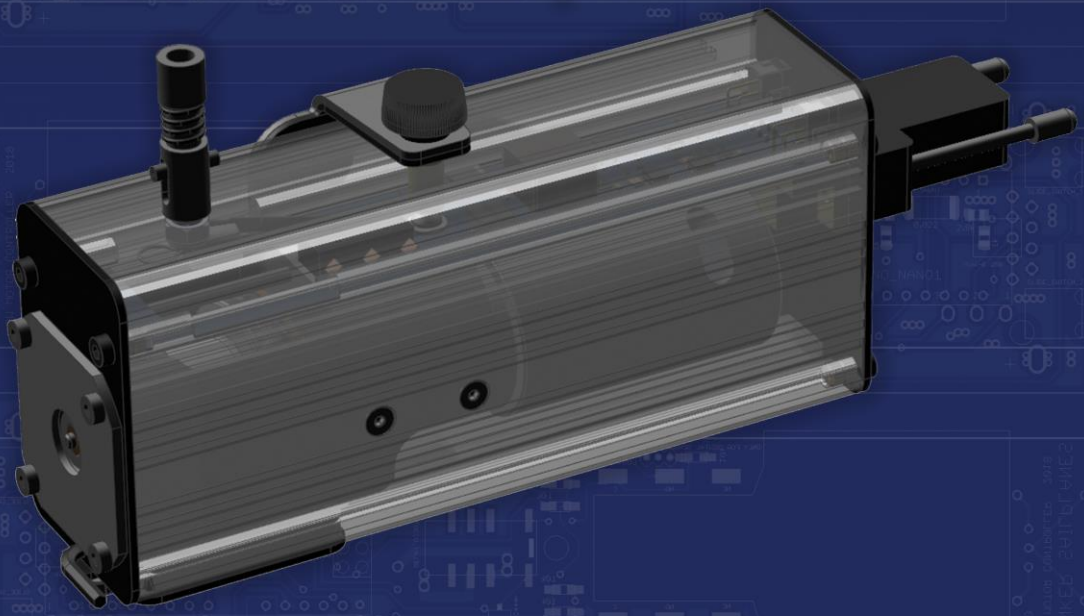
CuttingEDGE
BugWiperWinder
Operator's Manual



ON TRACK
TECHNOLOGIES

0. General

0.1. Record of Revision

Any revision of the present manual is recorded in the following table.

New or amended text in the revised page(s) will be indicated by a black vertical line in the left hand margin, and the Revision No. and the date will be shown at the bottom left hand corner of the page.

0.2. List of effective pages

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1. General

1.1. Introduction

This manual has been prepared to provide pilots and maintenance personnel with information for the safe and efficient operation of the CuttingEdge Bug Wiper Winder system.

1.2. Warnings, Cautions and Notes

The following definitions apply to Warnings, Cautions and Notes used in this manual.

WARNING: means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

CAUTION: means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety.

NOTE: draws the attention on any special item not directly related to safety but which is important or unusual.

1.3. Descriptive Data

The CuttingEdge Bug Wiper Winder is a 12V electrical system designed to wind bug wipers in/out to enable in-flight wing leading edge cleaning.

The winder can be operated in Automatic or Manual mode, and can be set for multiple wingspans.

1.4. Technical Data

Technical data	
Dimensions	
System weight (per winder)	770 g
Motor maximum rotary speed	580 RPM
Clutch slip force	5daN - 7daN
Spool capacity	14 m
Electrical technical data	
Electrical power supply	11V – 14.8V
Maximum current	7.5A
Standby current	40 mA
Maximum power output	19.7A
Circuit breaker rating	10A
Line technical data	
Recommended String type	Braided Fishing Line 0.45mm diameter
Minimum string breaking strength	360N (80 lbs)

Table 1-1: Winder technical data

1.5. Winder illustration

Figure 1-1 Bug wiper winder illustration

2. Normal operating procedure

2.1. Winder Operation Control

The CuttingEdge Bug Wiper Winder has two primary control switches:

- Left Winder Control Toggle Switch (OUT – OFF – IN)
- Right Winder Control Toggle Switch (OUT – OFF – IN)

Additionally each Bug Wiper Winder has two configuration switches positioned next to the cable connector. The switches are:

- Wingspan slider switch
    - W1 – Wingspan 1 (short wing)
    - W2 – Wingspan 2 (long wing)
- Programming slider switch
    - R – Normal Operation
    - P – Programming Mode

Figure 2-1: Configuration switches

2.2. Modes overview

The main operating modes for winders are selected using the control toggle switch. The primary modes are:

- Home (stopped in the retracted position)
- Automatic mode operation
- Manual mode operation
- Override-in

The toggle switch is used to the transit between the different modes.

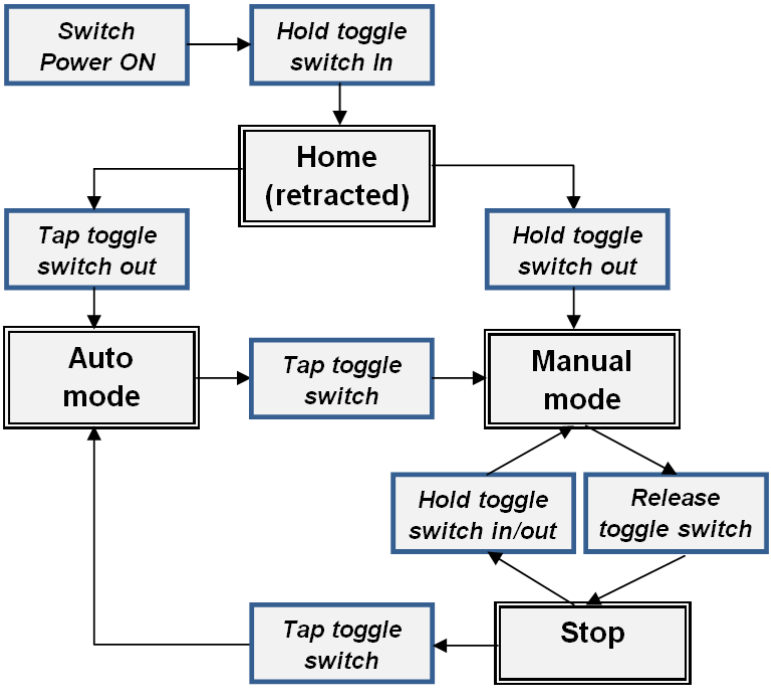


Figure 2-2: Modes Overview

2.3. Homing the wiper

Before the CuttingEdge Winder system can be operated, the bug wiper must be "homed".

This is required to ensure the system knows where the bug wiper is before winding starts.

"Home" the winder by press-and hold the toggle switch in the in-direction until the winder stops automatically.

NOTE: If the winder system is not "homed" after power up, winding will not be allowed, as the system does not know where the turn-around position is.

CAUTION: Ensure that the correct wing length is selected. An incorrect selection may result in the loss of a bug wiper over the end of the wing.

2.4. Automatic mode operation

The automatic mode is the easiest way to operate the bug wiper winders. A single tap in the out-direction (forward) is required to initiate the complete cleaning process.

The following triggers affect the operation in automatic mode:

2.4.1. Lose tension

Cable tension may be lost during the cleaning process when the bug wiper cleaning the wing misbehaves. The most common reasons are when the wiper gets stuck in the wing-fuselage junction area or crossing a poorly taped wing-junction area.

When tension is lost, the winder will stop. When tension is regained, the automatic winding process will proceed.

If the tension cannot be regained, the bug wiper may be retrieved in manual mode using the override-in function.

2.4.2. Turn-around position is reached

The pre-programmed turn around position is determined by an automatic counter, counting the drum revolutions. When this position is reached, the winder is slowed down and the winding direction is reversed to retrieve the bug wiper.

2.4.3. Home reached

This trigger is activated when the winder controller detects a stationary drum with increased electrical current. Standby-mode is entered and the winding process stops.

2.4.4. User input

When any user input is detected during the automatic mode, manual mode is activated.

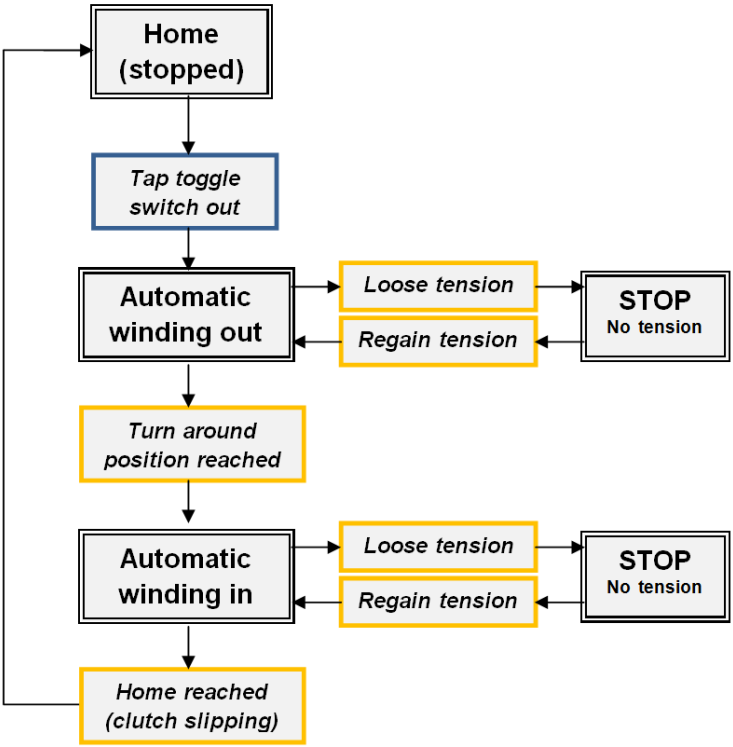


Figure 2-3: Modes Overview

2.5. Manual mode operation

The manual mode operation allows the pilot to control the bug wiper travel direction manually. Holding the control toggle switch in any direction is required to perform the cleaning process.

The following triggers affect the operation in manual mode:

2.5.1. Lose tension

Cable tension may be lost during the cleaning process. Refer to the Automatic mode for reasons for loss of tension.

When tension is lost, the winder will stop. When tension is regained, the manual winding process will proceed in the direction the control toggle switch is hold.

If the tension is not regained, the bug wiper may be retrieved in manual mode using the override-in function.

2.5.2. Turn-around position is reached

When the pre-programmed turn around position is reached, the winder motor will stop. The direction of the control toggle switch must be changed to the in-direction to wind the bug wiper back.

2.5.3. Home reached

This trigger is activated when the winder controller detects a stationary drum with increased electrical current. Standby-mode is entered and the winding process stops.

2.5.4. Control toggle switch released

When the pilot releases the control toggle switch in manual mode, the winder motor will stop.

Automatic or manual operation can be entered after the winder has stopped in manual mode.

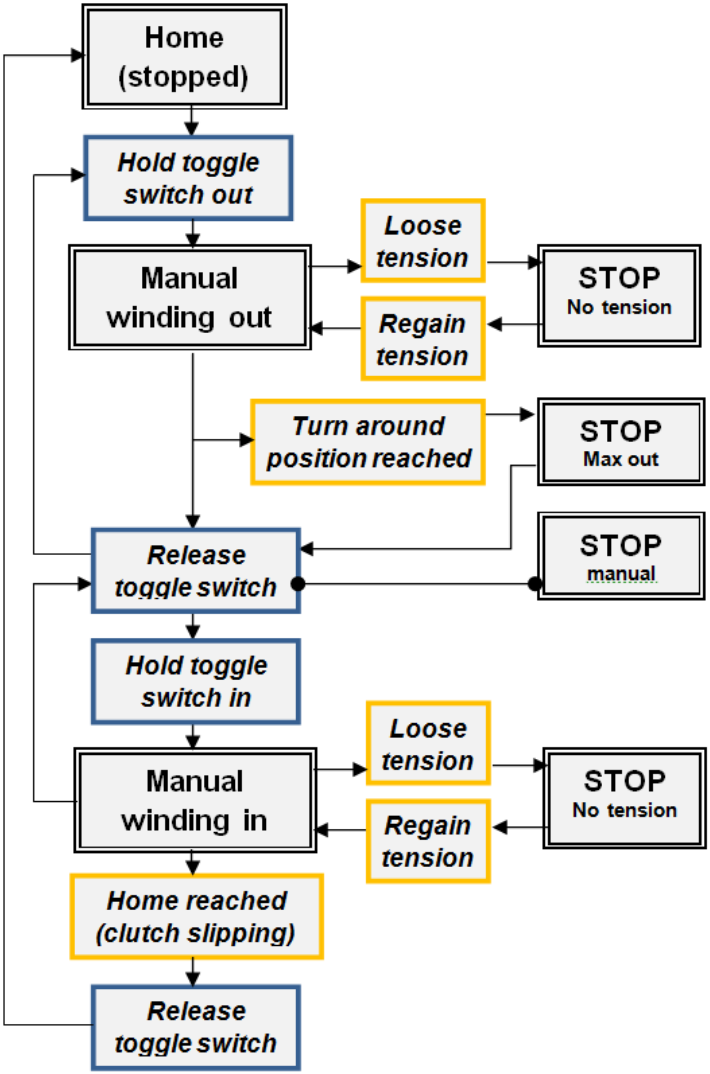


Figure 2-4: Manual Mode

2.6. Override-in

This mode is used when a bug wiper is stuck outside the home position without tension on the line.

Holding the control toggle switch in the in-direction will wind the bug wiper in. In case there is no tension on the line, the motor will wind in at a slow speed. As soon as tension has been restored, the normal manual operation mode will be entered.

3. Programming turn-around position

The CuttingEdge Bug Wiper Winders are designed to accommodate two different wingspans. To program the two different wing lengths follow the procedure given below.

Programming procedure:

1. Power up the bug wiper system
2. "Home" the winder by press-and hold the toggle switch in the in-direction until the winder stops automatically.
3. Select the desired wingspan by setting the slider switch (positioned next to the cable connector) to "W1" or "W2"
4. Slide the programming switch to the "P" position
5. Tap the control toggle switch in the "OUT" direction to activate the programming procedure. The bug wiper should extend approximately 25mm and stop.
6. Pull the bug wiper out to the desired turn-around position. Note that the motor friction has to be overcome when pulling the wiper out, but the clutch must not slip during this process.
7. Tap the Control Toggle switch in any direction to set length. (The relay switching can be heard when this action is done.)
8. Slide the programming switch to "R" position
9. Hold Toggle switch in "IN" direction to manually wind the bug wiper in.
10. Repeat the process for the alternate wingspan length and also for the winder of the other wing.

Note: Depending on the physical installation, it may be required to remove the winder temporarily from its mounting bracket to have access to the programming and span selection switches.

4. Emergency procedures

4.1. Winder failure in flight

If a mechanical or electrical failure occurs or the batteries supplying the Winder System have insufficient charge to operate the bug wiper system, an extended bug wiper cannot be retracted.

The pilot may continue flight with the bug wiper extended but a loss in performance may be observed.

4.2. Electrical fire

An electrical fire is very unlikely due to the protection with circuit breakers for all systems. Each battery has a circuit-breaker at the terminals and each battery device has a circuit breaker switch on the instrument panel.

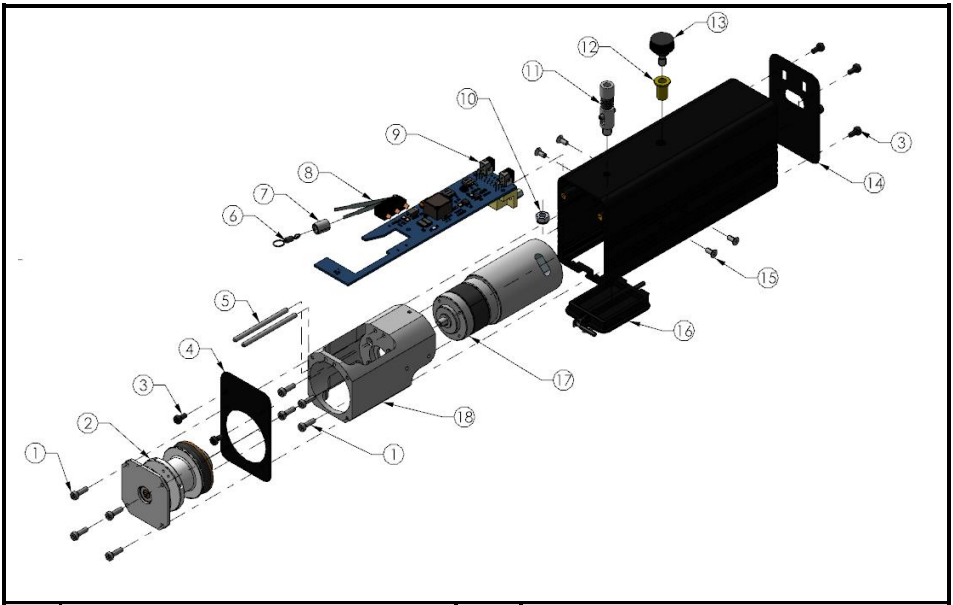
In the event of smoke or fumes coming from the instrument panel, take the following action:

1. Switch off the master switch supplying the circuits.
2. If a circuit breaker "pops", reset once only. This is most probably the faulty circuit.
3. Land as soon as possible.
4. Ensure the aircraft is serviceable before commencing with further flying.

5. System description

5.1. Mechanical layout

Figure 5-1 gives an exploded view of the bug wiper winder.



NO	DESCRIPTION	NO	DESCRIPTION
1	M3 A10	10	Nut: Nylock: M5
2	BWW Spool Assembly	11	Spring Loaded Thimble Assembly
3	M3x6 Black Cap Screw	12	Nut: Blind: Rivnut: M5
4	BWW Enclosure End Cap Front	13	BWW Thumb Bolt Assembly
5	BWW String Allignment Shafts	14	BWW Enclosure End Cap Rear
6	Big Eye Swivel	15	M3 CS 5mm
7	Parallel Splice	16	BWW Spool Cover Plate
8	Limit Switch 5A 57mm	17	BWW PM 3215IN Motor
9	BWW PCB Assembly	18	BWW Overwind Shield Mounting

Figure 5-1 : Exploded view of winder

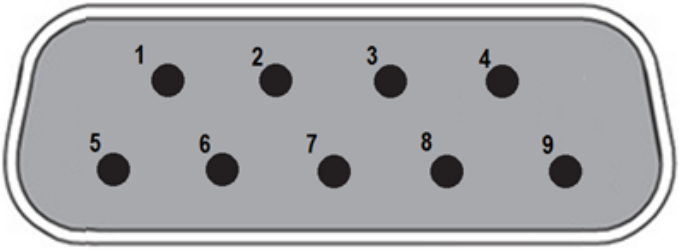
5.2. Electrical system

5.2.1. General

The electrical power of the Bug Wiper Winder System is supplied by the sailplanes' 12 volt battery system.

5.2.2. Pin layout

The pin layout of the connector on the winder is given in Figure 5-2



1	BWW Power (+) (AWG 16) White	6	BWW Power (+) (AWG 16) White
2	FWD BWIS (AWG 22) Yellow	7	GND BWIS (AWG 22) Blue
3	BCK BWIS (AWG 22) Green	8	BWW Power (-) (AWG 16) Blue
4	BWW Power (-) (AWG 16) Blue	9	BWW Power (-) (AWG 16) Blue
5	BWW Power (+) (AWG 16) White		

Figure 5-2: DB-9 pin layout

6. Maintenance

6.1. Recover end of braided line

The braided line must be replaced when worn or becoming too short. This procedure describes the replacement of the line.

1. Remove the bug wiper from its bracket.
2. Remove the BWW Spool Cover Plate.
3. Undo the BWW Clutch Bearing Hub by undoing the four M3A10 bolts.
4. Remove the BWW Spool Assembly from the BWW Overwind Shield Mounting.

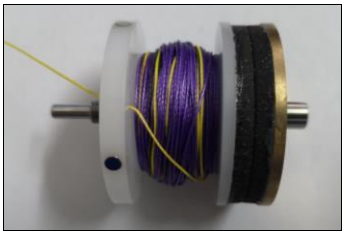


Figure 6-1 BWW Spool Assembly

5. Move the Big Eye Swivel of the micro switch in line with the Spring Loaded Thimble Assembly.
6. Insert the String Catcher from the outside through the Spring Loaded Thimble Assembly and through the Big Eye Swivel.

Figure 6-2 Sting Cather

7. Insert the end of the string through the eye of the String Catcher.

8. Slide the BWW Spool Assembly back into the BWW Overwind Shield Mounting. Keep the string tight when sliding into the enclosure.
9. Fastened the BWW Clutch Bearing Hub with the four M3A10 bolts.
10. Ensure the line is guided correctly through the guides and the Big Eye Swivel and that the limit switch is activated correctly with tension on the line.
11. Replace the BWW Spool Cover Plate.
12. Fasten the bug wipers to the string ends
13. Power on the unit and perform calibration and test procedure

6.2. Replacement of braided line

The braided line must be replaced when worn or becoming too short. This procedure describes the replacement of the line.

14. Remove the bug wiper from its bracket.
15. Extend the bug wiper a few meters using manual mode.
16. Cut the braided line knotted to the bug wiper
17. Cut a new length of braided line to the correct length.
18. Knot the new line to the old line.
19. Remove the BWW Spool Cover Plate.
20. Undo the BWW Clutch Bearing Hub by undoing the four M3A10 bolts.
21. Remove the BWW Clutch Assembly from the BWW Overwind Shield Mounting.
22. Feed the new line in through the Spring Loaded Thimble Assembly and through the Big Eye Swivel.
23. Unwind the old line from the spool and cut the new line from the old line.
24. Fastened the string with Fisherman's knot to the spool and secure the knot with a drop of super glue.

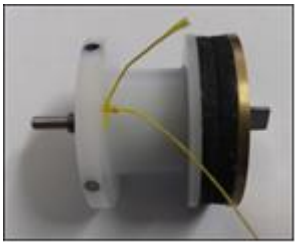


Figure 6-3: BWW Spool String attachment

25. Slide the BWW Spool Assembly back into the BWW Overwind Shield Mounting. Keep the string tight when sliding into the enclosure.
26. Fastened the BWW Clutch Bearing Hub with the four M3A10 bolts.
27. Ensure the line is guided correctly through the guides and the Big Eye Swivel and that the limit switch is activated correctly with tension on the line.
28. Replace the BWW Spool Cover Plate.
29. Fasten the bug wipers to the string ends
30. Power on the unit and perform calibration and test procedure.

Note: Refer to for reference to parts in this section

7. Pre-flight inspection

A pre-flight inspection of the bug wiper system should be done as part of the daily inspection of the glider.

Daily inspection checklist	
Ensure wingspan selection on the winder is correct for actual wingspan	
Power the unit up. Perform the home function	
Extend the wipers in automatic mode to ensure the operation is correct.	
Extend the wipers in manual mode. Inspect the condition of the line, especially near the bug wiper.	
Inspect the quality of the knots at the bug wiper	

Table 7-1: Daily inspection checklist