

MICROLIGHT AIRWORTHINESS APPROVAL NOTE

MAAN NO: 2336

ISSUE 1

DATE: 7 MARCH 2011

TITLE: Microlight Airworthiness Approval Note 2336: Shadow Fuel Tank Deterioration

APPLICABILITY: All BMAA-administered Shadow variants

STAGE: AUTHORISATION

1 INTRODUCTION

The Shadow is a type-approved microlight aeroplane whose variants are described in Microlight TADS BM6, BM19, BM40, BM41 and BM55. The BMAA is responsible for continued airworthiness.

This MAAN authorises the issue of a Service Bulletin in response to in-service experience of this type. The Service Bulletin relates to inspection of the integrity of the fuel tanks and outlet strainers. The bulletin is appended to this MAAN.

2 BASIS FOR APPROVAL

The basis for authorisation of this Service Bulletin is BCAR Section S Issue 5. Paragraphs affected are S963a, S965, and S977.

3 DESCRIPTION

Original Shadow fuel tanks are constructed of either Aerolam or Fibrelam. Aerolam has an aluminium honeycomb core, whereas Fibrelam has an aramid core.

They are constructed from flat 1/8" thick panels, rebated and bonded together at their edges with epoxy. Figure 1 shows a typical edge joint showing a neat fillet of epoxy. After assembly, but before the top is bonded on, the interior of the tanks is coated with a thin layer of epoxy. The fuel outlet hole is then screened by a plastic 'tea strainer' bonded onto the floor of the tank. After bonding on the top a small amount of epoxy is poured into the tank to coat the top panel. It is not possible to neatly fillet the top edge joints as with the rest of the tank.

In a number of examples the tanks have developed leaks at the bonded edges. Also fragments of epoxy have been found and the strainer has become dislodged. In one known case the strainer gauze had disintegrated leading to an engine failure, due to debris entering the fuel line. See Figures 2 & 3. Both the main and slipper tanks have been affected.

BMAA Service Bulletin 2336, appended to this MAAN, introduces an ongoing inspection schedule for all Shadow variants in the BMAA fleet: series B/BD, C/CD and D/DD.

4 TECHNICAL INVESTIGATION

It is thought that the deterioration of the tanks and strainers is partly a function of the age of the fleet but mostly the introduction of ethanol into fuel in recent years. This is born out by a very thorough scientific study commissioned by the American boating magazine, Seaworthy, published by the US Marine Insurance Industry. This can be found at <http://www.boatus.com/seaworthy/fueltest.asp#>

Further useful information may be found at <http://www.boatus.com/seaworthy/ethanol.asp>

The results of a more practical but very clear and convincing amateur investigation may be found at <http://egyptian.net/~raymacke/Cbnskif27.htm>

Once the tank has developed a leak it is very difficult to carry out a lasting repair since the joints will have been contaminated with 2-stroke oil. Also without removing the top panel, which is a recognised way of opening up the tank, it is impossible to repair the joint fillets effectively from the inside, or to replace the strainer. Removing the top panel is difficult to do without damaging the edges of both the top and sides of the tank.

The inspection can be performed by the owner.

5 FLIGHT TESTING

No flight-testing is required.

6 MANUALS, PLACARDS AND INFORMATION

A copy of this Service Bulletin must be retained with the Aircraft Manual.

The daily and 50 hour/annual inspection schedules must be amended to include the inspections specified by the Service Bulletin.

7 NOISE CERTIFICATION

Not affected.

8 RADIO

Any radio installation is not affected.

9 INSPECTION

To the Service Bulletin appended to this MAAN. Also to TADS BM6, BM19, BM40, BM41 or BM55 as appropriate in its latest issue.

10 WEIGHT AND BALANCE

Not affected.

11 SIGNIFICANT FEATURES AND LIMITATIONS

See section 3. All limitations remain unchanged.

12 CERTIFICATION

I authorise issue of BMAA Service Bulletin 2336 Issue 1, as appended to this MAAN.

Prepared by:

Authorised by:

A P Jones
Design Approval Engineer
British Microlight Aircraft Association

B J Syson
Chief Technical Officer
British Microlight Aircraft Association

Initial Distribution.

MAAN (including SB):

CAA Light Aircraft Certification Section (Gatwick)
CAA Applications and Approvals Section (Gatwick)
MAAN File 2336
Shadow post approval file
LAA Engineering

Service Bulletin:

All BMAA-administered Shadow registered owners



BRITISH MICROLIGHT AIRCRAFT ASSOCIATION SERVICE BULLETIN

Reference: BMAA Service Bulletin 2336 Issue 1
Title: Fuel Tank Deterioration
Applicability: All BMAA-administered Shadows
Author: Adrian Jones, Design Approval Engineer, BMAA
Effective date: 21 March 2011
Classification: Essential

1 INTRODUCTION

Original Shadow fuel tanks are constructed of either Aerolam or Fibrelam. Aerolam has an aluminium honeycomb core, whereas Fibrelam has an aramid core.

They are constructed from flat 1/8" thick panels, rebated and bonded together at their edges with epoxy. Figure 1 shows a typical edge joint showing a neat fillet of epoxy. After assembly, but before the top is bonded on, the interior of the tanks is coated with a thin layer of epoxy. The fuel outlet hole is then screened by a plastic 'tea strainer' bonded onto the floor of the tank. After bonding on the top a small amount of epoxy is poured into the tank to coat the top panel. It is not possible to neatly fillet the top edge joints as with the rest of the tank.

In a number of examples the tanks have developed leaks at the bonded edges. Also fragments of epoxy have been found and the strainer has become dislodged. In one known case the strainer gauze had disintegrated leading to an engine failure, due to debris entering the fuel line. See Figures 2 & 3. Both the main and slipper tanks have been affected.

It is thought that the deterioration of the tanks and strainers is partly a function of the age of the fleet but mostly the introduction of ethanol into fuel in recent years. This is born out by a very thorough scientific study commissioned by the American boating magazine, Seaworthy, published by the US Marine Insurance Industry. This can be found at <http://www.boatus.com/seaworthy/fueltest.asp#>.

Further useful information may be found at <http://www.boatus.com/seaworthy/ethanol.asp>

The results of a more practical but very clear and convincing amateur investigation may be found at <http://egyptian.net/~raymacke/Cbnskif27.htm>

Once the tank has developed a leak it is very difficult to carry out a lasting repair since the joints will have been contaminated with 2-stroke oil. Also without removing the top panel, which is a recognised way of opening up the tank, it is impossible to repair the joint fillets effectively from the inside, or to replace the strainer. Removing the top panel is difficult to do without damaging the edges of both the top and sides of the tank.

2 AIRCRAFT AFFECTED BY THIS SERVICE BULLETIN

All Shadow variants in the BMAA fleet: series B/BD, C/CD and D/DD.

3 IMPLEMENTATION OF THIS SERVICE BULLETIN

The owner may carry out this Service Bulletin. If the fuel system is disturbed it is recommended that a second inspection by a competent person is performed before flight.

As part of the *daily inspection* the fuel tanks should be checked externally for leaks. The colour imparted to the fuel by the 2-stroke oil often leaves an obvious trail. Otherwise use of a tissue will confirm any suspicion of a leak at a seam. The aircraft should not be flown with a leaking fuel tank.

PTO

Within **10 flight hours or 3 months** of the effective date (whichever is sooner), and then at least every **50-flight hours or annually** (whichever is sooner), check that the fuel strainer in the main tank, and the slipper tank if fitted, is intact and bonded in place, and that it is effective at straining out any particles in the fuel. For the main tank, shine an LED torch into the filler neck, but remember to turn it on and off away from the tank to eliminate the possibility of sparks igniting the fuel. For the slipper tank, remove the fuel gauge sender unit and inspect the strainer through the aperture. The aircraft should not be flown if a strainer is not doing its job effectively.

At the same time check for the presence of any particles of epoxy or other debris in either tank. If any are found they should be flushed out with clean fuel until no loose debris remains. Ensure that this is done in an open, well-ventilated area away from any possible source of ignition.

Ensure that the fuel gauge sender is replaced using a suitable sealant, but be careful that this does not enter the tank via the screw holes when the sender is reattached.

If a leak, or other damage, is discovered during a pre-flight inspection, record in the airframe logbook. Always record the 50 hour/annual inspection, and any findings, in the airframe logbook. Quote BMAA Service Bulletin 2336.

Any repairs or modifications must be made in full accordance with BMAA procedures – contact the BMAA Technical Office.

A copy of this Service Bulletin must be retained with the Aircraft Manual. The daily and 50 hour/annual inspection schedules must be amended to include the inspections specified by the Service Bulletin.

4 CONTACT DETAILS

BMAA
Bullring
Deddington
BANBURY
OX15 0TT

01869 336 006
cto@bmaa.org

5 FIGURES

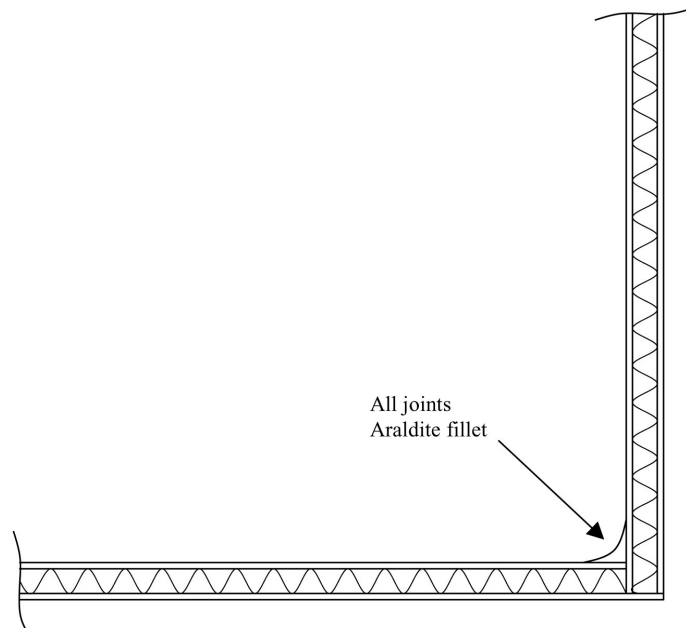


Figure 1: Shadow Fuel Tank Construction



Figure 2: Debris and Deterioration of Edge Joint



Figure 3: Debris and Strainer Disintegration