

	<b>Standard Modification</b> Issue 1 May 2013	Mod No. SM13312
		Page : 1 of 4
		Compiled : G Chater
		Approved : F Donaldson

**TITLE :** Fuel Tank Replacement

**APPLICABILITY :** CFM Starstreak and CFM Streak Shadow (narrow and wide bodied variants)

**Mod Type :** Retro-fit

### 1. Introduction

This modification describes replacing the original CFM-supplied main and slipper fuel tanks with welded aluminium alloy types manufactured by Jedi Racing Cars Ltd. Original tanks were constructed from Araldite 2005 epoxy bonded Aerolam sheets, butt jointed. There are reports of fuel leakage from the seams of original tanks, but new replacements of the same type are no longer available. Effecting a repair of the bonded tanks is difficult, particularly when pre-mix fuel has been used.

Four types of fuel tank are available from Jedi Racing Cars: main tank for narrow bodied aircraft, main tank for wide bodied aircraft, slipper tank for both narrow or wide bodied aircraft, and slipper tank for aircraft fitted with a Rotax 912-UL. In all cases, the tanks are the same size as the originals and are fitted to the airframe in exactly the same way. Tanks are available either painted or unpainted.

The benefits of fitting the Jedi fuel tanks are:

- 1) Reduced likelihood of seam leakage and potentially better compatibility with any fuels approved for use in the future.
- 2) The availability of new tanks as direct, dimensionally equivalent replacements for the originals.
- 3) Greater sump capacity.
- 4) Lanyard protection of filler cap.
- 5) Higher quality internal fuel filters.

Both types of main tank are available with or without a drainable sump. If a main tank is fitted without a slipper tank, the main tank must have a drainable sump. The slipper tank is always supplied with a drainable sump. The installation of a slipper tank is not mandatory.

The filler cap must be attached to a suitable point on the airframe with a lanyard using the tab provided on the cap.

### 2. Parts List

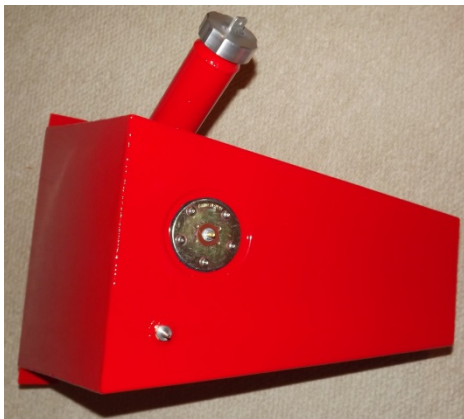
Qty	Part No.	Description	Source
1	Jedi Main Shadow Tank (Narrow)	Main Shadow series alloy fuel tank (narrow bodied, nominal capacity 23 litres)	Jedi Racing Cars Ltd., Nettlebush, Finedon Road, WELLINGBOROUGH NN8 4NY.
1	Jedi Main Shadow Tank (Wide)	Main Shadow series alloy fuel tank (wide bodied, nominal capacity 33 litres)	As above.
1	Jedi Slipper Shadow Tank	Shadow series slipper tank (nominal capacity 27 litres)	As above.
1	Jedi Slipper Shadow Tank (912 version)	Shadow series slipper tank for use where Rotax 912-UL engines are installed (nominal capacity 23 litres)	As above.

	<b>Standard Modification</b> Issue 1 May 2013	Mod No. SM13312
		Page : 2 of 4
		Compiled : G Chater
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Select the appropriate main tank, depending on the airframe type (original narrow bodied or later wide bodied) and the slipper tank depending on engine installation. Since the Jedi tanks are direct replacement parts, it is possible to use the aircraft's existing mounting hardware.

### 3. Action

- 3.1 **General** – Please refer to the notes on fuel gauge calibration (3.6) and weight (4) before proceeding. Ensure a fire extinguisher is to hand during all work. Disconnect batteries prior to starting work. The existing tanks must first be emptied into a suitable container by using the fuel drain or disconnecting the lower fuel pipe. Once the tanks have been drained, take note of fuel pipe routing (a photograph is helpful), then disconnect and retain all fuel pipes and clips. Inspect the parts for serviceability in case replacements are necessary. Disconnect the vent pipes from the tanks. Disconnect the wires from the level senders, taking note of polarity to aid reconnection. The ends of the disconnected pipes should be sealed up to prevent debris entering the fuel system.
- 3.2 **Main Tank removal (narrow or wide type)** – Before removing the existing tank, take note of the positions and orientation of support straps, mounting bolts, nuts and washers. Again, a photograph is helpful here. Unbolt the upper and lower support straps, which are retained by a single bolt each side. Remove the remaining bolts from the tank brackets; the tank will not drop far because the filler neck will still be supported by the engine mount. Carefully remove the tank from the airframe; it is easier to do this after unscrewing the filler cap. Inspect all mounting hardware for suitability to reuse. Inspect the neoprene strips on the support straps and replace if necessary.
- 3.3 **Slipper Tank removal** – Before removing the existing tank, take note of the positions and orientation of the support strap, mounting bolts, nuts and washers. Again, a photograph is helpful here. Gently support the tank from underneath. Unbolt the support strap. Remove the remaining bolts from the tank brackets; the tank is now free from the airframe. Inspect all mounting hardware for suitability to reuse. Inspect the neoprene strips on the support straps and replace if necessary.
- 3.4 **Jedi Main Tank installation (narrow or wide type)** – Fit a suitable short lanyard to the filler cap. Position fuel tank onto hull and temporarily fit support straps. Mark the tank brackets with a felt pen at the airframe's tank mounting hole locations. Remove the tank if desired and drill 3/16" holes at the marked positions. Refit the tank using the original or replacement hardware in the correct orientation. Connect the fuel pipe, vent pipe and sender wires as per the original scheme.



- 3.5 **Jedi Slipper Tank installation** – Support the tank from underneath, then position it onto the hull and temporarily fit the support strap. Mark the tank brackets with a felt pen at the airframe's tank mounting hole locations. The length of the rear mounting brackets of the Jedi slipper tank is designed to make any existing plastic spacer blocks

	<b>Standard Modification</b> Issue 1 May 2013	Mod No. SM13312
		Page : 3 of 4
		Compiled : G Chater
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redundant (see photograph above). Ensure that there is sufficient undercarriage clearance, including from the cross wires. Remove the tank if desired and drill 3/16" holes at the marked positions. Refit the tank using the original or replacement hardware in the correct orientation. Connect the fuel pipes, vent pipe and sender wires as per the original scheme.

- 3.6 Each fuel quantity indicator must be recalibrated according to the manufacturer's instructions. For best calibration accuracy, the aircraft's tail skid should be supported such that the wing is at a representative cruise angle of attack (four degrees is typical).
- 3.7 Check for leaks in the fuel system.

### 3. Weight and Balance

The prototype Jedi tanks showed no weight increase for the slipper (which is very close to the aircraft's C of G) and a 1lb increase for the main tank. Note that, due to their construction, the weight of the original tanks vary significantly from one example to another. It is therefore reasonable to state that the weight of the replacement tanks is similar to the originals. A representative example calculation appears below, based on an increase in main tank weight of 1lb. In order to complete an accurate weight and balance schedule, weigh the empty original tanks and the Jedi replacements.

	Weight (lb/kg)	CG (in/mm)	Moment
Existing A/C	422.4	53.26	22496
+/- Weight Change	+1.0	41	41
Post Mod A/C	423.4	53.23	22537

Amend the aircraft weight and balance schedule accordingly.

### 4. Flight Test and Special Instructions

Before the modified aircraft may be flown, an LAA inspector must check the installation complies with this modification:

- 4.1 By means of a visual external inspection, confirm that the tank(s) has been manufactured to an acceptable standard.
- 4.2 If a main tank is being used without a slipper tank, ensure that the main tank has a drainable sump incorporated.
- 4.3 Ensure that the tank has been fitted correctly.
- 4.4 Ensure that the holes in the mounting lugs have been drilled in correct locations (and drilled to a satisfactory standard).
- 4.5 Ensure that the strap supports the tank effectively and the tank is protected from abrasion by a foam or rubber strip.
- 4.6 Ensure that the filler cap (main tank) is secured by a lanyard and cannot reach the propeller.
- 4.7 Ensure that each fuel quantity indicator is operating correctly and calibrated to read zero when each tank is empty.
- 4.8 Confirm that the fuel system is otherwise unaffected.
- 4.9 Assess the effect of any weight difference on the empty weight and balance of the aircraft.
- 4.10 Ensure that the aircraft's weight and balance report, and all weight and fuel capacity related placards are correct.

	<b>Standard Modification</b> Issue 1 May 2013	Mod No. SM13312
		Page : 4 of 4
		Compiled : G Chater
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- 4.11 With no more than 5 litres fuel in the tank, ensure that the fuel flow from the fuel outlet (under gravity) exceeds 40.5 litres per hour.
- 4.12 Ensure ground run of engine to maximum static rpm is satisfactory.
- 4.13 With the above found to be satisfactory, a logbook entry must be made, stating the modification number SM13312 and recording the fuel flows achieved in section 4.11 above.
- 4.14 A short check flight must then be made to confirm satisfactory engine operation – stay within gliding distance of the airfield.
- 4.15 Following the flight, check the installation for fuel leaks and security.
- 4.14 Your inspector must sign form LAA-MOD 1 and issue a Permit Maintenance Release (PMR).

The owner must then return the form LAA-MOD 1 to LAA Engineering. A copy of this standard modification leaflet must be retained with the aircraft records.

**Additional Daily Inspection requirements:**

- Ensure tank in good and clean condition with no damage and no leaks (minor dents and scratches to the paint are acceptable).
- Ensure no fatigue cracks – particularly of mounting lugs and welded seams.
- Drain sample from sump to check for any water or debris.

**Additional 50 hour or annual check, whichever is sooner:**

- Ensure tank in good and clean condition with no damage and no leaks.
- Ensure no fatigue cracks – detailed inspection of whole tank.
- Drain and flush tank (recommended).