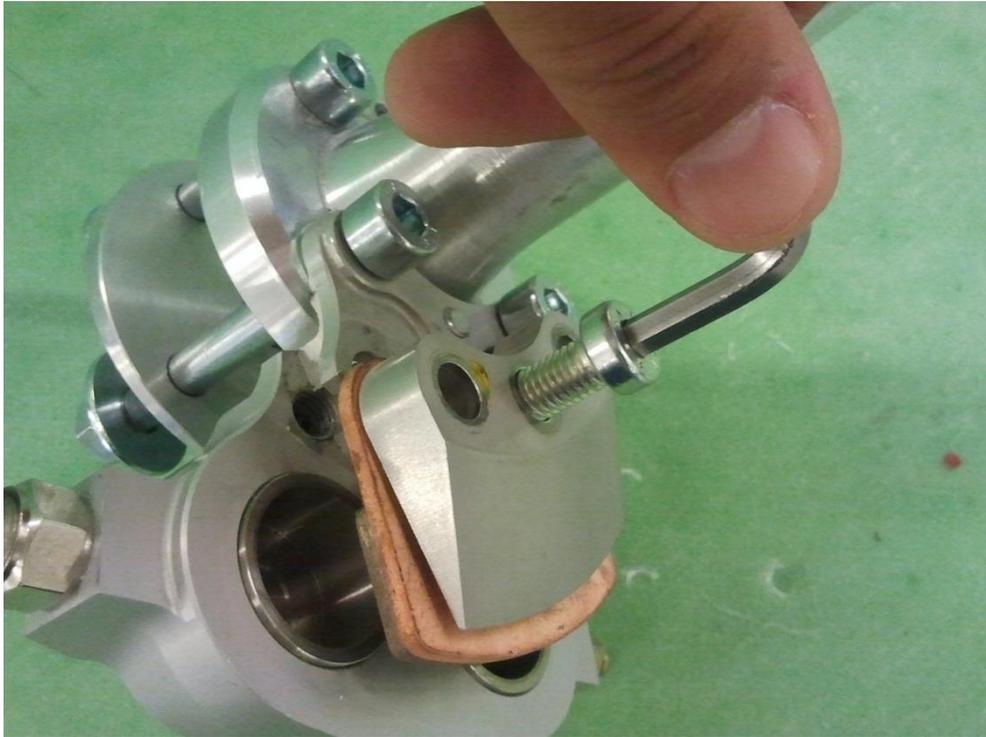
**Main wheel assembly axis to leave installed in the leg.**

**NOTE**

**For more information about wheel remove see "Main wheel assembly" chapter.**

**6) Release brake pads.** Unscrew three screws on the caliper as shown below and release the brake pads.





**7) Replacing brake pads.** Replace old brake pads with new ones.



**8) Screw.** Complete the caliper assembly. Use the reverse procedure. Screw three screws.



**9) Insert brake disc.** Insert brake disc between brake pads in caliper.





**10) Brake system function verification.** Check the Brake system function. Visually check the system for integrity and tightness.

**11) Wheel installation.** Slide main wheel to the main wheel axis.

**12) Attaching brake disc.** Attach the brake disc to the wheel by using wire.



**13) Install main wheel.** Screw wheel on the main wheel axis by the main wheel nut. Insert cotter pin 2.5 x 50.

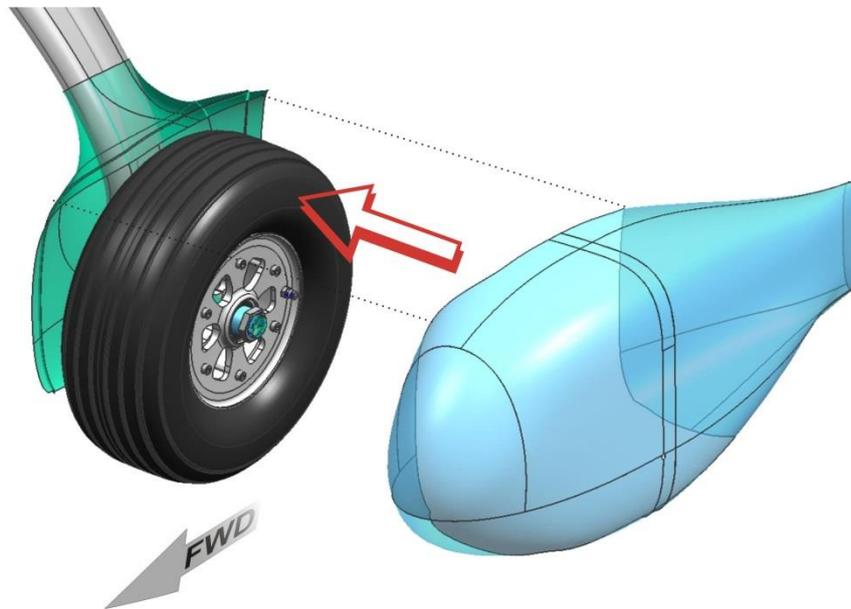
**NOTE**

**For more information about wheel remove see "Main wheel assembly" chapter.**

**14) Install inner part.** Download inner part of the main wheel pant back into place. Screw the highlighted screw.



**15) Install outer part.** Install outer part of the main wheel pant, i.e. screw screws connecting outer and inner part of the main wheel pant.





### 3.4.20 Verification Required (Replacing/removal of the Brake pads)

Make sure the main bolts are not loose (do not rotate).

Check wheel pants for foreign objects.

Check wheels for free travel.

Secure all bolted connections by the F-900 Torque seal.

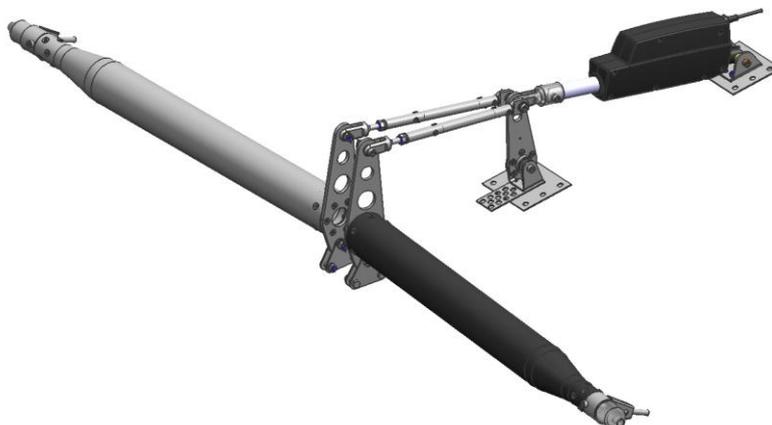


### 3.5 Structural control surfaces

TL - 2000 Sting S4 is equipped with electrically operated split flaps on the wing trailing edge. Extending flaps increases the camber of the wing airfoil, thus raising the maximum lift coefficient. TL - 2000 Sting S4 is equipped with ailerons on the wing trailing edge. The ailerons are used to control the aircraft roll.



Both flaps and ailerons are made of carbon top and bottom skins, glass fiber sandwich spars and ribs.





### 3.5.1 Flap installation

To flap installation requires one person

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Allen wrench 6 Socket wrench 10 (1 pcs) Torque wrench (1pcs)
<b>Materials Required</b>	F-900 Torque seal SOUDAL Fix All Classic (single component joint sealant)

#### Flap installation Checklist

**1) Lubricating.** Lubricate all metal details with plastic grease before connecting: 6 x flap hinge ( hole for bolt on the wing and on the flap ) and bearing in the flaps pull rod assembly.



**2) Flap installation.** Fix the flap on the wing with six bolts M6 x 45 DIN 912 with washer M6. Use only castle nuts M6 with cotter pin 1,6.



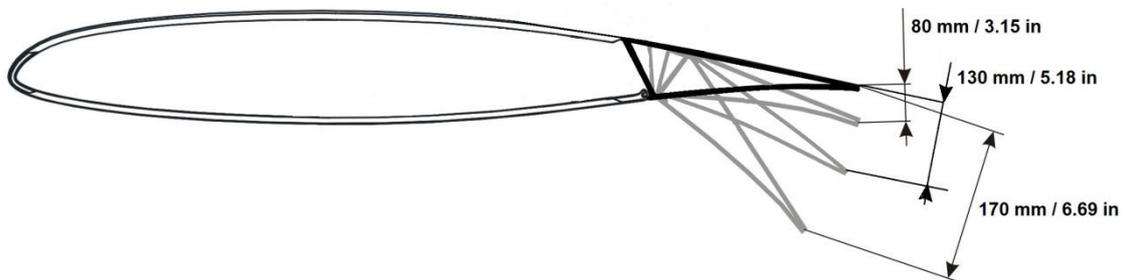
**3) Connection flap control.** Insert the flap drive into the backdrop drive flap, Stick must fit into the forks as shown below.





**4) Flaps deflection.** Ensure that flaps equally on each side of the airplane in all configurations. Measure the down deflection on each side. The difference in static deflection should not be greater than 1/8 " (3 mm). Inspect stop switches for operating. Inspect all flaps drive line for vibration and free travel.

S4 Flap Deflection



### 3.5.2. Flap Removal

The flap removal process goes in reverse to the Flap installation process.

Use segmented blade utility knife for Flap pull rod cover removing. Remove the Flap pull rod cover without damaging the wing.

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### 3.5.3. Verification Required (flap installation/removal)

Check flaps for free travel.

Secure all bolted connections by the F-900 Torque seal.

### 3.5.4 Setting Flap “ Zero ” Position

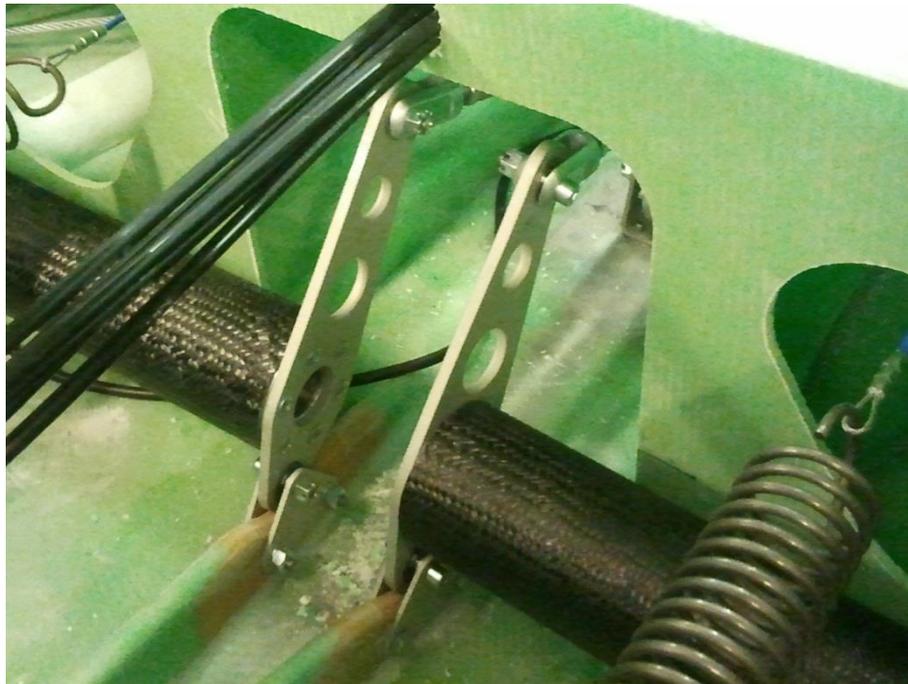
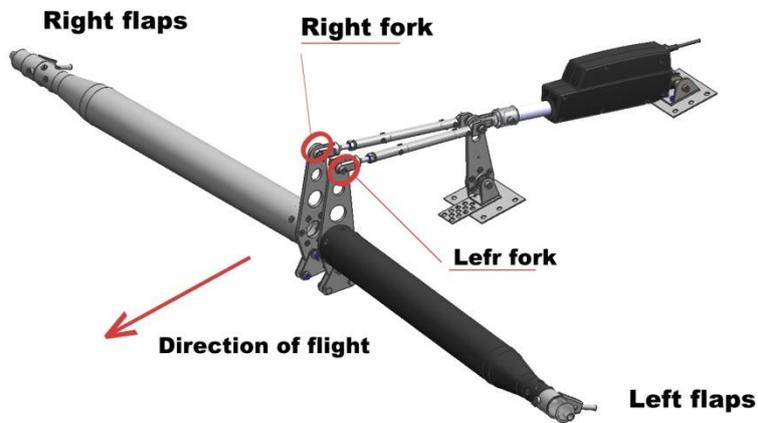
To Setting Flap ” Zero ” position requires one person.

“Zero“ position of the Flaps is the position when the flaps are aligned to the center – section on fuselage.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-ULTRALIGHT Airplane Operation Training.
<b>Tools Required</b>	Allen wrench 5 (1 pcs) Socket wrench 10 (1 pcs) Combination wrench 13 (1 pcs) Torque wrench (1pcs)
<b>Materials Required</b>	F-900 Torque seal SODAL Fix All Classic (single component joint sealant)
<b>Setting Flap “Zero” Position Checklist</b>	
<b>1) Close flaps and check position.</b> Fully close flaps using FLYBOX. Check position of booth flaps.	
<b>2) Check extended position.</b> Set flaps approx. on take-off position.  Check flaps deflection. On both flaps measure the value of deflection.	
<b>a)</b> both measured value of deflection are the same: the flaps are set correctly – continue to 4)	
<b>b)</b> both measured value of deflection are different: continue to 3)	

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**3) Flaps setting:** Using the one of the two highlighted forks set correct position of flaps.



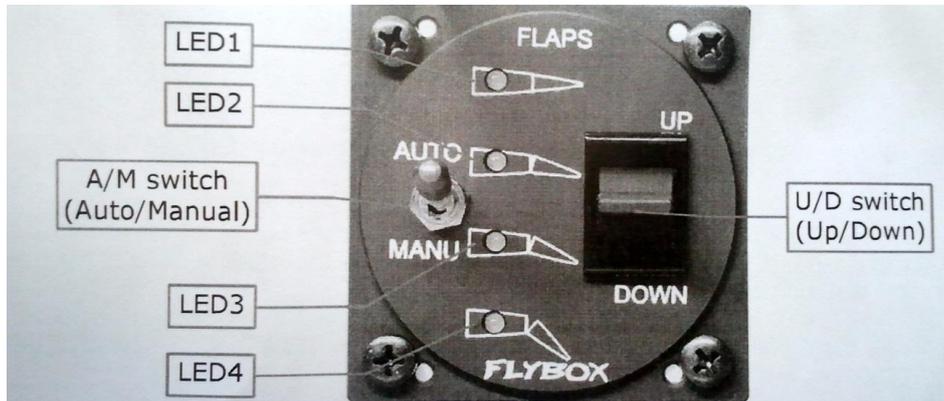
Flaps with higher measured value set on the same value, which has a flaps with lower measured value.

**CAUTION**

**Both flaps must have the same deflection.**

**4) Close flaps and check position.** Fully close flaps using FLYBOX. Check position of booth flaps.

**5) Fly Box flaps settings.**



**CAUTION**

**Both flaps must have the same deflection before FlyBox setting.**

<b>How to save the positions of flaps using an instrument FlyBox</b>
<b>1)</b> Device powered OFF. Switch A/M switch in the AUTOMATIC position.
<b>2)</b> Press and hold the U/D switch in the UP position for 10 seconds until the LED1 and LED4 start flashing. Then release the U/D switch.
<b>3)</b> Make the sequence using the U/D switch: 2 click in the UP position, 2 click in the DOWN position and 1 click in the UP.
<b>4)</b> Now, the first LED is flashing. You can adjust and the flaps in the desired position (using the U/D switch). To save the position, briefly move the A/M switch in the MANUAL and then return in the AUTOMATIC.
<b>5)</b> Now, the second LED is flashing. You can adjust and save the second position in the same way explained in the previous step (U/D switch to adjust then A/M switch to the save position).
<b>6)</b> Repeat again the step for the third and fourth position. The EFC-P will automatically exit from the programming mode and become operative once the last position is correctly saved in memory.

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### 3.5.5. Verification Required (flap “Zero” position)

Check flaps for free travel.

Secure all bolted connections by the F-900 Torque seal.

### 3.5.6 Aileron installation

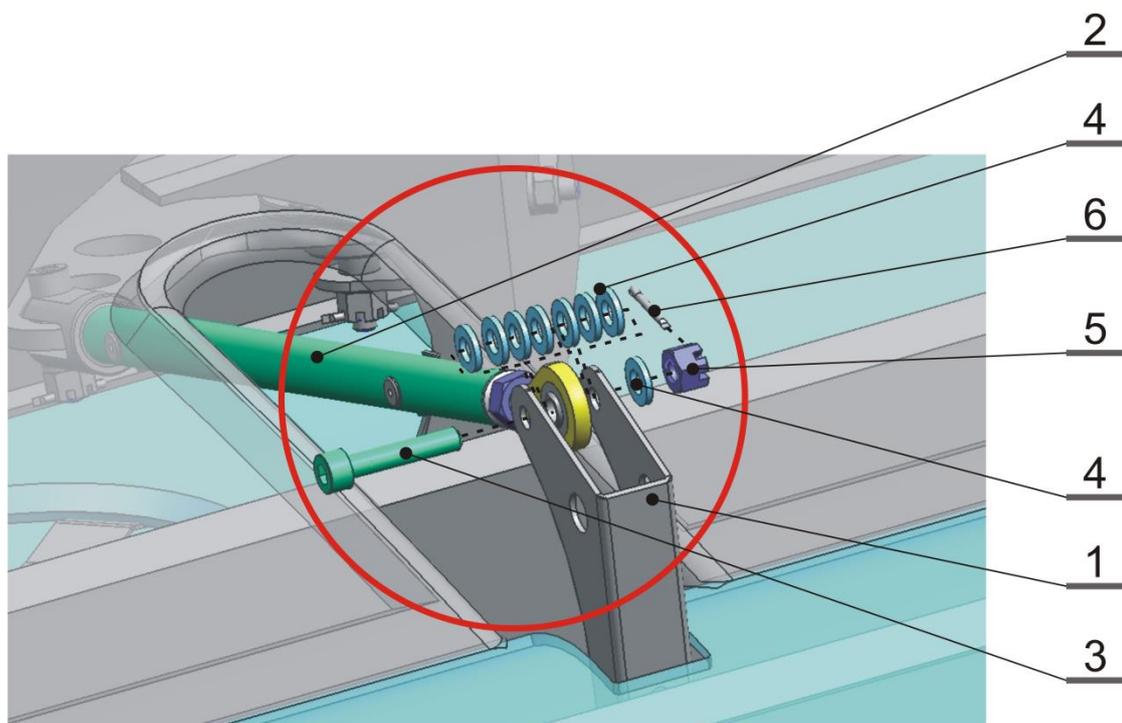
To aileron installation requires one person.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Allen wrench 5 Socket wrench 10 (1 pcs) Torque wrench (1pcs)
<b>Materials Required</b>	F-900 Torque seal Soudal Fix All Classic (single component joint sealant)
<b>Aileron installation Checklist</b>	
<b>1) Lubricating.</b> Lubricate all metal details with plastic grease before connecting: Lubricate hinges on the aileron and hinges on the wing (holes for bold) and bearing in the pull rod assembly.	

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**3) Pull rod connecting.** Connect the pull rod and aileron drive by the bold M6 x30 DIN 912. Use castle nut M6 with cotter pin 1,6 and 8 washers M6. Assemble as shown bellow.

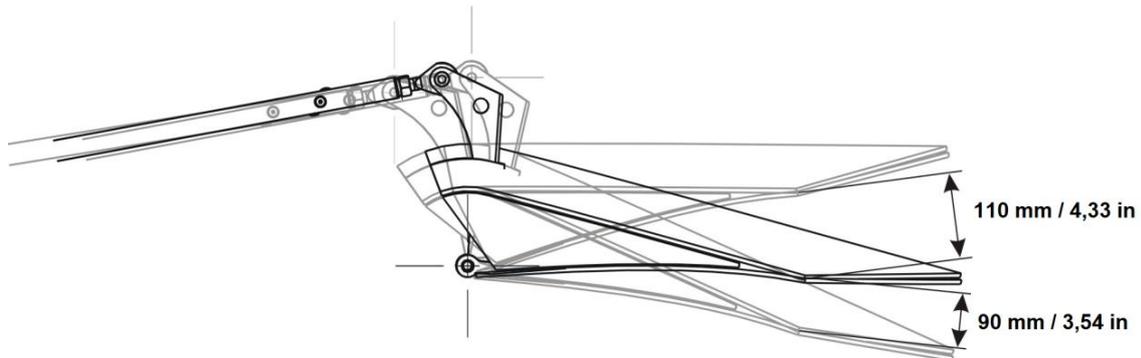




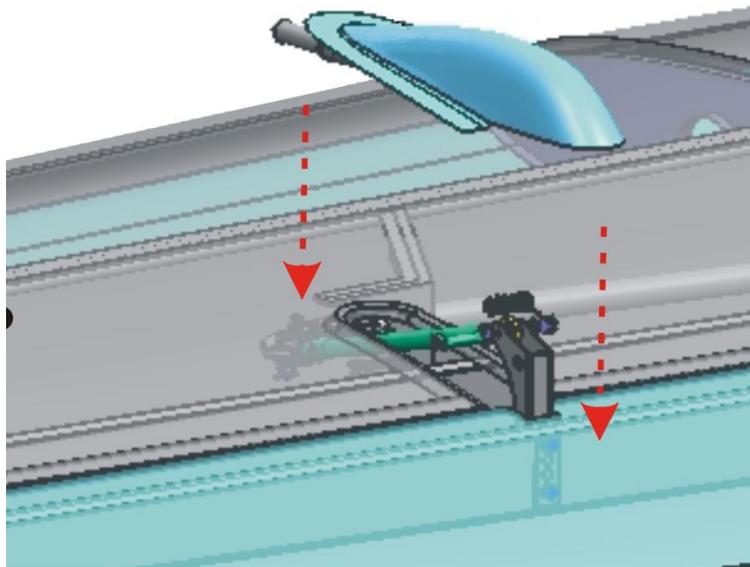
Pos.	Part	Part number / Norm
1	Aileron control hinge	s110_650_00-1
2	Pull rod assembly in the aileron	s523_600_00-1
3	Screw M6 x 30	DIN 912
4	Washer M6	ČSN 02 1721
5	Castle nut M 6	ČSN 02 1411
6	Cotter pin 1,6	ČSN 02 1781



**4) Ailerons deflection.** Check ailerons deflection. Angles of deflection of the aileron are to within the range as follows ( $\pm 5$  mm /  $\pm 0.2$  in).



**5) Aileron pull rod cover installing.** Fix the Aileron pull rod cover on the Wing with single component joint sealant Soudal Fix All Classic.



**CAUTION**

**Aileron pull rod cover must be placed in order not to interfere Aileron and Pull rod assembly in the aileron movement. Correct Aileron pull rod cover position must be determined by the test of all possible ailerons positions.**

	<b>Maintenance Manual</b>	Aircraft Type: TL - 2000 Sting S4
		Section 3 - Structures

**CAUTION**

**Do not support your hands or any subjects on the wing and aileron, as the laminate surface is not proportioned for high area force.**

### 3.5.7. Aileron Removal

The rest of the Aileron removal process goes in reverse to the Aileron installation process.

Use segmented blade utility knife for Aileron pull rod cover removing. Remove the Aileron pull rod cover without damaging the wing.

### 3.5.8. Verification required (aileron installation/removal)

Check aileron for free travel.

Secure all bolted connections by the F-900 Torque seal.

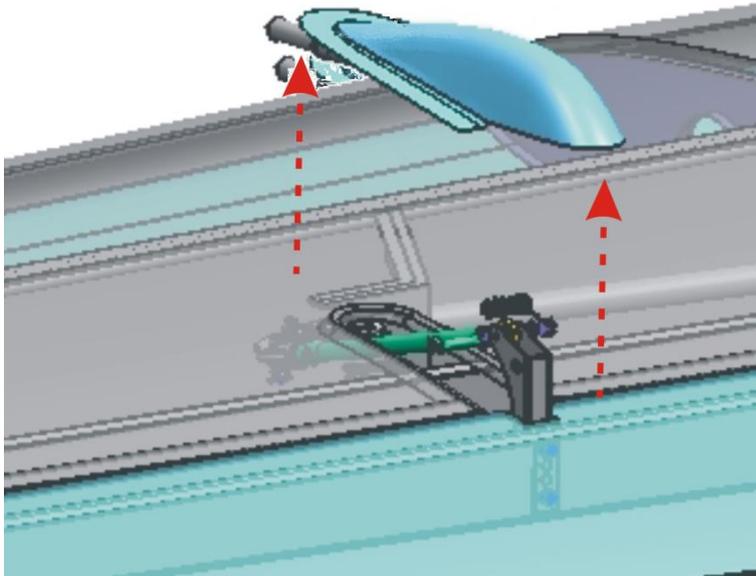
### 3.5.9 Setting Aileron “ Zero ” Position

To Setting Aileron ” Zero ” position requires one person.

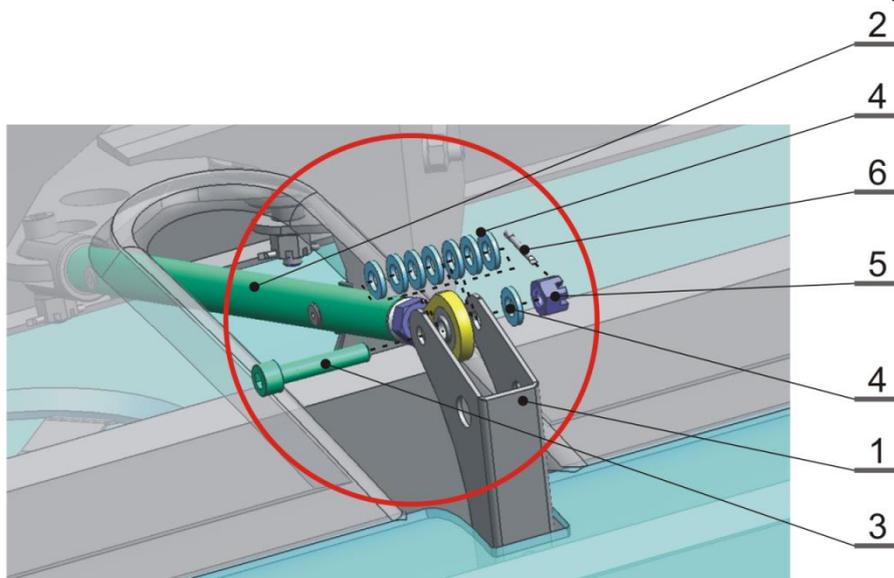
<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Allen wrench 5 (1 pcs) Socket wrench 10 (1 pcs) Combination wrench 13 (1 pcs) Torque wrench (1pcs)
<b>Materials Required</b>	F-900 Torque seal SOU DAL Fix All Classic (single component joint sealant)

**Setting Aileron “Zero” Position Checklist**

**1) Aileron pull rod cover removing.** Remove the Aileron pull rod cover from the Wing. Aileron pull rod cover is glued by the single component joint sealant on the wing. Use segmented blade utility knife for Aileron pull rod cover removing. Remove the Aileron pull rod cover without damaging the wing skin.

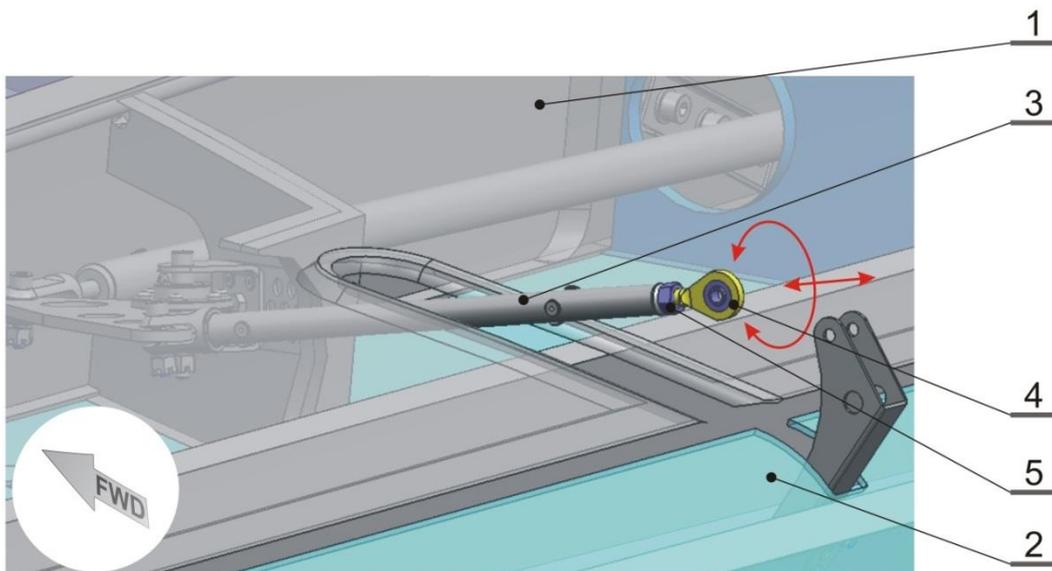


**2) Aileron control disconnecting.** Disconnect the Pull rod assembly in the aileron and the Aileron control hinge. Pull rod assembly in the aileron is fixed with screw M6 x 30 DIN 912 and castle nuts M6 ČSN 02 1411 with the Cotter pin 1,6

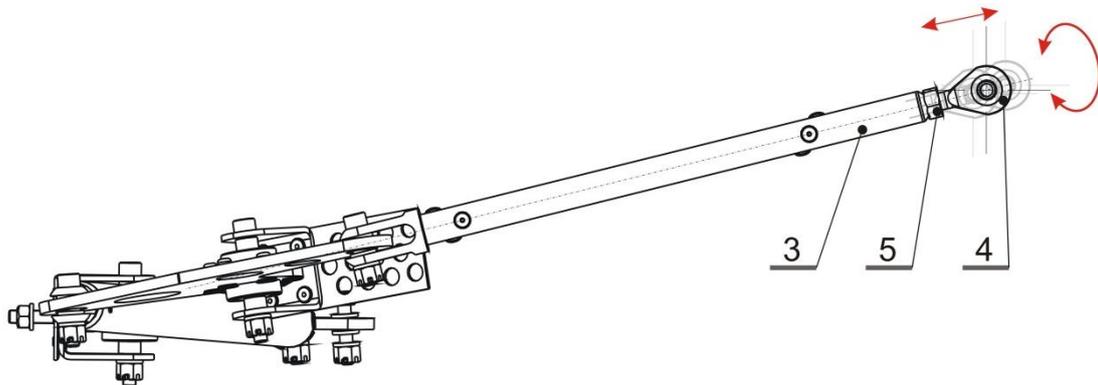


Pos.	Part	Part number / Norm
1	Aileron control hinge	s110_650_00-1
2	Pull rod assembly in the aileron	s523_600_00-1
3	Screw M6 x 30	DIN 912
4	Washer M6	ČSN 02 1721
5	Castle nut M 6	ČSN 02 1411
6	Cotter pin 1,6	ČSN 02 1781

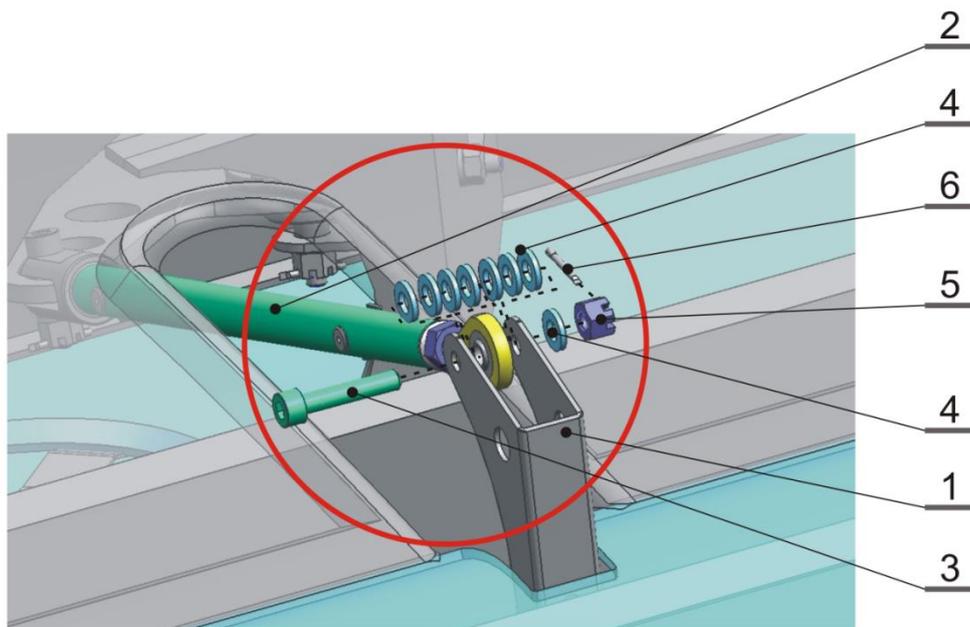
**3) Aileron pull rod setting.** Loosen the nut M8 ISO 4032 on the Adjustable eye M8. Select the correct Adjustable eye M8 position so that aileron is in the "zero" position. Then tighten the nut M8 ISO 4032 on the Adjustable eye M8 (use F-900 Torque seal).



Pos.	Part	Part number / Norm
1	Wing	s110_000_00-1
2	Aileron	s110_600_00-1
3	Pull rod assembly in the aileron	s523_600_00-1
4	Adjustable eye M8	s590_300_00-1
5	Nut M 6	ISO 4032

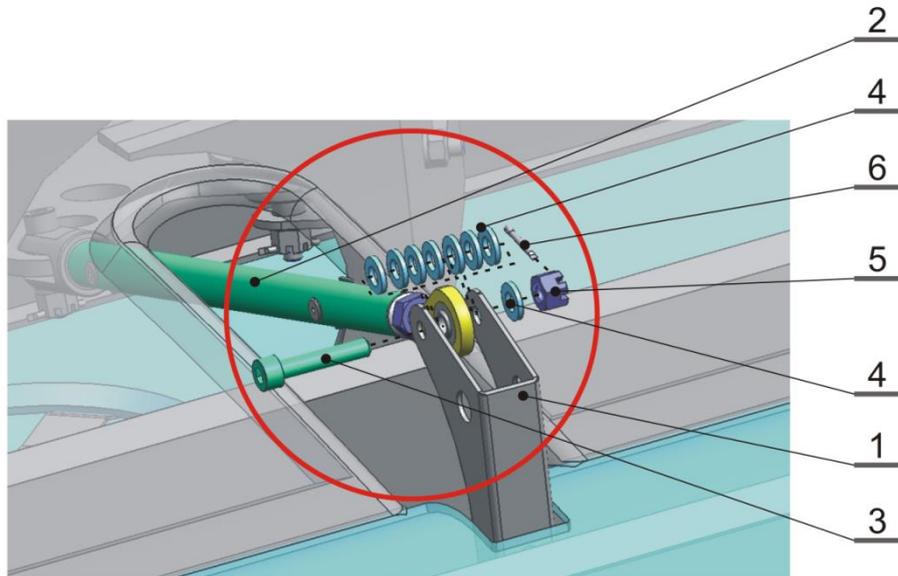


**4) Pull rod connecting.** Connect the pull rod and aileron drive by the bold M6 x30 DIN 912. Use castle nut M6 with cotter pin 1,6 and 8 washers M6. Assemble as shown bellow.



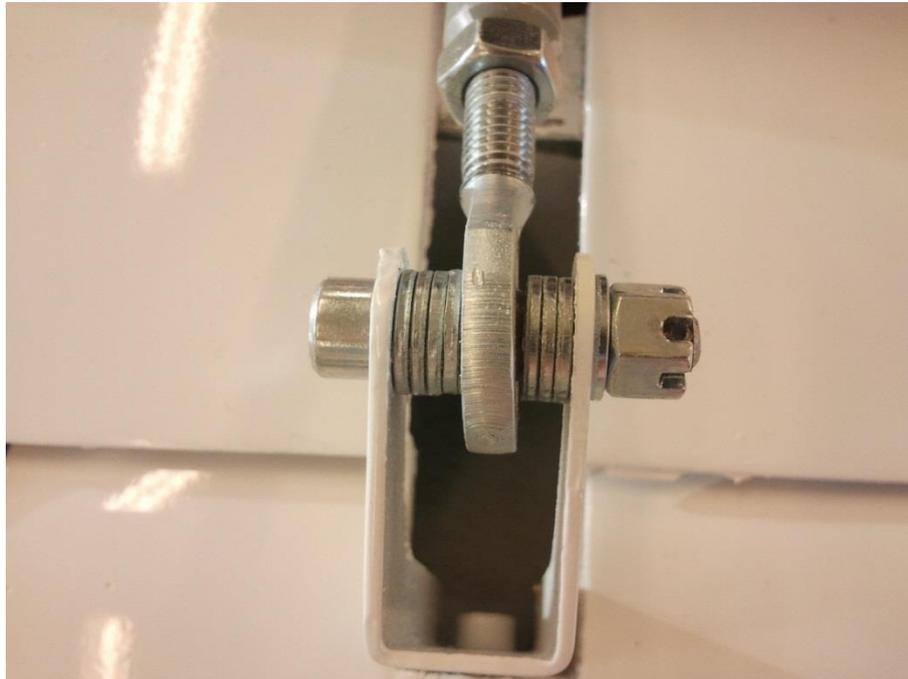
Pos.	Part	Part number / Norm
1	Aileron control hinge	s110_650_00-1
2	Pull rod assembly in the aileron	s523_600_00-1
3	Screw M6 x 30	DIN 912
4	Washer M6	ČSN 02 1721
5	Castle nut M 6	ČSN 02 1411
6	Cotter pin 1,6	ČSN 02 1781

**5) Pull rod connecting.** Connect the pull rod and aileron drive by the bold M6 x30 DIN 912. Use castle nut M6 with cotter pin 1,6 and 8 washers M6. Assemble as shown below.

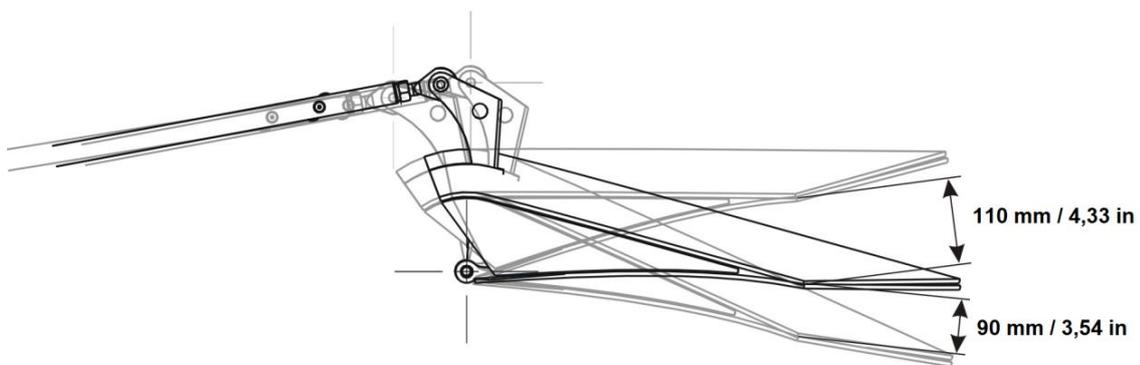


Pos.	Part	Part number / Norm
1	Aileron control hinge	s110_650_00-1
2	Pull rod assembly in the aileron	s523_600_00-1
3	Screw M6 x 30	DIN 912
4	Washer M6	ČSN 02 1721
5	Castle nut M 6	ČSN 02 1411
6	Cotter pin 1,6	ČSN 02 1781

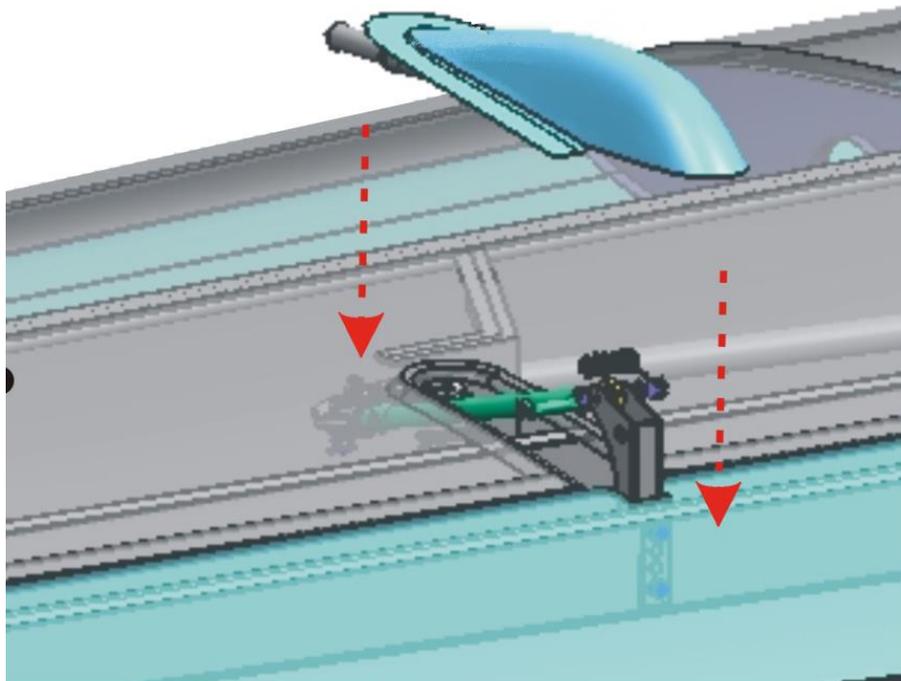




**6) Ailerons deflection.** Check ailerons deflection. Angles of deflection of the aileron are to within the range as follows ( $\pm 5$  mm /  $\pm 0.2$  in).



**7) Aileron pull rod cover installing.** Fix the Aileron pull rod cover on the Wing with single component joint sealant SOUDAL Fix All Classic.



**CAUTION**

Aileron pull rod cover must be placed in order not to interfere Aileron and pull rod assembly in the aileron movement. Correct Aileron pull rod cover position must be determined by the test of all possible ailerons positions.

**CAUTION**

Do not support your hands or any subjects on the wing and aileron, as the laminate surface is not proportioned for high area force.

**3.5.10 Verification Required (aileron “Zero” position)**

Check ailerons for free travel.

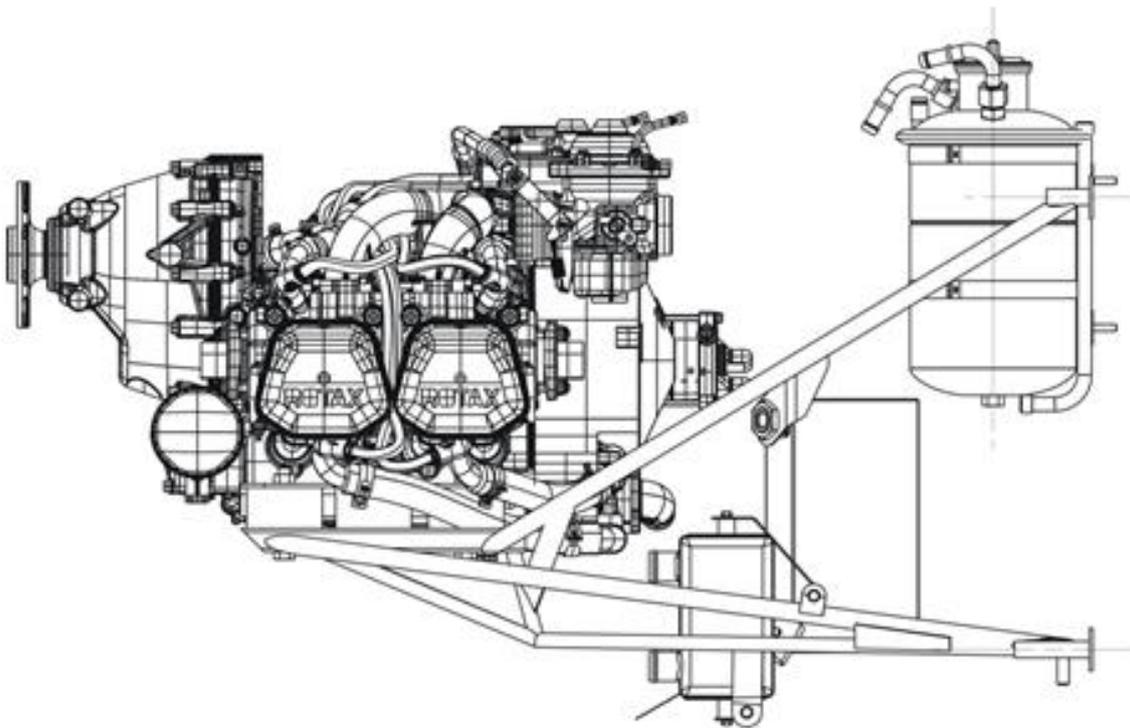
Secure all bolted connections by the F-900 Torque seal.



### 3.6 Engine

For engine inspection and maintenance refer to original Rotax manuals supplied with the aircraft:

- 1) Operator's Manual for ROTAX engine Type 912 Series
- 2) Documentation for ROTAX aircraft engines (CD – ROM)
- 3) Service instruction fur ROTAX Type 912 und 914 (series)
- 4) ROTAX service letter Warranty conditions for ROTAX engine types 912 and 914 (series)
- 5) ROTAX engine Log book



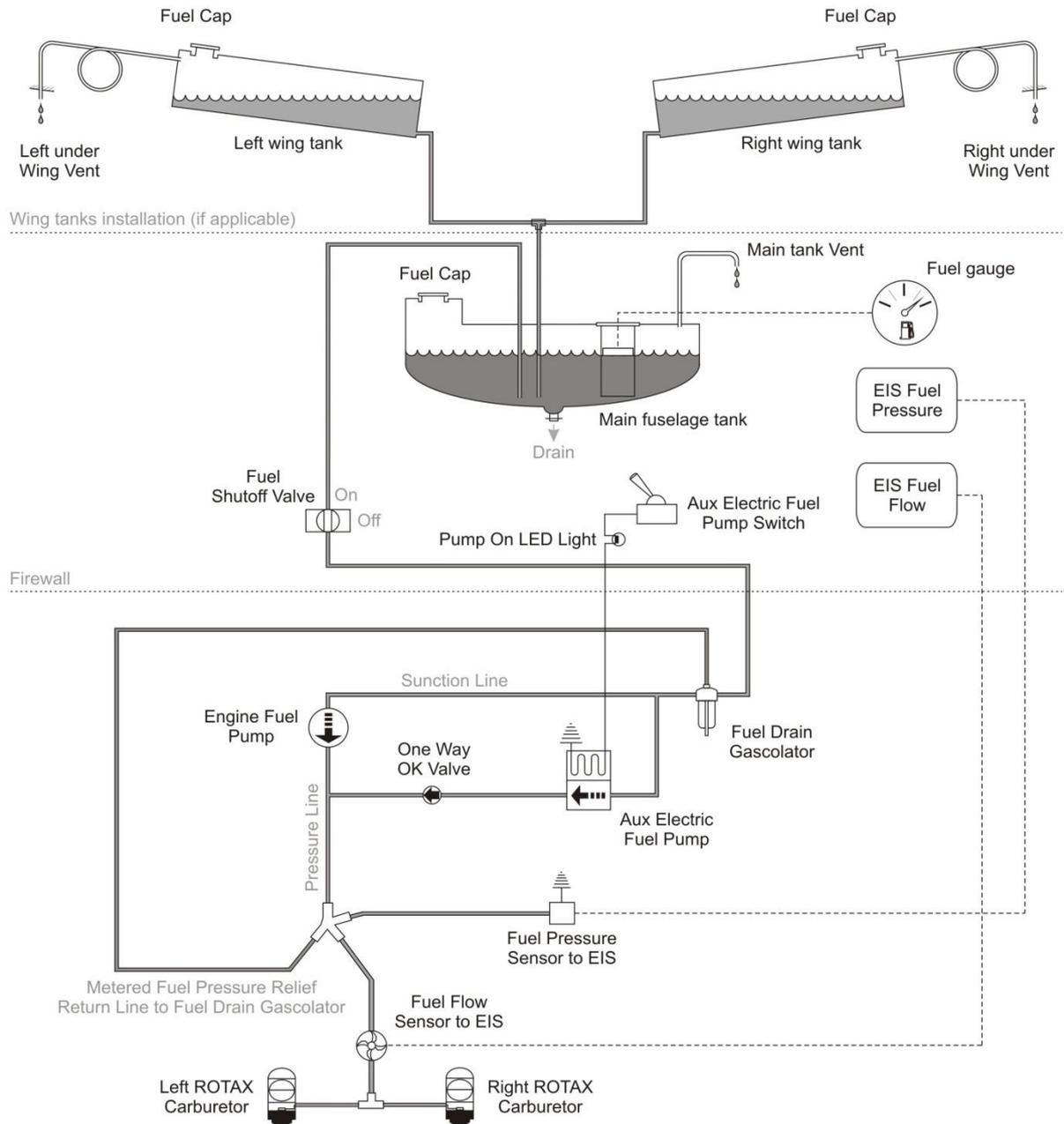
**CAUTION**

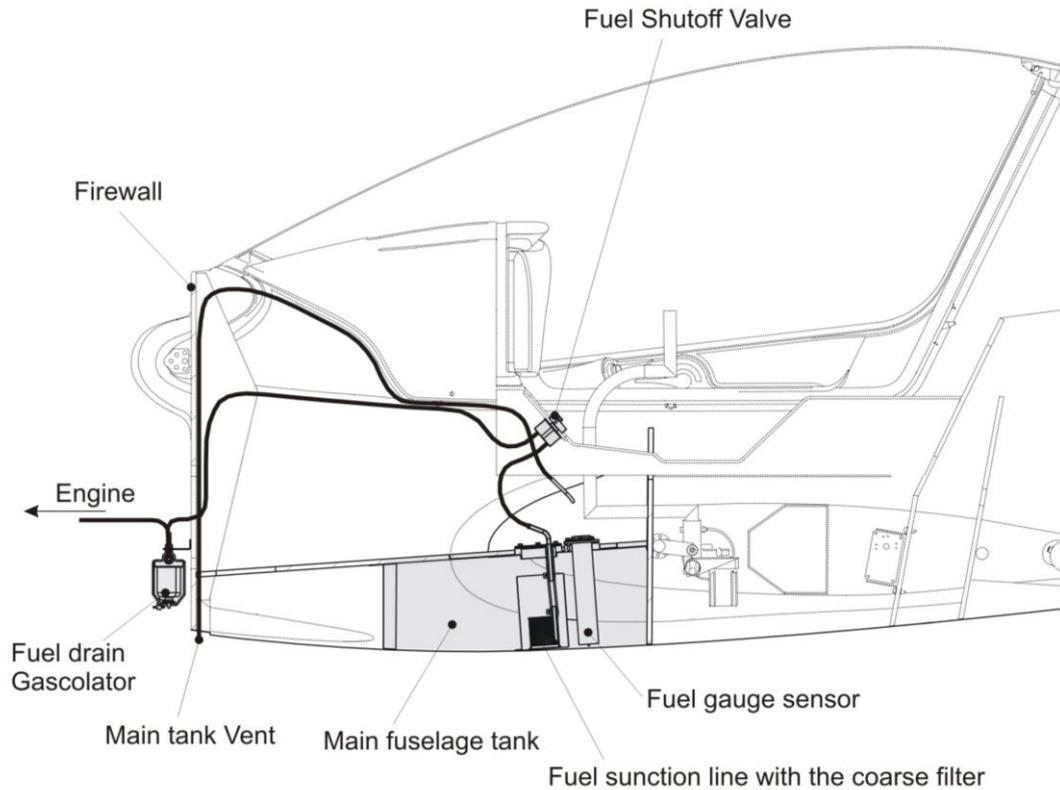
**Engine removal, installation and replacement can only done of TL-Ultralight authorized service center.**



### 3.7 Fuel System

The TL-2000 Sting S4 has one main fuel tank in fuselage and can also be equipped with tanks in the wings. Main tank has capacity 20.5 US Gals. Wing tanks, if installed, has a 6 US Gals each.





**NOTE**

The aircraft could be equipped with two different types of Fuel Shut-Off Valve. Older aircraft models are fitted with two-way valve type 22MB. The latest aircraft are equipped with two-way valve type TL-ultralight.



22 MB two - way Fuel shutoff Valve



TL - ultralight two - way Fuel shutoff Valve



### 3.7.1 Fuel tanks filter inspection/cleaning

To inspection/cleaning wing tanks fuel filters requires two persons.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Socket wrench 22 (1 pcs) Torque wrench (1pcs)
<b>Materials Required</b>	F-900 Torque seal
<b>Fuel tanks filters inspection/cleaning Checklist</b>	
<b>1) Drain the fuel tanks.</b> Unscrew the drain valve (located on the bottom side of the fuselage under the main fuel tank) to release fuel from the fuel tank.	
<b>2) Remove covers.</b> Remove the side covers of the central console. Unscrew all bolts attached side covers.	
	
<b>3) Unscrew the cover.</b> Unscrew all bolts attached cover on the main fuel tank. Take out the fuel tanks filters.	
<b>4) Fuel filters inspection/cleaning.</b> Inspect Fuel tank filter] for obstruction and cleanliness. Clean the fuel tank. Replace fuel filter, if damaged.	



**5) Screw the cover.** Install back the main fuel tank cover with fuel tanks filters.

**6) Install covers.** Install back the side covers of the central console. Screw all bolts attached the side covers.

**7) Screw the drain valve.** Screw the drain valve back.

### 3.7.2. Verification Required (Fuel tanks filters inspection/cleaning)

Make sure the main bolts are not loose (do not rotate).

Check wings and fuel tanks for foreign objects.

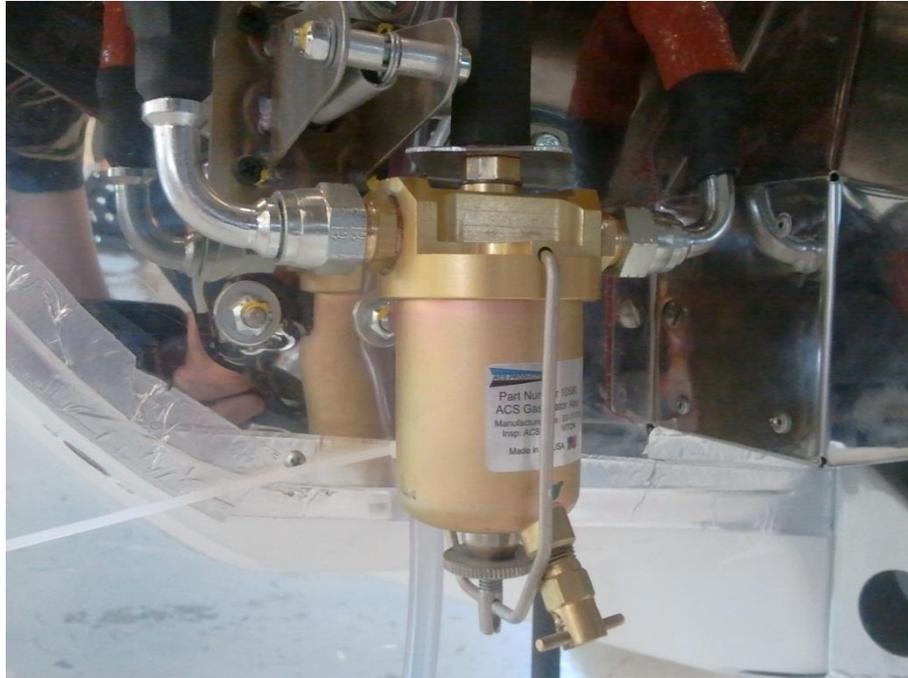
Inspect fuel system for fuel leak

Secure all bolted connections by the F-900 Torque seal.



### 3.7.3 Gascolator Inspection/cleaning

To inspection/cleaning Gascolator requires one person.



<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs)
<b>Materials Required</b>	Safety wire 0.032" diameter
<b>Gascolator inspection/cleaning Checklist</b>	
<b>1) Engine covers removing.</b> Remove Upper cowling and Bottom bowling.	
<b>2) Fuel selector valve.</b> Make sure the Fuel Selector Valve is in the off position.	
<b>3) Fuel gascolator draining.</b> Drain the Fuel gascolator by the draining vent on the Fuel gascolator tank. Remove all fuel from Fuel gascolator tank.	
<b>4) Safety wire removing.</b> Remove the stainless safety wire securing Fuel gascolator tank Nut.	



**5) Fuel filter tank removing.** Remove Fuel filter tank from the Fuel gascolator.

Pos.	Part	Part number / Norm
1	Fuel filter cap	ACS 10580
2	Fuel filter sealing	ACS 10580
3	Fuel filter tank	ACS 10580

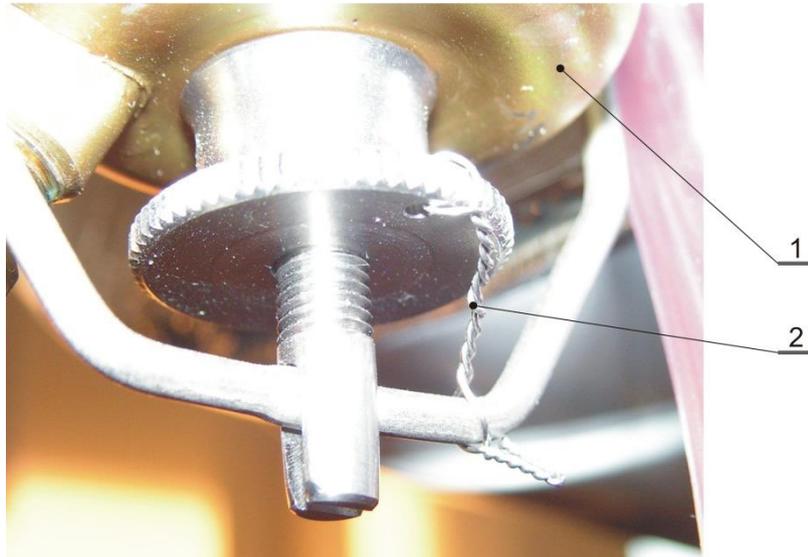


**6) Fuel gascolator inspection/cleaning.** Clean Fuel gascolator fuel strainer and sediment bowl. Inspect the Fuel gascolator sealing for condition, replace it if damaged.

**7) Fuel filter tank installation.** Install back Fuel filter tank from the Fuel gascolator [ACS 10580]. The rest of the Fuel filter tank installation process goes in reverse to the Fuel filter tank removing process (Step 5).

**8) Gascolator nut securing.** Secure the Fuel gascolator tank Nut by the stainless safety wire having diameter of 0.032“.

Pos.	Part	Part number / Norm
1	Fuel Gascolator	ACS 10580
2	Stainless safety wire	0.032“ diameter



**9) Leakage inspection.** Make the Fuel Selector Valve to the Left or Right tank position. Inspect Fuel Gascolator for leakage.

**10) Cowlings installation.** Install back the Upper cowling and Bottom cowling.

### 3.7.4 Verification Required (Gascolator Inspection/cleaning)

Make sure the nuts are not loose (do not rotate).

Check engine and gascolator area for foreign objects.

Inspect fuel system for fuel leak.

### 3.8 Propeller

For propeller inspection and maintenance refer to original propeller manufacturer's manuals.

**CAUTION**

**Propeller removal, installation and replacement can only done of TL-Ultralight or propeller manufacturer authorized service center.**



### 3.9 Utility systems

#### 3.9.1 Heating System

To minimize the chances for carbon monoxide entering the cockpit, heated air is drawn from the water radiator not from a heat exchanger on the muffler. Ambient inlet air taken through the radiator is heated and supplied through a control flap into the cockpit by a air hose. The amount of hot air is regulated by the CABIN HEAT knob on the lower throttle quadrant instrument panel.

In case that the aircraft is being operated while OAT is more than 20 °C dismount the carbon Heating cover and Heating air hose.

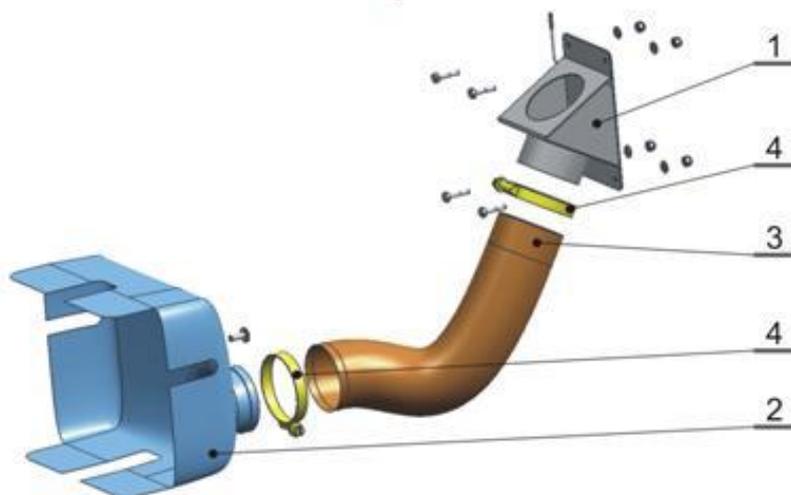
To dismounting Heating cover and Heating hose one person is required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Cross-screwdriver (1pcs)
<b>Materials Required</b>	-

#### Heating cover and Heating hose dismounting Checklist

1) **Engine covers removing.** Remove Upper bowling and Bottom cowling .

2) **Fuel selector valve.** Remove two Hose clamp carbon Heating cover and Heating hose from the engine area.





Pos.	Part	Part number / Norm
1	Heating flap	s700_910_00-1
2	Heating cover	s700_920_00-1
3	Heating hose	-
4	Hose clamp	TORRO 35 - 50

**3) Heating flap inspection.** Make sure the Heating flap on the firewall is in closed position.

**4) Cowlings installation.** Install back the Upper cowling and Bottom bowling.

To removal of the Cabin Heat control knob one person is required.



<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Cross-screwdriver (1pcs) Needle - nose pliers (1pcs)
<b>Materials Required</b>	-

	<h1>Maintenance Manual</h1>	Aircraft Type: TL - 2000 Sting S4
		<h2>Section 3 - Structures</h2>

<b>Cabin Heat control knob removal Checklist</b>
<b>1) Upper engine cover removing.</b> Remove Upper cowling.
<b>2) Control cable disconnecting.</b> Disconnect the control cable on the control flap lever located on the firewall (on the Heating flap).
<b>3) Nut removing.</b> Remove the nuts thus releasing the heating control knob.
<b>4) Control knob removing.</b> Remove the Heating control knob with cable from the flexible housing.

To installation of the Cabin Heat control knob one person is required.

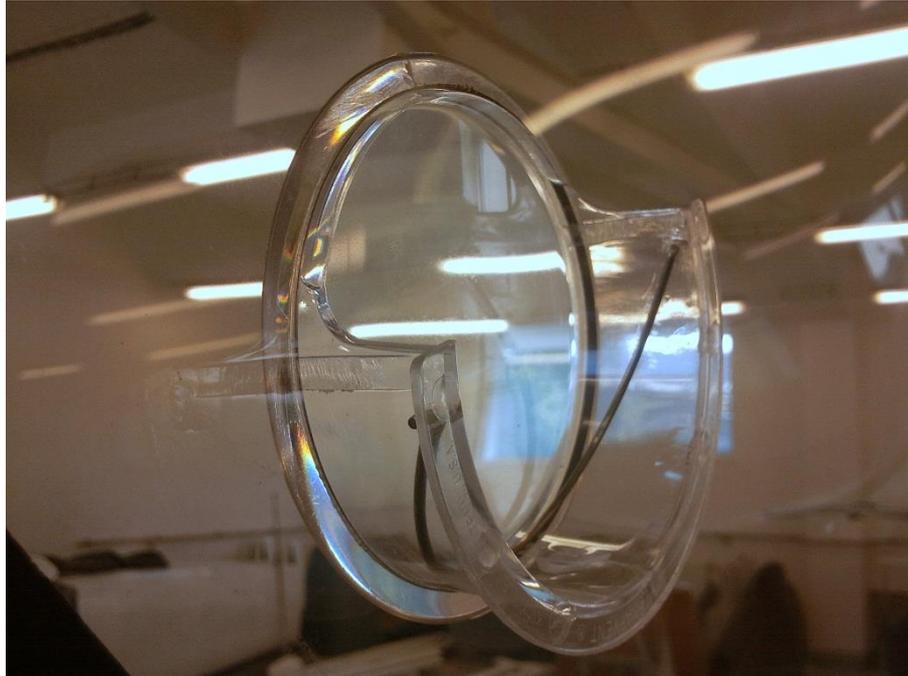
<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Cross-screwdriver (1pcs) Needle - nose pliers (1pcs)
<b>Materials Required</b>	F-900 Torque seal
<b>Cabin Heat control knob installation Checklist</b>	
<b>1) Upper engine cover removing.</b> Remove Upper cowling.	
<b>2) Control knob inserting.</b> Insert the Cabin Heat control knob into the flexible housing and fasten it from both sides of the lower throttle panel by means of nuts.	
<b>3) Control cable connecting.</b> Connect the control cable with control flap lever on the Heating flap.	
<b>4) Heat control adjusting.</b> Adjust heat control.	

### 3.9.2 Venting System

Cockpit ventilation is ensured by two rotating scoop air vents located on the canopy.

To removal and installation of the cabin air vents one person is required

TL2000/11/005AJ	Rev. No.: 2	Original Issue Date: 27.09.2011	<b>3-111</b>
		Revision Date: 04.07.2013	



<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	-
<b>Materials Required</b>	-
<b>Cabin air vents removal and installation Checklist</b>	
<b>1) Cabin air vents removal/installation.</b> The two rotating air vents mounted in the canopy can be removed or installed by slightly squeezing the interior edge of the vent scoop from the exterior and rotating the scoop slightly as it is removed or replaced.	
<b>CAUTION</b>	
<b>This is should be done carefully to not break the plastic scoop.</b>	

### 3.9.3 Seats

The seats of the Sting S4 are fixed and are equipped with an upholstered removable back cushions attached to the cockpit bulkhead by Velcro. The seat bases are attached to the lower cockpit frame.



To removal and installation of the seats one person is required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Cross-screwdriver (1pcs)
<b>Materials Required</b>	-

**Seat removal Checklist**

**1) Back seat removing.** Remove seat belts. Remove the back seat: back seat is attached to the cockpit bulkhead by Velcro. Slowly break away the back seat from the bulkhead with Velcro and pull up (in direction of arrow) the back seats.

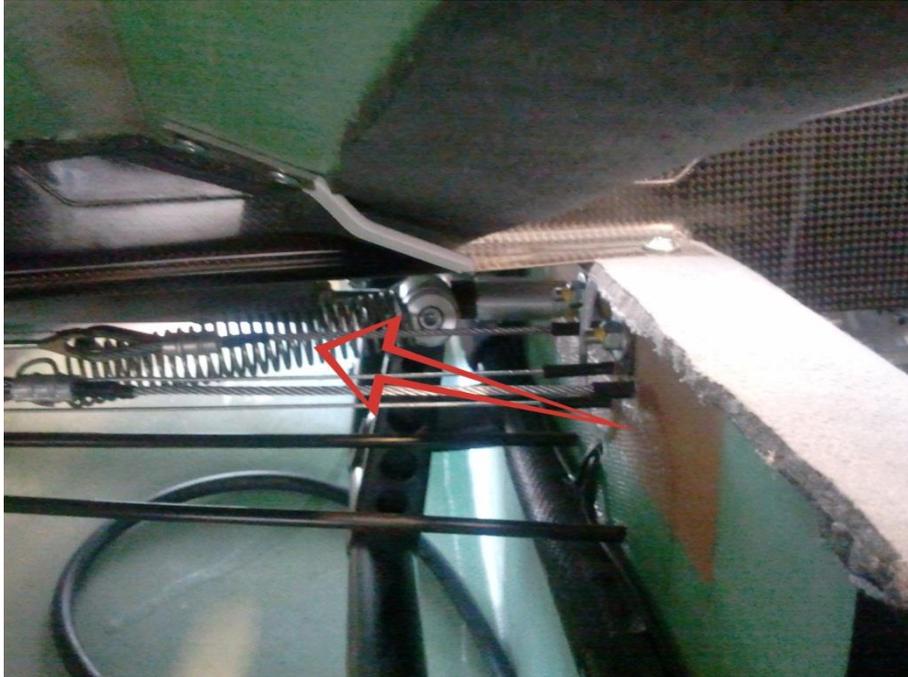




**2) Bottom seat unscrewing.** Remove the screws M5 x 16 located in the rear part of the bottom seat.

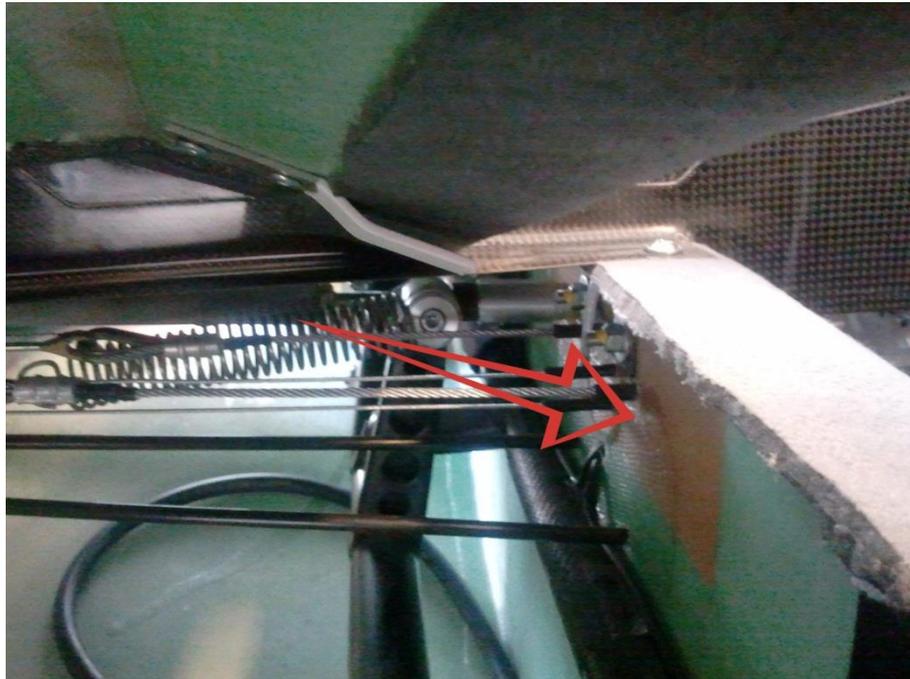


**3) Remove bottom seat.** Slide backwards the bottom seat out from the lower cockpit frame in the direction on arrow.



**4) Bottom seat install.** Slide the bottom seat back on the lower cockpit frame in the arrow direction as shown.





**5) Bottom seat screw.** Screw M5 x 16 is located in the rear part of the bottom seat. Screw the bottom seat.





**6) Back seat installs.** Install the back seat: back seat is attached to the cockpit bulkhead by Velcro. Slide the bottom part of the seats in the middle of the cockpit bulkhead and rear part of the bottom seat. Then press the back seat on the cockpit bulkhead to attach. Give back the seat belts.



### 3.9.4 Canopy

To removal and installation of the seats two persons are required.



**CAUTION**

Be careful. If the cover fall down and quickly closed, can cause injury.

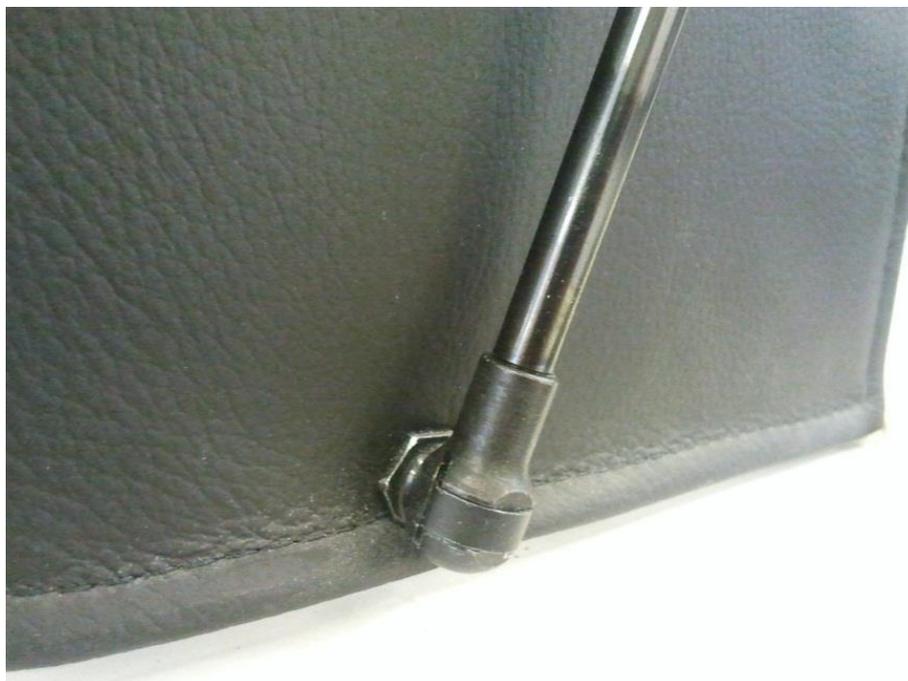
**CAUTION**

With the canopy handled with care. Be careful to do not break.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Allen wrench
<b>Materials Required</b>	

**Canopy removal checklist**

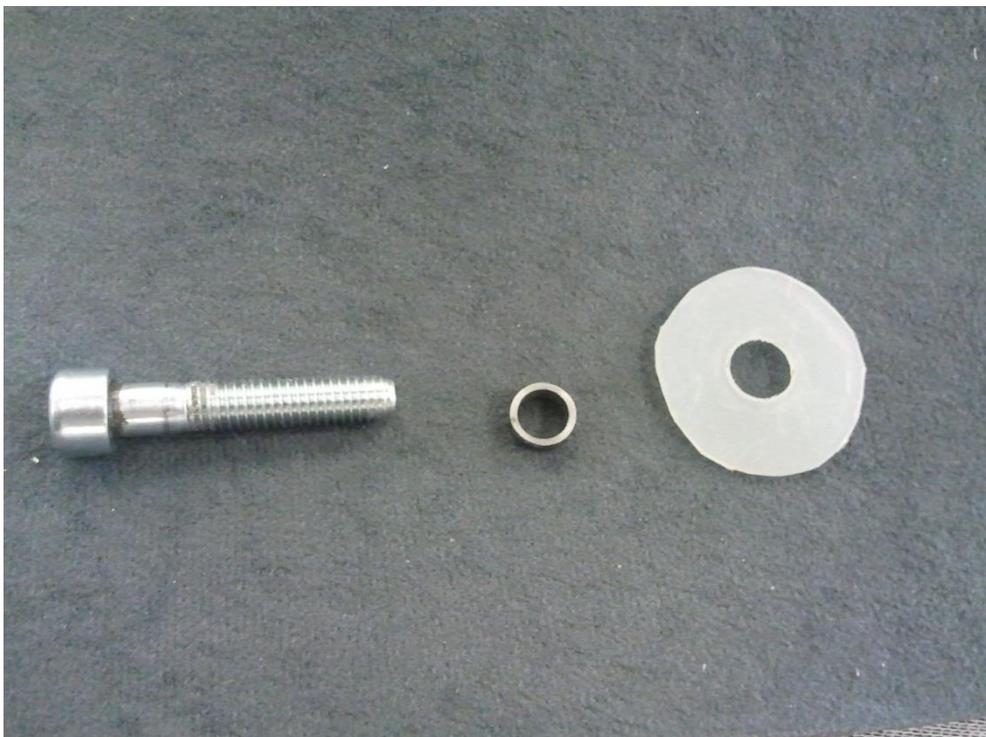
- 1) **Gas strut removal.** Take out the gas struts supporting the canopy.





**2) Unscrew bold.** Unscrew two bolts M8 x 40 (with nut M8) attached the canopy in the fuselage.







**3) Canopy removing.** Remove carefully canopy from the fuselage.

**CAUTION**

**With the canopy handled with care. Be careful to do not break.**

The canopy installation process goes in reverse to the canopy removal process.

**NOTE**

**Canopy is not designed for frequent assembly and disassembly, so these operations be performed only if necessary.**

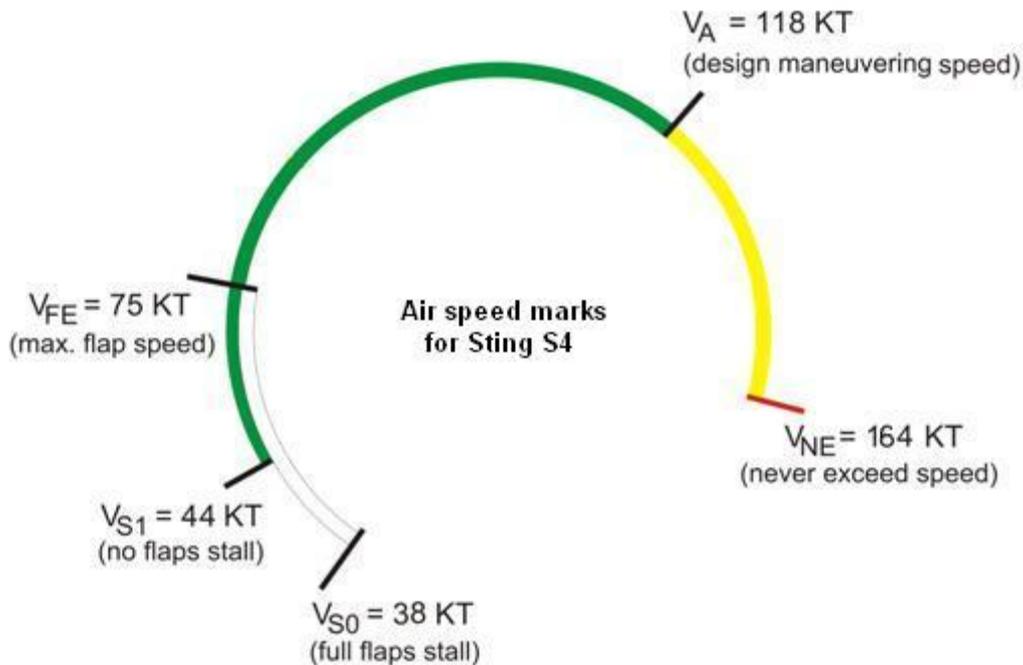


### 3.10 Instruments and Avionics

The specific instruments and/or the configuration in which they are arranged may vary slightly from aircraft to aircraft. The magnetic compass is centered on top of the glare shield behind the utility tray.

Sting S4 flight instruments are arranged in the basic “T” configuration on the pilot (left) side of the aircraft. Part of switches can be placed on the ceiling instrument panel. Exceptions can include the absence of a particular instrument or a variation in the order of the instruments due to after market changes.

#### 3.10.1 Airspeed indicator markings



Airspeed indicator speed range markings:

MARKING	KIAS	KCAS	SIGNIFICANCE
White arc	38 - 75	37-74	<b>Full-Flap Operating Range.</b> Lower limit is maximum weight $V_{S0}$ in landing configuration. Upper limit is maximum speed permissible with flaps extended to stage one (Takeoff) (Approach) setting.
Green arc	44 - 118	43-117	<b>Normal Operating Range.</b> Lower limit is maximum weight $V_S$ at most forward CG with flaps retracted. Upper limit is maximum structural cruising speed. VCMN
Yellow arc	118 - 164	117-162	<b>Caution Range.</b> Operations must be conducted with caution and only in smooth air
Red line	164	162	<b>Never Exceed Speed.</b> Maximum speed for all operations.



### 3.10.2 Engine instruments

The Engine Information System (EIS) is the primary display for monitoring engine operation. The EIS displays the following data: RPM, manifold pressure, fuel pressure, oil temperature, oil pressure, 2 cylinder head temperatures, 4 exhaust gas temperatures, voltage, elapsed engine time, and total engine time. Individual input limitations are preprogrammed into the system. If any of these limits are exceeded, a red EIS alert light will illuminate. The EIS data display will then flash the reading that is in alert.

#### NOTE

**A difference of as much as 200 RPM can exist between the Rotax® tachometer and the RPM indication on the EIS. The EIS digital RPM readout is more accurate and should be relied upon when in doubt.**

Engine manifold pressure is monitored in the AUX1 display on the EIS. The indication interpreted from the remote sensor is displayed in two digits with a decimal point and one more digit (eg 25.5) which is an indication of induction air manifold pressure, and is measured in inches of mercury.

Fuel pressure is monitored in the AUX2 display on the EIS. The indication interpreted from the remote sensor is displayed in two digits without a decimal point (eg 35) which is an indication of 3.5 and is measured in pounds per square inch (PSI).

#### Engine Information System (EIS) Setup (1 Nov 05) (L/O,RI,RM,A&P):

1. Hold down both the Next/ACK and Previous buttons at the same time for 5 seconds. The unit will enter the **MAIN** program 'set limits mode' and the alert light will stay on.
2. The left (Next/Ack) button will now increase the setting (Up)
3. The center (Previous) button will now lower the setting (Down)
4. The right (Display) button will enter the setting and advance to the (Next) setting.
5. Set Contrast at 2 and push Next,
6. Set Max timer to 0 and push Next,
7. Set Max Oil P to 92 and push Next,
8. Set Min Oil P to 30 and push Next,
9. Set Max Oil T to 256 and push Next,
10. Set Max RPM to 5700 and push Next,
11. Set Max Aux 1 to 0 and push Next,
12. Set Min Aux 1 to 0 and push Next,
13. Set Max Aux 2 to 56 and push Next,
14. Set Min Aux 2 to 22 and push Next,
15. Set Max Volt to 14.8 and push Next,



- 16. Set Min Volt to 11.0 and push Next,
- 17. Set Max CHT to 238 and push Next,
- 18. Set Max EGT to 1600 and push Next,
- 19. Set Display to 3 and push Next.
- 20. This will then exit the main program.

Prior to entering the **SECONDARY** program mode, you must read the static amount of the Fuel Pressure display with the power on but the engine off and the aux pump off.

Example to obtain the setting value for minimum fuel pressure on Aux2Off:

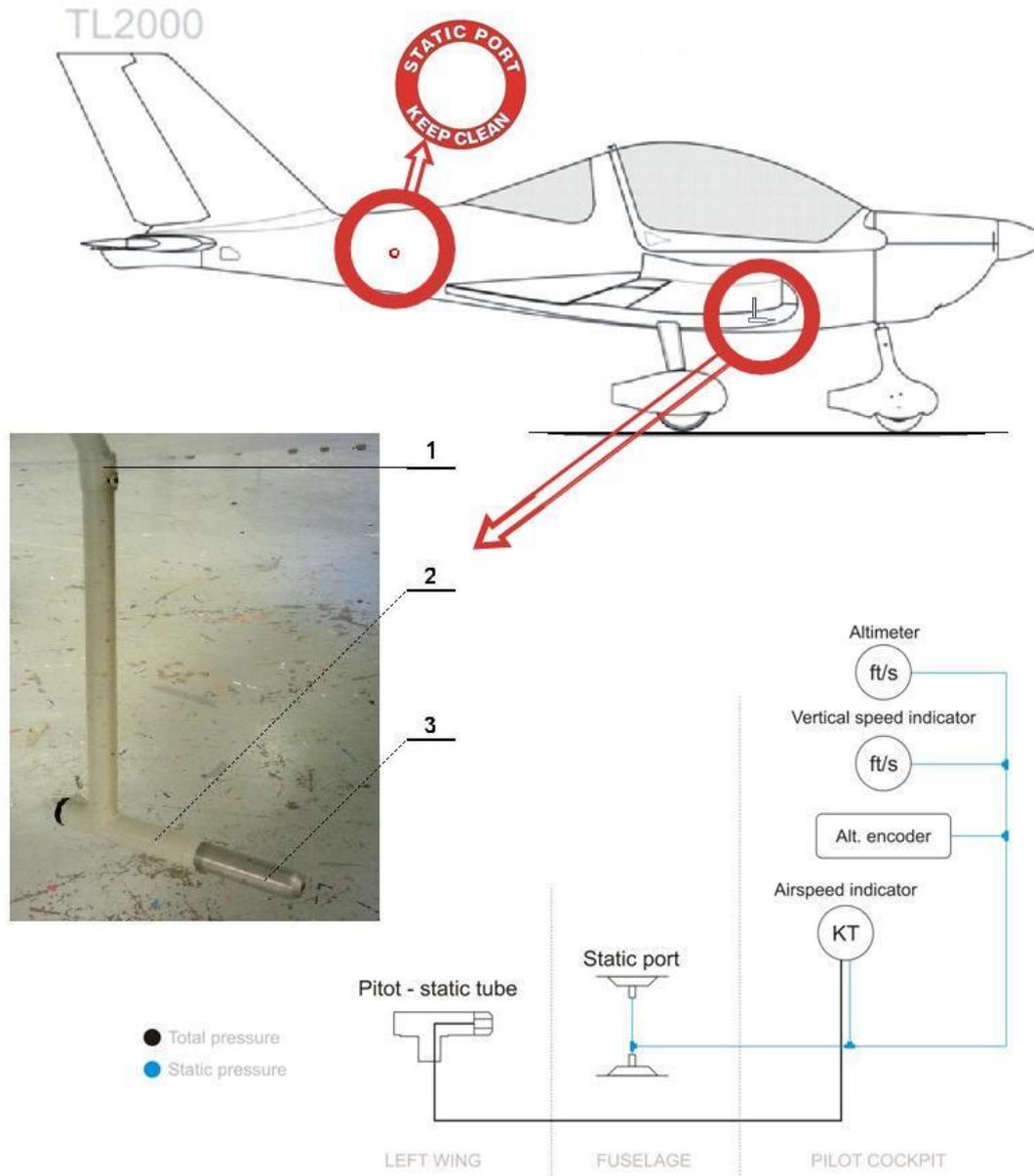
- 1. Turn on power to the EIS display. Read the EIS number shown for Fuel Pressure (AUX2) with the power on but no fuel pump or engine running.
- 2. If this number is one digit such as 9, place a decimal in front to read '.9'. If the number is two digits such as 11, insert a decimal to read '1.1'.
- 3. Multiply the number shown by 20, such as  $.9 \times 20 = 18$ . Then subtract 1, the number will always be odd, so the answer is 17 in this example.
- 4. If the number is 1.1, then the calculation will be  $1.1 \times 20 = 22$ , minus 1 = 21

### 3.10.3 Pitot – static system

The pitot-static tube is located under the leading edge of the right wing and consists of a ram air duct located inside a cylindrical static air chamber. Total system pressure is sensed through the hole in the pitot-tube face and static pressure is sensed through the holes on the side of the rear part of fuselage. Pressure distribution to individual instruments is received by means of flexible plastic hoses.

The tube supplies dynamic ram air pressure to the airspeed indicator, and the static ports supply outside atmospheric pressure to the airspeed indicator, altimeter, mode C encoder, and vertical speed indicator. If installed, the altitude hold portion of the autopilot is also connected to the pitot system.

Pos.	Part	Part number / Norm
1	Pitot – static tube attachment in the wing	s611_000_00-1
2	Pitot – static tube	s612_000_00-1
3	Pitot – static probe	Aviatik



To removal and installation of the pitot – static tube one persons is required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Linesman's pliers (1pcs)



<b>Materials Required</b>	-
<b>Pitot – static tube removal Checklist</b>	
<b>1) Screw removing.</b> Remove the screw attaching the Pitot – static tube with Pitot – static tube attachment to the wing.	
<b>2) Pitot – static tube removing.</b> Remove the Pitot – static tube by gently pulling front and rotating the tube to expose the total pressure hose.	
<b>3) Hose disconnecting.</b> Disconnect the total pressure hose from the Pitot – static probe [Aviatik].	

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Linesman's pliers (1pcs)
<b>Materials Required</b>	F-900 Torque seal
<b>Pitot – static tube installation Checklist</b>	
<b>1) Hose inserting.</b> Insert the transparent hose of total pressure line the Pitot – static tube. Connect the hose to the outlet of the Pitot – static probe and secure it with clamp.	
<b>WARNING</b>	
<b>When connecting the pitot – static system hose pay increased attention. There must not be any incorrect connection! Connect the hose to the outlet marked P.</b>	
<b>2) Pitot – static probe inserting.</b> Insert the Pitot – static probe in the Pitot - static tube.	
<b>3) Pitot – static tube mounting.</b> Attach the Pitot – static tube by means of the screw through the Pitot – static tube attachment protruding from the leading edge of the left wing. Use F-900 Torque seal for screw connection.	
<b>4) Pitot – static system inspection.</b> Carry out check of pitot – static system tightness.	

To inspect pitot – static system tightness one persons is required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-ultralight Airplane Operation Training.
<b>Pitot – static system tightness inspection Checklist</b>	
<b>1) Static pressure line.</b> In the static pressure system create the under pressure by means of an appropriate instrument corresponding to an altitude of 1000 ft indicated on the cockpit altimeter. Drop in the indicated altitude per one minute must not exceed 100 ft.	
<b>2) Total pressure line.</b> Create in the total pressure tube, by means of a suitable instrument, an overpressure corresponding to the speed of 120 KT indicated on the ASI. Drop in speed during 3 minutes must not exceed 3 KT.	

### 3.10.4 Airspeed indicator

The airspeed indicator (ASI) is the instrument that displays how fast the aircraft is traveling, in knots, through the air. Ram air pressure and static atmospheric pressure supplied by the pitot tube and static ports are compared by a diaphragm that expands and contracts as the difference between the two varies. Linkages are connected between the diaphragm and the indicator needle gives the operator a visual reading of the indicated airspeed at any given time.

### 3.10.5 Altimeter

The altimeter (ALT) contains aneroid wafers that expand and contract as atmospheric pressure changes. As altitude increases, the atmospheric pressure decreases, and the aneroid wafers expand. As altitude decreases, the aneroid wafers will contract. Atmospheric pressure is supplied to the altimeter by the static ports on the fuselage. Mechanical linkages attached to the aneroid wafers move the needles on the altimeter face. A knob on the altimeter's face allows the operator to enter the correct barometric pressure into the Kollsman window.

## NOTE

**When setting the current barometric pressure in the Kollsman window for the first flight of the day, note the difference between the indicated altitude and the known field elevation. This will give you a correction factor for airborne resetting.**

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### 3.10.6 Vertical speed indicator

The vertical speed indicator (VSI) provides the operator with rate of climb and rate of descent. It acts quite similar to the altimeter. Atmospheric pressure is supplied by the static ports on the fuselage, and this air is sent into a holding chamber. However, unlike the altimeter, this chamber also has a metered leak attached to it that allows the pressure inside the chamber to eventually equalize with the pressure outside of the chamber. As the aircraft climbs, pressure decreases and this is displayed by the needle on the VSI as a rate of climb. When the aircraft stops climbing, the metered leak allows the pressures to equalize, and thus the indicator needle returns to zero, or no rate of climb. The same holds true for a descent. The indicator will show a rate of descent so long as the aircraft continues to lose altitude, but will return to zero whenever level flight is reached. Because of the metered leak, there is a small delay in the VSI's indication and a change in altitude may be noted first from the altimeter.

### 3.10.7. Magnetic compass

The magnetic compass is designed to determine magnetic course of the airplane. The magnetic compass is positioned on the upper glare shield of the instrument panel and consists of a vessel filled with nonfreezing liquid to dampen movement and has a window in the front wall. The compass rose is positioned on the rotary swinging pivot inside the compass.

To magnetic compass compensation one person is required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Magnetic compass compensation Checklist</b>	
<b>1) Preparatory work.</b> Compass compensation must be performed on the approved compass swinging locations, which are at least 300 ft from steel structures, electric leading or over ground or underground steel equipment or objects. If the compass north is westward from magnetic north, the deviation is westward, i.e. negative. If the compass north is eastward from magnetic north, the deviation is eastward, i.e. positive.	
<b>2)</b> Turn the airplane to “N” heading; eliminate the deviation by “C” screw.	
<b>3)</b> Turn the airplane to “S” heading, reduce any deviation by half – value by “C” screw and write down the corrected heading.	

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|--|
| 4) Turn the airplane to “E” heading, eliminate the deviation by “B” screw.   |
| 5) Turn the airplane to “W” heading, reduce any deviation by half – value by “B” screw and write down the corrected heading.   |
| 6) Enter the individual corrected headings to maintain in the magnetic direction on the compass compensation card and position it in the airplane near the magnetic compass. |

### 3.10.8 Avionics equipment

For specific operational and maintenance instructions, see the manufacturer’s manual corresponding to each piece of equipment.

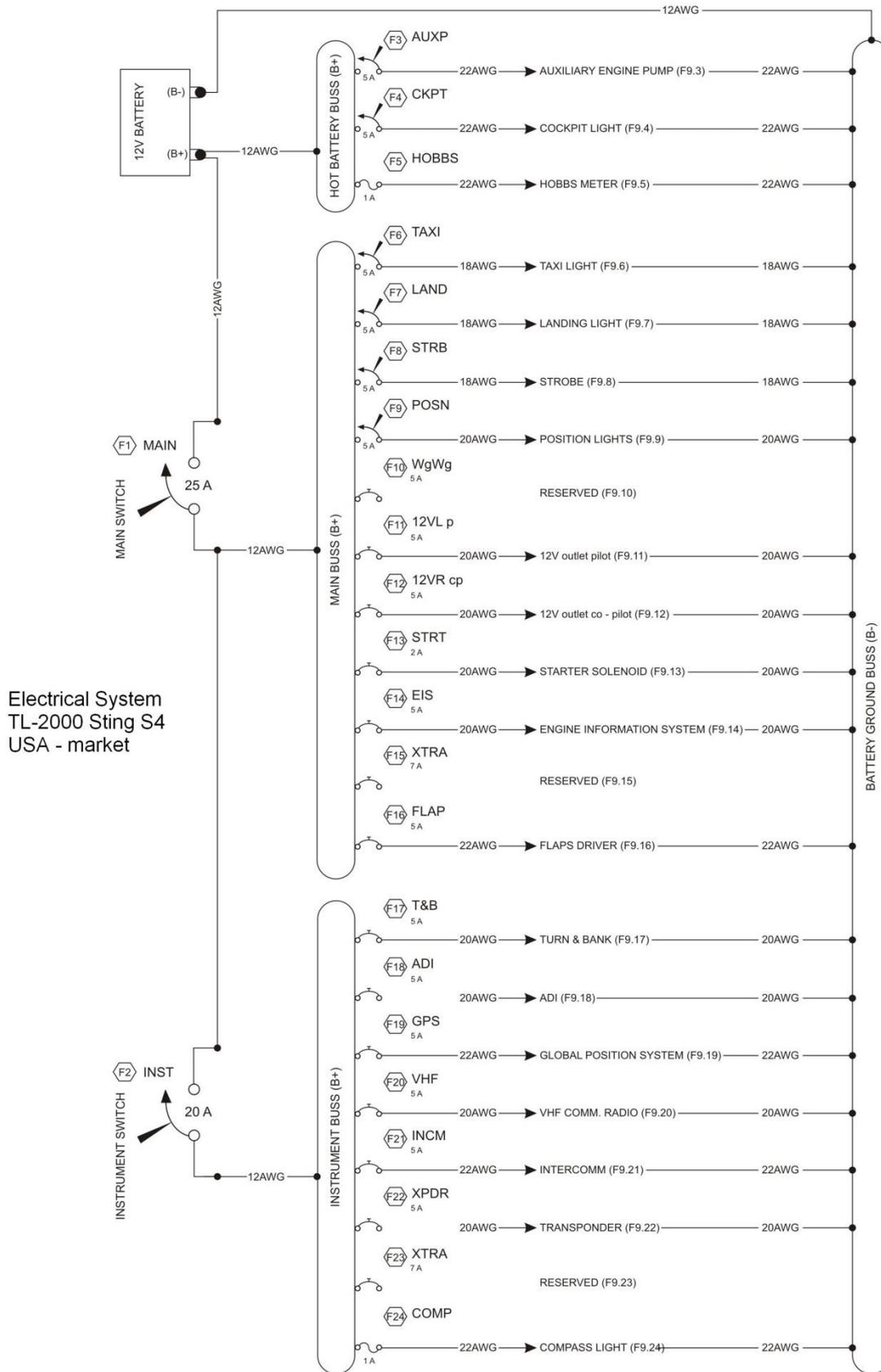
<b>NOTE</b>
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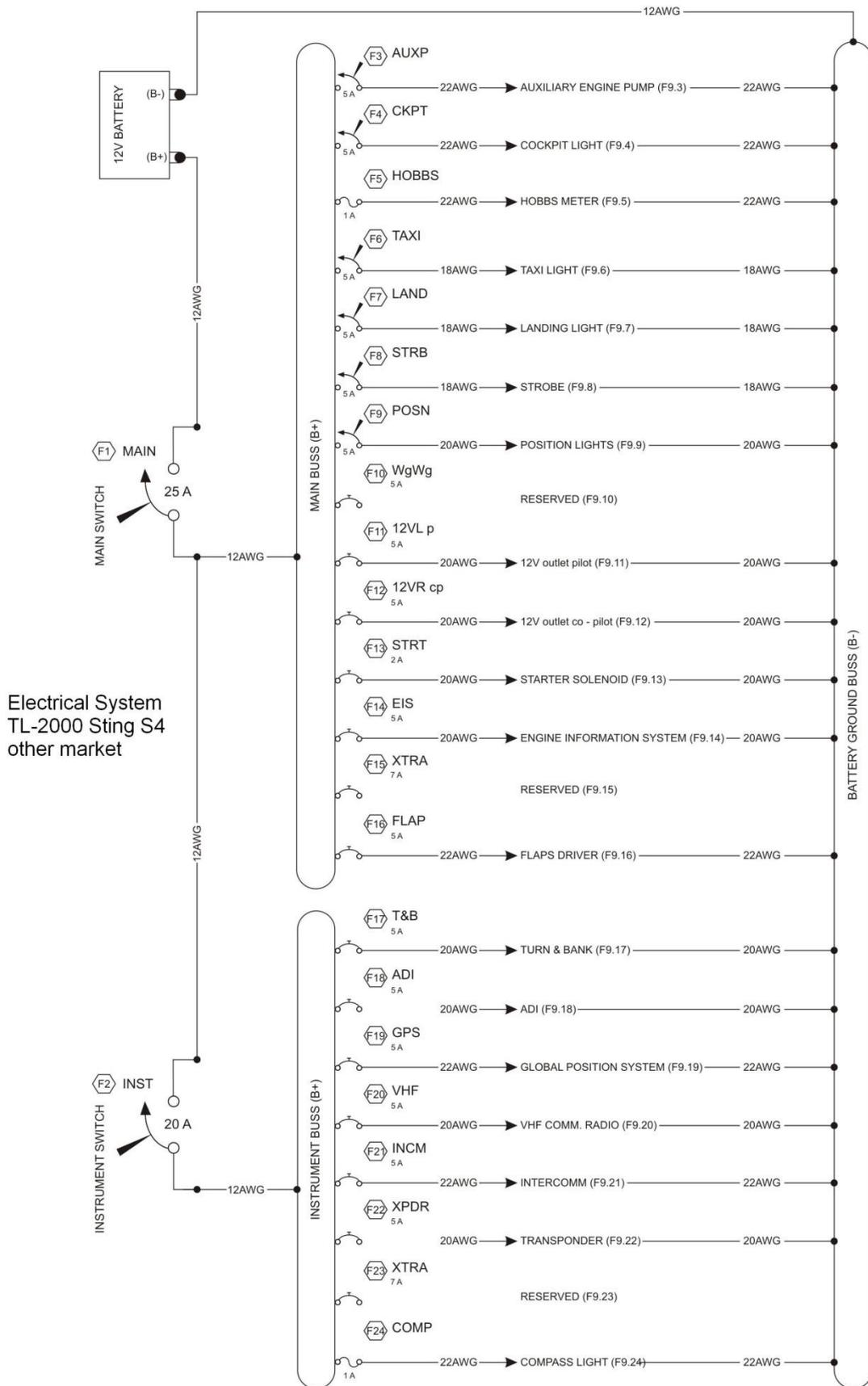
**The Garmin 295 GPS internal AA batteries should to be replaced at each annual condition inspection. The battery furnished with the Garmin 396 should be checked at each annual condition inspection and replaced in accordance with the manufacturer’s instructions.**

### 3.11 Electrical System

The aircraft is equipped with a 12-volt, direct-current electrical system with grounded negative pole. The primary source of electrical energy is provided by the engine mounted interior alternator/generator with total power of 750 W. The internal alternator located at the rear of the engine block will charge the battery up to 13.5 VDC. Power is supplied to the electrical and avionics circuits through a main bus bar located behind center instrument panel, this bus bar is energized anytime the Main switch is ON. Each system is protected by circuit breaker which is permanently on. If some circuit is overloaded, then the circuit breaker disconnects that circuit. The ELT is independent from the aircraft electrical system.

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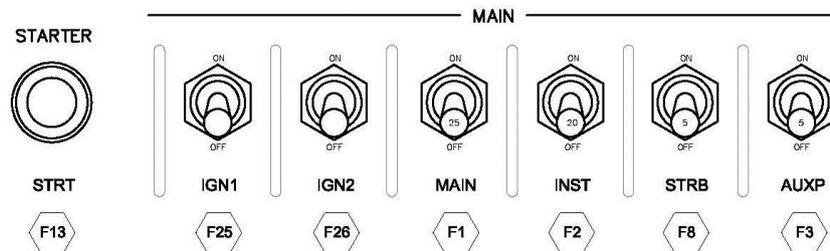


Two 12 VDC auxiliary power ports are installed in the lower right and left vertical surface of each seat. The ports are directly “hot-wired” to the battery and can be used to charge the battery without the operator having to connect additional leads directly to the battery.

**CAUTION**

**Do not attempt to start the engine with a dead battery by using either 12VDC port. The current load will exceed the wire capacity and a fire may result.**

The Instrument Switch activates all avionics equipment tied into the circuit. This instrument switch should always be in the OFF position before the main switch is turned on or before the main switch is turned off.



**Main switches on ceiling panel**

### 3.11.1 Exterior lighting

High capacity, anti-collision, safety strobe lights are located on each wingtip and one on the lower aft tail. These lights are encased in a clear-plastic, flush-mounted cover for protection and decreased drag. The center or ceiling panel has an ON/OFF circuit breaker-switch (CBS) for the strobe lights.

LED high intensity position-navigation lights are mounted on each wing tip and on the rudder trailing edge. The ceiling panel has an ON/OFF circuit breaker-switch (CBS) for the position lights.

The HID lamp is used for taxi and landing illumination and is mounted on the left wing leading edge. The ceiling panel has an ON/OFF circuit breaker-switch (CBS) for the landing light.

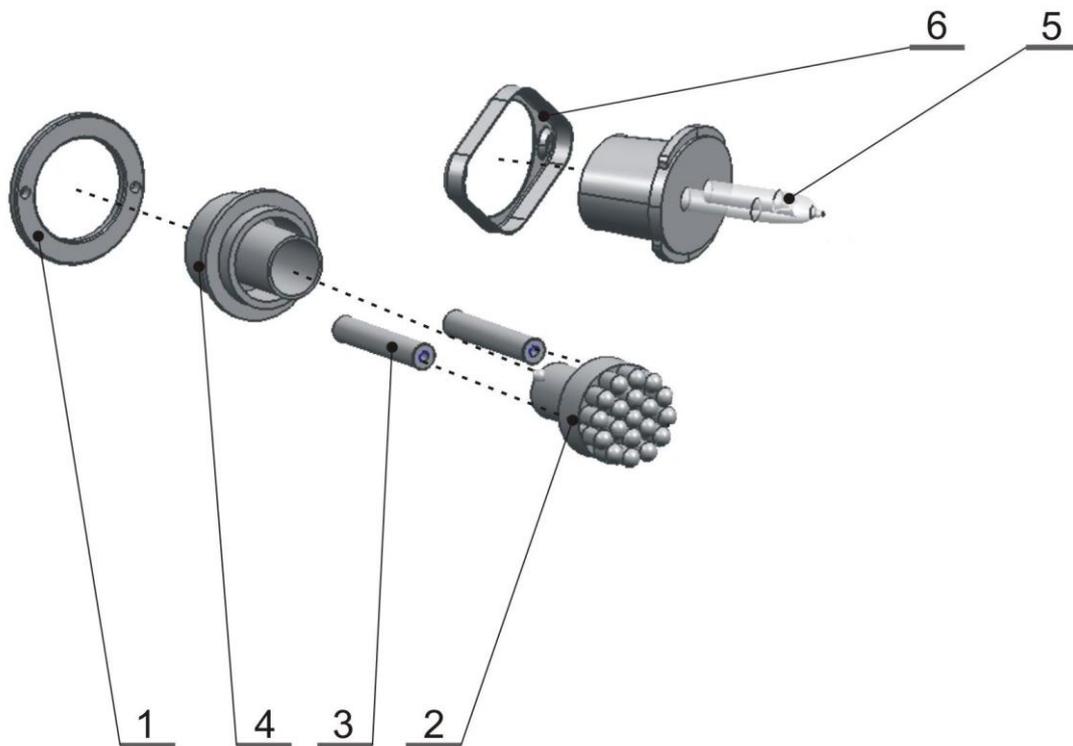
To wing tip lights installation one person is required.



<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Linesman's pliers (1pcs)
<b>Materials Required</b>	F-900 Torque seal

**Wing tip lights installation Checklist**

1) Light assembling. Assembly the wing tip light as shown.



Pos.	Part	Part number / Norm
1	LED light ring	s621_300_00-1
2	LED light 12V	s621_400_00-1
3	LED light spacer	-
4	LED light 12V socket	-
5	Strobe light	Krčmář
6	Strobe light socket	Krčmář



**NOTE**

**Wing tip lights could be mounted according to the customer's requirement.  
Aircraft could be fitted with various lights.**

**2) LED light 12V.** Mount LED light 12V assembly into the light console. Screw the light by a two black screws.



**3) Strobe light.** Mount the strobe light assembly into the light console. Screw the strobe light by a two black screws.





**4) Mount landing light.** Mount the landing light into the light console.



**5) Wing-to-wingtip lights wiring.** Connect all wing-to-wing tip light wiring, i.e. connect the lights sockets and plug.

**6) Light console installing.** Install the light console with lights on the wingtip. Use the Philips pan wood screws 3 x 10 with F900 Torque seal.

**7) Transparency light cover installing.** Install the Transparency light cover on the wing tip. Use the Philips pan wood screws 3 x 10 with F-900 Torque seal.





### 3.11.2 Generator

The 600 W generator is a part of the engine which supplies electric current through the rectifier. Regulator supplies electric current of 14 V voltage to onboard network. The maximum of approximately 18 amps is provided by the regulator, but only 14 amps should be considered available for use.

**Technical parameters of generator:**

Maximum output power: 600 W at 5500 RPM

**Technical parameters of rectifier - regulator:**

Type: electronic

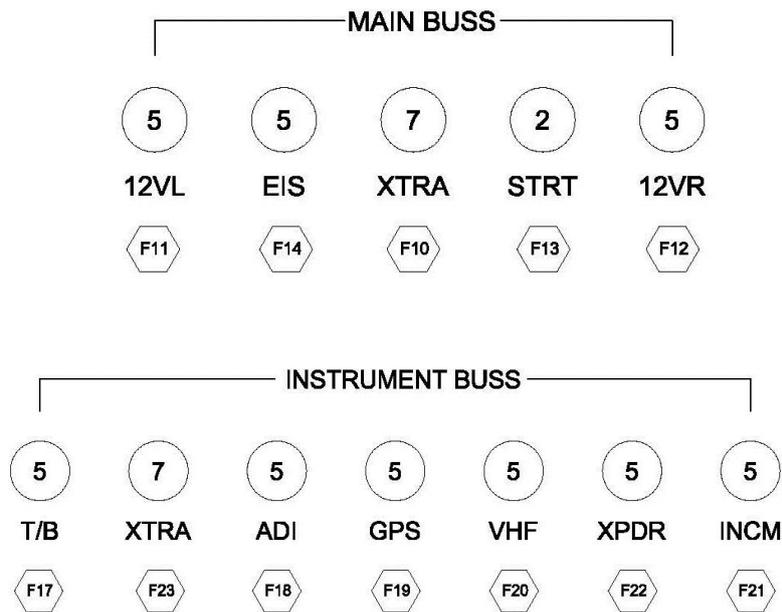
Output voltage:  $14 \pm 0.3$  V ( $000 \pm 250$  RPM)

Range of operation temperatures: min.  $-13$  °F max.  $+194$  °F

Weight: 0.6 lbs

### 3.11.3 Circuit breakers and fuses

Circuit breakers and fuses are the best protection for electrical loads and malfunctions. The most common form of protection for this aircraft is circuit breakers (CB) and circuit breaker-switches (CBS). The CBs cannot manually be pulled out to disconnect the circuit. If a surge or over-loading amperage is placed on a CB switch, the built-in circuit breaker will open turning the switch off, thus protecting the circuit. After reducing the electrical load, turn the switch back to the ON position to reset the breaker.



### 3.11.4 Battery

Both the GPS and the Emergency Locator Transmitter (ELT) contain internal batteries, and therefore can be operated when Main switch is OFF. The Garmin 295GPS contains six AA batteries. The ELT contains eight D-cell batteries, as well as one small battery in the remote control panel. All batteries should be replaced at each annual inspection. The Garmin 396GPS contains a rechargeable lithium-ion battery pack. The battery furnished with the Garmin 396 should be checked at each annual condition inspection and replaced in accordance with the manufacturers instructions.

The maintenance-free Varta battery or equivalent is installed on firewall. Battery can be charged directly in the airplane after disconnecting from the onboard electrical system.

#### Aircraft Battery Technical Parameters:

Voltage	12 V
Nominal capacity	24 Ah
Weight:	17 lbs
Discharging current	1200 mA
Maximum loading	200 A
Range of operation temperatures	-22°F to +122°F
Number of cycles, 100% discharging-charging:	more than 200
Service life:	4 to 5 years (Service life occurs at 60% of nominal capacity after full charging)



**NOTE**

If the airplane is not used for flight for more than one month, remove the battery from the airplane and store it. Always store the battery fully charged at temperature of 68 °F. Daily discharging is less than 0.1 % of battery nominal capacity. Regularly recharge it up to the full capacity once a month.

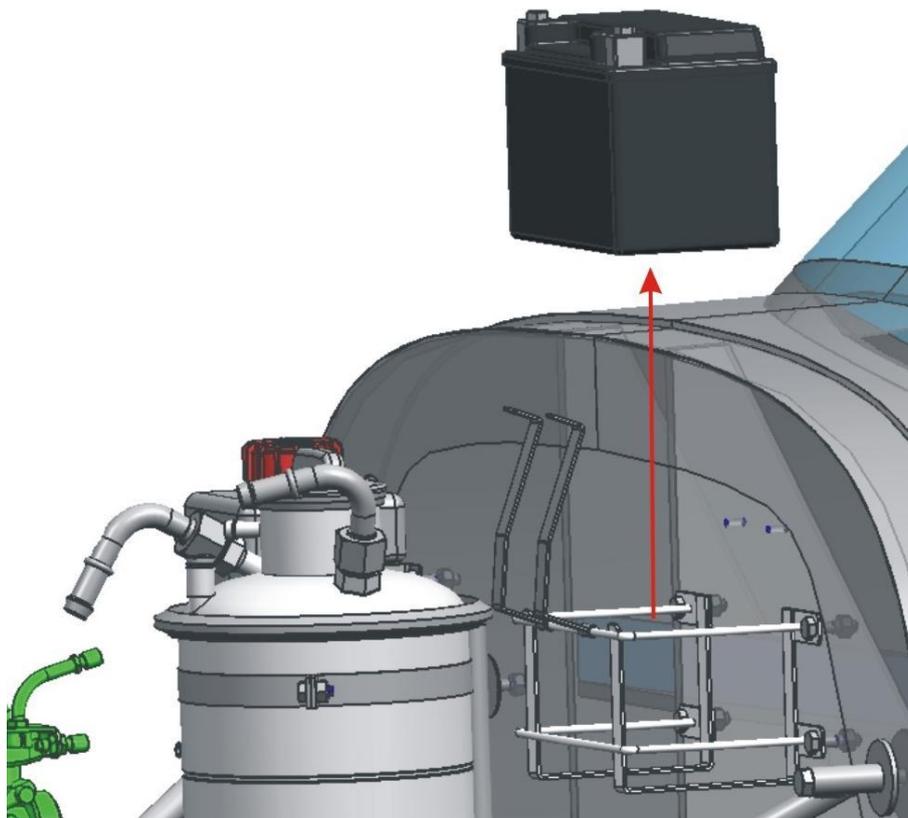
To battery removal one person is required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A& P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Cross-screwdriver (1pcs) Wrench 10 (1pcs)
<b>Materials Required</b>	-
<b>Battery removal Checklist</b>	
1) <b>Engine cover removing.</b> Remove Upper bowling.	
2) <b>Contacts disconnecting.</b> Disconnect the contacts from the battery.	
3) <b>Upper battery holder block.</b> Disconnect the Upper battery holder block i. e. remove two Philips mushroom head screws M4 x 10 ISO 7045.	
	



Pos.	Part	Part number / Norm
1	Bottom battery holder	s700_710_00-1
2	Upper battery holder block	s700_710_00-1
3	Battery	Varta 12V 8Ah 80A(EN)
4	Screw M4 x 10	ISO 7045

4) **Battery removing.** Remove the battery from the airplane.



**CAUTION**

To reduce the chance of personal injury and possible equipment damage, remove the negative wire before removing the positive wire.



To battery installation one person is required.

<b>Type of Maintenance</b>	Line
<b>Level of Certification Required</b>	L/O, RI, RM, A&P
<b>Task Specific</b>	Can be completed only by a responsible individual, which has received TL-Ultralight Airplane Operation Training.
<b>Tools Required</b>	Screwdriver (1pcs) Cross-screwdriver (1pcs) Wrench 10 (1pcs)
<b>Materials Required</b>	Electrical grease for battery contact

**Battery installation Checklist**

- 1) **Battery inserting.** Insert the battery into the Battery holder on the firewall
- 2) **Battery fastening.** Fasten the battery with fixing the Upper battery holder block so that it cannot move in the Bottom battery holder, i.e. fix the Upper battery holder block with two Philips mushroom head screws M4 x 10 ISO 7045.



Pos.	Part	Part number / Norm
1	Bottom battery holder	s700_710_00-1
2	Upper battery holder block	s700_710_00-1
3	Battery	Varta 12V 8Ah 80A(EN)
4	Screw M4 x 10	ISO 7045



**3) Additional contacts.** Install the additional electrical contacts to the aircraft electrical system.

**4) Contacts corrosion protection.** Install electrical grease on the battery contacts to minimize corrosion.

**5) Clamps installation.** Install the clamps on battery contacts from the aircraft electrical +/- system.



**6) Engine cowl installation.** Reinstall the Upper bowling.

### WARNING

**Failure to reconnect the battery connectors properly could result in reversing the polarity of the battery.**

### CAUTION

**Do not replace the dry cell battery with a wet cell battery. The dry cell battery has the electrolyte immobilized as a paste and the battery can be operated in any random position.**

### 3.11.5 Inspection and operation checks

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.

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 recommendations and procedures in the component manufacturer's maintenance instructions. Replace components of the electrical system that are damaged or defective with identical parts from the aircraft manufacturer's approved equipment, or its equivalent to the original in operating characteristics, mechanical strength, and environmental specifications.

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

<b>a</b>	Damaged, discolored, or overheated equipment, connections, wiring, and installations.
<b>b</b>	Excessive heat or discoloration at high current carrying connections.
<b>c</b>	Misalignment of electrically driven equipment.
<b>d</b>	Poor electrical bonding (broken, disconnected or corroded bonding strap) and grounding, including evidence of corrosion.
<b>e</b>	Dirty equipment and connections.
<b>f</b>	Improper, broken, inadequately supported wiring and conduit, loose connections of terminals, and loose ferrules.
<b>g</b>	Poor mechanical or cold solder joints.
<b>h</b>	Condition of circuit breaker and fuses.

<b>i</b>	Insufficient clearance between exposed current carrying parts and ground or poor insulation of exposed terminals.
<b>j</b>	Broken or missing safety wire, broken bundle lacing, cotter pins, etc.
<b>k</b>	Operational check of electrically operated equipment such as motors, inverters, generators, batteries, lights, protective devices, etc.
<b>l</b>	Ensure that ventilation and cooling air passages are clear and unobstructed.
<b>m</b>	Voltage check of system with portable precision equipment.

### 3.12 Structural Repair

Task Specific: can be completed only by a responsible individual, which holds either an FAA Mechanic certificate or an FAA LSA Repairman Certificate plus he (or she) must have received TL – Ultralight Structure Repairing course.

Otherwise all repairs can only be done at TL – Ultralight authorized service centers.

#### 3.12.1 Repair of Laminate parts

Any damage of parts from reinforced plastics with epoxy matrix leads to increased saturation of the matrix with humidity and subsequently to loss of properties. Carry out their repair as soon as possible after the damage has occurred.

According to the damage extent, it can be divided into repairs of:

1. **small damage**
2. **medium damage (not more than 10% of part damaged)**
1. **heavy damage**

General

Epoxy resin mixtures are prepared in a given mass ratio by means of weighing (accuracy of scales 0,002 lb)

**SMALL DAMAGE** (surface defects, not affecting the spars or other structure)

Repair of damage just by application of mastic and by varnish repair.

#### 1) Preparatory Sanding

For a good adhesion of repair layers it is necessary to carry out surface sanding at the utmost up to the depth of contact with the lower surface of fabric (do not damage). It is necessary to do surface sanding with overrun of 2" from the damage location smoothly to the top layer. It is suitable to do sanding with grain size of 160. Dry Sanding equipment with suction from the sanding area is used. Al<sub>2</sub>O<sub>3</sub> or equivalent (fused corundum) can be used as sanding material.

### 2) Dust removing

Wipe with clean and dry brush or by a vacuum cleaner.

### 3) Application of smoothing layer

After preparation of mixture and its eventual thickening to enhance the non-curtaining capability (for vertical or lower areas) is performed its application onto the repair area by means of a plastic spatula. For better distribution of deposited material on irregular surface it is possible to form it through the laid PE or PP transparent polyethylene. After proper application the layer is without bubbles. Deposit thickness is given by necessary thickness of surrounding layers (leveling) and ranges from 0.008" to 1/2" in one deposit.

Manufacturer	Type	Mixing Ratio	Delay	Rate of Setting	Time of Setting	Temperature	Fillers
MGS, A: L285 B: Hardener 285	Epoxy	A:B = 100:40	Process within 50 min (for 0.2kg mixture)	40%	16hours (32hours)	68-95°F (62-68°F)	Aerosil, Microballs
				100%	26hours (72hours) (2hours)	68-95°F (62-68°F) (176°F)	

### 4) Sanding

Sanding or eventually sealing the surface is made after setting the mixture and possible tearing of the used polyethylene. It is suitable to start sanding with grain size up to 160 and finish with grain size of at least 400. It is carried out by dry sanding equipment with suction from the sanding area. Al2O3 or equivalent (fused corundum) can be used as sanding material. Basic material of the part must not be diminished by sanding.

## NOTE

**Especially in case of carbon stiffener in the basic part, sanding through up to the stiffener must not occur**

### 5) Finishing

#### MEDIUM DAMAGE

Repair of damage by replacing the stiffener part, by mastic and varnish repair. At such repair it is necessary to distinguish type of used stiffener (especially for sanding):

- C (carbon), rovings of fabric of black color
- G (glass), rovings from milky white to transparent

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### 1) Preparatory Sanding:

For good adhesion of repair layers it is necessary to do sanding up to the depth of damage. It is necessary to do surface sanding from the damage area with overrun at the least 1" for every damaged stiffener layer smoothly up to the top layer and then about 2" for finishing and mastic application. It is convenient to do sanding with sanding material having grain size of 160. It is carried out by dry sanding equipment with suction from sanding area. Al<sub>2</sub>O<sub>3</sub> or equivalent (fused corundum) can be used as sanding material.

### 2) Dust removing

Dust is removed by wiping with a clean and dry brush or by a vacuum cleaner.

### 3) Stiffener preparation:

For this kind of repairs use the stiffener G (glass) with plain weave, 150g/m<sup>2</sup>, with surface protection for epoxy resins. Number of needed stiffener layers depends on depth of damage. It is possible to say that each layer of the mentioned fabric represents at proper saturation by matrix resin thickness of 0.020". Stiffener layers must be prepared (cut out) gradually from the smallest (the lowest) up to the bigger (upper), each with overrun of 3/4".

### 4) Putting layers

After preparing lamination mixture, it is applied to the place of repair by means of rigid brush. The first stiffener is laid into the deposit and it is again saturated by brush. Another layer of stiffener is laid and saturated. When putting the last layer it is necessary to pay attention to a proper saturation and compression of stiffeners so that they cannot "come up" to the surface and subsequent useless damage at final sanding. For better saturation of the surface by resin and securing against curtaining it is possible to put PE or PP transparent foil across the surface. When applied properly, the layer is without bubbles. Repair thickness should exceed surrounding surface in this phase by about 0,020" to 0,040" for finishing.

### 5) Sanding

Carry out sanding and eventually apply mastic on the surface after setting, eventually tearing of the foil. It is suitable to begin sanding by abrasive with grain size of 160 and finish by grain size of at least 400. Dry Sanding equipment is used with suction from the sanding area. Al<sub>2</sub>O<sub>3</sub> or equivalent can be used as sanding material. It is important not to diminish basic material of the part at sanding.

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### **HEAVY DAMAGE**

At such damage the part must be replaced.

### **CAUTION**

**When repairing structural parts, it is necessary to pay attention to timely repair see the text about low of properties at humidity effect.**

### **CAUTION**

**When repairing small damage, it is necessary to carefully pay attention not to damage any structural part!**

## **3.13 Painting and Coating**

Task Specific: can be completed a responsible individual, which holds either an FAA Mechanic certificate or an FAA LSA Repairman Certificate or aircraft owner plus he (or she) must have received TL – Ultralight Structure Repairing course.

### **3.13.1 Paint repairs**

#### **Safety rules**

**When working with paints, thinners and solvents follow the following safety rules:**

1. it is necessary to follow safety rules for working with flammable and volatile substances
2. working area must be properly aerated
3. it is prohibited to smoke and anyway handle with free fire in a working area
4. use protective working means such as goggles, gloves, respirator, etc.

Recommendation for additional surface treatment of the airplane surface

### **CAUTION**

**By applying permanent protective coats weight of airplane is increased and gravity center position is changed. Increase in weight depends on type of coat and its thickness.**

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### 1) Washing and degreasing

It is possible to use both organic solvents and water based solvents.

#### CAUTION

**All paints and solvents must be used only with caution for proper personal and environmental protection and disposal.**

**Organic solvents** – (acetone, metyetylketone (MEK), benzine, toluene)

Applied by spraying on washed surfaces (e.g. mechanical sprayer, jet ejector) or by wiping with wet (by pouring, not by dipping because it would contaminate the whole volume of solvent) textile wad. After applying it, the agent is wiped of by clean absorbing material before solvent evaporation.

**Advantages:** fast and reliable evaporation even from the corners and borders without additional warming

**Disadvantages:** it must be used without other dilution (expensive); not ecological (danger of water contamination); detrimental to health (must be carried out in an aerated area with personal protective means); waste (including dripping from the area) must be eliminated in the incinerating plants.

Use: for Al-alloys surfaces, epoxy fiberglass

#### CAUTION

**These agents must not be used for degreasing parts from plastics (PC -Lexan, PMMA Plexiglass)**

**Water-based agents** – (emulgation substances, wetting agents)

Applied also by spraying onto washed surfaces or by wiping with wet (by pouring and dipping) textile wad. After applying it, let it act for some time (see manufacturers recommendation) and then it is rinsed with clear water (by means of sponge dipped in ample amount of water or water jet).

**Advantages:** (different according to the type of product: it is possible to highly dilute with water (cheap); ecological - waste (including dripping from the surface due to ample amount of water it is necessary to contain it) can be generally eliminated after its additional dilution with water; the least detrimental to health.

**Disadvantages:** slow and unreliable evaporating from corners and borders, additional warming (drying) mostly required imperfect elimination of water results in

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wrong adhesion of paint coats; imperfect degreasing of fiberglass parts (not possible to use)

**Use:** for Al-alloys surfaces and plastics

### 2) Application of primer (paint)

In order to reach a uniform resistance to corrosion and smooth surface, carry out this application by means of spraying (air standard gun with the upper vessel, air HVLP gun, airless electric gun). The adjusting of the used gun (given by manufacturer) differs according to the type - air pressure, jet diameter. Primer should be applied in several sprayings (total thickness is not reached at a blow) with defined maximum dwell and total drying time till further treatment or handling.

Primer serves especially for anchoring (adhesion to the substrate) the topcoats and can serve also for eliminating irregularities of the surface (function of filler, for sanding).

Surface	Manufacturer	Type	Further Components	Surface Mass [lb/inch/ft <sup>2</sup> ]	Recom. Thickness [“]	Drying (between spraying / total) / 65°F
Carbon fiber Fiberglass	BASF Glasurit 801-1871 (base)	Epoxy	BASF Glasurit 965-35/2 (hardener)	8.49	0.00098 (at 0.00197 it can be also used as filler)	15 min / 12 hours
PC (Lexan), PMMA (Plexiglass)			Glasurit 965-50 (thinner)			

### 3) Bonding

After total drying of basic coat carry out total bonding of irregularities including repairs of bonding. After drying perform sanding with emery paper with grain size of 240 until the surface is smooth. After sanding clean dust and wipe off with grease remover and perform repairing paint coat by primer (1/3 of coat thickness).

### 4) Application of top coat

In order to reach smooth surface apply the paint coat only by spraying. Topcoat serves especially for creating the coat resistant to weather and external effects for aesthetic rendering of the unit. Considering the higher loading by external effects use top materials, exclusively two-component ones, on the acrylic-polyurethane or polyurethane basis, always with guaranteed adhesiveness to the used base coat (according to manufacturer).

### SMALL DAMAGE

#### General

Small damage is a deterioration of corrosion resistance. At repair the situation is made more difficult by the fact that the substrate for repair coats is not a compact surface of basic material but mostly all coats of surface protection (after sanding), of which not all are suitable for (in ageing stage) for good adhesion of paint coats. Therefore accomplish such repairs only by a verified system.

It is suitable to choose a defined edge delimited area (e.g. connection of parts, wing edge) for the scope of the place, which is being repaired transition, is then better blended. In the case that it is not possible to choose the area in this way, it is necessary to take into consideration the higher difficulty of the procedure as for the uniformity of shade and elaboration of coat transition.

#### Sanding

For good adhesion of the repair coats it is necessary to carry out sanding of the old paint coat at least up to such depth as the depth of damage. Ground area must be larger from 2" to 4" than damaged area. With two-coat type of the topcoat it is necessary to add at least 2" for the run-out of the top coat. Sanding can be started with abrasive having grain size of max. 160 and finish with grain size of 400. It is made by the grinder equipped with the suction from the area of sanding or by manual sanding under water.

#### Degreasing

It is carried out in the same way as in the case of the total spray coat.

#### Application of primer

For reaching the satisfactory equal adhesion to carry out a spray coat of the place to be repaired by adhesive interlayer

Surface	Manufacturer	Type	Surface weight [lb/inch/ft <sup>2</sup> ]	Recomm. Thickness ["]	Drying (total) / 65°F
Al-alloys	BASF Glasurit 934-0	Single- component	4.19	0.00019- 0.00039	max 15 min
Epoxy fiberglass					
Old paint coats					

Subsequently the primer is applied according to the table.. Paint coat thickness is given by necessary thickness of surrounding coats (leveling).

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**CAUTION**

**In case that the primer was not removed by the previous step, it is not necessary to apply the primer again. The original ground primer with adhesive intercoat is enough. Actual application of primer will be carried out in the same way as for the total spray-coat**

**Application of top coat**

Application of the top coat will be carried out by spraying as for the total spray coat with the exception of used thinners and hardeners. Due to the need of smooth transition to the basic surface it is necessary to use so called "spraying into the surface" using longer time of drying initiations for a good result of work.

**FINISH COATINGS COLORS AND NUMBER**

Paint number: Rabbe, RAL9003, Signal White  
 Silicone number: GE Silicone II, White

**3.13.2 Paint repairs – Method of Verification**

For final inspection touch the painted (or coated) surfaces of parts. Finished surface must be smooth, no dents or bumps are allowed. Ensure original profile of the treated surfaces, if necessary. Inspect painted surface visually from various viewpoints. No paint runs, unpainted areas are allowed. Quality of polishing must be the same of adjacent areas.

**3.14 Securing bolted connections**

**3.14.1 General**

Bolt/nut joint securing is used in order to prevent from their loosening due to vibration or force action on the connected parts, which could result in the damage of the connected parts. Three ways of bolt joint securing are used on the airplane: safety wire, cotter pin and locking washer.

**3.14.2 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.

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**Figure:** Securing bolts or castle nuts with a cotter pin.

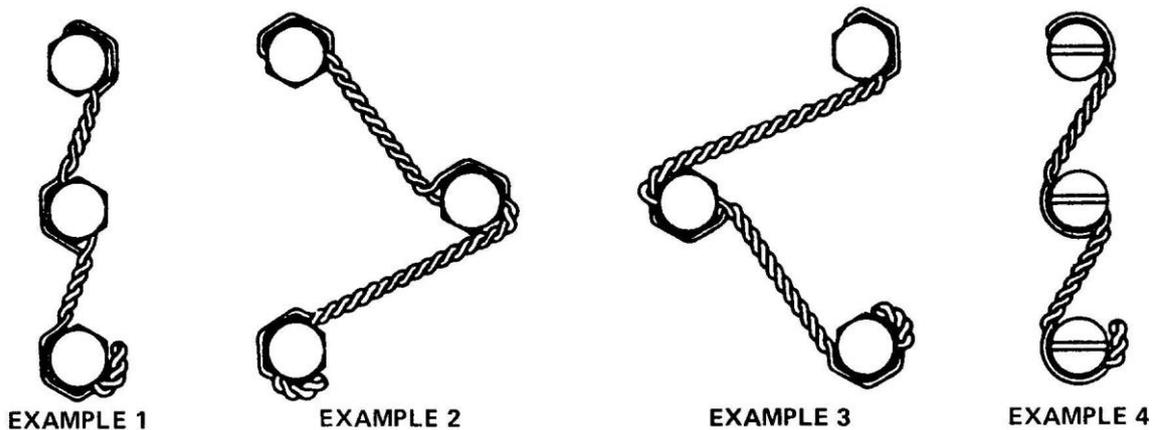
Cotter pin removal is very easy: by means of a flat screwdriver straighten up the bent ends of the cotter pin and take the cotter pin out of the hole with small pliers.

**CAUTION**

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 Figure above.

**3.14.3 Safety Wire**

Procedure of bolt joint securing is by stainless steel wire having diameter of 0.032".



**Figure:** Examples of correct direction for drilled bolt safety wire



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. See figure on above.

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 complete turns (1/2" to 5/8") of wound wire to complete a loop.

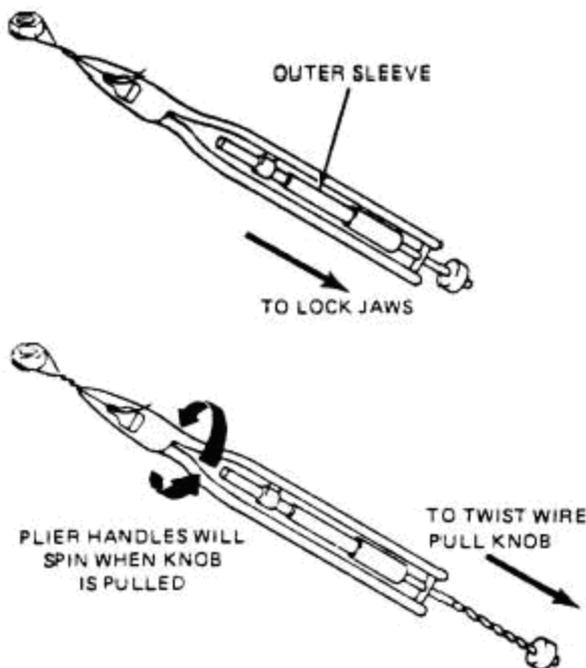


Figure: Safety wire pliers

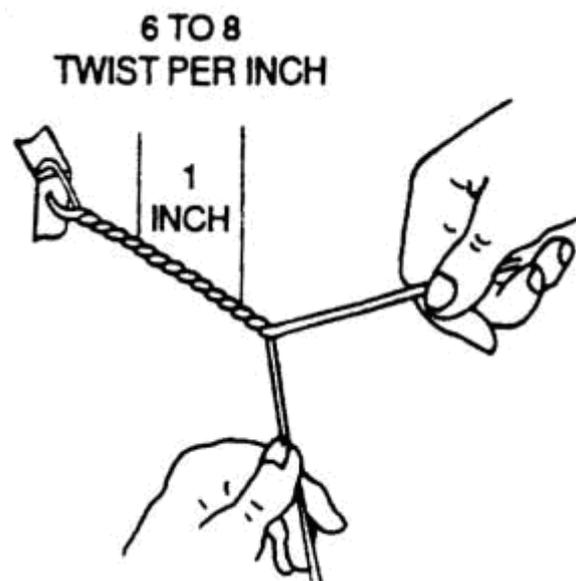
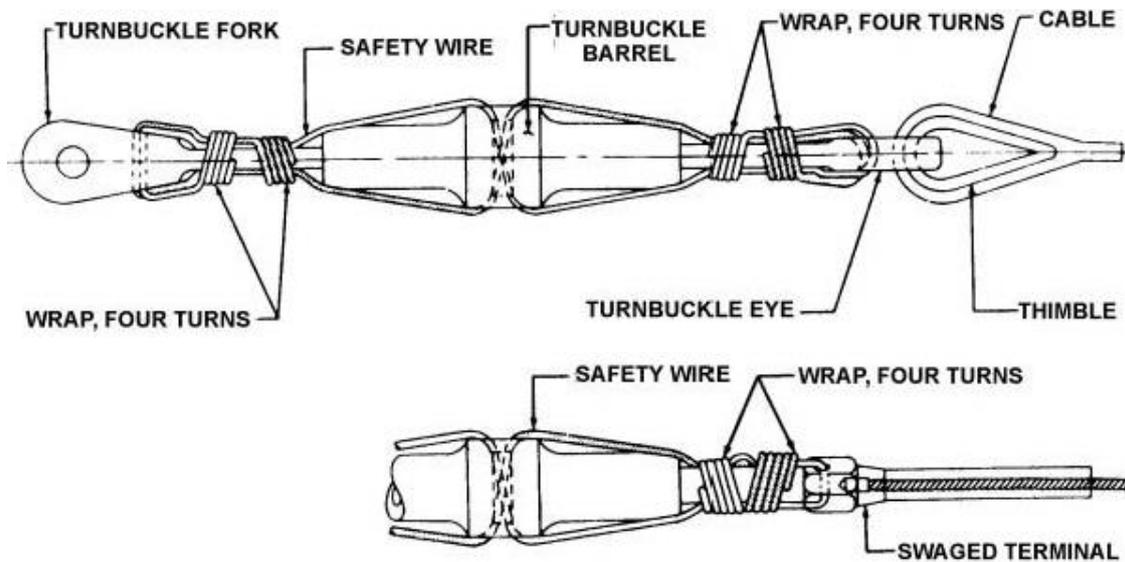


Figure: Twisting the wire

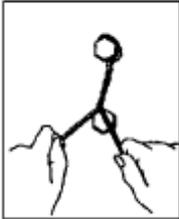
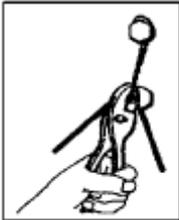


**Figure:** Safety wire installation to turnbuckles and swaged terminals

Safety wire procedures, alignment and installation are shown below:

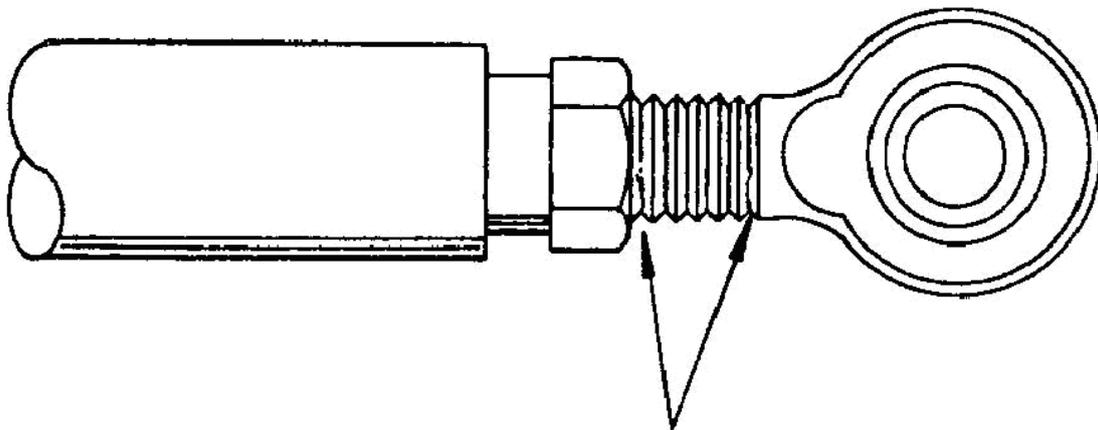
	<p>1. Adjust the correct position of holes for safety wire.</p>		<p>6. Pull the upper wire through the hole in the other bolt. Hold the wire end by pliers tighten it firm.</p>
	<p>2. Pull the safety wire through the hole in one bolt to be secured.</p>		<p>7. Hold the free end of wire by hand, bend it around the bolt head and along with the other end twist it counterclockwise.</p>
	<p>3. Hold the upper end of the wire and wind it around the bolt head and then by the other end of the wire. Make sure that the wire is properly tightened around the head.</p>		<p>8. Hold the twisted end by pliers and twist it tight.</p>



	4. Twist the wire to the hole in the next bolt as tight as possible.		9. Bend the end of the wire under the bolt head.
	5. Tighten the wire and at the same time continue its twisting until perfectly tightened. The twisted wire can have approximately from 3 to 4 threads on the length of 0,4".		10. Cut off the surplus wire.

### 3.14.4 Inspection of rod ends

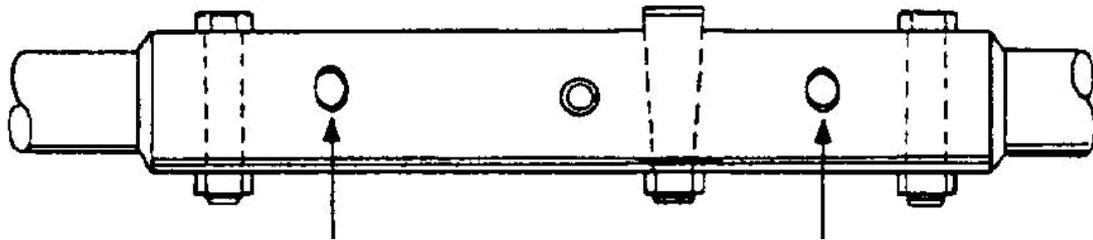
**Cracks and subsequent failures** of rod ends usually begin at the thread end near the bearing and adjacent to or under the jam nut. (See figure below)



Typical locations for rod end cracks

### 3.14.5 Inspection of push pull tube connections

**Elongated holes** are especially prevalent in taper-pin holes and bolt holes or at the riveted joints of torque tubes and push-pull rods. (See figure below)



Typical locations for elongation of insert holes in push pull tubes.

## 3.15 Cable inspections Swaged Nicopress clamp installation

### 3.15.1 Cable system Inspections

The aircraft uses cable only for the rudders and trim system. These cables are subject to many environmental exterior and interior conditions which can result in deterioration over of a long period of time. Wire or strand breakages is easy to visually recognize when bent into a curve. See Figure below. Other deterioration, such as wear, corrosion and distortion are not so easily seen. Therefore the control cables and all critical areas of fatigue, fairleads, pulleys and swaged connections should receive a detailed inspection at the annual condition inspection for signs of such deterioration.



**Figure:** Wire cable strands exposed by bending the cable.

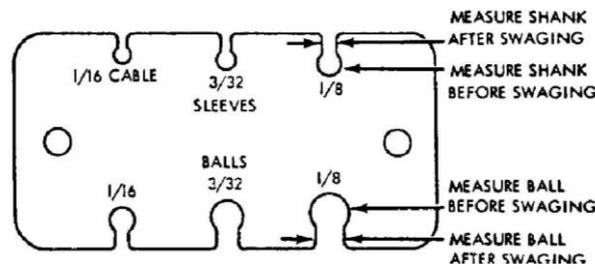
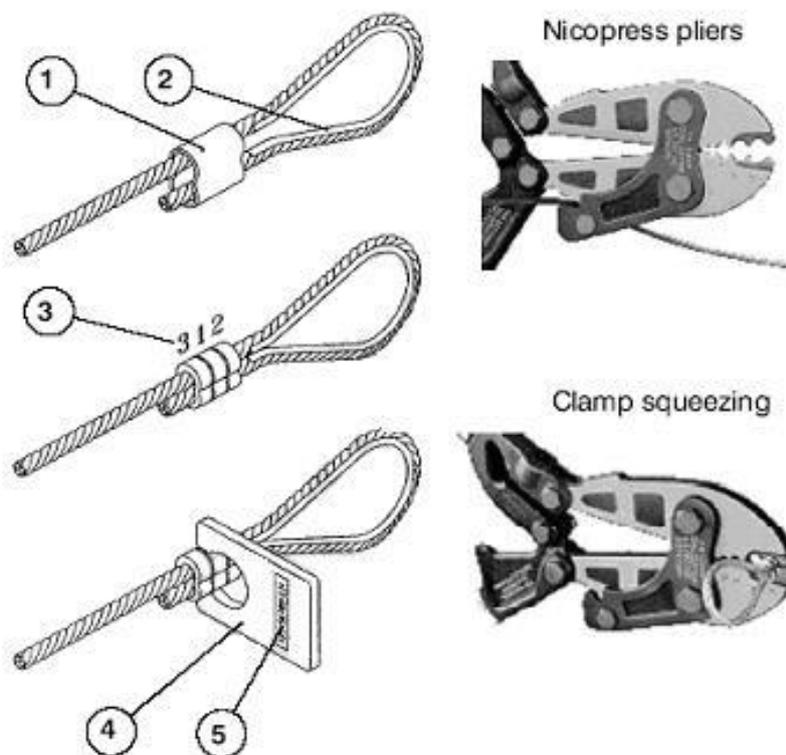


Figure: Swage terminal shank gauge

Nicopress clamp installation procedure is shown below:



Pos.	Part	Part number / Norm
1	Clamp	-
2	Eye	-
3	Sequence of squeezing	-
4	Inspection gauge	-
5	Gauge No.	-

Accomplish all procedures in accordance with the manufacturer directions. First pull the cable through the clamp, make a loop around the eye and pull the cable end back through the clamp. The cable end should overlap by about 1 ¼” from the clamp after its pulling through. The overlapping will ensure that the cable end will not be pulled back into the clamp during the clamp squeezing.

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Before actual squeezing the clamp it is also necessary to verify which cable terminal will be used, whether thimble or suspension eye, because some terminals must be put into the cable before actual clamp squeezing.

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