CIVIL AVIATION AUTHORITY – SAFETY REGULATION GROUP

MICROLIGHT TYPE APPROVAL DATA SHEET (TADS)

NO: BM 19 ISSUE: 6

Shadow Series BD

1 MANUFACTURER — CFM Aircraft Ltd (ceased trading)
BMAA is responsible for continued airworthiness

2 UK IMPORTER — None

3 CERTIFICATION — BCAR Section S Advance Issue dated March 1983. List of Section S Blue Papers and Additional CAA Requirements

4 DEFINITION OF BASIC STANDARD — CFM Aircraft Ltd Drawing Register Shadow Series B Schematics Section, 25 March 1985, plus CFM Mods 004, and 006

5 COMPLIANCE WITH THE MICROLIGHT DEFINITION

(a) MTOW	348 kg or 374 kg[1]
(b) No. Seats	2
(c) Maximum Wing Loading	24.85 kg/m^2
(d) Vso	33 kt IAS
(e) Permitted range of pilot weights	55 – 90 kg front seat 0 – 90 kg rear seat
(f) Typical Empty Weight (ZFW)	160 kg or 186 kg[1]
(g) ZFW + 172 kg crew + 1 hr fuel (19 litres / 13.7 kg)	346 kg or 372 kg[1]
(h) ZFW + 86 kg pilot + full fuel (49.6 litres / 35.7 kg)	308 kg
(i) Max ZFW at initial permit issue	162 kg or 188.5 kg[1]

6 POWER PLANTS

Designation	*Shadow Series BD*	*Shadow Series BD*		
Engine Type	*Rotax* 447 Upright	*Rotax* 447 Upright		
Reduction Gear	*2.58:1*	*2.58:1*		
Exhaust System	*Rotax Modified*	*Rotax Modified*		
Intake System	*Air filters*	*Rotax Airbox Muffler*		
Propeller Type	*Newton 19R/P*	*Newton 19 R/P*		
Propeller Dia x Pitch	*51" x 44"*	*51" x 45"*		
Noise Type Cert No.	*9M*	*39M*		
AAN approving configuration	*19526*	*19897*		

[1] If Mods CFM 26 and 35B are incorporated the MTOW is increase to 374 kg

7 MANDATORY LIMITATIONS

(a) Max Take-Off Weight — 348 kg or 374 kg[1]

(b) CG Limits — Aft limit 45" or 45.2"[1] aft of datum
Forward Limit 38" or 39.3"[1] aft of datum

(c) CG datum — 24" fwd of Wing Leading Edge at Wing Root

(d) Cockpit Loadings

	Front	Rear	Total
Min	55 kg	0 kg	55 kg
Max	90 kg	90 kg	180 kg

(e) Never Exceed Speed, V_{NE} — 94 kt IAS

(f) Manoeuvring Speed, V_A — 66 kt IAS

(g) Flap Limiting Speed, V_F — 15° deflection 57 kt IAS
30° deflection 52 kt IAS

(h) Permitted Manoeuvres — Maximum bank angle 60°
Normal acceleration limits, +4 / -2g
Aerobatics and Spinning prohibited

(i) Fuel Contents (Max Useable) — 22.7 litres
49.6 litres if slipper tank fitted.

(j) Power Plant

Engine	*Rotax 447*			
Max RPM	*6800*			
Max Continuous RPM	*6000*			
Max CHT	*260°C (500°F)*			
Max EGT	*650°C (1200°F)*			
Fuel Spec	*95 RON minimum unleaded to BS(EN)228, or AVGAS 100LL*			
Engine Oil Specification	*2 Stroke*			
Gearbox Oil Specification	*API-GL5/GL6 SAE 140 EP 85W-140 EP*			
Fuel/Oil Mix	*50:1*			
Fuel Pressure	*0.2-0.4 bar at cruise power*			

8 INSTRUMENTS REQUIRED

ASI	Altimeter	RPM	CHT / EGT	Compass	Fuel Gauge	VSI	Slip ball
Required	Required	Required	Required	Optional	Required	Optional	Optional

9 CONTROL DEFLECTIONS

Elevator UP:	20° ± 2°	Elevator trim tab UP:	5° *
Elevator DOWN:	16° ± 2°	Elevator trim tab DOWN:	35° *
Ailerons UP:	20° ± 2°	Flaps ZERO: In line with	0°
Ailerons DOWN:	10° ± 2°	wing centre section.	
Rudder LEFT:	25° ± 2°	Flaps INTERMEDIATE:	15° ± 3°
Rudder RIGHT:	25° ± 2°	Flaps LANDING:	30° ± 3°

* The elevator trim tab deflections are shown for guidance. In practice some variation is to be expected.

10 PILOT'S NOTES, MAINTENANCE MANUALS, PLACARDS

10.1 Manuals approved for use with this aircraft:

Shadow Series B & BD Pilots Notes PN – SH/B at Amendment 6
Shadow Series B & BD Service Manual SM – SH/B at Amendment 5
Shadow Series C & CD Construction Manual C/RM – CD at Amendment 1

10.2 See Annex D for details of the placards that are to be fitted.

11 SERVICE BULLETINS, MANDATORY MODIFICATIONS

See Annex A for details. Note: MPDs may be downloaded from the CAA Website:
http://www.caa.co.uk/docs/33/cap661.pdf

12 MINIMUM PERFORMANCE AT MAX TAKE-OFF WEIGHT

Rate of Climb: 450 ft/min at 60 kt IAS
Stall or Minimum Flying Speed: 33 kt IAS in landing configuration

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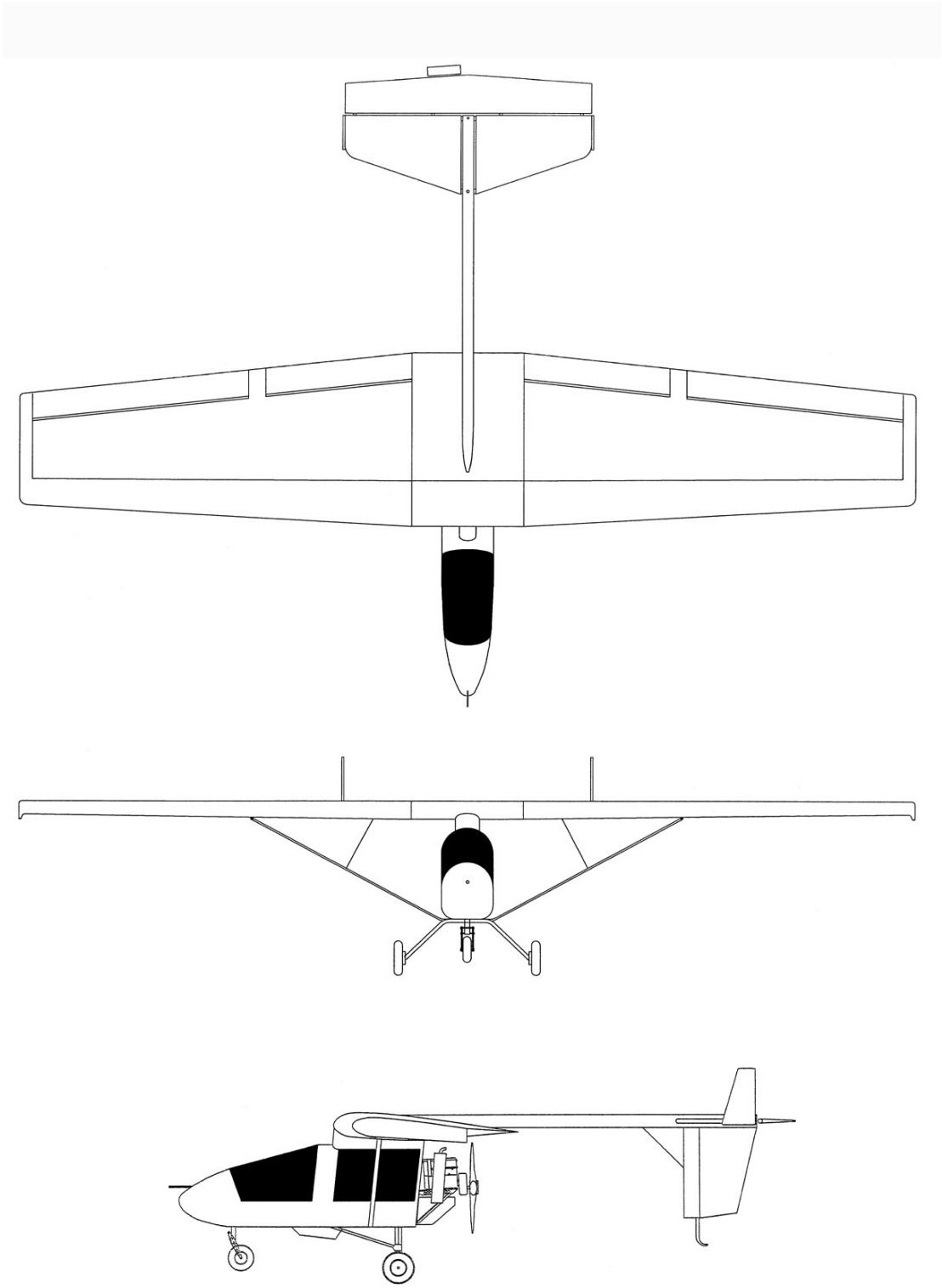
ISSUE HISTORY

Issue No.		Reason and signatory
1	26/06/86	Initial issue J G Wraith
2	26/09/86	T R Woods
3	18/03/97	To permit an increase in maximum take-off weight to 374 kg with incorporation of Mods 026 & 035B. R J Hardy
4	12/05/03	To include weighing information, editorial changes and the inclusion of MPD 2003-004 and BMAA SB 1681 issue 1. J Barratt
5	05/07/04	Change to the organisation responsible for continued airworthiness support and additional MPDs J Barratt
6	01/08/11	Removal of MPD 2004-002, as superseded by MPD 2004-007R1. Inclusion of all applicable MPDs, SBs and Approved Optional Mods. Correction of elevator and elevator trim tab deflections. Correction of fuel tank moment arm. Placard updates. Correction of climb rate. General data update, improved layout and 3-view drawing. A C Love

ILLUSTRATION OF AIRCRAFT – 3 VIEW



ANNEX A
SERVICE BULLETINS AND MANDATORY MODIFICATIONS

Designation	Classification	Subject
CFM SB 2	Essential	Rotax intake muffler and propeller pitch change
CFM SB 3a	Recommended	Rotax 447 fitting of internal deflector to cooling shroud
CFM SB 4	Optional	Rotax 447 upgrade of gearbox torsional damper
CFM SB 5	Recommended	Loctite on aileron control rod ends
CFM SB 6	Recommended	Aeration of outer wings 'D' box
CFM SB 7	Recommended	Solar heating of upper wing surfaces coloured other than white
CFM SB 8	Optional	Alloy wheels
CFM SB 9	Recommended	Support for front hanger bracket
CFM SB 10	Recommended	Fore/aft wing movement
CFM SB 11	Recommended	Multi-strand elevator cable
CFM SB 12 & MPD 1998-013 R2	Mandatory	Replace/modify the rudder fin post
CFM SB 13	Recommended	Rudder pedal hinges
CFM SB 14 Issue 2 & MPD 2001-002 R2	Mandatory	Cracking of tailplane spar leading edge spigot tubes
BMAA SB 1681 & MPD 2003-004	Mandatory	Installation of ASI and altimeter correction placards
MPD 2004-007 R1	Mandatory	Main undercarriage replacement with approved alternative. Implement in accordance with MAAN 1762 Issue 2 or MAAN 1773 Issue 1
MPD 2004-008 R1	Mandatory	Nosewheel undercarriage. Inspect in accordance with MAAN 1762 Issue 2 Appendix A, or MAAN 1773 Issue 1 Appendix A
BMAA SB 2073	Recommended	Inspection of Part F153 Hanger Tube Bracket
BMAA SB 2329	Essential	Horizontal Tailplane Spar and Bush Wear
BMAA SB 2336	Essential	Fuel Tank Deterioration

ANNEX B
APPROVED OPTIONAL MODIFICATIONS

The installation of all optional modifications is to be inspected by a BMAA inspector and an entry made in the appropriate logbook(s). Involvement of the BMAA Technical Office is not required. Note that other approved modifications may exist which are not mentioned here. Contact the BMAA for details.

Mod No.	Subject
CFM 15 / AAN 21458	Electrically operated elevator trim tab
CFM 18 / AAN 21555	Conversion of B Series to C Series
CFM 20 / AAN 21682	27 litre fuel tank in place of the rear occupant
CFM 26	Streamline struts and carry-through member. Mandatory for increase in MTOW to 374 kg
CFM 28 / AAN 23713	Modification to allow aircraft to be flown without foot controls
CFM 28a / AAN 23713	Mechanically operated brakes replace pneumatic
CFM 29 / AAN 27392 / MAAN 1193 Issue 5	Slipper tank. Requires incorporation of mod CFM 18
CFM 31 / AAN 25545	Multi-strand elevator cable
CFM 32 / AAN 25545	Additional fuselage (shroud) window
CFM 35B	MTOW increase to 374 kg, requires incorporation of mod CFM 26
MAAN 1762 Issue 2	Crosbie replacement undercarriage and introduction of new max continuous engine rpm (installation of this modification fulfils the requirements of MPD2004-007R1)
MAAN 1773 Issue 1	Cook replacement undercarriage and introduction of new max continuous engine rpm (installation of this modification fulfils the requirements of MPD2004-007R1)

ANNEX C
WEIGHING INFORMATION

CG Datum:	24" Fwd of Wing L/E at Wing Root
Weighing attitude:	Weigh at main wheels and tailskid with boom level
Mainwheel moment arm:	46.75" aft of datum
Skid moment arm:	165.75" aft of datum
Main tank moment arm:	63.5" aft of datum, capacity 22.7litres (16.3kg)
Slipper tank moment arm:	42" aft of datum, capacity 26.9 litres (19.4kg)
Pilot moment arm:	7.75" aft of datum for pilots below 75 kg
	9.75" aft of datum for pilots above 75 kg
Passenger moment arm:	42" aft of datum
Crew weights:	Front seat: minimum 55 kg / maximum 90 kg
	Rear seat: minimum 0 kg / maximum 90 kg
Aft CG Limit:	45" aft of datum
Fwd CG Limit:	38" aft of datum

ANNEX D
EXAMPLE PLACARDS

(a) FLIGHT LIMITATIONS PLACARD AND MARKINGS

To be displayed next to the ASI.

V_{NE} (Never exceed speed): 108 mph or 94 knots IAS (to match ASI units)
V_A (Manoeuvring speed): 76 mph or 66 knots IAS (to match ASI units)

Alternatively the ASI may be marked with: A red radial line at V_{NE}
An amber radial line at V_A
A white arc from V_{S0} to V_{FE}

(b) ASI CORRECTION PLACARD

To be displayed next to the ASI.

Kt IAS (ASI units)	30	33 (V_{S0})	40 (V_{S1})	50	60 climb	66 (V_A)	70	80	90	94 (V_{NE})
Kt CAS	29	31	36	44	52	57	61	70	80	84

(c) ALTIMETER CORRECTION PLACARD

To be displayed next to the Altimeter.

Kt IAS (ASI units)	30	40	50	60	70	80	90	94
Altimeter over-read (feet)	5	15	25	40	50	65	75	80

(d) LOADING PLACARD

The placard is to be visible to the pilot.

EMPTY WEIGHT:	Enter weight from current weight report
MAX TAKE–OFF WEIGHT:	348 kg or 374 kg[1]
MINIMUM COCKPIT LOAD:	55 kg in front seat
MAXIMUM COCKPIT LOAD:	90 kg in each seat (may be reduced to 86 kg pilot to satisfy cg limit)

(e) ENGINE LIMITATIONS PLACARDS AND MARKINGS

To be displayed next to the engine instruments, and/or the instruments to be marked as detailed below.

MAX RPM:	6800	and/or a red radial line
MAX CONT RPM:	6000	and/or an amber sector between MAX CONT and MAX RPM
MAX EGT:	650°C or 1200°F	(to match units of instrument) and/or a red radial line
MAX CHT:	250°C or 480°F	(to match units of instrument) and/or a red radial line

(f) FUEL LIMITATIONS PLACARD

This must be based on the most recent weight report for the aircraft and displayed near to the filler cap. The examples below are for an empty weight of 186 kg or 162 kg. Adjust accordingly using empty weight from current weight report.

With Slipper Tank

FUEL **Capacity 49.6 Litres** **2-stroke mix 50:1**	
Cockpit Weight (kg)	Max. Fuel Load (litres)
180	11
175	18
170	25
165	31
160	38
155	45
152	FULL
95 RON minimum unleaded to BS(EN)228 or AVGAS 100LL	

Without Slipper Tank

FUEL **Capacity 22.7 Litres** **2-stroke mix 50:1**	
Cockpit Weight (kg)	Max. Fuel Load (litres)
180	8
175	15
170	22
169	FULL
95 RON minimum unleaded to BS(EN)228 or AVGAS 100LL	

(g) SWITCHES

All switches are to be marked with function and sense (up=on, down=off).

(h) MISCELLANEOUS

Fireproof metal plate showing the aircraft registration to be mounted in a prominent position.

The additional limitations, warnings, and secondary controls and switches are to be placarded as below.

Front Cockpit

AEROBATICS AND SPINNING ARE PROHIBITED

TRIM: NOSE UP
NOSE DOWN

THROTTLE: INCREASE
DECREASE

CHOKE: ON
OFF

EMERGENCY FUEL CUT OFF: UP FOR OFF

IGNITION: ON
OFF

FLAPS: 0°
15° $V_{F1:}$ 65 mph or 57 knots IAS (to match ASI units)
30° $V_{F0:}$ 60 mph or 52 knots IAS (to match ASI units)

Rear Cockpit

MAXIMUM SEAT LOAD: 90 kg

DO NOT GET OUT WHEN ENGINE IS RUNNING

DO NOT ATTEMPT TO FLY THE AIRCRAFT SOLO FROM THE REAR SEAT

THROTTLE: INCREASE
DECREASE