REVISION	CHANGE	APPROVED	DATE
1	Published release	JTS	27/06/2025
1a	Formatted for website PDF	JTS	25/11/2025

Airmaster Propellers Ltd
20 Haszard Rd, Massey,
Auckland 0614, NZ

Phone: (+64) 9 833 1794
E-mail: support@propellor.com
Web: www.propellor.com

ASI-5-1-2

PROPELLER FUNCTIONAL TESTS (WITH ENGINE RUNNING)

PROCEDURE

SUBJECT:	
Propeller Setup	
ASSEMBLY NO:	**APPLICABILITY:**
AP-xxx	All propeller models

1. TOPIC

1.1 Introduction

This document covers the recommended procedure for testing and verifying the constant speed functions of an Airmaster propeller while the engine is running. These tests are designed to check the correct operation while rotating of the propeller pitch change mechanism, the adjustable pitch stops, and the governing functions of the Airmaster controller.

Each test is presented as a step-by-step checklist with visual cues that operators can print. The left column outlines the operator's required action, while the right column details the expected response.

Operators should perform these checks during initial setup of the propeller (before first flight), and after periodic inspection routines or other service procedures.

Some tests apply exclusively for feathering or beta-enabled (reversing or pre-rotate) propellers. Operators must follow the tests which are relevant for their set up. It is the operator's responsibility to ensure that any incorrect operation is identified and rectified before next flight.

1.2 Prerequisites

Complete the following tasks before proceeding:

- Review controller indications and their meanings in accordance with ***ASI-6-1-1***.
- Test propeller function with the engine off in accordance with procedure ***ASI-5-1-1***.

1.3 Admonishments

WARNING

The aircraft should be securely tethered with tie downs and chocks throughout this procedure to allow testing at maximum thrust. Due to the high thrust available, the aircraft brakes and wheels alone must not be relied upon.

Caution

The following procedure may be carried out before the propeller has been dynamically balanced. If unacceptable vibration is observed, stop and dynamically balance the propeller before proceeding.

Caution

Engine temperature and pressure should be monitored during high power engine running on the ground, due to the possibility of inadequate engine cooling. If engine temperature or pressure limits are exceeded, the test should be halted, and the engine allowed to cool before continuing.

Note

The following procedures are a functional check only. The actual pitch limits for the propeller may not be correct for flight and should be set later. 'Pitch Limit' refers to the propeller pitch setting determined by the applicable adjustable pitch stop.

Note

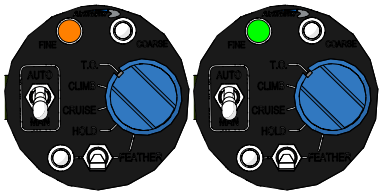
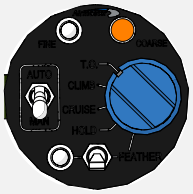
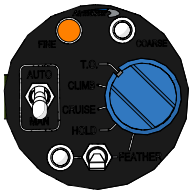
To check the preset target speeds programmed for the propeller, refer to the leading particulars section of the propeller logbook, or refer to the controller parameters sheet found in the propeller's assembly drawings booklet.

2. PROCEDURE

2.1 Test Manual Operation

This test checks correct operation of the propeller using manual over-ride mode, and correct function of the fine and coarse pitch limit stops while the propeller is rotating.

- This test applies for all propeller models.
- Set controller to manual over-ride mode (**MAN**) for the duration of this test.

STEP	ACTION	CORRECT RESPONSE	☑
1.	 • Engine **OFF**. Aircraft power **ON**. • Select **MAN** on controller. • Toggle FINE on the manual switch until the **Fine pitch limit** is reached.	 • Propeller pitch decreases smoothly. • FINE lamp illuminates orange as propeller pitch decreases. • FINE lamp turns green when the fine pitch limit is reached.	☐
2.	 • Start engine using normal warm-up procedure. • Advance throttle smoothly to medium power setting. • Briefly toggle COARSE on the manual switch (~2 sec) whilst observing engine RPM & controller indicators.	 • RPM decreases as propeller pitch increases. • COARSE lamp illuminates orange.	☐
3.	 • Briefly toggle FINE on the manual switch (~2 sec) whilst observing engine speed and controller indicators.	 • RPM increases as propeller pitch decreases. • FINE lamp illuminates orange.	☐

2.2 Test Automatic Operation

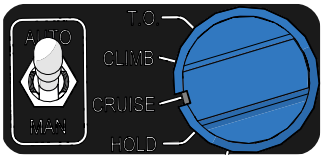
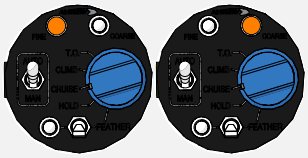
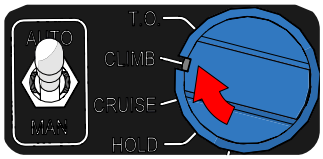
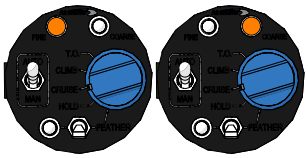
This test checks correct operation of the propeller's constant speed functions in automatic mode.

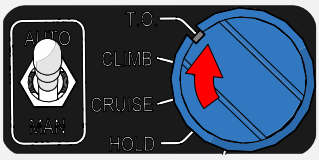
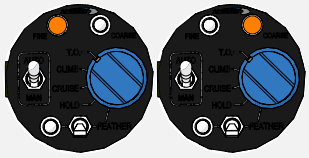
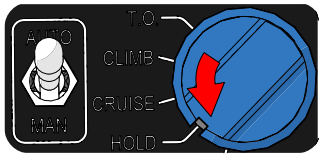
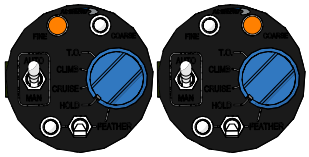
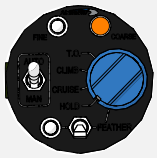
- This test applies for all propeller models.
- Set controller to automatic mode (**AUTO**) for the duration of this test.

> ⚠ ***Caution***
> *Take care not to exceed the maximum permissible speed of the engine, nor the time limit above the maximum continuous speed. Should either limit be exceeded, the throttle should be reduced to maintain engine speed within the limits prescribed by the engine manufacturer.*

> ⓘ ***Note***
> *Some aircraft may be unable to perform this test on the ground due to the high thrust achievable. Operators may perform this test in-flight as necessary.*

> ⓘ ***Note***
> *Higher speed settings such as climb or take-off may not be achievable if the propeller's fine pitch limit stop has not been set. In this case, repeat these checks after setting the fine pitch limit stop.*

STEP	ACTION	CORRECT RESPONSE	☑
1.	 • Set engine speed to a **FAST IDLE**. • Select **AUTO/CRUISE**.	 • FINE lamp should **not** flash orange (this confirms the controller is receiving a speed signal).	☐
2.	• Advance engine throttle smoothly to reach **CRUISE RPM**. • Adjust throttle [+/-] whilst observing engine RPM & controller indicators.	 • Propeller governs pitch to maintain cruise RPM - remains stable with minor throttle adjustment. • FINE/COARSE lamps may illuminate briefly as automatic pitch adjustments occur.	☐
3.	 • Select **AUTO/CLIMB**. • Advance engine throttle smoothly to reach **CLIMB RPM** (if sufficient throttle is available). • Adjust throttle [+/-] whilst observing engine RPM & controller indicators.	 • Propeller governs pitch to maintain cruise RPM - remains stable with minor throttle adjustment. • FINE/COARSE lamps may illuminate briefly as automatic pitch adjustments occur.	☐

4.	 • Select **AUTO/T.O.** • Advance engine throttle smoothly to reach **TAKE-OFF RPM** (if sufficient throttle is available). • Adjust throttle [+/-] whilst observing engine RPM & controller indicators.	 • Propeller governs pitch to maintain cruise RPM - remains stable with minor throttle adjustment. • FINE/COARSE lamps may illuminate briefly as automatic pitch adjustments occur.	☐
5.	 • Select **AUTO/HOLD**. • Adjust throttle [+/-] whilst observing engine RPM & controller indicators.	 • Propeller governs pitch to maintain initial hold RPM – remains stable with minor throttle adjustment. • FINE/COARSE lamps may illuminate briefly as automatic pitch adjustments occur.	☐
6.	 • Briefly toggle **COARSE** on the manual switch whilst observing engine RPM & controller indicators.	 • RPM decreases as propeller pitch increases. COARSE lamp illuminates orange (while toggling COARSE). • Propeller governs pitch to maintain a decreased hold speed setting (after switch is released). FINE/COARSE lamps may illuminate briefly as automatic pitch adjustments occur	☐
7.	 • Briefly toggle **FINE** on the manual switch whilst observing engine RPM & controller indicators.	 • RPM increases as propeller pitch decreases. FINE lamp illuminates orange (while toggling FINE). • Propeller governs pitch to maintain an increased hold RPM setting (after switch is released). FINE/COARSE lamps may illuminate briefly as automatic pitch adjustments occur.	☐

2.3 Test Automatic Beta Operation (As Applicable)

This test checks correct operation of the propeller's beta engage, drive and automatic return functions.

- This test applies for beta, reverse, or pre-rotate-enabled propeller models only.

WARNING

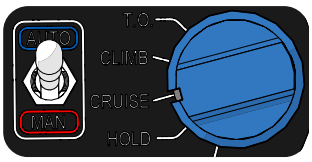
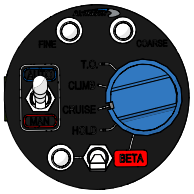
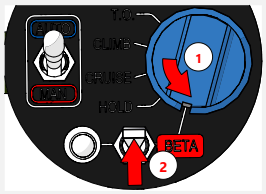
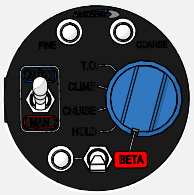
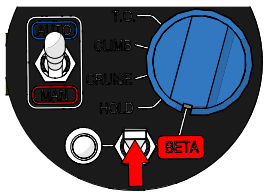
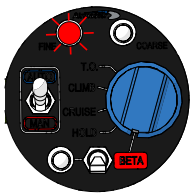
Use tie-downs and chocks to restrain the aircraft from moving in both directions. The reverse pitch settings achieved in this section will product negative thrust, pushing the aircraft backwards.

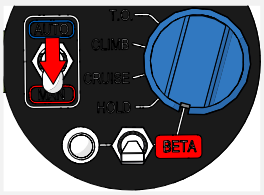
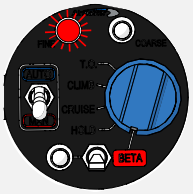
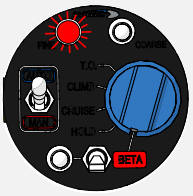
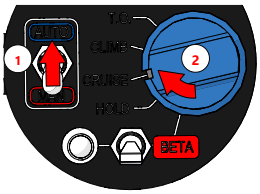
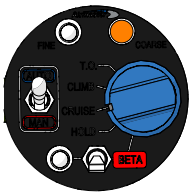
Caution

Engine temperature and pressure should be monitored carefully during this test as reverse pitch settings may affect engine cooling. If engine temperature or pressure limits are exceeded, the test should be halted, and the engine allowed to cool before continuing.

Note

*Beta control is initiated in two stages: Engage then Drive. This test checks that both stages will only function while RPM is below specified limits. These limits are recorded in the controller parameters sheet as **'Max Engage Rpm' (Par400)** and **'Max Run Rpm' (Par404)** respectively. These are typically set at 2500rpm and 3500rpm for Rotax engines, or 1000rpm and 1500rpm for direct drive engines.*

STEP	ACTION	CORRECT RESPONSE	☑
1.	 • Set engine RPM to a **FAST IDLE**. • Select **AUTO/CRUISE**.	 • FINE lamp should **not** flash orange. (this confirms the controller is receiving a speed signal).	☐
2.	 • Advance throttle smoothly to reach approximately **CRUISE RPM** (exceeding 'Max Engage RPM'). • Select **AUTO/BETA**. Actute the **BETA Engage switch**.	 • FINE lamp should **not** flash red after the BETA engage switch is released (at this RPM). *Note* *Beta control can't be initiated while engine speed is in the flight rpm range. Engine speed must be kept below 'Max Engage RPM'.*	☐
3.	 • Reduce engine RPM to a **SLOW IDLE** (below 'Max Engage RPM'). • Actuate the **BETA engage switch**.	 • FINE lamp should flash red (1Hz) after the BETA engage switch is released (at this RPM). *Note* *This indicates the fine pitch stop will be bypassed. Beta control engaged successfully.*	☐

4.	 • Select **MAN.**	 • FINE lamp flashes red more rapidly (5Hz). *Note* *This indicates the fine pitch stop is in over-ride. The propeller can be adjusted in the beta pitch direction.*	☐
5.	 • Toggle **FINE** on the manual switch to adjust the propeller in the beta pitch direction.	 • Propeller drives smoothly in the beta pitch direction (bypasses the fine pitch limit). • BETA lamp illuminates orange (turns green when the beta pitch limit is reached).	☐
6.	 • Increase throtte to reach approximately **CRUISE RPM** (exceeding Max Run RPM). • Toggle **FINE** on the manual switch to adjust the propeller further in the beta pitch direction.	 • Propeller will not adjust in the beta pitch direction while engine speed is above ‘Max Run RPM’. *Note* *RPM must be kept below this limit while the propeller is adjusted in the beta pitch direction.*	☐
7.	 • Reduce engine RPM to an **IDLE**. • Select **AUTO/CRUISE**.	 • Propeller automatically increases blade pitch and halts once it returns to normal flight range (between the fine and coarse pitch limit stops). *Note* *Automatic control of the propeller resumes shortly after the pitch return (beta-exit) cycle commences.*	☐

2.4 Subsequent Action

- If not yet completed, adjust the propeller’s pitch limit stop(s) in accordance with procedure ***ASI-5-3-2***.