GPC UNIT 11 – Introduction to Soaring

AIM

The aim of this unit is to introduce student pilots to soaring and what can be achieved by progressing through GPC training and beyond. It aims to foster enthusiasm to continue training and remain with the sport longer term. Thermal soaring is comprehensively covered in post-solo GPC units – this unit provides only a basic introduction to thermal soaring.

Note: It is preferred that a Silver Coach train this unit when available to do so.

PRE-REQUISITE UNITS

- GPC Unit 7 Straight flight, various speeds, trim
- GPC Unit 8 Sustained turns, all controls
- GPC Unit 9 Lookout scan procedures

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Soaring Sport	• Describes the pursuits available in the sport and their soaring goals beyond solo
Basic aircraft control	• Maintains reasonably constant attitude and heading in the direction of a geographic feature • Maintains constant attitude while rolling to 35-45 degree angle of bank • Maintains constant angle of bank and attitude in a sustained turn
Basic thermalling skills (Where possible)	• Identifies a thermal through feel or using the variometer • Basic thermal centring using minor corrections

KEY MESSAGES

- Soaring is not just about safely taking off and landing. There are many opportunities such as flying advanced aircraft types, cross country flying, mountain flying, flying competitions, badges and records, and aerobatics. Training is available for all of these pursuits.
- Soaring in thermals is a key skill essential for longer duration flights and cross country flying.
- More advanced soaring concepts are trained in the GPC syllabus after solo.
- Soaring is a great sport where you never stop learning.

LESSON PLANNING AND CONDUCT

Briefing

This unit is best achieved by exposing the student to flight experiences showing what they could achieve beyond solo. The briefing should be relatively short since the concepts will be trained through later training units.

Brief the opportunities available to a glider pilot including flying advanced aircraft types, cross country flying, mountain flying, flying competitions, badges and records, and aerobatics. Relate each pursuit to the training available.

Thermal soaring is a key enabler for all soaring pursuits. Introduce how gliders fly cross country in thermals by climbing in thermals and cruising to the next thermal.

With reference to the diagrams in the pilot guide for GPC unit 30 *Thermal Centring Techniques* briefly introduce the concept of a thermal and two primary methods of thermal centring:

1. Using feel. When a sustained upward acceleration is felt, bank should be reduced to about half for 2-3 seconds before resuming the original angle of bank.

2. Using the vario. Identify the minimum vario indication in the turn (preferably using audio). 45 degrees (1/8 turn) after this point bank should be reduced to about half for 2-3 seconds before resuming the original angle of bank.

Weather permitting, discuss where it may be possible to fly on a short cross country flight. Introduce planning and TEM for the flight.

Flight Exercises

Soaring is best experienced on a cross country flight. If the weather is suitable conduct a short cross country flight – reasonable thermal conditions are required to ensure a low stress flight and to enable the student pilot to feel the accelerations from lift and sink.

Where conditions are marginal the cross country flight can be around a number of close waypoints that do not take the glider far outside glide range of the home airfield (if at all); or an option may be to take a high aerotow (where available) and fly a short task within glide of the home airfield.

All efforts should be made to enable the student pilot to experience soaring flight outside the normal circuit area.

Demonstration

Demonstrate thermal entry and centring. Verbalise your mental picture of where the core is and approach to recentring. Ask the student to describe where they think the core is. Keep control movements slow and smooth and try to get the student to feel acceleration. Re-iterate the importance of maintaining a constant nose attitude and constant angle of bank once centred.

On a cross country flight, demonstrate initial climb, departure on task, cruising towards a goal, basic thermal joining, basic thermalling and thermal departure. Allow the student to enjoy the experience and do not explain complex concepts. Point out ground features, local towns etc.

Student Exercises

Under direction the student practices thermal joining, centring, cruising and related skills. In particular:

- Turning with a constant angle of bank and attitude
- Coming out of a turn on a heading
- Cruising towards a geographic feature holding constant attitude and heading
- Thermal entry – if they think they are in lift start a turn (don't forget lookout)
- The student verbalises where they think the best lift is in a turn
- The student practices moving the centre of the circle in the direction of best lift using one of the basic methods

Debrief

- Identify the parts of the flight the student most enjoyed and elaborate on these to motivate them to complete the GPC.
- Discuss the elements of the flight and how they will be trained in the GPC syllabus.
- Discuss the pathways in soaring for the student once post GPC.
- **If a cross country was not possible, it is important to strongly encourage the student fly a cross country with a coach or instructor as soon as the weather allows, or provide assistance in identifying a club where cross country flight is possible.**

THREAT AND ERROR MANAGEMENT

There are a number of unique threats associated with conduct of the cross country flight for this unit; these must be managed and possible errors mitigated. In addition this unit is a good opportunity to introduce the student to the importance of appropriate TEM for a cross country flight.

The cross country flight may be one of many flights conducted by the trainer on the day with other such flights and/or training introducing threats related to time pressure, lack of preparation and outlanding. Pay attention to hydration for yourself and your student and manage heat stress. This flight will be longer and more stressful than a normal training flight.

Time pressure is a major source of errors. Consider rescheduling other training and do not attempt the flight if there is insufficient time. You may not have time for the preparation that you would normally complete prior to a cross country flight. Make sure that you always consider actions such as task planning, weather assessment, airspace assessment and arranging a retrieve crew.

This flight is not about outlanding – minimise that threat by choosing to train this unit in better cross country conditions, or selecting a task that does not venture too far from the airfield. Don't allow your student to fly when in proximity to other aircraft – it's too distracting for them at this stage of their flying anyway.

Introduce your student to basic threat and error management concepts (“to err is human”) and strategies that can be employed to reduce risks during the flight.

TRAINING MATERIALS AND REFERENCES

The trainer should be versed in the following units to ensure consistency in training practice even though only a basic introduction to these units will be imparted to the student:

- Unit 30 Thermal centring techniques
- Unit 31 Thermal entry
- Unit 32 Soaring with other gliders
- Unit 33 Thermal sources and structure
- Unit 40 Cruising, speed to fly, height bands and thermal selection

GPC UNIT 30 – Thermal Centring Techniques

AIM

The aim of this unit is to develop the student's skills and ingrained habits in centring thermals effectively.

PRE-REQUISITE UNITS

- GPC Unit 8 Sustained Turns, All Controls
- GPC Unit 9 Lookout Scan Procedures
- GPC Unit 11 Introduction to Soaring
- GPC Unit 12 Slow Flight, Stalling

This unit should be read in conjunction with GPC Unit 31 *Thermal Entry.*

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Centring	• Consistently maintains positive climb at all points for 2 turns (where thermal permits) • Identifies where core is relative to glider • Understands limitations of total energy vario when centring
Glider Control and awareness	• Maintains appropriate bank and attitude (thus speed) • Uses coordinated controls • Thermals effectively in both directions • Maintains good lookout

KEY MESSAGES

- Horizontal thermal structure and size
- Awareness of accelerations and gusts and how they feel - feel of vertical accelerations is instantaneous
- Total Energy Vario always lags, typically 45-60 degrees but can be more
- Maintain coordinated control of the glider with consistent bank and attitude (actual angle not critical)
- Use terms vertical acceleration or surge, not lift and sink

- Students who are successful using the feel technique need to understand the vario technique as well

LESSON PLANNING AND CONDUCT

Briefing

Brief the horizontal structure of a thermal with reference to the diagrams in the pilot guide for this unit.

Brief the lag limitations of variometers as discussed in the pilot guide for this unit (gust limitations are covered under thermal entry).

Reinforce the importance of developing a mental picture of the lifting and sinking air while thermalling and the location of the core.

The two standard techniques below should be trained – each identifies the point of correction by different means but the action in each case is the same.

1. **Feel Technique (Ignoring the vario)**

   Thermalling by feel is by far the best technique and other techniques are secondary. In the ideal situation, we will feel upward and downward accelerations or surges.

   When a sustained upward acceleration is felt, bank should be reduced to about half for 2-3 seconds before resuming the original angle of bank. On the next turn repeat if necessary.

2. **Vario Technique**

   The student may not feel acceleration because the thermal is very wide, the strength is low, the glider has little natural feel, the student is too tense, or for a number of other reasons. For this reason a secondary technique is trained using vario indications. This technique compensates for vario lag. Vario lag will be different for each glider/weight/vario combination and generally equates to around a 45 to 60 degree portion of a typical thermalling turn.

   Identify the minimum vario indication in the turn (preferably using audio). 45 degrees (1/8 turn) after this point bank should be reduced to about half for 2-3 seconds before resuming the original angle of bank. On the next turn repeat if necessary.

Note:

- The period of 2-3 seconds at reduced bank is the time to hold that bank; it does not include the time to reduce and increase bank.
- Speed and bank angle changes will change the turn radius and centre; unless these are constant when centred, the centre of the thermal will be quickly lost.
- With both techniques, the vario indication is used to confirm that the thermal has been centred. If a positive vario indication remains reasonably constant throughout a turn, then the thermal has been centred.
- Beware of vario installations that have leaks or produce variable lag.

- The yaw string should be a little on the outside of the turn (slight slip). Thermalling with the yaw sting on the inside of the turn risks a spin.

Flight Exercises

1. Feel Technique

Demonstration

Position the glider in a thermal so that it is not centred. Ask the student to describe what is being felt at each point in the turn and from that identify where the centre of the thermal is most likely to be. Ask the student to identify the surge and correct using the feel technique.

Example patter:

I'm going to demonstrate thermal centring by feel. On the next turn we should expect to feel a surge as we fly into the stronger part of the thermal. Tell me when you feel the surge… OK that's great, remembering the diagram from the briefing, the thermal is a little to our right when we feel the surge. Tell me again when you feel the surge… lookout in the direction we'll be correcting… OK, reducing bank …1...2...3. Back into the turn now and we'll do a full turn to see if it worked… Do you think we need to try again? …

Student Exercises

Position the student in the thermal as before and have them repeat the actions demonstrated. Once the student has centred the thermal, take control again and move them away from the core to repeat the exercise.

2. Vario Technique

Demonstration

Position the glider in a thermal so that it is not centred. Fly a complete accurate circle and ask the student to identify the vario minimum. Emphasise the importance of maintaining lookout – use audio as a cue. Identify a ground feature 45 degrees from that point and correct when at that identified heading.

Example patter:

Now demonstrating using just the vario. We need to keep looking out, listen to the audio and check the vario needle when necessary. On the next turn let me know when you think the vario is indicating the peak and the minimum… OK, that's great. On the next turn we'll pick a ground feature 45 degrees to our right when the vario is at the minimum then reduce bank on that heading… lookout in the direction we'll be correcting … OK, there's the minimum. That farmhouse looks like about the right angle… reducing bank …1…2…3. Back into the turn…

Student Exercises

Position the student in the thermal as before and have them repeat the actions demonstrated. Once the student has centred the thermal, take control again and move them away from the core to repeat the exercise.

Flight Management

The most effective means of teaching pilots to thermal requires an extensive ground briefing away from the glider. There is too much happening in a short space of time, both in terms of sensory inputs to the pilot as well as required control inputs in relation to what is felt for this to be effectively taught only in the air.

This also dictates that the pilot should not also be loaded with other tasks/exercises at the same time.

In their air, students must be prevented from making control inputs without suitable lookout first. This means the instructor/coach needs to be well ahead of the student to be certain the sky is clear and able to see the students head move. Remember, the student could well turn in the opposite direction to what the trainer thinks is best.

PRACTICAL HINTS

- Don't introduce thermal centring when there are other gliders in the thermal at similar height (within 500 feet). Once the student has a good grasp of the concepts this can be relaxed.
- If the student does not maintain a constant nose attitude check that the glider is trimmed correctly.
- If the student is reacting to the vario and not feel, turn the sound off and cover the vario display(s)
- Use tail ballast where available to compensate for heavy pilots and to enable suitable trimmed speeds to be used.

Debrief

Review

- Lookout
- Requirement for precise coordinated flight
- Using acceleration feel to position the glider with respect to the core
- Using the vario as an indicator to identify where the core is
- How to position the glider's circle to where it needs to be
- Using the vario as confirmation the thermal has been centred

THREAT AND ERROR MANAGEMENT

The primary threats for thermal centring are collisions with other aircraft and stall/spin. Both should be considered for the conduct of the flight exercises and the student should be trained to recognise the threats and mitigating actions.

Effective lookout must be maintained at all times with a regular full scan and targeted scan before manoeuvring in the thermal. Given the time taken for a full scan this will need to be anticipated and conducted prior to the re-centring trigger. Be wary of not maintaining lookout in particular when training the vario technique and encourage your student to only glance at the vario when necessary.

Do not change the direct of the turn while thermalling, even if you think there are no other gliders in the thermal or nearby.

Skidding turns when thermalling may not be recognised before a spin develops. Be wary of an increasing skid combined with further back stick to keep the nose on the horizon – the result is likely to be a spin without warning. The yaw string should always be a little on the outside of the turn – in this state the glider is unlikely to spin (and it's also most efficient).

GPC UNIT 31 – Thermal Entry

AIM

The aim of this unit is to develop the student's knowledge and skills for safe thermal entry and the first thermalling turn.

PRE-REQUISITE UNITS

- GPC Unit 30 Thermal Centring Techniques

This unit should be read in conjunction with GPC Unit 32 *Soaring With Other Gliders*

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Thermal Recognition	• Identifies a thermal as opposed to a gust
Thermal Entry	• Appropriate lookout • Waits for peak before turning • Sets attitude for desired speed • Identifies if turn was in wrong direction and corrects

KEY MESSAGES

- Initial turn direction is less important than making the turn – it can be corrected if wrong
- Minimise changes in attitude during entry to maximise feel
- Lookout with respect to thermal entry and ongoing scan
- The vario indication is not particularly useful for thermal entry due to lag and gust sensitivity
- Steps for thermal entry
- Patience

LESSON PLANNING AND CONDUCT

Briefing

Conduct a ground briefing covering the following elements:

- Refresh vario lag discussed under GPC 30 – Thermal Centring Techniques. Brief the impact of horizontal gusts on the vario indication as discussed in the pilot guide for this GPC unit – this can make the vario indication useless for thermal entry. Discuss

the importance of feel of vertical accelerations. The vario is used to confirm what was felt.

- The three key decisions on thermal entry: **Deciding to turn/not turn; when to turn; and which way to turn**.
- With reference to the diagram in the pilot guide for this GPC unit, discuss the feel and actions on thermal entry. In particular draw attention to:
    - Full scan and targeted scan. When approaching a thermal, there is a good chance others are as well and from any direction. A FULL and TARGETED lookout scan is essential to ensure situational awareness and to predict where each glider is likely to be when the thermal is joined well before actually entering the thermal.
    - Turning the same way as gliders already in the thermal. If joining a thermal with other gliders, the turn must be in the same direction as the other gliders, and if at the same height the glider should be positioned opposite. The direction of turn of other thermalling gliders can take a while to establish when approaching. Once the direction of turn is clear, aim to arrive outside of the turn being used by other glider(s). They need to be concentrating on climbing and not avoiding you! See also GPC 32 – Soaring with Other Gliders.
    - The 'cobblestone' feel approaching the thermal as a trigger to set nose attitude for reduced speed. Entry speed for feel and manoeuvrability should be 10-20 knots below cruise speed.
    - The need to WAIT when flying through the surge (or increasing vario indication)
    - Turn if/when the acceleration has been sustained for at least five seconds or when the upward acceleration stops (refer to decision chart in the pilot guide)
    - Assess based on feel if the turn was the right way
    - If the turn is towards sink continue the turn through 270^{o}, then straighten for between 3 and 10 seconds (see further information in the pilot guide), and resume turn
    - Re-trim to thermalling speed
    - On the next turn re-centre the turn as necessary

Flight Exercises

Demonstration of thermal entry and first turn

From well outside a thermal refresh what will be felt and the actions on thermal entry:

- Draw attention to FULL SCAN and TARGETED SCAN
- Discuss appropriate entry speed and when to adjust the nose attitude
- Discuss the need for waiting for the sustained surge or vario indication before turning

Then as you fly into the thermal:

- Verbalise feel in the context of the thermal structure – turbulence, the surge and relate this to the vario indication when it happens. Ask the student to tell you when they feel the surge.
- Verbalise the decision if/when to turn
- Demonstrate the first turn
    - If turning in the correct direction, verbalise the choice of angle of bank – tight turn (40º) if acceleration feel is building on turn entry; shallower turn if searching
    - If turning in the incorrect direction, demonstrate the process of turning through 270º, straightening for 3 to 10 seconds, then recommencing a tight turn.

Repeat as necessary

Student exercises

Student practices thermal entry as many times as possible on a cross country flight. (If conditions are not suitable for cross country, the coach can fly out of a thermal for about 20-30 seconds and then turn back. Hand over to the student when approaching the thermal again)

PRACTICAL HINTS:

- Don't introduce thermal entry when there are other gliders in the thermal at similar height (within 500 feet). Once the student has a good grasp of the concepts this can be relaxed.
- The student must be relaxed to be able to feel the thermal. Trying to combine other exercises may overload them and be counterproductive.
- Make sure appropriate lookout scan is continuing at all times. Be aware of the student fixating on the panel and attitude only.
- If the student is reacting to the vario and not feel, ask the student to turn the sound off (check they know how to do this before the flight) and cover the vario display(s) (this will likely have to be done on the ground).
- Make sure attitude is held constant from well before the area of rising air is entered. Changing attitude applies vertical accelerations to the glider, masking the thermal feel.

Debrief

Review

- Lookout when approaching a thermal and on entry
- Understanding of thermal structure and size
- Understanding of lag and gust limitations of variometers
- Awareness of accelerations and gusts and how they feel
- Steps for thermal entry
- Patience

THREAT AND ERROR MANAGEMENT

The primary threat for thermal entry is collision with other gliders either already in the thermal or approaching at the same time. Thermal entry can be high workload so be wary of poor lookout while distracted by other tasks.

When approaching a thermal, there is a good chance others are as well and from any direction. A FULL and TARGETED lookout scan is essential to ensure situational awareness and to predict where each glider is likely to be when the thermal is joined well before actually entering the thermal. If another glider is in the thermal it can be difficult to see which way it is turning from some distance away so be vigilant as the thermal is approached.

Always thermal in the same direction as other gliders, regardless of height differences (look for gliders that may be much lower or higher).

Always assume that there may be gliders approaching the thermal or in the thermal in addition to any that you have seen.

Before commencing the first turn a TARGETED SCAN is required in the direction of the turn.

Encourage your student to only glance at the vario when necessary – in any case the vario is not a very useful instrument for thermal entry.

Do not enter the thermal if there is any collision possibility with other gliders. Do not assume that other pilots have seen you.

GPC UNIT 32 – Soaring with Other Gliders

AIM

To safely and cooperatively fly with other gliders. This requires **awareness**, **separation** and **predictability**.

The student will need to maintain accurate control of the glider (attitude and bank) while looking out and thinking ahead.

PRE-REQUISITE UNITS

- GPC Unit 9 Lookout Scan Procedures
- GPC Unit 22 Use of Situational Awareness Aids (FLARM/ADS-B/Radio)
- GPC Unit 23 Rules of the Air

COMPETENCY ELEMENTS AND PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Awareness	Consistent Lookout Other gliders are located and their intentions predicted Recognition of potential conflicts such as converging headings or converging height changes Avoidance of double-blind situations
Separation	Can describe the concept of a separation bubble Can describe how “separation priority” works Demonstrated adequate separation from other gliders: • While cruising, allowing adequate space for other gliders to turn quickly without conflict • When joining a thermal • While thermalling
Predictability	Demonstrated predictable behaviour: • When Cruising • Entering a thermal • Thermalling

KEY MESSAGES

- **Lookout** is essential for awareness of other aircraft and predicting behaviour.
- Separation is maintained by thinking ahead and predicting what other aircraft might do.
- If you are in another pilot's blind spot, you are responsible for giving way.
- Adopt gentle, predictable maneuvering techniques, join in with other gliders cruising or circling patterns and don't surprise anyone or burst any bubbles!

LESSON PLANNING AND CONDUCT

Briefing

Explain the concepts below and then have the student explain them to you. Personal examples from the trainer's experience may be helpful.

As it will be necessary to fly with other gliders, it would be helpful if those pilots also attended the briefing.

Awareness

Stress the importance of keeping a constant lookout to locate other aircraft and predict:

- what the other aircraft might do; and
- where conflict may occur due to converging headings or converging heights.

Separation

Explain the "bubble" concept.

Explain the principle of Separation Priority when cruising:

- Give way to anyone within a half-sphere ahead (up/down, left/right)
- You must give way to these gliders no matter how the gliders in front, or to the side, manoeuvre
- When overtaking make the other pilot aware (radio)
- Do not enter double-blind situations. Eg aircraft under the nose or over the tail – you can't see each other

Predictability

Explain the importance of predictability and the steps for thermalling with other gliders below.

Approaching a thermal

- FULL scan and TARGETED scan is very important as discussed in *GPC Unit 31 Thermal Entry*
- Locate gliders in the thermal and identify their direction of turn.
- Plan ahead for arrival – which gliders will you be joining in with?
- Slow down before arriving to synchronize with the other gliders' speed. Never pull up in the core near another thermalling glider.

Thermal entry

- Join with zero potential conflict – fly around the outside of the other gliders' circle (with at least 60m separation) until an opening is available or they climb above.

Thermalling

- Go with the flow – match other gliders bank angle and speed
- Make small centering corrections when safe to do so
- Don't turn inside other gliders
- Note that one pilot with a small bank angle disrupts the thermal for the others who are forced to follow him/her

Leaving a thermal

- Exit with a gentle roll-out after checking for potential conflict
- If you roll to wings level (zero bank), others will assume you are leaving so don't turn back into the thermal

Flight Exercises

Flying for this unit requires reasonable thermal conditions with at least two other gliders available together to cruise and thermal with. If this is not possible then flight exercises must be delayed to another day or potentially be conducted at another site.

The trainer demonstrates **cruising, thermal joining, thermalling** and **leaving:**

- Explain what is happening and what you're thinking or planning
- Ask the student what they would do
- Point out any non-compliant flying which other pilots may do (and counsel them later)

Student practice (under supervision) of **cruising, thermal joining, thermalling** and **leaving:**

- Use several thermals until the student is consistently able to demonstrate competence in awareness, separation and predictability.
- It is essential that the student maintains a good lookout for the duration

The trainer must also keep a consistent lookout and be ready to take-over when needed.

Notes

- Judgement of the distance to gliders and the closing rate or relative speed between gliders will take time to develop
- This exercise will be challenging for many students because they need to concentrate on what's happening outside the glider while maintaining accurate control of the glider
- Any shortcomings in glider control will need to be addressed away from the pressure of flying with other gliders before continuing with this unit

THREAT AND ERROR MANAGEMENT

The primary risk with soaring with other gliders is loss of separation and collision.

All of the threats and associated management below applies to the conduct of the training exercise and future flying for the student. Ensure that the student understands the threat situations and appropriate management.

Be aware that judging distance and closing speed to other aircraft is difficult, particularly for inexperienced pilots or pilots that lack currency. Plan ahead and increase margins so that judgement errors do not result in lack of separation.

Lack of separation is likely to result from poor lookout when cruising (watch for gliders in front manoeuvring and converging headings), when entering thermals, whilst thermalling, and leaving. When entering thermals always join gliders already in the thermal from the outside of their circle and such that 60m separation is maintained. Be vigilant with a regular full scan and targeted scans before manoeuvring.

Anticipate double-blind situations and prevent the situation arising. It’s too late once in the situation since separation is not visible. In the cruise, don’t allow a glider to remain directly under the nose – manoeuvre to one side to keep the front glider visible. While thermalling never turn inside another glider. When leaving a thermal conduct a targeted scan in the direction of exit as well as under the outboard wing.

Unpredictable behaviour is a threat. All pilots should be predictable at all times so that other pilots can maintain separation through anticipating their actions and likely flight path. Gliders that are ahead in the cruise will expect gliders following to give way if they turn – leave enough space to do this safely. However leading gliders should not manoeuvre suddenly and unexpectedly, and should not rely on following gliders seeing them and giving way appropriately.

GPC UNIT 33 – Thermal Sources and Structure

AIM

The aim of this unit is to develop the student's knowledge and skills related to thermal sources, thermal structure, and thermal lifecycle.

PRE-REQUISITE UNIT

- GPC Unit 31 Thermal Entry

In addition reference GPC Unit 40 Cruising, speed to fly, height bands and thermal selection.

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Thermal sources and triggers	• Can describe and explain the difference between thermal sources and triggers • Potential thermal sources and triggers are identified taking into consideration sun, wind, terrain, vegetation, time of day, cloud cover • Navigation to relevant thermal sources and triggers in a search for thermals
Thermal structure	• Can describe the vertical thermal structure
Thermal lifecycle	• Can describe how thermals cycle and variations with terrain and time of day

KEY MESSAGES

- Thermals are rising buoyant air from a thermal source
- The ground is a thermal source when it is heated by the sun. Darker and hotter surfaces generate better thermals
- Thermals have a lifecycle
- Thermalling at low level increases the risk of a spin – maintain safe speed near the ground and have a clear break-off point at a safe height for a circuit and landing.

LESSON PLANNING AND CONDUCT

Briefing

Brief:

- Air buoyancy due to surface temperature and humidity relative to the surrounding air.

- Thermal sources through heating of the ground by the sun and the ground heating the air. Discuss the effect of terrain, surface, sun and wind with reference to variations with time of day.
- The lift, sink, and turbulence structure of a thermal and variation with height.
- Thermal triggers and the difference in size between thermal sources and triggers.
- Thermal cycling through exhaustion and replenishment of a pool of buoyant air.
- The relationship between convection height, thermal strength and horizontal spacing.

Advise that care must be taken when thermalling at low level (in the turbulent super-adiabatic layer) due to the possibility of an inadvertent spin under these conditions. Safe speed near the ground must be maintained when thermalling at low level and a clear break-off point at a safe height is essential for a circuit and landing.

Flight Exercises

Demonstration

- Point out ground features and discuss their likelihood as a thermal source
- Point out potential triggers

Student exercises

- Ask the student to identify potential thermal sources and triggers, and sample as many as practical to develop understanding of how to use them and the cycling behaviour

THREAT AND ERROR MANAGEMENT

As covered in the briefing, thermals in the super-adiabatic layer are disorganised and turbulent. Thermalling in this layer creates increased risk due to these conditions. Combined with the likely high stress of the situation for the student potentially causing mishandling of the glider, particularly when on a cross country flight, there will be increased risk of inadvertent spin. Be aware of this when training at low level and discuss the effect and mitigation strategies with the student – for example breaking off the flight at increased altitude, being aware of the effect of stress on concentration, and increasing thermalling speed at low level. At a minimum safe-speed-near the ground should be maintained when thermalling at lower level.

GPC UNIT 35 – Flight preparation, glider, trailer, car and pilot

AIM

The aim of this unit is to develop the student's skills, knowledge and ingrained habits to minimise risks due to inadequate preparation for themselves, the glider and trailer. This is essential for the pilot to be able to concentrate on achieving their goals when flying cross country.

PRE-REQUISITE UNITS

- There are no pre-requisites for this unit

This unit should be read in conjunction with:

- GPC Unit 36 Meteorology and Flight Planning
- GPC Unit 37 Navigation and Airspace
- GPC Unit 38 Advanced Soaring Instruments and Flight Computers

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Personal Preparation	• Understands physical limitations that may affect a pilot's performance on the day of a flight • Able to list personal needs for cross-country flying
Glider Preparation	• Able to list elements of glider preparation to ensure the glider is ready to go
Trailer and Car Preparation	• Able to describe common faults that would prevent or delay a retrieve

KEY MESSAGES

- Effective personal and equipment preparation leads to a greater likelihood of the pilot achieving their goals and increases their overall enjoyment of the sport.
- Being prepared and relaxed will reduce the risk when outlanding.
- Concerns over the state of a retrieve vehicle, the trailer or availability of crew leads to concerns about the possibility of an outlanding. The result is not being willing to leave the circuit area, abandoning tasks at the first sign of difficulty and/or not concentrating on the basics of flying. The result is a pilot who is unable to enjoy cross country flight and is liable to quit the sport.

LESSON PLANNING AND CONDUCT

Briefing

This unit is a ground briefing only, but competency should be checked by observing and questioning using questions such as “What are you doing about …?” or “Why are you doing …?”

Whilst most of the material should be covered over time through normal training, it is helpful to present this section of the syllabus to a pilot as a whole to ensure clear understanding of the importance of being prepared and how this is achieved.

Brief the importance of preparation for successfully achieving cross country goals and the safety benefits.

Brief the following points (derived from the pilot guide).

Personal Preparation

- The importance of physical condition and rest.
- Fatigue and dehydration effects of alcohol on the days prior to a flight.
- Necessary personal items such as hat, sunglasses, clothing, drinking water, charged phone, satellite tracker/beacon.
- Meteorology and preflight planning, maps, airspace restrictions (Refer to Unit 38 – Meteorology and flight planning).
- SAR considerations (reference also GPC Unit 43 – Independent operator responsibilities).

Glider Preparation

- Checking the airworthiness of the glider in advance and cleaning (especially the canopy); checking gap tapes.
- Batteries must be fully charged and sufficient for the duration of the flight. Discharging lead acid batteries below 50% significantly reduces battery life. Modern electronic systems typically draw large current the may discharge the glider batteries in an extended flight.
- The glider must be adjusted for an extended flight – seating position comfortable (with the parachute) with everything within easy reach.
- The importance of being familiar with the instruments (particularly flight computers and oxygen systems
- Flight declaration. Emergency water and tie down kit.

Trailer and Retrieve Preparation

- Trailers are commonly poorly maintained and have missing fittings. Is the trailer registered? Tyres must be in good condition and appropriately inflated. Discuss weight limits for car/trailer combinations, braking systems, electrical connections.
- Discuss common problems with pilot’s cars for a retrieve – insurance for any driver, full tank of fuel (what sort of fuel), keys are not in the pilot’s pocket!

Checklist

The pilot guide for this unit contains a checklist. Cover the points in the checklist and suggest that the student creates their own checklist for their specific circumstances.

Exercises

Spend time looking at and finding faults with various trailers and gliders around the club and point out the simple remedies. For example, what are the ballast limits for the glider, are the batteries charged, do you know how to operate the flight computer? Has the trailer been prepared for the upcoming flying season? Have the tyres been checked, are all the rigging aids present and working, can you find the keys to unlock the trailer?

It is beneficial to observe the student preparing for a cross country flight (even if the flight is not conducted).

Practical Hints

- Training for this unit is best conducted with a number of pilots as a group in the form of a targeted discussion facilitated by the coach.
- Make sure all pilots participate and test that knowledge has been gained by re-questioning.
- Use a number of real trailers, both good and bad to demonstrate the common problems and the implications of them.
- Use a number of gliders to demonstrate seating positions and getting comfortable for a long flight.
- Encourage pilots to prepare and use checklists as an aid to being confident that all essential tasks have been completed.

THREAT AND ERROR MANAGEMENT

Ensure that the student has a good understanding of the need for thorough preparation to manage threats and errors in their future cross country flights.

Cross country flight introduces additional threats beyond those arising from local soaring flights such as longer flight times and outlanding. Poor physical and mental condition is a significant contributor to errors in judgement, particularly related to outlanding and normal landings at the end of the flight; good preparation well before a cross country flight is essential for improving physical and mental condition. Timely preparation will reduce stress and fatigue, and improve comfort and hydration. Excessive use of alcohol in the days preceding a cross country flight will impact hydration and concentration.

Outlanding risks are higher with lack of flight planning. Appropriate consideration before the flight to weather analysis, outlanding options, airspace, SAR arrangements etc is essential to reduce the risk.

GPC UNIT 36 – Navigation and Airspace

AIM

The aim of this unit is to develop the student's knowledge and skills related to the Australian airspace system as it applies to glider pilots as well as basic navigation skills. Flight in controlled airspace is not covered in the unit.

Navigation with electronic navigation aids is covered in GPC Unit 38 *Advanced Soaring Instruments and Flight Computers*.

PRE-REQUISITE UNITS

- GPC Unit 21 Radio Use and Endorsement
- GPC Unit 23 Rules of the Air

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Aviation Airspace and Regulations	• Can describe Australian airspace classes and applicability to gliders • Can describe the difference between QNH, QFE, FL
Navigation Principles and Aviation Operations	• Can identify key map features of the different chart types • Correct interpretation of airspace limits with reference to a VNC or VTC • Map reading and measuring distances is demonstrated • Can describe heading, drift and track • Demonstrated access and correct interpretation of NOTAMs • Can convert between UTC time/date and local time/date • Understands appropriate radio frequencies for cross country flight • Understands CTAF procedures
Navigation in Aviation Airspace	• Can navigate outside the local flying area with reference to charts and ground features • Can identify and remain clear of local airspace boundaries in flight • Demonstrated correct use of radio on cross country flight

KEY MESSAGES

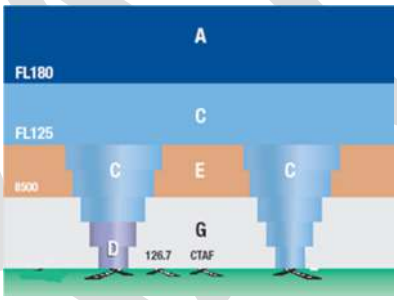
- Pilots must be able to navigate with charts and electronic flight aids.
- In Australia gliders can generally only fly in Class G or E airspace.
- Key airspace and navigational information is available through aeronautical Visual Navigation Charts (VNC), Visual Terminal Charts (VTC) and World Aeronautical Charts (WAC).
- Airspace limits are shown on aeronautical charts, and via NOTAM in the case of temporary changes. Below 10000 feet altitude is expressed in feet relative to QNH, and above expressed in FL relative to 1013.25.
- CTAF procedures must be complied with in the vicinity of an aerodrome.
- Gliders must listen on the area frequency in Class E (some exemptions apply).

LESSON PLANNING AND CONDUCT

Briefing

Aviation Airspace and Regulations

Brief the Australian airspace system (including Prohibited, Restricted and Danger areas) and where glider pilots can fly.



VNC charts are the best source of information for glider pilots for airspace and frequencies. These charts are updated in May and November each year and pilots must fly with current charts. VNC/VTC charts will also show if airspace is permanent or activated by NOTAM.

Aerodrome information in ERSA indicates when some class D and C airspace may be deactivated. E.g. at Albury after 5pm local on Saturday the class D and class C airspace below 8,500' reverts to class G as the tower is closed. This information is also available in the Designated Airspace Handbook.

Discuss altimetry including QNH (based on area QNH) as well as Flight Levels (FL) and when each is used. Discuss the transition level.

Navigation Principles and Aviation Operations

Introduce charts for the local area (VNC, VTC, WAC).

- Point out key map features including ground features, airspace limits and radio frequencies.
- Ask the student to measure a distance on a chart and estimate a bearing between two points. Discuss the difference between true north and magnetic north.

- Compare the charts to a satellite view using something like Google Maps. Whilst the charts show roads, rivers and terrain, they do not show forests. It can be a good idea to mark the extent of large forests on the chart. Cover how easy certain features are to see both close up and from a distance. Features that run along the desired track are good for following. Features that run across the track are good for measuring progress.

Discuss the difference between track, drift and heading in the presence of wind.

Demonstrate accessing NOTAMs and reading them to obtain relevant information including airspace, temporary restricted or danger areas, and aerodrome changes. Discuss conversion of UTC time/date to local time/date.

Introduce the use of ERSA for aerodrome information. The key information for glider pilots are the CTAF frequency, runway directions as well as circuit procedures. If outlanding, where possible, comply with the preferred circuit direction.

Discuss the use of area frequencies, Multicom and gliding radio frequencies. Cover the correct frequency when in the vicinity of charted and uncharted aerodromes, use of gliding frequencies, and use of area frequency for Class E airspace.

Brief use of radio in the vicinity of a CTAF.

Flight Exercises

Observe the student planning a flight outside the local flying area checking relevant information sources including charts, NOTAMs, airspace information, and weather information.

Conduct the flight with emphasis on navigation relative to ground features, airspace boundaries (if applicable), and correct use of radio. This flight can be made in conjunction with GPC Unit 38 *Meteorology and Flight Planning*.

NOTES

1. Whilst the local area may have no airspace restrictions, a pilot with a GPC is expected to be able to fly from any site without needing additional training except for specific local procedures (if any). This means understanding the types of airspace gliders can use and how they are marked as well as understanding airspace that is activated or deactivated by NOTAM.

2. Navigation without use of electronic aids is an essential basic skill. It is recommended that all students conduct their early cross country flights with reference to maps with electronic aids as a secondary source of information.

3. Whilst radio use will have been trained pre-solo, it's unlikely the student will have used it to make CTAF transit calls, inbound calls, or air to air communication in class E airspace.

THREAT AND ERROR MANAGEMENT

Navigation is difficult under some conditions such as poor visibility and homogeneous terrain, compounded by wind effects such as strong cross winds. Knowledge of these threats and vigilance under these conditions will reduce the “navigationally challenged” incidents. A thorough understanding of map features and the ability to relate them to features on the ground will assist with doing this under stressful situations in the air. If unsure of location take a step back – where was I before and where am I likely to be? Don’t rely solely on electronic instruments; they can fail so always have a backup means of navigation.

Complex airspace and radio procedures are a threat that will lead to errors unless carefully managed. Possible errors include airspace infringements, incorrect use of radio and incorrect radio frequencies. All pilots must have a thorough understanding of airspace and associated regulations, even if these procedures are simple at their home airfield – this can only be achieved through training. Similarly radio procedures in the vicinity of aerodromes require training and practice.

Interpreting NOTAMs is error-prone due to the complex format. In addition errors in converting from UTC to local time are common. Avoiding these errors comes down to training, practice and diligence. Encourage pilots to check their understanding of NOTAMs with experienced pilots.

GPC UNIT 38 – Meteorology and Flight Planning

AIM

The aim of this unit is to develop the student's skills and ingrained habits in determining the suitability of the forecast weather for cross country flight and in setting an appropriate task for the expected conditions and their experience.

PRE-REQUISITE UNITS

- GPC Unit 33 Thermal sources and structure
- GPC Unit 34 Outlanding planning, demonstration and execution
- GPC Unit 36 Navigation and airspace

This unit should be read in conjunction with:

- GPC Unit 40 Cruising, speed to fly, height bands and thermal selection

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Meteorology (Briefing)	• Can access relevant weather information for the local area • Determines wind speed and direction at different times and heights • Understands the meaning of "soaring window" and how this affects flight planning decisions. • Understands weather threats and mitigation strategies
Flight Planning	• Understands likely cross country speeds under various conditions • Determines possible task distance • Defines a suitable task for the day based on forecast conditions

KEY MESSAGES

- How to access and use weather information relevant to planning a flight.
- Weather threats such as wind, rain, thunderstorms, and dust/smoke and effect on flight planning.
- The concept of the soaring window.
- The likely cross-country speed that can be achieved based on predicted thermal strength, wind and other conditions.
- Selection of a suitable task.

LESSON PLANNING AND CONDUCT

Briefing

Pre-flight briefings are based on predicted weather, so it is important to compare actual flight experiences against the predictions with the student after the flight.

The lesson can either take the form of a presentation covering the details, or a less formal approach of simply working the student through the process prior to a flight. Presenting a lecture is often more efficient with a number of students. The less formal approach works best with a single student.

Meteorology and flight planning is a very large subject. At the GPC level it is only necessary to train the minimum to allow students to predict basic soaring weather for flight planning purposes. Emphasise that inexperienced pilots should be conservative – if in doubt don't fly cross country or speak with an instructor or coach. Meteorology and flight planning will be covered in greater detail in the post-GPC syllabus.

It is important that the student learns to predict the soaring conditions themselves, however most likely there will be a daily club weather briefing and discussion on possible tasks. This is a great learning environment. Student pilots can also talk with experienced pilots on the day.

Weather predictions

This section discusses sources of weather information and the information to be extracted, or predicted, from the weather sources.

Ensure that the student(s) have sufficient knowledge to be able to access weather information sources in future (including login). Demonstrate access to each source listed below and how to find the relevant information:

- Looking outside!
- Bureau of Meteorology – General forecast, synoptic chart, prognostic chart, satellite images
- NAIPS area forecast
- Atmospheric soundings
- Gliding weather models (such as Skysight and XCSkies)

Students must be able to interpret and use general weather forecasts and not rely solely on gliding weather models.

A list of basic weather information required is below. This information is used for task planning (discussed later) and assessment of weather hazards:

- Weather events and timing (fronts, wind, rain, thunderstorms, dust/smoke etc)
- Wind speed and direction during the day (at surface and selected altitudes)
- Cloud – cumulus cloud base and high cloud over the day
- Maximum temperatures over the task area
- Thermal heights
- Thermal strength
- Soaring window

Predicted versus actual. Discuss the importance of comparing information from general and gliding forecasts with actual observations such as local temperatures and satellite images –

look outside and don't get seduced by computer models. Are fronts/troughs/cumulus development progressing as expected?

Brief the formation of cumulus cloud from condensation of rising water vapour forming water droplets (condensing when the dew point is reached). Describe calculating the approximate cumulous cloud base in feet (where present) derived from the difference between the observed dew point and temperature multiplied by 400.

At this level predicting thermal heights and strengths from modelled and observed atmospheric soundings is not covered. This information can be found in the gliding weather models, or from talking with experienced pilots. The rule of thumb generally applies that the higher the thermals go, the stronger they are – for example often 3 to 4 knots for 4000 foot thermals, and 6 to 7 knots for 10000 foot thermals.

Similarly predicting the time when thermals start and stop (the soaring window) from first principles is not covered in this unit – this information is available from gliding weather models.

Make sure the student understands the implications of wind on cross country flight:

- Impact on outlanding
- Impact on achieved speed - the stronger the head wind, the slower the average speed
- Impact on thermals – broken and so harder to use, so slower average achieved climb rate
- Increased danger in using thermals low

Flight Planning

Flight planning in the context of this unit is the process of using the weather predictions to plan an appropriate task. This requires the student to develop an understanding of achievable cross country speeds under various conditions and other considerations for planning a task including safety.

At the GPC level the student only needs to be aware that MacCready theory can be used to calculate achievable cross country speed given the performance of the glider and the strength of the thermals. It is not necessary to delve into the theory. It should be noted that an inexperienced pilot is only expected to achieve speeds much lower than theoretically possible – generally due to average climb rates significantly lower than for experienced pilots.

The pilot guide for this unit includes guidance on typical achievable speeds for an inexperienced pilot flying an unballasted glider such as an LS4. These speeds are intentionally low and hopefully will provide a sense of achievement when exceeded. If there is any significant wind, then cross country speed will be reduced, particularly for inexperienced pilots. A rule of thumb that can be applied is that if predicted winds are above 5 knots at flying heights, reduce the predicted average speed by about 1 kph per knot of wind speed. If possible, it is useful to review cross country speeds actually achieved by the pilot from previous flights under different conditions.

Some considerations for task planning are:

1. Task time. This should be shorter than the soaring window as predicted from the weather analysis and should take into account time to climb in the first thermal and before leaving on task. Early cross country pilots should not be too ambitious with task time. Consider landing well before significant weather events.
2. Task distance. Calculated from the predicted cross country speed in the task time available.
3. Task waypoints. The following should be considered:

- Airspace restrictions.
- Areas of adverse weather.
- If possible fly down wind on 1st and last legs - into wind during the peak of the day.
- Avoid flying west at the end of the day (visibility is poor).
- Placing the airfield mid-leg minimises any retrieve.
- Silver Distance requires flying to at least 50km from the tow release point. Be aware of other geometry requirements for badge flights.
- Choose a task that avoids difficult outlanding terrain (or make sure enough height is available to cross), or choose a task that remains within range of suitable airfields.
- What is the longest retrieve the pilot is comfortable with (if needed)?

Discuss possible tasks using a map or use a program such as SeeYou.

The simple task planner table in the pilot guide for this unit is a tool that can be used for planning a task. The student may wish to keep the completed planner for each day to use for future reference.

Review of Flight

It is useful, regardless of whether or not a task was flown, to demonstrate basic elements of reviewing a flight (detailed flight analysis is in the post-GPC syllabus). It would be best to do this with a recorded flight of the student if possible. Alternatively, a flight showing examples of both good and poor climbs would be helpful.

Attention should be paid to individual thermals and the climb rate achieved for the duration of the thermal. Any drop off in thermal climb rate should be reviewed at the beginning of the thermal and prior to leaving the thermal to highlight thermal centring issues or spending too much time in a weakening thermal.

The achieved heights, thermal strengths and weather should be reviewed against the forecasts for the day. Reasons for variations should be discussed.

If possible, show students how programs such as See You can be used to determine achieved cross-country speed, average thermal climb rate achieved during a task and percentage of time spent thermalling against cruising.

THREAT AND ERROR MANAGEMENT

The main weather threats include wind, rain, thunderstorms, and dust/smoke. Ensure that the student can access and understand the appropriate information sources to assess the likelihood of these weather events. Appropriate actions may be not to fly, task in a different direction, task for a shorter part of the day, abandon the task, or simply increased vigilance. Ensure that the student is aware of the dangers of outlanding in difficult conditions such as strong winds or gust fronts. At all times it’s always a good idea for pilots to seek advice from experienced instructors.

Other than specifically related to weather events, unlandable terrain may be a major cross country flying threat. Ensure that the student understands areas of unlandable terrain in the local tasking area and how to assess this during task planning – for example through the use of Google Maps. At some sites it is advisable to fly with a database of airfields and always keep at least one within glide at all times.

GPC UNIT 39 – Advanced Soaring Instruments and Flight Computers

AIM

The aim of this unit is to develop the student's knowledge and skill in the use of modern flight computers without degrading their lookout and situational awareness.

The focus is on moving map flight computers, including personal devices such as the Oudie and mobile phones.

The pilot should become familiar with the operation of the devices they will use and apply the concepts outlined in this unit.

PRE-REQUISITE UNITS

- GPC Unit 36 Navigation and airspace
- GPC Unit 38 Meteorology and flight planning

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Understanding	The student should adequately describe or demonstrate: • Averager and netto modes of electric variometers • The purpose of relevant items shown on flight computer pages and at what stage of the flight each item is of use • The basis on which flight computer predictions of ETA and arrival height are made • How to set up a task and adjust thermal strength, wind parameters and arrival height on a flight computer
Practical use	In flight the student should demonstrate: • An excellent lookout with minimum "screen time" • Correct interpretation of the information displayed

KEY MESSAGES

- The pilot needs to think and look ahead.
- Flight computers can be a distraction from the tasks at hand and degrade pilot performance.
- Flight computers display accurately what's happening now and in the past. Predictions of finish height, ETA etc are based on assumptions of climb rate and winds.
- Flight computers can display a huge amount of information - only relevant or useful information should be displayed.
- The display should be uncluttered to allow relevant information to be seen clearly and quickly.

LESSON PLANNING AND CONDUCT

Classroom Briefing

Electric Variometers

Brief the concepts of electric varios with reference to:

- Averaging of the instantaneous vertical climb/sink rate (averager)
- Netto and relative netto
- Configurable parameters such as total energy compensation based on a mix of the total energy probe, pitot, GPS and inertial sensors
- Speed to fly information
- Many other display features blurring the distinction between varios and flight computers

Note that they still suffer from limitations related to lag and gust sensitivity. Advanced functions require configuration and a good understanding of what is displayed.

Flight Computers

Discuss the many types of flight computers available (there's a list in the pilot guide for this unit). This unit can't cover the breadth of these devices, and nor is it appropriate for an inexperienced pilot to use many of the features – they should learn to fly cross country using the basics first then move on to the fancy devices if they wish. However there are common principles which are covered below.

All systems display and allow configuration of:

- A task
- MacCready setting (assumed climb rate)
- Airspace boundaries
- Wind vectors
- Required track and actual track
- Distance and bearing to next turn point
- Finish height or final glide data

Using an example device such as those available in the club gliders, demonstrate configuration and display of the above items. Most devices have a simulator that can be run on a computer – these are a great way to demonstrate use of the device. Or use the appropriate pages from the manual and then demonstrate in a glider. If the club gliders don't have flight computers try using the Oudie simulator (search for it on google).

Explain the effects of the MacCready setting, wind, bugs, ballast and finish height on the predictions made by the computer for the task (particularly ETA and finish height).

At the flight computer to be used:

- Ensure correct computer setup for the pilot, glider polar, bugs, airspace, turn-points, finish height, ballast and connection to other devices.
- Help to set up a short task on the flight computer.
- If possible, run through a simulation or replay of a flight on the computer so the pilot can see how it works and what it displays.

Flight Exercises

Do the short task set in the flight computer. The whole task may be within gliding range of the airfield or can be combined with a flight for one of the other GPC units.

Monitor the student's lookout and understanding of the information being displayed. Be aware that the student may become absorbed by the computer and lose lookout and awareness.

THREAT AND ERROR MANAGEMENT

Flights computers, otherwise known as "advanced distraction devices" introduce significant threats that must be carefully managed. Pilots must be aware of the distraction from other tasks such as maintaining good lookout. Screen time should be kept to a minimum – this can be achieved by ensuring that only the required information is presented and that the pilot is well practiced in using the device. Where increased screen time is unavoidable, such as reprogramming a task, this should only be conducted after moving away from other aircraft, conducting a full scan lookout with a 180 degree turn, and then regular full scans. Break longer tasks into smaller sub-tasks and conduct a full scan between each sub-task.

Incorrect interpretation of the information displayed can lead to errors such as misjudging final glides or infringing airspace. In addition, configuration of flight computers is complex and misconfiguration may give erroneous results, potentially impacting safety. All pilots using them must be familiar with the use of the device, be aware of limitations and the potential for incorrect setup; basic setup problems include such items as incorrect glider polar, weight, airspace, and task. This should be practiced on the ground.

Even with correct configuration, predictions by a flight computer are dependent on history and assumptions about future events. For example the flight computer won't know about wind changes and changes in flight conditions ahead – so ETA and final glide height may be incorrect.

GPC 40 - Cruising, speed to fly, height bands and thermal selection

AIM

The aim of this sequence is to develop the student's skills and ingrained habits in selecting a path through the air which improves achieved glide performance; selecting and maintaining an appropriate speed to fly; using height bands to manage risk in terms of locating the next thermal; and choosing which thermals to accept.

PRE-REQUISITE UNITS

- GPC Unit 30 Thermal Centring Techniques
- GPC Unit 31 Thermal Entry
- GPC Unit 33 Thermal Sources and Structure
- GPC Unit 36 Navigation and Airspace
- GPC Unit 38 Meteorology and Flight Planning

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Cruising - Track selection	• Looks to the distance on track to identify several thermal sources and/or cumulus clouds and follows a pathway through these to maximise the chance of finding thermals • Identifies and follows a pathway through areas of rising air to extend glide performance whilst making progress on task
Speed to Fly	• Consistently determines and adjusts cruise speed based on expected conditions • Maintains the nominated speed throughout the flight +/- 5 knots
Height Bands	• Nominates appropriate height bands for the conditions • Adjusts speed and desired thermal strength to avoid descending to the lowest height band • Limits the number of thermals used by extending the glide within the selected height band
Thermal selection	• Nominates the expected thermal strength required and selects only when this is met • Ignores weaker thermals unless in the lowest height band, thus reducing the number of thermals used
Final Glides	• Identifies sufficient height for final glide, monitors glide and takes appropriate actions

KEY MESSAGES

- Aim to fly a track through rising (or less sinking) air to improve glide performance and maximise the chance of finding the best climbs.
- The speed to fly should be based on the expected conditions ahead, not the last thermal.
- Cruising strictly to MacCready speed to fly theory is inefficient and impossible to achieve - use block speeds (plus or minus 10 knots) that approximate MacCready speeds.
- Don't take every thermal unless necessary - be selective with thermal strength and avoid wasting time by centring too many thermals.
- Don't climb to the top of each thermal - leave when you think the next climb will be better (or to remain below cloud).
- Divide the convection height into three bands: in the top band cruise fastest and only take strong climbs; in the middle band cruise more conservatively and be prepared to take weaker climbs; below 2000 feet prepare for an outlanding and stay within reach of an appropriate landing site while searching for a climb.
- Transition from a soaring pilot to a landing pilot with sufficient height for a safe circuit.

LESSON PLANNING AND CONDUCT

Briefing

Using the pilot guide as a reference brief:

- Cruising – Track selection
- Speed to Fly
- Height Bands
- Thermal selection
- Final glides

Do not brief in too much detail. These topics are an introduction at the GPC level and will be discussed in more detail in the advanced training syllabus.

Assist the student to plan a task. The task for this unit will need to be of sufficient length to demonstrate and allow the student to practice each of the competencies. A triangle task of at least 150 km should be sufficient.

Review the set task:

- Based on the weather forecast, determine thermal height and strength expected.
- Nominate height bands and expected cruise speeds.
- Consider potential thermal sources on track, and areas with potentially weaker thermals.
- Identify where the last thermal for final glide is likely to be.

Flight Exercises

Demonstration

- Point out the direction to the next goal whilst you fly the glider. Point out areas of better or reduced thermal potential, areas that may be hotter or have good trigger points. Point out lines of cumulus (if present) in the general direction of track and describe hopping between the clouds.

- Advise the upper height band and challenge the student not to thermal until coming to the bottom of the height band. Suggest the appropriate speed to fly and state the need to maintain this speed unless flying into lift, when you can reduce speed by 10 knots to get a better feel.

Student exercises

- A key skill is flying in the direction of track, aiming for a good thermal or thermal source, maintaining the set cruise speed. Monitor these three elements and provide positive feedback, or suggest improvements.
- Monitor and emphasise lookout and use of trim.
- Once this has been consistently demonstrated change the focus to feeling for better air as you fly towards the next thermal. Fly at a slower speed to get better feel if necessary.
- Point out the height lost in reaching the next thermal, and monitor this for subsequent glides. As the glider descends to the next height band, make sure you announce this and encourage a small speed reduction and greater focus on finding a thermal.
- As you approach 2000 feet talk about a possible outlanding and then take over. Your focus should be to climb. Ask the student to identify suitable landing fields. Monitor their contribution, but also consider alternatives.
- There is no problem with outlanding. It will be a good experience for the student. Do not try thermalling at very low altitude in order to ‘save’ the flight. This sets a poor example for future solo flights.

THREAT AND ERROR MANAGEMENT

The primary threats for this unit relate to outlanding and collision with other traffic. Recap with the student threats and mitigating actions identified in the GPC units ‘Soaring with other gliders’, ‘Outlanding planning, demonstration and execution’ and ‘Navigation and airspace’. Re-inforce the importance of transitioning at the appropriate time from a soaring pilot to a landing pilot, allowing sufficient height for a full circuit, and not selecting a track over unlandable terrain. In particular discuss the dangers associated with becoming low on final glide and the temptation to try stretch the glide to the airfield – make an early decision to find a thermal and plan for a possible outlanding. As always, emphasise the importance of maintaining good lookout at all times.

GPC UNIT 41 – Demonstrated Cross Country Capability

AIM

The aim of this unit is to evaluate the student's capability to combine the GPC competencies to safely plan and achieve cross country flight in thermals.

PRE-REQUISITE UNITS

- GPC Units 30 to 36 and 38 to 40

COMPETENCY ELEMENTS & PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARD
Flight Planning	Satisfactory flight planning considering at least: • personal preparation • meteorology • airspace and radio frequencies • NOTAM • safe outlanding options and trailer/crew arrangements • task setting, task declaration and official observer awareness • flight computer programming
Flight conduct	• Effective lookout throughout all stages of the flight • Proficient navigation and choice of route considering thermal sources, weather and airspace • Safe consideration of outlanding options • Appropriate decisions on when to take thermals and when to leave • Safe entry to thermals and centring within 2-3 turns • Maintains an appropriate cruise speed relative to anticipated climb rate and height • Competent use of flight computer

KEY MESSAGES

- For safe and successful cross country flight good pre-flight preparation is essential.
- In-flight choice of route, thermals and cruise speed must be constantly re-evaluated with consideration of weather, terrain, outlanding options and airspace.

LESSON PLANNING AND CONDUCT

Briefing and Flight Planning Assessment

Advise the student that Demonstrated Cross Country Capability is an assessment unit. They will be observed in all aspects of flight planning and flight conduct on a cross country flight in thermal conditions. With the exception of safety concerns, the assessor will not prompt the student. Training sequences will not be conducted on the cross country flight.

Ask the student to go through the complete flight planning exercise. It may be helpful for students to use the required flight planning competency for this unit and competencies from the prerequisite units as a checklist.

The planned cross country flight need not be long but must include at least two waypoints well beyond glide of the departure airfield given the anticipated conditions of the day.

If flight planning is not completed to a suitable proficiency then do not continue with the flight assessment until the student undertakes further training and can demonstrate proficient flight planning.

Flight Assessment

The flight should be conducted in a twin seater glider with the student in the front seat (assuming tandem configuration). Assess the competencies listed under flight conduct for this unit.

Ensure that effective lookout is maintained at all times, particularly during high stress portions of the flight.

The student should have met the performance standard required by all the pre-requisite units; however it is to be expected that there will be lapses in concentration putting this all together to achieve cross country flight. The flight assessment can be signed off provided that the flight is conducted safely and the student can demonstrate that they understand the concepts and demonstrate the required performance standard most of the time.

Flying for this sequence requires reasonable thermal conditions such that a relatively straightforward cross country flight can be conducted with limited risk of outlanding. If an outlanding becomes necessary it is best conducted by the student under observation, provided that the assessor holds a L1 or above instructor rating. Outlanding does not preclude a satisfactory assessment of proficiency.

Debrief

Provide feedback on the flight planning and flight – strengths and areas for further improvement.

Highlight further training opportunities defined in the Advanced Training Syllabus (in work).

THREAT AND ERROR MANAGEMENT

Threats and errors related to cross country flying are covered in the prerequisite units. For Demonstrated Cross Country look out for errors related to multi-tasking. For example lookout may be acceptable in isolation, but may become poor when trying to navigate, while stressed at the low end of the height band, while trying to work out why the flight computer

wind seems to be wrong etc. As previously trained, make sure that the student is always prepared for a safe outlanding. The debrief is a good opportunity to review threats and errors related to all of the cross country sequences.