



BMAA TECHNICAL INFORMATION LEAFLET (TIL)

TIL 056 ISSUE 2

TEST PILOT HANDBOOK

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1. Introduction

This document describes the BMAA's test flying procedures. It is aimed at BMAA Test Pilots, but may also be useful reading for aircraft owners whose aircraft are under test. This document is not a test flying manual, and does not describe general test flying techniques or test flying safety precautions.

BMAA test flying is normally performed for the following purposes: testing of prototype aircraft (new types or variants); testing of amateur-built subsequent examples; testing of aircraft that have been modified; investigation of safety issues.

Test flying should not be confusing with check flying. Check flights are straightforward 'test' flights to find out whether or not an aircraft is flying as it should. The BMAA's check flying procedures are described in the BMAA's Check Flying Handbook, TIL 042 (which contains a lot of good basic safety advice).

This document (issue 2) is issued in January 2019. Its issue follows the BMAA being approved against BCAR A8-26 in 2015, and the changes made to the BMAA check flying system in 2016.

Comments or queries on this document should be emailed to technical.office@bmaa.org.

2. B Conditions

BMAA test flying is carried out under B Conditions. The legal basis for B Conditions is in Chapter 2 of Part 1 of Schedule 3 of the Air Navigation Order 2016. The BMAA's test flying procedures are also compliant with the CAA's test flying requirements in Chapter A8-9 and A8-26 of BCAR Section A.

The BMAA has an F1 BCAR A8-9 approval for Microlight aeroplanes and Very Light Aeroplanes (MAUW not exceeding 750 kg). The BMAA's B Conditions number is G-80.

The most common reasons for flying a BMAA aircraft on B Conditions are listed in the Introduction. Using B Conditions for other purposes is possible as long as the purpose meets the criteria for B Conditions flight in the Air Navigation Order. Written authority from the Technical Office is required.

2.1. Certificate of Clearance for Flight for Test Purposes

Each flight test programme is authorised by a Certificate of Clearance for Flight for Test Purposes (Certificate of Clearance). This is a BMAA form, reference BMAA/AW/029, which takes the form of a stapled A5 booklet.

The Certificate of Clearance is issued by the Technical Office once it is satisfied that the aircraft design standard and conditions stated on the certificate are adequate to conduct the necessary flight tests.

The BMAA's Certificate of Clearance contains detailed instructions on its use, which test pilots must ensure that they understand and are familiar with.

2.2. Project Pilot

Each flight test project is run by an individually authorised BMAA Test Pilot. This test pilot is the Project Pilot and authorised on the Certificate of Clearance.

The Project Pilot has a number of administrative roles that are described below.

2.2.1. Admin role #1: Clearing the aircraft for flight

The Project Pilot is responsible for ensuring the Certificate of Clearance is properly completed, and signed by authorised personnel, prior to the first test flight. The Project Pilot must sign the Certificate of Clearance (Section B on the front page) to confirm this; see the instructions on the Certificate of Clearance for details.

Note: the Project Pilot is performing the 'Quality Management Function' of BCAR A8-9. This avoids the Certificate of Clearance having to be sent to the Technical Office after the final inspection, and then returned to the owner, before test flying can commence.

2.2.2. Admin role #2: Authorising non-assessing pilots

The Project Pilot is authorised to add non-assessing pilots to the Certificate of Clearance. The Project Pilot is usually asked to use this authority for reliability flying (of a newly completed amateur-built aircraft, or a newly modified aircraft) after the formal test flying has been satisfactorily completed. In this case the Project Pilot should ask the prospective pilot to confirm that they are licenced to fly the aircraft, and obtain their pilot licence reference number. Newly qualified pilots should not normally be authorised as some experience is desirable in case a problem is encountered during the reliability flying.

Note: just like an aircraft flying on a Permit to Fly, it is the non-assessing pilot's - not the Project Pilot's - responsibility to satisfy themselves that they are capable of flying the aircraft before acting as pilot in command.

2.2.3. Admin role #3: Authorising test airfields

The Project Pilot is authorised to add additional test airfields to the Certificate of Clearance. Although, in general, the requirements on a test airfield are very dependent on the individual circumstances of the test aircraft (and possibly the specifics of the test programme), the Project Pilot is usually asked to use this authority to add airfields for reliability flying (of a newly completed amateur-built aircraft, or a newly modified aircraft) after the formal test flying has been satisfactorily completed. In this case the minimum requirements on a test airfield are normally:

1. The length of the runways should be at least as long as the published take-off distance and landing distance (to and from 15m respectively) for the aircraft.
2. The runways and the airfield should not have any particularly hazardous or unusual features (such as, for example, runways with significant slopes, or tall obstacles adjacent to runways).
3. There should be reasonable emergency landing opportunities in case of engine failure after take-off, and it should be possible to use the airfield without having to fly over built-up areas at low level.

2.2.4. Admin role #4: Authorising Flight Test Observers

The Project Pilot is authorised to add Flight Test Observers to the Certificate of Clearance. Observers must be briefed; see the instructions on the Certificate of Clearance for details. If the Project Pilot is authorising an observer (for reliability flying by a non-assessing pilot) who is not present, they should ensure that the non-assessing pilot is aware of the need to brief the observer.

2.3. Draft MAAN

Each Certificate of Clearance is usually issued together with a Draft MAAN (Microlight Airworthiness Approval Note). The Draft MAAN describes both the test aircraft and the flight test programme. The Project Pilot and BMAA Inspector must make themselves familiar with the Draft MAAN before commencing flight testing.

3. BMAA Test Pilots

The BMAA maintains a small group of BMAA Test Pilots.

Aircraft owners, subject to authorisation by the BMAA, may also carry out certain trivial and low risk flight test tasks such as the flight testing of avionics, or the flight testing of minor powerplant changes.

3.1. Test Pilot Categories

3.1.1. BMAA Test Pilot Class 1 (TP1)

TP1 Test Pilots may carry out any test flying task (subject to authorisation from the BMAA). TP1 Test Pilots are registered with, and accepted by, the CAA.

3.1.2. BMAA Test Pilot Class 2 (TP2)

TP2 Test Pilots may carry out certain standard flight test tasks (subject to authorisation from the BMAA). Typical tasks include flight testing of amateur-built subsequent examples, or the flight testing of a propeller change.

3.2. Test Pilot Currency

The onus is on BMAA Test Pilots themselves to ensure that they are current for the task in hand. If in any doubt, the Technical Office should be consulted.

3.2.1. Spin Testing

Spin testing may only be performed by TP1 Test Pilots who have had appropriate training, and are in current spinning practice.

4. Insurance

Legal minimum insurance must be in place for all test flying.

Note that test flying is flown under B Conditions, not an aircraft's Permit to Fly. The policy must cover this.

4.1. BMAA Test Flying Insurance

The BMAA provides comprehensive - hull and passenger / third party liability - insurance for test flying by BMAA Test Pilots (TP1 and TP2) under BMAA B Conditions. It is a condition of the policy that the test pilot does not own (or part own) the aircraft.

Maximum hull value is £80,000 (2018/19 figure). The test pilot must make the owner aware of this limit prior to test flying, and, if the hull of the aircraft exceeds this value, alternative insurance arrangements must be made.

A copy of the current insurance document may be requested from the Technical Office.

5. Miscellaneous (but important)

5.1. Minimising risk to third parties

Any significant risk to an uninvolved third party as a result of BMAA test flying is unacceptable, and all test flying operations should be planned to ensure that such risks are not incurred. CAA CAP 1220, 'Operation of experimental aircraft under E conditions', addresses this subject in detail.

This section contains a few additional considerations – relevant to testing BMAA aircraft – on this subject.

5.1.1. First flights

The first flight of a newly completed aircraft should normally be flown solo to check for any major problems prior to taking an observer. The same is true for the first flight of a significantly modified aircraft, where the modification could – due to its operation or failure – adversely affect basic aircraft operation.

Although very rare, loss of control immediately after take-off is a possibility on a first flight; indeed, there has been such an accident to a BMAA aircraft, which was due to a manufacturing error. For this reason, first flights should not normally be flown from airfields immediately adjacent to built-up areas, and in particular not with built-up areas in the likely crash zone off the end of the runway.

5.1.2. Engine failure after take-off

The majority of BMAA test flying is relatively routine: testing of pre-existing foreign types for UK approval, testing of relatively minor modifications, and production test flying of amateur-built subsequent examples. The largest risk to third parties is engine failure after take-off (EFATO) resulting in a forced landing in an unsuitable location.

Test flying should only be undertaken from airfields where a forced landing can be made following EFATO clear of third parties and third-party property (except open farmland). Test pilots should also plan for EFATO at all points of the climb out from the test airfield. For example, a BMAA flight test programme was undertaken from private strip adjacent to the M11 motorway. Exploratory flights were first performed (with another aircraft) to ensure that the motorway could be avoided following all possible EFATO.

There have been a number of accidents to BMAA aircraft following partial engine failure after take-off where the pilot has decided to continue. The engine has subsequently failed completely resulting in an engine failure at a location and height for which the pilot had not planned. While whether to continue or not on a sick engine is a judgement call, test pilots should ensure that they do not put themselves in a position where a forced landing will endanger third-parties.