Visual Tutorial

VOR Simulator

Adobe (formerly Macromedia) Flash Requirements

Thank you for using the VOR simulator from **luizmonteiro.com**. Please note that this tutorial is designed to help you learn how to use the simulator, however, it is not designed to teach you how to use a VOR. If you would like to know how to use a VOR there are several resources available, including the Instrument Flying Handbook published by the FAA (Federal Aviation Administration in the USA). At the time this tutorial was written an Adobe PDF version of the handbook could be found at the following web site:
http://www.faa.gov/library/manuals/aviation/

Before you begin using the simulator, please make sure that your browser has the Adobe (formerly Macromedia) Flash version 8 or higher. If you do not have this you may go to the Adobe website at:
http://www.adobe.com and go to the downloads section where you will be able to download and install the latest version.

The VOR Simulator web page will also run a test (Flash Version Detector) to check which version is installed in your browser. If you have at least version 8 installed the following message will appear on the page right before the simulator section:

> A query on your Flash viewer's version returned the following: Version 8
> Congratulations! You have the correct version of Flash.

If your browser has an older version which will not allow the simulator to function correctly the following message will appear:

> A query on your Flash viewer's version returned the following: Version 7
> The version of Flash on your computer must be updated
> Please visit the Adobe site below for the latest version of flash.

VOR Simulator Application Parts

Horizontal Panel / Horizontal Navigation View

Flash Version Detector

Navigational Aid Type Selector

Settings Section

Information Section

VOR Instrument

Vertical Navigation View

VOR Simulator Application Parts (cont.)

Navigational Aid Symbol

Cone of Confusion

Projection Flags

From Region

Compass Rose

To Region

Aircraft Horizontal Symbol

Projection Flags

To / From Legend

Projection Flags

Aircraft Vertical Symbol

Glide Slope Symbol

Navigational Aid Type

VOR

| VOR |
| VOR DME |
| VORTAC |
| LOC |
| LOC Glide Slope (ILS) |
| LOC Back Course |
| LDA |
| SDF |

Horizontal Navigation

Navigational Aid Type
VOR

Settings
☑ Show Compass Rose
☑ Show To / From Region
☑ Show Projection Flags
☑ North Up / Heading Up

Information
Heading: 045°
OBS Setting: 030°

Altitude AGL: 05000ft

To
From

Not to scale   Vertical Navigation

OBS

Additional Parts

Horizontal Navigation

Navigational Aid Type
LOC Glide Slope (ILS)

Settings
☑ Show Compass Rose
☑ Show To / From Region
☑ Show Projection Flags
☑ North Up / Heading Up
Inb. CRS: 20

Information
Heading: 045°
OBS Setting: 030°

Altitude AGL: 05000ft
DME Dist.*: 11.3 Nm

To
From

Not to scale   Vertical Navigation

VOR Simulator Application Parts (cont.)

Flash Version Detector
Used to check which version of Macromedia Flash is installed in your browser. If you have Version 8, the VOR simulator will operate correctly. If you have a previous version you must upgrade to the latest version in order for the simulator to function properly.

Horizontal Panel
Displays the horizontal position of the aircraft in relation to the navigational facility the same way an IFR enroute chart or an approach plate's plan view would.

Vertical Panel
Displays the vertical position of the aircraft in relation to the navigational facility the same way an approach plate's profile view would. It is used for several purposes:
1) Simulate the effects of the cone of confusion which increases with altitude
2) Simulate the slant range error in DME readings
3) Enable the simulation of the glide slope

Navigation Aid Type Selector
Is used to select the type of navigational facility. Some features such as DME or glide slope will only work with certain types of facilities.

Settings Section
Use this section to select and activate different features.

Information Section
Displays information such as heading, altitude, DME distance and OBS setting. (This section cannot be changed by the user).

VOR Instrument
Similar to the one found on many aircraft instrument panels, this VOR incorporates a glide slope function as well. The VOR's display will be dependent on the Navigational Aid (navaid) chosen, the aircraft's position and the OBS setting (except for Localizer type aids).

Navigational Aid Symbol
Represents the Navigational Aid selected and is similar to the representation found on aeronautical charts.

Cone of Confusion
An area around the navigational facility where adequate navigation signals are not received and will cause the NAV flag to show continuously (simulated) or intermittently in an actual aircraft (not simulated). This area increases with altitude and is shown as a beige circle at the center of the navigational facility (navaid)

From Region
Shows on the Horizontal Navigation panel the region where the VOR flag will display From if the aircraft is positioned in the From region regardless of heading.

Compass Rose
Used as an aid to show the orientation of the Horizontal Navigation panel. It serves the same purpose as the compass rose symbol on IFR enroute charts to show direction in relation to the magnetic north.

To Region
Shows on the Horizontal Navigation panel the region where the VOR flag will display To if the aircraft is positioned in the To region regardless of heading.

Aircraft Horizontal Symbol
Used to show aircraft's horizontal position in relation to the navigational facility (navaid)

Projection Flags
IFR approach plates have a profile view that displays the sideways vertical projection of the approach course. The projection flags serve to help visualize how and where this projection is made from the Horizontal Panel view. Notice how the aircraft moves on the Horizontal panel when it is dragged on the Vertical panel and vice versa. The movement is made in alignment with the projection flags.
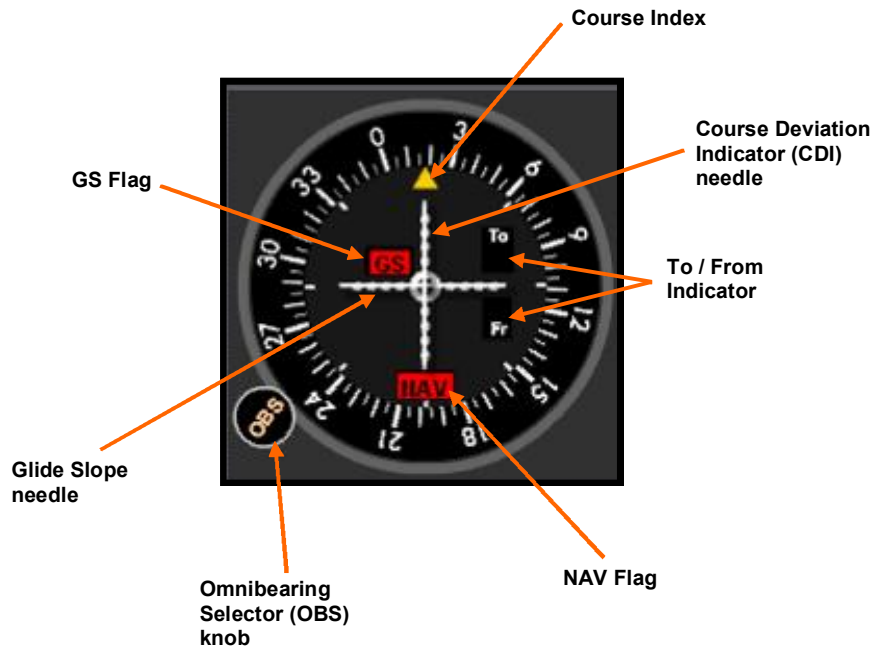
Aircraft Vertical Symbol
Used to show the aircraft's vertical position in relation to the navigational facility (navaid)

Glide Slope Symbol
When applicable to the navigational facility (navaid), displays the glide slope path referenced by the instrument.

VOR / Glide Slope Components

Course Index
Points to the course selected by the OBS

Course Deviation Indicator (CDI) needle
Shows aircraft's deviation from the course. Sensitivity depends on the type of navigational facility (navaid).

To / From Indicator
Shows an arrow flag pointing to the appropriate To or From region if the aircraft is positioned there and adequate signals are received.

NAV Flag
When not receiving adequate VOR or Localizer signals such as when the aircraft is out of range or in the cone of confusion, the NAV flag will be displayed

Omnibearing Selector (OBS) knob
Selects the course referenced by the VOR instrument

Glide Slope needle
If the navigational facility has a glide slope, positioning the aircraft above or below the glide slope causes the glide slope needle to move in the opposite direction (provided the aircraft is within rage of the signal)

GS Flag
When not receiving adequate Glide Slope signals, such as when the aircraft is out of range, the GS flag will appear.

Moving Aircraft

Moving Horizontally
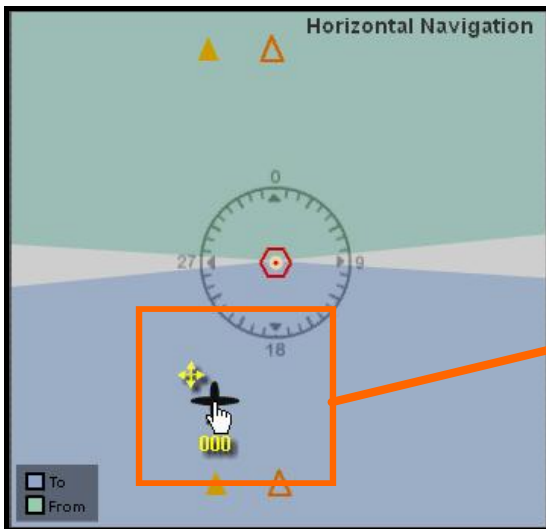
Move Icon
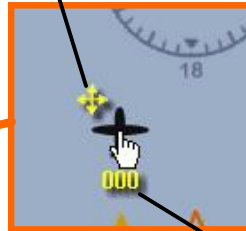
Step 1
On the horizontal navigation panel move mouse pointer on the aircraft symbol until the yellow move icon appears
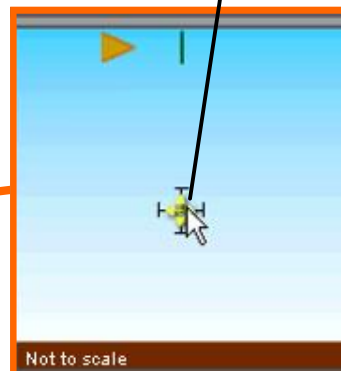
Aircraft Heading

Step 2
Hold left mouse button down and drag aircraft to desired location and then release mouse button

Moving Vertically
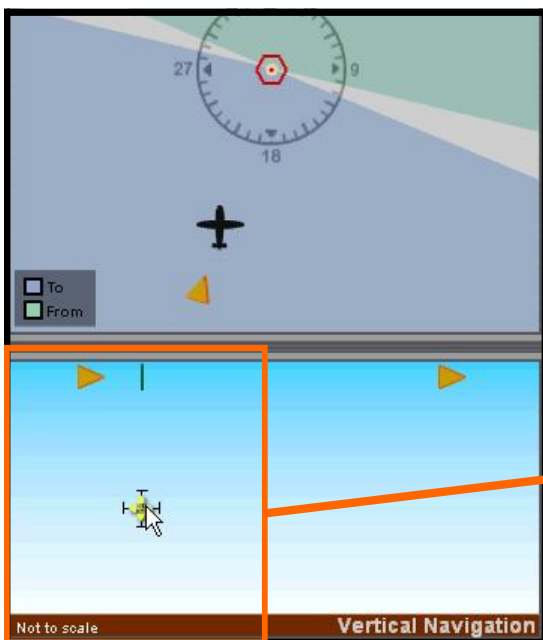
Move Icon

Step 1
Move mouse pointer until the yellow move icon appears

Moving Aircraft

Moving Vertically (cont.)

Not to scale — Vertical Navigation

Cone of Confusion

Cone of Confusion
Notice that the cone of confusion increases as the aircraft's height increases. One of the reasons vertical movement is featured is to simulate the cone of confusion

Not to scale

Step 2
Hold left mouse button down and drag aircraft up or down to change altitude then release mouse button

Note that it is also possible to move the aircraft horizontally using the vertical panel. When dragging the aircraft left to right/right to left in the vertical panel, the aircraft will also move horizontally parallel to the projection flags.

Question:
What is the purpose of the Vertical Navigation panel?

Answer:
The Vertical Navigation Panel serves three purposes, which are:
      1) Simulate the effects of the cone of confusion which increases with altitude
      2) Simulate the slant range error in DME readings
      3) Enable the simulation of the glide slope

Setting Aircraft Heading

Rotating Aircraft (North Up Selected)

One Degree Clockwise Rotate Icon

Aircraft Heading

Step 1
Move mouse pointer until the rotate icon appears

Step 2
Hold left mouse button down until desired heading is selected
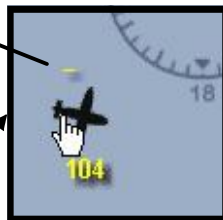
Five Degree Clockwise Rotate Icon
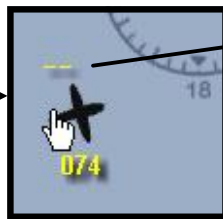
Ten Degree Clockwise Rotate Icon

Rotating Clockwise Faster
Move mouse slightly right until ++ or +++ appears and either click left mouse button or if already holding button continue to hold mouse button down until desired heading is selected

One Degree Counterclockwise Rotate Icon

Five Degree Counterclockwise Rotate Icon

Ten Degree Counterclockwise Rotate Icon

Rotating Counterclockwise
Counterclockwise heading change is done in a similar fashion to clockwise except that the mouse is moved slightly to the left

Setting Aircraft Heading (Cont.)

Rotating Aircraft (Heading Up Selected)

One Degree Clockwise Rotate Icon

Step 1
Move mouse pointer to the right side (clockwise rotation) of the Navaid until the rotate icon appears
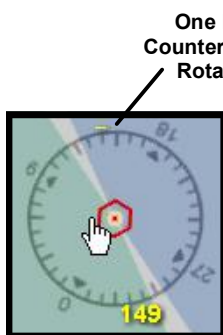
Heading Value

North Up Deselected and Heading Up Selected

Five Degree Clockwise Rotate Icon

Step 2
Hold left mouse button down until desired heading is selected. Move mouse further to the right side if a greater rate is desired.

Ten Degree Clockwise Rotate Icon

Greater Rate
Greater rate is obtained by moving the aircraft further to the side of the Navaid. Moving right of the Navaid increases Heading

One Degree Counterclockwise Rotate Icon

Five Degree Counterclockwise Rotate Icon

Ten Degree Counterclockwise Rotate Icon

Rotating Counterclockwise
Counterclockwise heading change is done in a similar fashion to clockwise except that the mouse is moved slightly to the left

Setting Aircraft Heading (cont.)

Note that when changing the heading with heading up mode selected it may appear that the aircraft is moving around the Navaid, but in reality it is not. In this example the aircraft has always remained in the same location only the heading has changed.

Heading Change
Different heading but the aircraft is in the same position

North Up
When switching back to the North up mode the aircraft still remains in the same position even though it may seem that the aircraft has moved around the Navaid

Setting the OBS

Changing the OBS Setting

Changing the OBS setting is done in a similar fashion as setting the aircraft's heading. Move cursor slightly right or left of the OBS knob until the "+" (right) or "-" (left) appears. Hold left mouse button down until desired setting is reached. For faster rate, move mouse slightly more to the side until the "++", "+++", "- -", or "- - -" sign appears.

Increasing the OBS Setting

OBS Knob

OBS Setting

Knob Rotation Icon

Decreasing the OBS Setting

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VOR / Localizer and Glide Slope Simulation

Inb. CRS: 20

Information
Heading: 033⁰
OBS Setting: 018⁰

Altitude AGL: 03400ft
DME Dist.*: 11.4 Nm

To
From

Not to scale   Vertical Navigation

CDI needle deflection

Course Deviation Needle Deflection
Positioning the aircraft left or right of course will cause needle to deviate. The direction depends on several factors.

North Up / Heading Up
Inb. CRS: 20

Information
Heading: 033⁰
OBS Setting: 018⁰

Altitude AGL: 03400ft
DME Dist.*: 11.4 Nm

To
From

Not to scale   Vertical Navigation

CDI needle deflection

www.luizmonteiro.com

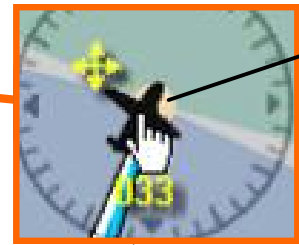## VOR / Localizer and Glide Slope Simulation (cont.)
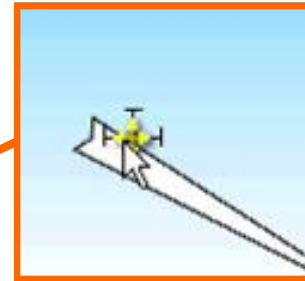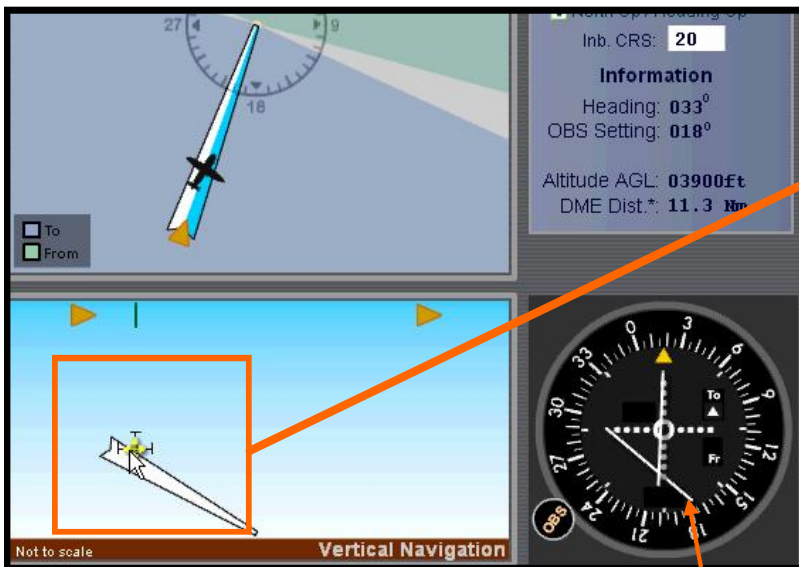
Glide Slope Deviation Needle Deflection
Positioning the aircraft above or below glide slope causes glide slope needle to move in the opposite direction

Glide Slope needle deflection
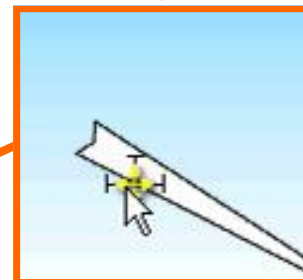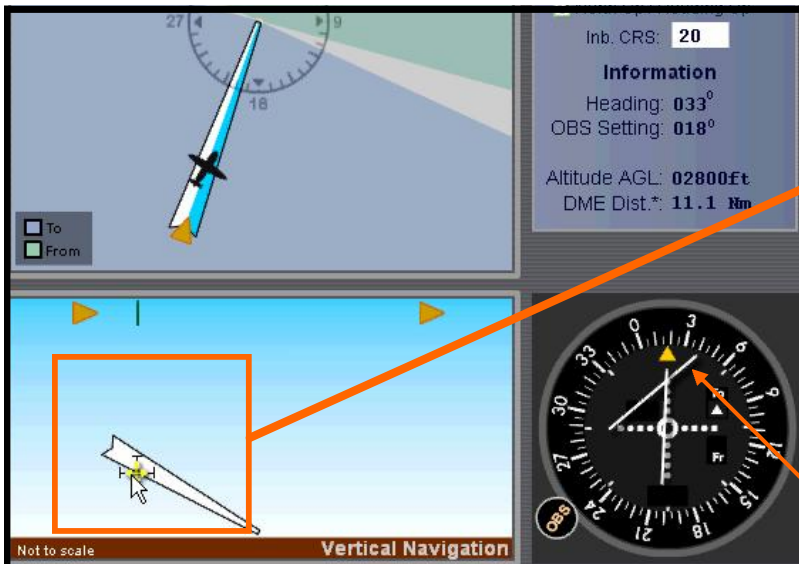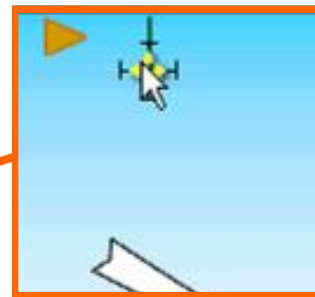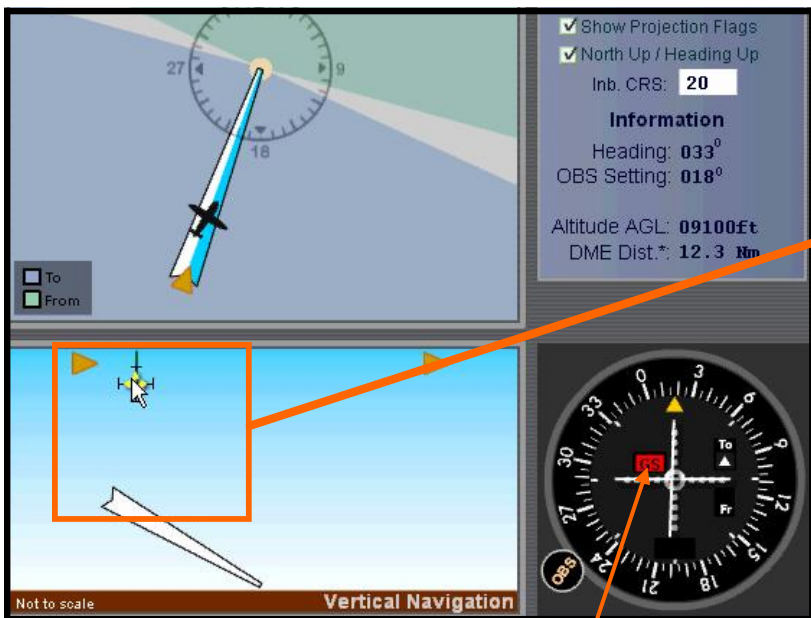
Glide Slope needle deflection

VOR / Localizer and Glide Slope Simulation (cont.)

Cone of Confusion

NAV Flag
When not receiving adequate VOR or Localizer signals such as when the aircraft is out of range or in the cone of confusion, the NAV flag will be displayed

NAV Flag

GS Flag
When not receiving adequate Glide Slope signals, such as when the aircraft is out of range, the GS flag will appear. In this case the aircraft is too high.

Glide Slope (GS) Flag

End

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