

Live Flight Data



Real-time data plotter for simulators with FSUIPC or Simconnect communication.

By toms_FSaddons@web.de

Contents

| | |
|--------------------------------------|---|
| Connection..... | 2 |
| Expressions..... | 3 |
| Cell addresses..... | 4 |
| Example of a complex expression..... | 5 |
| Data recording..... | 6 |
| Live Graph..... | 7 |

Connection

There are two versions available, one for FSUIPC and Lvars and a second for Simconnect. The connection to the simulator happens automatically when the program starts or the start button is pressed. The variables are entered in the main window. A database can be opened with the small button in each line.

FSUIPC:

FSUIPC from <http://www.fsuipc.com/> must be installed.

The database is based on FSInterrogate2std from the FSUIPC SDK. There is no guarantee of completeness or accuracy.

Many thanks to Pete Dowson and Pelle Liljendal.

Please see the FSUIPC SDK for further infos.

The title can be chosen freely.

Lvars:

Choose a user offset (66C0 - 66F8) and set the Var.Type to *Lvar*. In the title insert the variablename without *L:*.

SimConnect:

The database is based on the FSX Acceleration SDK. There is no guarantee of completeness or accuracy.

Optionally in the field *Simulation Variable* you can enter your own title: After the variable name, the title can be entered within "".

Please see the SDK of your simulator for further infos.

The screenshot displays the LiveFlightData application interface. On the left, a window titled 'LiveFlightData' shows the 'FSUIPC connection OK' status. It includes controls for 'Start / Reset', 'Stop', and 'Pause', along with a 'Running...' indicator. The 'Update Interval' is set to 120 ms, and the 'max. Entries' is set to 200. The 'Graph duration' is 24 seconds. Below these controls is a table with columns for 'Offset', 'Var.Type', 'Title', and 'Expression'. The table lists 10 entries, with the 4th entry (Offset 02BC, Var.Type S32, Title Indicated Air Speed, Expression #/128) selected. On the right, a window titled 'D:\OneDrive\LiveFlightData Backups\XML\FSUIPC_Offsets.xml' displays a list of variables. The table has columns for 'Offset', 'Var.Type', 'Category', 'Title', 'Expression', and 'Usage'. The table lists 27 entries, with the 4th entry (Offset 02BC, Var.Type S32, Category Pos./Attitude, Title Indicated Air Speed, Expression #/128, Usage Knots * 128) selected.

| Offset | Var.Type | Category | Title | Expression | Usage |
|--------|----------|---------------|-----------------------------------|------------|--|
| 02BC | S32 | Pos./Attitude | Indicated Air Speed | #/128 | Knots * 128 |
| 0584 | U32 | Pos./Attitude | LLAPBH updated flags | # | Bits indicating which of LLAPBH (offsets 0560-0580) were... |
| 0B67 | U8 | Failure | Fail Attitude Indicator | # | |
| 0B6C | U8 | Failure | Fail Fuel Indicators | # | |
| 0B6D | U8 | Failure | Fail Heading Indicator | # | |
| 0BB4 | S16 | Controls | Elevator indicator | # | |
| 0BB8 | S16 | Controls | Aileron indicator | # | |
| 0BBC | S16 | Controls | Rudder indicator | # | |
| 0BC2 | S16 | Controls | Trim indicator | # | |
| 0BCA | S16 | Controls | Brake Commanded | # | Braking indicator 0 = off, 16383 = applied. Probably analo... |
| 0BE0 | S32 | Controls | Flaps indicator (Left) | # | For FS2002/4 see also 30E0-30FF |
| 0BE4 | S32 | Controls | Flaps indicator (right) | # | For FS2002/4 see also 30E0-30FF |
| 0C4A | U8 | Radios | NAV1 BC flags | # | Flags indicating VOR1 aspects as follows: (bit 0 = least si... |
| 0C5A | U8 | Radios | NAV2 BC flags | # | Flags indicating VOR2 aspects as follows: (bit 0 = least si... |
| 115E | U8 | Environment | Time of Day Indicator | # | 1=Day, 2=Dusk/Dawn, 4=Night |
| 2912 | U8 | Simulation | Hot Button change required | # | This byte indicates which change is to be notified: = 0 for ... |
| 2F70 | FLT64 | Cockpit | Attitude Indicator Pitch | # | degrees |
| 2F78 | FLT64 | Cockpit | Attitude Indicator Bank | # | degrees |
| 2F98 | FLT64 | Radios | HSI speed indication (metres/sec) | # | -1 if invalid |
| 2FA0 | FLT64 | Radios | HSI distance indication (metres) | # | -1 if invalid |
| 3211 | U8 | Simulation | Hot Key shift states | # | Shift state indicator Bit 0, the least significant, = shift Bit 1... |

The offset or SimVar list can be exported. When importing with the checkbox *Load Settings* set, *Update Interval* and *max. Entries* are set too.

Expressions

The expressions enable flexible processing of the read values.

| Expression functions | Description | Example | Result |
|----------------------|-------------|---------|--------|
|----------------------|-------------|---------|--------|

| | | | |
|---|--|--|--|
| # | Placeholder for read variables from Sim. | | |
|---|--|--|--|

Common operators:

| | | | |
|---|---|---------|----|
| + | Addition | | |
| - | Subtraction | | |
| * | Multiplication | | |
| / | Division | | |
| % | Modulo, returns the rest of a division. | 5%3 | 2 |
| | | 5-3*2 | -1 |
| | | (5-3)*2 | 4 |

Constants:

| | | | |
|----|----------------|----|-----------|
| pi | π | pi | 3.1415... |
| e | Euler's number | e | 2.7182... |

Special functions:

| | | | |
|-----|--|----------------------|------------|
| | input is case-insensitive, can contain spaces. | | |
| deg | Direct conversion from radians to degrees. | deg1 = 180/ π *1 | 57.2957... |
| rad | Direct conversion from degrees to radians. | rad1 = π /180*1 | 0.0174... |

| | | | |
|--------------------------|---|--|----------------|
| Abs() | Absolute value | abs(-5) | 5 |
| Acos() | Arc cosine | deg acos(0.5) | 60 |
| Asin() | Arc sine | deg asin(0.5) | 30 |
| Atan() | Arc tangent | deg atan(2) | 63.4349... |
| Atan2(y,x) | Arc tangent with y and x coordinate of a point. | deg atan2(10,5) | 63.4349... |
| Ceil() | Return integer number, greater or equal to the input value. | Ceil(4.3) | 5 |
| Cos(radian) | Cosine | cos(pi) | -1 |
| Floor() | Return integer number, less or equal to the input value. | floor(4.8) | 4 |
| Log(, base) | Returns the logarithm with the specified base. If no base is defined, the natural logarithm with the base e is returned. | log(5) log(8,2) | 1.6094... 3 |
| Max(,) | Returns the greater of two values. | max(17,24) | 24 |
| Min(,) | Returns the smaller of two values. | min(17,24) | 17 |
| Pow(, power) | Multiply a value by itself. If no power is defined, the number is squared. | pow(3) = 3 ² pow(4,3) = 4 ³ | 9 64 |
| Round(, decimal places) | Rounds a number to the specified decimal places. 0.5 is rounded up. | round(1.2345) round(1.2345,3) | 1 1.235 |
| Sign() | Returns an integer that indicates the sign of a number. | sign(2.43) sign(0) sign(-7.63) | 1 0 -1 |
| Sin(radian) | Sine | sin(rad30) | 0.5 |
| Sqrt() | Square root | sqrt(25) = $\sqrt{25}$ | 5 |
| Tan(radian) | Tangent | tan(rad30) | 0.5773... |
| Trunc() | Truncates the decimal places. | trunc(-2.678) | -2 |

Cell addresses

Within the expressions it is possible to access other cells. The column number can be specified in the curly brackets.

$\{0\}$ means the most current value from the time column. The column that is accessed must be in front of the one from which it is accessed.

Optionally, the row number can also be specified separated by a ; after the column number. The numbering is based on the latest value as zero and counts back to the previous rows.

The expression $\{0\} - \{0;1\}$ means that the difference between the last two values is calculated from the time column. The result is the time interval.

Data Viewer

| Sim-Time sec. | Pitch | Bank | Heading | Indicated Airspeed |
|---------------|-------------------|------------------|------------------|--------------------|
| 65.111 | -4.36850007623434 | 25.6692356429994 | 76.9222003687173 | 72.90625 |
| 65.222 | -4.35058711096644 | 25.6335722375661 | 76.1863755527884 | 73.0859375 |
| 65.333 | -4.33827099390328 | 25.6063908152282 | 75.4602701403201 | 73.265625 |
| 65.444 | -4.32866089046001 | 25.58120906353 | 74.713582796976 | 73.4453125 |
| 65.556 | -4.3176856264472 | 25.5525648314506 | 73.8415853306651 | 73.6484375 |
| 65.667 | -4.30418062023818 | 25.5288318078965 | 73.1216598115861 | 73.828125 |
| 65.778 | -4.28881441242993 | 25.5039969831705 | 72.3666660021991 | 74.0078125 |
| 65.944 | -4.25724062137306 | 25.4877650924027 | 71.6072674188763 | 74.203125 |
| 66.056 | -4.20023370534182 | 25.486333379522 | 70.8817287068814 | 74.390625 |
| 66.167 | -4.14193203672767 | 25.483021941036 | 70.0706967618316 | 74.59375 |
| 66.278 | -4.11505613476038 | 25.4728213325143 | 69.3547622021288 | 74.7734375 |
| 66.389 | -4.10671220161021 | 25.4605358093977 | 68.6294982489198 | 74.953125 |
| 66.556 | -4.1133938357234 | 25.4451548494399 | 67.8022639174014 | 75.1484375 |
| 66.611 | -4.12854018621147 | 25.4324902966619 | 67.1755780186504 | 75.296875 |
| 66.778 | -4.16296005249023 | 25.4146558698267 | 66.3922998122871 | 75.484375 |
| 66.889 | -4.21423475258052 | 25.390408616513 | 65.6655054911971 | 75.6484375 |
| 67.000 | -4.30237063206732 | 25.3542172349989 | 64.8823323938996 | 75.8359375 |
| 67.111 | -4.42965846508741 | 25.3113310597837 | 64.0375741012394 | 76.0078125 |
| 67.222 | -4.53925696201622 | 25.2767541166395 | 63.3764859382063 | 76.140625 |
| 67.389 | -4.68328856863081 | 25.2310539688915 | 62.5222829170525 | 76.3046875 |
| 67.500 | -4.80049590580165 | 25.1918759476393 | 61.8016414158046 | 76.4375 |
| 67.611 | -4.88202064298093 | 25.1601462531835 | 61.0799705330282 | 76.578125 |
| 67.722 | -4.87722074612975 | 25.155673250556 | 60.3437355905771 | 76.734375 |
| 67.778 | -4.86409393139184 | 25.1572568435222 | 60.1726733520627 | 76.7734375 |

LiveFlightData

FSUIPC connection OK

Start / Reset Stop Pause

Running...

Update Interval 120 ms 8.33 Hz max. Entries 200

Graph duration: 24 seconds

| Offset | Var. Typ | Title | Expression |
|---------|----------|---------------------|-----------------|
| #1 0578 | s32 | Pitch | #360/pow(65536) |
| #2 057C | s32 | Bank | #360/pow(65536) |
| #3 0580 | u32 | Heading | #360/pow(65536) |
| #4 02BC | s32 | Indicated Air Speed | #/128 |
| #5 | | | # |
| #6 | | | # |
| #7 | | | # |
| #8 | | | # |
| #9 | | | # |
| #10 | | | # |

Export Offset-List Import Offset-List Load Settings Clear

Example of a complex expression (for advanced Users)

This example shows the calculation of the distance from the read coordinates.

Longitude is in Column #1, latitude in #2

Distance between the last positions:

```
d_lon= {1}-{1;1}
```

```
d_lat= {2}-{2;1}
```

Conversion from degrees to NM. 1 degree Longitude is 60 NM at the equator and decreases to 0 up to the poles. The factor is the cosine from the latitude in radians.

```
d_lonNM= d_lon*60*cos( rad{2} )
```

Latitude is always 60 NM per degree.

```
d_latNM= d_lat*60
```

The total distance of both points is calculated using the Pythagorean theorem.

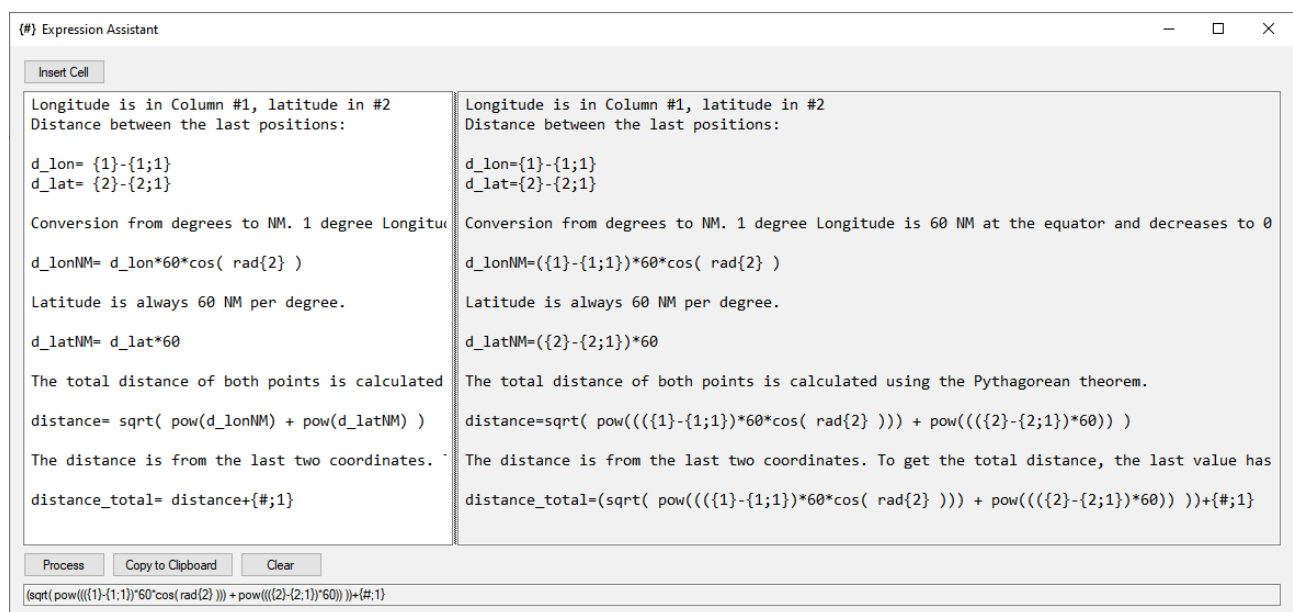
```
distance= sqrt( pow(d_lonNM) + pow(d_latNM) )
```

The distance is from the last two coordinates. To get the total distance, the last value has to be added.

```
distance_total= distance+{#;1}
```

There is an Expression Assistant under the menu item *Extras*.

The formulas can be entered in this. Make sure the variable names are unique.



Copy / paste the final expression into the LiveFlightData list. Don't worry about the complex formulas, this doesn't affect performance.

LiveFlightData

File Extras ?

FSUIPC connection OK

Start / Reset

Stop

Pause

☒ Sim-Time
 ☐ System-Time

Running...

Update Interval ms 10 Hz max. Entries

Graph duration: 1 minutes 40 seconds

| | Offset | Var. Typ | Title | Expression |
|--|--------|----------|-----------------------|---|
| <input checked="" type="checkbox"/> #1 | 0568 | s64 | Longitude of aircraft | #*360/pow(65536,4) |
| <input checked="" type="checkbox"/> #2 | 0560 | s64 | Latitude of aircraft | #*90/(10001750*pow(65536)) |
| <input checked="" type="checkbox"/> #3 | | | Distance | (sqrt(pow((((1}-{1;1})*60*cos(rad{2}))) + pow((((2}-{2;1})*60))))+{#;1} |
| <input checked="" type="checkbox"/> #4 | 02BC | s32 | Indicated Air Speed | #/128 |
| <input type="checkbox"/> #5 | | | | # |
| <input type="checkbox"/> #6 | | | | # |
| <input type="checkbox"/> #7 | | | | # |
| <input type="checkbox"/> #8 | | | | # |
| <input type="checkbox"/> #9 | | | | # |
| <input type="checkbox"/> #10 | | | | # |

Export Offset-List

Import Offset-List

☒ Load Settings

Clear

Data recording

Start/Reset starts a new recording in an internal table. If the max. Entries is reached, the oldest entries are deleted.

Stop stops recording and keeps the data in the table.

Pause is synchronized with the simulator.

The internal table can be displayed (not suitable as real time display due bad performance) or saved as a CSV file under the menu item *File*.

Live Graph



A right click within the graph allows some configurations of the display.

Note: The secondary X-axis is always the time axis. The selection makes only sense if another (primary) X-axis has been selected.

A position or selection can be shown with the left mouse button. The marking is removed with a double click.

A selection with the Ctrl key pressed zooms into the graph.