AtmData MFD - Version 0.2 (20 March 2008)

ABOUT

This MFD collects and displays atmospheric data relative to a selectable target vessel. In its simplest form it reports data obtained by the vessel containing the MFD.   By specifying a target other than the current vessel, however, it is possible to display data as it is collected by another vessel.   This has such uses as monitoring a ship or probe as it enters a dangerous atmosphere from the safety of a vessel in orbit.

This MFD started as a way for me to become familiar with the Orbiter SDK.   Because others may find it useful I thought I would make it available.   Much of the information provided by this MFD is available from other MFDs but I couldn't find another one that would provide remote collection of atmospheric data so I decided to make this MFD do just that.

-- Mike Janicki <mikejani@hotmail.com>
mjanicki on the forums

CREDITS

Of course, credit and thanks goes to Dr. Martin Schweiger for developing Orbiter.   Also, portions of the data collection routines were cleaned up between v0.1 and v0.2 by reviewing similar data collection in the source code for the CustomMFD provided with the Orbiter SDK samples.

CHANGES FROM v0.1

Auto-reference button removed
Added ability to pause data collection
Added ability to swap axes in the graphs
Added a scenario to display remote data collection
(scenario requires the standard Shuttle PB and Dragonfly vessels)
Data collection routines simplified using ideas from Orbiter SDK sample CustomMFD

INSTALLATION

Simply extract the AtmDataMFD02.zip archive into your root Orbiter directory, preserving directory structure.   Then from the Orbiter Launchpad select the Modules tab and then enable the AtmDataMFD module.   No Orbiter files will be modified or overwritten.

UPGRADING FROM v0.1

If you had installed version 0.1 of this MFD, unzipping the archive will overwrite the old dll and old documentation so there is no need to delete anything in order to upgrade.   However, as the old dll is overwritten, ensure that Orbiter is not running when you extract this archive as this will cause problems if the old dll is loaded when you try to overwrite it.

UNINSTALL

To uninstall:
        deselect AtmDataMFD from the active modules listed in Orbiter Launchpad
        delete the file: %ORBITER_ROOT%\Modules\Plugin\AtmDataMFD.dll
        delete the directory: %ORBITER_ROOT%\add-on docs\AtmDataMFD
        delete the directory: %ORBITER_ROOT%\Scenarios\AtmDataMFD

USING

Default Mode - Current Vessel as Target

Upon loading the MFD the Target vessel is set to the current focus vessel and the Atmosphere reference body is selected automatically for that vessel.   If the vessel is inside an atmosphere data is immediately reported for the atmospheric temperature, pressure, and density as well as the vessel's altitude with respect to the reference body.   Plots are generated for temperature, pressure, and density, all as functions of altitude, as long as the target vessel remains inside an atmosphere.   Plots can be displayed individually along with realtime data displayed textually, or a page can be displayed with all three plots and no text.   In this mode there is little need for interaction other than selecting which graphs you would like to see. Figure 1 gives an example of data displayed in this mode.

If the target vessel is not within an atmosphere, the MFD displays "No Atmosphere Detected" but the graphs remain.   That way, if you exit an atmosphere, the final plots are still available for viewing.

Alternate Target Mode - Data Collected from Remote Target Vessel

Using the "TGT" button on the MFD allows one to select a vessel, other than the current one, to use for data collection.   This is useful, for example, to monitor data from the safety of an orbiting vessel as a probe descends into an atmosphere.   More on selecting targets and reference bodies will be discussed later.

As with the default mode, realtime data and plots are available.   Figure 2 is an example where data was collected by a DeltaGlider on a crash course with Venus but the data was displayed in an MFD in a larger vessel sitting in high Venus orbit.
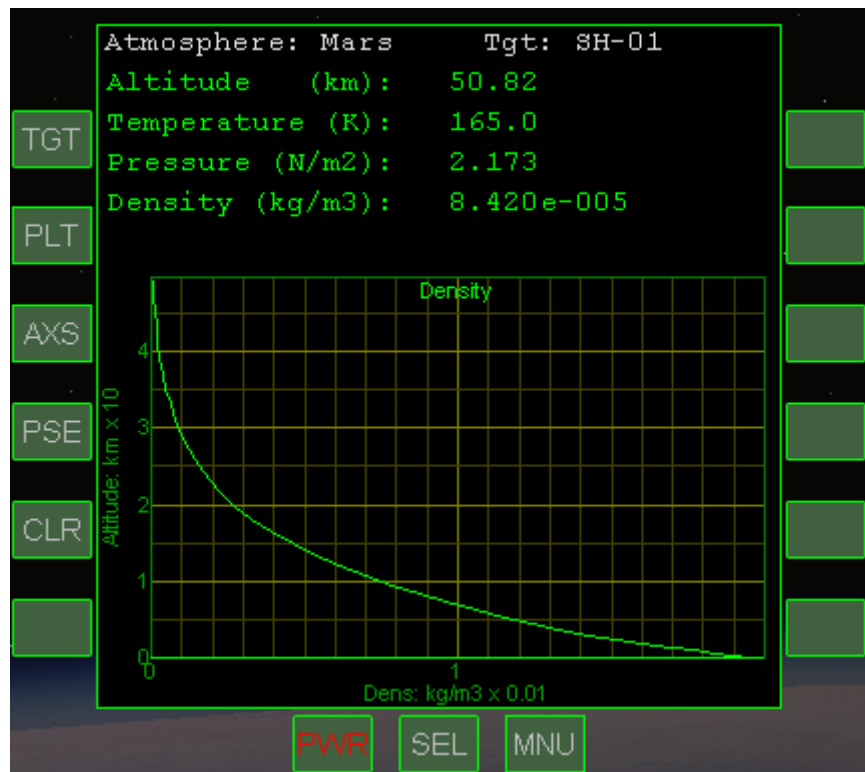
Figure 1 - realtime data and plot of Pressure as a function of Altitude with axes reversed
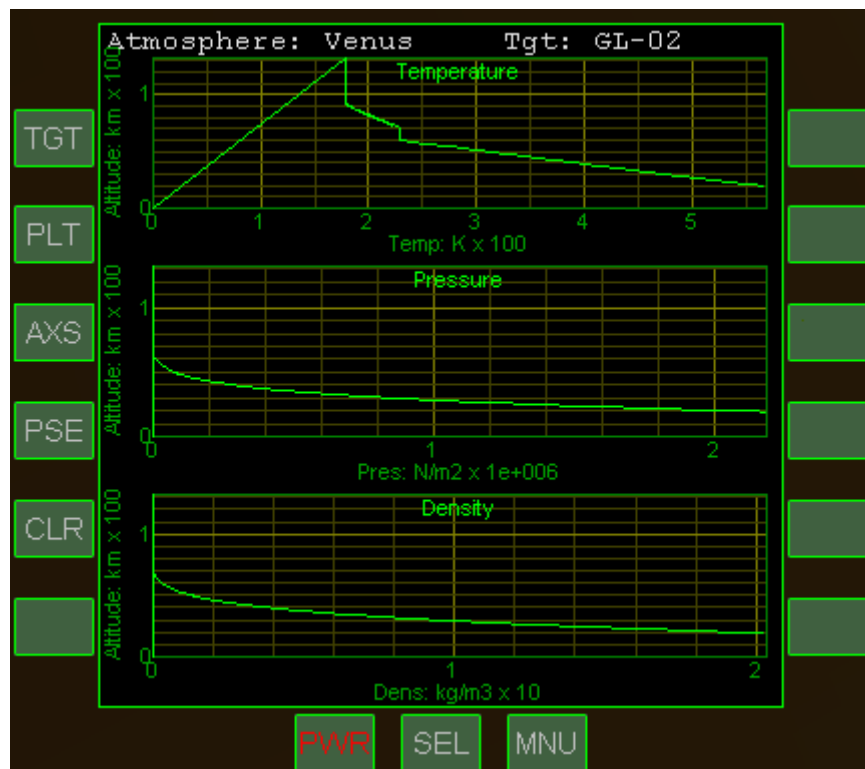

Figure 2 - All three plots displayed using remote collection

MFD Buttons Explained

TGT   -   Target: allows the selection of a target vessel for remote viewing
Pressing TGT will bring up an input dialog where you can enter the name of the vessel you wish to monitor.   Input is restricted to only those objects which report their type as vessel, but no effort is made to preclude the selection of a far-off vessel.   It is possible to monitor a Titan probe from the surface of Mercury if you so choose.   Whether such uses are realistic can be debated but I leave that decision up to the user.   To select "Self" or the current focus vessel, leave the input field empty and just press Enter.   When a new target is selected, the appropriate reference body is automatically selected for the target vessel. An example of remotely viewing a target is given below.

PLT   -   Plot Mode: cycles through available plot modes
There are 4 plot modes .   Three of the plots are of temperature, pressure, and density as functions of altitude keeping the textual realtime data in the display as shown in Figure 1.   The fourth mode contains all three plots on a single screen with no textual information as shown in Figure 2.

AXS   -   Reverse Axes:
The default plot style is to put Altitude along the horizontal axis.   The AXS button will reverse axes so that Altitude is along the vertical axis.   Using the AXS button again will alternate through placing Altitude along one axis or the other.

PSE   -   Pause: pauses data collection for graphs but not for the realtime data
This is useful, for example, if you plan to spend a lot of time in the upper atmosphere where data points are not likely to change all that much.   That way the useful information isn't shoved out of the portion of the graph which is visible by many data points which are relatively constant.   Only the collection of data points for graphing purposes is paused.   The textual displays will still update. Once paused, you will see "PAUSED" displayed in the MFD where the target vessel is usually displayed.   To unpause and continue collecting data, use the PSE button again.

CLR   -   Clear Data: clears previously collected data
This is useful if you collect data leaving one atmosphere and want to have clean plots for another atmosphere which you intend to enter.   If you do not use the CLR button, collected data will be preserved so that you can view results of earlier data capture whenever you like.
Note: no data is stored permanently so exiting Orbiter and restarting will mean the loss of previously recorded data.

Example of Setting Up Remote Viewing

This MFD now comes with a simple scenario to show how easy it is to setup remote data collection.   To use it, start Orbiter and load the scenario AtmDataMFD_test in the AtmDataMFD scenario directory in the Orbiter Launchpad.   When the scenario starts you will be in a Shuttle PB orbiting Earth.   Meanwhile, a Dragonfly is set on a course that will cause it to enter Earth's atmosphere.   It is not a nice re-entry but that's not the exercise here.

Once inside the Shuttle named PB-01 the left MFD should contain the AtmDataMFD. Select "TGT" and enter "TUG-01".   You are now monitoring the Dragonfly's encounter with Earth's atmosphere.   In just under one minute from the start of the scenario the Dragonfly should enter Earth's atmosphere and begin relaying data back to the Shuttle PB.   That's all there is to it.

NOTES

Switching between vessels will cause the MFD to switch targets and reference bodies with the vessel change.   For the moment I consider that a feature, but if it turns out that people want the ability to monitor 100 different probes simultaneously then I will look into accomodating that.   So, when switching vessels (to one other than the vessel targeted for collection) you can use the TGT button to reacquire your data collector if need be.   Graphs are preserved across vessel changes so if you switch vessels and don't want the previous graphs just use the CLR button to clear the old data.

The example scenario makes use of the Shuttle PB and the Dragonfly, both of which are provided with the default Orbiter installation.