LAA TYPE ACCEPTANCE DATA SHEET
TADS 204B
RANS S6-ESD and RANS S6-ESD XL

Issue 1	Initial issue	Dated 05/10/16	JV
Revision A	Addition of Rans heater installation as a standard option. Updated UK agent contact details.	Dated 20/7/18	JP
Revision B	Addition of Safety Spot articles	Dated 27/4/20	JH
Revision C	Correction to limitations in section 2.9 Additional guidance added in section 3.6	Dated 13/10/20	FD

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

Skycraft Ltd., Riverside House, Bloodfold Farm, Ravens Bank, Holbeach, PE12 8SR.

Tel: 01406 371779
Email: sales@sky-craft.co.uk
Website: www.sky-craft.co.uk

1.2 Description

The Rans S6-ESD is a high wing microlight seating two side by side in an enclosed cockpit, and is available in kit form for amateur construction from Rans Inc of Kansas, and originally distributed by Sportair UK. More recently the dealership has been taken over by Skycraft.

The airframe is mainly of bolted and riveted aluminium tube construction, but the forward fuselage structure consists of a welded steel tube cage. The aircraft is covered using pre-treated and accurately pre-sewn Dacron envelopes which are stretched and laced into place.

The Rans S6-ESD is a lighter-weight version of the Rans S6-ES, the main differences being that the 'ESD' version has wider chord flaps and ailerons, with lower rated front wing lift struts and a single rear fuselage tank. The variant is available as either a nosewheel or a tailwheel.

The S6-ESD XL version has fixed flaps and is only available in nosewheel configuration. It has a fuel tank in the wing root rather than a fuselage tank.

Variants of both may be modified to increase their maximum take-off weight by substituting the wider chord flaps and ailerons with the narrower versions and installing the uprated front wing lift struts. These aircraft are designated Rans S6-ESD (modified) or Rans S6-ESD XL (modified) as appropriate. Please contact LAA Engineering prior to starting any conversion activities.

Engine models currently approved in the UK for use in the S6-ESD or ESD XL versions are the Rotax 503, Rotax 532, Rotax 582, Rotax 912-UL and Jabiru 2200A. 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.

All variants are classed as microlight aeroplanes with a maximum gross weight of 385 kg for the un-modified variants, or 430 kg or 450 kg for the modified variants (weight is restricted to 430 kg when fitted with the Rotax 503 for performance reasons).

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 contents of the standard fast build kit is accepted as compliant with the 51% 'major portion' requirements on the basis that it is the same kit standard that has been accepted as 51% compliant by the FAA.

2.2 Build Manual

As supplied by manufacturer.

2.3 Build Inspections

Build inspection schedule 9 (Tubular aircraft).
Inspector approval codes A-A, A-M, K or M. Inspector signing off final inspection also requires 'first flight' endorsement.

2.4 Flight Manual

TBC

2.5 Mandatory Permit Directives

Applicable specifically to this aircraft type:

2003-017 R1	Restraint harnesses of unsatisfactory type
2003-018 R1	Restraint harnesses condition

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

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

Several modifications were required by the LAA for acceptance of the type in the UK, as follows:

LAA-204-001	Idler arm in elevator control pushrod
LAA-204-002	Positive locking of control surface hinges
LAA-204-003	Elevator bungee type trim addition of markings
LAA-204-004	(not applicable to S6-ESD model)
LAA-204-005	Tab type elevator trim – addition of trim tab stops and pivot wire locking
LAA-204-006	Cockpit static source
LAA-204-007	Gascolator fitted forward of firewall
LAA-204-008	Fire resistant type rubber fuel pipe substituted in engine compartment
LAA-204-009	Fuel filler cap forward facing vent placards
LAA-204-010	Pilot and Passenger restraint harness. (Add swivel fitting – MPD 2003-017 refers)
LAA-204-011	Inspection of seat harness condition (MPD 2003-018 also refers)
MOD/204/012	Flying wire cable attach tangs – cracking
MOD/204/013	Inspection of lower fin tube

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 503 engine:	Max CHT: 250°C (normal 180-220°C) Max difference: 20°C Max EGT: 650°C (normal 460-580°C) Max difference: 25°C
With Rotax 582 engine:	Max CHT: 150°C (normal 110-130°C) Max difference: 10°C Max EGT: 650°C (normal 500-620°C) Max difference : 25°C Max Coolant temp: 80°C
With Jabiru 2200A:	Max CHT: 210°C Oil temp: 50-110°C Oil pressure 125-525 kPa @3100 RPM
With Rotax 912-UL:	Maximum CHT: 150°C Max Coolant Temp: 120°C (with 50/50 Glycol/water coolant) Oil Temp Limits: 50°C to 140°C (Normal 90-110°C) Oil Pressure: 2-5 Bar Minimum Fuel Pressure: 0.15 bar

2.8 Control surface deflections

Ailerons	TBC
Elevators	TBC
Elevator tab	TBC
Rudder	TBC
Flap	TBC

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
The aeroplane is permitted to fly only for non-aerobatic operation. In this context, non-aerobatic operation includes:
i) any manoeuvre necessary for normal flying.
ii) intentional stalls from level flight.
iii) steep turns in which the angle of bank does not exceed 60 degrees.
Intentional spinning is prohibited.

2.2 Loading Limitations (S6-ESD & S6-ESD XL)
Maximum Total Weight Authorised: 385 kg
CG Range: 66.0 inches to 71.0 inches aft of datum point
Datum Point is: rear face of the propeller
Loading Limitations (S6-ESD (modified) & S6-ESD XL (modified))
Maximum Total Weight Authorised: 430 kg or 450 kg (depending on engine fit)
CG Range: forward limit 62.5 inches aft of datum up to 295 kg, 66.0 inches aft of datum at MTWA, with linear variation between. Aft limit 71" aft of datum.
Datum Point is: rear face of the propeller

2.3 Engine Limitations (Rotax 503 engine and Rotax 582 engine)
Maximum Engine RPM: 6800
Maximum continuous engine RPM: 6500
Engine Limitations (Rotax 912-UL engine)
Maximum Engine RPM:5800
Maximum continuous engine RPM: 5500
Engine Limitations (Jabiru 2200A engine)
Maximum Engine RPM: 3300

2.4 Airspeed Limitations
Maximum indicated airspeed (S6-ESD & S6-ESD XL): 100 mph
Maximum indicated airspeed (S6-ESD (modified) & S6-ESD XL (modified)): 110 mph
Maximum indicated airspeed, flaps extended (S6-ESD and S6ESD XL): 65 mph

Maximum indicated airspeed, flaps extended S6-ESD (Modified) and S6-ESD XL (Modified): 80 mph

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.

As a microlight aircraft, additional microlight weight placard must be fitted as described in TL2.11 regarding empty weight and payload.

2.10 Maximum permitted empty weight

See TL 3.16

Section 3 – Advice to owners, operators and inspectors

3.1 Maintenance Manual

Nil. In the absence of a manufacturer's maintenance schedule for the airframe, refer to LAMS schedule. Refer to build manual for rigging instructions. For engine consult engine manufacturer's schedule.

3.2 Standard Options

(Subject to empty weight considerations)

Cabin heater installation (see also Special Inspection Points below)

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.

Ref	*Date*	*Description*
011790-02	17.01.90	Tailplane truss – fitting problem
011790-01	17.01.90	Cooling system filler cap
012390-03	23.01.90	Control linkage rod ends – safety washers
012390-04	23.01.90	Negative incidence setting on tailplane
032090-01	02.03.90	Elevator flutter – reinforced pushrod
092190-01	21.09.90	Lock rings on tail cable turnbuckles
121590	15.12.90	Reinforced G3 tail brackets

0122690-01	26.12.90	Reinforced vertical stabiliser gusset
0122690-02	26.12.90	Rudder horn and rudder travel
0101491-01	01.01.91	Reinforcement of control stick torque tube
00316092-01	16.3.92	Landing gear sockets – loose legs
042792-01	27.4.92	Reinforced tail channel gusset – taildraggers
AA101	??????	Rotax 912 engine electrical schematic
AA105	21.9.92	Oil System Rotax 582
AA106	21.9.92	Discharging battery with Rotax 912
AA107	15.9.92	Quartz Hobbs meter
AA108	11.2.92	912 oil temperature sender
AA109	04.2.93	Aft lift strut shim
AD105	22.6.93	Bellcrank gusset – possible control jam
OA119	27.1.95	Reinforced vertical tail spreader tube
AD108	24.3.95	Gear leg solid doubler – add roll pin
AA121	04.4.95	Fire resistant fuel lines firewall forward
AD112	31.7.96	Inspect taildragger cages for cracks
AD114	10.1.97	Skylight rivets
AA125	5.96	Fuel cap venting
AA126	14.1.97	Fuel tank position dimension wrong
AA127	31.3.97	Undercarriage mountings – doublers
AD115	25.3.98	Hegar master brake cylinders
AA133	19.2.98	Rotationally moulded fuel tank expansion
AD120	22.1.01	Elevator yoke exit
AD122	16.3.01	912/912S oil pressure sender and oil pressure switch
OA149	4.6.01	Two-blade Warp Drive propellers on 100 HP 912S
AD126	22.4.02	Engine mount for Rotax 912 engines
AD128	26.6.02	Aileron push pull tubes / rear lift struts
OA158	20.8.03	Nose gear disconnect & shimmy damper
AD130	6.10.03	Improved tail spring mount & steer horns
AD134	18.9.06	Tail spring breakage
AD135	27.9.07	CAB-TANG failure
OA167	14.8.08	¼" Blue fule line and 1/8" blue primer line
OA168	23.4.09	Fuel filter
AD136	9.7.10	Hour meter oil pressure switch leak
AA172	16.12.10	Incorrect shipping of AAPQ-44 rivets
AD135	25.9.07	Cable tang failure
AD136	14.5.10	Hour meter oil pressure switch leak
AD137	7.2.11	Nose gear strut inspection
OA173	24.5.13	Trim wire breakage
AA178	23.12.15	Seat bottom cushion without wire pocket
AA179	8.1.16	Incorrect sized K-1000-3 nut plate

3.4 Special Inspection Points

- Inspectors should check all metalwork supplied in the kit carefully for quality before construction commences.
- One or two of the detail design features give away the aircraft's microlight status and 'go against the grain' with the traditionalists amongst us, but nevertheless the Rans S6 is now a well proven design.
- Build manual diagrams are reasonably clear and few construction problems have been reported.
- Check the 'squashed and bent' aluminium tube ends on early examples for minute cracks formed during manufacture, and dress out as required to prevent cracks

growing from these points in service – later versions use more conventional riveted joints.

- Ensure that all blind rivets are 'pulled' squarely and check that rivet heads are properly seated with a feeler gauge.
- The proper fitting of the pre-sewn covering envelopes is something of an art (they are a very tight fit and must be worked into place progressively) and care must be taken to avoid wrinkles, and to avoid tearing the material. The amount of spanwise tension on the wing 'envelopes' controls the 'sag' between ribs and hence the aerofoil profile.
- The build manual is not detailed regarding engine installation and inspectors should take care to check that standard UK practices have been followed with regard to engine installation, fuel system, etc.
- With Rotax 912-UL engine option, the throttle spring on the carburettors must be adjusted so that the system does not have a strong tendency to spring to 'full throttle' when the throttle knob is released, or require a strong pull to keep it in the closed position.
- If Rotax engine fitted, appropriate Rotax 2-stroke or Rotax 912 series installation checklist to be completed (apart from flight test section) as part of final inspections prior to applying for Permit to Fly.
- If Rotax 912 engine fitted, a vapour return line must be fitted to the fuel system if unleaded Mogas fuel is to be used. This returns the excess fuel and vapour to the fuel tank. Returning it to the fuel supply pipe downstream of the tank outlet is not acceptable.
- Fabric life is limited, and strength can degrade quite rapidly under adverse conditions particularly on surfaces exposed to sunlight due to the absence of an UV blocker. Dacron covers deteriorate with time and lose their strength, particularly if the aircraft is tethered outside. The Bettsometer is standard device for assessing fabric strength.
- Rans state that fading of the colours on upper surfaces compared to those on the lower surfaces is a good indication that the fabric is nearing the end of its useful life, and recommend that the Dacron be replaced when its strength is reduced to half its original value. The 'Bettsometer' can be used to check the fabric strength whilst causing minimal damage to the fabric being tested. A Bettsometer reading of 1000grm or below is cause for closer inspection and perhaps rejection of the subject skin, replacement skins are available for all models.
- The instrument panel is a structural part of the fuselage frame, serving as a brace for the main fuselage uprights. Replacement instrument panels only acceptable if equally strong as standard panel. Some after-market alternative panels have been rejected on this basis. It is not acceptable to make cut-outs in the instrument panel to accept instruments larger than the standard size 3 1/8" diameter instruments unless specific modification approval has been obtained from LAA Engineering.
- Check bracing wire attachment tangs carefully for signs of cracking in service, particularly on tail bracing wires, see MOD/204/012.
- Several cases have been reported of cracking in the seat back frame, particularly on early examples with pull start engines. On early examples with the tailplane mounted on the fin base root rib cracks have been found at the front tailplane attachment and rudder post. Later examples have the tailplane attached to the upper fuselage longerons and are more robust in this respect.
- Maintenance of the airframe is typical of a modern tubular aluminium microlight such as a Thruster or AX3. Watch out for bent tubes, cracks in tubing and gussets, loose rivets, signs of fretting in joints (grey metal dust stains).
- In the case of a heavy landing, check particularly carefully the cantilever main undercarriage legs, early type legs have a reputation for 'yielding' slightly and taking on a set. Later legs (which are retro-fittable) are of an improved type which are more robust. You should also check the truss-type cross-beam which the undercarriage legs fit to for signs of distortion/failure and also the bolts which attach

the legs to the airframe, as the bolt holes tend to wear and consequently the legs become progressively looser in their sockets, eventually leading to wheel shimmy.

- As a microlight aircraft, a noise certificate must be issued by the CAA specific to each individual aircraft built. A new noise certificate must be obtained following any change in noise output, including change to engine type, reduction gear ratio, propeller type, propeller pitch setting, type of exhaust, exhaust after-muffler or intake silencer.
- Levelling datum: tube forming lower sill of cockpit door aperture.
- Cabin heater system: exhaust muffler shroud should be removed annually to enable a complete inspection for the muffler for cracks or other failures.

3.5 Operational Issues

The following Safety Spot articles are relevant to Rans S6 aircraft

Light Aviation issue April 2008 *Fin tube cracking*

AIL released regarding 'under the skin' fin inspection. Cracks in the fin likely caused by overstressing during ground handling; lifting aircraft into a hanger by tailplane's leading edge.

Light Aviation issue Dec 2008 & July 2008 *Ice cracking/bursting tube*

Ice expansion caused cracks in airframe tube to burst. Inspect for cracks on structures where water might collect over winter.

Light Aviation issue February 2011 *Vapour return line issue*

Fuel vapour return found connected to a point lower than head of fuel. The return line will supply fuel to the carburettor without the ability to shut off fuel flow.

Light Aviation issue June 2011 *Extended decent fuel starvation*

Fuel collectors from wing tanks are located at front and rear of tanks, on extended decent with low fuel, the route of the fuel is such that it can't flow up to the filter.

Light Aviation issue August 2012 *Kink in fuel line*

Kink in fuel line suspected to have caused engine failure after take-off. Kinks in fuel lines restrict flow effectively but act as a venturi and could cause air bubbles to form.

Light Aviation issue June 2013 *Oil cooler failure*

Second new installation of oil cooler on Jabiru 2200 leaked. Pipework routing adjusted to provide more support and prevent further damage.

Light Aviation issue August 2014 *Incorrect air filter*

Low RPM generated by Rotax 503, prop fined further and air filter changed as last resort, incorrect air filter fitted in the first case restricting air supply to engine.

Light Aviation issue July 2016 *Unseen accident damage*

Aircraft purchased damaged after accident had further unseen damage to longerons hiding under fabric coverings. Full inspections required after unusual occurrences.

Light Aviation issue September 2016 *Fuel pump failure*

Serious loss of engine power due to a Jabiru fuel pump failure. The failure being the rocker arm had dislocated from the slot in which it resided.

3.6 Special Test Flying Issues

- Some examples of the Rans S6 variants have suffered from Carbon Monoxide fumes in the cockpit. With the laced joint in the fuselage bottom covering there are inevitably multiple entry routes available for exhaust smoke into the cockpit and it relies on the airflow / pressure field around the fuselage to disperse the fumes aft rather than allowing them to seep into the cockpit. It is recommended that a CO 'dead spot' type indicator is fitted to the instrument panel. Tests have shown that the human nose is not altogether reliable in identifying the very low levels of exhaust smoke concentration involved, even when pre-mixed oil and fuel is used. If problems persist in flight an extended exhaust tailpipe may solve the problem. Later models and new replacement fuselage skins have velcro flaps covering the laced fuselage joint improving the performance and reducing drafts.
- Special attention to adequacy of rate of climb with 503 engine - minimum 250 ft/min at max gross weight. One example had to have max gross weight reduced below 430 Kg for performance reasons.
- With Jabiru engines, it is imperative that the cylinder head bolts and tappets are checked at 5, 10, 15 and 20 hours. Omitting this check can lead to head leaks and damage at around 25-50 hours. Have a good look around the rocker boxes and make sure oil is present and that there are no signs of overheating in the form of burnt lacquered oil. New engines with hydraulic tappets need only to have the head bolts checked.
- With Jabiru engines, encourage test pilot to work the engine quite hard to avoid glazed piston bores, vary rpm settings and do not fly at low power settings for too long.
- With any Rotax installations, to ensure future reliability you should go to some trouble to get the engine cooling properly set up and the propeller pitched correctly. This should give correct rpm whilst also avoiding excessive high EGTs which may occur not only with high throttle settings but also during the part-throttle descent when the engine is running on the 'lean part of the needle'.
- Proper co-ordinated rudder and aileron control is required, and care must be taken not to over-estimate the field performance which will be obtained using the Rotax 503 on a hot day from a short strip, especially with the aircraft fully loaded. As with any microlight, particular care is required on windy days, especially with crosswinds. The current version S6-ES, particularly when fitted with the Rotax 582, 912 or Jabiru is a significant improvement on the early models and has proven very robust in service with no real issues reported to date. The introduction of the 450 kg microlight limit has permitted later, and up-graded ESD, ESD-XL, versions to be fitted with a range of Rans options such as moulded interior kits, hydraulic brakes, Super Coyote engine cowlings etc. However, care must still be taken, particularly on Rotax 912 microlight examples, to ensure that their present maximum permitted empty weight is not exceeded.
- Flight Manual/POH. It should be noted that various unofficial documents exist that include flight manual type information and a generic RANS S6 aircraft Airplane Fight Manual has been available from the manufacturer. However different versions of the aeroplane are operated to different limitations (speeds, weights, etc) in different countries, and depending on engine model, etc. The definitive data for examples of

the aircraft operating on LAA Permits to Fly is that contained on the operating limitations document associated with the Permit to Fly.

- The high-wing configuration of the Rans S6-ESD and ESD XL is a common configuration on light aircraft and has many benefits. One of the disadvantages however is that during approaches to small, short-runway airfields, the high wing can blank the landing area during positioning turns on to the active runway. This has more of an affect when approaching into smaller airfields without a radio facility because the pilot will tend to fly over the airfield to see the wind direction and then make a series of turns to position on to the most suitable runway. It is during these manoeuvres that pilot distraction could set in, and speed and keeping the slip ball centred might not be as accurate as during other operations.
- Particularly the two-stroke engine equipped models tend to be low powered. As with many microlights, this, in combination with the relatively draggy character of the design, makes it reasonably easy to lose speed if distracted, particularly during tight turns.
- In common with many such designs, the directional stability of the Rans S6-ESD and ESD XL is positive but relatively weak. Consequently, if the slip-ball is left out of the pilot's scan for any amount of time, there can be a tendency for a side slip to develop. In itself, this does not cause any particular problems, other than flying out of trim.
- With the slip ball kept in the middle, the stalling qualities of the Rans S6-ESD and ESD XL aircraft typically do not demonstrate a significant wing drop. However, if a stall is performed with the slip ball not centred there can be a tendency for the aircraft to drop a wing rapidly and enter a tight spiral, with a nose-low attitude. This quality is similar to the stall characteristics of many types of light aircraft and microlights. However, the characteristic could be exacerbated in the RANS S6-ESD and ESD XL aircraft because of the combination of the above qualities: i.e. relatively easy to add side-slip inadvertently or while distracted, the low power of the aircraft in combination with high drag making it easy to lose speed, the high-wing design making it more difficult to keep the landing area in view during turns overhead the airfield leading to potentially making tighter turns than intended when manoeuvring to line up with the runway.
- The aircraft is a relatively low-cost, entry-level aircraft that is often used from small, grass airfields that are often uncontrolled. New owners unfamiliar with the Rans S6-ESD or to this type of operation should seek an appropriate 'checkout' on the type and/or the type of operation before they fly their new aircraft as PIC. Such checkouts should emphasise the particular qualities of the aircraft and the need for caution during manoeuvring close to the stall. See TL 2.30 'Converting To A New Type'.

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