

NO: BM 19 ISSUE: 6

| | | |
|---|---|---|
| TYPE: | 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) V _{so} | | 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 |

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

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(j) Power Plant

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

(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: | $20^{\circ} \pm 2^{\circ}$ | Elevator trim tab UP: | $5^{\circ} *$ |
| Elevator DOWN: | $16^{\circ} \pm 2^{\circ}$ | Elevator trim tab DOWN: | $35^{\circ} *$ |
| Ailerons UP: | $20^{\circ} \pm 2^{\circ}$ | Flaps ZERO: In line with wing centre section. | 0° |
| Ailerons DOWN: | $10^{\circ} \pm 2^{\circ}$ | Flaps INTERMEDIATE: | $15^{\circ} \pm 3^{\circ}$ |
| Rudder LEFT: | $25^{\circ} \pm 2^{\circ}$ | Flaps LANDING: | $30^{\circ} \pm 3^{\circ}$ |
| Rudder RIGHT: | $25^{\circ} \pm 2^{\circ}$ | | |

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

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(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 |

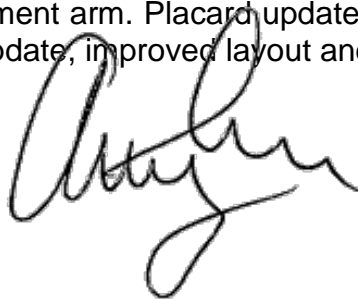
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ISSUE HISTORY

| <u>Issue No.</u> | <u>Reason and signatory</u> |
|------------------|---|
| 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. |

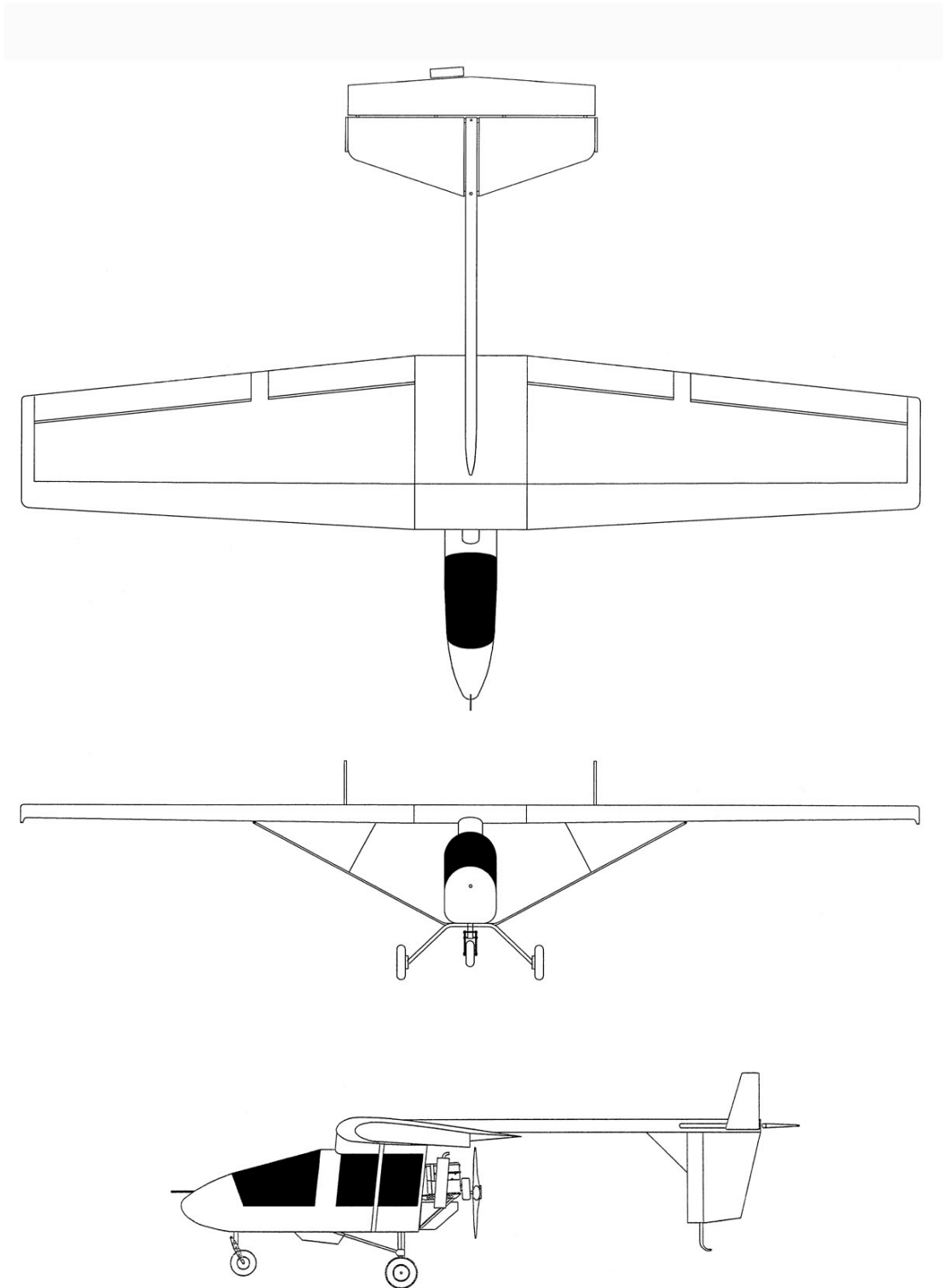
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ILLUSTRATION OF AIRCRAFT – 3 VIEW



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ANNEX A
SERVICE BULLETINS AND MANDATORY MODIFICATIONS

| <u>Designation</u> | <u>Classification</u> | <u>Subject</u> |
|--|-----------------------|---|
| 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 |

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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.

| <u>Mod No.</u> | <u>Subject</u> |
|---|---|
| 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

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(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 kg¹
 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)

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(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:

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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