

MALOKE GAMES

ASSETS

MULTI-FUNCTION DISPLAY MFD

Digital Flight Instruments



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- Contact: Maloke7-Games@yahoo.com.br
 - Full Portfolio: <https://maloke.itch.io/>
 - AssetStore: <https://assetstore.unity.com/publishers/26634>

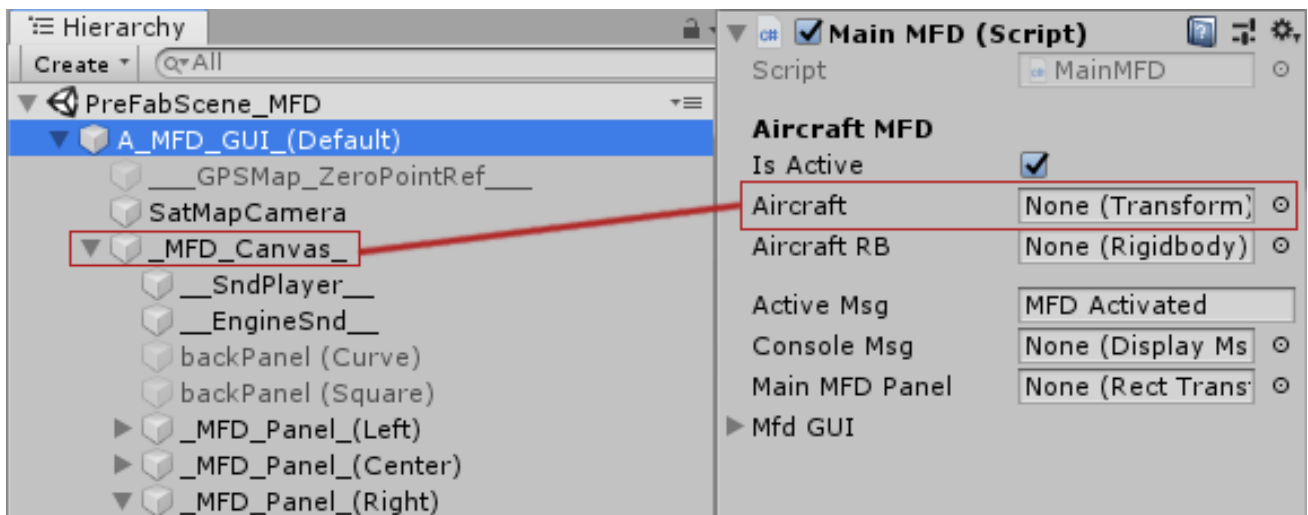
➤ Quick Instructions:

You can find a DemoScene with this asset configured and working straight away for many different layouts as. The demo uses a very basic camera movement script applied to the main camera that emulates an aircraft flight movement to help you visualize properly how it works.

To use on your own aircraft you ***just need to link a reference of your aircraft's Transform to the main script***. If you leave these fields **empty** it will automatically look for the current **MainCamera** in the scene and calculate all variables based on its movement.

Just follow these 3 simple steps:

- 1- Drop on your scene any of the "X_MFD_GUI_(type).prefab" prefab.
- 2- Locate the main script "**MainMFD**" as shown in the image:

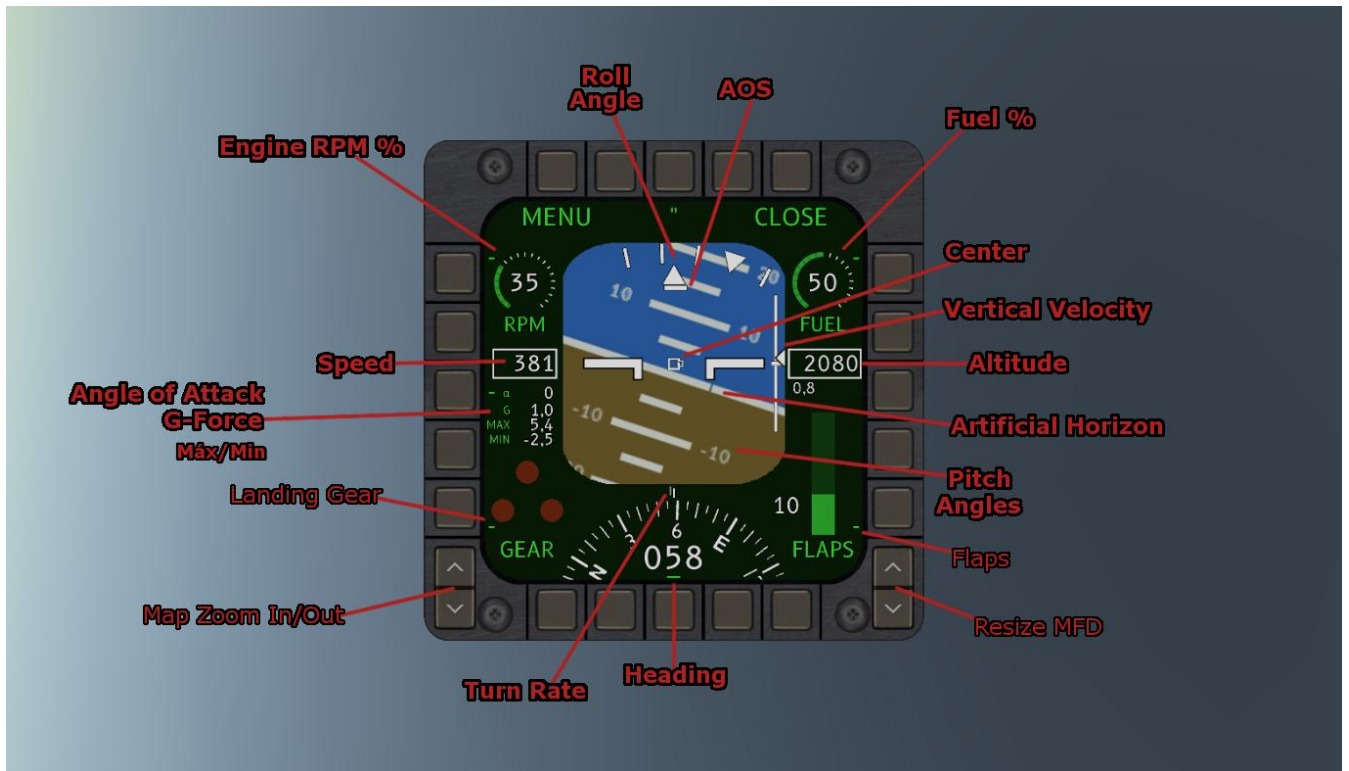


- 3- Then simply drag your aircraft object to the field "**Aircraft**" and you are ready to go!

To make use of the GPS map you can put the GameObject "**__GPSMap_ZeroPointRef__**" on the world to mark the center position and the Map will automatically align itself.

If you want to know more about this asset and how to customize or tweak it more in depth, you can find extra information further on this document.

➤ **PFD - Primary Flight Instrument Symbology and Overview:**



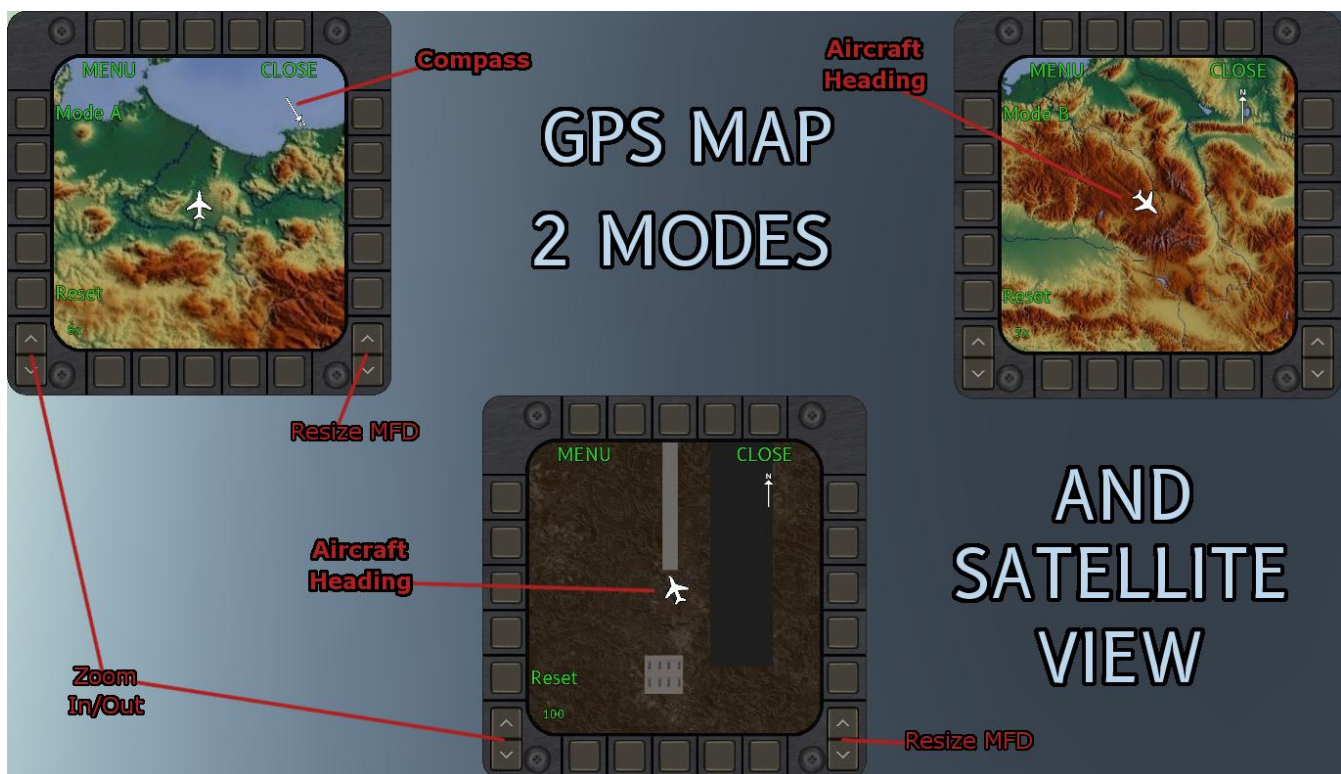
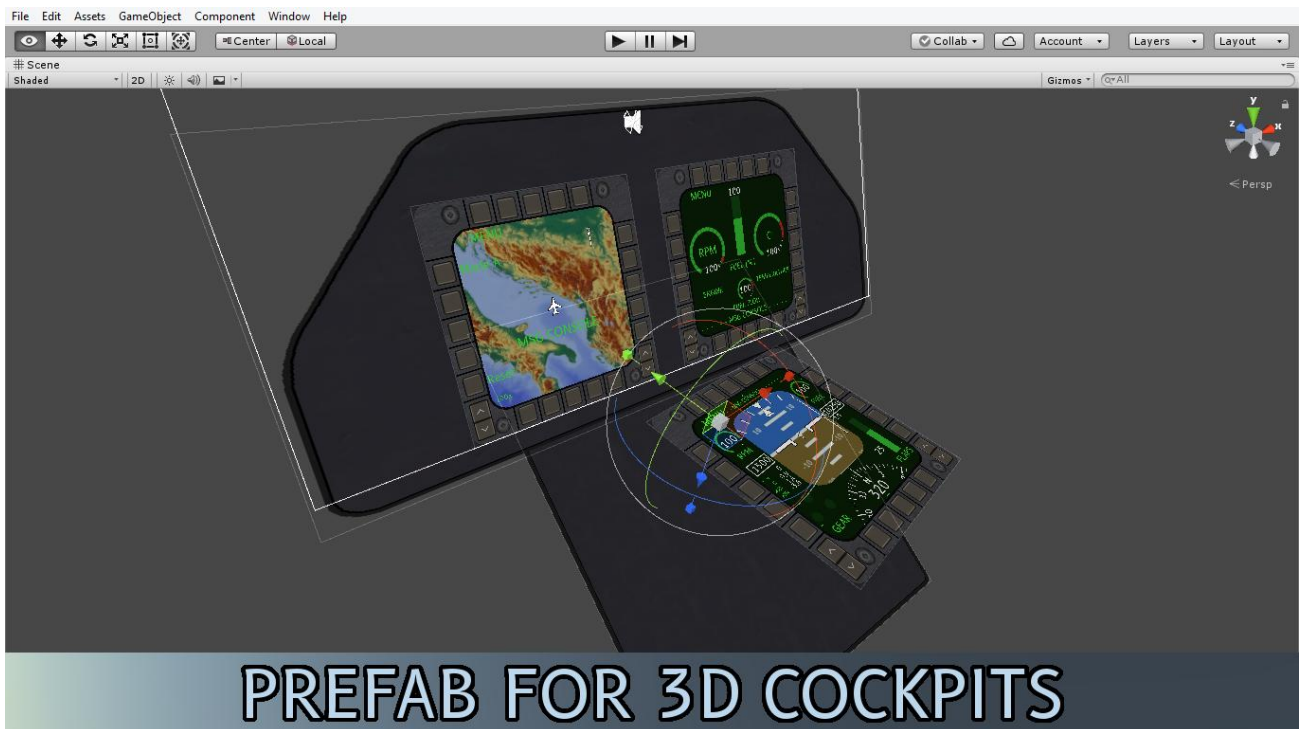
The flight variables are calculated *automatically*, but you can set **Manual** values to gauges like the *Engine RPM*, *Fuel*, *FuelFlow* or let it in the **Automatic** mode.

On **Manual** mode, you can set the value of each instrument directly on the **External Controllers** section of the **MainMFD** script inside Editor. You can still make use of the **LowPassFilter** factor to smooth these readings.

On **Automatic** mode you just have to link your aircraft **transform** to the script and all values will be calculated. This includes simple mechanics for *Engine Temperature*, *Fuel*, *Engine Pitch* sound synchronized with RPM.

This asset includes **5 Prefab Templates** with possible variations on each one. You can start with a prefab and then customize your own version and displacement of the instruments. We recommend that you break prefab instance before making modifications to avoid overwriting the original asset example.

Also includes a **3D prefab configured in WorldCoordinates**, so you can displace the instruments inside a **3D cockpit model**, and also a **Mini-MainMenu-Template** that uses the MFD GUI images for creating a game menu.



Besides the instruments, you can also find a **GPS Map with Zoom In/Out/Reset** operations and 2 Modes (*FirstPerson* or *ThirdPerson*) that can display any image as a map, and a **Satellite View** that works like a mini-map with a camera showing the aircraft from up-down view.

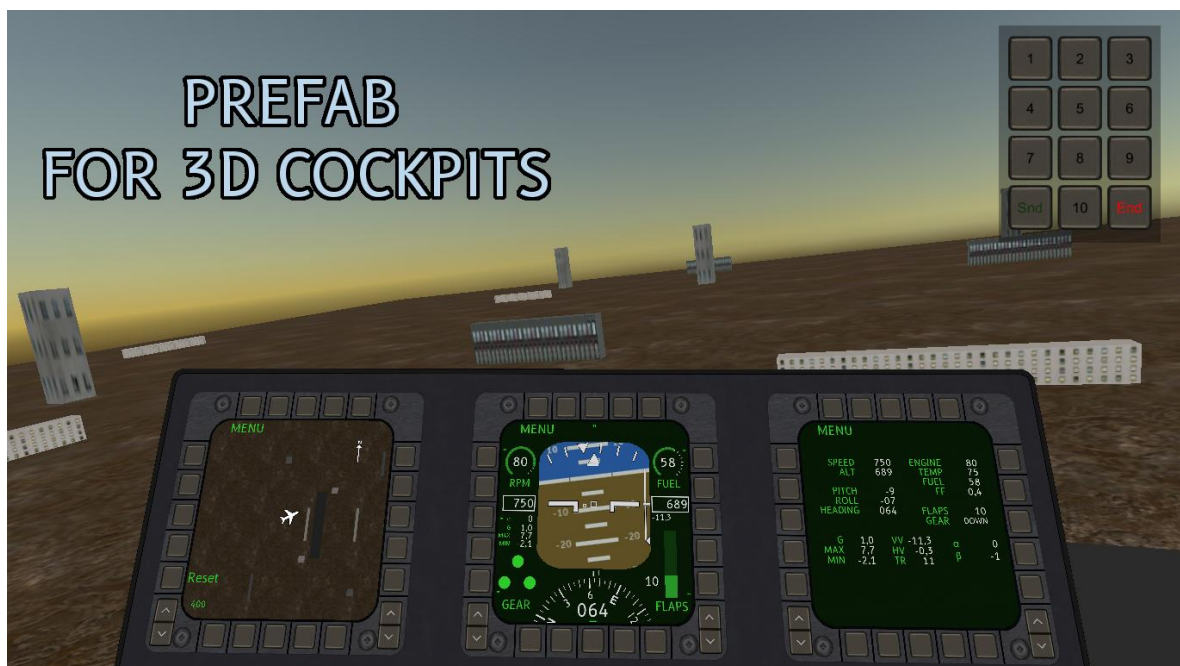
➤ Main Layouts:

This asset comes with many example and variations layouts and you can customize it further by changing colors, positions and enabling/disabling instruments that you wish to use. We recommend that you break prefab instance before making modifications to avoid overwriting the original example.

* 2D GUI Mode *



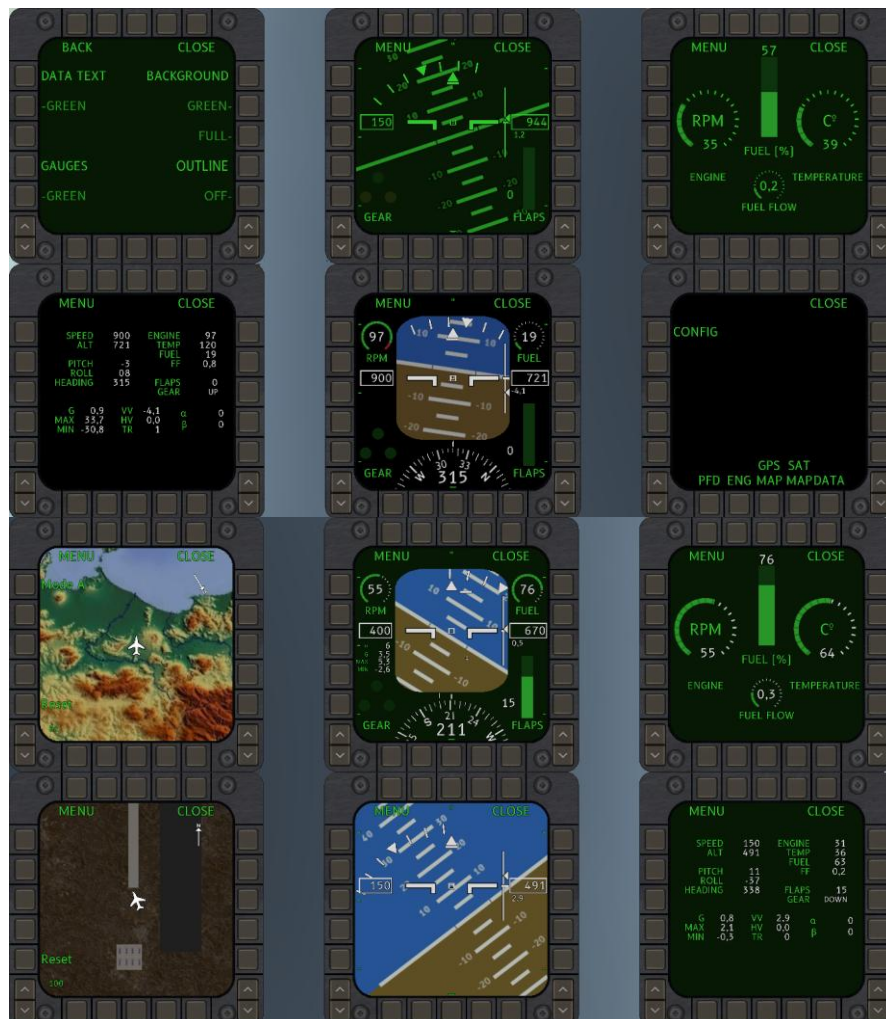
* 3D Instruments for Cockpits *



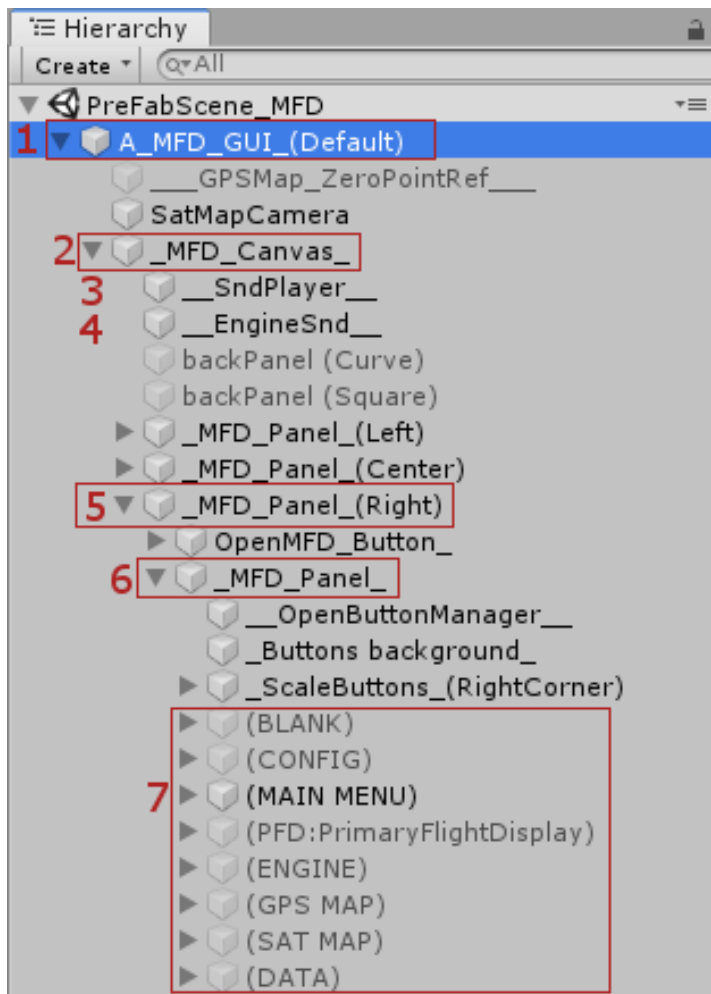
* PFD in HUD Mode with extra MFDs on side *



* Navigate and Configure All Tabs *



➤ Main Components:



1- The Main root of the PreFab.

2- The MainCanvas of this Asset, also containing the main scripts (**MainMFD + GPSMapMFD + SATMapMFD**) in which controls the whole Instruments, calculations and references, so you can setup and tweak all necessary values there.

3- Contains script "**SndPlayer**" that manages the General GUI sounds.

4- Contains the **AudioSource** for the **Engine sound**.

5- The main panel for a single **MFD** display.

6- It contains the script **MFDScript** which is responsible for reading from the main script **MainMFD** and passing its calculated values to the *MFD GUIs Tabs*.

7- There we have each Tab that is accessible to the user to navigate through. There is a Blank tab, Configuration, Main Menu, **PFD** with the mains flight instruments, Engine related values, GPS map, Satellite view, and the

DataConsole which displays all variables at a single screen in real time.

*** ATTENTION!! - DO NOT DELETE THE DATA TAB!**

If you do not wish to show it, then just disable the button that gives access to this tab. Other instruments get some values from it and deleting it may create missing references. Other instruments can be deleted if not used but make sure to check for missing references for instruments and reconnect them on the **MFDScript** if necessary.

Also, each Tab contains the script "**DisplayMsg**" which is responsible to send/show text messages to the console inside each one of the Tabs.

**Some of these components are used "under the hood" by the asset and do not require any setup or configuration... but fell free to use them for extra purposes on your project if you like!*

➤ MFD - Asset Scripts in Editor:

▼ **Main MFD (Script)**

Script

→ MainMFD

Aircraft MFD

Is Active ☒

Aircraft

None (Transform)

Aircraft RB

None (Rigidbody)

Active Msg

MFD Activated

Console Msg

None (Display Ms)

Main MFD Panel

None (Rect Trans)

► Mfd GUI

Roll

Use Roll ☒

Roll Amplitude

-1

Roll Off Set

0

Roll Filter Factor

0,25

Horizon Roll

None (Rect Trans)

Horizon Roll Txt

None (Text)

Pitch

Use Pitch ☒

Pitch Amplitude

-12,5

Pitch Off Set

0

Pitch X Off Set

0

Pitch Y Off Set

0

Pitch Filter Factor

0,125

Horizon Pitch

None (Rect Trans)

Horizon Pitch Txt

None (Text)

Heading & TurnRate

Use Heading ☒

Heading Amplitude

1

Heading Off Set

0

Heading Filter Factor

0,1

Compass HSI

None (Rect Trans)

Heading Txt

None (Text)

Compass Bar

None (Compass E)

Heading Roll Digit

None (Roll Digit I)

Use Turn Rate ☒

Turn Rate Amplitude

1

Turn Rate Off Set

0

Turn Rate Filter Factor

0,1

Turn Rate Txt

None (Text)

Turn Rate Indicator

None (Arrow Indi)

Turn Rate Pointer

None (Pointer Ind)

Altitude

Use Altitude ☒

Altitude Amplitude

1

Altitude Off Set

0

Altitude Filter Factor

0,5

Altitude Roll Digit

None (Roll Digit I)

Altitude Pointer

None (Pointer Ind)

Altitude Txt

None (Text)

AirSpeed

Use Speed ☒

Speed Amplitude

1

Speed Off Set

0

Speed Filter Factor

0,25

Speed Needle

None (Needle Ind)

Speed Roll Digit

None (Roll Digit I)

Speed Pointer

None (Pointer Ind)

Speed Txt

None (Text)

Vertical Velocity

Use VV ☒

Vv Amplitude

1

Vv Off Set

0

Vv Filter Factor

0,1

Vv Needle

None (Needle Ind)

Vv Arrow

None (Arrow Indi)

Vv Roll Digit

None (Roll Digit I)

Round VV ☒

Show Decimal VV ☒

Round Factor VV

0,1

Vertical Speed Txt

None (Text)

Horizontal Velocity

Use HV ☒

Hv Amplitude

1

Hv Off Set

0

Hv Filter Factor

0,1

Hv Needle

None (Needle Ind)

Hv Arrow

None (Arrow Indi)

Round HV ☒

Show Decimal HV ☒

Round Factor HV

0,1

Horizontal Speed Txt

None (Text)

G-Force

Use G Force ☒

G Force Amplitude

1

G Force Off Set

0

G Force Filter Factor

0,25

G Force Txt

None (Text)

Max G Force Txt

None (Text)

Min G Force Txt

None (Text)

AOA, AOS and GlidePath

Use Alpha Beta ☒

Alpha Amplitude

1

Alpha Off Set

0

Alpha Filter Factor

0,25

Alpha Needle

None (Needle Ind)

Alpha Arrow

None (Arrow Indi)

Alpha Txt

None (Text)

Beta Amplitude

1

Beta Off Set

0

Beta Filter Factor

0,25

Beta Needle

None (Needle Ind)

Beta Arrow

None (Arrow Indi)

Beta Txt

None (Text)

Use Glide Path ☒

Glide Path Filter Factor

0,1

Glide X Delta Clamp

600

Glide Y Delta Clamp

700

Glide Path

None (Rect Trans)

Engine and Fuel

Use Engine ☒

Engine Amplitude

100

Engine Off Set

0

Engine Filter Factor

0,0125

Engine Pointer

None (Pointer Ind)

Engine Roll Digit

None (Roll Digit I)

Engine Slider UI

None (Slider)

Engine Fill UI

None (Image)

Engine Txt

None (Text)

Use Fuel ☒

Fuel Amplitude

100

Fuel Filter Factor

0,0125

Fuel Pointer

None (Pointer Ind)

Fuel Roll Digit

None (Roll Digit I)

Fuel Slider UI

None (Slider)

Fuel Fill UI

None (Image)

Fuel Txt

None (Text)

Fuel Flow Amplitude

1

Fuel Flow Fill UI

None (Image)

Fuel Flow Txt

None (Text)

Temperature

Use Temperature ☒

Temperature Amplitude

120

Temperature Off Set

0

Temperature Filter Factor

0,25

Temperature Roll Digit

None (Roll Digit I)

Temperature Pointer

None (Pointer Ind)

Temperature Slider

None (Slider)

Temperature Fill UI

None (Image)

Temperature Txt

None (Text)

Flaps & Gear

Use Flaps ☒

Flaps Filter Factor

0,05

Flaps Slider UI

None (Slider)

Flaps Fill UI

None (Image)

Flaps Txt

None (Text)

Use Gear ☒

▼ Gear Lights

Size

0

▼ Gear Flash Lights

Size

0

Gear Txt

None (Text)

- "**isActive**" determines if the script should be active.
- "**Aircraft**" (***Transform***) is the references to your aircraft gameObject which will be used to calculate all the values displayed on the instruments. If you leave it empty, then the script will automatically look for the **MainCamera** to calculate from there.
- **ActiveMsg** is the *string* displayed on the console when this instruments panel is activated.
- The others are just references to each GUI element used internally by the script and doesn't require any setup.

Each section corresponds to a ***Flight Variable*** and the following pattern applies to all of them:

- The *bool* values "**useXXX**" determine if that variable will be used by the script.
- The "**xxxAmplitude**" is a value multiplied to that variable after calculations and before showing it on the GUI. It can work as a **Scale** or as a ***unit conversion factor***.
- The "**xxxOffset**" is a value added to the variable after calculation. It can also be used to ***unit conversion*** or simple adjusts.
- All the "**xxxFilterFactor**" values are used to smooth the value shown (*works as a **lowpass filter***). If set to **1** it will ***show direct value*** and will have no filtering at all. If set closer to **0** it ***will be smoothed and take more time to reach the final value***.
- The "**CompassBar**" is a reference to the script that controls the compass sliding position to indicate current heading.
- All "**xxxTXT**" are references to a ui *text* component that represent the variable in text format on the **DataConsole**.
- The "**XXPointer**" is a reference to the script that controls the visual indication of that value using the angle of the UI pointer instrument.

--- Manual Controllers ---

Gear Down ☐

Flaps Index

▼ Flaps

Size

Element 0

Element 1

Element 2

Element 3

Auto RPM ☒

Max Engine

Max Speed

Engine Target

Idle Engine

Critical Engine

Engine AS

Min Pitch

Max Pitch

Auto Temperature ☒

Max Temperature

Temperature Target

Idle Temperature

Temp Flow

Auto Fuel ☒

Max Fuel

Fuel Target

Fuel Max Time

Fuel Min Time

Keys

Use Keys ☒

Gear Key

Flaps Up Key

Flaps Down Key

Reset Key

Flight Variables - ReadOnly!

Flap

Current Flap

Gear

Speed

Altitude

Pitch

Roll

Heading

Turn Rate

G Force

Max G Force

Min G Force

Alpha

Beta

Vv

Hv

Engine

Fuel

Fuel Flow

Temperature

- On the **Manual Controllers** section you can set the instruments value manually or let the script calculate it automatically. Also, you can configure some of the values for the Flaps, Engine RPM, Fuel and Key Controls.

-The **bool** values "**AutoXXX**" determine if that variable will be calculated by the script or if you wish to set it manually, for instance, if you already have an asset that calculates these values and you wish *only to use the GUI* to show that value.

- The "**xxxTarget**" sliders are normalized between **0-1** and let you *set the desired value to be shown* by the instrument. In auto mode these values will be automatically controlled by the script.

- The "**EngineAS**" is a reference to the **AudioSource** used for the **engine sounds**. The **audio pitch** will automatically follow from **Min** to **MaxPitch** value depending on current engine RPM. If you already have an asset that controls engine sounds for you, then you can leave this field **empty**.

- The **FuelMaxTime** and **FuelMinTime** determine how much time in minutes takes *to consume 100% of the fuel* when **Engine RPM** is at **Idle** and **Máx RPM** and *interpolates quadratically* in-between them according to current **EngineRPM**.

- The Keys sections lets you customize what keys can be used for manipulating the GUI instruments controls. Set the **UseKeys** to **false** if you do not want the player to change anything during gameplay.

- The last section shows **Current Variables** values for all the variables in real time inside the Editor.

This is just for debug or tweeking and are **ReadOnly!**

You can also visualize these variables during runtime using the **Data Tab**.

➤ GPSMapMFD and SATMapMFD Scripts):

You can setup both the **GPS** map and **Satellite Camera** on the **GPSMapMFD** and **SatMapMFD** scripts located at *the Main Canvas of the asset* (Item 2 of MainStructure). They are the **Master** script which passes their values to the **Slave** ones located *inside the MFD tab*:

On the **Main** section you can see the script is the **Master** mode and thus it will pass their configuration to other **Slave** scripts.

MapConfiguration:

ModeA true makes the map work in *FirstPerson mode*, so the center is fixed and the map turns around. If **false**, it operates in *third-person mode*, so the Map rotation is fixed and aligned to the North, while the aircraft center image is rotated according to **Heading**.

MapScale determines the proportion of moved distances in the World in relation to pixels in the Map Image. (Direct Pixel equivalence is achieved only if map image is set to its NativeSize, otherwise, it's one unit on the RectTransform).

Zoom: These elements controls the max-min and step of the current zoom value.

Offset: You can use some off-set to your current position in the map and the option AutoCenterOffset will calculate an initial off-set value that puts you automatically in the center of the map.

GetZeroFrom: his determines where in the game World the center of the map should be located at. Just put the "**__GPSMap_ZeroPointRef__**" object that comes from the template in your world center.

Keys: These are the keyboard controls for the map operations. Users can control by clicking the GUI's buttons or by keyboard if the "**UseKeys**" bool is on.

References: The aircraft reference is automatically updated from the **MainMFD** script and the other fields are responsible only for linking the GUI images to the code.

***To use your Custom Map Image** just locate the "**Map_RawImg**" object and link your map there!

▼ **Sat Map MFD (Script)**

Script

Main (Master-Slave)

Is Active ☒

Map Cam

Mode

Master Parent

Map Configuration

Zoom

Zoom Step

Zoom Min

Zoom Max

Map Cam Off Set

X Y Z

Map Cam Angle

X Y Z

Keys

Use Keys ☐

Override Master ☐

Zoom In Key

Zoom Out Key

Zoom Reset Key

References

Aircraft

Aircraft Center

Map Main Panel

Strings Data

Zoom Txt

In the **Main** section, you can see the script is the **Master** mode and thus it will pass their configuration to other **Slave** scripts.

MapConfiguration:

Zoom: These elements controls the max-min and step of current zoom value.

MapCam OffSet and Angle: These values determine *the relative position of the Satellite Camera in relation to your Aircraft*. The **Default** settings put the camera 100 units above the aircraft and facing straight downwards by 90 degrees.

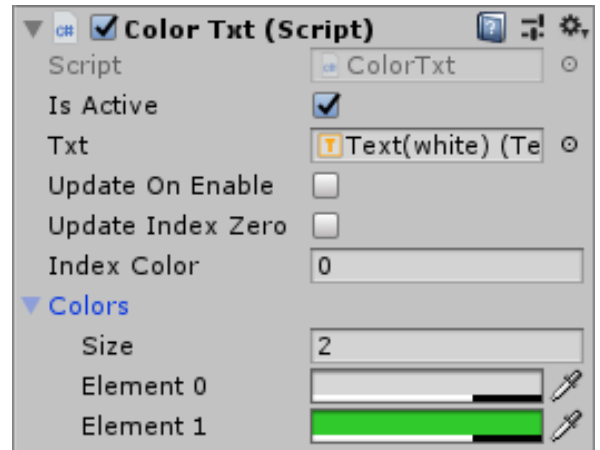
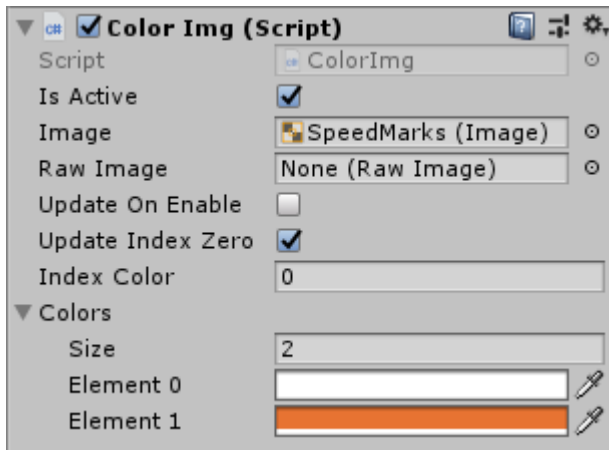
Keys: These are the keyboard controls for the map operations. Users can control by clicking the GUI's buttons or by keyboard if the "**UseKeys**" bool is on.

References: The aircraft reference is automatically updated from the **MainMFD** script and the other fields are responsible only for linking the GUI images to the code.

To customize the **Camera Settings just locate the "**SatMapCamera**" object on the prefab root and edit the camera component settings there!*

➤ Custom Color (ColorImg + ColorTxt Scripts):

You can **customize** your own colors for **all instruments** by editing the fields of the **ColorImg script** as shown below:



When the user toggles the configuration options, the main script will automatically look for all **ColorImg scripts** currently active on the scene and will toggle the image component color between **Element0** and **Element1**.

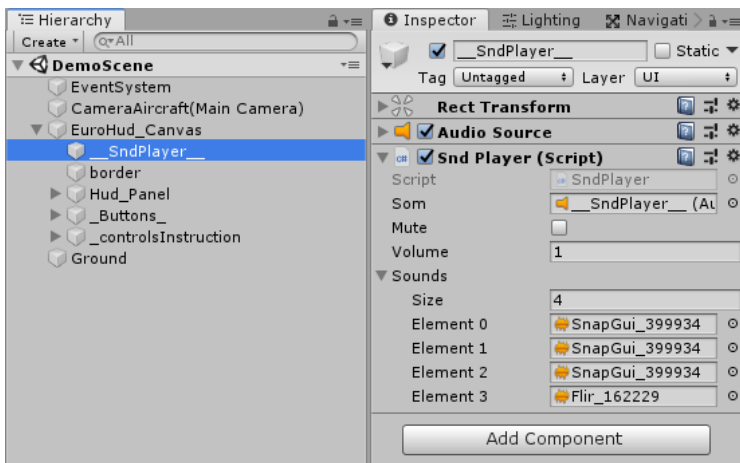
The option "**UpdateIndexZero**" will automatically allocate the current color used in the editor for the component to the **Element0** during runtime.

A **quick way** to change light colors of all components is to type "**ColorImg**" on the **Hierarchy search field** and then select all the gameObjects containing it to edit then simultaneously to your desired color.

Exactly the same applies to **Text Colors** using the **ColorTxt** script in the same matter.

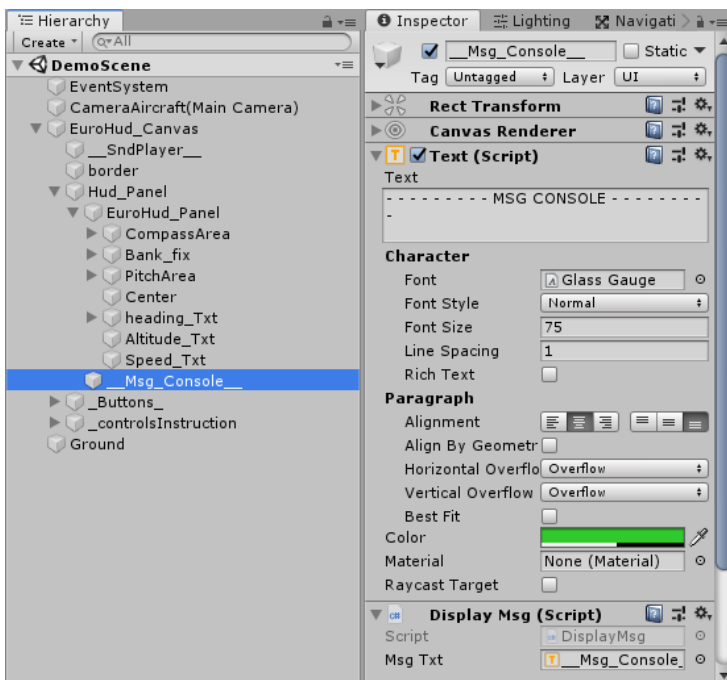
➤ Secondary Components (Sound and Message Console) :

If you wish extra functionalities, you can make use of these components by script calling statics methods:



```
-public static void play(int index);  
-public static void play(AudioClip clip, float volume = 1f);
```

(Plays the sound listed on array Sounds with index position or the audioclip itself)

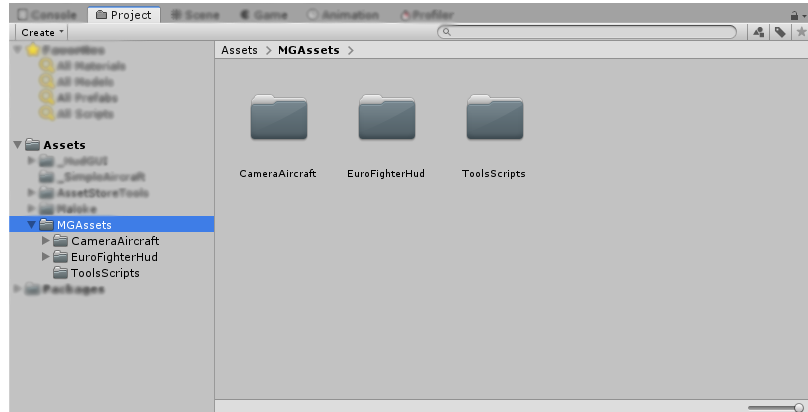


```
-public void displayMsg(string msg = "");  
-public void displayQuickMsg(string msg = "");  
-public static void show(string msg = "", float timed = 0);
```

Displays a string message on the bottom of the HUD for an amount of seconds (quick is 5s).

➤ Asset's Folders Organization:

All assets and packages from MalokeGamesAssets will be downloaded/unpacked to a folder called **"MGAssets"** inside the Unity's **"Assets"** root:



Inside **"MGAssets"** you will find a separate folder for each asset package and all their specific resources (like data, scripts, textures, sprites, prefabs, demo scenes and so on...) will be found inside and organized in their respective subfolders.

Notice that some assets may use "under the hood" some general scripts and shared functionalities, so for this reason (and to avoid duplicity or accidental deletion) you will find all this shared tools inside a folder called **"ToolsScripts"**.

Feel free to explore and use them on your projects too, they are simple but handy!

