

CANCELLED 29NOV2021

REFER BSE CHAPTER 28

AIRWORTHINESS DIRECTIVE

SUBJECT: Inspection, replacement and maintenance of l'Hotellier couplings.

TYPE AFFECTED: All gliders, powered sailplanes and power assisted sailplanes fitted with l'Hotellier type ball joint quick disconnects in flight control systems.


BACKGROUND: Since 1980 there has been a steady run of incidents and accidents caused by disconnection of l'Hotellier coupling. The couplings may disconnect for the following reasons:

- a) Incorrect assembly during rigging, either not connected at all or only partly engaged resulting in separation.
- b) Fracture of the ball coupling at the top of the threaded section.
- c) Fracture of the ball coupling at the neck immediately under the ball.
- d) Disconnection of controls which have been correctly connected. The use of some form of locking device such as a safety pin will prevent this. (This caused at least 1 fatal accident in Germany during 1988)

Issue 2, 24/5/1983, combined all known inspection, replacement and maintenance actions required to ensure safe operations of l'Hotellier couplings.

Issue 3, 18/4/1990, represented the experience generated since 1983 from the application of Issue 2 requirements.

- a) Correct lubrication prevents ball wear. Correct installation will help to prevent fracturing of the threaded part of the ball.

SIGNED: 	For and on behalf of:		
CHIEF TECHNICAL OFFICER AIRWORTHINESS	THE GLIDING FEDERATION OF AUSTRALIA		
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- b) Excessive pilot effort to lock/unlock airbrake systems is a major contributor to ball wear and ball stem/thread fracture. When rigging an airbrake system the glider manufacturer's recommended procedure must be followed.
- c) Lack of proper out travel stops, close to the pilot in airbrake systems can cause ball stems to bend and crack when the airbrake is fully functioned during pre-flight cockpit checks.
- d) Balls with threaded shanks larger than 6 mm diameter need not be replaced at intervals less than 3000 hours, as recommended by the l'Hotellier coupling manufacturer.

Issue 4, 30/10/1991, added an additional check on the condition of the springs.

Issue 5, 12/5/98, required the earlier couplings with the locking cam to have safety pins installed and the maintenance requirements updated to reflect the latest information from l'Hotellier.

Issue 6, 25/1/2001, changes the requirements for lubrication of the couplings (Page 4).

Issue 7, 9/5/2001, corrects an erroneous part number for replacement l'Hotellier coupling balls.

DOCUMENTATION:

Earlier issues of AD 177.

Glasser-Dirks Technical note No. 826/24.

LBA ADs 1994-001/2 and 1993-001/3.

l'Hotellier Maintenance Instructions 10.01 dated 03/94.

ACTION REQUIRED:

1. Connection and Daily Inspection.

The correct and incorrect assembly of the couplings must be pointed out by Daily Inspector Examiners and understood by Daily Inspectors and is shown in figure 1.

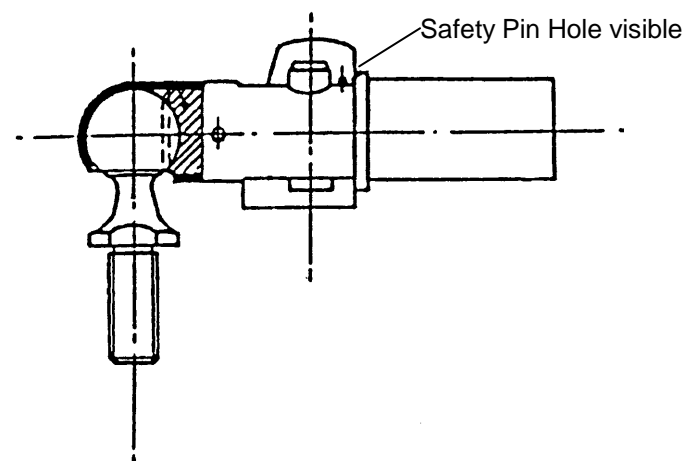


FIGURE 1. CORRECTLY ASSEMBLED COUPLING

Daily inspectors should be aware that it is possible to connect these couplings incorrectly. The ball may not be fully home as shown in Figure 2.

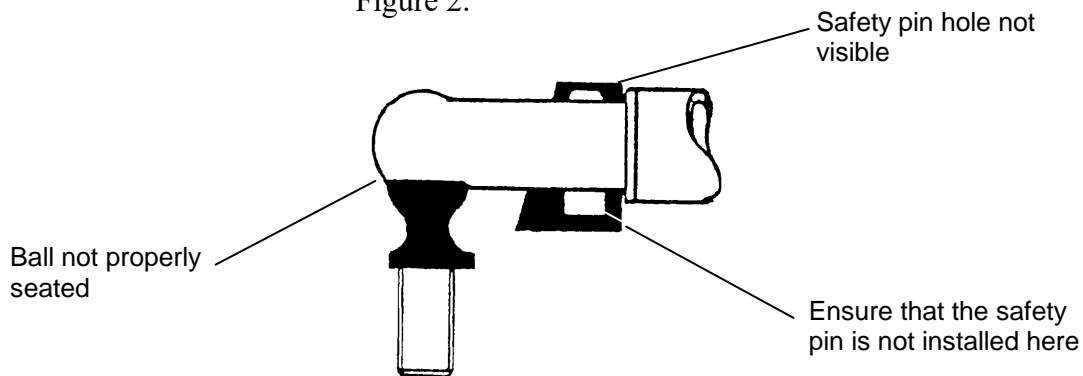


FIGURE 2. INCORRECTLY ASSEMBLED COUPLING

After a coupling has been connected and the safety pin has been installed the slide should be pushed to ensure it is impossible to undo the coupling.

2. Safety Locking.

Before next flight all l'Hotellier couplings having a check hole must be safety locked. The locking must be checked at each Daily Inspection.

Acceptable methods of safety locking includes installing the pin types shown in Figure 3 and using of safety wire. Other methods of locking the couplings include Wedekind Safety Sleeves, Uerling type sleeves and the LS Sleeve as used on the LS 4. Because these other types of locking mechanism are significantly bulkier than the safety pins or wires shown in Figure 3 each type must be specifically approved for use in a particular aircraft type. If an aircraft type is approved for the use of other locking methods then it will be shown in the Flight and or Maintenance Manual or in the specific GFA AN for the type.

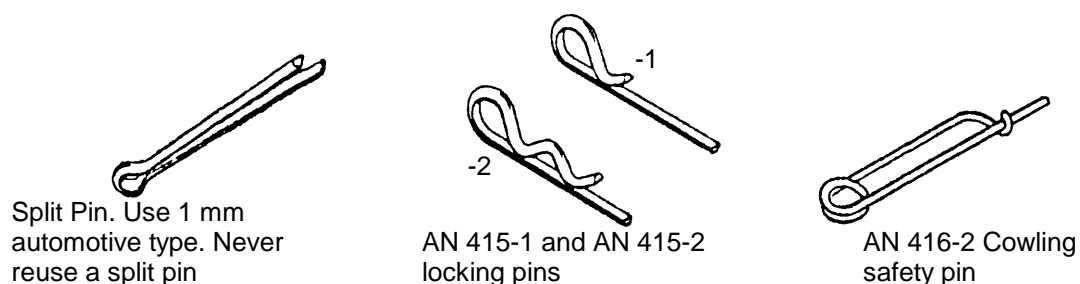


FIGURE 3. ACCEPTABLE LOCKING PINS

It is recommended that each safety pin be tied to part of the fitting by thin nylon chord or similar to avoid loss.

Each safety pin installation must be checked for clearance from the surrounding structure and control systems through the full travel of each control system.

Before 31 July, 1998 all cam style l'Hotellier couplings which do not have a hole for the safety pin must be modified by drilling a hole as shown in Figure 4 using the following procedures:

- a) Remove the connector from the aircraft.
- b) Fit a coupling ball so that the coupling is in the connected state.
- c) Drill a 1.3 mm \varnothing hole as show in Figure 4. Clean the coupling and ensure no swarf remains.
- d) Reinstall the couplings. Ensure that the lock nuts are secured.
- e) Check the control surface deflections and freeplays of all control circuits which have been disturbed.

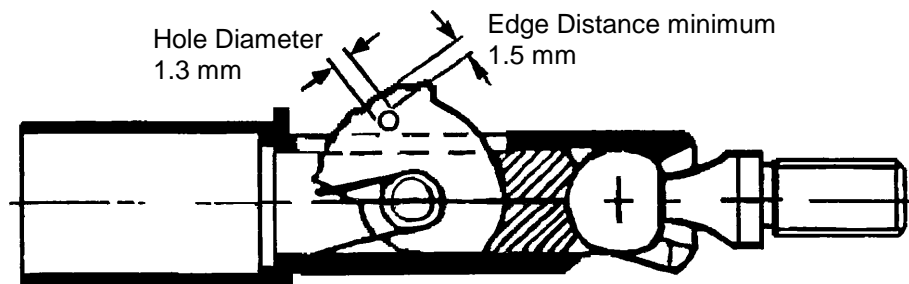


FIGURE 4. DRILLING THE LOCKING HOLE

Once the holes have been drilled safety pins as per Figure 3 or lock wire must be fitted. When fitting the pins for the first time clearance around the fitting must be checked as some designs do not permit the installation of the safety pins due to fouling with the adjacent structure and in these instances locking wire must be used.

3. Lubrication

Couplings must be lubricated at:

- (a) 50 hour or 6 month intervals (whichever comes first);
- (b) during each rigging and;
- (c) during annual inspections.

Where (a), (b) or (c) are impractical due the aircraft's construction, alternative arrangements may be approved by the CTO/A on written application by the certificate holder.

A high quality grease may be used for flight in non freezing conditions. Flight in sub-zero temperatures (e.g. wave-flying) requires the use of low temperature aviation greases such as Mobilgrease 28 or one of the Aeroshell greases.

4. Ball wear

All balls must be checked for wear, as per Figure 5, at 500 hour intervals and during Annual Inspections, whichever comes first. The maximum out of round $A - B$ or $B - A$ is 0.1 mm

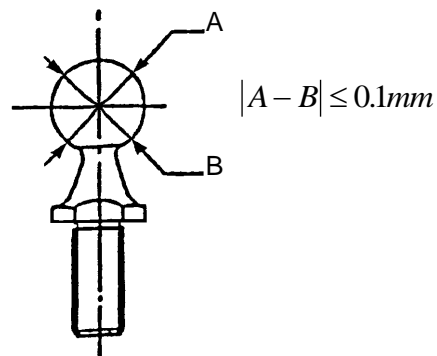


FIGURE 5. BALL WEAR MEASUREMENTS

It is recommended that the fit of the ball in the fitting be checked by unbolting the ball from the control system and installing it in the coupling and attempting to rotate it. Any variation in the torque needed to rotate the ball is an indication of wear and ball replacement should be considered.

5. Fitting clearances and wear

At each annual inspection the projection of the locking plate must be checked as per Figure 6. This measurement is an indication of the combined wear of the ball and coupling. If replacing the ball does not bring the extension back into tolerance then the coupling is excessively worn and must be replaced.

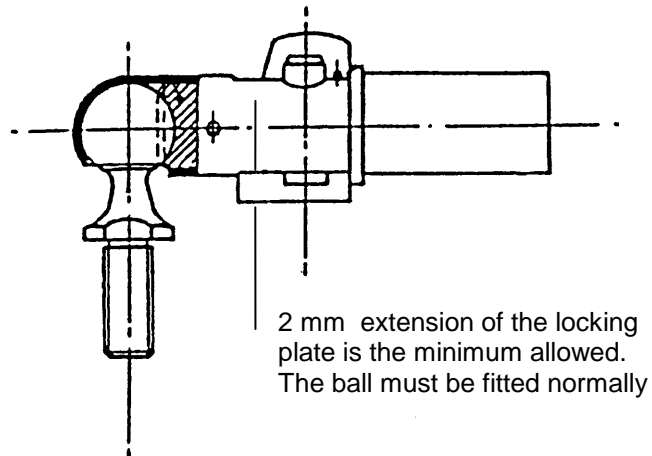


FIGURE 6. LOCKING PLATE EXTENSION

Some glider types are fitted with alloy fittings. These must be checked at each Form 2 for socket wear and when replaced, replaced with a steel assembly.

6. BALL REPLACEMENT

- 6.1 Balls with threaded shanks 6 mm diameter or less, fitted into divebrake or flap control systems must be replaced at intervals not exceeding 1000 hours flight time. Note that some types require more frequent replacement and the Flight Manual or a specific AD for the type should be checked.
- 6.2 All other balls must be replaced at intervals not exceeding 3000 hours.
- 6.3 Balls removed previously under AD 177 are not to be reinstalled.
- 6.4 Balls removed must be damaged to prevent further use.

7. BALL INSTALLATION

Daily and Form 2 Inspectors must look for looseness of balls, ie. loose nuts, broken tab washers, worn threads etc. Any of these defects will allow them to wind out or loosen. Any looseness can cause bending failure and cracking of the shank at the underside of the flange .

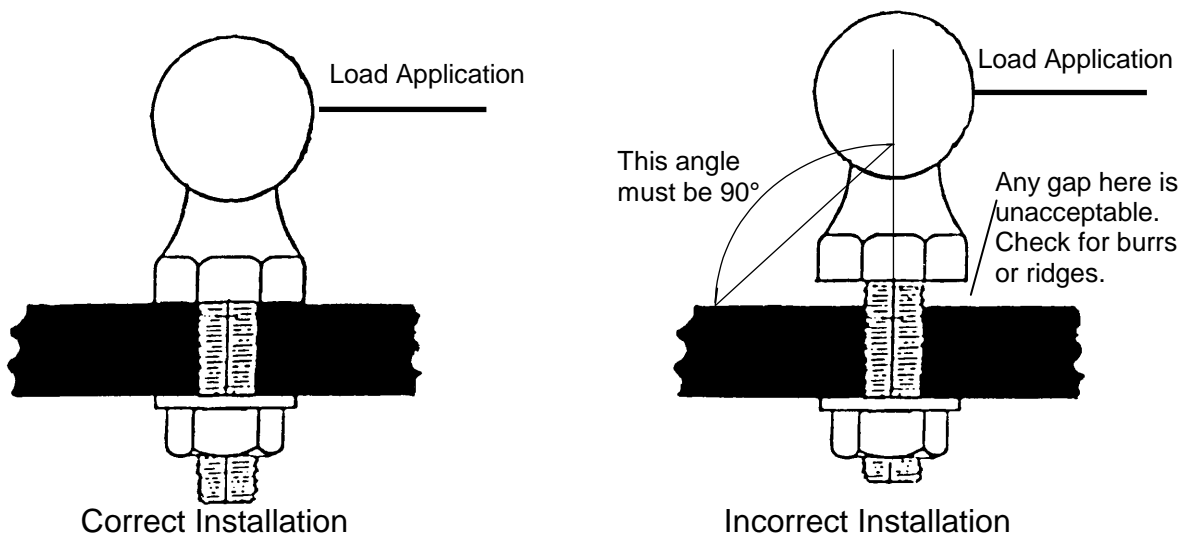


FIGURE 7. BALL INSTALLATION

Since the last issue of this AD l'Hotellier have redesigned some of the balls to remove the undercut thread and introduce a small length of shank. The original design is shown in Figure 8. Balls with redesigned threads are identified as 961S-150-150.L3 according to Figure 9.

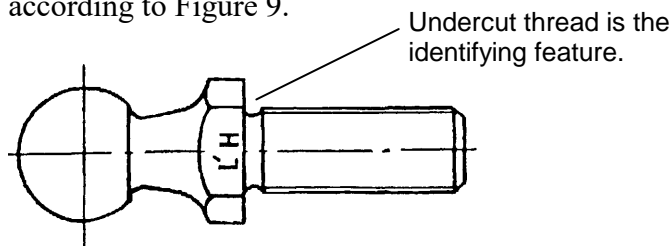


FIGURE 8. ORIGINAL BALL

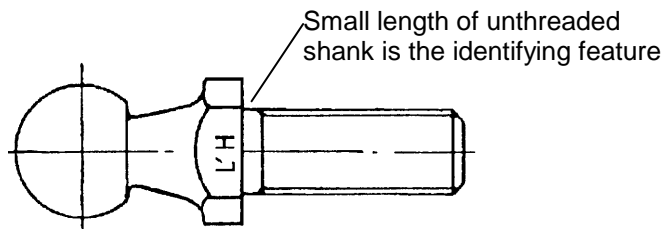


FIGURE 9. REPLACEMENT 961S-150-150.L3 BALL

Because of the redesigned thread the mounting brackets must be modified to accept the new thread. Where the ball is mounted at

90° as shown in Figure 10 and there is a nut on the ball then the plate may be drilled out to accept the 961S ball.

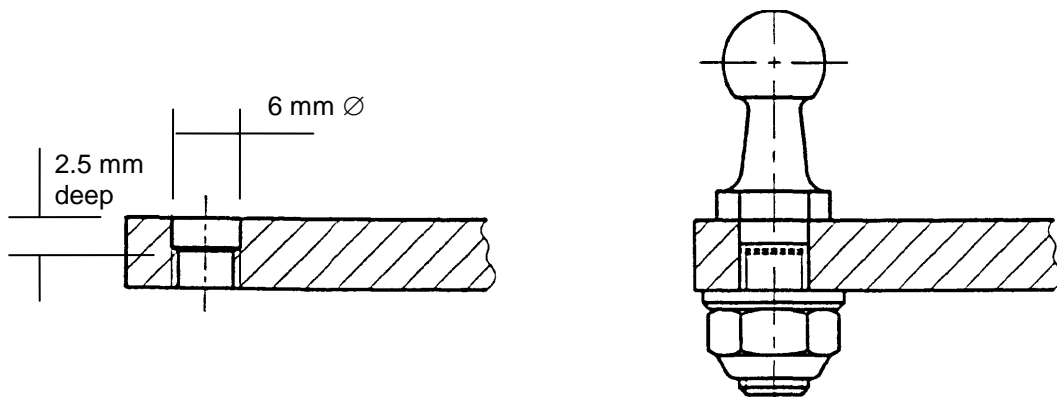


FIGURE 10 MODIFIED MOUNTING FOR 961S-150-150.L3 BALL

The ball may be installed in end fittings by installing 2.5 mm of washers under the ball flange. Because this changes the geometry of the control system the control deflections or dive brake locking forces must be checked and adjusted to bring them back into tolerance.

The installation of 961S-150-150.L3 balls in any other designs requires formal design approval.

8. SPRING CHECKING

At each Form 2 clean the coupling and measure the force required to initially move the sliding latch (pre-load) and the maximum force just before the latch reaches its natural stop.

The pre-load should be approximately 600 g and the force when the latch is fully out is approximately 1000 g.

Faulty latches have been measured with zero pre-load and a maximum load of 300 g.

9. MAINTENANCE RELEASE

Part one of affected Maintenance Releases must be endorsed with:

Total Time in Service (TTIS) and date lubrication is due under Action 3.

TTIS the wear inspection is due under Action 4.

TTIS for ball replacement under Action 6.

- IMPLEMENTATION:
1. Fitting safety pins and lubrication of the coupling may be performed by Daily Inspectors.
 2. Replacing balls and inspecting for ball wear, fitting wear and spring deterioration must be done by persons rated for Annual Inspections, any type.

WEIGHT AND BALANCE: No effect.

COMPLIANCE: The requirements of this GFA Airworthiness Directive are mandatory. This Directive is issued pursuant to the Rules and Regulations of the Gliding Federation of Australia.