

Gliding Australia Training Manual

Pilot Guide



Unit 3 Pre-Flight Preparation

Unit 3 - Pre-Flight Preparation

WHAT THIS UNIT IS ABOUT

To

- Develop, obtain and interpret required pre-flight information; and
- perform the outside and cockpit pre take-off checks.
- apply standard checks reliably and thoroughly, by rote or by reference to a checklist, without undue delay.

A basic understanding of the parachute is also required if these are used.

WHAT ARE THE PRE-REQUISITES FOR THIS UNIT?

- Nil

COMPLEMENTARY UNITS

This unit should be read in conjunction with:

- Nil

KEY MESSAGES

- Become familiar with Pre-flight briefing material.
- A sterile environment is required when checks are conducted. If interrupted start again.
- Follow approved checklists and call all checks out loud.

PILOT GUIDE FOR THIS UNIT

Pre- Flight information

- Your trainer will indicate to you that it is vitally important to obtain the weather and aeronautical information before flying to determine which runway to use and ensure that the weather and other conditions are suitable for your type of operation.
- The weather and other information can be obtained through NAIPS which is a government aviation site providing up to date information for pilots. You will also be shown other sites such as “Windy” weather” and on the GFA site a weather prediction purely for gliders indicating how high and far you could possibly fly on that hday.
- You will be shown your local airfield layout, training areas, airspace boundaries, circuit directions and safe landing areas in case of launch failures.

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Aircraft documentation and Cockpit Safety

You will be shown in a parked glider the following information. You will be expected to access this information as you perform a pre-flight inspection of your glider.

Airworthiness Documentation

- All gliders are certified as airworthy with the issue of a Certificate of Airworthiness (C of A). There is a requirement to conduct an annual inspection by authorised people. When deemed airworthy from the inspection, a Maintenance Release is issued, which is carried in the cockpit of the glider (see below).

The Maintenance Release

- This document certifies that the glider is being maintained in accordance with GFA requirements. It also validates the C of A or Permit to fly of the glider. It is issued by a GFA- qualified inspector and is renewed on completion of the relevant inspection. If a Maintenance Release is present in the glider and is within its validity period, the glider is legal to fly. Check this before flight.

MAINTENANCE RELEASE PART 1		Aircraft Type	Registration Marks VH -
In accordance with the GFA Manual of Standard Procedures this Maintenance Release is issued following the completion of an inspection certified on the GFA Form 2 dated		/...../.....
Issued by: (Organisation)		Valid from First light on/...../.....
Signed by: (Person)	1109 G:	Valid until Last light on/...../.....
RETURN TO SERVICE – FLIGHT REPORT			
Before return to general service an experienced pilot must conduct a check flight and sign below that the flight characteristics are normal. Check for general handling, trim, abnormal buffeting within the flight envelope.			
LOW SPEED <input type="checkbox"/> Stalls, Spins, Trim Abnormal wing drop etc.		HIGH SPEED <input type="checkbox"/> Handling, Trim etc. Up to V _{NE}	
Pilot's signature:		Date:/...../.....	
MAINTENANCE			
This Maintenance Release is issued subject to the following conditions:			
1. A Daily Inspection as detailed in the GFA Manual of Standard Procedures shall be performed on the aircraft each day before flight <i>and following any re-rigging occurring at any time.</i>			
2. Maintenance required during the validity period of this Maintenance Release shall be performed.			

- Although it may be legal to fly, the glider is not necessarily airworthy to fly. For example, it may have suffered a heavy landing on its last flight the previous day and there may be damage present which, for some reason, the last pilot did not report and did not enter into the Major Defects section of the Maintenance Release.
- It is therefore a requirement for a glider to receive a Daily Inspection by a qualified person before it is allowed to fly on any given day.
- Each pilot flying the glider must check that the Daily Inspection has been carried out, before carrying out his own walk-round inspection prior to flight.

The Daily Inspection Record (GFA Form 1)

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- This is used to certify that a glider has received a Daily Inspection from a suitably qualified person. Check that the correct date appears alongside the Inspector's signature. If the correct date does not appear there, do not fly the glider - make some enquiries.
- The Maintenance Release and the Daily Inspection Record are contained in the same common booklet, which is kept in the glider at all times. It is a very important document and forms the link between the inspector who looks after the airworthiness of the glider and the pilot who flies it.

DAILY INSPECTION RECORD GFA FORM 1					
A signature and authorisation number on this form certifies, in accordance with the GFA Manual of Standard Procedures that at the start of a day's flying and after each rigging a Daily Inspection has been performed and the glider is considered fit for flight. INDEPENDENT CONTROL CHECK. Two consecutive independent signatures are required after controls have been disconnected and reconnected.					
Signature and Authorisation Number	Date and Time	Signature and Authorisation Number	Date and Time	Signature and Authorisation Number	Date and Time
1		8		15	
2		9		16	
3		10		17	
4		11		18	
5		12		19	
6		13		20	
7		14		21	

The daily inspection is carried out before the first flight of the day. On each subsequent flight, the pilot must carry out a pre-flight inspection/check. See Pre-Boarding checks on Page 3.f

Glider Limitation Placards

- A typical glider speed and manoeuvres limitations placard appears below: -

Rolladen Schneider LS4a <i>neo</i> Sn.4312 VH-HDI			
Limiting Speeds		Limiting Weights	
Max Smooth Air	VNE 151 kts	Min Solo Pilot	80 kg
Max Dive Brakes	Vd 146 kts	Max Solo Pilot	110 kg
Max Landing Gear	VLO 146 kts	Max Fuselage Load	123 kg
Max Rough Air	VRA 103 kts	Max Take off Dry	370 kg
Max Manoeuvring	VA 103 kts	Max Take off Wet <i>neo</i>	505 kg
Max Aerotow	VT 103 kts	Max Water Ballast	160 kg
Max Winch	Vw 76 kts	Max Weak Link	600 kg
Acrobatic Flying	Not Permitted	Airframe Empty Weight	260 kg

The permitted aerobatic manoeuvres will also be displayed, either on the same placard or on a separate one alongside. The maximum (and possibly the minimum) weak link strength will be displayed, internally on the placard and externally next to the release hook(s).

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Weight and Balance

As well as observing placarded speed and manoeuvre limitations, a glider also has to be operated within strict limitations of weight and balance. A pilot must be thoroughly familiar with these limitations on each glider he flies.

The following basic definitions are relevant: -

Empty weight - the glider's empty weight, equipped to fly, without pilot, parachute or removable ballast.

Gross weight - the maximum flying weight.

Maximum pilot weight - the heaviest pilot with parachute that can be accommodated without exceeding gross weight or moving the CG out of limits

Minimum pilot weight - the lightest pilot with parachute that can be accommodated without fitting removable ballast

Removable ballast - Lead or steel blocks or cushions which can be fitted and secured in order to bring a pilot up to the minimum pilot weight.

CG range - the range of movement of the centre of gravity, presented to the pilot in terms of a maximum and minimum pilot weight. In the case of two-seaters, a sliding scale is often used in order to take into account the varying weights in each cockpit.

A typical weight and balance placard is shown below:

Payload (Pilot & Parachute) - Twin Astir		
Maximum flying weight	650 kg	1435 lb
Minimum front cockpit for all flight	70 kg	154 lb
Maximum load front	110 kg	242 lb
Maximum load back	110 kg	242 lb

- The maximum permitted weight must not be exceeded. The maximum pilot weight is important too, because it is likely that if it is exceeded the glider will be flown outside its forward CG limit. This may make it impossible to trim the glider to minimum sink speed and could make it difficult to flare the glider on the landing. More seriously, it could also result in the maximum calculated flight loads on the tailplane being exceeded.
- The consequences of flying a glider outside the aft CG, that is with too light a pilot, are even more serious and could result in loss of control. The implications of flying a glider outside the aft CG limit are as follows.
 - It will be unstable in pitch and possibly uncontrollable.
 - It may be difficult or impossible to trim to a safe speed near the ground.
 - If a spin is deliberately or accidentally entered, it may be impossible to recover.

NEVER fly a glider below its minimum pilot weight. If your weight is marginal and you are not sure whether you are quite heavy enough, add some ballast.

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Daily Inspections – Purpose

- You are not expected to perform a daily inspection on a glider at this stage of your training. Daily Inspection is covered in Unit 42 - Daily Inspection, Pilot Maintenance Limits, DI certificate and requires you to be trained and authorised
- You will observe your instructor performing a daily inspection and you will progressively be invited to participate in some aspects.
- There are five reasons for carrying out a Daily Inspection:
 1. To check for progressive deterioration caused by fair wear and tear.
 2. To check for unserviceability's or sudden deterioration which fall outside the category of fair wear and tear.
 3. To check for unreported damage.
 4. To check that the glider is correctly rigged and the control circuits are properly connected and locked.
 5. To check that there are no tools or other loose objects lying around after maintenance.
- When carrying out a DI, it is sometimes difficult to work out how far to go, how deep an inspection to do. Using the above five points as a guide, the answer is to go deep enough to satisfy your curiosity as to whether the glider can safely fly, without going to the extent of starting to overhaul it.
- A DI is basically a visual inspection, using only those tools which are necessary to gain access to essential parts of the structure, such as wing roots or underneath nose fairings.

Basic Glider Instruments

The instruments fitted to training gliders are usually quite simple, although single seaters can be more elaborately equipped, especially those used for competitions. A brief description of basic glider instruments, together with their principles of operation, follows.

The Altimeter

This instrument is simply an aneroid barometer, converted to read in feet instead of hectopascals of air pressure. Since an increase in height results in a decrease in air pressure, there is a direct relationship between the two and this can be shown clearly to the pilot.

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- Most altimeters fitted to gliders are of the so- called "sensitive" type, which means that they have more than one hand, the better to show accurately the thousands and hundreds of feet at which the glider is flying.
- Similar to an ordinary domestic clock display, the large hand shows hundreds of feet and the small hand shows thousands. Many glider altimeters are of ex-military stock, purchased through disposals stores, and some of these have a third, very small, hand which shows tens of thousands of feet.
- Altimeters have a "sub-scale", on which can be set the barometric pressure, using the little knob provided for the purpose. This can complicate the use of the altimeter and at this point it is best to refer to the chapter on altimetry in the GFA publication "Airways and Radio Procedures for Glider Pilots".

The Airspeed Indicator (ASI)

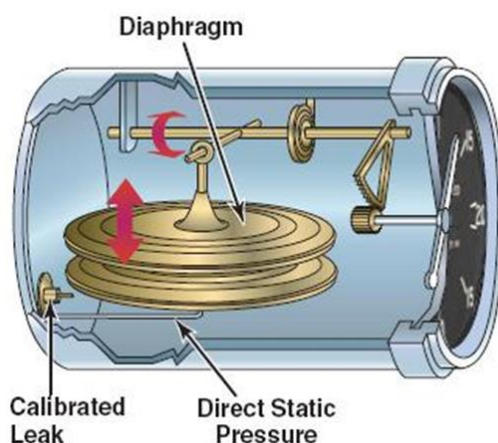
- This instrument uses the pressure built up in front of the pitot head to move a needle around a dial, thus displaying the glider's speed through the air. The diagram explains how it works. Note that the pressures being handled by airspeed indicators are quite subtle and excessive pressure applied to the instrument through the pitot head will cause damage.
- Do not blow into pitot heads until properly taught how to do so when training to become a Daily Inspector. If you see anyone blowing into pitot heads (some people don't seem to be able to resist it), suspect that the instrument has suffered and report it to somebody.
- In the lower levels of the atmosphere, where most training gliders operate, the airspeed indicator is relatively free from serious errors. However, the reduced pressure and density of the air at higher altitudes results in errors progressively creeping in.
- For information on these errors, refer to the "indicated airspeed and true airspeed" section the GFA manual – Basic Sailplane Engineering - in Chapter 7, Basic Airworthiness.

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The Variometer

- Arguably the most important instrument in a glider, with the possible exception of the seat of the pilot's pants, the variometer is a very sensitive instrument for measuring rate of climb and descent. In its basic form, it works by measuring the rate at which air flows into and out of an enclosed container, which is a flask of standard .45 litre capacity. The air flowing in and out of the flask moves the needle in an up or down direction to indicate to the pilot whether the glider is climbing or descending.
- As the glider climbs in a thermal, it is moving into air of decreasing pressure. In order to equalise the pressures inside and outside of the flask, air flows out of the flask and passes through the instrument on its way. In doing so, it moves the needle to an "up" indication, by means of suitable linkages. The opposite happens when the glider descends into regions of increasing pressure.



Electrical Systems

Most gliders have an electrical system. Each glider will vary with its equipment and power demands. Your instructor will show in your glider the relevant system and how to fit the battery and turn the system on.

Cockpit Safety

Your instructor will demonstrate in your type of glider:

- entering and exiting the cockpit safely;
- fitting, adjusting and unfastening the seat harness;

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- adjusting the seating position to give adequate lookout and easy access to all controls.
- canopy operation, canopy jettison system.
- ventilation controls and their operation.

It's important that you know how to hold the control column without activating the push to talk button and how-to takeover and handover control.

Pre-Boarding checks

- It's vital that we perform checks before we take off to ensure we have a safe flight.
- These checks have been developed by the GFA to cover all glider operations and must be performed before launching.
- There are checks to do before we board and then checks to complete when strapped in the cockpit.
- The GFA pre-boarding checks are ABCD which stand for:
 - A -Aircraft.** Walk around check for damage and defects. Maintenance release checked, including DI validity.
 - B- Ballast.** Glider loading is within placarded limitations and trim ballast, if required, is secure.
 - C- Controls.** Check the controls, including airbrakes and flaps, for correct sense and full deflections.
 - D-Dollies.** All dollies and ground handling equipment removed.

Pre-Takeoff checks

Once we are in the cockpit and strapped in we conduct the pre-take-off CHAOTIC Checks which are:

C-Control Access Seat adjustments are secure and positioned to allow for comfortable access to all flight controls, switches & knobs and the tow release. Rudder pedals positions are adjusted.

H-Harnesses Secure the harness, lap-belt low on hips, for all pilots.

A-Airbrakes & Flaps Watch as airbrakes are cycled and set for launch, or closed and locked. Where they're fitted, flaps set as required for take-off.

O-Outside Options Airspace and take-off path are clear. Wind velocity and direction checked. Enough competent ground crew are available. Note the glider's critical speeds for the launch method and safe speed near the ground. Have emergency plans in case of launch failure.

T-Trim Correct ballast is confirmed. Trim set as required.

I-Instruments Altimeter is set, other instruments are reading normally with no apparent damage. Radio is turned on, volume up and set to the correct frequency.

C-Canopy Closed and locked

C-Carriage Undercarriage is locked down

C-Controls Checked for full and free movement.

C-Cable Hook on

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Distraction can be a killer if the pilot is interrupted during these checks, so we have what's called a **"Sterile launch point environment"**. This means the pilot should not be interrupted during this process but if the pilot is interrupted then the checks must be started again.

Parachute Operation

Generally, pilots will wear parachutes when flying to provide protection in the case of mid-air collisions.

Some clubs when training in twin seat trainers will not require their use.

Your instructor will at an appropriate time demonstrate to you how to:

- Confirm the parachute serviceability.
- Operates all adjustments straps to fit securely.
- Adjust the straps to correct tension and will
- Describe steps to deploy parachute in an emergency.

FLIGHT EXERCISES FOR THIS UNIT

- No flying for this unit, but you will experience many aspects that have been covered here in your first flights

THINGS YOU MIGHT HAVE DIFFICULTY WITH

COMMON PROBLEMS

- There are many items and procedures to learn in this unit. You are not expected to have learnt all these procedures on day one! As your flying progresses you should be able to come to terms with these items before your first solo.

HOW DO YOU DEMONSTRATE COMPETENCE?

- Obtain a weather briefing
- Pre-flight a Glider which includes inspecting documentation and fitting ballast.
- Operate the aircraft systems.
- Prepare cockpit and perform the pre-flight checks.
- Prepare and fit a parachute if your club uses these in your training glider.

RESOURCES & REFERENCES

- Australian Gliding Knowledge pages 91 – 95

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SELF-CHECK QUESTIONS

Use these questions to test your knowledge of the unit.

- What ballast will you require in the cockpit for you to comply with the weight limits for your training glider. What must you do if there is too much or too little in the cockpit.
- What are the checks that must be performed in the cockpit before Take-Off.
- How can you confirm that your glider has had a Daily Inspection.
- What is the purpose of the variometer instrument?