

CIVIL AVIATION AUTHORITY

AIRWORTHINESS APPROVAL NOTE NO. 13923

APPLICANT: Vickers-Slingsby

AIRCRAFT TYPE: Slingsby T61E Venture T Mk. 2

REGISTRATION: Not Allocated (Ministry of Defence Aircraft)

CONSTRUCTOR'S NO. 1870

T.61E
T.61E
1350/As noted
613 KFS

Modification No. 19.
Introduction of the Vickers-Slingsby T61E
Venture T Mk. 2 Self Launching Motor
Glider

1. Introduction

The Slingsby T61A approved for UK certification in the General Purpose Category by AAN No. 11002, is a Slingsby version of the German Scheibe SF.25.B. Falke, built under licence in the UK. In order to supply the Ministry of Defence with a glider for use by the Air Training Corps, to Ministry of Defence Aircraft Specification No. 289 D & P, the applicant has introduced a new variant, the T61E Venture T Mk. 2, by the introduction of Modification No. 19.

This AAN deals with the investigation associated with recommending a Certificate of Airworthiness in the General Purpose Category for this new variant.

2. Design Investigation

2.1 Build Standard Definition

The T61E is derived from a T61A, as defined by AAN No. 11002 plus the following existing modifications:-

3, 5, 6, 8, 10, 11, 14, 15, 16, 17 and 18 and new Modification No. 19, introducing the variant, comprising the Build Standard Definition.

(a) Existing Modifications Embodied

Mod. No. 3

Introduction of Special Elevator control pin in lieu of 'PIP' pin - The SF.25.B design used 'PIP' pins at the 'breakdown' joint in the elevator controls and pin with more positive locking has been introduced.

Applicant
Surveyor-in-Charge
Radio Surveyor
A & S Section
Aircraft Projects Department
Licensing Section
Flight & Maintenance Section
Maintenance Section
Engineering Section
Power Plant Department

/cont'd...

For the Civil Aviation Authority

Date

Mod. No. 5

Incorporation of flame resistant material for cockpit trim - This was introduced to provide compliance with CAA flame resistance requirements.

Mod. No. 6

Incorporation of new canopy jettison catch - Introduced as a product improvement.

Mod. No. 8

Gearing reduction to reduce steerable tailwheel movement - Introduced in order to provide less violent ground handling characteristics.

Mod. No. 10

Incorporation of 12mm engine bolts in lower engine mounting - This embodied an engine manufacturer's modification which was introduced following cracking of the 10mm bolts used in this location.

Mod. No. 11

Installation of Rollason 1600 cc in lieu of Stazo MS 1500/1 engine - This modification introduced the T61D variant and was approved by AAN No. 11900 dated 18th May 1973.

Mod. No. 14

Change of forward C.G. limit from 7.4" to 6.4" aft of datum - Introduced in order to provide an improved disposable payload capacity and approved by AAN No. 12335 dated 3rd December 1973.

Mod. No. 15

Addition of Mechanical Fasteners to secure canopy moulding to frame - This improved the attachment of the transparency to the supporting framework.

Mod. No. 16

Replacement of centre elevator hinge - A modification was introduced following cracking at a weld.

Mod. No. 17

Modification to aileron operating lever - An improved method of attaching the actuating arm to the torque tube has been introduced.

Mod. No. 18

Reduction of length of rudder pedal footstraps - This shortens the length of footstrap on the inboard side of the port right hand and starboard left hand rudder pedals in order to prevent possible jamming due to local distortion.

(b) New Modifications

The only new modifications embodied is Mod. No. 19 which introduces the T61E and this is split into the following 24 parts:-

19/1 - Weight Increase

The maximum AUW has been increased to 1350 lb. Operating limitations, other than AUW, are unchanged by the weight increase.

19/2 - Gaps Sealed in Cockpit Floor

The cockpit floor is sealed in accordance with Drawing No. T61E-10-06.

19/3 -

Installation of coloured ball for fuel sight glass - This is to Drawing No. T61E-50-04.

19/4 -

Installation of transparent guard for fuel sight glass - This provides a co-axial guard to Drawing No. T61E-10-16.

19/5 -

Relocation of fuel ON/OFF valve - At the request of the Ministry of Defence the fuel ON/OFF valve has to be relocated to Drawing No. T61E-10-08.

19/6 -

Modification to carburettor hot air control - This modification provides a more positive restraint after selecting a setting and is in accordance with Drawing No. T61E-50-52.

19/7 -

Installation of different oil temperature gauge - An oil temperature gauge with a lower reading of 0°C has been installed in accordance with Drawing No. T61E-50-12.

19/8 -

Change of propeller brake springs - Stronger springs have been fitted to the propeller brake, in accordance with Drawing No. T61E-50-14, to provide a more effective brake when the propeller is not in use.

19/9 -

Relocation of wheel brake control lever - The wheel brake control lever has been moved from the starboard to the port control column as shown on Drawing No. T61E-10-33 and T61E-45-11.

19/10 -

New pull-start handle - In order to reduce the possibility of injury to a pilot's hand when operating the engine pull-start within the cockpit, the hand grip area has been modified in accordance with Drawing No. T61E-50-25.

19/11 -

Bowden cable casing security - In order to improve the security of casings in end seatings the cable casings have been changed to MORSE types and the following drawings are applicable:-

Air Vent	-	T61E-10-67
Wheel Brake	-	T61E-10-68
Fuel Cock	-	T61E-10-69
Trimmer	-	T61E-45-17

19/12 -

Modification to engine exhaust silencer - The exhaust silencer has been lowered by 2.0" in order to improve access to the engine oil drain, in accordance with Drawing No. T61E-50-05.

19/13 -

Witness mark on oil filler cap - The engine oil filler cap now has an indelible witness mark and this is included in the engine build standard definition.

19/14 -

Repositioned fuel drain pipe - The fuel drain pipe from the filter bowl has been repositioned in accordance with Drawing No. T61E-50-01.

19/15 -

Tailwheel Bush - An Acetyl Co-Polymer bush has been fitted in the tailwheel to Drawing No. T61E-10-34.

19/16 -

Locking at control system 'breakdown' points - At the request of the Ministry of Defence the locking at all control system joints disconnected at 'breakdown' have been modified in accordance with the following Drawings:-

Trimmer	-	T61E-45-7
Elevator	-	T61E-45-8
Aileron	-	T61E-45-9
Spoiler	-	T61E-45-10

19/17 -

First Aid Kit Stowage - Stowage for a First Aid Kit is provided to Drawing No. T61E-10-19.

19/18 -

External Canopy Lock - An external padlock hasp is provided to Drawing No. T61E-10-36.

19/19 -

Fire Extinguisher - A Graviner Swordsman fire extinguisher has been installed in accordance with Drawing No. T61E-10-06.

19/20 -

Static Vent Plate - A brass plate has been added to both the port and starboard static vents in order to improve the stability of the indicator. This is as shown on Drawing No. T61E-10-101.

19/21 -

Spoiler Levers - The spoiler operating levers have been moved $1\frac{1}{2}$ " aft and shortened by 1.0" in order to improve access and operation. This is in accordance with the following Drawings:-

Pilot - T61E-45-26
Co-Pilot - T61E-45-13

19/22 -

Ground Control Locks - These have been added at the request of the Ministry of Defence, to Drawing No. T61E-45-18.

19/23 -

Cowling Reinforcement - The engine cowlings have been reinforced at the fastener points to prevent cracks, in accordance with Drawing No. T61E-10-04.

19/24 -

Fitment of 'ZB' Harness - A full 'ZB' harness has been fitted as an 'Embedment Load' item.

2.2 Structural Substantiation

The max. AWW has been increased to 1550 lb by the introduction of Part 1 of Modification No. 19. This weight increase has necessitated increasing the strength of the wing main spar and in order to minimise the associated structural weight increase, the spar boom material has been changed from wood to G.R.P., utilising manufacturing techniques already used in producing the 'Kestrel' Sailplane.

The maximum design manoeuvre load factor for this aircraft is +5.3 'g' and this produces a maximum boom stress of 26,800 lb/in² which, having an allowable design stress of 75,000 lb/in² adequately covers both Ultimate and Plastics Factors of 1.5 x 1.5. A series of tests used for the GRP boom design and development are detailed in Report Nos. RPT 220 A, B, C, D and E plus RPT 342, 350, 362, 374, 384, 393A and 398B. The spar shear webs are still plywood so complete spar or wing tests which include a 1.5 Plastics Factor are deemed unrealistic. A full scale wing static test was conducted and is described in Report RPT 368. When tested, the wing reached 100% ultimate design load, at which point the spar plywood shear web failed between Ribs 4 and 5, allowing the compression boom to buckle due to lack of lateral support.

An operational life of 15 years is required from the T6LE, so a wing fatigue test was conducted, representing the increased max. AUW and using an agreed loading spectrum obtained from an instrumented aircraft. With a Scatter Factor of 5 the spectrum representing 15 years operation is as follows:-

9,800 cycles of	1.0	±	0.80	'g'
2,800 cycles of	1.40	±	1.35	'g'
100,000 cycles of	0	±	0.15	'g'
4,200 cycles of	1.00	±	2.00	'g'

The above programme being repeated 10 times to represent 75 years.

A fatigue test using the above programme has been successfully completed without failure and Report R & D TR.477 is applicable.

A Type Record Addendum has been prepared by the applicant.

3. Flight Testing

The applicant has successfully flight tested this aircraft to Issue 4 of CAA Airworthiness Flight Test Schedule No. 2 and Flight Test Report with CAA Reference 13928/1 dated 2nd July 1977 is applicable. It was discovered during the flight testing that the introduction of Part 20 of Modification No. 19, adding brass plates to the static vents, has resulted in change in the static position error. This revised S.P.E.C. is acceptable and shown in Addendum 4 to the Pilot's Notes.

At the increased max. AUW a sea level ISA rate of climb of 350 ft/min was achieved.

The increased max. AUW has decreased the glide ratio to about 20:1 which is the minimum allowable to qualify as a Self Launching Motor Glider. With airbrakes fully open the glide ratio reduces to 6.87:1 which compares favourably with the allowed maximum of 8.0:1. The aircraft stalls at 39 knots (62.4 km/hr) which is well below the maximum permitted 75 km/hr for a SLMG.

To summarise, the applicant's flight test has shown this aircraft to have acceptable handling and stability characteristics. In addition the performance and glide requirements of the SLMG Redhill 1969 Definition have been met.

4. Basic Data

Dimensions and Weights:-

Wing Spar	50.20 ft
Length	24.90 ft
Wing Area	188.00 ft ²
Aspect Ratio	13.40
Max. AOW	1350 lb
 C.G.	 6.40" to 12.90 AOD

Engine:-

Type	Rollason - RS1
Max. Continuous	2950 rpm
Max. Permissible (30 secs)	3500 rpm
Max. Take-off (5 mins)	3300 rpm

Propeller:-

Type	Hoffman HO.11.150.B-70.L
------	--------------------------

Speeds:-

Max. Permissible Speed (Spoilers Open)	114 mph (99 kts)
Max. Permissible Speed (Spoilers Closed)	114 mph (99 kts)
Max. Permissible Rough Air Speed	91 mph (79 kts)

5. Pilots Notes

The Pilot's Notes already cover the use of the RS1 engine by the addition of Addendum No. 2 and 3, applicable to the T61D. In order to cater for the T61E variant, Addendum No. 4, now at Issue 2, has been added to the Pilot's Notes.

6. Approval

Having regard to information made available by the applicant it is agreed that design of the Vickers-Slingsby T61E Venture T Mk 2 is of such a standard that a recommendation can be made for the issue of a Certificate of Airworthiness in the General Purpose Category for aircraft of that type, classified as a Self Launching Motor Glider.

This Self Launching Motor Glider has been inspected and found to be airworthy and in accordance with the build standard defined on this AAN. A recommendation is made for the issue of a Certificate of Airworthiness in the General Purpose Category for this Vickers-Slingsby T61E - Venture T Mk 2, Constructor's No. 1370.

E. H. Smith
 E. H. SMITH
 For the Civil Aviation Authority

Date..... 12th September 1977