



DUTCH
SAFETY BOARD

Detached air brake control rod

Rolladen-Schneider LS 4-b glider



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The Hague, July 2019

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Cover photo: G.A. Metz

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This report is published in the Dutch and English languages. If there is a difference in interpretation between the Dutch report and English versions, the English text wil prevail.

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GENERAL OVERVIEW

Identification number:	2018021
Classification:	Incident
Date, time of occurrence:	23 April 2018, 17.15 hours (local time)
Location of occurrence:	Larserveld, the Netherlands
Registration:	PH-974
Aircraft type:	Rolladen-Schneider LS 4-b
Aircraft category:	Glider
Type of flight:	Local
Phase of operation:	En route
Damage to aircraft:	Detached air brake control rod
Flight crew:	One
Passengers:	None
Injuries:	None
Other damage:	None
Light conditions:	Daylight

The Rolladen-Schneider LS 4-b, a single seat glider, made a local flight on 23 April 2018. At an altitude of approximately 1,100 metres the air brake control rod in the cockpit of the glider detached. From that moment on the pilot had little to no control of the air brakes and he decided to return to the airfield. The pilot used his right hand to hold the remaining part of the control rod and used his left hand to steer the aircraft. The landing was without any further problems. After the flight, it was found that the air brake control rod had become detached from the rest of the mechanism.

In 2017 several events had already taken place with this type of glider where a junction in the air brake control rod was about to fail. To address this potential unsafe condition, the aircraft manufacturer published a technical note, providing inspection of and modification instructions for the junction in the air brake control rod. The European Aviation Safety Agency (EASA) assessed the problems with the air brake control rod junction in LS 4-b gliders as a safety risk and made the technical note mandatory by issuing Airworthiness Directive AD 2018-0032 with an effective date 1 March 2018.

The involved glider was modified on 7 April 2018 in the flying club workshop as a result of the Airworthiness Directive. During the subsequent analysis by investigators of the Dutch Safety Board it was concluded that the wrong type of Loctite was used and the Loctite had expired 2 years ago. Furthermore, the weld in the air brake control rod was not removed by a 13.5 mm drill as required by the technical note of the manufacturer, but with another drill. Subsequently this led to a complete detachment of the swivel, as a result of which the air brakes could not be retracted completely anymore. The effect of non-functioning air brakes is that the descent angle on final can no longer be controlled with these brakes and it becomes impossible to land the glider in the usual way at the intended landing site.

FACTUAL INFORMATION

During the winch launch of the Rolladen-Schneider LS 4-b glider, the air brakes opened unexpectedly. The air brake control rod had slipped out of the locked position which was corrected by the pilot. After approximately one hour in the air and flying through mild turbulence, the problem of unlocking air brakes and corrective actions by the pilot recurred several times. At an altitude of approximately 1,100 metres, with the glider still in the vicinity of the airfield, the air brake control rod detached with a loud bang. From that moment on the pilot had little to no control of the air brakes and he decided to return to the airfield. The pilot used his right hand to hold on to the remaining part of the control rod and used his left hand to steer the aircraft. The landing was without any further problems. After the flight, it was found that the air brake control rod had become detached from the rest of the mechanism; see Figure 1.

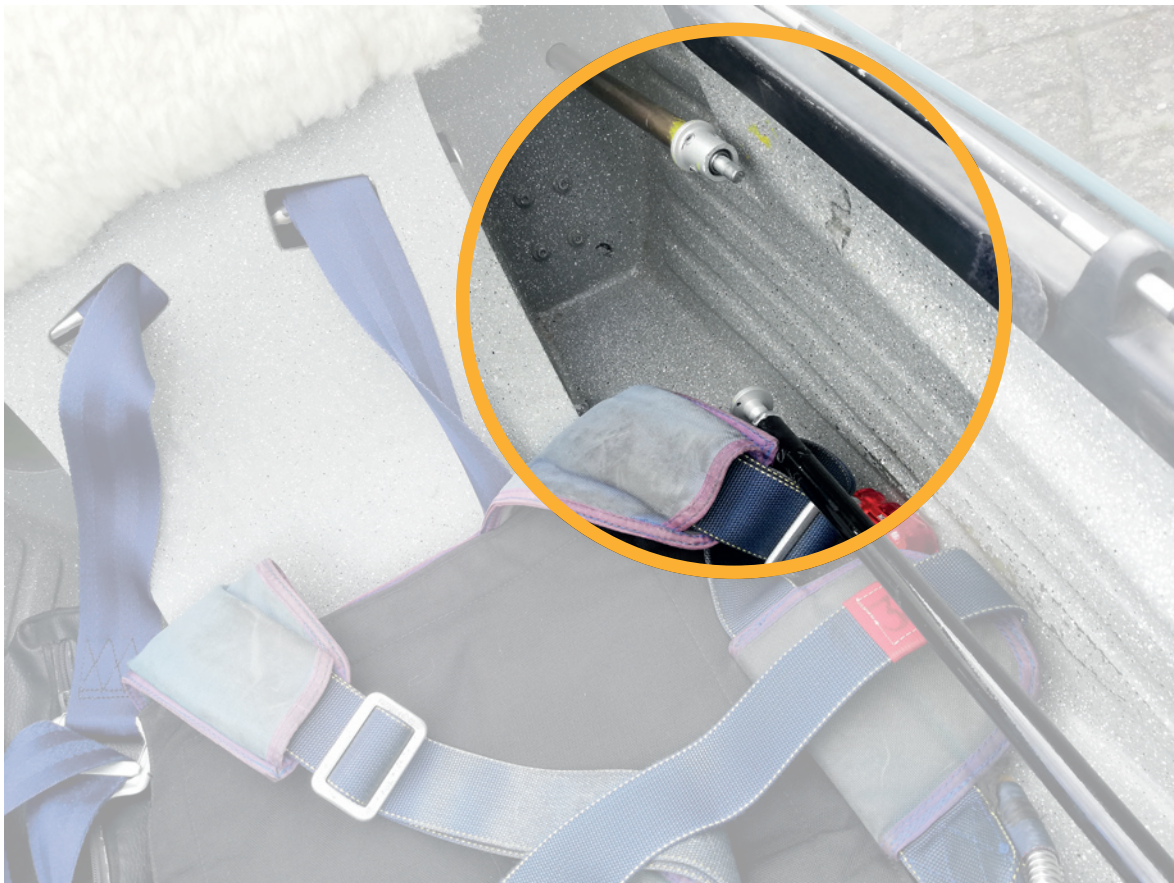


Figure 1: Detached air brake control rod. (Source: G.A. Metz)

The pilot was in the possession of a Light Aircraft Pilot License (LAPL) and a medical certificate. He had a total flying experience of 60 hours (295 flights) of which 13 hours (59 flights) on the type concerned. He also had 3.5 hours of flying experience on single-engine aircraft.

INVESTIGATION AND ANALYSIS

According to the aircraft manufacturer, in 2017 alone six occurrences were reported where a junction in the air brake control rod was about to fail as a result of a cracked weld or loose blind rivets. The junction is only visible during maintenance checks and not at a pre-flight inspection. Analysis revealed that any lateral (sideward) force on the air brake handle directly leads to a bending moment on the air brake control rod junction. If discrepancies as a result of this condition are not detected and corrected, they may lead to failure of the welding or riveting of the junction causing reduced air brake control of the glider.

To address this potential unsafe condition, the aircraft manufacturer determined that a swivel needs to be installed similar to that used in another type of glider of the manufacturer, the Rolladen-Schneider LS 4-a. A Technical Note (TN) 4048 was published on 30 November 2017 by the aircraft manufacturer, providing inspection and modification instructions.

The European Aviation Safety Agency (EASA) assessed the problems with the air brake control rod junction in LS 4-b gliders as a safety risk and made TN 4048 mandatory by issuing Airworthiness Directive AD 2018-0032 with an effective date 1 March 2018.¹ In short the AD mandates the inspection of the air brake junction and rivets within 30 days after the effective date of the AD. If, during the inspection discrepancies are detected, the air brake control system has to be modified according to TN 4048 before the next flight. If no discrepancies are detected, the modification has to be executed within four months after the effective date of the AD.

One user had submitted an Alternative Method of Compliance (AMOC) to EASA which was approved. AMOC 10065242 implied regular checks of the control rod instead of modification. The aircraft manufacturer however opposed to approval of the AMOC because the inspection intervals of the control rod are different than the regular maintenance checks, with the risk of overlooking the control rod.

The involved glider was modified on 7 April 2018 in the flying club workshop shortly before the event flight. The bolted connection of the air brake swivel loosened in flight and the air brakes could not be retracted completely anymore. During the subsequent analysis by investigators of the Dutch Safety Board it was concluded that the wrong type of Loctite (243 instead of 638) was used and the Loctite had expired 2 years ago. Furthermore, the weld in the control rod was not removed by a 13.5 mm drill as required by the TN, but with another drill. As a result the control rod was limited in its movement, which caused a bending moment on the air brake control rod junction. The weld inside the rod did not only result in an additional bending moment, but also put pressure on

¹ <https://ad.easa.europa.eu/ad/2018-0032>

the threading of the bolt in the swivel. As there was insufficient thread locking on the bolt, combined with the repeated rotational movement of the airbrake handle (needed to operate the airbrakes) the pressure on the threading resulted in loosening of the bolt. Subsequently this led to a complete detachment of the swivel.

The aircraft manufacturer recommended to perform TN 4048 in a certified maintenance organisation (EASA Part-M Subpart F). EASA and the Royal Netherlands Aeronautical Association (in Dutch: KNVvL) however stated that the modification and release can also be performed by an EASA M.A. 801 (c) organisation (for example a flying club workshop). The aircraft manufacturer is of the opinion that this is formally not correct, since EASA M.A. 801 (c) refers to EASA M.A. 801 (b)2, which in turn says for non-commercial ELA1² aircraft, the aircraft release to service can be signed by (individual) certifying staff, without any form of organisation behind it. The aircraft manufacturer chose not to recommend this path in their TN, since the requirements for performing any work are not defined adequately in their opinion.

On request of the Safety Board, mechanics in the Netherlands that had performed the modification were asked by the KNVvL to share their experiences. The mechanics are of the opinion that in general the modification was not difficult to execute. Some mechanics however found the modification instructions not clear and reported that they had requested the aircraft manufacturer for help. Technical support provided by the manufacturer was considered adequate. For future modifications, KNVvL suggested the aircraft manufacturer to provide a complete material listing with the modification instructions including not only the retrofit kit parts but also the required non-standard consumables and non-standard tools (such as the Loctite types and the 13.5 mm drill). Even better would be to include these items in the kit.

The Dutch Safety Board concludes that from a legal point of view the modification can be performed by flying club technicians but that based on practical experience of technicians it appears that the modification instructions must be clear. In addition, these instructions must contain a complete material listing, including retrofit kit parts and required non-standard consumables and non-standard tools. Preferably the modification kit contains not only the retrofit hardware but also the non-standard consumables and non-standard tools.

2 ELA1: European Light Aircraft: An aeroplane, sailplane or powered sailplane with a maximum Take-off Mass (MTOM) less than 1,000 kg that is not classified as complex motor powered aircraft.

CONCLUSION

The involved glider was modified on 7 April 2018 in the flying club workshop as a result of an EASA Airworthiness Directive. During the subsequent analysis it was concluded that the wrong type of Loctite was used and the Loctite had expired 2 years ago. Furthermore, the weld in the air brake control rod was not removed by a 13.5 mm drill as required by the technical note of the manufacturer, but with another drill. As a result the control rod was limited in its movement, which caused a bending moment on the air brake control rod junction. The weld also put pressure on the threading of the bolt in the swivel. As there was insufficient thread locking on the bolt, combined with the repeated rotational movement of the airbrake handle (needed to operate the airbrakes) the pressure on the threading resulted in loosening of the bolt. Subsequently this led to a complete detachment of the swivel, as a result of which the air brakes could not be retracted completely anymore. The effect of non-functioning air brakes is that the descent angle on final can no longer be controlled with these brakes and it becomes impossible to land the glider in the usual way at the intended landing site.

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