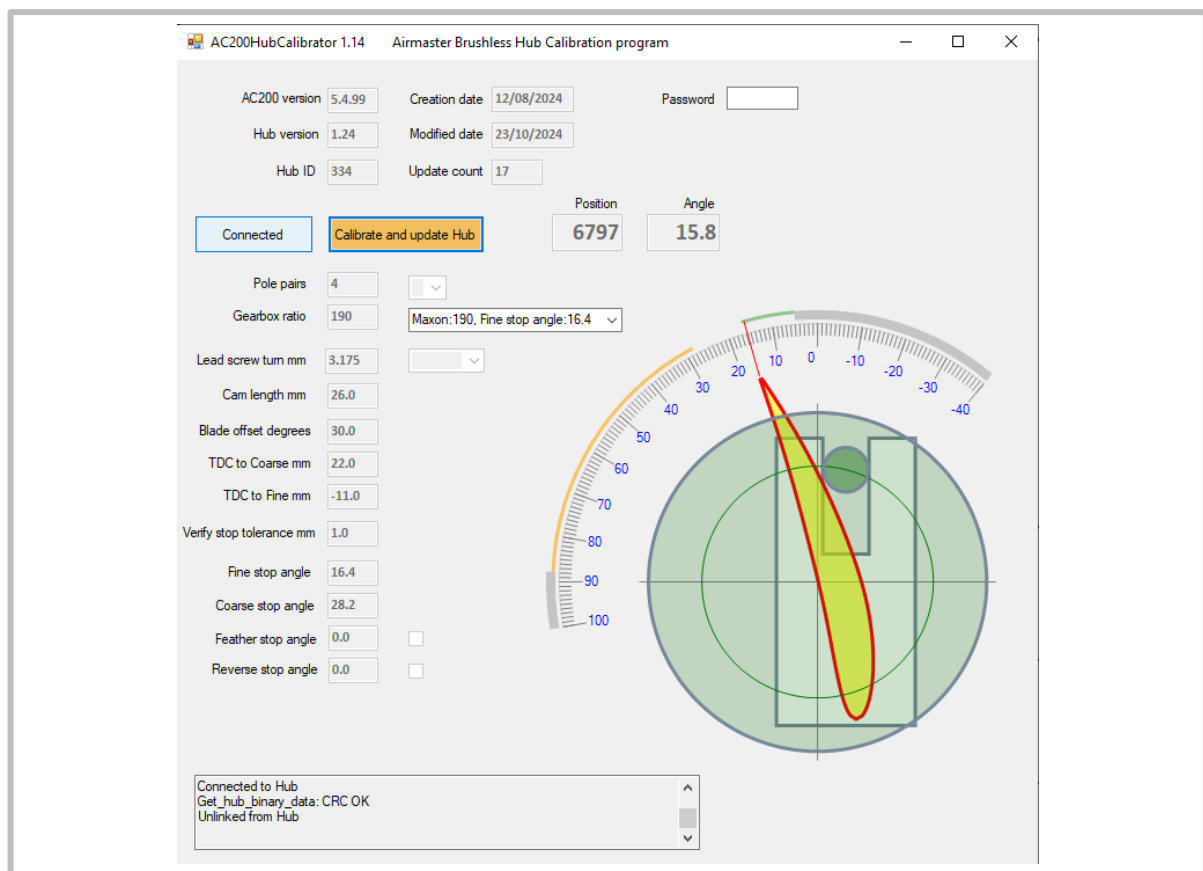


REVISION	CHANGE	APPROVED	DATE
0	Provisional Release	JTS	23/10/2024
1	Initial Release	JTS	08/11/2024

APL-SI-0029

DSD HUB CALIBRATION PROCEDURE



SUBJECT:

PROPELLER SETUP

ASSEMBLY NO:

AH-xxx (i30-xxx) | AC-300xx

APPLICABILITY:

All DSD propeller hub models.

1. TOPIC

1.1 Introduction

This instruction covers the calibration procedure for an Airmaster propeller incorporating the digital servo-drive (DSD) facility. The hub control parameters and other settings programmed into the DSD hub are also covered, and how they can be checked or modified by the operator.

1.2 Calibration

DSD propellers can sense and set propeller blade angle with digital accuracy due to the use of a brushless DC pitch change motor as a digital encoder. A calibration cycle is required for the propeller controller to determine propeller blade angle based on the hub geometry.

The calibration cycle can be initiated two ways, either by physical command of the AC300 controller, or by connection to a windows PC running the dedicated Airmaster Hub Calibrator program. The propeller's AC300 controller will indicate that calibration is required by displaying a hub miscalibration error as a double red flash of the Feather/Beta LED.

Calibration of the hub also includes defining virtual stops for feather or reverse functionality (completed by Airmaster when applicable). The propeller's fine and coarse pitch limit stops remain physically set by the pitch feedback cams.

1.3 Prerequisites

Complete the following tasks before proceeding:

- Complete installation of DSD propeller. Connect the hub assembly to the AC300 control system and apply power.

2. MATERIAL REQUIREMENTS

2.1 Parts

ITEM	QTY	PART NO.	DESCRIPTION	IMAGE
1.	1	AH-xxx (i30-xxx)	Airmaster DSD Hub Assembly	
2.	1	AC-300xxx	Airmaster AC300 Control System Assembly	

2.2 Tooling

ITEM	QTY	DESCRIPTION	IMAGE
1.	1	MS Windows PC	
2.	1	AC200HubCalibrator_1_15 (.exe)	

2.3 Paperwork

ITEM	QTY	CODE	DESCRIPTION
1.	1	AH-xxx (i30-xxx)	Airmaster DSD Hub Assembly Drawing & BoM
2.	1	AC-300xxx	Airmaster AC300 Control System Assembly Drawing & BoM
3.	1	AD-UNIVERSAL	DSD Hub Firmware & Parameters Sheet

3. PROCEDURE

3.1 Calibrate Hub (via AC300 Controller)

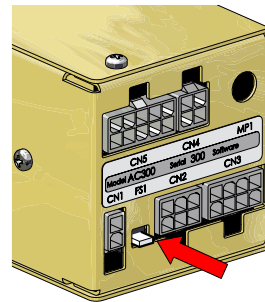
Procedure: Calibrating DSD Hub (via AC300 Controller)

Step 1 Reset Controller

- Reset AC300 controller (press FS1 at rear).

Note

Or cycle power to the independent circuit breaker in the aircraft.

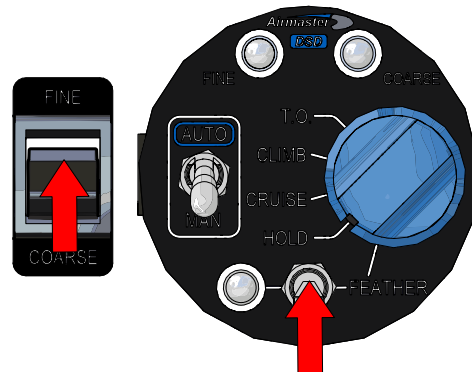


Step 2 Initiate Hub Calibration Cycle

- Set controller to MAN/HOLD.
- Simultaneously lift the Feather engage switch and toggle 'FINE' on the manual control switch.

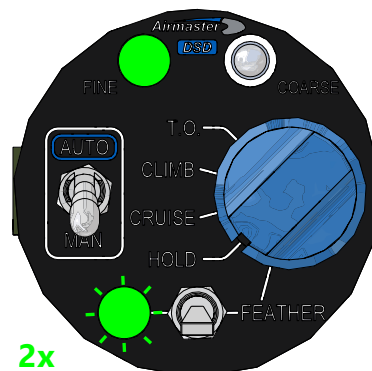
Note

The hub calibration cycle must be initiated within 10s of resetting power to the controller.



Step 3 Successful Calibration

- The propeller hub should automatically drive to the coarse hard stop, then to the fine hard stop, then halt at the fine pitch limit stop (Fine LED green on controller).
- The Feather/Beta LED should indicate a double orange flash during the calibration cycle, which turns to a double green flash after the calibration cycle completes successfully.



- Reset the controller and confirm that no calibration error is indicated afterwards.

Note

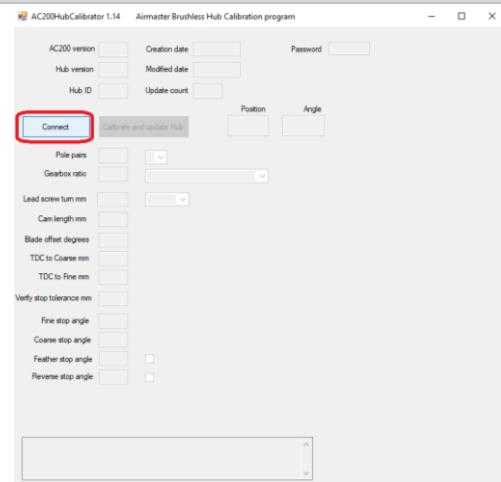
The AC300 controller indicates a calibration error as a double red flash of the Feather/Beta LED.

3.2 Calibrate Hub (via Hub Calibrator Program)

Procedure: Calibrating DSD Hub Assembly (via Hub Calibrator Program)

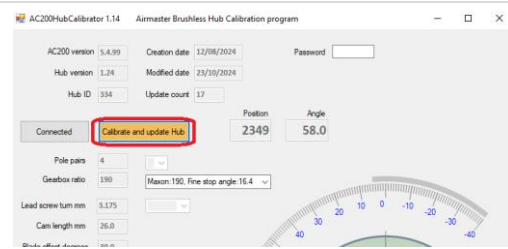
Step 1 Run Hub Calibrator Program

- Apply power to the AC300 controller.
- Connect controller to windows PC via USB-serial cable (A0117).
- Run the latest version of the Airmaster Hub Calibrator Program (AC200HubCalibrator_x_xx.exe).
- Press 'Connect'.



Step 2 Initiate Hub Calibration Cycle

- Press 'Calibrate and Update Hub' to initiate the automatic hub calibration cycle.

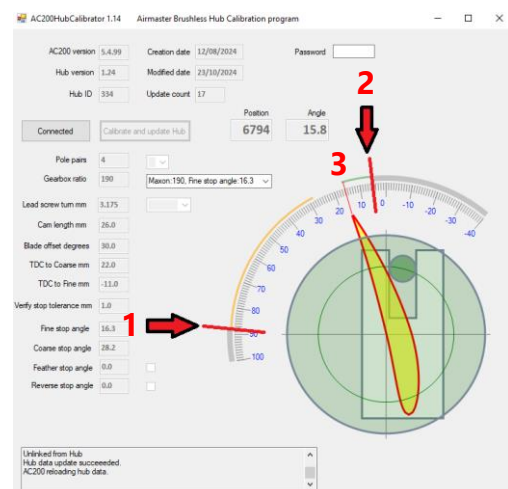


Step 3 Successful Calibration

- The propeller hub should automatically drive to the coarse hard stop, then to the fine hard stop, then halt at the fine pitch limit stop (Fine LED green on controller).
- The hub calibrator program should display "Hub Data Update Succeeded" afterwards and no error alarms should be raised.
- The controller should not indicate a calibration error afterwards.

Note

The controller indicates a calibration error as a double red flash of the Feather/Beta LED.



3.3 View Hub Parameters

Note

This section discusses the settings and parameters for a DSD hub which can be viewed in the Hub calibrator program. These values are also recorded in the "DSD Firmware & Parameters Sheet".

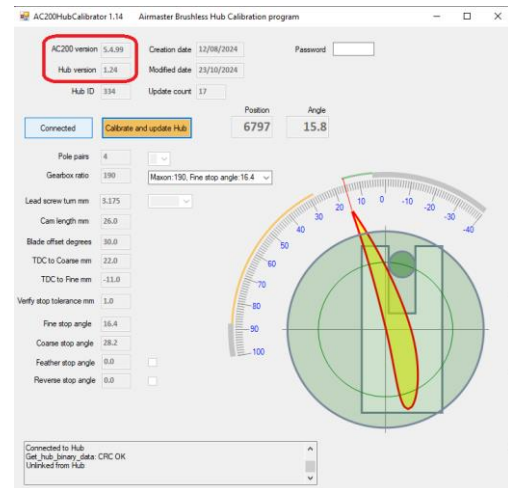
Procedure: Checking DSD Hub Parameters

Step 1 Check Firmware Versions

- Check 'AC200 version' is latest firmware version.
- Check 'hub version' is latest firmware version.

Note

Check with Airmaster for latest firmware versions. If either version is non-current, the relevant firmware should be updated using the dedicated Airmaster programmer.



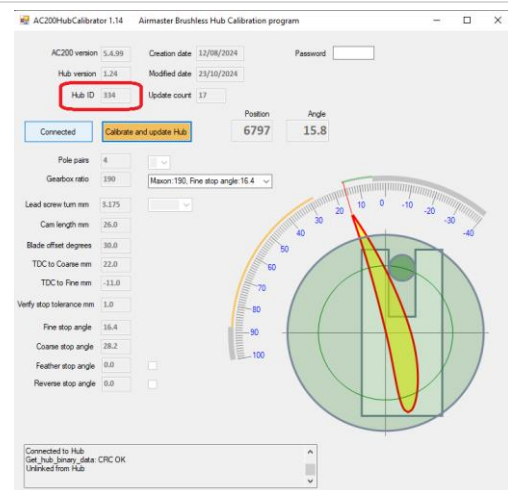
Step 2 Check Hub ID

- Check 'Hub ID' matches the hub serial number.

Note

The hub serial number is stamped on the base of the hub opposite port 1.

- If the 'Hub ID' field is blank:
 - Enter the password.
 - Enter the hub serial number.
 - Press 'Update Hub'.



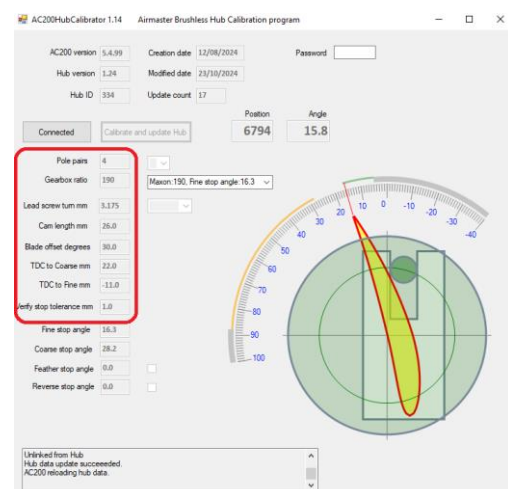
Step 3 Check Hub Parameters

- Check the parameters displayed in the hub calibrator program match those listed in the "DSD Hub Firmware & Parameters Sheet"; and the combination of hub, blades and PC motor specified in the sheet are correct for the propeller.

Note

Correct hub parameters for DSD AP3/AP4/AP5 hubs are shown below:

POLE PAIRS	GEARBOX RATIO	LEAD SCREW [mm]	CAM LENGTH [mm]	BLADE OFFSET [°]	STOP TOLERANCE [mm]
4	190	3.175	26	30 (32 for Warpdrive)	0.5



3.4 Modify Hub Parameters

Note

This section describes the method for modifying the hub parameters. Please contact Airmaster for the required password.

Procedure: Modifying DSD Hub Parameters

Step 1 Adjust Hub Parameters

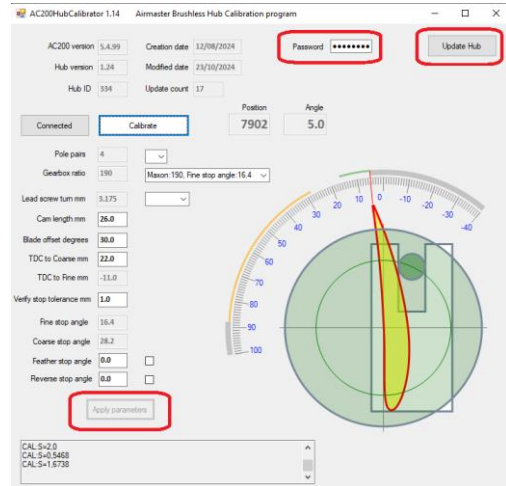
- Adjust the hub parameters (excluding the 'stop angles') as follows:
 - Enter password.
 - Adjust parameter field.
 - Press 'Apply Parameters'.
 - Press 'Update Hub'.

Note

The TDC measurement to the fine/coarse hard stops is determined and saved after the hub calibration cycle.

Attention

DSD Hub Firmware & Parameters Sheet

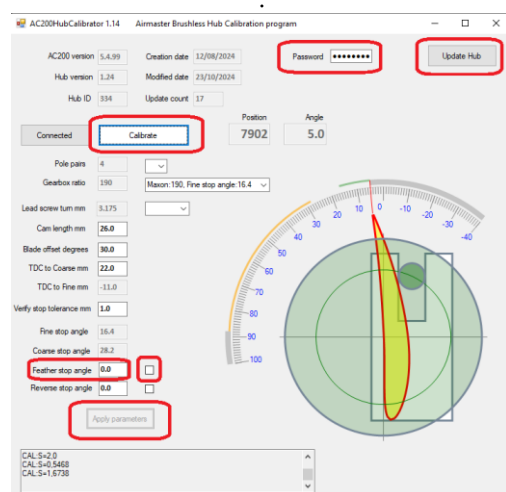


Step 2 Adjust Stop Angle

Note

The propeller's fine and coarse pitch limits stops/angles are physically set by adjusting the pitch feedback cams whereas the feather/reverse stop angles are digitally set via the Hub calibrator program.

- Adjust the feather/reverse stop angles as follows:
 - Enter password.
 - Tick the relevant stop angle checkbox.
 - Press 'Update Hub'.
 - Calibrate the hub.
 - Enter stop angle value.
 - Press 'Apply Parameters'.
 - Press 'Update Hub' again.



Step 3 Record Parameter Update

- Record the updated parameter values under a new column in the "DSD Hub Firmware & Parameters Sheet".
- Create an entry in the propeller logbook to record the action carried out.

