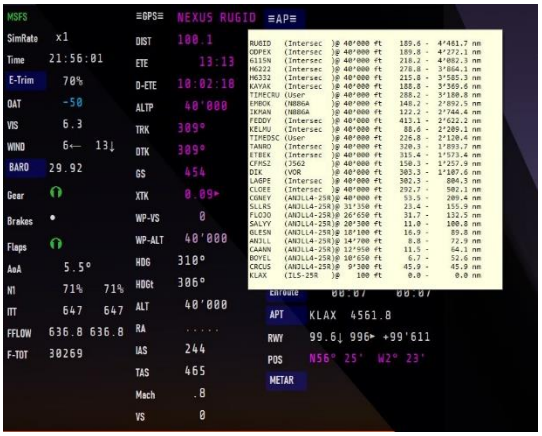
MSFS HudBar V 0.36.0.30

See (V0.36) indications for updates from the previous version

Display essential Information as Bar or Tile at any side of the primary screen Or use the Window to have it anywhere you like

- Displays more than 70 essential aircraft and flight information items as Bar, Tile or Window
- Supports 1 and 2 engine aircrafts (Prop/Engine RPM, N1, Fuel Flow for each)
- Provides 5 different content profiles which are fully configurable
- The pilot can directly activate Autopilot commands
- Auto Elevator Trim on a click
- Bottom/Top Bars work best with wide screen monitors
- AutoSave of the Flight (FLT file) at 5 Min intervals



Usage

- Deploy the release zip content in a folder (no installer provided or needed)

Best is to start MSFS first, then the Bar (but the Bar should connect the sim in any case - MSFS turns green)

- Start MSFS2020 first and once the Main Menu is shown
- Start FS20_HudBar.exe
- It attempts to connect to the Flight simulator in 5 sec intervals, but shows an error message while it cannot connect
- Note: the shown values are a bit meaningless until the aircraft and flight is live
  Also note that the bar is shown on the **++PRIMARY monitor++** at the bottom of the screen

  If you are using it the first time, all items except for the MSFS status are unchecked i.e. no further items are shown in the default bar at the bottom of the screen.
  – just head straight to the Configuration and check the ones you like (right click the bar – Configure…)!

- **Right** Click the Bar and choose from the pop up menu
  - To **select** a Profile (1..5 - your names)
  - To **Configure**.. to check or uncheck the items to be shown
  - To **Exit** and stop the program

- The Hud can be shown as **Bar** or **Tile** or **Window** or **Borderless Window** (new V0.36)
  (to be changed in Configuration, default is Bar at the Bottom of the screen)
  - Bar: a full width window attached to the defined side of the screen
  - Tile: a window sized to accommodate the selected items
    A Tile can be moved freely along the side where it is attached to
  - Window: like Tile but freely movable with a window bar
  - Window no border: like Tile but freely movable without window bar

What is shown

Fields can be selected to be shown in the Configuration Window

The sequence can be adjusted to your needs in Configuration

From the Left - MSFS indicates if the Bar is connected to the Simulation (**red** if not connected)

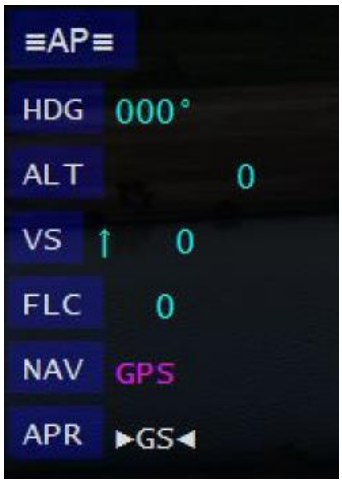
Then there are: Trim, Gear, Brakes (Park), Flaps

Followed by: Engine Values, GPS data, Aircraft data and Auto Pilot Indications, Checkpoint meters

See below for parts of the items available

Clickable Commands

In general when you see a label with a dark blue background and when hovering with the mouse pointer it turns to a hand cursor – the item is actionable.



Autopilot commands

Actionable autopilot command are:

-AP-, HDG, ALT, VS, FLC, BC, NAV, APR and YD, LVL

Clicking them will toggle the state if this is supported by the Sim

Setting the BARO to the current pressure

Click BARO to set it to current (same as the keyboard B button)

E-,R-,A-Trim Reset

Click the label to set the trim value to 0% (reset Trim)

Automatic Elevator Trim

A-ETrim – Aside from showing the current Elevator Trim % it provides an Auto Elevator Trim function:

Clicking the **A-ETrim** label will activate the Auto Elevator Trim module for about 20 seconds.
It will display **A-ETrim** in green color while active - clicking the active module again will switch it off
Note: the module controls the Elevator Trim in a way to level the aircraft towards zero vertical speed.
It may or may not work to your expectation.. so use it only if you feel comfortable with.

METAR

The **APT** and **METAR** action labels will retrieve the latest Metar information from an external server when clicked (see also chapter METAR Data Retrieval).
Once the information is available the Background will turn to the FlightCondition color (green, blue, red, magenta, orange(below ILS)) and hovering the mouse over the label will show the Metar message in plain text.
→ Be aware that for some airports and locations there is no Metar available, then it tries to find the closest weather station within a range, if this does not succeed the Background color remains dark blue.

APT tries to retrieve the Metar from the Airport ICAO ID shown or the closest weather station.
METAR gets the Metar from the nearest weather station found within max. 500 Statute miles in direction of flight (current bearing when clicked), the returned station is sometimes not really what one expects, but what the Metar server provides… (Cannot change it though).

The Metar is real weather information at the location i.e. suitable when using Live Weather.
– Sim weather cannot be retrieved outside the sim.

Moving a Tile Hud or Window without border

If a profile is set as **Tile** one is able to move the window along the bound edge of the screen

If a profile is set as **Window no border** one is able to move the window anywhere on any screen (new V0.36)

Movement is available if the cursor shows up as Cross with Arrows

Click the **Left** mouse button and drag the window, it will remain attached to the bound border while moving it if it is a **Tile** else you can move it anywhere.

Other information

Checkpoint Lapse Meter:

- Click one of the CP1..CP3 labels to start the meter, it shows the time elapsed and the distance from the trigger location (Lat/Lon Distance). The label turns green when clicked once.
- Click again to re-start the meter – *there is no Stop function, just let it run*

Waypoint Estimates:

WP-VS – Which VS is required to arrive at the next Waypoint at the set altitude given the current GS assuming a straight flight. This requires to have a next Waypoint and its altitude other than zero, the altitude target is ALTP. The target altitude may change to a blue indication and using the AP set altitude when there is no GPS target altitude (=0).

WP-ALT – At which altitude is the aircraft when reaching the next Waypoint given the current GS and VS. This requires to have a next Waypoint.

Flight AUTO SAVE

Sometimes the Sim may let you down and exit for some reasons…

If in Configuration **Allow FLT AutoSave** is **Checked** the program will capture Flight files (.FLT) at regular intervals to retrieve flight plan information.
Having such files available allows the HudBar to copy them into a convenient location to maintain a flight backup in case needed.

The program saves such files every 5 Minutes and maintains a maximum of 12 files (last hour).
AutoSave files are not flight dependent – if you want to store them for later, copy them away into a new location, else they will eventually vanish while doing the housekeeping.

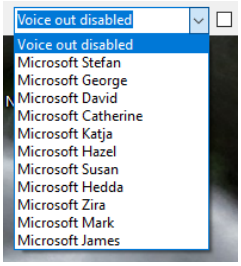
The AutoSave location is the Users `MyDocuments\MSFS_HudBarSave` folder

Files are named: `AutoSave_YYYY-MM-DDThh_mm_ss.FLT` (e.g. `AutoSave_2021-08-22T16_19_35.FLT`)

Note: During Missions the Sim is usually maintaining AutoSaves on its own and the HudBar will not save additional ones.

Audible RA

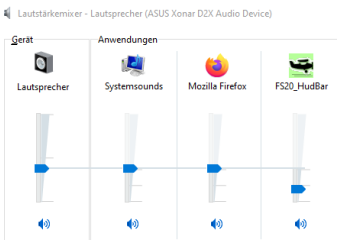
There is a second RA (radio altitude) readout with the item name **RAv** which announces altitudes of 400, 300, 200, 100, 50, 40, 30, 20, 10 ft while descending.



It tracks the way down and will <u>not</u> repeat annunciations made before **unless going above** 410 ft before the next descend!

Select your preferred voice in the Configuration.

- ➔ To test a voice just click into the voice name of the drop down box after selecting one.
- ➔ Change then Volume in the Windows Mixer for FS20_HudBar



You may add voices in Windows Settings – Time & Language – Speech

There you may add e.g. English if you prefer English readouts.
You may add even some of the English variants to choose a preferred one.

I.e. “James” has a rather formidable pronunciation (it is from the en-AU selection)

See also: https://www.tenforums.com/tutorials/132456-add-remove-speech-voices-windows-10-a.html

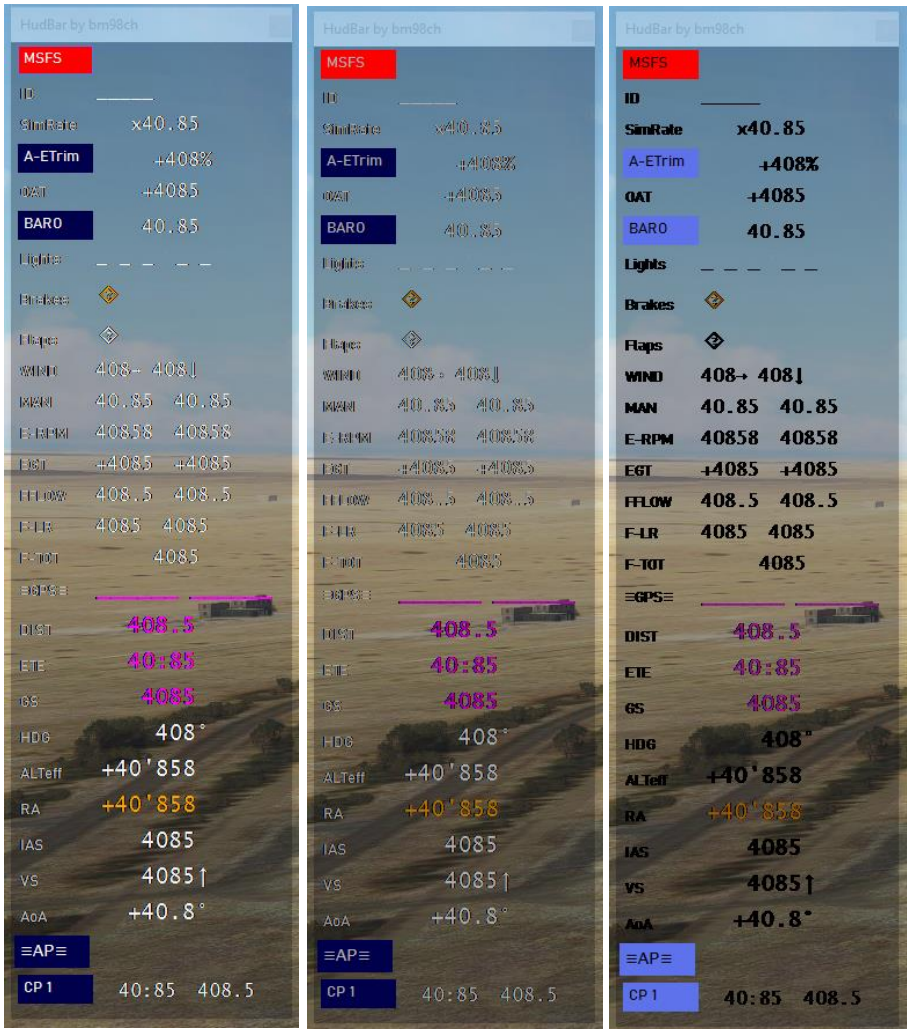
Transparency and Appearance

Transparency can be set per profile from **Opaque, 10% .. 90%**.

➔ When selecting a more transparent background (50%..90%) one will observe rather jagged edges on brighter backgrounds such as a sunny sky. I am afraid but this is NOT a bug to be corrected in the program but how Windows renders such things.

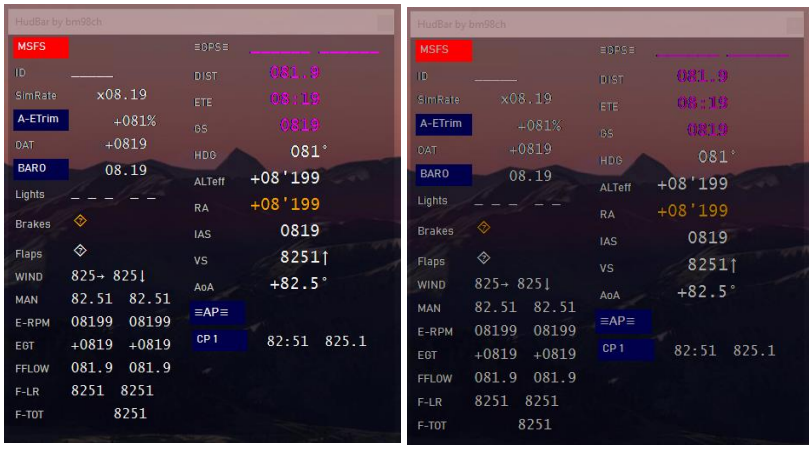
The **Appearance** of the values can be change in either the context menu (**Right Click** – **Appearance** - selection) or easier by **clicking the MSFS status label** with the mouse whereby switching through all 3 modes.

Appearance is related to the items shown and can be chosen from **Bright**, **Dimmed** and **Dark**.



Above an example of 70% Transparency on a brighter background (Bright, Dimmed, Dark)

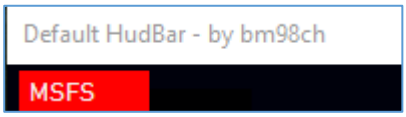
Darker backgrounds are not so much of a problem rather than that **Bright** values may be distracting, so use the **Dimmed** appearance for a more comfortable experience.



Instances (new V0.36)

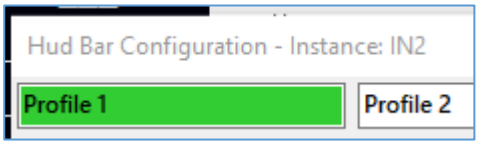
You may want to start the HudBar more than once and get independent display bars and therefore programs running.

However they share the same Settings i.e. the location is saved from the last movement on any of the instances. In order to have truly independent instances with their own settings (all settings in Config and locations etc.) an Instance Name can be added to the Command Line when starting the HudBar.



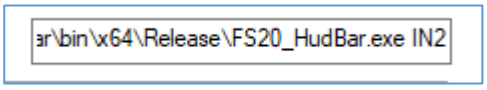
No command line parameter is considered and referred to as 'Default'

If you provide an Instance name to start the HudBar it will be shown in the Window Title (Window Bar and Configuration)



Here "IN2" was used as Instance name

You may start instances the easy way by creating a **Desktop Shortcut** and then modify the **Properties** of the **Shortcut** (right click) by adding an Instance name to the **Target** field:



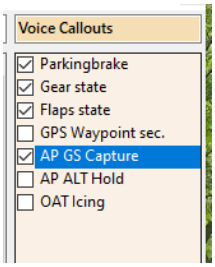
This is the command line; add a space and the name at the end of the text field – here IN2 was added

Then may be rename the **Shortcut** in order to recognize it later.

Note: you may want to enable the voices only in once instance as they will all talk when enabled…

Voice Callouts (new V0.36)

A number of general Callouts have been added:



Each one can be checked (enabled) or unchecked (disabled)

Parking Brake announces "Parkingbrake Set" and "Parkingbrake Released"

Gear state announces "Gear Up" and "Gear Down" when Safe Gear is reached

Flaps state announces "Flaps Up", "Flaps Down", "Flaps NN" where NN is the % deployment number i.e. 10, 20, … the number depends on the aircraft flaps stages available
– when the Flaps handle is moved (not when the state is reached)

GPS Waypoint sec. announces the GPS ETE to the next Waypoint when crossing 90, 60, 30 seconds as "Waypoint in NN" where NN is 90, 60, 30

AP GS Capture announces "Glideslope" when the GS is captured i.e. turns green (but not when it is lost afterwards)

AP ALT Hold announces when the AP changes to ALT holding (ALT turns green) with the altitude set as "Holding NNNN feet" or "Holding Flightlevel NN" when at or above 8000ft – this is usually before the alt is reached.

OAT Icing announces "Low Air Temperature" when the OA temp gets down to around 3°C and "Icing Alert" at around 0°C.

Note: the RA callout remains an Item to be checked per profile

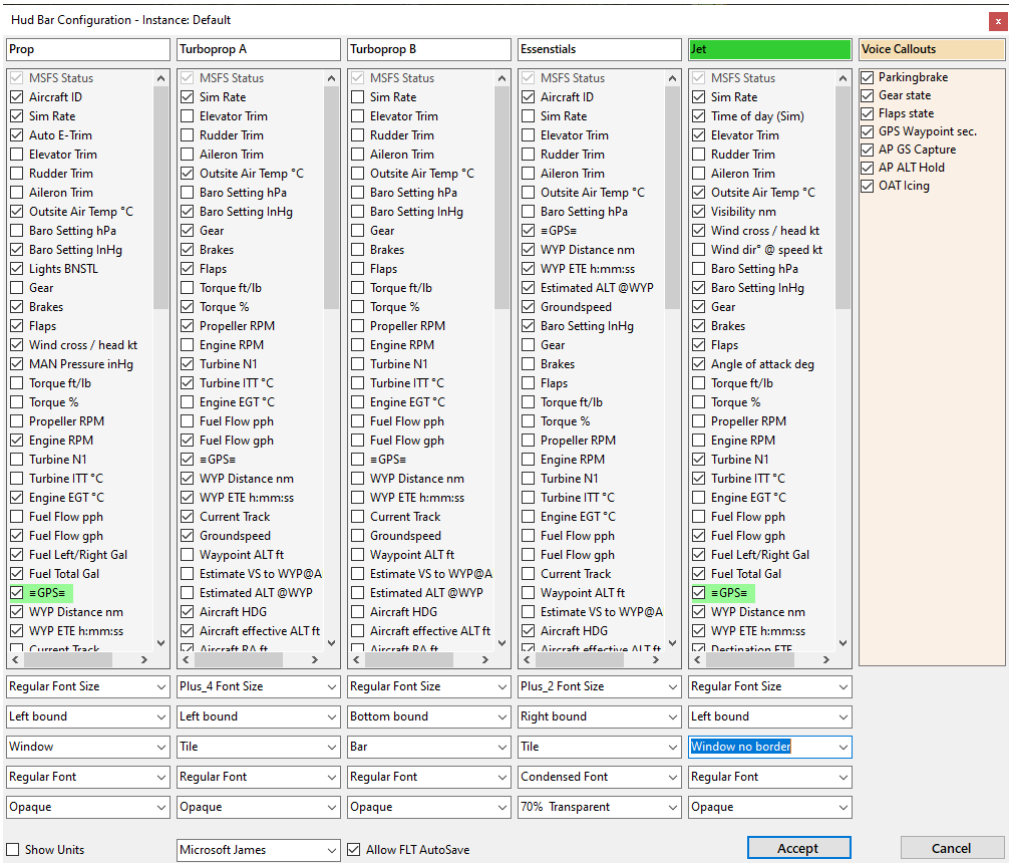
Configuration

The currently selected one will show up with a green background color (here it was “Prop”)

Name and use up to 5 different profiles per instance (see Instances above) (new V0.36)

The Window Title refers to the Instance (Default or the Instance Name used) (new V0.36)

Type the profile name into the field of the topmost row (here Prop, Turboprop A, …)



General Settings are:

- Check **Show Units** to display the units along the values
- Select the audible **Voice** from the ones available – **Voice out disabled** for silence (see Chapter above)
- Check **Allow FLT AutoSave** to have the Bar retrieving and AutoSave FLT files for flight plan handling

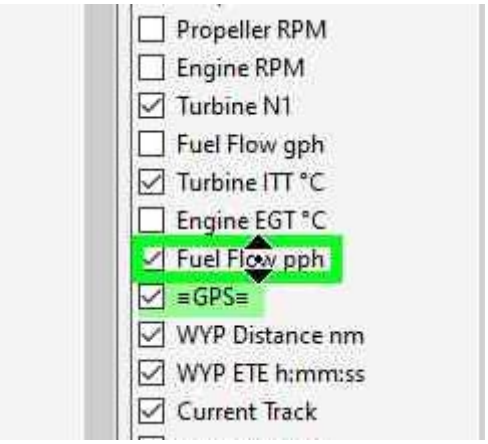
For any profile:

- Check / Uncheck the items in the list which to show / hide items
- Select a **Fontsize** from Regular, Plus-2, -4, -6, -8, -10, Minus-2, -4, Plus-12, -14
  (the bar rescales to multiple rows/columns to fit all checked items on the screen)
- Select the **Alignment** of the bar for any profile (left, right, top, bottom)
- Select the **Kind** of the bar – where Bar is a full width or height band and Tile is a rectangle bound to the alignment border, the size of the tile will adapt to the items shown
  Window is similar to Tile however it can be moved freely to any position and screen
  Window no border same as Window above but looks like a Tile (new V0.36)
- Select from **Regular** or **Condensed** Font type
- Select from **Transparency** for Opaque to 90% in 10% steps

➔ Checked items are shown in either horizontal or vertical order as they are shown in the configuration panel.
See below how to re-arrange the order here and to apply new lines

Move an item within a bar:

Works about the same as Drag and Drop



- **Left** Click and hold the item which will be moved
- Move the mouse up or down – the cursor will change to a NS sign
- Drop (**Release** the mouse button) – the item should appear at the drop position
  Note: Due to the rearrangement of the affected items the behavior is different if you move an item up or down – sometimes you need a second drag to place it where you want it to be
- Hit **Escape** or move the mouse out of the drop zone and release the mouse button if you wish to cancel the movement

Start a new line for the item and its successors:

- **Right** click an item to start it on a new line/column in the Hud
- New Lines are indicated with items that have a light green background color (e.g -GPS- above)
- **Right** click again to remove the New Line – the background color reverts to light gray

Note: if the New Line item is unchecked the line break is omitted

Leaving the Configuration Window

- Click **Accept** to accept all changes made to the configuration
- Click **Cancel** to discard all changes made
- The window will close and the Hud is rebuilt according to the profile

All settings are automatically saved and should be available for any further use

Available Info Fields

For Engine related fields the Bar shows up to 2 Engines.
Once a 2 Engine aircraft is detected the left one is Engine 1 and the second/right one Engine 2

SimRate x: the current Sim Rate factor – if not x1 it is shown with yellow background

ID: the aircraft ID

Time: the current Sim Time [h:mm:ss]

E-, **R-**, **A-Trim**: Elevator, Rudder, Aileron Trim % values +- deflection (click the label to Zero Trim)

A-ETrim: Elevator Trim % value with clickable Auto Elevator Trim

OAT: Outside Air Temperature [°C] (only in °C – sorry…)

VIS: Visibility [nm] (not reliable for the current MSFS I think)

BARO: Setting is available as [inHg] or [HPA] – chose one that fits the needs

WIND: Setting is available as Dir[deg] @ Speed [kt] or Cross- / Head-Tail Wind [kt]

AoA: Angle of attack degrees [deg]

Gear: either Up, down or Unknown (Transient) ⓤⓓ➲

Brakes: Parking Brake indication - Set: ◆ Released: •

Flaps: either full up, down or steps in-between (depends on the number of steps available) ⓤ❶❷❸ⓓ

TORQ: Engine torque value is available as [ft/lb] or [%] – chose one that fits the needs

P-RPM: Propeller RPM Value

E-RPM: Engine RPM Value

N1: Turbine N1 % Value

ITT: Turbine ITT Temperature [°C]

EGT: Engine Exhaust Gas Temperature [°C]

MAN: Manifold Pressure [inHg]

FFLOW: Fuel Flow value is available as pounds per hour or gallons per hour – chose one that fits the needs

F-LR: Fuel quantity Left / Right [gal] (only gallons available) get Amber readings when unbalanced more than 15% of Total Capacity

F-TOT: Fuel quantity Total [gal] (only gallons available) + Fuel Time remaining (at current consumption) (new V0.36)

-GPS- Shows the previous and next Waypoint if a flight plan is active
ToolTips - *hovering* the **-GPS-** label pulls the remaining ATC flight plan, hovering the **two waypoints** shows waypoint details from the flight plan (based on FLT file information - updated every 30 sec).

DIST shows the GPS Distance to the next Waypoint [nm]

ETE shows the GPS Estimated Time Enroute to the next Waypoint [h:mm:ss]

D-ETE shows the GPS Estimated Time Enroute to the next Destination [h:mm:ss]

BRG shows the GPS magnetic bearing to the next Waypoint [degm]

TRK shows the GPS magnetic ground track [degm]

DTK shows the GPS desired track to the next Waypoint [degm]

XTK shows the GPS cross track distance [nm]

GS shows the GPS ground speed [kt]

ALTP shows the GPS Waypoint Altitude if it is available [ft]

POS shows the Latitude and Longitude position of the aircraft

Enroute shows the elapsed times towards the WYP and TOTAL (Active, Click to restart tracking)

Calculated fields when a "Next Waypoint" is available:

- **WP-VS** Estimated VS to WYP@ALT:
  Calculated VS to reach the next waypoint at the proposed altitude with the current GS and DIST (ALTP altitude when purple or Setting Alt when blue)
- **WP-ALT** Estimated ALT@WYP:
  Calculated altitude at next waypoint using the actual GS, VS and DIST

Note: the calculated fields are experimental they are rounded to the nearest 100.

HDG: Current Magnetic Heading [degm]

HDGt: Current True Heading [deg]

ALTeff: Current effective Altitude [ft] (sim model based)

ALT: Current Instrument Altitude [ft] (baro corrected)

RA: Radio Altitude [ft AOG] available when <=1500ft AOG

RAv: Radio Altitude with audible readouts <=400 [ft AOG] available when <=1500ft AOG

IAS: Indicated Airspeed [kt]

TAS: True Airspeed [kt]

Mach: Mach number [M]

VS: Vertical rate [feet per minute] with Arrows or with +-Sign; step size is 20fpm

-AP-: Autopilot Master (all Autopilot signs turn to **Green** text if active)

HDG: Heading Mode Sign and Heading Setting

ALT: Altitude Mode Sign and Altitude Setting [ft]

VS: Vertical Rate Sign and VS Setting [fpm]

FLC: Flight Level Change Sign and IAS Setting [kt]

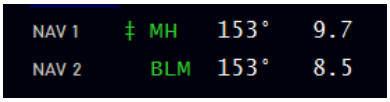
BC: Back Course Sign

NAV: Nav Mode Sign and GPS Source – GPS active source shown in purple letters else if NAV is guiding the GPS label is greyed out

APR: Approach Mode Sign and Glide Slope/Path (**>GS<**) Capture. **GS** turns **green** if captured

YD: Yaw Damper Sign (validity depends on Acft type)

LVL: Wing Leveler Sign (validity depends on Acft type)



NAV1/2: ID; BRG, DST [nm] – ID of the NAV where a single cross (†) marks a Localizer, a double cross (‡) a LOC with glideslope, and double cross with Diamond (‡◊) once the glideslope signal from the LOC was detected (new V0.36)

RWY shows the distance [nm], left/right deviation [ft] and height [ft] from the ATC assigned runway

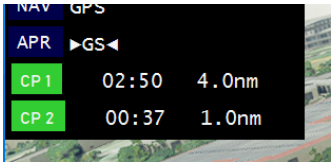
APT shows the ATC assumed flight plan destination ICAO code and remaining distance in nm

ATC shows the ATC assigned/expected Altitude ft and Heading deg and Next Waypoint ID

ToolTips - *hovering* the **ATC** label pulls the full complete ATC flight plan

METAR when clicked retrieves the closest Metar in bearing direction, shows the station, distance and bearing when the response was retrieved.

ToolTips - *hovering* the **APT** or **METAR** label shows the latest Metar message (Click the label to retrieve the information from the external server).



CP1..3: Checkpoints to track elapsed time and Lat/Lon distance from start point click a CPn label to start tracking, it turns green while tracking, click again to set a new start point

Note on Flightplans:

The flight plan in MSFS is a strange beast… and not always what one would expect.

*If you experience problems try to **uncheck** the FLT AutoSave and see if it works OK.*

Flight Plan detection and collection is Enabled in Configuration by checking Allow FLT AutoSave

The aim of the program is to show what the ATC assumes your flight plan is by capturing the FLT file output once every 30 sec to not overloading the sim.

The file location is `%TEMP%\HudBar\` and file `MostCurrent.FLT`

A flight plan usually changes after IFR clearance, once you are on arrival or approach i.e. waypoints are added and removed on the fly during such procedures. It may need ATC-Clearance and your read back to get new legs added or changed. **ATC assumed flight plans may not match your GPS flight plan though…**
Also the flight plans altitudes for waypoints are usually not what you would been asked to maintain by ATC and may even violate min/max altitude restrictions. They are added to the report to have it complete and may be once it will match. Lately there were quite some changes to how MSFS maintains flight plans – so the current program may have it wrong- let me know, then we may improve it over time. Pls provide the FLT file.

You may find such a flight plan:

```
Flightplan: RJAH-RJAA
 ATC Altitude : 7'000 ft
 ATC Clearance: Own Navigation
Waypoints:
RJAH          (Airport    )     0.0 -     0.0 nm @    107 ft
D0            (HOKT5E-03R)     1.6 -   143.8 nm @    450 ft
D1            (HOKT5E-03R)    20.7 -   142.2 nm @    750 ft
D091W         (HOKT5E-03R)     4.0 -   121.5 nm @  4'900 ft   ¯ 8'000
HUC27         (HOKT5E-03R)     0.0 -   117.5 nm @  5'700 ft
D4            (HOKT5E-03R)     3.5 -   117.4 nm @  5'700 ft   _11'000
D5            (HOKT5E-03R)     3.5 -   113.9 nm @  6'400 ft   _11'000
D6            (HOKT5E-03R)     2.4 -   110.4 nm @  7'100 ft   _11'000
HOKTA         (HOKT5E-03R)    11.3 -   107.9 nm @  7'600 ft   _11'000
DAPPE         (HOKT5E-03R)    30.2 -    96.7 nm @  9'850 ft   Σ6'000 · 11'000 Max. 210 kt
GOT           (HOKT5E-03R)    17.6 -    66.4 nm @ 12'200 ft
GURIP         (Intersec   )    14.7 -    48.8 nm @  9'950 ft
SWAMP         (Intersec   )    34.2 -    34.2 nm @  7'000 ft
RJAA          (ILS-34L    )     0.0 -     0.0 nm @    150 ft
```

Where the columns are:

ID **Waypoint Type** **Leg Dist.** **Remaining** **FP Alt** **WP Limits**

FP Alt is the flight plan altitude – if assigned by MSFS likely completely off …

The **WP Limits** are:

¯ 8'000	-> at or below 8'000 ft
_11'000	-> at or above 11'000 ft
Σ6'000 · 11'000	-> between 6'000 and 11'000 ft

Max. 210 kt would be a speed limit

ATC Altitude is the cleared altitude by the MSFS ATC (what they expect you to fly at..), in general ATC assigns you the bottom Alt when limits apply and sometimes only short before the WP (my experience)

ATC Clearance can be (just what the FLT file contains as current state):

```
Own Navigation, Vectors Icpt Left, Vectors Icpt Right, Vectors Route, (Start, Enroute)
IFR Expecting Approach, IFR Cleared Approach, IFR Cleared To Land, (Approach and Landing)
VFR Landing Request, VFR Landing Pattern, VFR Cleared To Land,
VFR TG Request, VFR TG Pattern, VFR TG Cleared To Land, (go arounds)
```

Note: During Missions the Sim is usually maintaining AutoSaves on its own and the HudBar will not save additional ones (due to some Sim issues this would cause mission handling to fail).

METAR Data Retrieval:

Please note that the program will issue HTTP Requests to an external server to retrieve the latest METAR information.
The data for METAR is retrieved from: **https://aviationweather.gov**

Please make sure to comply with their terms and conditions when retrieving METAR data with this program.

See also: https://aviationweather.gov/dataserver/example?datatype=metar

Distributed Contents:

My FlightSim Libraries (included in the release package)

- SimConnectClient.dll -- FlightSim interface to MSFS2020 SimConnect
- FSimClientIF.dll -- Generic FSim Client interface definition
- FSimIF.dll -- Generic FSim interface definition
- CoordLib.dll -- Generic Geodetic Coordinates and Algorithm library
- MetarLib.dll -- METAR retrieval and formatting library
- FS20_AptLib.dll -- MSFS2020 Airport Location DB from Aug21 BGL files
- SpeechLib.dll -- A voice synth lib using Win10 TTS facilities

From MSFS2020 Developer Kit for convenience included:

- SimConnect.cfg
- Microsoft.FlightSimulator.SimConnect.dll
- SimConnect.dll

From Google Fonts Library embedded:

- Share_Tech_Mono

A rather condensed monospaced font used for the ‘Condensed Font Window

---

Full Credit goes to JayDeeGaming

Where the idea of this HudBar is 'borrowed' from (https://www.youtube.com/c/JayDeeGaming/about)

Other credits:

CoordLib is based on: https://github.com/chrisveness/geodesy
Translated to C# and partially modified
Original code license: The MIT License (MIT)