TMG Exercise 15b: Navigation problems at lower level and in reduced visibility

Version 0.2

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Aim

To understand the differences with navigation with reduced visibility

Pre-requisite exercises

Ex 4 to a good standard, Ex 15a complete.

Competency elements and performance standards

ELEMENT	PERFORMANCE STANDARD
Workload management	• **Use of GPS and map whilst prioritise handling and lookout**
Decision making	• **Being able to adjust the routing to make the flight as safe as possible and give the easiest way of navigating (maybe with line features)**

Key messages

It is better to decide to divert (or return) earlier rather than later in deteriorating conditions

Try to think ahead for options

It is easier making decisions when workload is lower (hence generating options early)

Lesson planning and conduct

Briefing

- Ensure the trainee knows how to work the GPS
- Explain the limitations and dangers of low level navigation

- Tips on estimating tracks and distances on the half mill chart (in the air)
- The importance of navigating around hazards (obstacles, hazards, airspace)
- Using the chart to back up the GPS or vice versa

A) Actions before descending

FREDA

Organise yourself. When the landing field is in sight, stow your chart, GPS and nav log and concentrate on the circuit and approach

B) Hazards (for example obstacles & terrain)

Various methods of calculating MSA (Minimum Safety Altitude) but the easiest is take the highest grid obstacle on your ½ mill chart and add 500'

You can go <MSA but ONLY if VFR and so long as you know where the obstacles are. **Therefore if flying <MSA you MUST be certain of your position.**

C) Difficulties of map reading

At low levels, and in poor visibility, you can't see as many features as normal. In fact they tend to appear in front of you and pass by relatively quickly.

Hold the calculated heading (and time) and don't panic if you haven't seen a decent feature for a few minutes.

Consider following a line feature. Example, build in an error to your heading, hit a railway line and know in which direction to turn

You will look at the map more often; consider holding the map high to read and lookout

D) Effects of wind & turbulence

Max Drift = 60/TAS x windspeed

Therefore a Falke**,** slow cruising at ~60 kts; the max drift will equal the wind speed

If the wind is 90°across the track – the drift will equal the wind

If the wind is 45°across the track – the drift will be 75% of the wind

If the wind is 30°across the track – the drift will be 50% of the wind

Therefore having estimated the new track (eg for a diversion), adjust with the estimated drift to give you a heading to fly.

Likewise the distance to fly can be estimated and “adjusted” with the wind

Turbulence can be experienced at lower levels (in moderate winds) when in the lee of topography, built up areas, lines large trees etc

E) Vertical situational awareness (avoidance of CFIT)

Ideally maintain MSA or above. If this is impossible, and visibility poor, a precautionary landing might be prudent (especially if you stumble over a suitable airfield on the way).

Think ATZs and Danger/Restrictive/Prohibitive Areas when flying at lower levels than planned

F) Avoidance of noise sensitive areas

This should be part of your flight planning. However following a diversion in poor weather, you are unlikely to be as well prepared. Remember the priority is to land safely, so with reduced power in a TMG, suggest you concentrate on the flying!

You must not fly over built up areas at a level so low that you can’t glide clear in case of engine failure. So flying around towns and cities is often the only safe course of action

G) Joining the circuit

Because the preferred standard overhead join is unlikely to be possible in poor weather you will be faced with intercepting a circuit at circuit height (or possibly lower due to cloud base).

Consider asking ATC to turn the lights up if visibility is poor

H) Bad weather circuit and landing

If so leave the power for safe (but slower) cruise and intercept the correct approach path – possibly as late as the final approach, cut the power and use spoilers to fly a standard normal idle power approach

Flight exercises

- The instructor can simulate lowering cloud which forces the TMG below MSA. Ideally the trainee decides to divert. Allow trainee time to choose a diversion airfield and route.

- Then fly the TMG at 1000’ agl and give instruction as you proceed

Practical hints

- If map reading, hold the map up and in the orientation of travel
- Don’t panic if features are sparse
- Flying to a line feature and then following it is perfectly acceptable
- If using a GPS; back it up with a gross error check

Debrief

To check understanding; create a nav scenario somewhere well away from Gransden. The cloudbase is reducing along the second leg. Give a position (approaching a fix) and ask the trainee what to do with lower cloud ahead and a shower forming behind.

Threat and Error Management

Collision, Airspace infringement, CFIT