

Gliding Australia Training Manual

Pilot Guide



Unit 7

Straight Flight, Various Speeds and Trim

Unit 7 - Straight Flight, Various Speeds and Trim

WHAT THIS UNIT IS ABOUT

To develop the knowledge and skills required to fly a glider in straight flight at a steady speed, in a set direction, with wings level, without slip or skid.

WHAT ARE THE PRE-REQUISITES FOR THIS UNIT?

- GPC Unit 6 Aileron drag, rudder co-ordination
- GPC Unit 9 Lookout Scan Procedures

COMPLEMENTARY UNITS

This unit should be read in conjunction with:

- GPC Unit 8 Sustained turns, all controls

KEY MESSAGES

- A relaxed grip on the stick is required to feel the air and effectively fly the glider.
- Airspeed is determined by attitude
- Looking in the distance makes it easier to maintain attitude / airspeed; and heading / track; and Lookout / Scan. Looking inside the cockpit makes it harder to fly
- Select the attitude you want by moving the stick and then adjust the trim to help you maintain that attitude. Do not move the trim to change the attitude.
- A small angle of bank or rudder deflection will cause you to fly away from your desired track

PILOT GUIDE FOR THIS UNIT

Changing speed and Trimming the glider

- Remember the stable platform – the glider will maintain its current situation until it is displaced by a control movement or via air movement.
- If you want to change your airspeed you need to change the attitude, in reference to the horizon, by moving the stick forward (faster) or backward (slower).
- Each attitude corresponds to a specific airspeed, so by remembering the attitude required for any desired speed. E.g. 50kt, 60kt, 70kt, minimum sink speed, best glide speed, circuit speed, you can select the attitude/speed without needing to constantly look at the instrument.
- When you change the attitude, the glider must accelerate and the instrument must register the change, so the Airspeed Indicator takes a small time to show the actual airspeed. When you select the attitude that you want you will need to wait a few seconds before checking what the instrument shows.
- If you fly at 50 knots and want to increase speed to 80 knots you will need to make a definite but smooth attitude change by moving the stick forward to the attitude that you expect will give 80 Knots. Hold this attitude for a few seconds and then confirm that the ASI shows 80 Knots. An additional or correcting control movement may be required.

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- If you relax the pressure on the stick the attitude will rise on the horizon and return to the 50 knot attitude and speed (stable platform). If you want to maintain 80 knots you have to hold the forward pressure on the stick, or you can move the Trim lever.
- The **green** Trim lever adjusts the tension on some springs on the elevator mechanism, or it moves a small control surface on the elevator itself (depending on the glider) which re-sets the speed for the stable platform. A bit like a cruise control in a car.
- If you are having to hold forward pressure on the stick to maintain 80 knots then you will need to move the trim lever forward to re-set for 80 Knots. You will feel the reduction in pressure needed and if you set it correctly then you can completely relax your hold on the stick and the glider will be a stable platform at 80 knots.
- If you want to reduce speed to say 60 knots, firstly move the stick backwards to show the attitude you expect for 60 knots. Hold the backward pressure on the stick and check the ASI. Adjust accordingly to give 60 knots. As you now need to apply backward pressure on the stick to achieve the required attitude then you will need to move the trim lever backward.
- Hold and maintain the stick position and pressure to achieve the desired attitude/speed. Then move the trim to remove the pressure. Do not move the trim to achieve the attitude that you want. The trim control is a little coarse in its action so trying to fly by moving the trim will not be smooth and is slower to give the required outcomes.
- Whenever you change the attitude/speed and wish to return to the stable platform, you must adjust the trim also.

How do you achieve “Feel” when flying

- This typically relates to how you hold the stick. If you grip the stick hard then you will not feel responses from the glider, you will constantly fight it and by the end of a 30 minute battle you will be tired, your hand sore and you will have not had a chance to relax and enjoy the view. The aim is to relax in the seat, relax your hands and feet. A light grip on the stick will let you feel what the air is doing to the glider which will improve your control and also your ability to feel thermals.
- Most problems you will have with aircraft control at this stage of your training will be caused by a tight grip and unnecessary, small control movements. Sit back and relax your body, and relax your grip and relax your legs and the glider will stop moving all over the place.
- When changing attitude, you will need to apply smooth pressure on the stick, and then move the trim to remove that pressure. When you can completely relax any pressure the glider will “fly itself”.

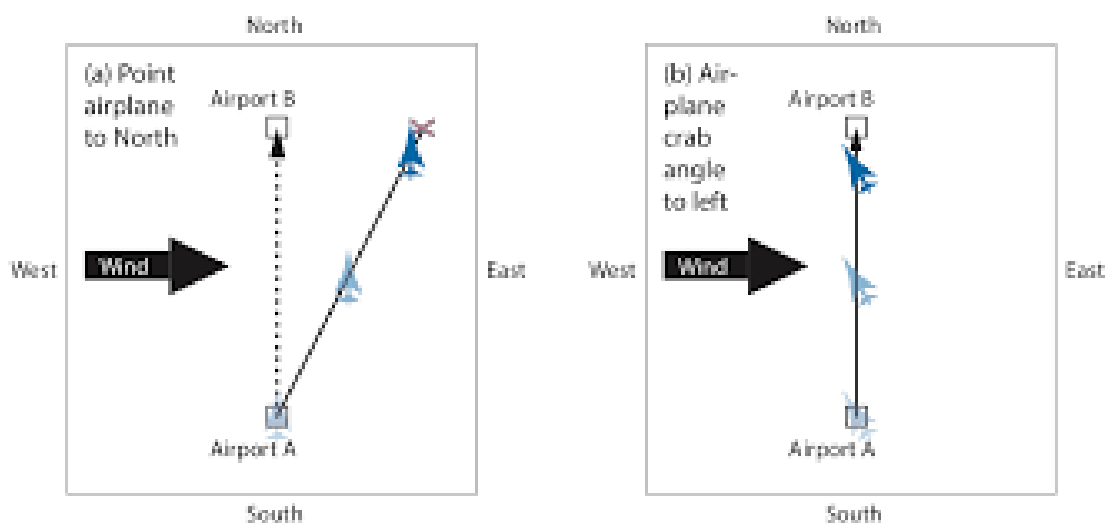
Flying Straight

- When flying back to the airfield, or to a thermal, or travelling to a nearby town, or flying the circuit, you need to fly in a straight line.
- To achieve this, you need to look into the distance and identify a point to fly towards. Looking ahead in the distance lets you spot any deviation from your proposed track as well as letting

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you keep a better lookout for other traffic. Detecting that the glider is not flying straight takes some practice but it is an important skill in flying.

- If you fly directly into wind or downwind the glider will not drift so your heading (direction that you are flying) and track (direction of where you want to go) will be the same. If there is a cross wind then to achieve your intention of flying to a certain point you will need to head slightly upwind of your track so that you achieve your goal. It is like swimming across a river, if you head directly to the opposite bank you will end up well down stream by the time you get across. You would have to swim aiming for a point upstream of your target.
- You cannot achieve this just by using the rudder, you have to turn the glider so that it is heading in the new direction, with all controls centred and the yaw string straight.
- If you have even a very small bank – one wing slightly lower than the other, the glider will slowly turn and you will no longer be flying toward your target. With practice you will learn to see even a small bank angle when looking ahead at the horizon.
- The pilot's task is to see small deviations and then change the heading through coordinated use of the controls.
- Practice will mean that you can fly straight towards your desired goal even whilst adjusting your attitude/speed.



FLIGHT EXERCISES FOR THIS UNIT

- Trimming for a required speed and flying straight to a goal are simple tasks but it needs some practice.
- You will practice flying ahead at a set speed and then changing the nose attitude to achieve a faster or slower speed. You will quickly learn to identify the nose attitude that is needed to give you a desired speed, and you can rely on this for future flights. Whilst you are doing this, you will find that the pressures required to maintain a speed become annoying and difficult to maintain, so you will practice how to use the trim to set the new speed.
- You will use the Air Speed Indicator (ASI) to verify that you have reached the speed that you want, but you cannot just keep looking at the ASI. The ASI is slow to react to changes in attitude and if you fly by the ASI your speed will constantly change. If you maintain the nose

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attitude your speed will remain constant. If you struggle to do this then the Instructor will cover the ASI so that you have to rely on attitude.

- Your instructor will then ask you to fly towards a certain target (a town or a hill or a cloud etc). Looking to a spot on the horizon will help you to see if you are really flying in the desired direction. Look into the distance. You will use this technique when you are learning to land and want to fly straight down the runway – look far ahead.
- You will need to understand the difference between your heading (the direction that the glider is pointing) and the track you make across the ground. The track is determined by where you want to go, and you control the heading but turning the glider slightly so that its heading is changed. As you practice this you will be able to correct for a strong cross wind so that you still get to where you want to go.

THINGS YOU MIGHT HAVE DIFFICULTY WITH

COMMON PROBLEMS

- Watching the ASI rather than the horizon attitude will cause the attitude and hence your speed to vary.
- If your grip on the stick is too tense it will make trimming very difficult. Relax your grip.
- Pay attention to the nose attitude – noting where the horizon cuts the canopy.
- Don't try to change attitude and speed by using the trim, it is slow and inaccurate. Change speed with the elevator/stick, then adjust the pressure with trim.
- To fly to a target point you identify if the glider wanders off track – often because of small control movements – relax your grip.
- A small bank angle – wings not level – will result in the glider turning away from your target goal. Use aileron to level the wings.

HOW DO YOU DEMONSTRATE COMPETENCE?

- Conduct a flight in a constant heading and airspeed at various speeds.
- Trim the aircraft
- Maintain straight flight on a nominated track

RESOURCES & REFERENCES

- Theory Lesson 2

SELF-CHECK QUESTIONS

Use these questions to test your knowledge of the unit.

- Q1. If the glider is trimmed for 60knots and you let go of the stick, what will happen to the nose attitude of the glider?
 - A. The nose will pitch up above the horizon
 - B. The nose will stay at the current attitude

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- C. The nose attitude will drop lower
- Q2. You are trying to fly at a constant speed of 60 knots but the speed constantly varies, sometime 65, sometime 55. What is the likely cause?
- Q3. You are having to hold back pressure on the stick to keep the same speed. Which way should you move the trim to remove this pressure?
- Q4. You want to fly at 70 knots but you are only getting 65 knots on the ASI. How do you correct this?
- Q5. The airfield is directly upwind of your current location and you turn to fly towards the airfield. How much drift will you experience as you fly to the airfield?
- Q6. The airfield is due west (270 degrees) of your current location and is about 10km away. There is a strong Northerly wind (wind blowing from the north). Which of the following 3 options A,B,C would be the best estimate of:
 - a. The track to the airfield
 - b. The heading you should fly to reach the airfield
 - A. 255 degrees
 - B. 270 degrees
 - C. 285 degrees