THE GLIDING FEDERATION OF AUSTRALIA

GFA AD 277
(ISSUE 8)

GFA AIRWORTHINESS DIRECTIVE

CANCELLED 5.01.2017
REFER MOSP3/BSE SECTION 16

APPLICIBILITY: All Sailplanes fitted with Tost releases.

SUBJECT: Inspection and Maintenance of Tost releases.

BACKGROUND: The GFA received approval from the Tost release manufacturers to carry out maintenance on their releases in conformance to this AD, thus meeting their requirements without having to send the releases to Germany.

Technical Notice No TM 1-2001, removed the four-yearly requirement to overhaul their releases, and based the overhaul requirement solely on the number of actuations of the release.

The release spring must be replaced after 2,000 flights so as to fully implement TM 1-2001. The over-centre test (Test 1) must also be carried after 2000 flights.

DOCUMENTATION: Appendix A, Tost release testing procedures.

Appendix B, Tips on re-assembling Tost releases.

Appendix C, Tost Release Testing and Adjustments Results Sheet

Tost Technical Notice No TM 1-2001.

SIGNED: GFA CTOA CHIEF TECHNICAL OFFICER AIRWORTHINESS	For and on behalf of: THE GLIDING FEDERATION OF AUSTRALIA

ACTION REQUIRED:

Action 1 At each Annual Inspection if more than 200 launches have been completed since Action 1 was last performed the following servicing must be completed:

a) Clean and Lubricate.

b) Check the beak for wear.

c) Perform Test 2 and Test 3 to determine that the main spring is in good condition. (See Appendix A for test procedure.)

If a new main spring is installed, it must be the correct Tost part, and such installation removes the need for Tests 2 and 3

d) If a back release mechanism is fitted perform Test 4.

CLARIFICATION: If the sailplane is due for an annual inspection and it has completed less than 200 launches since Action 1 was last completed then a visual inspection of the releases is all that is required.

If the sailplane is due for an annual inspection and it has completed more than 200 launches since the releases were last serviced in accordance with Action 1 then the releases must again be serviced in accordance with Action 1.

If the sailplane is not due for an annual inspection but has completed 200 launches then the releases may continue in service with no action until the next annual inspection.

Recommendation: At any stage, if there has been a reason to replace the main spring with a new Tost part, then consider including over-centre testing in accordance with Test 1 so that Action 2 is accomplished, thus maximising the benefit from the effort made.

Action 2 Every 2000 launches each release must be serviced in accordance with Action 1. In addition the main spring must be replaced with a new Tost release spring as appropriate to the model of the release. **Over centre testing in accordance with Test 1 must also be carried out**.

Action 3 Releases with paper work to show that the release was manufactured after 1993 and which are unused (except for test flying) may enter service without testing. All other releases entering Australia must be tested in accordance with Action 2 before being placed into service.

LOG BOOK ENTIRES: When certifying compliance with this AD the log book entry must:

- state which Actions have been performed,
- record if the main spring has been replaced, and
- specify the number of launches at which Action 2 is next due.

WEIGHT AND BALANCE: Not affected.

IMPLEMENTATION: Testing and servicing of releases may be certified by persons rated as Annual Inspectors any type.

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.

APPENDIX A
TOST RELEASE TESTING PROCEDURES

GENERAL: The following procedures are derived from both Tost specifications and local research therefore if direct comparison is made to Tost publications it is possible variations may exist.

TEST RINGS: Test Rings must be dimensionally the same as genuine Tost Rings.

TEST PREPARATION: The release must be cleaned and lubricated prior to testing.

RELEASE OPERATING CIRCUIT:

The release operation circuit must be disconnected from the release. For maintenance requirements of release circuits see Basic Sailplane Engineering.

NOMENCLATURE: Throughout this document the following nomenclature will be used.

X axis	Direction of flight
Y axis	Spanwise direction
Z axis	90° to the direction of flight (up)
P	Actuating Force on lever (kgf)
P_R	Spring return force (kgf)
Q	Load applied to beak (kgf)
l	Lever arm (Standard arm has 68 mm lever distance but varies from 35 to 120 mm on different sailplane types).

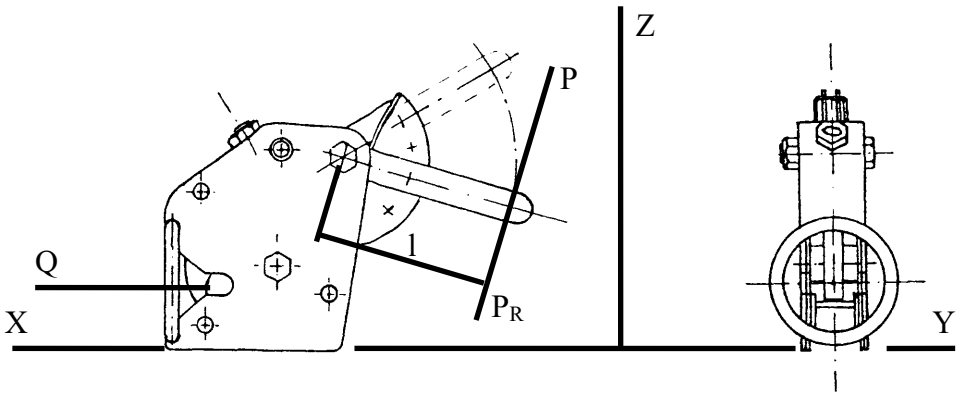


FIGURE 1 TYPICAL AEROTOW RELEASE

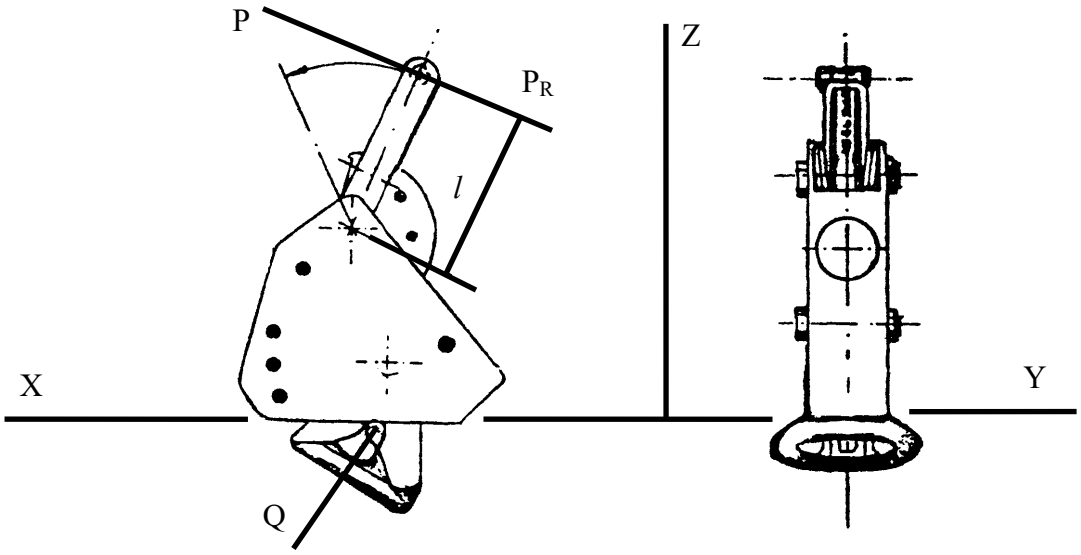


FIGURE 2 TYPICAL WINCH RELEASE

TEST 1 OVERCENTRE TESTING

1. After cleaning and lubricating as per Action 1 reassemble the release without the main spring.

2. Check that the mechanism has some over-centre otherwise the release may open when the load is applied. To test, pull on the beak with the fingers and move the lever arm. The lever should move about 5 mm before the release can be opened by the beak.

3. Install the release in the tester and apply a load Q of 200 kgf to the beak.

4. Measure the force necessary to open the release using a spring balance at 90° & attached by cord to the actuating lever.

5. If necessary correct the force to the standard 68 mm lever using chart 2 and plot the result on chart 1.

6. Repeat steps 3, 4 and 5 using a Q of 300 and 400 kgf.

7. Draw a straight line of best fit through the three points and interpret the results. If the results are not close to a straight line the release should be carefully inspected for other faults. If necessary adjust the release and repeat the test until acceptable results are achieved.

8. Reinstall the mainspring (see Appendix B) ensuring that the release spring is correctly orientated; refer diagram on page 6.

INTERPRETATION OF RESULTS:

If the release opens automatically when the load Q is applied the release is not over-centre.

If there is no increase in P as the load Q is increased then the mechanism is on centre-line and has 'hair trigger' behaviour. The release is then entirely dependant on the main spring for closure and is vulnerable to other factors such as wear and vibration causing it to release.

If the load P increases but is still below the minimum line on Chart 1 then the release is over-centre but not enough to allow for possible future wear.

If the load P is above the maximum line on Chart 1 then there is too much over-centre and the pilot may not be able to operate the release in an emergency.

Note: If the beak has a groove the load P will be high and if the tip of the beak is worn it will give a low load.

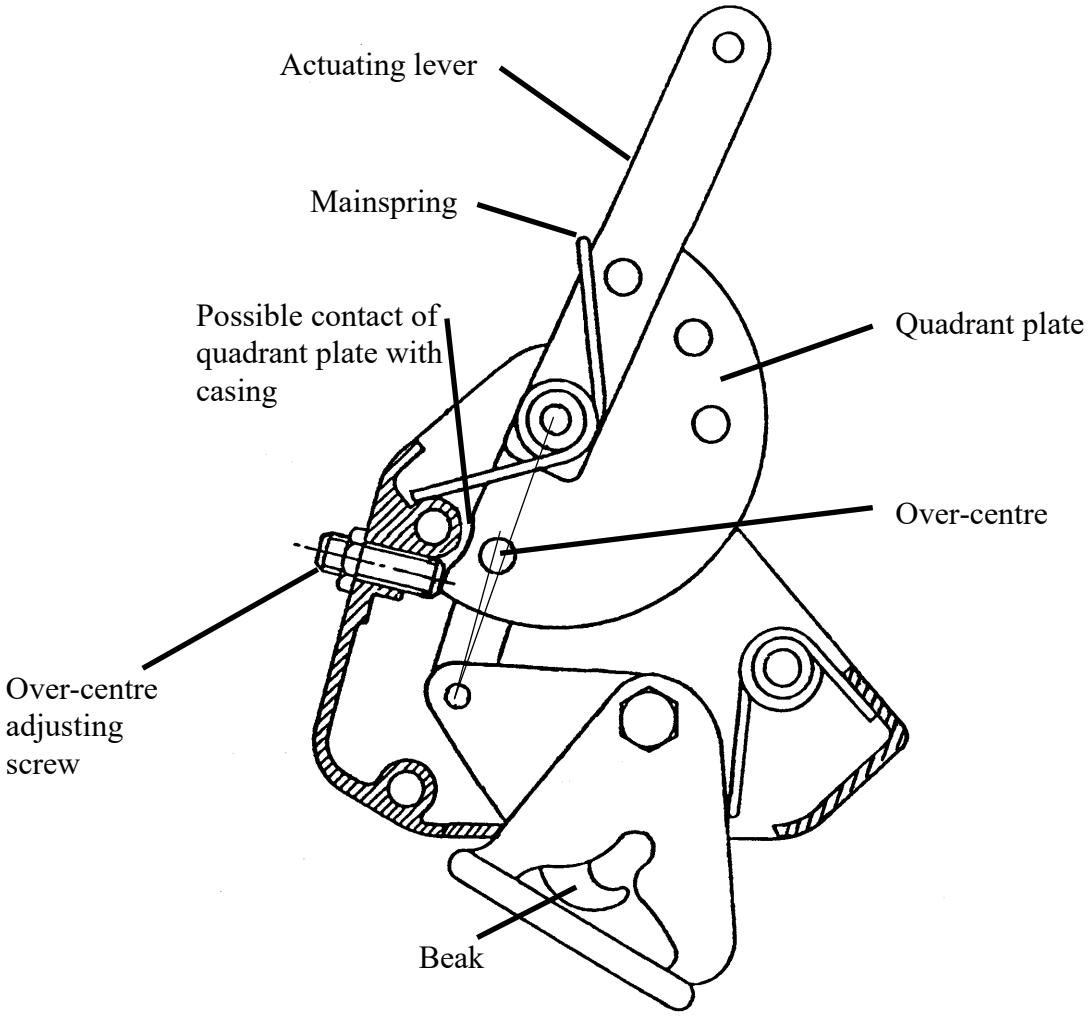


FIGURE 3 RELEASE COMPONENTS

ADJUSTING THE OVERCENTRE

On releases with adjusting screws the first step is to check that the quadrant plate is contacting the screw. There have been cases where the quadrant contacts the case. If necessary the quadrant should be relieved until only the over-centre screw limits the quadrant plate closure movement.

To increase the over-centre, wind the screw out.

To reduce the over-centre, wind the screw in.

Be sure to tighten the lock nut before retesting otherwise the screw may turn during the testing. Once testing is complete punch lock the screw to prevent it moving in service.

On releases without adjusting screws it is necessary to build up the quadrant plate with weld to reduce the over-centre and then file the weld back in steps to progressively increase the over-centre. Only a small amount of adjusting should be done at a time to prevent having to re-weld the quadrant plate.

TEST 2 MAIN SPRING TEST

Attach a spring balance via a chord to the actuating arm at the normal release actuating mechanism attachment point and measure the force P at right angles to the actuating arm to:

a) Just make the arm move. Allowable P is 3 ± 1 kgf.

b) Make the arm move until it is just before maximum travel. Allowable P is 6 ± 1.5 kgf.

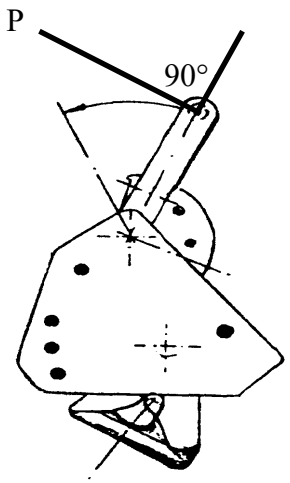


FIGURE 4 TEST SETUP

A force below the allowable may indicate a weak or broken spring or that the spring is installed incorrectly.

A force above the allowable indicates a non standard spring which is too strong has been fitted or there is excessive friction in the release.

TEST 3 PULL BACK TEST

This test is to determine that the main spring is strong enough to return the actuating mechanism to the normal position.

Apply the spring balance as in Test 2. Fully rotate the lever through its arc and then gently relax and allow the arm to pull the spring balance until the release in closed.

The load just before the release is fully closed shall be 3 ± 1 kgf.

TEST 4 BACK RELEASE

A load Q should be applied at an angle of 83 ± 7° using a spring balance and the load should be increased until the back release mechanism operates. The load at which release happens should be 20 ± 4 kgf.

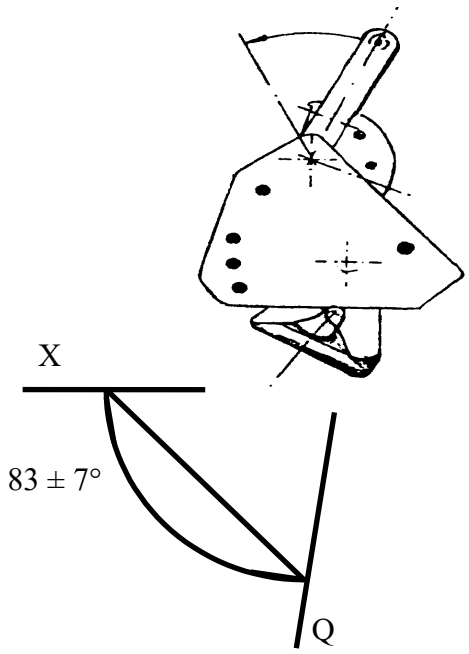
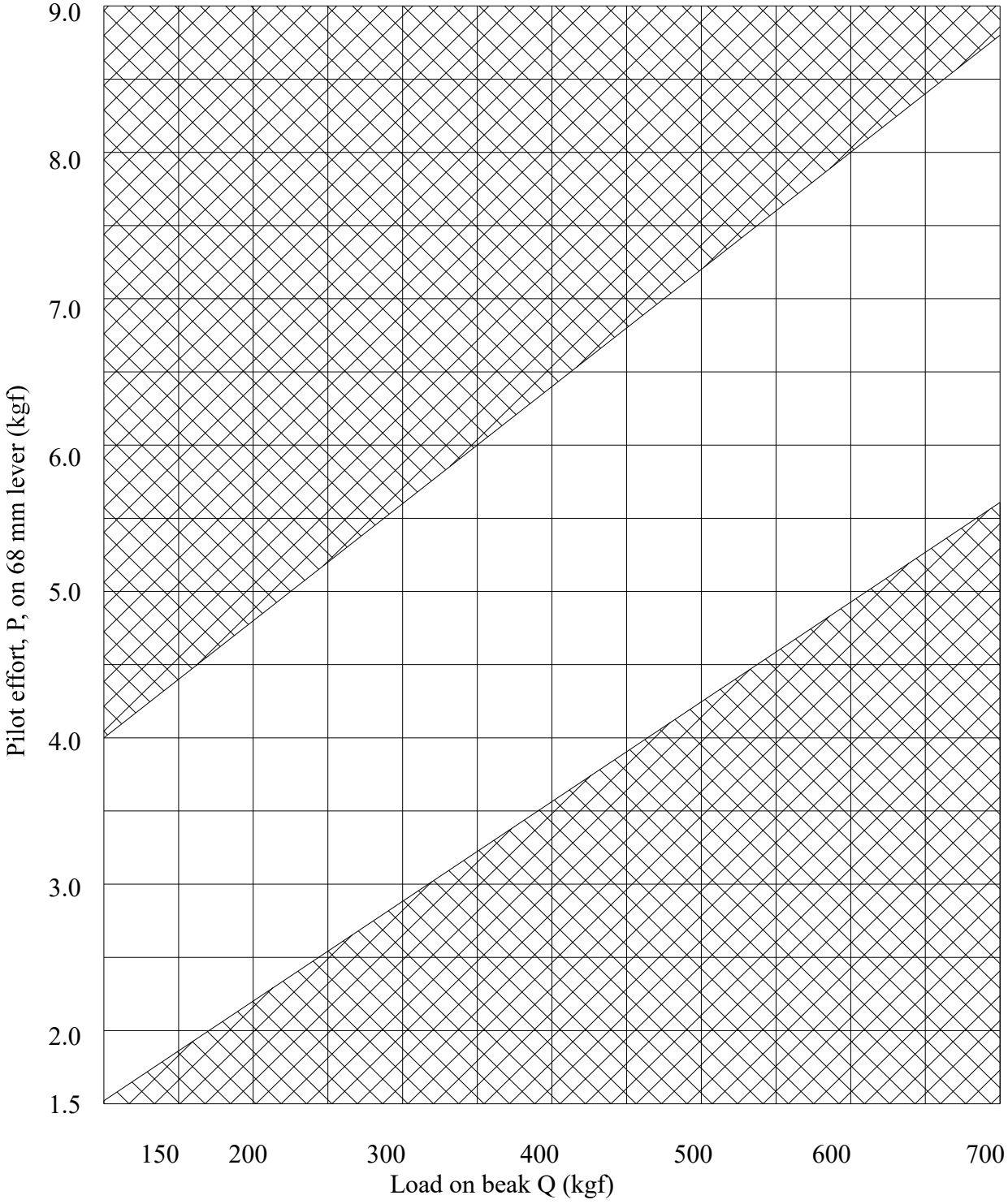


FIGURE 5 THE BACK RELEASE TEST

Low release load indicates a deteriorated back release spring.

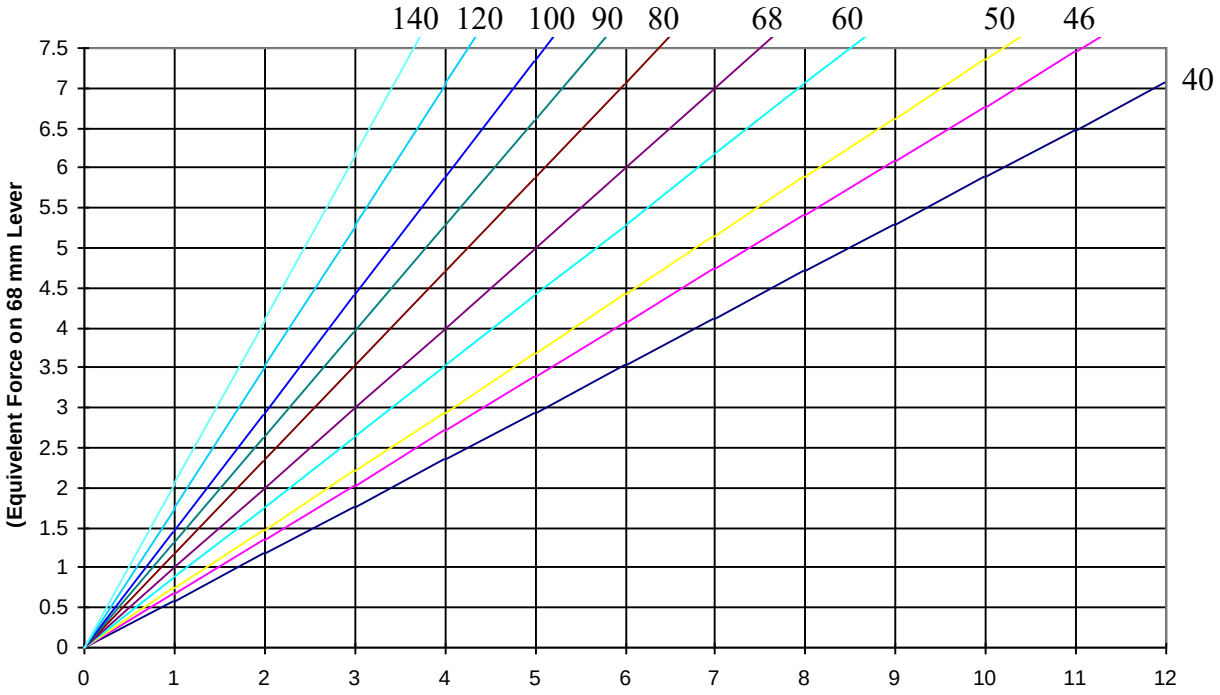
High loads may mean high friction or the beak may be worn or burred.

CHART 1



Provided the line stays within the unshaded area the release over-centre is acceptable

CHART 2



EXAMPLE: A 3.3 kgf spring balance reading on a 140 mm lever is equivalent to 6.8 kg on a standard 68 mm lever.

FORMULA: More precise calculations may be performed using the following formula:

$$Equivalent\_force = measured\_force \times \frac{measured\_length}{68}$$

APPENDIX B
TIPS ON REASSEMBLING TOST RELEASES

GENERAL:

Reassembling Tost releases requires a few tools such as spanners, screwdrivers etc plus a vice with soft jaws (aluminium pieces between the vice jaws and the release to protect the casing) to securely hold the body of the release. A small amount of wire is also useful to make loops to hold the spring ends.

SPRING:

When installed correctly, actuating the mechanism tightens the main release spring. It is possible to get it wrong and so take care. The correct orientation is depicted in the diagram on page 6.

INSTALLING THE SPRING:

There are a number of different techniques for installing the spring. Most people use a length of wire with a loop at each end which is looped around the ends of the spring and pulled with a pair of pliers to bring the ends of the spring up over the ledge in the casing.

Another method involves using two chisel end screwdrivers wedged under the spring ends from each side of the release and then levering the spring ends over the ledge in the casing.

In all cases the release should be mounted in the vice in such a way that you can push on the quadrant plate with your thumb while levering the spring ends so that as soon as the ends are above the ledge in the casing the quadrant plate can be pushed into position. A helper for this task can also make it much easier.

A Philip's head screwdriver or tapered pin punch should be handy to push through the bolt hole as soon as the spring is in place.

Many inspectors who do a lot of inspections make up specialised tools to make the reassembling of the release very easy.

Australian Gliding magazine published details of such specialised tools in September-October 1998.

ANNEX C: TOST RELEASE TESTING AND ADJUSTMENTRESULTS

Release Type: _____ S/N: _____ Aircraft: VH-_____ Position: Nose ☐

Belly ☐

Release Testing Tool employed for test:

GFA 450 Tester, S/No._____ ☐ GFA Hydraulic Tester _____ ☐

Deadweight Tester ☐ Other _____ ☐

Spring balance for actuating load measurement: _____

Actuating Loads Measured at Arm Length:

Either (a) Standard Arm = 68 mm ☐ **Use chart 1 directly**

OR (b) Actual arm length = ____mm ☐ **Use conversion chart 2 then chart 1**

Leads to: Force at std arm = Measured force x (Arm ____ mm/ 68 mm)

= Measured force x _____

Notes before test: _____

SIGNED: GFA CTOA
CHIEF TECHNICAL OFFICER AIRWORTHINESS

For and on behalf of:
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TEST 1: Over-centre Test Actuating Loads Measured at arm length as above

Applied Load kgf	Allowable Force kgf Chart 1 Arm = 68mm		Measured Prior To Adjustment kgf	First Adjustment kgf	Second Adjustment kgf	Third Adjust't kgf
200 kgf	2.2 to 4.8	Meas.				
		Conv.				
300 kgf	2.9 to 5.6	Meas.				
		Conv.				
400 kgf	3.6 to 6.4	Meas.				
		Conv.				

Meas. = Measured

Conv. = Conversion to equivalent force at standard arm (where necessary)

Project results to loads above 400 kgf: Satisfactory ☐ Unsatisfactory ☐

RESULT: Satisfactory without adjustment ☐ Satisfactory after adjustment ☐

Unsatisfactory after adjustment ☐

		Measured	**Allowable**		**Acceptable**	
Test 2: Spring check on actuation						
Force at start of motion	_____ kgf	2 to 4 kgf	Yes	☐	No	☐
Force at end of motion	_____ kgf	4.5 to 7.5 kgf	Yes	☐	No	☐
Test 3: Spring check on retraction						
Force	_____ kgf	2 to 4 kgf	Yes	☐	No	☐

Test 4: Back release spring (Belly release only)

Force _____ kgf 16 to 24 kgf Yes ☐ No ☐

New Tost main spring installed? Yes ☐ No ☐

Notes following test: _____

DATE OF TEST: _____ SIGNATURE _____ G _____