

CFM-Metalfax

SHADOW

Series C-D

PILOT'S NOTES



FLYING

ENGINE START

COLD STARTING

1. Master *ON*
2. Strobe *ON*
3. Radio *OFF*
4. Mags *ON*
5. Throttle *CLOSED*
6. Fuel Pump *ON*
7. *FULL* Choke
8. Check Prop *CLEAR*
9. Hold Brakes *ON*
10. Press *START*
11. When engine fires, release choke and increase throttle to high idle (just above four-stroking point)
12. Fuel Pump *OFF*

If engine dies, repeat procedure, using right hand to keep a small amount of choke on for ten seconds or so.

HOT STARTING

- Crack throttle, without choke.
- If engine fails to start, use cold start procedure.
- If flooding is suspected, use full throttle, but be ready to close throttle quickly when engine starts (as the brakes will not hold at full throttle).

WARM UP

- Warm up at 2200rpm, with brake *ON*.
- Once CHT temps are above three bars, you may taxi.

TAXYING

- Steer with rudder and brakes, but avoid blipping the throttle.
- Taxi slowly on grass surfaces.

PRE-TAKEOFF CHECKS

- Run-up at 4000rpm (avoid loose stones).
 - Check mags for minor revs drop and no rough running.
 - Check voltage with alternator cut-off switch *OFF*, then *ON*, (and also with strobe *OFF*, then *ON*).
 - Check EGT and CHT rise.
 - Check idle.

- **Choke** *OFF*
- **Controls** full and free movement
- **Hatches** front and rear *CLOSED*
- **Harness** *OKAY*
- **Ignition** both *ON*
- **Instruments** *OKAY*
- Check **Fuel** contents sufficient and **Fuel pump** *ON* (NOT Txfr Pump)
- **Flaps** 15 degrees for soft runway only, otherwise **NO** flap
- Set **Trim** to *NEUTRAL* (cycle elevator trim through full range to check that indicator lights work).

- Check emergency **chute safety pin** has been removed

TAKE-OFF

(Use prepared airstrips only)

NORMAL - into Wind

1. Full *UP* elevator
2. Apply *FULL* power steadily
3. Keep straight with rudder
4. When nose rises, check elevator to hold the nose wheel just off, then keep aircraft in this attitude (over-rotation may cause a tail strike and damage the rudder).
5. The aircraft should lift off at 40 knots or less.
6. Allow the aircraft to accelerate to 50 knots, and then climb at 50 knots on full power (approximately 6000rpm).
7. Check CHT's are not off the scale. If so, land immediately.
8. Check EGT's just below RED range. If in red range, easing the power back should rectify (indicates a lean mixture at full throttle).
9. Fuel pump *OFF* at 300ft.

SHORT TAKEOFF - negligible Crosswind

1. For soft ground and/or long grass, apply 15 degrees of flap.
2. Apply brakes
3. Apply *UP* elevator
4. Apply *FULL* power and check revs above 5800rpm
5. Release brakes as soon as they no longer hold against the increase in power.
6. Hold the nose off at a slightly higher angle than normal.
7. Climb at 47 knots.
8. Flap *UP* as soon as the climb is established.
9. Check CHT's and EGT's (as above).
10. Fuel pump *OFF* at 300ft.

CROSSWIND - Max 15 knots

1. No flaps
2. Line up close to the downwind edge of the runway
3. Aileron into wind (reduce as speed increases)
4. Apply *FULL* power
5. Use rudder and differential braking to keep straight
6. Lift off as soon as possible and accelerate prior to assuming climb attitude - keep wings level
7. Adjust climb out track

CLIMB and CRUISE

Max angle-of-climb speed: 47 knots IAS on full power

Max rate-of-climb speed: 50 knots on full power

Cruise climb speed: 55 to 60 knots *as required to keep below max RPM (6600 rpm) at full power*

Cross Country Cruise: 62 to 67 knots IAS at 5800rpm

Endurance Cruise: 58 to 62 knots IAS at 5200rpm

DESCENT

Trimming for a high-speed, high power descent is difficult.

- Trim full nose-down and reduce power to achieve the required rate of descent.
- Avoid extended high rpm descents with less than 1/3 throttle, as this reduces engine life due to insufficient lubrication via the fuel/oil mixture.

APPROACH

PRE-LANDING CHECKS

- Brakes
- Check Choke *OFF* (i.e. fully forward)
- Fuel contents sufficient
- Fuel Pump *ON* (NOT Transfer Pump)
- Harness *OKAY*
- Strobe *ON*

APPROACH in circuit

1. Reduce power to approximately 4000 RPM
2. Trim to 50 knots and adjust rate-of-descent with power

LANDING

NORMAL LANDING - light winds; 300m strip

1. No flap is needed, but may be used if a bit high (do not side slip - use turns if necessary)
[Max full-flap extension speed is 50 knots]
2. Close the throttle at about 30 ft agl with speed above 45 knots, then hold off at 2 feet until the speed washes off and the aircraft settles (it will float on in light winds)
3. Keep straight with rudder
4. Generally braking is not required.

PRECISION (Short) Landing

1. Select *FULL* flap
2. Reduce speed to 45 knots on final
3. Cross the fence at 41 knots
4. Close the throttle just before the flare
5. Brake as required.

Note: At high weights (or 10+ kts headwind) maintain 45 knots to the flare, as prop diskings at high angles of attack reduces elevator and rudder effectiveness

CROSSWIND landing

The limiting factor here is rudder power after the throttle is closed (demonstrated max crosswind is 16 knots).

1. Select flaps and final approach speed according to conditions.
2. Fly 'wing down' into wind. Use rudder to keep parallel with the runway, and use aileron to keep on the runway centreline.

3. Touchdown on the 'into wind' main wheel, holding into wind aileron as the other main wheel settles. Full rudder and differential braking may be needed to keep straight once on the ground.

Consider landing on the downwind side of the runway to allow some room for a curved run out.

FORCED LANDING without POWER

1. Trim 48 - 50 knots IAS, so minimum sink rate of 1000ft for every 2.5NM in still air (with prop stopped) is achieved.
2. Select a landing area and plan your approach.
3. Do trouble checks - Fuel (pumps *ON*) and Mags *ON*
4. On finals, Master *OFF*, Fuel Shut-off *UP*
5. Select full flap when assured of threshold
6. Maintain 42 knots IAS minimum to flare.

ENGINE SHUT-DOWN

1. Check flaps *UP* and fuel pump *OFF*.
2. Warm-down engine at around 2800rpm, until both CHT's are below four bars.
3. Switch *OFF* radio and GPS.
4. Leave strobe light *ON*.
5. *CLOSE* throttle and turn *OFF* both mags.
6. Check engine time on hourmeter.
7. Master *OFF*.
8. Fill out flight log.

EGRESS and SECURITY

1. Remove headset and leads, and place them on open canopy.
2. Undo harness.
3. Stand up on the seat and place right hand on the side rail ahead of the mag switches.
4. Gently climb out, keeping sufficient weight on the side rail to prevent the tail from slamming to the ground.
5. Gently lower the tail.
6. Ensure emergency parachute safety pin is inserted
7. Secure the aircraft tail down into wind (use tie downs if the wind is above 12 knots).

MANOEUVRES

Spinning, Aerobatics, Max Rate Turns and Stall Turns are all PROHIBITED

- Vne: 94 knots IAS
- Manoeuvring Speed: 67 knots IAS
- Vmin: 35 knots IAS
- Max Bank Angle: 60 degrees
- Max nose up: 45 degrees
- Max nose down: 60 degrees
- Max 15 degree Flap speed: 58 knots
- Max 40 degree Flap speed: 50 knots

Stalls: At minimum flying speed (regardless of power or flap), the nose may drop a few degrees and the aircraft will start to sink. Ailerons remain effective throughout, but are more effective with flap. Speed washes off quickly in medium to steep turns, requiring increased elevator or power to maintain height. Slow flying is best without flap and with full nose-up trim, using power as necessary to adjust height.

EMERGENCY CHUTE

Deployment is not practiced and specific knowledge of how the descent would occur with this aircraft is not available.

The system works by pulling hard on the handle to draw about 200mm of locking cable out of a locking pin. This releases a compressed air bottle (projectile), which carries a chute deployment lanyard out with it.

The parachute shrouds are attached to a wire rope, which is in turn attached to the main boom tube where it passes through the central wing spar box. This attachment point is close to the aircraft's centre of gravity and should allow for an upright descent assuming the aircraft is substantially intact.

A forced landing without power should take precedence over emergency chute deployment whenever:

1. A suitable landing area is available; *and*
2. The aircraft is controllable; *and*
3. There is reasonable assurance that a successful forced landing can be made.

The chute should be immediately deployed whenever:

1. A structural failure occurs; *or*
2. A control failure occurs; *and*

The aircraft has reached, or is likely to reach/exceed Vne.

A delayed deployment may be appropriate if:

1. The aircraft can be normally controlled into a position away from populated areas (or to where deployment is preferable i.e. a heavily wooded area); *or*
2. Excessive speed is not a factor, but high winds aloft exist.

Always deploy parachute with the engine OFF.

Switch OFF fuel and electrics.

Brace for landing.

PRE-FLIGHT

PRE-FLIGHT CHECK (Excluding Assembly)

1. Fill tank with correct fuel. If engine doesn't have automatic oil injection, prepare 50:1 fuel mix using Super Two-Stroke oil (for 'air-cooled' engines). After the mix has settled for at least 5 minutes, drain some fuel to check for water.
2. Check security of spark plug leads and electrical wires, engine mount bolts, carburettor attachments & cables, air intake filters, and exhaust attachments ensuring all safety wires are in place.
3. Check prop for damage. Check gearbox for oil leaks. Always treat the prop as live, unless all spark plug leads have been disconnected.

WALK-AROUND

Start at open cockpit.

1. Withdraw Emergency parachute safety pin and stow it.
2. Check Flap lever for action. Leave flaps *DOWN*.
3. Check harness for fraying. Lay out harness to assist entry.
4. Turn Master *ON*. Check Auxiliary fuel pump, Fuel transfer pump & Trim motor for operation. Check Strobe light. Switch *OFF* Master.
5. Check Radio and GPS batteries (if applicable). Leave headset and leads sitting in open canopy.

Starboard side

6. Check starboard main landing gear attachments and tyre.
7. Ensure lower wing strut bolt is secure and the safety clip is in place.
8. Check rear cabin for loose items, and that tie-downs and slide hammer are secure.

9. Secure starboard rear cabin door. Check hinge.
10. Check both starboard main wing spar pins & safety clips.
11. Use a starboard to check the right aileron push-pull pin & safety clip is in place.
12. Check starboard upper wing strut bolt for tightness.
13. Check starboard aileron hinges. Use a torch to check that the bellcrank lock nuts are in place.
14. Check starboard wing fabric covering.
15. Check starboard flap hinges, and flap rod pins & safety clips. Use a torch to check bellcrank lock nut.
16. Check emergency chute pressure is above 2650psi (just into the red line). Check lanyard and shackle. Check that unit is secure on its rail.
17. Check VHF aerial.

Tail area

18. Check fin post pin & safety clip, and stabiliser front pin & safety clip.
19. Check rudder Teleflex control cable pin & safety clip.
Ensure the cable sheath is securely attached to the side of the boom.
20. Check starboard stabiliser fabric covering.
21. Check starboard vertical fin attachment bolts.
22. Check elevator hinge pins & safety clips. Ensure all four hinges are correctly aligned.
23. Check stabiliser rear pin & safety clip.
24. Check elevator Teleflex control cable pin & safety clip.
Ensure the cable sheath is securely attached to the top of the boom.
25. Check elevator trim actuator rod pin & safety ring, and trim tab hinge.
26. Check port stabiliser fabric covering.
27. Check port vertical fin attachment bolts.

Port side

28. Check port flap hinges, and flap rod pins & safety clips.
Use a torch to check bellcrank lock nut.
29. Check port wing fabric covering.
30. Check port aileron hinges. Use a torch to check that the bellcrank lock nuts are in place.
31. Check port upper wing strut bolt for tightness.
32. Use a torch to check the port aileron push-pull pin & safety clip is in place.
33. Check both port main wing spar pins & safety clips.
34. Secure port rear cabin door. Check hinge.
35. Check port main landing gear attachments and tyre.
36. Ensure lower wing strut bolt is secure and the safety clip is in place.
37. Check that nose wheel bungees & limit strap are serviceable, and nose wheel rotates freely. Tighten anti-clockwise if required. Check the front tyre.
38. Check pitot probe.

Wing + Tail ASSEMBLY

Tools Required.

- Light rubber mallet
- Spanners for strut bolts
- Clevis pins & safety clips for wing, stabiliser, elevator and rudder attachment
- Tail boom prop (or lead/water ballast weights for cockpit)
- Temporary wing support (*for holding first wing up*)
- A small ladder or chair to stand on
- Wheel chocks
- Special slide hammer (*for removing wing pins*)

Considerations

- Do not attempt to assemble the aircraft outdoors in any significant wind, until experience has been gained.
- A minimum of two people are required to assemble the aircraft.
- All pins and tubes should be lightly greased.

ASSEMBLY STEPS

Assemble in the order listed below:

Tail Assembly

1. Remove blanking plugs from tail boom.
2. Prop the tail boom up (or use 'cockpit-friendly' weights well forward in the cockpit) to keep the nose wheel on the ground. Alternatively have someone of at least 80kgs sit in the cockpit.
3. Insert the fin post/rudder assembly into the tail boom and secure the support wire to its attachment point. Attach the rudder control cable using the appropriate pin and clip.
4. Insert the port stabiliser and gently wiggle/push into place. Insert the starboard stabiliser and gently push into place,

so that both the front and rear pin holes line up. Insert both pins and clips.

5. The elevator can now be fitted - it's best to use two people. Ensure the four pins and clips are in place, before attaching the elevator control cable. Connect the elevator trim electric cable.

Wing Assembly (*preferably on a clean grassed surface*)

Either wing can be fitted first. It is generally easier with the aircraft's tail up. It is strongly recommended that you leave each wing in the trailer, until immediately before it is to be fitted.

1. Loosen off the upper wing strut attachment bolts, so they can be easily removed by hand.
2. Place the ladder near the leading edge of centre wing section.
3. Place one of the main spar attachment pins near the ladder. Have the temporary wing support handy to support the wing. Chock the main wheels.
4. Remove the first wing from the trailer and position it on the ground near where it is going to go. The helper at the wing tip needs to be briefed on how to respond to *UP*, *DOWN*, *IN*, *OUT*, *FORWARD* and *BACK* and *TILT* instructions.
5. Remove the flap tube protection cap.
6. A coordinated effort is required to keep the wing more or less parallel with the ground while it is lifted up. The wing root person has to manoeuvre under the wing and guide it, so that it slides into both the main spar attachment lugs and the flap tube hole. Once in, it will stay there quite happily (if the wing tip person applies gentle inwards pressure).
7. Get the first main spar attachment pin. Stand on the ladder and gently insert it into the front hole. Small movements at the wingtip will assist to line up the hole. Gently push the pin home and repeat with the second pin. Remember that each pin has to pass through 6 holes.

8. Once both pins are in, fit the temporary wing support under the wing using the strut attachment bolt. Check that this support is stable, before leaving the wing tip unattended.
9. Repeat steps 2 – 8 for the other wing.
10. Once both wings are attached by the four pins, the temporary wing support can be removed.

Assembling both Wing Struts

11. Fit the wing struts (Note: port and starboard struts are different). Generally it is best to slide the strut into its bottom anchor before fitting the wing bolt. Use the spacer washers. The wing tip may need to be lifted up to align the bottom pin holes.
12. Once the struts are in place, secure the strut jury braces.

Aileron push-pull rod assembly

13. Fit the aileron push-pull pins and safety clips. Then fit the flap rods and safety pins.
14. Fasten the under-wing access hatches *or* do up zips.

<p>Now do the 'walk-around' pre-flight checks, especially making sure all of the pins & safety clips are in place.</p>
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DISASSEMBLY STEPS

Disassemble in the reverse order,

- Use the special slide hammer to help remove wing pins.
- As each linkage or hinge is disconnected, make sure you replace the clevis pin and/or safety clip back into its normal location (they are easily lost in the grass)