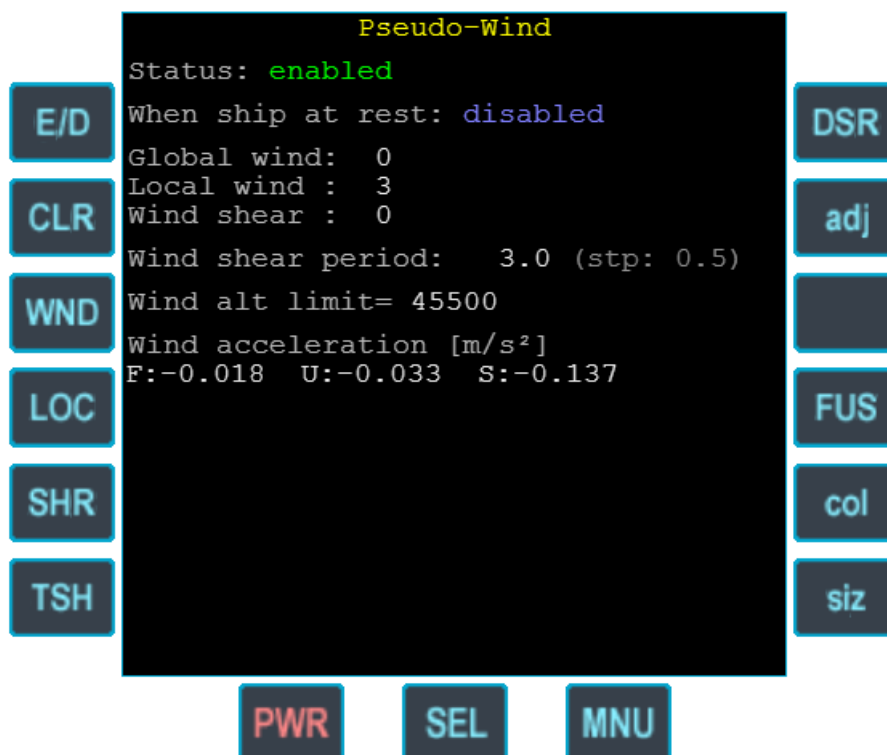


# Pseudo-Wind MFD

An Orbiter add-on to simulate the effect of the wind on the focused ship



## 1. Version history

Version	Date	Changes
1.1.0	2015-10-12	Added an on-screen indication of the ship's velocity components; added the display of the acceleration exerted by the wind; slightly reduced the wind strength; improved the realism of the local wind and wind shear; the parameters are now increased/decreased with the left and right mouse buttons instead of two MFD buttons.
1.0.0	2015-09-24	First release.

## 2. Introduction

This add-on realistically simulate the effect of the wind on the focused ship.

Since in Orbiter the ground speed is always locked to the true airspeed, there is no way to accurately simulate the wind, hence the name "Pseudo-wind" (for simplicity's sake, in this manual the term "wind" will be used instead of "pseudo-wind").

This add-on works for any celestial body with an atmosphere. Since *Pseudo-Wind MFD* correctly takes into account the atmospheric density, the effect of the wind at low altitudes is stronger than that at high altitudes.

## 3. Installation

Unzip the archive to the Orbiter root folder maintaining the folder structure. The file "PseudoWindMFD.dll" will be unpacked in "<Orbiter\_root>\Modules\Plugin" folder.

Activate the add-on via the Launchpad dialog → Modules and then click on the checkbox "PseudoWindMFD".

If you have the version 1.0.0, simply overwrite the old files. The file "PseudoWindMFD.cfg" is compatible with the new version (new keys will be added).

This add-on needs the files msvcp110.dll and msucr110.dll; you may already have them installed. You can install the "Visual C++ Redistributable Packages for Visual Studio 2012" from this link: <http://www.microsoft.com/en-us/download/details.aspx?id=30679>.

## 4. Quick start

- 1) Start the simulation;
- 2) select *Pseudo-Wind MFD*;
- 3) press "E/D" (to show "Status: **enabled**");
- 4) increase the levels by right clicking the "WND", "LOC" and "SHR" buttons;
- 5) take off (the "E/D" button can be pressed also while the ship is flying inside or outside an atmosphere).

## 5. Description

When the MFD is not shown, this add-on works in the background; in other words, the wind is active even when this MFD is not shown.

The wind will be present from the ground to an altitude where a 100 m/s wind would generate a dynamic pressure equal to 1 Pa. That altitude, expressed in meters, is shown in the MFD as "Wind alt limit".

This add-on creates the file "<Orbiter\_root>\Modules\Plugin\PseudoWindMFD.cfg" to store the MFD statuses for all the combinations of ship's class and celestial body flown by the user.

## 5.1. Type of wind

This add-on simulates three types of wind effects:

MFD label	Type of wind
Global wind	It's the wind present on the whole celestial body's atmosphere. The wind strength and direction change with the altitude, but the vertical profile is exactly the same at any location of the celestial body. Several layers of steady wind are generated.
Local wind	Simulate a local variation of the global wind.
Wind shear	This is simulated as a head wind gust that suddenly changes its direction of about 180° and then it weakens.

The three types of effects are added vectorially and the components are applied on the ship's barycenter.

## 5.2. On-screen labels

*Pseudo-Wind MFD* can optionally show the ship's velocity components (true airspeed) directly above the HUD direction indicator. This visual helper could be useful during the vertical landing in presence of the wind. The maximum displayed value is  $\pm 99.9$  m/s and the labels are only displayed when the ship's altitude is less than 1 km.

Label	Meaning	Direction	Ship's axe
F	Forward	Longitudinal	+z
U	Up	Vertical	+y
S	Starboard	Lateral	+x

The table shows the meaning of the labels and the corresponding ship's axe in the ship's reference frame.

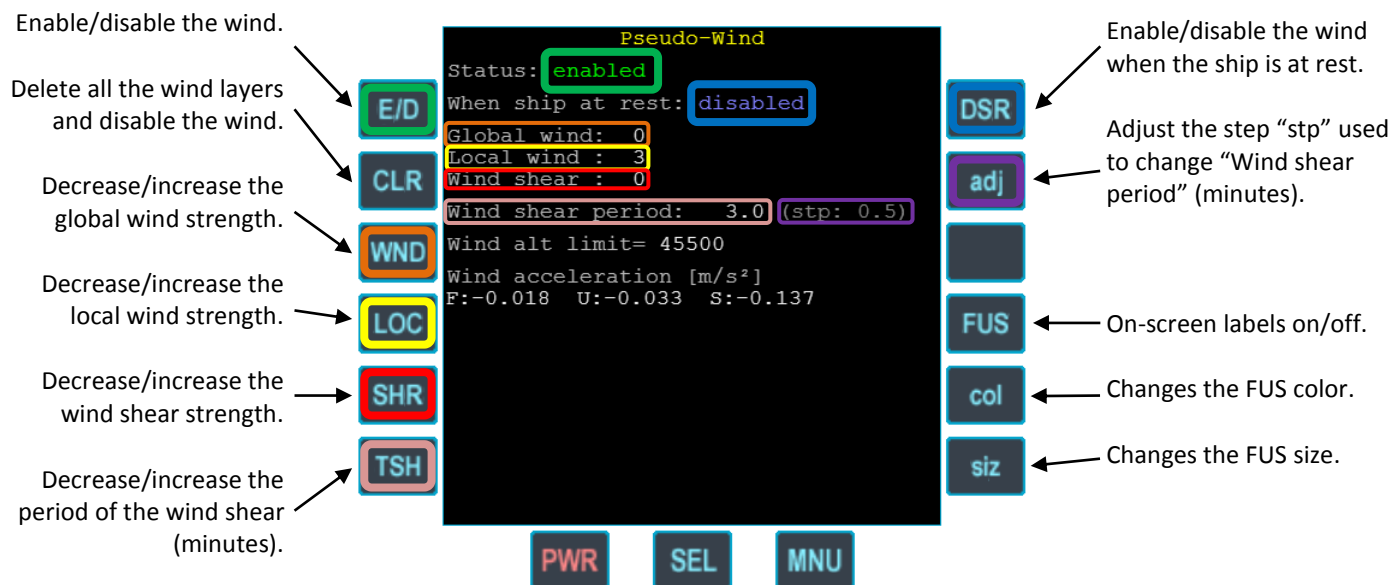
The displayed components are always given in the ship's reference frame (this is useful to operate both the main engines

and the RSC thrusters).

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### 5.3. MFD buttons and values

The following image associates the buttons with the values.



Value	Description
Status	<b>enabled</b> : the wind is active if: the ship is inside an atmosphere, the ship altitude is not bigger than "Wind alt limit" and at least one of the "Global wind", "Local wind" and "Wind shear" value is greater than zero. <b>disabled</b> : the wind is inactive, regardless of any other value.
When ship at rest	<b>disabled</b> : the wind is inactive while the ship is at rest, regardless of any other value. <i>When the time acceleration is active, it is advised to set this value to disabled.</i>
Global wind	level of the global wind.
Local wind	level of the local wind.
Wind shear	level of the wind shear.
Wind shear period	this value is related to the probability for the wind shear to happen; the bigger this value, the lower the probability. Suppose that this value is 1.5 (minutes). Every about 90 s a random number $x$ is generated in the range $[0,1]$ ; if $x$ is less than 0.5, then the wind shear is generated.
stp	when "TSH" is pressed, the "Wind shear period" is decreased or increased by this value (minutes).
Wind alt limit	above this altitude the wind is not present.
Wind acceleration	acceleration components due to the wind force.

#### Notes:

- if the wind layers haven't been created yet, the button "E/D" creates the layers when the status becomes **enabled**;
- if the wind layers have already been created, the button "E/D" does not delete the layers;
- when "E/D" is pressed after the button "CLR", the new layers are generated;
- when the ship enters an atmosphere and the wind is enabled ("Status: **enabled**") the MFD loads the setting saved in the file "PseudoWindMFD.cfg" (if any) for the current ship's class and celestial body.