



VICTORIA FLYING CLUB

# Contact Information

- Stephan Heinemann
- SMS: +1 (250) 891-5446
- Email: [stephan.heinemann@hotmail.com](mailto:stephan.heinemann@hotmail.com)
- Bookings, Questions



# Pilot Navigation

- Review Navigation (Ground School)
- Definition and Motivation
- Pilot Navigation
- Summary and Questions
- Pre-Flight Briefing

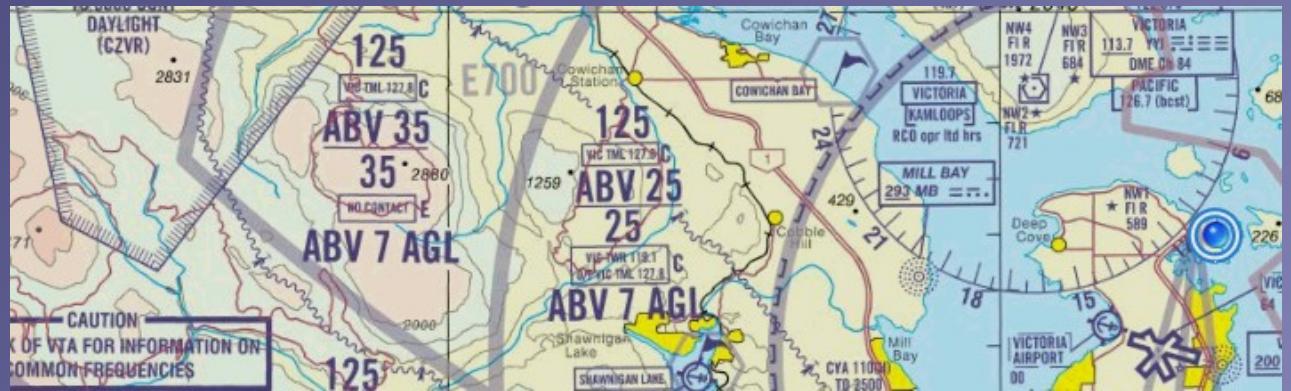


# Review Navigation

- What is the purpose of flight planning and preparation and how does it relate to the actual flight?
- What information is required to prepare a cross-country flight and where can it be obtained?
- What elements of a navigation log are filled in before and during the flight, respectively.
- What is a flight plan and itinerary, respectively?



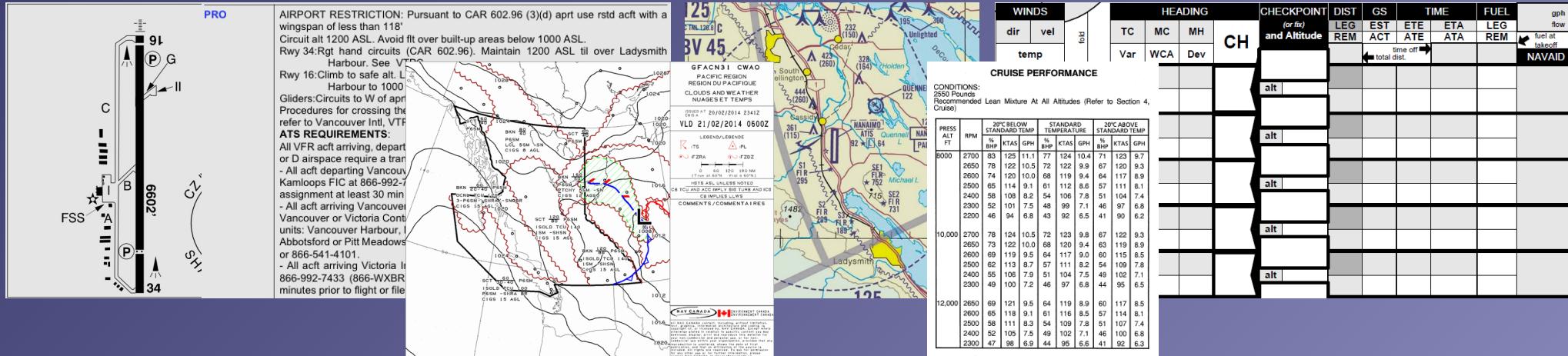
# Definition and Motivation



- *The process or activity of accurately ascertaining one's position and planning while following a route.*
- **Essential skill** to safely and efficiently travel from **departure to destination**
- Navigation **planning** establishes a level of **situational awareness** including potential options *before* the flight
- Supports **decision making** *during* the flight



# Preparation



- Charts, CFS, Weather (SWC, GFA, FD, METAR, TAF, AIRMET, SIGMET, PIREP), NOTAM, W&B, Performance, Navigation Log, Flight Plan, FIC Briefing & Flight Planning
- Aircraft (CoR, CoA, W&B, Insurance, Journey Log, POH, Checklists), Survival Equipment
- Pilot (License, Ratings, Medical), IMSAFE



# Navigation Log



# Navigation Log (Route)



# Navigation Log (Aircraft)



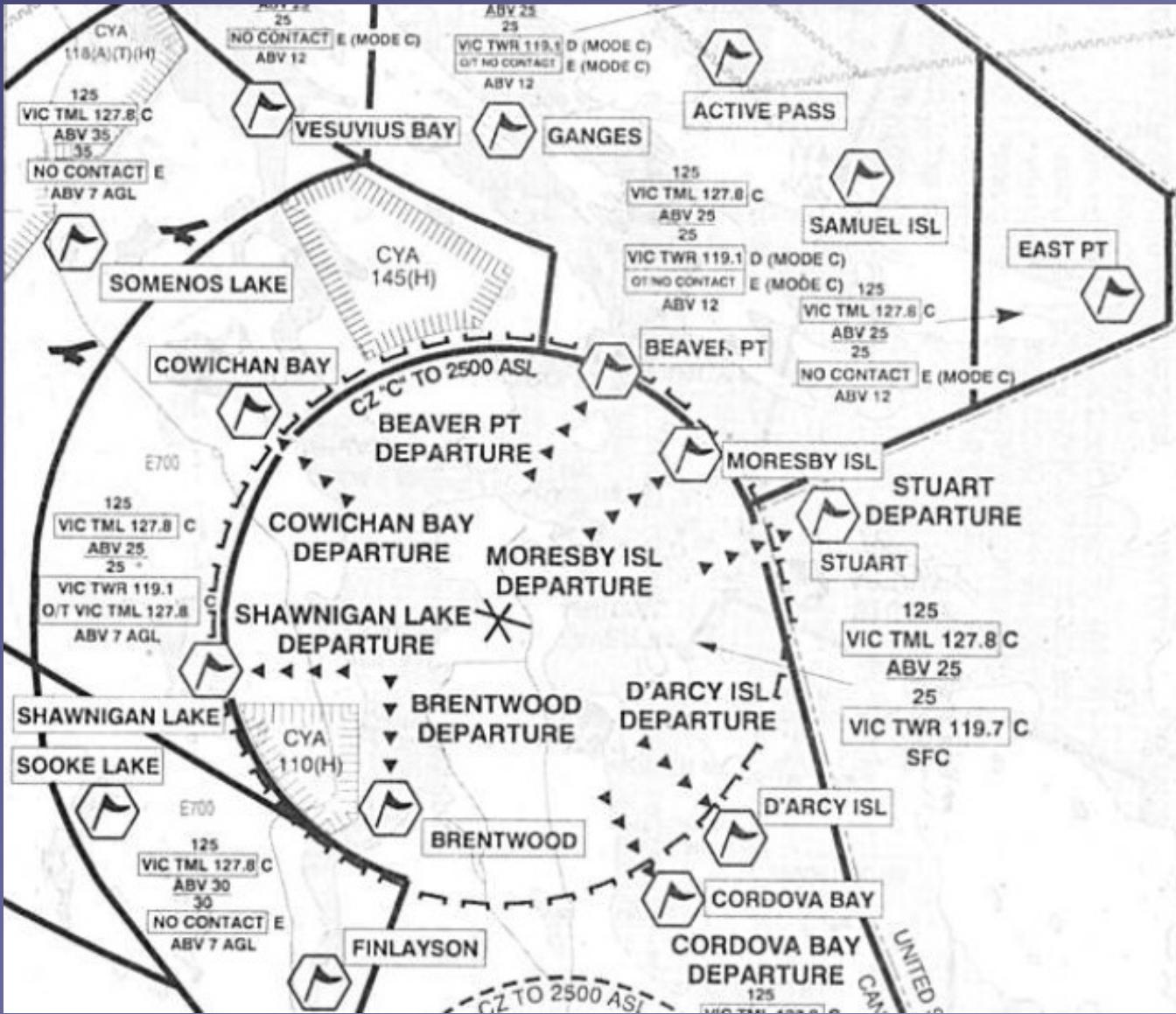
# Navigation Log (Weather)



# Navigation Log (Calculation)



# Victoria Standard VFR Departures



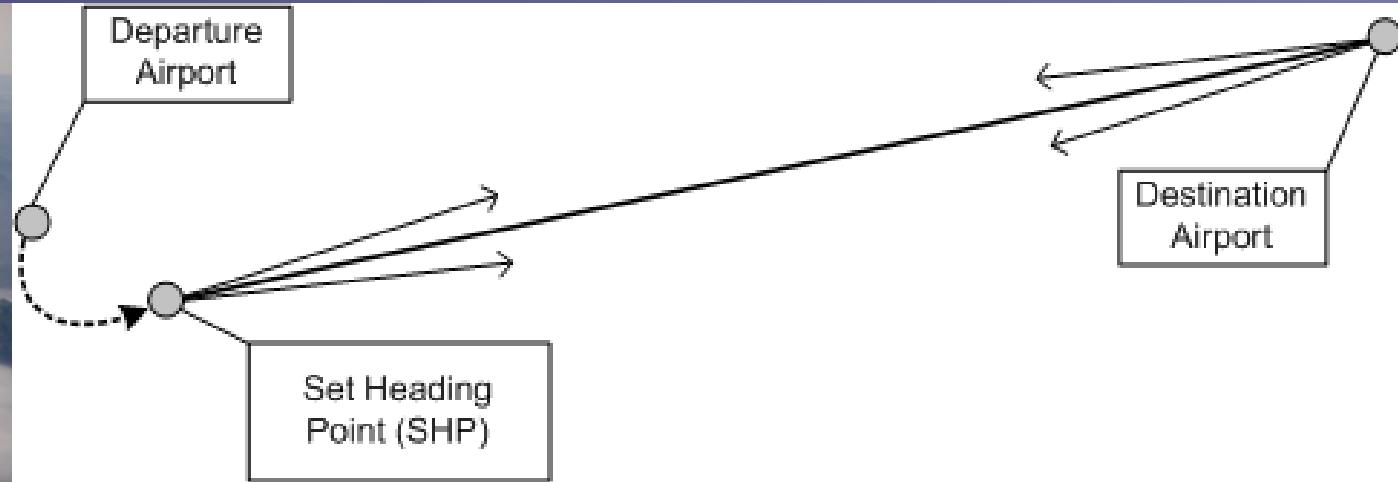


# Practical Considerations

- A plan remains a plan until it is put into action
- A plan should **prepare** and **guide** but *never* restrict you
- Do *never* let a plan limit your available **options**
- Be aware of *possible* Get-Home-itis – stay **flexible**
- **Situational awareness** and **adaptation** is *always* required
- Context: pilot, crew, passengers, weather, traffic, aircraft
- Cockpit organization: **terrestrial navigation** is done using a **chart** but not the navigation log – keep the **chart** on *top*



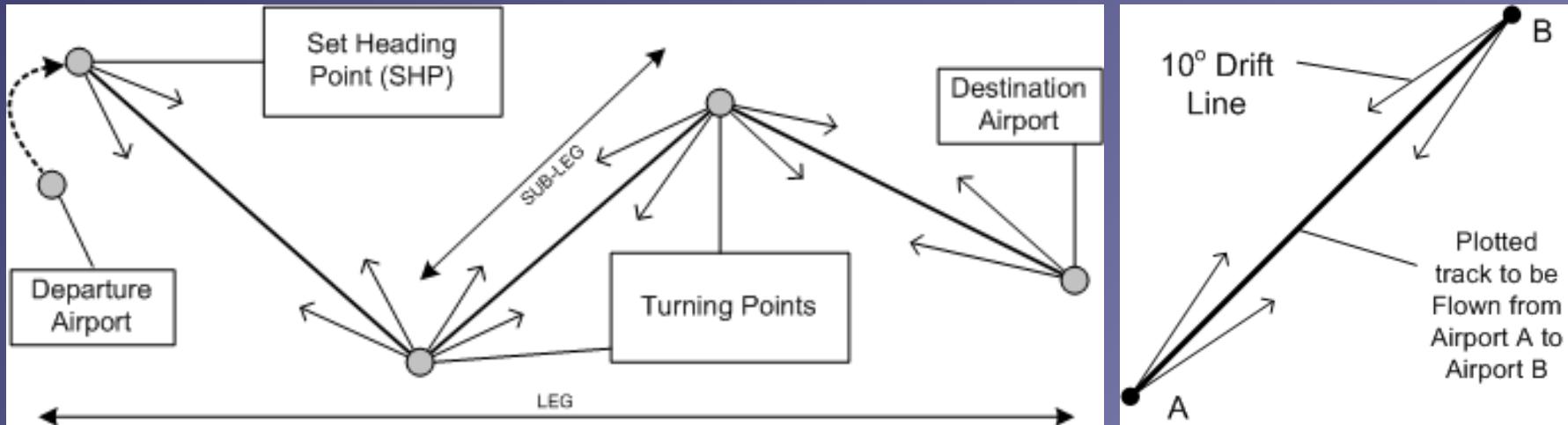
# Geographic Point Procedure



- Fly departure to **Set Heading Point**
- 5 T's – *Time, Turn, Throttle (Mixture), Tune, Talk*
- Enter *current Actual Time Over (ATO)* into navigation log
- Enter *next Estimated Time Over (ETO)* into navigation log
- Establish *planned heading* – heading indicator
- Crosscheck *visual angle and track* with *chart* and navigation log



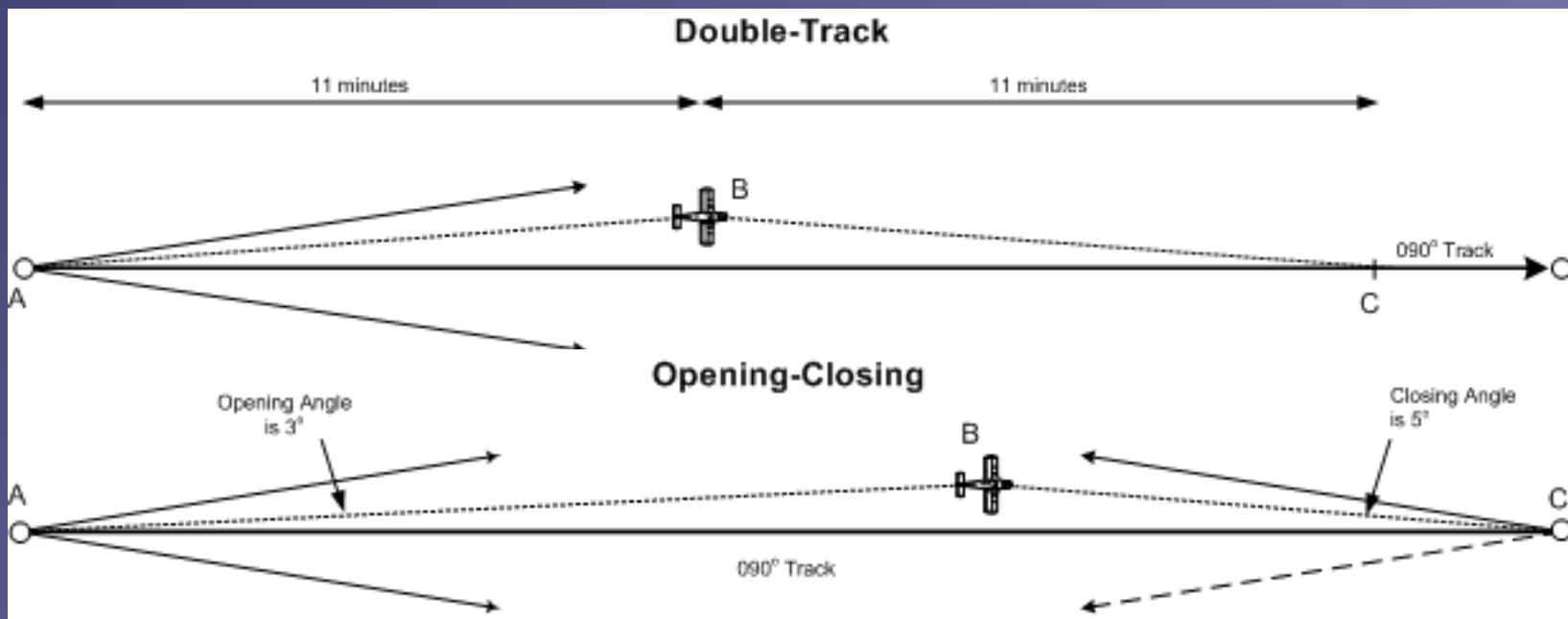
# Flying Legs



- 5 T's – *Time, Turn, Throttle (Mixture), Tune, Talk*
- Update **ETA** and *next ETO* at each waypoint
- Maintain **accurate heading** and observe *resulting track*
- Correct **drift** as required – update **heading**
- Check **ground speed** – update **ETA** and *next ETO*
- Perform **OPS / cockpit checks** every **15 to 30 min**



# Track Error Corrections



- **Visual Alteration** method – visual correction to desired track
- **Double Track Error** method – apply twice inverted drift angle
- **Opening Closing Angle** method – apply sum of both angles
- **Drift Compensation** method – maintain inverted drift angle



VICTORIA FLYING CLUB

# 1 in 60 Rule

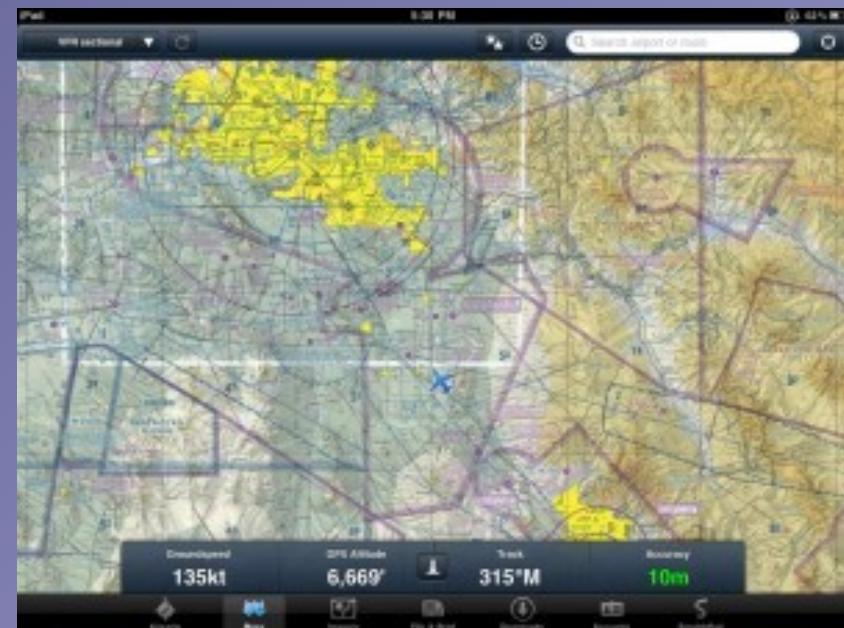




# Ground Speed Check



- **30 NM, 30 min → 60 kts**
- **30 NM, 15 min → 120 kts**
- **30 NM, 20 min → 90 kts**
- **10 NM, 5 min → 120 kts**
- **5 NM, 2.5 min → 120 kts**





# E6B GS Check and ETA Update

- GS Check:
  - **Distance** in **NM** on the *outside* ring over
  - **Time** in **min/hours** on the *inside* ring
  - Read **Speed** in **knots** on the *outside* ring over **60**
- ETA / ETO Update:
  - **Speed** in **knots** on the *outside* ring over **60**
  - Read **Time** in **min/hours** on the *inside* ring under
  - **Distance** in **NM** on the *outside* ring



# OPS / Cockpit Checks

*Magnetic Compass*



*Heading Indicator*



- Assure *navigational performance*
- Check power plant, fuel and electrical **systems**
- **Magnetic Compass, Heading Indicator** – Cross Check
- **Engine Instruments** (Fuel, Oil) – Check Green Arcs
- **Ammeter, Voltmeter** – Check No Discharge



VICTORIA FLYING CLUB

# Flight Plan / Itinerary

NAV CANADA		CANADIAN FLIGHT PLAN / ITINERARY PLAN / ITINERAIRE DE VOL CANADIEN	ICAO FLIGHT PLAN PLAN DE VOL OACI
PRIORITY / PRIORITE	ADDRESSEE(S) / DESTINATAIRE(S)		
<= FF =>		<=	
FILING TIME / HEURE DE DEPOT	ORIGINATOR / EXPEDITEUR	<=	
SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND/OR ORIGINATOR / IDENTIFICATION PRECISE DU(DES) DESTINATAIRE(S) ET/OU DE L'EXPEDITEUR			
3 MESSAGE TYPE TYPE DE MESSAGE <= (FPL)	7 AIRCRAFT IDENTIFICATION IDENTIFICATION DE L'AERONEF —	8 FLIGHT RULES REGLES DE VOL — <input type="checkbox"/>	9 NUMBER / NOMBRE TYPE OF AIRCRAFT / TYPE D'AERONEF —
13 DEPARTURE AERODROME / AERODROME DE DEPART —	WAKE TURBULENCE CAT. CAT. DE TURBULENCE DE SILLAGE / <input type="checkbox"/>	10 EQUIPMENT / EQUIPEMENT — <input type="checkbox"/> <=	15 CRUISING SPEED VITESSE DE CROISIERE ALTITUDE / LEVEL / NIVEAU ROUTE / ROUTE —
<= TIME / HEURE <=			



- Required for **advisory, control and alerting** service
- Required for all flights beyond **25 NM** of departure
- Filing with **FIC** at least **30 min** before departure, *alternatively*
- Filing with **FISE** *in-flight* if communication with **FIC** not possible
- Closing with **FISE** *in-flight*, control tower, **FSS** or **FIC**
- **SAR** times (**1 / 24 h** after **ETA** or as specified)



# Diversions



- *Circle, Circle, Line, Heading, Distance, Time*
- *Check your Fuel, Make a call and you'll be fine*
- **Fuel** (reserve) required and **weather** for alternate
- Consider **departure aerodrome** and **reciprocal** track
- Use terrestrial features for **visual navigation** (roads, rivers)
- Support with *all means of navigation (GPS, VOR, NDB)*



# Diversions



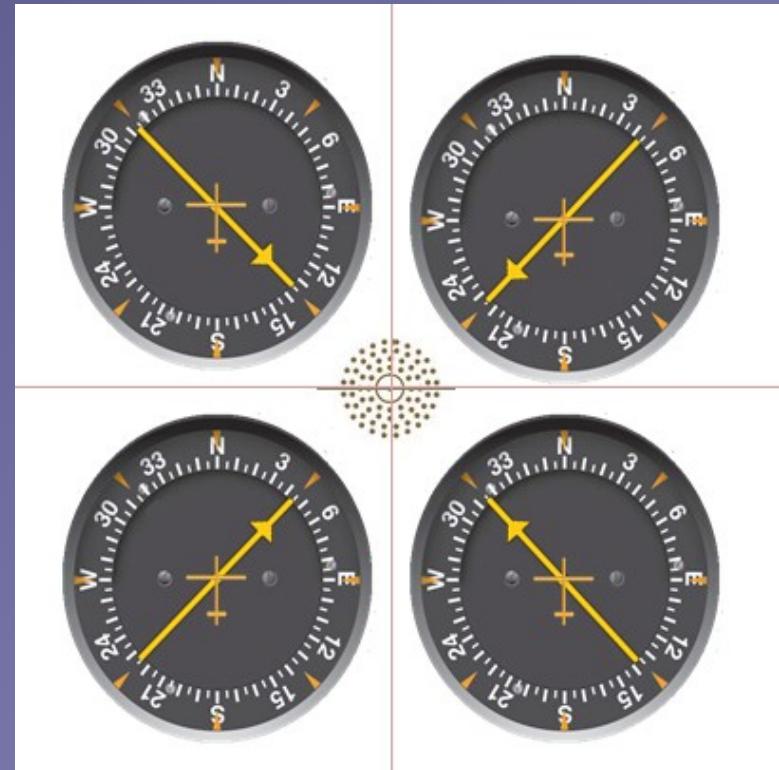


# Diversions





# Navigational Aids



- Navigational aids to support both *primary navigation* and *diversion*
- **GPS** – map and **direct to** (mounted, portable), aviation database
- **VOR** – **radial inbound or outbound, fix**
- **NDB** – **bearing to or from station**



VICTORIA FLYING CLUB

# Low-Level Navigation



- *Restricted field of view and limited navigational cues*
- Requires accurate tracking and timing
- Remain clear of obstacles – continue looking outside
- Use shorelines, rivers, roads, railways
- Consider precautionary landing or special VFR



# Navigational Assistance

- **Steady heading** – crosscheck MC and HI
- Navigation **errors** – verify heading, drift, landmarks
- **Circle of uncertainty** – last known position
- Apply *ground to map* versus *map to ground* as applicable
- Proceed to *major landmarks*, consider **climb**
- Request **assistance** – vectors, **DF** steer
- Consider **GPS**, **VOR**, **NDB** for support (be aware of **CFIT**)
- Declare urgency or emergency if necessary (**7700**, **ELT**)



# Summary / Quiz

- What preparation items need to be completed before commencing a cross-country flight?
- Which elements of a navigation log are filled in during the flight and why is an up-to-date log necessary?
- What are the problems associated with attempting to obtain a ground speed check within only a few minutes after setting heading?
- What track error correction methods are available to you and how can they be used?



# Pre-Flight Briefing

- Exercise
- Training Area
- Departure and Arrival Procedures
- Weather Briefing / NOTAMs
- Aircraft and Documents
- Time and Fuel Requirements
- Safety Considerations and Responsibilities



# Additional Materials

- Additional materials for Navigation
- Flight Instructor Guide – Exercise 23
- Flight Instructor Guide – Lesson Plans 3, 5, 26



# Planning Practice

- VNC, VTA, WAC, CFS Procedures
- Route and Alternate Selection, Chart Preparation
- Distance, Economy, Weather / Wind, Navigation Aids, Comfort, Oxygen, Performance Limitations, Gliding Distance, Facilities and Services
- Markings and Folding
- Drift Lines, Angles
- Weather and NOTAMs (AWSG), Briefings



VICTORIA FLYING CLUB

# Weather Products

- AWWs and AWSG
- GFA, SWC, FD
- METAR, TAF, SIGMET, AIRMET, PIREP
- Radar, Satellite and Web-Cams
- Briefing, FIC
- Current Situation and Forecast



# Navigation Log

- Log Keeping
- Time Off and Flight Plan Opening Time
- Set Heading Time
- Compass Headings and Waypoint Times
- ETA for Waypoints and Destination
- ATA (Time Over) for Waypoints and Destination
- Revised GS and ETA
- SAR times (long versus short plans, round trips)



VICTORIA FLYING CLUB

# Documents

- CoR, CoA, W&B, Insurance, Journey Log, MEL
- License, Medical, IMSAFE
- POH, Checklists, Charts



# Departure, Enroute and Arrival

- Overhead, Geographic Point, En-Route Climb
- GUMPS, OPS Checks, Ground Speed Check
- Position Reports, PIREPs
- Chart Reading: Orientation, Anticipation, Confirmation, Pin-Pointing
- Desired, Actual Track / Error, Angles (10-25 NM)
- Double Track Error Method, Visual Alteration, Opening Closing Angle Method, Drift Compensation Method
- Lookout / Scanning and Traffic Awareness (Crew, Systems, Weather)



# Diversion

- Priority: Aviate, Navigate, Communicate, Manage
- Circle, Circle, Line, Heading, Distance, Ground Speed, Time – Check Fuel, You'll Be Fine (Consider Leg-Size)
- Reciprocal Track and Wind Correction
- Estimations: Track, Distance, Ground Speed, Time, Heading
- Multiples of 60 KIAS, Multiples of leg section
- Communication (FISE)
- Circle of Uncertainty, Low-Level Navigation
- Emergency Procedures, Triangles