



# FLIGHT TEST CHECKS

|   |           |                       |                   |                                   |    |
|---|-----------|-----------------------|-------------------|-----------------------------------|----|
| <b>ELECTRIC AND MANUALLY OPERATED IN-FLIGHT ADJUSTABLE PROPELLERS</b> |           |                       |                   | <b>LAA/FT - EIFA PROP Issue 6</b> |    |
| A/C Type:   | Reg:      | Engine:               | Gearbox ratio: :1 |                                   |    |
| Propeller Type/ Designation:  |           | Dia: in/mm*           | Controller Type:  |                                   |    |
| Loaded Weight: (min 95% MTOW)   | lb* / kg* | CG: Aft/Fwd* of datum | OAT: °C           | QNH                               | mb |

\* Delete as appropriate.

## 1. ENGINE RUNS

The aircraft should face cross-wind.

If wind strength makes parking cross-wind hazardous, face into wind.

**Magneto check:-** Run engine to normal operating temperature – check RPM, pressures, temps, mag drops, carb heat drop. Check operation of engine and fuel controls.

| FROM AFM, POH                                 |                      |                     |                      | MEASURED                          |                      |
|---|----------------------|---------------------|----------------------|-----------------------------------|----------------------|
| Magneto test RPM or RPM at which tested       | <input type="text"/> |                     |                      | No.1 magneto off RPM drop         | <input type="text"/> |
| Max Drop Permitted                            | <input type="text"/> | Max Split Permitted | <input type="text"/> | No.2 magneto off RPM drop         | <input type="text"/> |
| Carburettor Hot air or Alternate air test RPM | <input type="text"/> |                     |                      | Hot air or Alternate air RPM drop | <input type="text"/> |

*RPM data entered that exceeds the maximum permitted on the Operating Limitations sheet or flight test authorisation will fail the application. It should not be possible to exceed maximum permitted RPM. If it is, then something is wrong – check tach. Otherwise an inappropriate or incorrectly adjusted propeller may be fitted.*

## Maximum power:- FINE PITCH STOP

With the propeller blades at full fine pitch, constant speed controller (if fitted) set to MANUAL mode and with Wide Open Throttle (WOT), the engine must not over-speed when 'static' on the ground. e.g. for the Rotax 912/914 series engines, max rpm 5800 (CS-VLA 33 refers).

| (FROM AFM, POH)                    |                      | (MEASURED)                   |                      |
|------------------------------------|----------------------|------------------------------|----------------------|
| MAX ALLOWABLE ENGINE RPM           | <input type="text"/> | MAX ACHIEVED STATIC RPM      | <input type="text"/> |
| MAX ALLOWABLE OIL TEMPERATURE      | ____ °C ____ °F      | ACTUAL OIL TEMPERATURE       | ____ °C ____ °F      |
| MIN/MAX ALLOWABLE OIL PRESSURE     | / bar/psi*           | ACTUAL MIN/MAX OIL PRESSURE  | / bar/psi*           |
| MAX ALLOWED TEMP (CHT OR COOLANT)* | ____ °C ____ °F      | ACTUAL MAX TEMP CHT/COOLANT* | ____ °C ____ °F      |
| MAX ALLOWABLE EGT                  | ____ °C ____ °F      | ACTUAL MAX HOTTEST EGT       | ____ °C ____ °F      |
|                                    |                      | MANIFOLD PRESSURE            | In/Hg                |
|                                    |                      | FUEL PRESSURE                | / bar/psi*           |

\* Delete as appropriate

**2. TAKE-OFF** (Valid flight test authorisation issued by LAA Engineering required)

The take-off is to be made with flaps (if fitted) in the take-off position, propeller set to TAKE-OFF. As soon as possible after unstick, record:-

|               |                      |             |  |
|---------------|----------------------|-------------|--|
| UNSTICK SPEED | _____ Kts _____ MPH* | UNSTICK RPM |  |
|---------------|----------------------|-------------|--|

**3. CLIMB**

Flight conditions: **In stable conditions - clear of cloud, turbulence, thermals** and well clear of any hills which could produce orographic lift/sink.

Configuration: **Normal** for best rate of climb (see Manual).

Power: **Maximum Continuous RPM** with air intake in 'Cold' or 'Ram' air position. With the throttle wide open in the climb, the engine must not over-speed. (CS-VLA 33 refers).

Speed: Enter scheduled best rate of climb speed ( $V_Y$ ); Before starting to record data, establish the aircraft in the climb at best rate of climb speed  $V_Y$  and maintain steady heading and speed  $\pm 2$  knots/mph throughout. (From AFM, POH).

(knots/mph IAS)

To aid lookout it is permissible to turn during the climb. Carry out gentle turns (max 10° bank angle).

**Important notes:**

1. Sustained 5 minute climb is normally required to be carried out to establish adequacy of cooling, proper functioning at altitude and to provide sufficient data points to calculate a reliable rate of climb figure. However, where the rate of climb exceeds 1500 ft/min, or an aircraft with a Cirrus Minor or Gipsy Major engine is fitted, then a 3 minute climb will be accepted.
2. Incomplete climbs due to airspace, cloud or other similar reasons will not be accepted.
3. Do not allow engine to exceed limits.
4. Plot and attach a copy of the climb performance results, preferably using the spreadsheet that is available from the flight testing section of the LAA website or use the grid on page 5.

| TIME (min) | ALTITUDE (FT)<br>1013 mb | IAS<br>knots / mph* | RPM | OIL TEMP<br>°C / °F* | OIL PRESS<br>bar / psi* | CHT/CLNT<br>°C / °F* | EGT<br>°C / °F* |
|------------|--------------------------|---------------------|-----|----------------------|-------------------------|----------------------|-----------------|
| 0          |                          |                     |     |                      |                         |                      |                 |
| 1          |                          |                     |     |                      |                         |                      |                 |
| 2          |                          |                     |     |                      |                         |                      |                 |
| 3          |                          |                     |     |                      |                         |                      |                 |
| 4          |                          |                     |     |                      |                         |                      |                 |
| 5          |                          |                     |     |                      |                         |                      |                 |

If there is any difficulty in recording these figures during the timed climb, maintain the climb speed and power, and record them at the end of the climb.

Towards the end of the climb, record:

|                   |             |               |                |
|-------------------|-------------|---------------|----------------|
| MANIFOLD PRESSURE | _____ in Hg | FUEL PRESSURE | _____ bar/psi* |
|-------------------|-------------|---------------|----------------|

**RPM data entered that exceeds the maximum permitted on the flight test authorisation and incomplete climb due to airspace restrictions will fail the application.**

**4. VIBRATION**

Check for signs of vibrations or buffeting throughout the rpm range and in all phases of ground running as well as in flight. This may result if the natural frequency of vibration of the engine on its mount rubbers, or the tail surfaces or fuselage, or of the engine/reduction drive coupling should happen to couple in an unfortunate way with the resonant frequency of the propeller blades in bending, or the aerodynamic buffer coming from the slipstream. It may also indicate that the propeller is out of track or out of balance.

|     |       |           |
|-----|-------|-----------|
| SAT | UNSAT | COMMENTS: |
|-----|-------|-----------|

**5. ELECTRIC CONSTANT SPEED CONTROL**

|                 |
|-----------------|
| FITTED YES / NO |
|-----------------|

When set to AUTOMATIC mode, with an airspeed between  $V_{FE}$  and  $V_{NO}$  and with appropriate throttle settings the constant speed controller must control the propeller pitch to limit the engine RPM to the pre-set speeds  $\pm 50$  RPM in all available settings.

| MODE     | PRE-SET RPM | ACTUAL RPM |
|----------|-------------|------------|
| TAKE-OFF |             |            |
| CLIMB    |             |            |
| CRUISE   |             |            |

**6. LEVEL FLIGHT**

At a constant altitude in stable conditions not above 2000 feet, after at least 2 minutes at each of the 3 different power settings required (provided that this has no detrimental effect on the engine), record:-

| POWER SETTING           | RPM | MAN PRESS | IAS kts/mph* | OIL T °C /°F* | OIL P bar/psi* | CHT/CLNT °C/°F* | EGT °C/°F* | FUEL FLOW Lit/Gal*/ hr |
|-------------------------|-----|-----------|--------------|---------------|----------------|-----------------|------------|------------------------|
| ECONOMY CRUISE          |     |           |              |               |                |                 |            |                        |
| MAX CONT. or CRUISE RPM |     |           |              |               |                |                 |            |                        |
| WOT AND MAX RPM         |     |           |              |               |                |                 |            |                        |

From WOT/Max RPM, gently throttle back to idle. Report any undue vibration or behaviour.

COMMENTS:

**7. FEATHER FUNCTION**

|                 |
|-----------------|
| FITTED YES / NO |
|-----------------|

This test is mandatory for motor gliders but optional for aeroplanes that are fitted with a feathering propeller. If the test is not carried out in an aeroplane fitted with a feathering propeller, a cockpit placard must be fitted stating that the feathering function must not be used except in emergency.

|                               |
|-------------------------------|
| PLACARD FITTED YES / NO / N/A |
|-------------------------------|

Refer to the Pilot's Operating Handbook/engine manufacturer's instructions for engine shut-down/re-start procedures, where available. Take care on re-starting not to allow a build up of fuel/air mixture in the cylinders with ignition off. Only where it is possible to re-start the engine in flight, at a height sufficient to do so and over a suitable landing site, shut down the engine and slow the aircraft gradually to allow the propeller to stop wind-milling (caution not to stall the aircraft).

Operate the FEATHER function then, after the blades have reached their full feather position, un-feather the blades again. When un-feathering is complete, re-start the engine by wind-milling if possible (do not exceed  $V_{NE}$ ). Record the airspeeds at which the propeller stops and starts below. Repeat the procedure but re-start the engine by using the starter. Check that the engine stops and re-starts without excessive vibration or other detrimental behaviour.

| SAT | UNSAT | PROP WIND-MILLING SPEEDS: STOPPING: _____ kts. STARTING: _____ kts. |
|-----|-------|---|
|     |       | COMMENTS:   |

## 8. COARSE PITCH STOP

### THIS TEST MUST ONLY BE FLOWN IN SMOOTH AIR CONDITIONS

The purpose of this test is to check that flight at  $V_{NE}$  can be achieved without exceeding max permitted RPM. The  $V_{NE}$  speed is stated in the flight test authorisation or Operating Limitations sheet. Never exceed the  $V_{NE}$ . Beware of false reading ASI. Airspeed or RPM data entered that exceeds the maximum permitted will fail the application.

- a) With the propeller blades at full coarse pitch, constant speed controller (if fitted) set to MANUAL mode, increase speed up to  $V_{NE}$  at the shallowest dive angle possible by maintaining sufficient power but keeping RPM within maximum permissible. If any unusual vibration is felt, immediately reduce speed by closing the throttle and gradually pulling the control column back.

|                       |                      |                 |  |
|-----------------------|----------------------|-----------------|--|
| AIRSPEED ( $V_{NE}$ ) | _____ kts _____ mph* | RPM AT $V_{NE}$ |  |
|-----------------------|----------------------|-----------------|--|

b) **Non-certified propellers only need comply.**

With the propeller blades at full coarse pitch, constant speed controller (if fitted) set to MANUAL, the aeroplane must demonstrate an ability to safely go-around and provide a positive rate of climb, with the aeroplane at maximum gross weight, undercarriage up where possible, take-off flap set, under International Standard Atmosphere (ISA) conditions.  
(Coarse pitch stop set to ensure RPM achieved has no detrimental effect on the engine).

|                     |                      |  |                            |
|---------------------|----------------------|--|----------------------------|
| CLIMB AIRSPEED      | _____ kts _____ mph* | RPM IN CLIMB                             |                            |
| TIME THROUGH 300 FT | SECONDS              | RATE OF CLIMB<br>(ht change ÷ secs) x 60 | Ft/Min<br>(min 300 ft/min) |

## 9. REVERSE FUNCTION

|               |
|---------------|
| FITTED YES/NO |
|---------------|

**Note: Reverse function must not be used whilst airborne.**

During the landing roll and with all wheels in contact with the ground, select the REVERSE function and check that the level of instability caused by disturbed airflow over the control surfaces is not detrimental to adequate control, first at minimum power then at power sufficient to provide effective braking.

|     |       |           |
|-----|-------|-----------|
| SAT | UNSAT | COMMENTS: |
|-----|-------|-----------|

## 10. COMPARISON WITH PREVIOUSLY FITTED PROPELLER

|  |                     |   |
|--|---------------------|---|
| Previously fitted propeller Type/Designation:                  | Dia: _____ Inch/mm* | Pitch: _____ ins/mm or _____ deg at _____ % radius/tip* |
| If possible, comment on relative performance, vibration, etc.: |                     |   |

## 11. CERTIFICATION

I certify that I have flown the above aircraft and that the above checks have been carried out to my satisfaction.

|       |         |               |              |
|-------|---------|---------------|--------------|
| Name: | Signed: | Date of Test: | Licence No.: |
|-------|---------|---------------|--------------|

Once completed, send this form to LAA Engineering. Send in also the *original* aircraft Operating Limitations sheet. (Refer to Technical Leaflet TL 2.02).

**Important note:** Following conclusion of satisfactory flight test, the modified aircraft must not be flown until issue of modification final approval.

Either complete and submit a plot from the spreadsheet available on the LAA web site or enter appropriate scales and plot climb results on grid below and draw on best fit slope then calculate the average rate of climb.

Ave ROC = \_\_\_\_\_ fpm

### Climb Performance

