# THE GLIDING FEDERATION OF AUSTRALIA INC



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# Incident Report IS-28B2 Wing Rigging Failure

### Date:

**Region:** 

SOAR Report Number:

Aircraft:

PIC Age:

## OVERVIEW

IS-28B2 had recently completed an annual inspection for the issue of a maintenance release and was performing a post maintenance evaluation flight with two pilots onboard. The glider was conducting an aerotow launch. The aircraft had just separated from the ground when a loud cracking noise was heard behind the rear cockpit. The flight was terminated and a landing straight ahead was successfully carried out. After landing, the glider wings exhibited an exaggerated dihedral. On inspection, the connection between the lower wing spar attachment fittings had failed.



# Photo 1 – Post Incident Showing Exaggerated Dihedral



Photo 2 - Lower Spar Connection Post Incident Showing Disconnection of Fittings

#### INVESTIGATION

The sailplane was inspected by an airworthiness inspector with over 21 years of experience. Visual inspection of the spar fittings showed the upper tapered bolt had engaged in the spar fittings, but lower tapered bolt had not. It was noted that the guide plates that retains the collar of the threaded spindle were deformed and the retaining slots worn. The centre locating collar on the spindle had broken loose from the retaining slots and was well above its normal position.

Witnesses during the fitting of the wings state an extension tool was used during the rigging process, which is against the manufacturers' recommendation and explicitly stated not to do in the Flight Manual. Using an extension tool when rigging would give added torque on the spindle and could apply excessive force if either of the tapered bolts were jammed.

The initial inspection suggested the upper tapered bolt had engaged correctly during rigging, but the lower tapered bolt had not engaged correctly. There were less than 14 mm of thread exposed on both the lower and upper tapered bolt. A comparison with another IS-28B2 revealed that both correctly engaged tapered bolts had approximately 25 mm of threads exposed on upper and lower threads when the tapered bolts were fully engaged.



Collar above retaining slots

13 mm thread exposed

Wear / contact surface visible above upper surface of stbd fitting

Photo 3 - Incorrect rigging of - 13 mm thread exposed and wear / contact surfaces visible above upper surface of stbd fitting on lower tapered bolt. Centre collar is above retaining slot in guide plates.



Photo 4 - Correctly engaged lower tapered bolt - 25 mm thread exposed, no wear / contact surfaces of tapered bolt exposed above upper surface of fitting, centre collar housed in retainer.

#### Sequence of Events

After the initial inspection, was derigged and it was able to recreate the likely sequence of events:

During the assembly of the wings to the fuselage, the lower spar fittings were mis-aligned whilst the upper fittings were aligned. As the spindle was turned, the upper and lower tapered bolts extended. The lower tapered bolt jammed when it encountered the misalignment.

An extension handle was being used on the T handle rigging tool used to rotate the threaded spindle. With the lower tapered bolt jammed and the additional torque provided by the extension to the Tee handle, caused the spindle collar to force itself free of the retaining slots.

The upper tapered bolt was then free to extend into the upper fitting. The lower tapered bolt was still jammed and winding the T handle simply moved the spindle and upper pin upwards. The rigging procedure was concluded when the upper tapered bolt was identified as being fully engaged. The lower retaining bolt had not engaged the port wing fitting at all.



Collar free of slots. Retaining plates deformed.

Photo 5 - Recreation of event. The port lower spar tongue (removed from wing) is jamming the lower tapered bolt with wear / contact surfaces exposed, the collar is 10-15mm above the retaining slots. The collar retaining slots are worn and rounded. The upper tapered bolt is fully engaged.

#### **Human Factors**

Complacency,

Use of non standard tooling,

Too many chiefs in the rigging process

Poor independent inspections,

Poor DI standards and execution.

#### **Aircraft Documents**

The IS-28B2 Type Certificate EASA.A.453 is held by the Aeroclubul Romaniei. The STC No.10054289 is also held by the Aeroclubul Rumaniei and was purchased by the in 2016.

The aircraft's logbook records an annual and life extension survey completed in 2020. The logbook also records an annual form 2 conducted in 2021 and was certified by dated 19/10/2021.

The annual inspection Form 2 paperwork AIRW-F002 used by the inspector was of the current revision and completed correctly. It records **Constitution** as carrying out the duplicate inspection and the aircraft's time in service being 8,596 hrs and 22,136 landings. There were no defects recorded under the heading 'Description of Defects' on page 4.

The aircraft's maintenance release 'Daily Inspectors Record' on page 18 contains two signatures, the first being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed and dated 24/10/2021 at 1100 hrs, the second being signed at the second second

The TC/STC holder was advised of the incident and was provided hours and landing information since 2016 when the glider was re-released to service on STC No.10054289.

#### CONCLUSION

It is accepted that the wing spar connection mechanism was serviceable at the time of inspection as the aircraft had just undergone an annual inspection for the issue of a maintenance release. There is no record of the rigging mechanism being deemed unserviceable or requiring any maintenance in the worksheets or in the aircraft's logbook entry.

The mechanism likely failed during the rigging process due to excessive force being applied using an extension to the rigging tool against the procedure stated in the Flight Manual. The lower tapered bolt was not engaged in the lower spar cap connection. The daily inspection and independent inspection failed to identify the mechanism failure.

#### RECOMMENDATIONS

The investigation recommends the following when rigging an IS-28B2:

1. Prior to rigging, the slot in the guide plates for the collar should be inspected for undue wear.

2. Prior to rigging, the tapered bolt assembly must be inspected and confirmed to be in good condition, fully functional and serviceable. Worn bolt assemblies must be replaced.

3. The tapered bolts and collar should be visually inspected after rigging (including using a torch and mirror) to ensure upper and lower tapered bolts are fully engaged and collar is retained correctly in slot. Check the exposed threads are roughly equal on the upper and lower surface and approximately 25 mm of thread is exposed. Wear / contact surfaces on both tapered bolts should not be visible.

These recommendations have been communicated to members via Airworthiness Alert (AWA) 2021-3.

Dennis Stacey GFA CTO 08/11/2021