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FLIGHT MANUAL

BRISTELL LSA

SUPPLEMENT

GLIDER TOWING





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SUPPLEMENT

GLIDER TOWING

Serial number: **718/2024**

Registration mark: **ZK-TOW**

The aeroplane must be operated in accordance with the information and limitations in the Flight Manual and this Supplement.

This Supplement must be carried on board the aeroplane at all times.

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0-1

0.1 *List of revisions and changes*

Any revisions or changes to this Supplement shall be issued in the form of bulletins, which will have new pages as an attachment.

It is in the user's interest to replace the existing page with a new page and record this change in the following table.

New or changed text on corrected pages will be indicated by a black vertical line on the margin of the page and the change number and date will be indicated on the lower left margin of the page.

| Rev. No. | Affected Section | Affected pages | Date of issue | Approved by | Date of approval | Date of insertion | Signature |
|----------|------------------|----------------|---------------|-------------|------------------|-------------------|--|
| - | all, new issue | all, new issue | 07/2024 | I. Gabáni | 07/2024 | 07/2024 |   |
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SECTION 1

1. GENERAL

1.1 *Introduction*

1.3 *Technical description*

1.3.1 Aircraft description

1.3.2 Power plant

1.3.5 Approved gliders

1.1 Introduction

This supplement to the flight manual provides important information necessary for the safe and efficient operation of the BRISTELL LSA equipped with the glider towing device.

The aeroplane must be operated in accordance with the information in the Flight Manual and this Supplement.

NOTE

For ease of identification of paragraphs and pages in the flight manual that are affected by this Supplement, the paragraph numbering corresponds to the numbering in the Flight Manual.

All glider towing operations in New Zealand shall be carried out in accordance with this Flight Manual Supplement **and** in accordance with the:

Gliding New Zealand Incorporated

Advisory Circular № AC 2-09

Manual of Glider Tow Pilot Training and Towing procedures.

1.3 Technical description

1.3.1 Aircraft description

The BRISTELL LSA, as modified for towing gliders, is equipped with the following equipment in accordance with Annex III of the Airworthiness Requirements for Ultralight Aircraft UL 2 - Part I and ELSA-A (ASTM F2245 Appendix 1):

- Towing gear (hook) under tail surfaces
- Yellow tow hook release lever inside the cockpit

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- Rear view mirror for monitoring the glider's position
- Additional electric fuel pump
- Oil temperature and engine cooling indication
- Labels indicating the function of the towing gear and its limits
- Towing rope - textile (load capacity greater than 1000 kg), 40 to 60 m long, fitted with a weak link with a maximum load capacity of 300 kg, inserted between the towing hook and the textile rope (at the tow aeroplane hook side)
- This Flight Manual Supplement
- The relevant type certificate/supplemental type certificate approving the aeroplane for towing

1.3.2 Power plant

Engine:

- Rotax 915 iS

Propeller:

- 3-blade Inconel Hydraulic FLASHBLACK-3-R

1.3.5 Approved gliders

ZK-TOW is approved to tow any glider that does not exceed 800 kg MTOW.

SECTION 2

2. OPERATING LIMITATIONS

2.2 *Airspeed limits*

2.6 *Weight limits*

2.11 *Crew*

2.13 *Other limitations*

2.2 *Airspeed limits*

| | | |
|------------------------------|----|-------|
| Minimum aero tow speed | 57 | knots |
| Maximum aero tow speed | 86 | knots |
| Best rate of climb..... | 65 | knots |

CAUTION

The maximum permissible speed for towing during overflights must not exceed the permissible speed for the towed glider and also the design manoeuvring speed of the towing aeroplane $V_A = 96$ knots IAS.

CAUTION

Before each towing operation, an agreement on the towing speed must be made between the tow pilot and the glider pilot.

2.6 *Weight limits*

ROTAX 915 iS:

| | | |
|---|-----|----|
| Maximum take-off weight of the towing aeroplane | 600 | kg |
| Max. take-off weight of towed glider | 800 | kg |

2.11 *Crew*

CAUTION

The pilot-in-command of the towing aircraft must hold an aero towing rating.

2.13 Other limitations

2.13.1 Aerotows performed by LSA aircraft

The following restrictions apply:

- Towing rope weak link strength: 300±30 kg
- Towing of more than one glider at a time is prohibited.
- Towing a glider with the wing on the ground (without a helper) is prohibited
- Minimum length of tow rope 40 m.

SECTION 3

3. EMERGENCY PROCEDURES

3.9 *Towing*

3.9.1 Unusual behaviour of a tow plane

3.9.2 Glider unable to disconnect tow rope

3.9.3 Unable to drop the rope on landing

3.17 Glider towing emergencies

3.9 Towing

3.9.1 Unusual behaviour of a tow plane

Whenever unusual behaviour and characteristics of the towed aircraft become apparent, and if necessary for safety, the pilot of the towed glider should be notified (by radio, wing rolling, etc.) to release the glider, or the glider should be released from the towing aircraft.

3.9.2 Glider unable to disconnect tow rope

In case of repeated unsuccessful release by the glider pilot, the pilot of towing aircraft shall release the glider. If possible perform this release above the aerodrome.

3.9.3 Unable to drop the rope on landing

Repeat attempts to drop the rope and if unable, then perform a repeat circuit with the rope, descending to land at a higher speed (65 knots) and make a landing with the rope on a runway with as few bumps as possible.

CAUTION

Landings with a tow rope may be made provided that the free end of the rope clears all obstacles, particularly aerodrome boundary fences. The end of the rope should be at least 30 feet above all natural and artificial obstacles, including persons and animals.

3.17 Glider towing emergencies

- 3.17.1 If, during the phase from the start of the take-off roll to the lift-off of the towing aircraft, the tow rope is intentionally or unintentionally disconnected from the glider or towing aircraft, procedures shall be implemented to prevent the glider from striking the towing aircraft. If the remaining length of the RWY/area is sufficient to abort the take-off, the pilot-in-command of the towing aircraft shall, after a sufficient time delay, gradually reduce speed and deviate slightly, if possible, from the original direction of take-off to an obstacle-free area. The glider pilot shall immediately initiate action to stop or land safely, as appropriate, using full extension of the air brakes followed by application of landing gear brakes, follow the towing aircraft and, if possible, turn from the original heading into clear area. In the event that a collision with the towing aircraft cannot otherwise be avoided, it shall turn off with the aid of a wing to the ground. If, after the tow rope has been released, the remaining length of RWY/area is insufficient for a safe gradual abort, the towing aircraft pilot-in-command shall continue the take-off and the glider shall land without risk of collision with the towing aircraft, using the procedures described above to avoid collision with obstacles at the end of the RWY/area (winch, vegetation behind the aerodrome, etc.).
- 3.17.2 If, in the phase from the start of the take-off roll to the lift-off of the towing aircraft from the ground, there is a loss of engine power the pilot of the towing aircraft shall smoothly turn into the clear area as soon as possible to create space for the glider. The glider pilot shall proceed in a manner similar to that specified in paragraph 3.17.1.
- 3.17.3 If the tow rope is disconnected after the tow plane has lifted off the ground, the tow plane pilot shall continue the take-off and the glider pilot should make a forced landing on the remaining portion of the aerodrome or field if possible.
- 3.17.4 If the loss of engine power or any other defect preventing continuation of flight occurs after the towing aircraft is airborne, the pilot of the towing aircraft shall immediately disconnect the tow rope and, taking into account the nature of the defect, make a forced landing. If possible and appropriate to the situation, he/she shall direct the aircraft towards the aerodrome before releasing the glider. The glider pilot shall handle the situation according to the altitude and area in which the glider was released.

- 3.17.5 Forced landing of a tow plane or glider with a rope is prohibited except in cases of extreme emergency. If the tow rope remains attached to the glider and the flight height is sufficient, the pilot of the glider shall fly over the aerodrome, drop the tow rope into an open part of the aerodrome and make a landing. If it is necessary to drop the tow rope outside the aerodrome, or before landing, the pilot of the glider shall select a position and height of flight such that persons and property on the ground are not endangered and the minimum height of the end of the tow rope above obstacles specified in paragraph 3.12 is maintained when flying with the tow rope hanging.
- 3.17.6 In case the glider pilot does not release the tow rope even after repeated signals, the pilot of the towing aircraft will fly the glider over the aerodrome and release the glider there. The glider pilot shall attempt to disengage the tow rope over the clear area of the aerodrome. If after repeated attempts to disengage the rope fails, the glider pilot shall land the glider with the hanging rope while maintaining a safe height of the free end of the rope above obstacles (including vegetation in front of the aerodrome). The hang-rope flight and the approach to landing up to a height of about 1.5 m above the ground should be made at a speed about 5 - 10 knots higher than the speed specified in the flight manual of the type of glider.
- 3.17.7 In the event of an emergency situation where after repeated attempts the tow rope cannot be disengaged either by the towing aircraft or the glider, the glider pilot shall attempt to break the tow rope by mechanical stress. In the extreme, a landing must be made with the glider in tow. The pilot in command of the towing aircraft shall make a gradual descent and approach for landing, taking into account the glider's ability to follow the flight path safely. The glider pilot shall keep a close watch on the towing aircraft and maintain line tension using the air brakes. The pilot in command of the towing aircraft must reduce the approach speed slowly after landing, using the power unit, to prevent the glider from approaching the aircraft. To this end, he/she shall land so that the usable length of the RWY is sufficient for the extended range. If the aerodrome in question is not suitable for dealing with such an emergency situation in terms of approach obstacles and RWY length, the pilot of the towing aircraft should select another suitable aerodrome, if available, for the landing. After landing, the glider pilot must apply the landing gear brakes and full airbrake deflections intensively to prevent the glider from approaching the towing aircraft and crossing the tow rope.
- 3.17.9 In the event that the pilot of a glider fails to prevent the tow rope from sagging significantly during horizontal or descending flight in tow, e.g. in

turbulence, even by applying the air brakes or by a slight yaw followed by a return to the original position after tensioning the tow rope, and if there is a risk of a dangerous approach or even overflight of the towing aircraft, he/she shall disengage the tow rope. He/she shall also disengage the tow rope if he/she is unable to safely maintain the glider's position behind the towing aircraft (e.g. when centering in a thermal). The glider pilot then proceeds according to the specific conditions, either by using the thermal or by making an emergency landing at the nearest aerodrome or at a suitable area in the field.

- 3.17.11 If the emergency situation permits, crews are required to use radio communication with each other and with the appropriate ATC or ATS unit to convey information about the emergency situation and their decisions and intentions to deal with it.

SECTION 4

4. NORMAL PROCEDURES

4.3 *Pre-flight Inspection*

4.4 Aircraft towing

4.4.1 Before start

4.4.2 Start

4.4.3 Climbing

4.4.4 Aero tow flight

4.4.5 Release

4.4.6 Descent and landing

4.3 *Pre-flight Inspection*

Checks:

In addition to the standard pre-flight inspection acc.to the flight manual:

- Check oil and coolant quantity and add if needed
- Exhaust system check for cracks and intactness
- Check of the tow hook and tow rope release test

4.4 Aircraft towing

4.4.1 Before start

CAUTION

The pilot of the towed aircraft shall familiarize himself with the limitations of the towed glider as specified in its flight manual and, if applicable, with the method of take-off of the towed glider. At all times from the time of departure for take-off until the glider is released, the pilot of towing aircraft is responsible for the safe conduct of the entire aero tow and for compliance with the flying rules, including the safety of glider pilot. The glider pilot is responsible for the safe operation of the glider in tow.

1. Before take-off, the towing aeroplane and glider must be lined up on the take-off path
2. The tow rope shall be hooked to the tow plane
3. The tow rope shall be attached to the glider on the instruction of its pilot
4. Tension the tow rope on the signalman's instruction
5. Before take-off procedures shall be done, including checking that the auxiliary fuel pump is switched on and visually checking the glider for readiness for take-off by looking in the rear-view mirror

4.4.2 Start

1. Slowly add throttle (smooth start)
2. During take-off, the helper must hold the glider wing in a position suitable for the initial take-off as instructed by the glider pilot.
3. The helper shall accompany the glider during the initial take-off. Take-off with the glider wing on the ground is forbidden.
4. During the take-off briefly check the glider and rope tension by looking in the mirror.
5. After lift-off, set nose attitude to achieve a safe climb speed of at least 57 knots.
6. Make transition to normal climb towing speed.

4.4.3 Climbing

1. Stabilise climb speed to 65-70 KIAS (for best climb) or as appropriate for the glider
2. Climb straight without sudden changes of regime or sharp turns (30° recommended), check the glider by looking in the mirror
3. Climb to desired altitude

CAUTION

The pilot of a towing aircraft with a glider in tow may enter a thermal in which another glider(s) is circling, but in the same direction of circling. He/she may only fly above a circling glider if the altitude separation is greater than 1000 ft in the same direction of circling. The pilot of the towing aircraft must keep a constant watch on the surrounding gliders. If a dangerous approach to other gliders occurs, he/she must leave the thermal immediately. Under no circumstances shall the towing pilot, to steady the towed glider, create a hazardous situation for other gliders. This does not, however, relieve the pilots of other gliders of the obligation to observe other aircraft and to leave the thermal if a dangerous situation arises.

4.4.4 Aero tow flight

CAUTION

The pilot of the towing aircraft must perform all manoeuvres during flight (manipulation of engine throttle, changes of direction or altitude) smoothly so that the glider pilot can react to them in time and safely. The tow shall be performed to the area and altitude specified by the glider pilot or, in the case of a student pilot, by his instructor.

1. Observe the speed limit of the towed glider
2. Fly without abrupt changes of attitude or steep turns
3. Take into account meteorological conditions and especially turbulence
4. Flights with glider in tow must be conducted at a minimum altitude of 1000 ft above the ground unless otherwise specified by ATC.
5. When transitioning into a descent, reduce engine power very slowly while taking the aircraft into a gentle descent at a constant airspeed. Descending flight with the glider in tow must be performed at a constant airspeed.

4.4.5 Release

1. If the glider pilot does not release of his own accord, inform the glider pilot to release the tow rope (by wing rolling or radio)
2. Ensure that the glider has been released
3. After glider release execute a descending turn to the opposite side from the released glider

CAUTION

It is forbidden to land a glider in tow except in an emergency when the tow rope of the tow plane or glider cannot be released.

4.4.6 Descent and landing

CAUTION

The pilot shall observe surrounding traffic (including parachutists) during the descent to avoid dangerous convergence with other traffic and shall not cross vertically or horizontally the route of the operating aerodrome circuit at its height.

1. During descending flight observe all limitations of the aeroplane according to the flight manual
2. Adjust the descent of the aeroplane with the tow rope so that an altitude of 160 ft is reached at the expected tow rope drop point.
3. Make the rope drop approach in the direction of the RWY only, after relaying this intention to ATC or ATS (if provided) and in accordance with instructions or information issued.
4. Checking the clearance of the dropping area
5. Pull the release lever to drop the rope, ensuring that the rope has been dropped
6. Land in the usual manner

SECTION 5

5. PERFORMANCE

5.1 *Introduction*

5.2.3 Takeoff

5.2.5 Climbing / Glider towing

5.2.8 Demonstrated crosswind performance

5.1 Introduction

The Performance shown in the following graphs are determined under MSA conditions.

In real conditions they are subject to change depending on:

- Wet, high grass or soft airfields will extend the runway by up to 30% or may make take-off impossible in extreme cases.
- Higher air temperature and lower air pressure degrade performance both on take-off and climb.
- The performance depends on the total weight of the towed glider, and therefore the towing speed of the glider. Increasing these parameters deteriorates the performance.
- Surface contamination or rain has no significant effect on performance, but propeller contamination worsens it, up to a 10%. Glider surface contamination can be significant and negative in terms of towing performance.

5.2.3 Takeoff

Take-off distance over 50 ft obstacle depending on glider weight and altitude:

ROTAX 915 iS,

Propeller: 3 blade DUC Flashblack Constant Speed

| BRISTELL = 600 kg glider = 350 kg | Field Altitude [ft] | Outside air temperature [° C] | | | | |
|---|---------------------------|-------------------------------|----------|-----|---------|----------|
| | | ISA - 20 | ISA - 10 | ISA | ISA +10 | ISA + 20 |
| Ground Roll [m] | 0 | 82 | 89 | 97 | 105 | 114 |
| | 2000 | 96 | 105 | 115 | 126 | 139 |
| | 4000 | 114 | 127 | 140 | 155 | 173 |
| | 6000 | 139 | 156 | 176 | 199 | 226 |
| Distance to clear a 15-m obstacle [m] | 0 | 292 | 325 | 361 | 398 | 436 |
| | 2000 | 345 | 379 | 415 | 454 | 493 |
| | 4000 | 400 | 436 | 473 | 514 | 558 |
| | 6000 | 459 | 497 | 539 | 586 | 637 |

| BRISTELL = 600 kg glider = 550 kg | Field Altitude [ft] | Outside air temperature [° C] | | | | |
|---|---------------------------|-------------------------------|----------|-----|---------|----------|
| | | ISA - 20 | ISA - 10 | ISA | ISA +10 | ISA + 20 |
| Ground Roll [m] | 0 | 146 | 159 | 173 | 188 | 204 |
| | 2000 | 172 | 188 | 205 | 225 | 247 |
| | 4000 | 204 | 226 | 249 | 277 | 309 |
| | 6000 | 249 | 278 | 313 | 354 | 404 |
| Distance to clear a 15-m obstacle [m] | 0 | 345 | 383 | 423 | 465 | 509 |
| | 2000 | 407 | 447 | 489 | 535 | 583 |
| | 4000 | 475 | 518 | 565 | 616 | 673 |
| | 6000 | 551 | 601 | 657 | 721 | 793 |

| BRISTELL = 600 kg glider = 750 kg | Field Altitude [ft] | Outside air temperature [° C] | | | | |
|---|---------------------------|-------------------------------|----------|-----|---------|----------|
| | | ISA - 20 | ISA - 10 | ISA | ISA +10 | ISA + 20 |
| Ground Roll [m] | 0 | 211 | 229 | 249 | 270 | 294 |
| | 2000 | 247 | 270 | 295 | 324 | 356 |
| | 4000 | 294 | 325 | 359 | 399 | 445 |
| | 6000 | 358 | 401 | 451 | 510 | 581 |
| Distance to clear a 15-m obstacle [m] | 0 | 398 | 440 | 485 | 532 | 581 |
| | 2000 | 469 | 515 | 563 | 616 | 673 |
| | 4000 | 549 | 601 | 657 | 719 | 788 |
| | 6000 | 644 | 706 | 776 | 856 | 948 |

| BRISTELL = 600 kg glider = 800 kg | Field Altitude [ft] | Outside air temperature [° C] | | | | |
|---|---------------------------|-------------------------------|----------|-----|---------|----------|
| | | ISA - 20 | ISA - 10 | ISA | ISA +10 | ISA + 20 |
| Ground Roll [m] | 0 | 227 | 246 | 268 | 291 | 316 |
| | 2000 | 266 | 291 | 317 | 349 | 383 |
| | 4000 | 316 | 350 | 386 | 429 | 478 |
| | 6000 | 385 | 431 | 485 | 549 | 626 |
| Distance to clear a 15-m obstacle [m] | 0 | 412 | 454 | 500 | 549 | 599 |
| | 2000 | 485 | 532 | 582 | 637 | 695 |
| | 4000 | 568 | 622 | 680 | 745 | 817 |
| | 6000 | 667 | 732 | 805 | 890 | 987 |

Increase of TO distance due to grass runway of 20% is taken for dry, short grass landing airfields

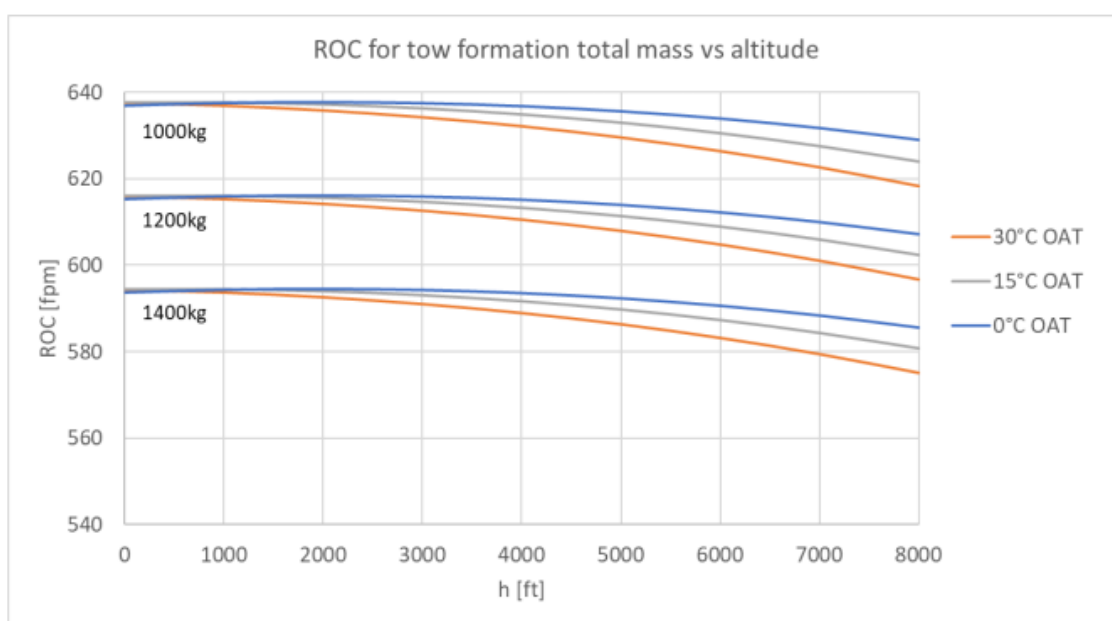
5.2.5 Climbing / Glider towing

Best rate of climb speed at towing.....65 KIAS

Rate of climb at tow flight depending on tug and glider weight combination, and altitude:

ROTAX 915 iS:

Propeller: 3 blade DUC Flashblack Constant Speed



5.2.8 Demonstrated crosswind performance

Max. permissible crosswind velocity

for aero tow take-off and landing10 knots

SECTION 6

6. WEIGHT AND BALANCE

(by the Supplement non-affected Section)

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SECTION 7

7. AIRPLANE AND SYSTEMS DESCRIPTION

7.13 *Miscellaneous equipment*

7.14 *Cockpit controls*

7.13 *Miscellaneous equipment*

BRISTELL LSA aircraft

Serial number: 718/2024

Registration mark: ZK-TOW

Is fitted with the following equipment to tow the gliders:

- Towing gear (hook) under tail surfaces



- Yellow tow hook release lever inside the cockpit
- Rear view mirror for monitoring the glider's position



- Oil temperature and engine cooling indication
- Labels indicating the function of the towing gear and its limits
- Towing rope - textile (load capacity greater than 1000 kg), 40 to 60 m long, fitted with a weak link with a maximum load capacity of 300 ± 30 kg, inserted between the towing hook and the textile rope (at the tow aeroplane hook side)
- This Flight Manual Supplement

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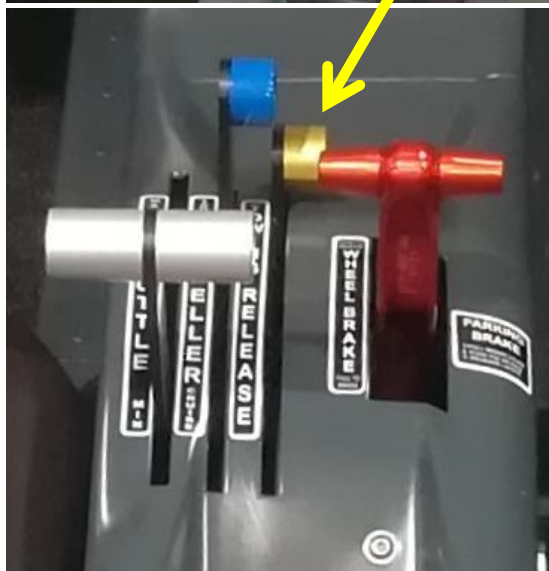
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7.14 Cockpit controls

If a tow device is fitted, the tow hook release lever is located in the cockpit on the centre quadrant between the seats (the lever has a yellow handle).



SECTION 8

8. AIRPLANE HANDLING, SERVICING AND MAINTENANCE

8.2 *Periodic inspections of the aeroplane*

8.2 *Periodic inspections of the aeroplane*

Aircraft used for towing must be maintained and inspected in the appropriate manner and to the extent prescribed by the engine manufacturer, and maintenance must be documented by entries in the aircraft operating documentation.

In addition to each regular 100 hour (annual) inspection:

- Detailed inspection of the towing mechanism, its installation in the fuselage, the condition of the release cable and its routing. Any fraying of the cable or sharp breaks are not allowed - must be replaced.
- Testing of the functionality of the hook locking and release system. The hook must be fully locked, the release cable slightly slack before the release lever.

SECTION 9

9. REQUIRED PLACARDS AND MARKINGS

9.1 *Limitation placards*

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9.1 *Limitation placards*

The aircraft equipped with a towing device shall be equipped with the following placards in the cockpit:

WARNING

All limitations of the airframe and engine must be kept !

Placards near the airspeed indicator

WARNING

Watch closely towing speed !

ROTAX 915 iS:

AEROTOW FLIGHT LIMITATIONS

| | | |
|--|--------|-----|
| MTOW of towing aeroplane | 600 | kg |
| MTOW of towed glider | 800 | kg |
| Crew of towing aeroplane | Max 2 | |
| Tow rope weak link strength | 300±30 | kg |
| Minimum towing speed (IAS) | 57 | kts |
| Max.tow.speed – as per glider, not more than | 86 | kts |
| Best rate-of-climb speed (IAS) | 65 | kts |