

VOR TrainingE (V1.0)

Flight created on 18.08.2024

Estimated flight duration 1h

Difficulty level easy-difficult (depending on flight mode)

Task: Train VOR navigation in poor visibility conditions.

Introduction:

In this mission you train VOR navigation with 2 different aircraft:

1) With the Maule, the flight is quite easy, thanks to the modern autopilot, 2 navigation displays and DME.

2) With the C69, the flight is much more difficult because the old autopilot only has a few functions. In addition, there is only one navigation display and no DME. You have to measure the distances to be flown using a stopwatch. There is no stopwatch built into the C69, so you have to have one ready, if necessary a cell phone with a stopwatch function will also work.

At the beginning you choose the aircraft:

1 Maule: A small, single-engine aircraft with modern equipment.

2 C69: A four-engine, large, old aircraft.

Then select the level of difficulty:

With help:

- Here you get help with VOR settings, flaps, altitude, wind direction, etc.
- The mission compass points to the next waypoint.
- With the Maule, you can also activate help for the autopilot.
- In the event of a missed approach, you will receive extensive help.

Without help:

- Here you get very little information, from an altitude of 8000 feet there is no further information until Sion.
- You can read the VOR settings in the kneeboard under Messages.
- Leaving the prescribed altitude or deviating too far from the course will cause the mission to fail without warning.
- You will receive a little help in the event of a missed approach.

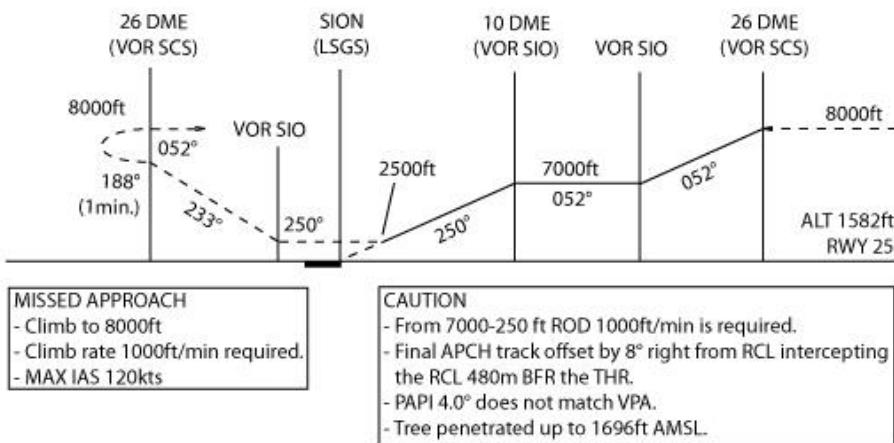
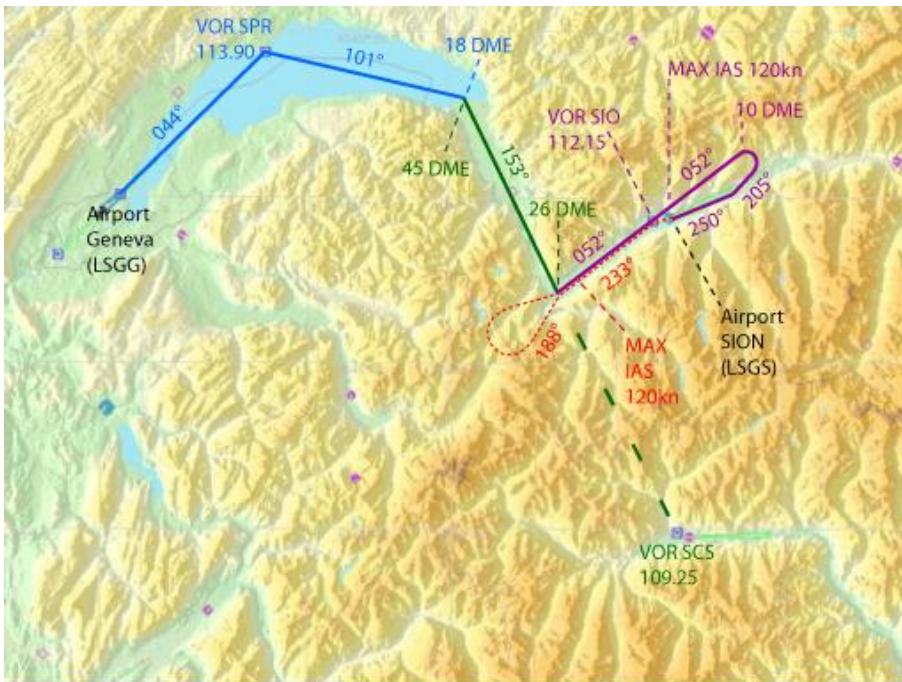
The flight:

You are in Switzerland, at Geneva Airport (LSGG). The flight takes you over Lake Geneva, to the right along the Rhone Valley to Sion Airport (LSGS).

The weather leaves a lot to be desired, as it is cloudy, windy and visibility is only just under 3nm.

That's why you have to stick very closely to the altitude information and follow the VOR course exactly to avoid flying into a mountain.

- 1) After take-off, fly on the 044° radial to the VOR SPR.
- 2) At the VOR SPR, turn right and leave the VOR on the 101° radial to 18DME.
- 3) At 18DME you set course for VOR SCS, up to an approach of 26DME.
- 4) From there turn left on the 052° radial to VOR SIO.
- 5) Leave VOR SIO on the 052° radial to 10DME.
- 6) Here the approach to Sion airport begins with a right turn.
- 7) If you do not see the runway in time, the missed approach procedure will start: Continue to fly to VOR SIO, exit the VOR on the 233° radial and climb to 8000 feet. At the crossing point (VOR SCS, 153° radial), perform a procedural turn and start a new approach (point 4).



(You will find this map in A4 size for printing in the storage directory).

Info about this card:

1) The chart does not correspond to the real approach chart for Sion.
 I have adapted it a little because the real chart is only intended for larger airliners that start their approach at 17000 feet.

2) Many abbreviations have been used on the map. If you don't know all the abbreviations, you can read them here:

ALT Altitude

AMSL Above Mean Sea Level

AP Autopilot

APCH Approach

BFR Before

DME Distance Measuring Equipment

FPM Feet per Minute

HDG Heading

IAS Indicated Airspeed

MAX Maximum

RCL Runway Center Line

ROD Rate Of Descent (FPM)

RWY Runway

THR Threshold

VOR Very High Frequency Omnidirectional Range

VPA Vertical Path Angle

Info about the flight:

1) VOR SPR:

Shortly before the VOR SPR you must set the new heading to 101°. The AP follows the HDG and therefore remains on course. You can still recognize when you have flown over the VOR by the display.

Maule

C69

This is what the display looks like before the changeover:

Arrow up

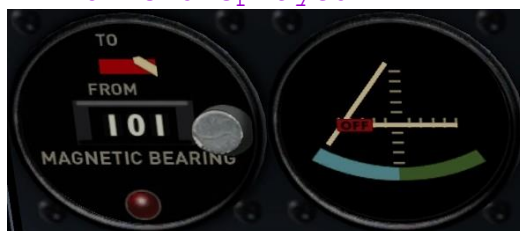
TO is displayed



The display after the changeover:

Arrow up

TO is displayed



Now you are directly above the VOR.

Arrow is gone TO/FROM is horizontal



After the flyover:

Arrow down FROM is displayed



This is what the flight curve looks like when you fly over the VOR:



You have to fly the turn at about 121° to pick up the 101° radial.

2) VOR SCS:

The new frequency and the radial are set before the VOR SCS. The AP follows the HDG, i.e. remains on course.

- NAV2 is already set correctly on the Maule, so you simply follow NAV2 when changing course.

- The C69 only has a VOR display, so the new frequency and the radial are set using a stopwatch.

The VOR SCS is 45DME away, so the needle of the VOR indicator moves very slowly. Approaching the correct radial is relatively easy.

3) VOR SIO:

Shortly before the VOR SIO, set the frequency and radial appropriately.

- NAV1 standby is already set correctly on the Maule, so just switch to active and set the heading to 052° .

Now you can observe how the VOR1 needle slowly swings to the center.

- More work is required for the C69: NAV frequency and radial must be adjusted. The AP follows the HDG, so it stays on course. You can only see when the VOR needle moves towards the center.

Tip: As soon as the needle moves minimally, you must immediately turn to the new radial, as the C69 flies faster than the Maule. The turn radius is larger and you will probably have to fly over the radial and "counter-steer" in order to pick up the radial.

This is what the curve looks like when flown with the Maule:



4) Approach:

If the approach altitude is correct, you will have visual contact about 3nm before the runway.

- With visual contact, approach the runway and land.
- If there is no visual contact, the missed approach procedure is used.

If you wish, you can remain at an altitude of 2500 feet despite visual contact with the runway and practice a missed approach. You will receive appropriate instructions when flying over the runway.

Requirements:

To successfully complete the flight, you must comply with the following values:

Flight altitude:

With help: Flight altitude +/-100feet will be claimed, but tolerated.

So you can correct accordingly.

Without help: The flight will fail if 200 feet too low.

At 9000 feet the flight fails because you are flying much too high.

Too high" is not monitored more precisely, you simply won't make the approach if you fly too high.

Speed:

From VOR SIO do not fly faster than 120 knots/140mph.

It is better to fly a little slower (100-110 knots) than too fast.

With help: At 130 knots/150mph you will receive a warning, at 140 knots/161mph the flight will fail.

Without help: At 140 knots/161mph the flight fails without warning.

Course:

The further away from the approached VOR, the smaller the deviation of the VOR needle.

Therefore, if the distance to the VOR is large, you must react to even small deviations of the needle.

With help: Here you are warned if the needle deviates visibly (1-2 needle widths from the center), if you deviate even further from the course (around 200m/650 feet further away from the course), the flight fails.

Without help: The flight will fail without warning if you deviate too far from the course.

Further requirements for flying without assistance:

If the following requirements are not met, problems will occur. Sion may no longer be accessible.

You can attempt an emergency landing at Geneva Airport.

This will not be easy with the poor visibility.

Maule propeller speed: After take-off, reduce the propeller speed to 2400RPM.



If the propeller speed is not reduced after starting, an oil leak will occur.

If the propeller speed is still not reduced, the oil leak will increase.

The "Oil Pressure" display shows wonderfully how the Maule is slowly dying:

Pressure normal



Pressure zero



- With a small oil leak you can still reach Sion airport.

If you wish, you can deliberately leave the propeller speed at maximum to provoke a slight oil leak.

If the oil leak occurs, reduce the propeller speed.

This way you can practise flying to Sion with an oil leak.

It's kind of fun to watch the oil pressure gauge and hope with beads of sweat on your forehead that the engine will last until you reach the airport.

- If the "major oil leak" occurs before you reach 8000 feet, you will have to turn around and make an emergency landing at Geneva Airport.

If you want, you can leave the propeller speed at max. even if there is a slight oil leak.

This way you can practise an emergency landing at Geneva airport.

C69 Cooling air flaps, power and propeller speed:

Cooling air flaps:

- Open before take-off.
- Close at 8000 feet.
- Open from 7500 feet during descent.

Power and propeller speed:

After take-off, reduce power and propeller speed to the green range.

Power 100%

Propeller 100%



Power 80% OK

Propeller 85% OK



If the **cooling air flaps, power and propeller speed** are not handled correctly, a fuel leak will occur.

If there is still a fault after some time, the fuel leak will become larger.

- With a small fuel leak you can still reach Sion airport.

If you want, you can deliberately set the cooling air flaps, power, or propeller speed incorrectly to provoke a slight fuel leak.

If the fuel leak occurs, correct the settings.

This way you can practice the flight to Sion with an fuel leak.

It's kind of fun to watch the fuel gauge and hope with beads of sweat on your forehead that the fuel will last to the airport.

Tip: In the event of a fuel leak, the C69 will become continuously

lighter, so you must constantly readjust the pitch in the autopilot to maintain altitude!

- If the "major fuel leak" occurs before you reach 8000 feet, you will have to turn around and make an emergency landing at Geneva Airport.

If you want, you can deliberately leave the settings incorrect. This way you can practise an emergency landing at Geneva Airport.

Info about the Maule:

You should be familiar with most of the instruments, so here are just the special ones:

Overview 2D-Cockpit



Overview 3D cockpit



1) Course position display (NAV1):

Here the line moves to the left/right:

On course slightly right strongly right



The button at the bottom left sets the NAV course. (Tooltip does not help here when setting the course).
The button at the bottom right sets the HDG course. (Tooltip helps when setting the course.)

2) NAV2:

Here the needle swivels to the left/right:
On course slightly right strongly right





The switch must be set to NAV!

6) Oil pressure:

Pressure normal



Pressure zero



7) Radio group: (The radio group must be activated separately in the 2D cockpit).

- The red frame shows the settings for NAV1:

White shows the active frequency, yellow the standby frequency. Use the button in the orange frame to switch between active/standby.

- The settings for NAV2 are in the green frame (displays and switches as for NAV1).

- The DME is in the purple frame:

On the left is the distance in nm, next to it the speed in knots, relative to the DME. In the light blue frame is the switch for NAV1/2.

(Distance and speed are only displayed for one VOR, so you have to switch if necessary).



Info about the C69:

- 1) This aircraft is normally flown by 3-4 people. Pilot and co-pilot in the front and 2 more people in the back who adjust flaps, cooling air flaps, mixture, propeller speed, etc. and monitor the instruments. You have to do everything on your own.
- 2) The autopilot in old aircraft works slightly differently than in modern airplanes:



Autopilot On/Off: Activates heading and pitch.

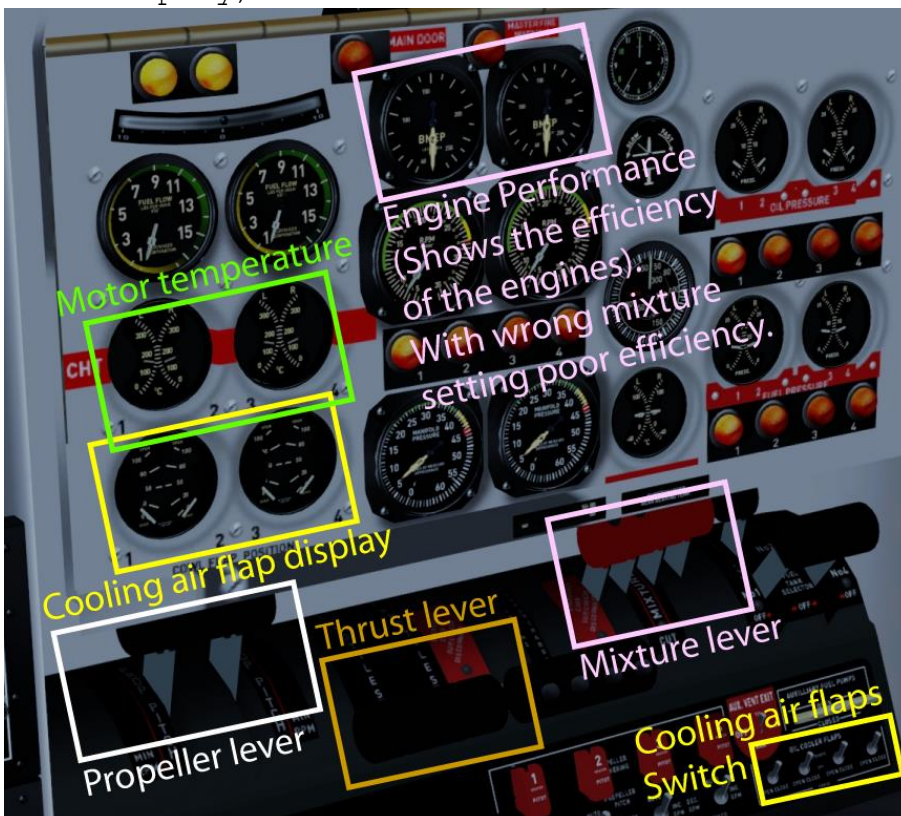
Heading (HDG): is as usual, set heading 100 and you will fly in this direction.

Pitch: This is the replacement for climb rate. You want to climb to 8000 feet at 1000 feet/min.

Set Pitch to approx. 11, then you will achieve approximately this climb rate.

Depending on the power, you will have to make corrections and when you reach 8000 feet, reduce the power and correct the pitch in the autopilot (probably to +2 to 0).

3) In the rear area you will see the following instruments (Look to the rear right, or switch through the views to get to this display):



Here you can adjust thrust, propeller speed, mixture, cooling air

flaps and monitor temperatures.

4) You will sometimes have to maintain a certain speed during this flight.

Here are some of the required speeds:



5) The NAV display looks like this.

Here the needle swings to the left/right:

On course slightly right strongly right



The NAV rate is set on the left.



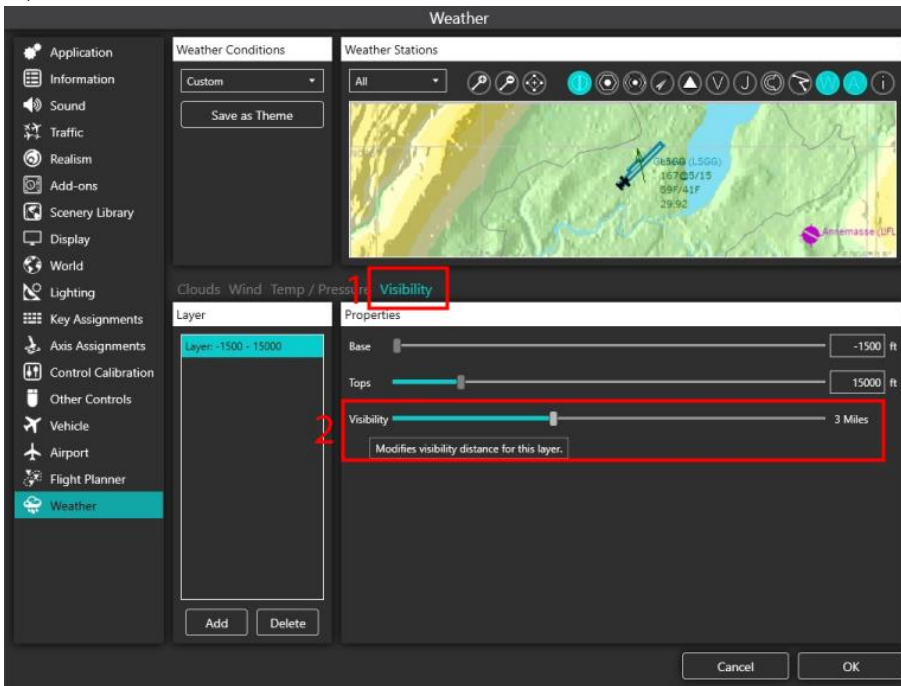
Tip:

If you have problems with the poor visibility, you can extend the visibility from 3nm to 30nm for practice purposes in the weather.

To do this, click on World/Weather.



- 1) Switch to Visibility.
- 2) Set the slider to 30nm.



I hope you enjoyed this flight, if so please give feedback to p3d@andi20.ch . Also send error messages (spelling mistakes, wrong information, etc.) to p3d@andi20.ch, I appreciate any feedback.