# SERVICE BULLETIN

# No. SB-NG-1-21

**Extra considers compliance mandatory**

**Subject:** **Starter Solenoid Circuit**

**Aircraft affected:** EXTRA NG: S/N NG019, NG021 through NG025 and those retrofitted with ACS A-510-2 Ignition Switch.

**Purpose:** The ACS A-510-2 Ignition Switch was introduced as an alternative part into the EXTRA NG Type Certificate. To protect this ignition switch from induced voltage at the moment the starter solenoid opens, a flyback diode was placed across the starter solenoid coil terminals. This required flyback diode noticeably delays the release of the solenoid by keeping the coil current flowing longer. An arc across the opening internal contacts of the solenoid may occur, preventing a release to open position. This will cause a prolonged starter engagement going along with high alternator current draw and final starter overheating.

Adding a Zener diode in series with the already present flyback diode, but in the opposite direction, will make the circulating current decay faster at the drawback of an increased reverse voltage.

**Approval:** The technical content of this document is approved under the authority of the DOA Nr. EASA.21J.593.

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## COMPLIANCE TIME

The retrofit of a Zener diode as described in this Service Bulletin needs to be carried out

- when the starter solenoid remains in closed position,
- within the next 10h time-in-service (TIS) or
- at the next 25h inspection, whichever occurs first.

If in the mean time the starter solenoid sticks, switch off the master switch to de-energize the system.

## INSTRUCTIONS

**NOTE** **Alterations or repair of the aircraft must be accomplished by licensed personnel only.**

1. Make sure the aircraft is powered down.
2. Remove the bottom fuselage access panel as per Chapter 51-00-01 and 53-30 of the EXTRA NG MM and disconnect the main battery.
3. The starter solenoid is installed on the electrical main board, see Figure 1 and 2. The electrical main board is installed behind the LH landing gear cuff, see Chapter 51-00-01 of the EXTRA NG MM.

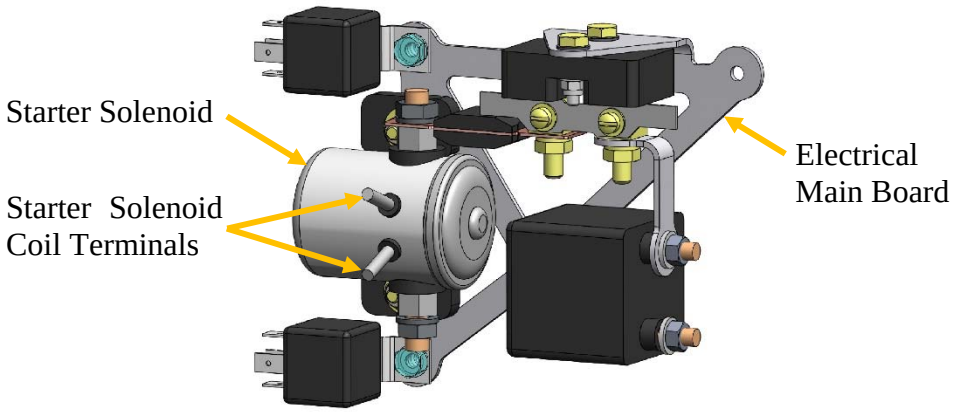


*Figure 1: Starter Solenoid on Electrical Main Board*

4. Remove top and bottom halves of the engine cowling as per Chapter 71-10 of the EXTRA NG MM.
5. Remove the LH landing gear cuff as per Chapter 53-30 of the EXTRA NG MM.
6. Note that the coil of the solenoid does not have a positive and a negative terminal. The coil causes a magnetic field that attracts the relay plunger regardless of the direction of the magnetic field. The positive terminal is connected to the Slickstart module and ignition switch. Both coil terminals are protected with a cover nipple.
7. Identify the starter solenoid positive coil terminal and remove the cover nipple, the nut and the washer. Use a back-up wrench to hold the bottom nut stationary when releasing the outer nuts.
8. Remove the ring terminal from the black wire with the red heat shrink tubing band (wire between coil terminals with flyback diode).

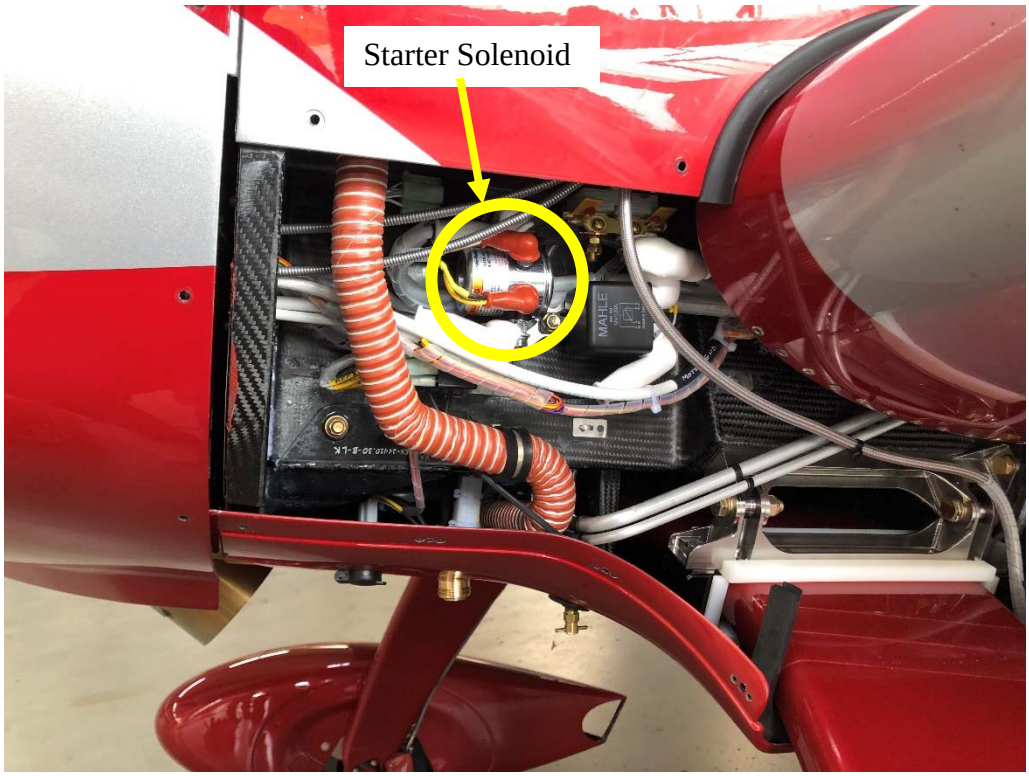


*Figure 2: Electrical Main Board behind LH Landing Gear Cuff*

9. Cut the wire between the flyback diode and the loose ring terminal and dispose of the ring terminal.
10. Remove the insulation on the remaining wire.
11. Attach the Zener diode (EXTRA P/N 35842) in opposite direction of the present flyback diode using a crimp contact (EXTRA P/N FE4108), see Figure 3.

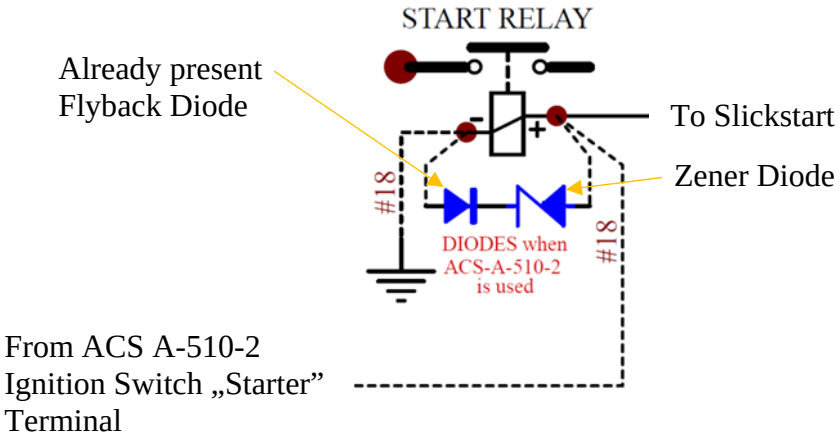


*Figure 3: Starter Solenoid Wiring with opposite oriented Diodes*

12. Put on heat shrink tubing long enough to cover the complete area.
13. Attach a 20 AWG aircraft wire (MIL-W-22759, EXTRA P/N 00775) with a ring terminal (EXTRA P/N 02198) to the other end of the Zener diode using a crimp contact (EXTRA P/N FE4108).
14. Pull back the heat shrink tubing to cover all parts and connections and use a heat gun to shrink it in place.
15. Install the ring terminal on the positive coil contact and attach with previously removed nut and washer (Max torque 45-55 inch-lbs / 5–6.2 Nm). Use a back-up wrench to hold the bottom nut stationary when applying the outer nuts.
16. Reinstall the cover nipple on the starter solenoid positive coil terminal.
17. Reconnect the battery.
18. Test the starter solenoid circuit for proper operation.

**⚠ DANGER** **The propeller will turn during this procedure, and could cause death or serious injury.**
**Remain clear of the propeller turning arc!**

**NOTICE** **Risk of starter overheating.**
**Do not energize the starter for a period longer than 15 seconds!**

Remove one spark plug from each cylinder of the engine.
Place the mixture vernier control in the “idle cut-off” position and the fuel selector valve control in “off” position.
Turn the engine with the starter to verify proper function of the starter system circuit.
Reinstall spark plugs.

19. Reinstall the bottom fuselage access panel as per Chapter 53-30 of the EXTRA NG MM.
20. Reinstall LH landing gear cuff as per Chapter 53-30 of the NG MM.
21. Reinstall top and bottom halves of the engine cowling as per Chapter 71-10 of the EXTRA NG MM.
22. Make a note of the successful completion of this Service Bulletin in the aircraft logbook.

The required parts need to be ordered from:

EXTRA Flugzeugproduktions- und Vertriebs GmbH

Flugplatz Dinslaken
Schwarze Heide 21
46569 Hünxe / Germany

parts@extraaircraft.com

Table 1: Parts/Material required

| **EXTRA P/N** | **QTY** | **Description** |
|---|---|---|
| 00775 | L = 10 cm | MIL-W-22759 Aircraft Wire, AWG 20 |
| 02198 | 1 | Ring Terminal, 5mm |
| FE4108 | 2 | Crimp Connector |
| 35842 | 1 | Zener Diode |
| 03144 | L = 10 cm | Heat Shrink Tubing 3,2 – 1,6 mm (1/8”), yellow |