



AIRWORTHINESS APPROVAL NOTE NO: 22556 Issue 10

APPLICANT: CAA Internal Purposes

AIRCRAFT TYPE: DH 82A Tiger Moth

REGISTRATION NO: G-ANDE CONSTRUCTOR'S NO: 85957

OPERATOR:

INSTALLER:

DESIGN ORGANISATION: de Havilland Support Ltd

CERTIFICATE CATEGORY: Certificate of Airworthiness

MODIFICATION NO:

MODIFICATION TITLE: To approve the DH 82A Tiger Moth for the issue of a Certificate of Airworthiness

1. Introduction

The DH 82A Tiger Moth is a two seat tandem biplane of steel tube, wood and fabric construction powered by a Gipsy Major engine driving a two blade fixed pitch propeller. The Tiger Moth was a development of the DH 60 Moth series and first flew in 1931.

The Tiger Moth has been in service ever since then and at the present time there are more than 170 on the UK register, of which more than 100 have current Certificates of Airworthiness or Permits to Fly.

This AAN was compiled to record, for CAA internal purposes, the basis of approval and the applicable conditions and limitations for certification of the DH82A Tiger Moth.

Issue 2 of this AAN was raised to delete the requirement for the removal of the cockpit door when operating for the purposes of parachuting. Issue 3 of this AAN was raised to further amend the conditions for parachuting operations to address an anomaly in the limitations identified between the Certificate of Airworthiness limitations for various aeroplanes. Issue 4 of this AAN was raised to amend the conditions for glider towing to include the approval of additional engine types by equivalence.

Issue 5 of this AAN was raised to record the changes to the spinning restrictions of unstraked aircraft. Issue 6 was raised to record de Havilland Support Ltd (DHSL) as the Type Design organisation, replacing British Aerospace. Issue 7 of this AAN was raised to correct the constructor's number and to record approval of the Hoffmann propeller H021-198B-140LK. Issue 8 of this AAN was raised to clarify the c.g. datum position. Issue 9 clarified the maintenance instructions to be employed.

Issue 10 of this AAN has been raised to reflect the deletion of the need for a CAA flight test evaluation of an aircraft not fitted with anti-spinning strakes, to specify the maximum luggage locker load, and to reflect the change from a responsible Type Certificate Holder to a Type Responsibility Agreement Holder.

2. Aircraft Build Standard

The DH 82A Tiger Moth is a two seat tandem biplane powered by one of a number of Gipsy Major engine variants driving a two blade fixed pitch propeller. The propeller can also be one of a number of variants.

The basic aeroplane is defined by a master drawing schedule of which two exist, relating to the civil and RAF versions of the aeroplane respectively. The Type Design Holder submitted a copy of each of these master drawing schedules for reference purposes under cover of a letter dated 2nd April 1991 (Ref: CI/Moth). The aircraft type is now supported by a Type Responsibility Agreement (TRA) in accordance with BCAR A5-1. The TRA Holder is de Havilland Support Ltd.

3. Approval Procedures

The Tiger Moth was built as a training aeroplane for the RAF in 1931 and has been in continuous operation since that time. Approval of this aeroplane is based upon the known satisfactory operating experience of the type, and the fact that the type is supported by a currently CAA Approved company (de Havilland Support Ltd).

4. Basis Of Certification/Validation/Approval

4.1 CAA Certification For the Aircraft

The design of the Tiger Moth is accepted on the basis of the known satisfactory operating experience of the type over many years and based on the design and continued airworthiness support provided by the Type Responsibility Agreement holder.

4.2 CAA Design Requirements For The Issue Of A Certificate of Airworthiness

CAP 476 ADs and CAP 747 Generic Requirements as applicable.

Any installed equipment for which the Air Navigation Order requires approval must be approved by the CAA.

4.3 Environmental Requirements

Air Navigation (Environmental Standards for Non-EASA Aircraft) Order 2008.

4.4 Design Requirements Associated With Operational Approvals

This aeroplane can be approved for parachuting and glider towing. The limitations and conditions applicable to these operations are presented in Section 5.4 of this AAN.

5. Compliance With The Basis Of Certification

5.1 Compliance With The Certification Basis For The Aircraft

The Tiger Moth is operated in accordance with a four page Certificate of Airworthiness which identifies the allowable engine units which may be installed, together with the permissible max RPM limitations. The following Gipsy Major engine variants have been approved for installation in this aeroplane type.

- Gipsy Major 1
- Gipsy Major 1C
- Gipsy Major 1F
- Gipsy Major 1H
- Gipsy Major 1D
- Gipsy Major 1J
- Gipsy Major 10-1
- Gipsy Major 10-2

This particular aeroplane is fitted with a Hoffmann HO21-198B-140LK propeller, but there are a number of other propellers which have been approved for the type. The other approved engine and propeller options are specified in CAP 562 CAAIP Leaflet 61-10.

Issue 2 of this AAN deleted the need to remove the cockpit door for parachuting operations. This limitation was reviewed by CAA and deemed unnecessary (Letter 9/23/G-ADGV/SW to Mr Whitehead from Mr Fautley dated 18 July 1991 refers).

Issue 3 of this AAN deleted the requirement to disconnect and remove the Rudder Bar connecting rod when operating in the parachuting role to address an anomaly identified when actioning the changes initiated by Issue 2 of this AAN. This condition was deleted on the basis of satisfactory operation of the type for parachuting over many years without the rudder bar being removed on many of these aeroplanes (e.g. G-AGZZ), and on the basis that the parachuting technique employed and the location of the rudder bar minimises the risk of inadvertent damage or rudder input during this activity.

Issue 4 of this AAN addressed an anomaly between the approved engine types and those engines approved for glider towing by incorporating approval for additional engine types to be used for the towing of gliders. This was approved on the basis of similarity of engine type and equivalence in engine power with those engines already approved for the purpose. Section 6 of this AAN was amended accordingly. Issue 7 of this AAN recognised that the Hoffmann HO21-198B-140LK propeller is equivalent to the Hoffmann HO21-198B-140L propeller from which it differs only in hub contour.

Issue 10 of this AAN removes the restrictions on aerobatics with aircraft not fitted with anti-spin strakes.

5.2 Compliance With Design Requirements For The Issue Of A Certificate of Airworthiness

Evidence (or references to evidence) of compliance with the requirements of 4.2 above shall be shown.

5.3 Compliance With Environmental Requirements

As this aircraft was manufactured prior to 1980 it is exempt from the requirements of the noise order.

5.4 Compliance With Design Requirements Associated With Operational Approvals

The DH 82A Tiger Moth has been approved by CAA for the purposes of Glider Towing and Free fall parachuting. For those particular aircraft, the following conditions are applied on an individual basis in addition to those above:

Free fall parachuting:

Subject to the issue of a Civil Aviation Authority Permission as required by Article 44(4) of the Air Navigation Order, this aircraft may be used for free-fall parachuting by persons, subject to the following conditions and limitations:

- (a) The pilot must occupy the rear cockpit,
- (b) The front cockpit control column must be removed,
- (c) The parachutist must occupy the front cockpit and exit to starboard,
- (d) All four straps of the front cockpit seat harness must be joined and made secure, prior to the parachutist leaving the aircraft,
- (e) At the time of dropping the wings must be level and air speed between 60 and 80 mph IAS.

Towing of gliders:

This aircraft when equipped with an approved glider tow hook installation, is approved for towing gliders, provided that:-

- (a) The weight towed, be it of one or two gliders, shall not exceed the following:-

Glider Classification Group*	Maximum weight of glider(s)	
	Single Occupant of Tug Aircraft	Two Occupants of Tug Aircraft
When fitted with a Gipsy Major 1 or 1F	A 1000 lb (454 kg)	700 lb (318 kg)
	B 900 lb (408 kg)	625 lb (283 kg)
	C 800 lb (363 kg)	550 lb (249 kg)
When fitted with a Gipsy Major 1C, 1D, 1H, 1J or Gipsy Major 10-1, 10-2	A 1250 (567 kg)	950 lb (431 kg)
	B 1125 lb (510 kg)	850 lb (385 kg)
	C 1000 lb (454 kg)	750 lb (340 kg)

* As defined in British Gliding Association document entitled "Notes for Tug Pilots".

- (b) The number of gliders on tow shall not exceed two
- (c) The breaking load of the towing cable, or weak link, if fitted, shall not exceed 1000 lb (454 kg) when towing one glider. A weak link, the breaking load of which shall not exceed 1300 lb (590 kg), shall be installed between the towing bridle and the tug aircraft when towing two gliders.
- (d) Air speed shall not exceed the lesser of the maximum permitted speeds for any glider(s) under tow.
- (e) The aircraft shall not be flown at a speed less than 60 miles per hour (52 knots) IAS when towing a glider, other than during take-off.
- (f) Outside ambient air temperature shall not exceed ISA +15 °C.

NOTE: Towing procedures should be in accordance with those recommended in the British Gliding Association document entitled "Notes for Tug Pilots".

The aircraft shall not be flown for the purpose of Public Transport when in the glider towing or parachuting roles.

Note: Compliance has been established with the design requirements which are a pre-requisite to approval of the associated operation. This finding of compliance with the design requirements does not signify that any operational approval has been granted.

5.5 Required Manuals And Other Documents Including Mandatory Placards

The aircraft shall at all times be flown in accordance with the appropriate technical publications and manufacturer's instructions for the type and model of aircraft, or as indicated by cockpit placards and instrument markings (* denotes that the item is to be placarded or otherwise marked on gauges).

5.5.1 Pilot's Notes

The Tiger Moth is operated in accordance with a four page Certificate of Airworthiness with Conditions.

5.5.2 Placards*

- a) Maximum Number of Occupants, see section 6.1 below
- b) Aerobatic Limitations, see section 6.2 below*
- c) Engine Limitations, see section 6.3 below*
- d) Airspeed Limitations, see section 6.4 below*
- e) Loading Limitations, see section 6.5 below
- f) Other Limitations, see section 6.6 below*

5.5.3 Weight and Balance

When anti-spinning strakes are fitted:

The aircraft shall be so loaded that the centre of gravity position is within the range of 7.0 inches to 13.5 inches aft of the datum point except when the aircraft is flown under Visual Meteorological Conditions, the range may be extended to 7.0 inches to 15.3 inches aft of the datum point. The datum is defined as the leading edge of the lower mainplane at the root.

When anti-spinning strakes are not fitted:

The aircraft shall be so loaded that the centre of gravity position is within the range of 7.0 inches to 13.5 inches aft of the datum point. The datum is defined as the leading edge of the lower mainplane at the root.

5.5.4 Maintenance Manual and Schedule

The aircraft must be maintained to the CAA Approved Maintenance Schedule.

6. Conditions Affecting This Approval

Certain operational approvals require that the aircraft and/or systems comply with specified design requirements. Where this AAN records compliance with those design requirements this shall not be taken as acceptance by the CAA of compliance with the relevant operational requirements, for which further justification may be required.

Airworthiness Limitations for CofA with Conditions:

The flying characteristics and performance of the DH 82A Tiger Moth are extremely well known. There are 100 on the UK Register with current Certificates of Airworthiness or Permits to Fly. CAA have also flown this aeroplane as a series check post a major repair and was deemed to be satisfactory [FTR 7768S refers]. Flight Test FTR 7670S 24 Nov 1990 addresses the issue of spinning restrictions on unstraked aircraft. No further flight testing is necessary in order to approve the type.

The aircraft has no performance classification.

As a result of many years of operation, the following Limitations have been established for the DH 82A Tiger Moth:

6.1 Maximum Number of Occupants

Maximum number of occupants (inc. crew): 2 occupants

The minimum flight crew is: 1 pilot

6.2 Aerobatic Limitations*

The following aerobatic manoeuvres (and any combination of these) are permitted:

- i) Spins (erect)
- ii) Inside Loops
- iii) Slow Rolls
- iv) Barrel Rolls
- v) Stall Turns
- vi) Half inside loop and roll out
- vii) Half roll and dive out

NOTE 1 Flick Manoeuvres and manoeuvres involving high inverted loads are not permitted.

NOTE 2 The slats shall be locked in the closed position before commencing aerobatics.

NOTE 3 When an auxiliary fuel tank is installed and is carrying fuel, aerobatic manoeuvres are prohibited.

NOTE 4 Fitment of aileron mass balances and/or bomb racks (for historical purposes) would cause aerobatic manoeuvres to become prohibited.

The following placard shall be displayed in each pilot's cockpit:

"This aeroplane is designed to meet semi-aerobatic load factors. When performing permitted aerobatics, care shall be taken not to apply more g than is necessary".

6.3 Engine Limitations*

<u>Engine Type</u>	<u>Maximum Take-off and Climb RPM (Full throttle)</u>	<u>Emergency 5 Minutes RPM (Full Throttle)</u>
Gipsy Major 1 1C 1F 1H	2100	2400
Gipsy Major 1D 1J	2400	2550
Gipsy Major (AAN 12018) 10-1 10-2	2400	2550

A placard to this effect shall be displayed in each pilot's cockpit

6.4 Air speed Limitations*

Max indicated air speed V_{NE} : 160 mph (139 knots)

A placard to this effect shall be displayed in each pilot's cockpit

6.5 Loading Limitations*

Maximum total weight authorised: 828 Kg (1825 lb)
Maximum aerobatic weight authorised: 802 Kg (1768 lb)
Maximum luggage locker load authorised: 22.7 kg (50 lb)
(load to be evenly distributed)

CG range forward limit 7.0 inches aft of datum.
CG range aft limit 13.5 inches aft of datum
CG range aft limit with spin strakes and in VMC 15.3 inches aft of datum

6.6 Other Limitations

Smoking in the aircraft is prohibited.

7. Continued Airworthiness

The original Maintenance and Repair Manual for the Tiger Moth, reference DHTM 1, remains applicable and is to be employed in conjunction with Technical News Sheet Series CT(MOTH) as currently amended by de Havilland Support Ltd.

A separate manual for the eligible Gipsy Major engine variants is identified by the title 'Bristol Siddeley Gipsy Major 1, 1C, 1D, 1F, 1G, HC, and 7 Handbook' and "Early Type Gipsy Engines - Modification and Technical News Sheets" issued by Deltair Airmotive are to be employed.

Certain modifications and inspections in airframe TNS CT(MOTH) and in engine Modification and Technical News Sheets are mandated by CAP 476 and CAP 747.

8. Survey

There are a large number of these aircraft on the UK Register with current Certificates of Airworthiness. On this basis, no further inspection is considered necessary to support the formal recording of Type Approval in this AAN.

9. Issue of Certificate of Airworthiness

The following actions must be completed prior to initial issue of the Certificate of Airworthiness:

- a) All actions and ground test procedures specified by the aircraft manufacturer must be completed satisfactorily.
- b) It must be verified that the documents or amendments to documents, and the placards defined under Section 5.5 above are as specified.

10. Approval

This Aircraft, registration G-ANDE or any other de Havilland DH 82A aircraft is approved for the issue of a Certificate of Airworthiness provided it is operated in accordance with the conditions and limitations as specified on the Certificate of Airworthiness and that it conforms to the contents of this AAN.



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M Poole
For the Civil Aviation Authority

Date: 15 May 2015