



LAA TYPE ACCEPTANCE DATA SHEET
TADS 347
TL 2000UK STING CARBON &
TL 2000UK STING CARBON S4

Issue 2	Addition of LAA mandatory inspection MOD/347/034 and corresponding service bulletin. Minor editorial changes.	Dated 22/02/19	JV
Revision A	Note added to MOD/347/033. Addition of Safety Spot articles	Dated 27/04/20	MR

This TADS is intended as a summary of available information about the type and should be used during the build, operation and permit revalidation phases to help owners and inspectors. Although it is hoped that this document is as complete as possible, other sources may contain more up to date information, e.g. the manufacturer's website.

Section 1 contains general information about the type.

Section 2 contains information about the type that is **MANDATORY** and must be complied with.

Section 3 contains advisory information that owners and inspectors should review to help them maintain the aircraft in an airworthy condition. If due consideration and circumstances suggest that compliance with the requirements in this section can safely be deferred, is not required or not applicable, then this is a permitted judgement call. This section also provides a useful repository for advisory information gathered through defect reports and experience.

Section 1 - Introduction

1.1 UK contact

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1.2 Description

The TL 2000 is a Group 'A', two-seat, side-by-side, low-wing, tractor propeller, tricycle aeroplane of conventional layout and composite construction which is manufactured by TL Ultralight of Hradec Kralove, Czech Republic. It uses the 100hp Rotax 912-ULS engine and Woodcomp SR3000-170 or TL Powermax 1748 mm, both of which are electrically-actuated VP propellers. It is derived from the 80hp TL-96 Star.

The TL 2000UK variant is supplied as a kit for the UK market, and requires modifications to achieve compliance with the certification basis. Components for the modifications are included in the kit.

The fuselage is a composite monocoque with the fin integral, moulded in two halves. There are bulkheads for the firewall and ahead of the tailplane, semi-bulkheads for boundaries of the tank and seats, and several frames. The large forward-opening canopy is hinged from the firewall, latched in 3 places and supported by two gas struts. The integral fuel tank is under the cockpit floor. The rudder is attached by two hinges: one mounted in the fuselage and one on the fin, and has an aerodynamic horn balance.



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The tapered wings are detachable, glider-style. The wings are entirely composite. There is a main spar and a rear spar, the latter carrying the flap and aileron hinges, a root rib and a tip closure in each panel. There are no other ribs. There are two shear ball fittings on each side of the fuselage, which enter receptacles in the wing panel root ribs. The spar tangs cross under the occupants' seats, and are secured by a single pin on the centreline. The wings have split flaps and differential ailerons. The pitot-static head is mounted under the starboard wing. Optional long-range tanks can be installed, during build, in the root of the forward cell of the two-cell wing.

The tailplane is a two-spar structure attached to the fuselage by two pins at the mainspar and a bolt near the leading edge. The elevator is attached by five hinges. The inset tab is attached by three hinges, and is both a trim tab and an anti-balance tab.

The tricycle landing gear comprises an elastomerically-sprung, oil-damped, steerable noseleg of heat-treated 4130 steel and two fuselage-mounted, glassfibre composite spring mainlegs. All tyres are 400x100. The mainwheels have disc brakes with single callipers (dual callipers on some early UK aircraft with dual brakes). All wheels have fairings, the nosewheel fairing extending to cover the leg as well.

The pilots' controls are sticks and bottom-pivoted pedals with toe brakes. The pedals are adjustable. The ailerons, elevator and flaps are operated by pushrods. The flaps have two deployed positions. The rudder is operated by cables. The rudder circuit is completed by steering links to the steering lever on the noseleg. The throttle lever is co-axial with the trim lever and they share a friction adjustment. There is no mixture control. The propeller pitch adjustment is by means of a switch on the instrument panel. The fuel selector has two positions only.

The engine is the Rotax 912-ULS in a conventional installation. The silencer exhaust ejects downwards. The radiator is mounted beneath the engine and the oil cooler is on the starboard side with its own NACA duct. There are additional cooling-air inlets for the barrels, and for ventilating the upper aft region of the engine bay. The cowling is split into upper and lower parts, secured by Camlock fasteners to each other and to the firewall. The firewall is stainless steel backed with Fiberfrax. There are drip trays under the carburettors and redundant mountings for the carburettors to overcome two common issues with Rotax installations. The standard propeller is a 1700mm diameter 3-blade electrically-actuated VP Woodcomp SR3000 or a 1748 mm diameter 3-blade electrically-actuated VP TL Powermax.

There are some 30 differences between a UK TL2000 complying with CS-VLA and a typical European microlight variant. Some of the UK modifications have been adopted for LSAs, and some for all future production. The modifications include a new noseleg, fireproof firewall, structural reinforcement, and extensive changes to the trim system. The S4 variant includes all but 10 of these differences as part of the kit delivery standard. The S4 variant also includes a number of improvements over the original design, including: engine cowlings redesigned for improved engine cooling; redesigned canopy to aid entry and improve ventilation; rudder pedals in-flight adjustable; luggage bay with top entry for easier access; electric flaps; redesigned rudder and fin; larger wheels and tyres; redesigned wheel spats and instrument panel. The S4 variant is normally fitted with a Rotax 912iS and either Woodcomp SR3000 1700 mm or Kiev 283/1800 prop.

Note that the only propeller(s) approved for an individual aircraft are those listed on the individual aircraft's Operating Limitations document or in the PTL/1 (Propeller Type List) for the type.



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Section 2 – Mandatory information for owners, operators and inspectors

At all times, responsibility for the maintenance and airworthiness of an aircraft rests with the owner. Condition No 3 of a Permit to Fly requires that: *"the aircraft shall be maintained in an airworthy condition"*.

2.1 Fast Build Kit 51% Compliance

The following items must be carried out by the builder to satisfy the 51% rule:

Preparatory work	Inspect incoming fuselage kit Inspect tail kit components Inspect wing kit components Inspect undercarriage components Inspect engine installation components
Fuselage	Install brackets and fittings Fabricate cables, wires and lines Install cables, wires and lines Install canopy Make and install elevator pushrod guide Fabricate and install engine mounting attachment reinforcement
Wings	Install cables, wires and lines Install and rig wings to fuselage Make and fit leading edge stall strips Fabricate aileron trim tab Install aileron trim tab Install and rig aileron Install and rig flap
Tail	Install and rig elevator trim tab Install and rig elevator Install rudder brackets and fittings Fabricate rudder trim tab Install rudder trim tab Install and rig rudder Install and rig trim range expansion interlink elevator/flap Inspect and install empennage Install ballast in tailplane nose pocket
Undercarriage	Fabricate cables, wires and lines Assemble wheels, brakes, tyres, landing gear Install landing gear components Fabricate wheel spats
Powerplant	Install engine Install cowlings Install propeller Install fuel system components Install firewall
Cockpit	Install instrument panel



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Fabricate seats
Install seats
Fabricate electrical loom
Install electrical systems
Install avionics
Install aerials
Install lights
Install standoffs under seats

Final assembly

Paint aircraft
Install placards and registration marks
Ground tests

Note: It is acceptable that the seats and wheel spats are factory-supplied for early kits providing the amateur builder has carried out the alternative tasks of:

- Rear fuselage composite reinforcement
- Reinforcement of seat belt brackets
- Reinforcement of wing root ribs.

2.2 Build Manual

TL2000 Sting Build Manual v0.3.11 has been accepted by the LAA.
TL2000 Sting S4 Build Manual Part 1 v2 (Dec 2016) has been accepted by the LAA.
TL2000 Sting S4 Build Manual Part 2 v2 (Jan 2017) has been accepted by the LAA.

These are available from TL Sting UK Ltd.

2.3 Build Inspections

Build inspection schedule 60 (TL 2000UK Sting Carbon).
Inspector approval codes AC-1 or A-A or K. Inspector signing off final inspection also requires 'first flight' endorsement.

2.4 Flight Manual

Aircraft Flight Manual TL2000 Sting Carbon 600 kg UK has been accepted by the LAA.
This is available from TL Sting UK Ltd.

2.5 Mandatory Permit Directives

None applicable specifically to this aircraft type.

Also check the LAA website for MPDs that are non-type specific ([TL2.22](#)).



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2.6 LAA Required Modifications (including LAA issued AILs, SBs, etc)

The following modifications must be incorporated at the time of build (components should be included in the kit):

<i>LAA reference</i>	<i>Description</i>	<i>Drawing number</i>	<i>Applicability</i>
MOD/347/001	Roll-over hoop modification	TQN9020	Not S4
MOD/347/002	Rear Fuselage re-enforcement (one extra layer of carbon fibre and additional semi bulk head)	TQN9021	Not S4
MOD/347/003	Stainless Steel Firewall with Fibrefrax	TQN9022	Not S4
MOD/347/004	Narrow chord, wide span elevator trim tab, up elevator bias spring deleted	TQN9019	Not S4
MOD/347/005	Elevator Wedges or 2° tailplane incidence reduction	TQN9019	Not S4
MOD/347/006	UK redesigned nose Leg	TQN9023	All variants
MOD/347/007	Wing stall strips	TQN9017	Not S4
MOD/347/008	Trim tab drive gearing and pushrod configuration	TQN9019	Not S4
MAD/347/009	Straight trim rod with solid fork ends and solid rivets (not pull rivets)	TQN9024	All variants
MOD/347/010	Elevator push rod anti-buckling support	TQN9025	Not S4
MOD/347/011	Fireproof metal brake reservoir	TQN9026	All variants
MOD/347/012	Crashproof metal gascolator and heatshield added	TQN9027	Not S4
MOD/347/013	Rudder pedal mountings - floor reinforcements	TQN9037	Not S4
MOD/347/014	Rudder pedal mounting block bores - opened up	TQN9031	Not S4
MOD/347/015	Centre harness attachment reinforcement	TQN9032	Not S4
MoD/347/016	Addition of ventilation holes to flying surfaces	TQN9000	All variants
MOD/347/017	Canopy location lugs - nylon sockets in fuselage	TQN6006	Not S4
MOD/347/018	Rudder centring strip & noseleg steering bearings	TQN9033	Not S4
MOD/347/019	Larger size coolant radiator	TQN9034	Not S4
MOD/347/020	UK placards	TQN9007	All variants
MOD/347/021	Compass deviation card	TQN9008	All variants
MOD/347/022	Addition of starter warning light	TQN9014	All variants
MOD/347/023	(Cancelled)		
MOD/347/024	Fireproofing fuel pipes and metal fuel fittings	TQN9035	All variants
MOD/347/025	Stiffnuts replaced by castle nuts and split pins	TQN9036	All variants
MOD/s47/026	Substitution of Andair fuel valve	TQN903B	Not S4
MOD/347/027	Ground adjustable aileron tab	TQN9039	Not S4
MOD/347/028	Addition of over-centre preventer to elevator trim mixer	TQN9040	Not S4
MOD/347/029	Addition of braces to firewall	TQN9041	Not S4
MOD/347/030	Reinforcement of wing root rib	TQN9042	Not S4



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MOD/347/031	End grain balsa stand offs between seats and spar tangs	TQN9043	All variants
MOD/347/032	Trim speed range expansion - bungee between flap torque tube push rod fork end and elevator back stop	TQN9044	Not S4
MOD/347/033	Modified electrical system (refer to current build manual)		S4 fitted with Rotax 912iS

Note that where it states 'not S4' above, in most cases this is due to incorporation of the feature into the basic design.

The following modifications/inspections must be incorporated/carried out in service:

<i>LAA reference</i>	<i>Description</i>	<i>Applicability</i>
MOD/347/034	Inspection of horizontal stabiliser securing pins (see also LAA/AWA/18/12 and TL SB 2018/001)	All variants

2.7 Additional engine operating limitations to be placarded or shown by instrument markings

Notes:

- Refer to the engine manufacturer's latest documentation for the definitive parameter values and recommended instruments.
- Where an instrument is not fitted, the limit need not be displayed.

With Rotax 912-ULS engine:

- Maximum CHT: 135°C
- Max Coolant Temp: 120°C (with 50/50 Glycol/water coolant)
- Oil Temp Limits: 50°C to 130°C (Normal 90-110°C)
- Oil Pressure: 2-5 Bar
- Minimum Fuel Pressure: 0.15 bar

2.8 Control surface deflections

Ailerons (wing trailing edge to aileron trailing edge)	Up: 11 cm ± 2 cm Down: 7.5 cm ± 2 cm
Elevators (elevator trailing edge to top tip of rudder)	Up: 114 cm ± 2 cm Down: 128 cm ± 2 cm
Elevator tab	Set by gearing
Rudder (centre of fuselage to rudder bottom tip)	Left: 18 cm ± 2 cm Right: 18 cm ± 2 cm
Flap (wing trailing edge to flap trailing edge)	First stage: 8 cm ± 2 cm Second stage: 17 cm ± 2 cm



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2.9 Operating Limitations and Placards

(Note that the wording on an individual aircraft's Operating Limitations document takes precedence, if different.)

1. Maximum number of occupants authorised to be carried: Two
2. The aircraft must be operated in compliance with the following operating limitations, which shall be displayed in the cockpit by means of placards or instrument markings:
 - 2.1 **Aerobatic Limitations**
Aerobatic manoeuvres are prohibited.
Intentional spinning is prohibited.
 - 2.2 **Loading Limitations**
Maximum Total Weight Authorised: 600 kg
CG Range*: Aft limit 428 mm aft of datum. Forward limit 275 mm aft of datum at weights of 460 kg or less. Forward limit varies linearly between 275 mm aft of datum at 460 kg and 337 mm aft of datum at 600 kg.
Datum point is*: wing leading edge at the root
Maximum seat load: 98 kg
Maximum baggage weight: 8 kg in each locker and 8 kg on baggage shelf
 - 2.3 **Engine Limitations**
Maximum Engine RPM: 5800
Maximum continuous engine RPM: 5500
 - 2.4 **Airspeed Limitations**
Maximum Indicated Airspeed (V_{NE}): 144 KIAS
Max Indicated Airspeed Flaps Extended: 77 KIAS (15°), 66 KIAS (full)
Maximum Structural Cruising Speed (V_c): 120 KIAS
Maximum Manoeuvring Speed (V_a): 120 KIAS
 - 2.5 **Other Limitations**
The aircraft shall be flown by day and under Visual Flight Rules only.
Smoking in the aircraft is prohibited.

Additional Placards:

"Occupant Warning - This Aircraft has not been Certificated to an International Requirement"

A fireproof identification plate must be fitted to fuselage, engraved or stamped with aircraft's registration letters.

* Note that the cg range and datum are different from that given in the manufacturer's information for the S4 variant. The manufacturer states the cg datum to be the tip of the propeller spinner, which should equate to 1730 mm forward of the wing leading edge of the root for the standard propeller/engine configuration; however, as propeller and engine changes are common on LAA aircraft, it is more appropriate to use the wing leading edge. The approved cg range is that which has been tested by the LAA to meet the appropriate approval requirements, including stability requirements, and differs from the manufacturer's stated range.



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2.10 Maximum permitted empty weight

Not applicable.

Section 3 – Advice to owners, operators and inspectors

3.1 Maintenance Manual

Maintenance Manual TL Sting Carbon 600 kg CS-VLA has been accepted by the LAA. This is available from TL Sting UK Ltd.

3.2 Standard Options

1. Some early aircraft are fitted with dual calliper brakes
2. Dynon Skyview D1000 EFIS
3. Dynon Skyview autopilot*
4. Garmin G3X Touch EFIS
5. Garmin heated pitot tube
6. Garmin G3X autopilot*
7. TL Ultralight strobes, navigation and landing lights
8. TL Ultralight dual brakes
9. TL Ultralight parking brake
10. Galaxy 6/600 SD S-LSA recovery parachute system (contact LAA Engineering prior to retrofitting)
11. Long range fuel tanks
12. Heated seats
13. Leather seats
14. Floscan 201 fuel flow sensor for use with EFIS units
15. Tinted canopy
16. Skydrive coolant-type carb heater

* Note that autopilot installations need to be individually approved by LAA Engineering due to the testing required. If fitting retrospectively, please contact LAA Engineering. If fitting as part of initial build, please include forms LAA/IC-APR and LAA/IC-APP, as appropriate, with your build paperwork.

The retractable gear and aerotowing options offered by the factory have not yet been approved by the LAA. Electric flaps are only approved on the S4 variant.

3.3 Manufacturer's Information (including Service Bulletins, Service Letters, etc)

In the absence of any over-riding LAA classification, inspections and modifications published by the manufacturer should be satisfied according to the recommendation of the manufacturer. It is the owner's responsibility to be aware of and supply such information to their Inspector.



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<i>Ref</i>	<i>Date</i>	<i>Description</i>	<i>Factory compliance status</i>	<i>Applicability</i>
SB 2018/001	6/12/18	Maintenance of the stabiliser securing pins	Advisory (note that LAA has mandated this as MOD/347/034)	All variants

3.4 Special Inspection Points

Nil.

3.5 Operational Issues

The following *Safety Spot* articles are relevant to TL2000 Sting aircraft:

Light Aviation [May 2011](#) *TL Sting- In Flight Tailplane Detachment*
TL Sting suffering catastrophic failure of the tailplane in flight, aircraft saved by BRS. Article notes tailplane sailplane like spins and their frequent inspections noted in AIL [MOD/347/034](#) and [LAA/AWA/18/12](#)

Light Aviation [May 2011](#) *Leaking Drain Valve*
'O' ring on a fuel drain valve damaged and causing a leak of fuel. Also the drain valve was of the type that could be accidentally left open. Accidental fuel starvation could be deadly

Light Aviation [Feb 2011](#) *Not so 'Good Vibrations' on a Sting but easily cured*
Sting nosewheel friction device not tightened up enough to prevent rotation in flight causing unusual vibration noise in flight. Small tweaks and good documentation during test flying vital.

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Please report any errors or omissions to LAA Engineering: engineering@laa.uk.com