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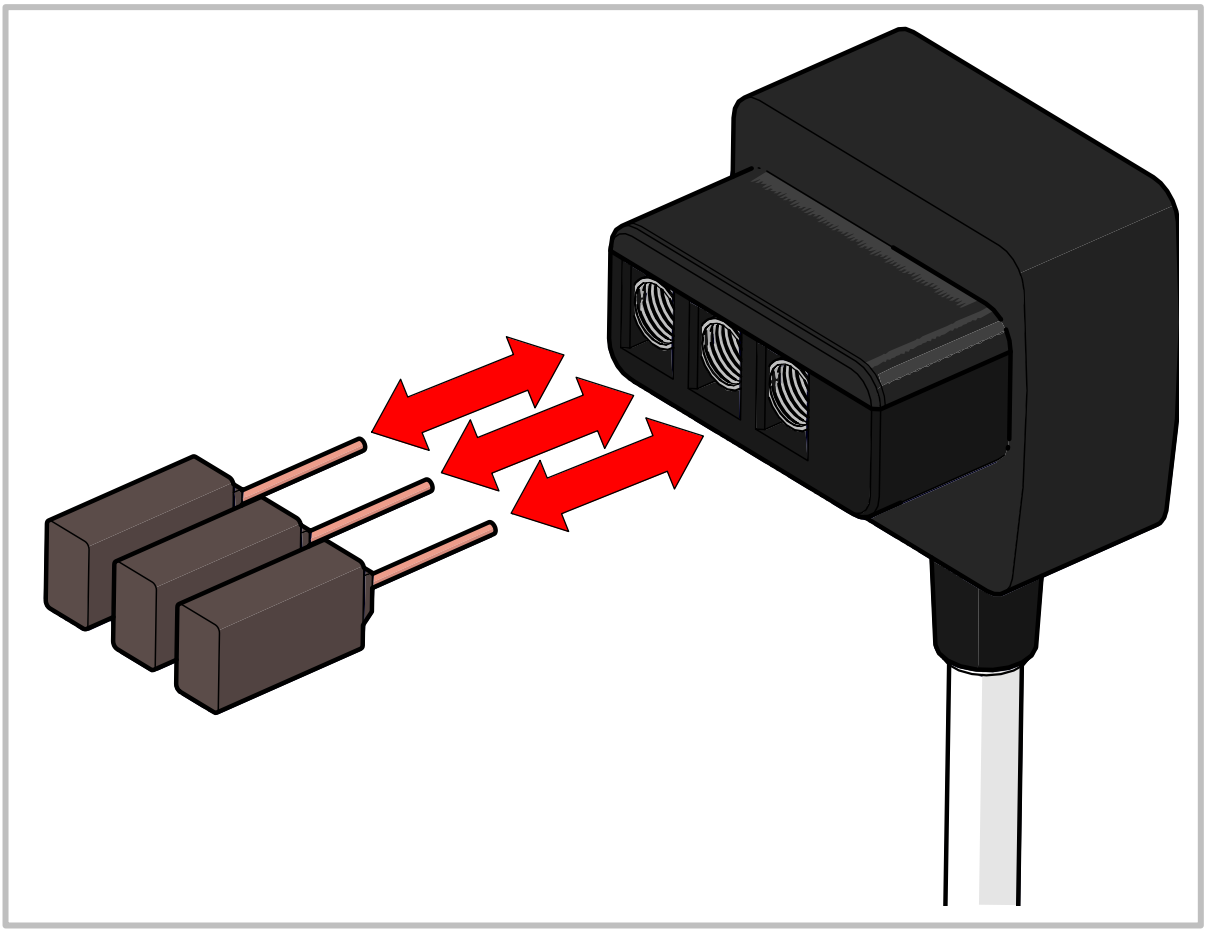
ASI-7-1-2

CARBON BRUSH REPLACEMENT

PROCEDURE



SUBJECT:	
Service & Maintenance	
ASSEMBLY NO:	**APPLICABILITY:**
A0120 or A0122	All propeller models

1. TOPIC

1.1 Introduction

This document covers the recommended procedure for replacing the carbon brushes incorporated within an Airmaster sensor-brush assembly (*A0120* or *A0122*).

The brushes that run on the slipring will progressively wear down during service. Once they have become so worn that the springs behind them are at full extension, the brushes will no longer provide sufficient contact with the slipring. This may be observed during an inspection of the propeller or may become apparent as an open circuit alarm (as indicated by all three lamps flashing red on the controller).

1.2 Service Life of Brushes

Operators are encouraged to replace the slipring brushes proactively at prescribed service intervals, instead of waiting for failure to occur. A spare set of (3) brushes is provided with each propeller for replacement in the field.

The expected service life for these carbon brushes is approximately 600hrs when a mini slipring assembly is used, and approximately 300hrs when a standard slipring assembly used. Environmental factors will also influence service life.

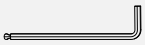
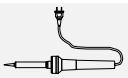
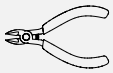
> ⓘ *Note*
> *The sensor-brush assembly is a standard propeller component incorporating three carbon brushes, however in some cases only two brushes may be used e.g. propellers suited for a Lycoming engine.*

2. MATERIAL REQUIREMENTS

2.1 Parts

ITEM	QTY	PART NO.	DESCRIPTION	IMAGE
1.	As required	P0265	Carbon Brush	
2.	1	A0120 (or A0122)	Sensor-Brush Assembly	

2.2 Tooling

ITEM	QTY	DESCRIPTION	IMAGE
1.	1	Hex Key (5mm or 6mm) **Size requirements may vary*	
2.	1	9/64” Hex Key	
3.	1	Soldering Iron	
4.	1	Extractor Fan	
5.	1	Wire Cutter	
6.	1	Digital Multimeter *(with probes)*	

7.	1	Piece of Card	
8.	1	Torque Screwdriver (9/64” Hex) [2Nm]	

2.3 Consumables

ITEM	QTY	DESCRIPTION	IMAGE
1.	As required	Electrical Solder Wire	
2.	As required	Flux-Clean Solvent	
3.	As required	Solder Wick	
4.	As required	Loctite 243	
5.	As required	Contact Cleaner	
6.	As required	Paper Towels	

2.4 Paperwork

ITEM	QTY	CODE	DESCRIPTION
1.	1	AR-*xxx*	Airmaster Slipring Assembly Drawing & BoM

2.5 PPE

ITEM	QTY	DESCRIPTION	IMAGE
1.	As required	Protective Gloves	
2.	As required	Protective Goggles	

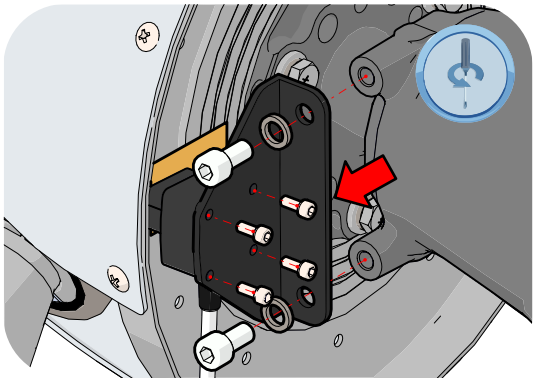
3. PROCEDURE

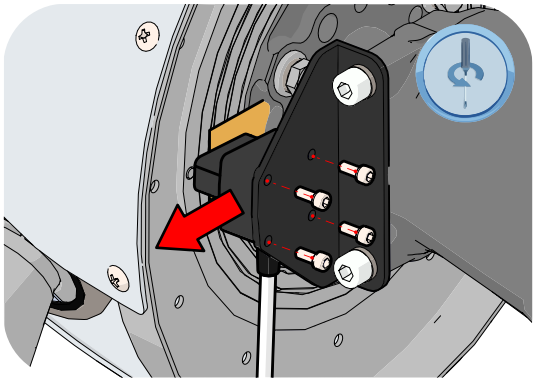
3.1 Remove Sensor-Brush Assembly

PROCEDURE

Step 1 Remove Sensor-Brush Assembly

- Remove sensor-brush assembly by either of the following methods, based on which is most convenient:
  - Detach sensor-brush block from mounting bracket via (4) 8-32 UNC cap screws, then carefully slide the block out from between the bracket and slipring.
  - Remove mounting bracket from engine first, then detach sensor-brush assembly via (4) 8-32 UNC cap screws.
- Unplug sensor-brush cable connector from extension loom.





Caution
Insert a piece of card between the brushes and slipring to protect the brushes as the sensor-brush assembly is removed.

Note
Standard slipring and sensor-brush bracket shown.

Attention
9/64” Hex-key (for 8-32 UNC cap screws)
5mm or 6mm Hex-key (depending on bracket).

3.2 Remove Carbon Brushes

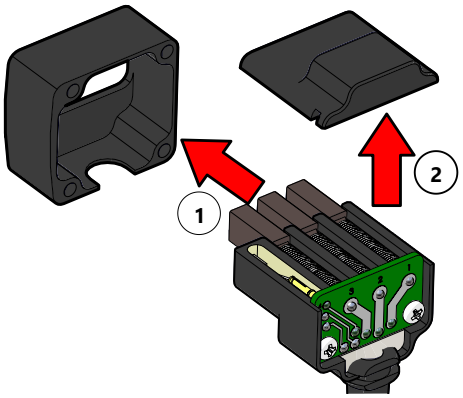
> ⚠ ***Caution***
> *Soldering irons become very hot. Take care when handling equipment to prevent risk of burns.*

> ⚠ ***Caution***
> *Solder fumes are hazardous. Perform this task in a well-ventilated area and use an extractor fan. Protective goggles should be worn, and lead-free solder is recommended.*

PROCEDURE

Step 1 Dismantle Block Head

- Remove outer casing by sliding it over the front of the sensor-brush block.
- Remove plastic cover.

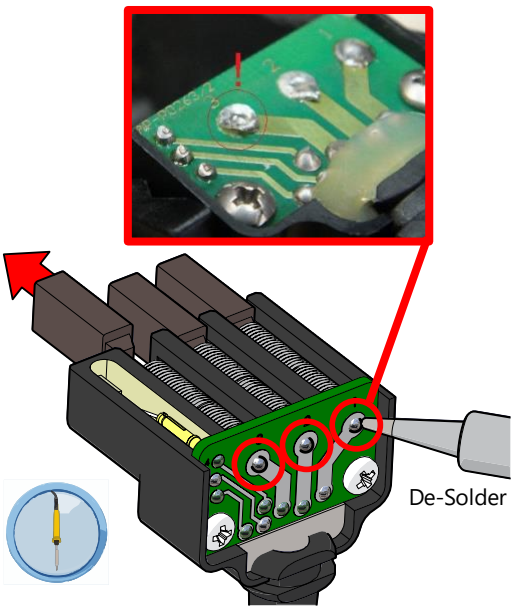


Step 2 Desolder Brushes

- Remove carbon brushes one at a time by simultaneously de-soldering the brush lead from the circuit board pads (labelled 1, 2, 3) and gently pulling the brush out from the front of the block.
- Use solder wick to carefully remove any residual solder from solder pads.

> ⚠ ***Caution***
> *Solder pads and PCB traces are sensitive to prolonged heating. Take care not to heat PCB pads for longer than 5s at a time. A solder iron temperature of approx. 300℃ is recommended.*

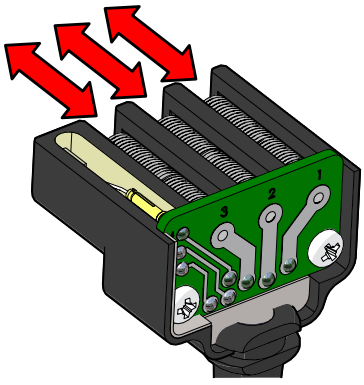
> ⓘ *Attention*
> *Soldering Iron, Flux-Clean Solvent, Contact Cleaner, Solder-Wick*



Step 3 Check Spring Travel

- Compress each spring (e.g. with screwdriver tip) to check for smooth and complete travel.

> ⓘ *Note*
> *If the springs are sticking, check they are properly seated inside the grooved walls of the brush holder channel, and check the springs have not deformed. Use compressed air to blow out any carbon dust that has accumulated in the brush holder channels.*

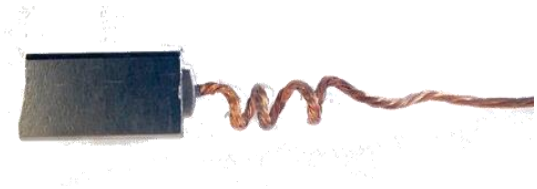


3.3 Solder Replacement Carbon Brushes

PROCEDURE

Step 1 Prepare Brushes

- Retrieve a new set of carbon brushes (*P0265*) and inspect closely for damage (e.g. cracking).
- Gently twist the end of each brush lead to prevent the braids from fraying.
- Form three curls in each brush lead by wrapping thrice around a slender screwdriver.

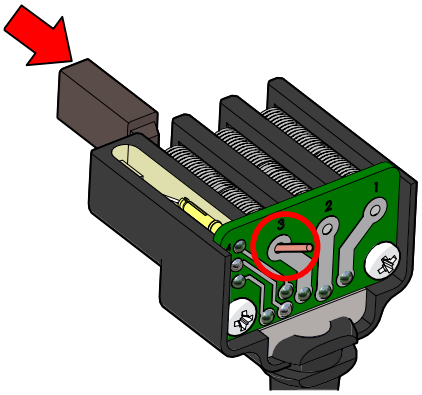


Attention *Slender Screwdriver*

Step 2 Insert Brush

- Insert brush lead through spring and exit through the hole in the circuit board.

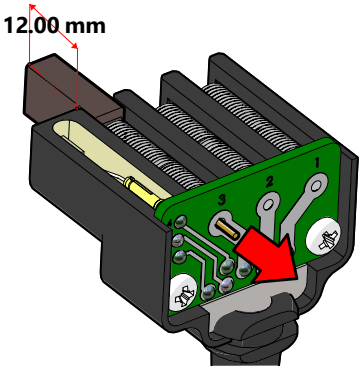
Note
The front face of each brush has a slight curve. The shorter end should be oriented at the top.



Step 3 Pull Brush Lead Taut

- Gently pull the brush lead through the hole until the brush just begins to compress the spring and the brush lead just becomes taut.

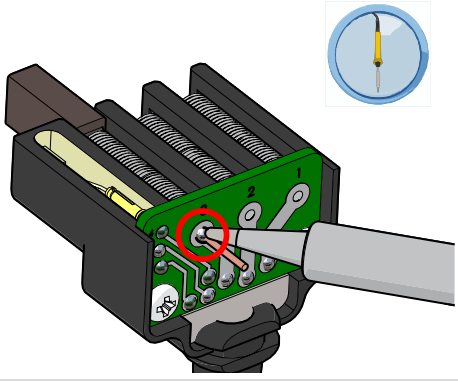
Note
The brush should protrude approximately 12mm (0.5in) from the front face of the brush block.



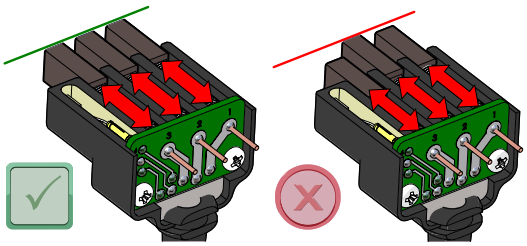
Step 4 Temporarily Solder Brush Lead

- Fold brush lead across face of solder pad.
- Temporarily secure brush lead to solder pad with a small solder joint.
- Repeat this step to temporarily secure remaining brushes, ensuring they protrude equal distances from the front of the block.

Attention *Soldering Iron, Solder-Wire*



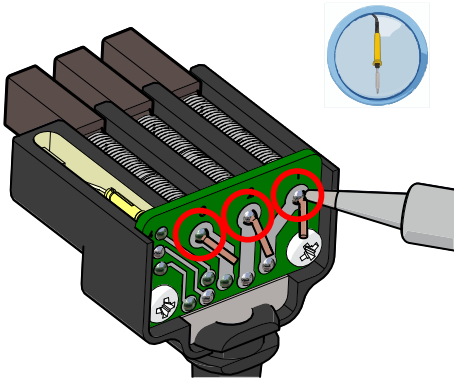
Step 5 Check Brush Travel



- Carefully compress and release the brushes in unison to check they travel smoothly and evenly through the brush holder and do not stick.

> *Note*
> *Ensure that brush leads do not catch inside the springs. Poke any protruding brush lead into the centre of the spring.*

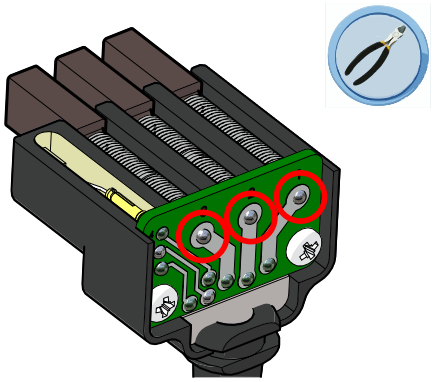
Step 6 Solder Brushes



- Properly secure the brush leads to their solder pads with additional solder, ensuring adequate coverage and bleed-through.

> *Attention*
> *Soldering Iron, Solder-Wire, Wire Cutter*

Step 7 Trim Brush Leads & Solder Joints

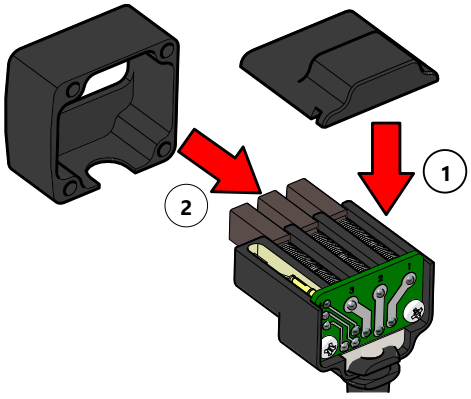


- Trim excess length of each brush lead close to the solder joint.
- If necessary, trim solder joints close to circuit board, ensuring they will not contact the brush block mounting bracket.

> ***Caution***
> *Ensure that the brush solder joints do not protrude further than the rear face of the brush holder as this will cause an electrical short.*

> *Attention* *Wire Cutter*

Step 1 Reassemble Block Head

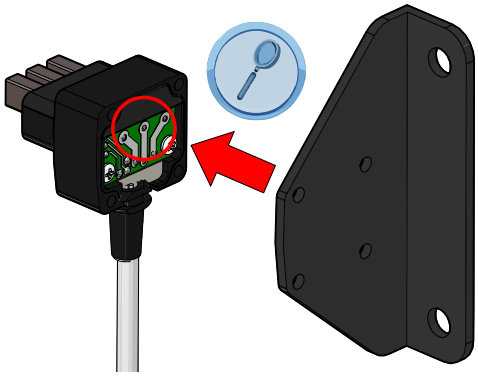


- Place plastic cover on top of brush block.
- Slide metal casing over front of brush block.

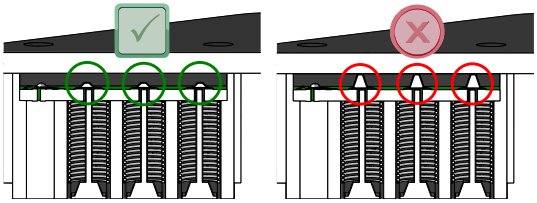
3.4 Test Sensor-Brush Block

PROCEDURE

Step 2 Check Solder Joint Height



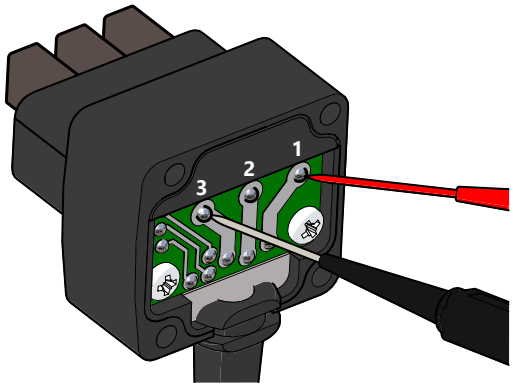
- Dry-fit sensor-brush block against mounting bracket.
- Check solder joints located on rear circuit board do not contact the bracket (this may create an electrical short).
- Trim solder joints as necessary to prevent contact.



Note
Rotax standard mounting bracket (P0259) is shown.

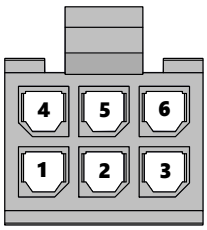
Attention *Wire Cutter (as required)*

Step 3 Check Electrical Continuity



- Check there is no continuity between brushes.
- Check there is no continuity between each brush and the brush block casing.
- Check for continuity between each brush and the corresponding pin in the cable connector (refer below). No continuity should exist in any other configurations.

BRUSH POSITION	PCB PAD NO.	CONNECTOR PIN [CN2]
Inner	1	4
Centre	2	5
Outer	3	6



Attention *Digital Multimeter (with probes)*

3.5 Subsequent Action

Perform the following tasks once this procedure is complete:

- Remount sensor-brush assembly in the reverse sequence of the removal process:
  - Attach sensor-brush block to mounting bracket in accordance with procedure ***ASI-4-8-1***.
  - Remount sensor-brush assembly to engine in accordance with the applicable installation procedure.