

# B25 Flight Simulator Project

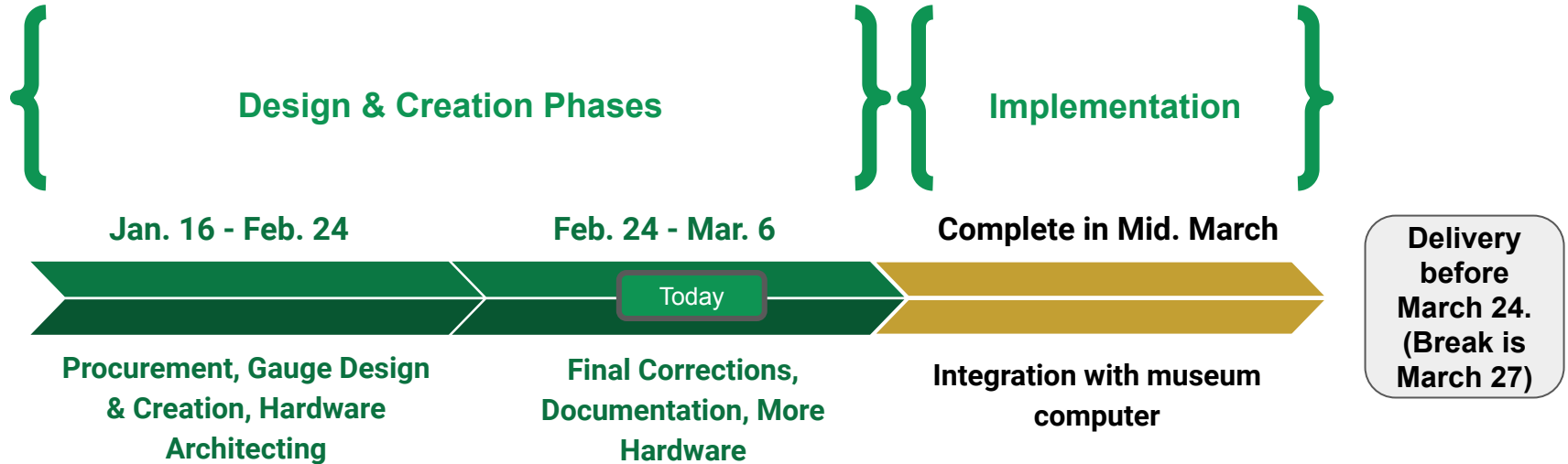
National Museum of WWII Aviation

## Milestone #2

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# Project Phases (updated)



# Project Timeline

## Complete: Milestone #1.5

- Software environment
- Procurement of major hardware/tools.
- Selection of gauges complete
- Hardware architecture

Today

Feb. 24

Feb 7

## Milestone #2

- Hardware solution demo.
- Documentation & Schematics
- Engine Util. gauges complete.
- Gauge behavior testing

## Milestone #3

- Gauge details finalized.
- Final report 75% done.

Week of  
Mar. 6

Mar. 14

## Milestone #4

- Integration with museum computer complete.
- Final report completed.

## Final Delivery

- Requirements validation.
- Electronic copies of files delivered.
- Poster rough draft completed.

Before Mar. 24

# Milestone Accomplishments

- Gauges are complete, behaviors are fine-tuned.
  - Engine gauges complete
  - Main fuel gauge completed
- Analog hardware demoed.
- Provisional documentation completed, will deliver today for review.
  - Hardware flight inputs documentation
  - Gauge creation documentation
- Testing solution
  - P3D Sim director - Automated Recorded Flights (“flight instructor” mode), with video recording of gauge behavior with flight view (recorded with OBS).
  - Air Manager variable viewer.

# Engine Utility Gauges Version B25-B

- \*Example Gauges for portside engine (#1 engine).
  - Process to make other engine is simple:

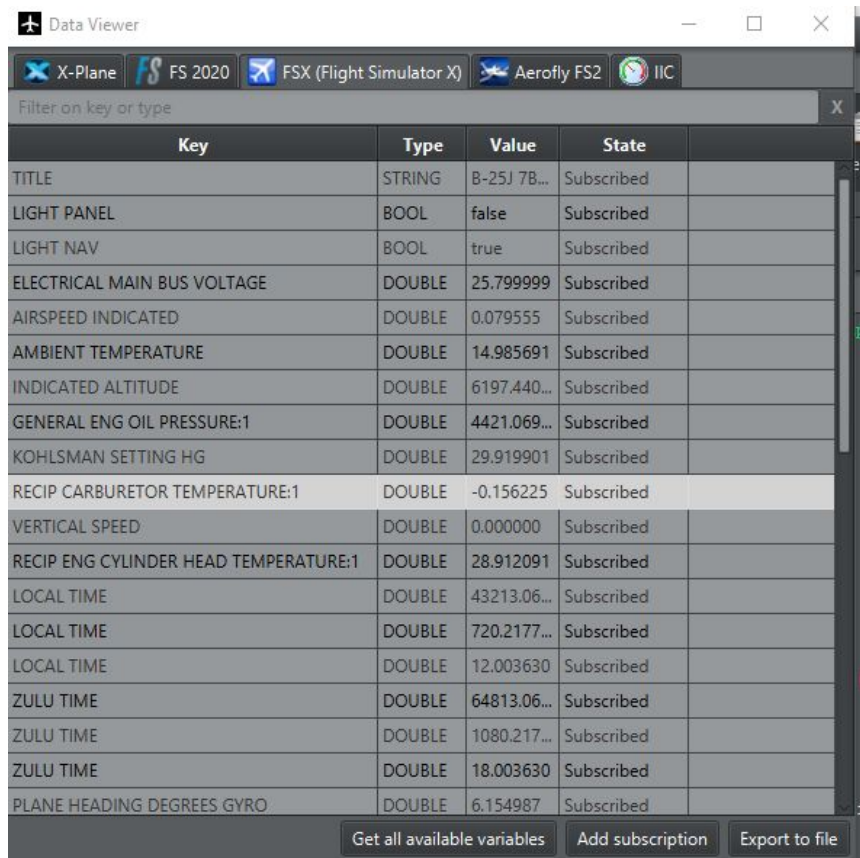
Clone portside gauge clone and change engine number variable.



# Gauge Testing Solution

## Air Manager Variable Viewer

- Allows for quick evaluation of gauge accuracy.



The screenshot shows the 'Data Viewer' window of the Air Manager software. The window has a title bar with standard OS controls and a toolbar with icons for X-Plane, FS 2020, FSX (Flight Simulator X), AeroFly FS2, and IIC. Below the toolbar is a search bar labeled 'Filter on key or type'. The main area contains a table with five columns: 'Key', 'Type', 'Value', 'State', and an empty column for actions. The table lists various flight variables, all of which are 'Subscribed'. At the bottom of the window are three buttons: 'Get all available variables', 'Add subscription', and 'Export to file'.

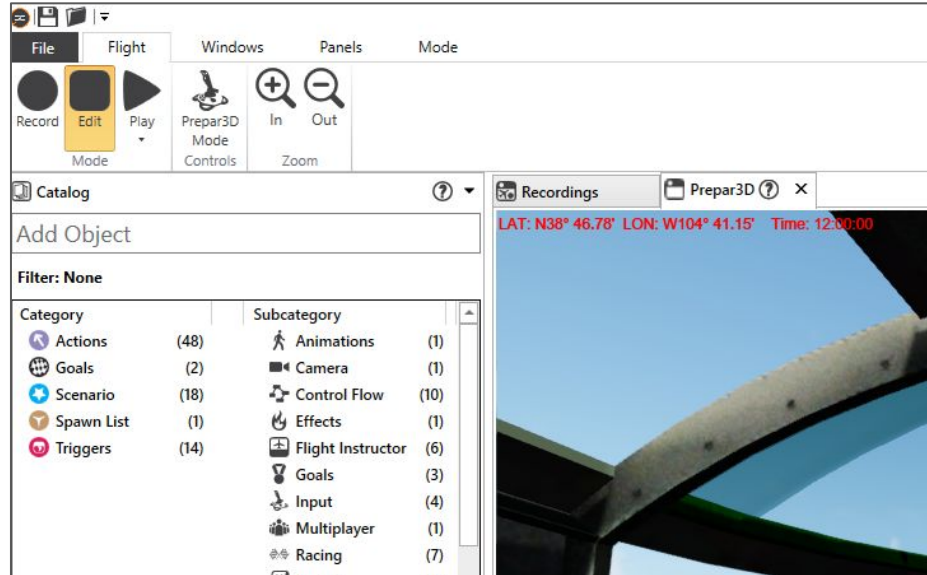
Key	Type	Value	State	
TITLE	STRING	B-25J 7B...	Subscribed	
LIGHT PANEL	BOOL	false	Subscribed	
LIGHT NAV	BOOL	true	Subscribed	
ELECTRICAL MAIN BUS VOLTAGE	DOUBLE	25.799999	Subscribed	
AIRSPEED INDICATED	DOUBLE	0.079555	Subscribed	
AMBIENT TEMPERATURE	DOUBLE	14.985691	Subscribed	
INDICATED ALTITUDE	DOUBLE	6197.440...	Subscribed	
GENERAL ENG OIL PRESSURE:1	DOUBLE	4421.069...	Subscribed	
KOHLSMAN SETTING HG	DOUBLE	29.919901	Subscribed	
RECIP CARBURETOR TEMPERATURE:1	DOUBLE	-0.156225	Subscribed	
VERTICAL SPEED	DOUBLE	0.000000	Subscribed	
RECIP ENG CYLINDER HEAD TEMPERATURE:1	DOUBLE	28.912091	Subscribed	
LOCAL TIME	DOUBLE	43213.06...	Subscribed	
LOCAL TIME	DOUBLE	720.2177...	Subscribed	
LOCAL TIME	DOUBLE	12.003630	Subscribed	
ZULU TIME	DOUBLE	64813.06...	Subscribed	
ZULU TIME	DOUBLE	1080.217...	Subscribed	
ZULU TIME	DOUBLE	18.003630	Subscribed	
PLANE HEADING DEGREES GYRO	DOUBLE	6.154987	Subscribed	

Get all available variables Add subscription Export to file

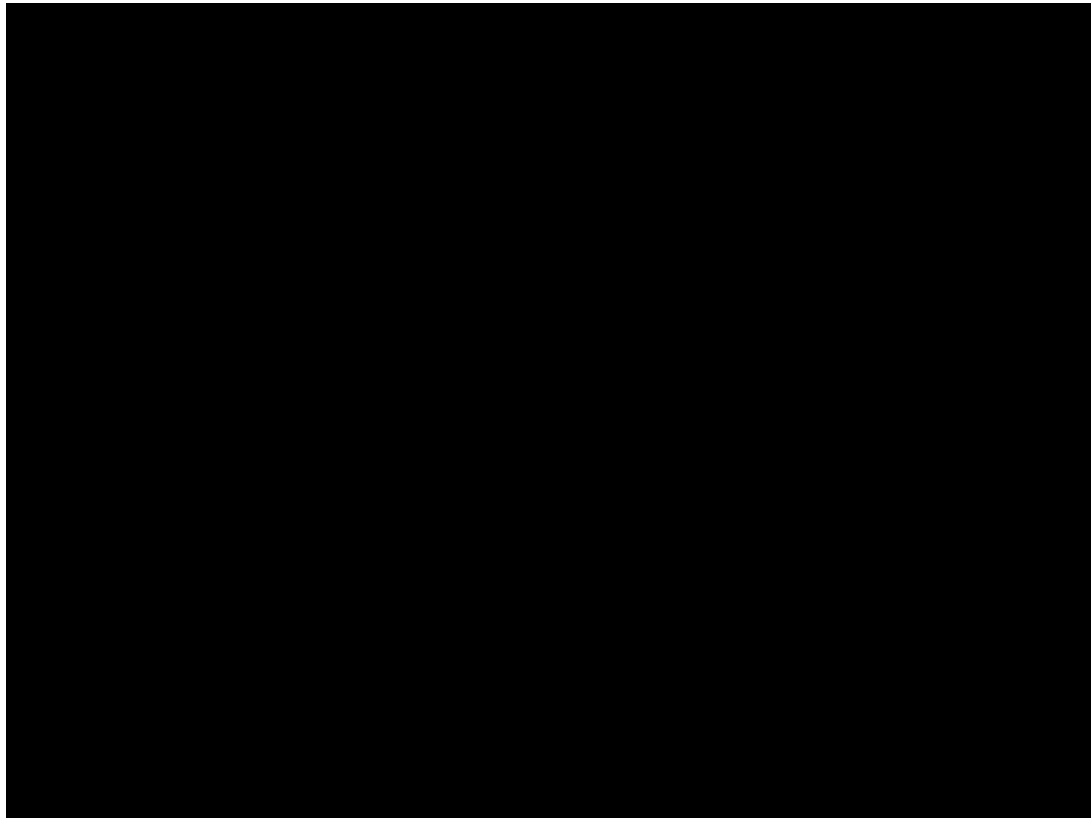
# Gauge Testing Solution

## P3D Sim Director Flight Recording

P3D can automatically “re-fly” user flights. Allows for easy gauge behavior evaluation.



# Gauges In Flight Video





# Fuel Gauge Demo (4 tanks)

The image displays the Air Manager software interface on the left and a fuel gauge instrument panel on the right.

**Air Manager Interface:**

- Instrument List:** A list of instruments is shown on the left, including:
  - 8-25 Mitchell - Accelerometer
  - 8-25 Mitchell - Air Speed Indicator
  - 8-25 Mitchell - Air Temperature Indicator
  - 8-25 Mitchell - Altimeter (3 needle)
  - 8-25 Mitchell - Carburetor Temperature Pressure
  - 8-25 Mitchell - Climb Indicator
  - 8-25 Mitchell - Clock EightNumbers
  - 8-25 Mitchell - Cylinder Head Temperature (Portside)
  - 8-25 Mitchell - Directional Gyro
  - 8-25 Mitchell - Engine Oil Temp
  - 8-25 Mitchell - Flight Indicator
  - 8-25 Mitchell - Fuel Pressure Gauge
  - 8-25 Mitchell - Fuel Pressure dr
  - 8-25 Mitchell - Lower Hydraulic Pressure
  - 8-25 Mitchell - Main Fuel
  - 8-25 Mitchell - Manifold Pressure Gauge (Portside)
  - 8-25 Mitchell - Neoprene (AUX) Fuel Tank
  - 8-25 Mitchell - Oil Pressure Gauge
  - 8-25 Mitchell - RAF Gear and Flap Position Indicator
  - 8-25 Mitchell - RPM Gauge (portside)
  - 8-25 Mitchell - RPM Gauge (starboard)
  - 8-25 Mitchell - Radio Compass
  - 8-25 Mitchell - Turn Co-ordinator CLONE
  - 8-25 Mitchell - Turn Co-ordinator ND
  - 8-25 Mitchell - V81 Gear, Flap Pos. Indicator
  - 8-25 Mitchell - V82.1 Gear, Flap Indicator
  - 8-25 Mitchell - Vacuum Pressure Gauge
  - 8-25 Mitchell - Engine Hydraulic Pressure
  - Boeing 727 - Hydraulic brake pressure
- Code Editor:** The central pane shows a Lua script snippet:

```
40 print "dial has been turned into direction" .. direction
41 if direction == 1 then
42   if times_called < 4 then
43     move_gauge_node_every_times_called, window loc "x", window loc "y" = y moveable, nil, nil, AN
```
- Function List:** The right pane shows a list of functions for the FSX (Flight Simulator X) instrument:

Function name	Value	Send
FUEL TANK CENTER QUANTITY - gallons	0.000000	Send
FUEL TANK LEFT AUX QUANTITY - gallons	100	Send
FUEL TANK LEFT MAIN QUANTITY - gallons	375	Send
FUEL TANK LEFT TIP QUANTITY - gallons	0.000000	Send
FUEL TANK RIGHT AUX QUANTITY - gallons	160	Send
FUEL TANK RIGHT MAIN QUANTITY - gallons	0	Send

**Fuel Gauge Instrument Panel:**

- L.H. MAIN:** A large fuel gauge with a scale from 0 to 375 gallons. The needle is positioned at approximately 375 gallons.
- L.H. REAR:** A smaller fuel gauge with a scale from 0 to 100 gallons. The needle is positioned at approximately 100 gallons.
- R.H. REAR:** A smaller fuel gauge with a scale from 0 to 160 gallons. The needle is positioned at approximately 160 gallons.
- R.H. MAIN:** A smaller fuel gauge with a scale from 0 to 375 gallons. The needle is positioned at approximately 375 gallons.
- BOMB BAY:** A fuel gauge with a scale from 0 to 100 gallons. The needle is positioned at approximately 100 gallons.
- L.H. FRONT:** A fuel gauge with a scale from 0 to 100 gallons. The needle is positioned at approximately 100 gallons.

# End of Project Deliverables

- Gauges working on a museum computer.
- Final Report, on paper and electronically delivered.
  - Design Description and Extension/Integration guide
  - User manuals
  - Schematics
  - Copies of course deliverables (copy of **poster** and copy of final **PowerPoint**).
- Digital copy of code files and graphics that were used.
  - Delivered on USB drive and/or a online repository.
    - Will contain gauge packages and separate gauge graphics repository (folder).



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