Navigation and Flight Planning

Part 3

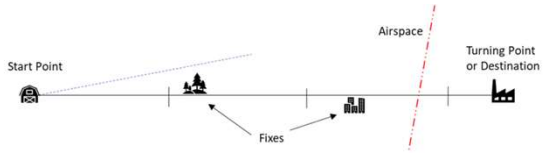
1

Part 3: Navigating

Course corrections	Flying the plan	Navigating
Map use, Return to base, Off track, 1:60 rule Correction angle Diversions.	X-country check list, Getting the weather, Aircraft loading, Flight following, SAR watch.	Keeping the log Bad weather Getting lost Precautionary landing

2

6 minutes



Groundspeed = 80 kts

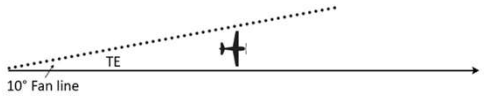
$$Distance_{6\ Minutes} = \frac{Groundspeed}{10}[NM] = 8\ NM$$

3

Max Drift and Reference Fan

Windspeed = 20 kts
TAS = 90 kts = 1.5 NM/min

$$Max\ Drift = \frac{Windspeed\ [kts]}{TAS\ [\frac{NM}{min}]} = \frac{20}{1.5}[°] = 13°$$



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CAA Visual Navigation

https://www.aviation.govt.nz/safety/safety-education-and-advice/education/practical-flying-guides/

- Circles
- Track with gaps for important map stuff (fixes)
- 10° downwind fan line
- 6 minute markers
- Wind info

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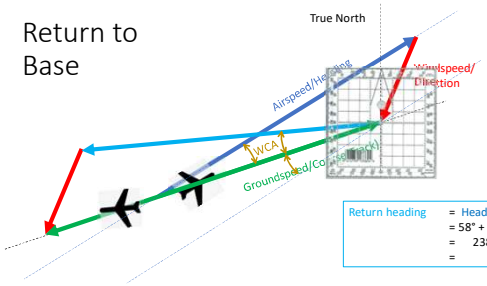
Return to Base



Return heading = Heading + 180° - 2*WCA
= 58° + 180° - 2*(-13°)
= 238° + 26°
= 264°

If original drift (wind pushes you) to left, double |drift angle| and subtract from reciprocal of original heading.
If original drift to right, double |drift angle| and add to reciprocal of original heading.

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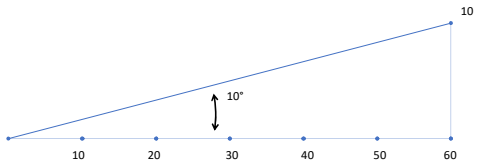
1:60 rule

60 units along and 1 unit across gives an angle of about 1°



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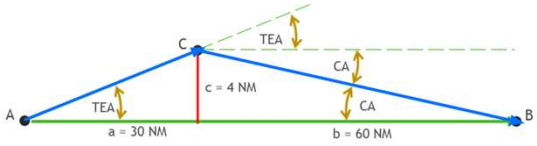
Heading corrections

We plan to track from A to B. After 30nm, at point C, we are 4nm mile to the left of our track. How do we get to B?



Track error in degrees, $TEA = \frac{4\,NM}{30\,NM} * 60° = 8°$

Closing angle, $\mathrm{CA} = \frac{4\,NM}{60\,NM} * 60° = 4°$

Total correction required is 12° to the right.

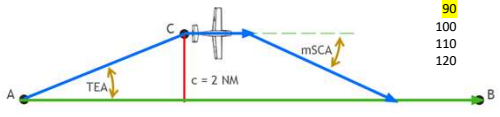
8

Modified standard closing angle

The Modified Standard Closing Angle is a heading change that will bring you back onto your planned course in **twice** the number of minutes as you are nautical miles off course.

$$mSCA = \frac{30}{TAS\ \left[\frac{NM}{min}\right]}$$

TAS [kts]	NM/min	Mod SCA degrees
60	1.0	30
70	1.2	26
80	1.3	23
90	1.5	20
100	1.7	18
110	1.8	16
120	2.0	15



Cruise 90kn, 2 NM off-course: turn 20° towards the track for 4 minutes then back onto the correct heading.

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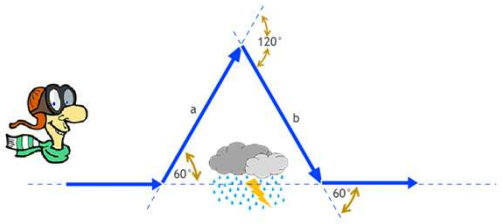
Standard diversions

see page 12 of the Practical Flying Guide 1



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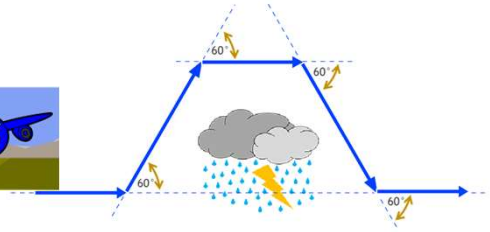
Standard diversions



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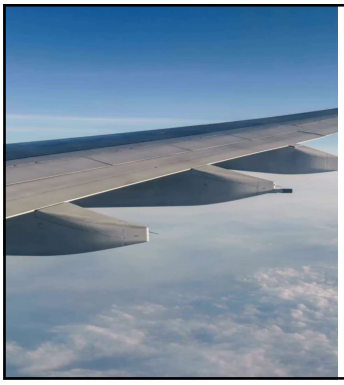

Altitude and pressure changes

34 hPa / 1000 ft or 30 feet / 1 mbar

- High ⇨ Low = High (Look out below!)
  When flying from high to low pressure the altimeter will read high (shows more altitude than you have !)
- Low ⇨ High = Low
  When flying from low to high pressure the altimeter will read low.

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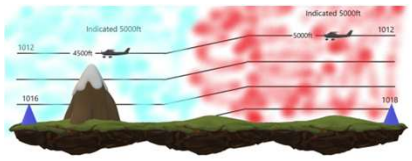
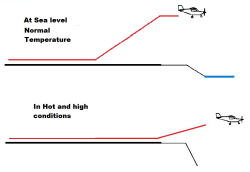
12





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Altitudes

Indicated altitude with meter set to QNH: ALT

Pressure altitude with meter set to 1013: PA = ALT + 30·(1013-QNH)

Temperature at altitude as per ISA model: ISA = 15 – (2·PA)/1000

Density Altitude: DA = PA +120·(OAT-ISA)

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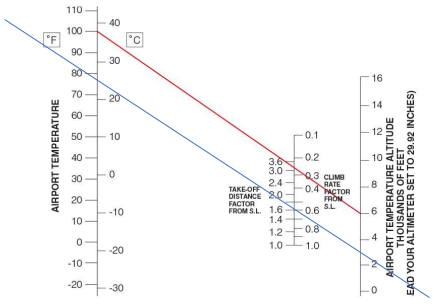
Koch Chart



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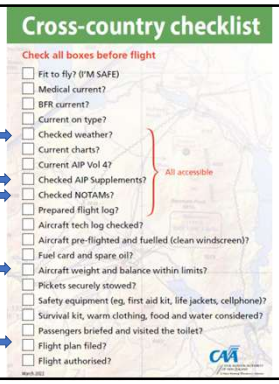
Flying the plan

https://gopreflight.co.nz/

http://www.aip.net.nz/
https://www.ifis.airways.co.nz/secure/script/user_reg/login.asp

Calculate

https://www.ifis.airways.co.nz/script/flight_plans/vfr.asp



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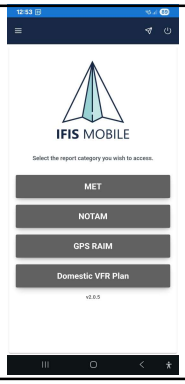
IFIS Mobile



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Weather

Get your 'official' weather briefing from the GoPreflight website.

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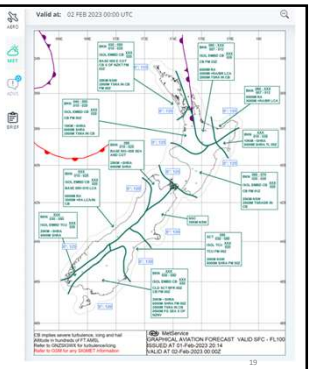
AAW and GRAFOR



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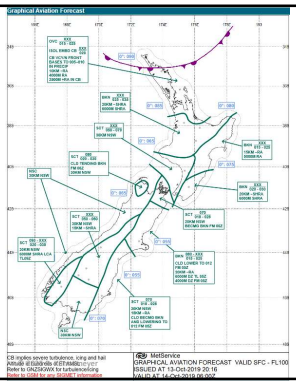
GRAFOR



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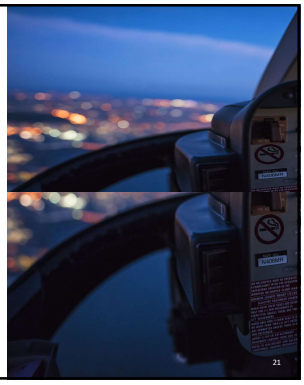
In-flight from ATS

SIGMET, TAF, METAR/SPECI, META AUTO, BWR*, ATIS

ATC – air traffic control

FIS – flight information service
(Christchurch Information FISCOM)

- On receipt
  - New NOTAM;
  - New SIGMET, SPECI on unattended aerodromes, and amended TAF
- Summary (of new) on the hour, subject to workload
- On request at any time.



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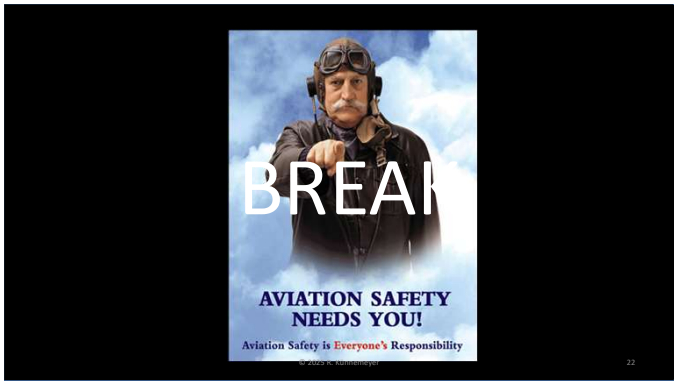

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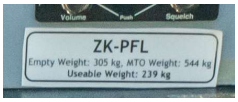
Weight and balance



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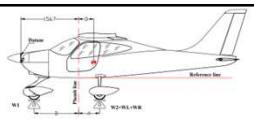
Aircraft loading

P2008 LSA



	ltr	weight [kg]	arm [m]	moment [kg·m]
empty		385	1.942	748
pilot & passenger			1.900	
fuel			2.209	
luggage			2.417	
TOTAL				
Limits	min		1.842	
	max	600	2.020	

Calculate for full and empty tanks !!

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Flight plan / flight following / SAR watch

VFR flight plan
www.ifis.airways.co.nz/script/flight_plans/vfr.asp

Tell someone via
Spider tracks, Avplan,
Club, Family, ADS-B.


EFFECTIVE 24 JANUARY 2002
VFR FLIGHT PLAN
1. Aircraft Registration
2. Aircraft Callsign
3. Type of Aircraft
4. Route
5. SARTIME
6. Fuel Endurance
7. Persons on Board
8. Other Information
9. Pilot in command
10. Contact Number
11. Operator

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Navigating:

refer to the CAA Practical Flying Guide 1

Monitor and record flight progress !!

- Check clock, map, ground
- Anticipate what should come up, work from landmark to landmark
- Take intermittent position fixes
- Establish track made good, track error, actual ground speed
- Deviations can be due to
  - pilot, compass error, different wind, incorrect track, etc.
- Fix the aircraft's position
  - identify landmarks: topographical features, like coastline, rivers, roads, rail, towns, transmission lines, ridges and peaks. If high, extended features are easier, if low use taller ones.
  - two, or more lines of position (harder)
- Recalculate ETE/ETA and fuel consumption
- Check actual fuel consumption
- Divert to an alternate airfield, if required. **Have options** !!

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Bad Weather

Stay in the clear!
- Watch what is developing around you
- Don't fly towards worsening weather
- When any doubt exists, make a 180° turn or divert towards better conditions

Be wary of lowering cloud and rising ground!

Be wary of valleys!

Be wary of concealed CB and squall lines!

Don't get caught on top!

Be wary of sucker holes!

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Getting Lost

Fly the aeroplane!

Log kept, track followed?

- Only a small area of uncertainty.
- Next waypoint ETA not yet reached?
  - Hold heading. Keep going. Look around!
- ETA substantially passed?
  - Choose landmark, log time, and orbit
  - Reduce power to save fuel, airspeed for a safe flight
  - Check for obvious errors.
  - Below 3000 feet AGL climb, clouds permitting. Line of sight at 4000 feet AGL is 65 NM
  - Try to pick up all the major landmarks, near and middle distance
  - On a bright day cloud shadows make some landmarks difficult to see

Read from ground to map!

- Look for two or more large features on the ground
- Identify similar features on the chart
- Try to use point or line feature
- If line feature, fly along it until you can derive a fix

If in controlled airspace or transponder equipped, ask ATS for help !

Don't stay up too late! Don't waste fuel! Land !!

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Precautionary landing

- Deteriorating weather
- Oncoming darkness
- Fuel reaching reserve level
- Lost and you decide to obtain help on the ground
- Engine rough running
- Occupant illness

Communicate! Share the problem.

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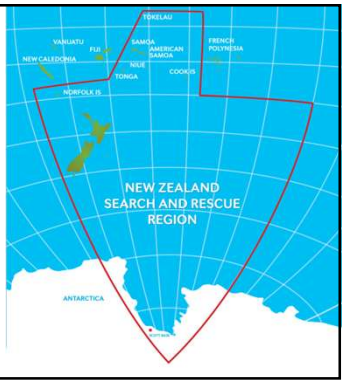
Some useful numbers

Emergency: 111 (all services)

RCCNZ: 0508 4 RCCNZ (0508 472 269)

CAA: 0508 ACCIDENT (0508 222 433)



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Learn
to
Fly

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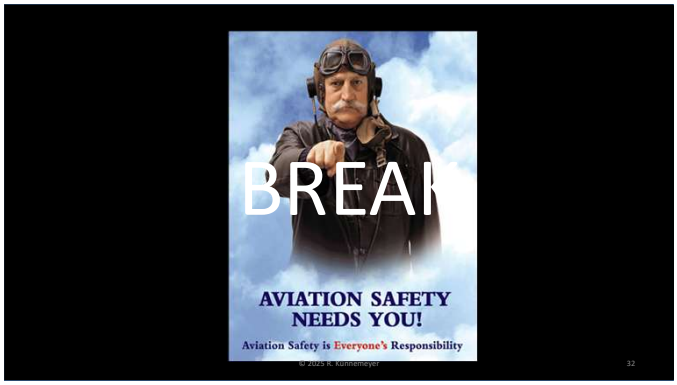
BREAK
AVIATION SAFETY
NEEDS YOU!
Aviation Safety is Everyone's Responsibility

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