Flight Test Working Group: Monthly Tagup

Aeroelastic Prediction Workshop 3
X-56 Flight Test Working Group
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Updates

- BOX file share is set-up
  - So far 16 people are signed up for access to AePW FTWG file share site
- Beginning data release process with AFRL

Next Meeting

- Thursday, November 19th 2020 at 8AM PST
- Topics
  - Results sharing

Reference Slides

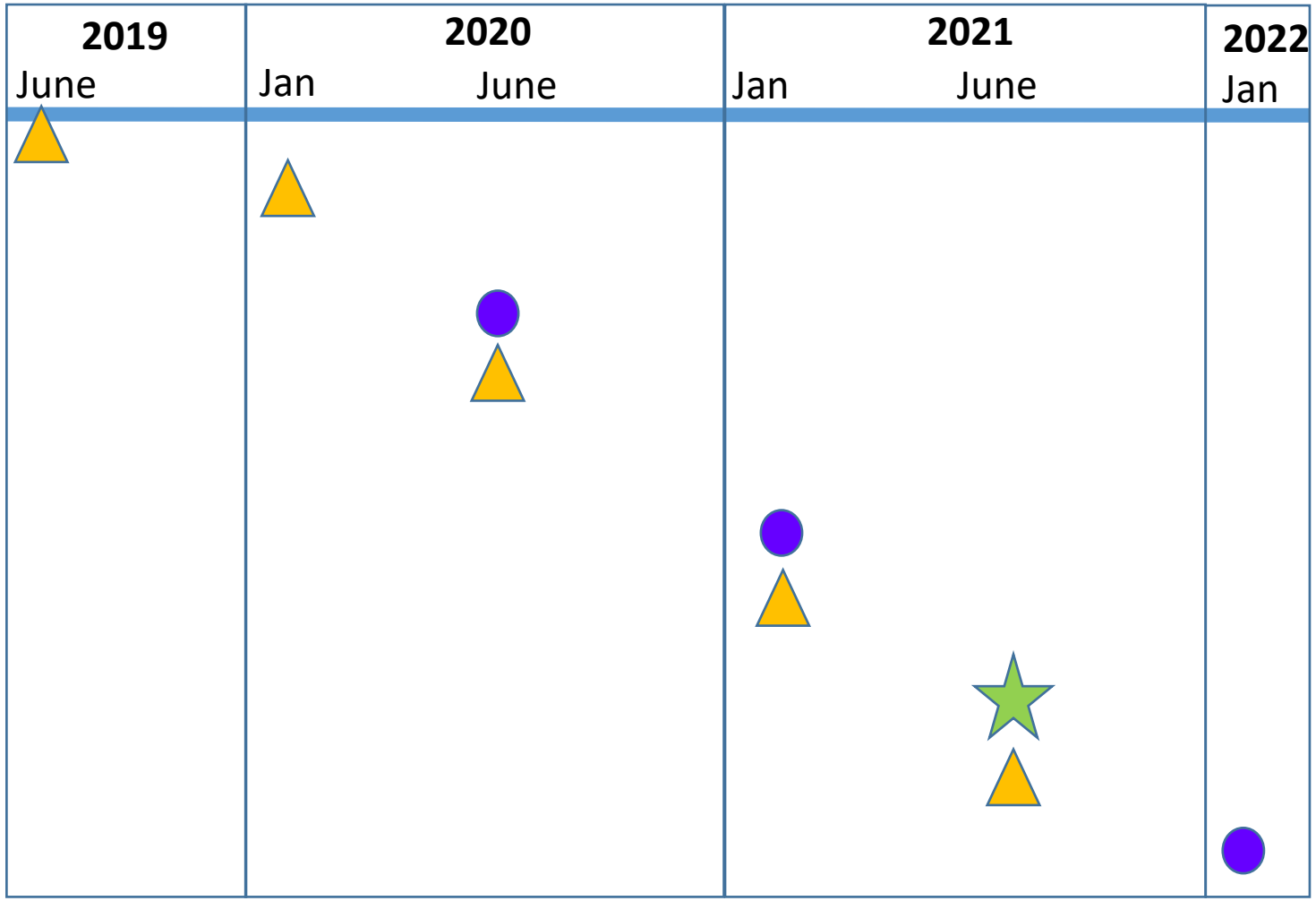
Deliverables

- Part 1: Flutter Analysis
  - Aero model description
  - Flutter solution method
  - Vg and Vf plots
  - Not sure how this has been done in the past. Provide a template to fill in?
    - Carol noted that AePW1, a template was used to help participants compare pressure data. Scripts were shared to convert data into Matlab environment.
    - Depending on number of participants, will evaluate best ways to keep data anonymous, if that is needed.
    - Denis noted that since most of the model uncertainty is related to the aero modeling, comparing information like generalized aerodynamic forces (GAF) for the first few modes at a specific set of reduced frequencies may be helpful.
    - This was a preliminary discussion. Will evolve and provide more guidance as participants continue to work on this effort.
- Part 2: Models for control
  - Background information
  - Assumptions
  - Test cases

Toward the next Aeroelastic Prediction Workshop (AePW-3): Requesting Conference-Associated Support

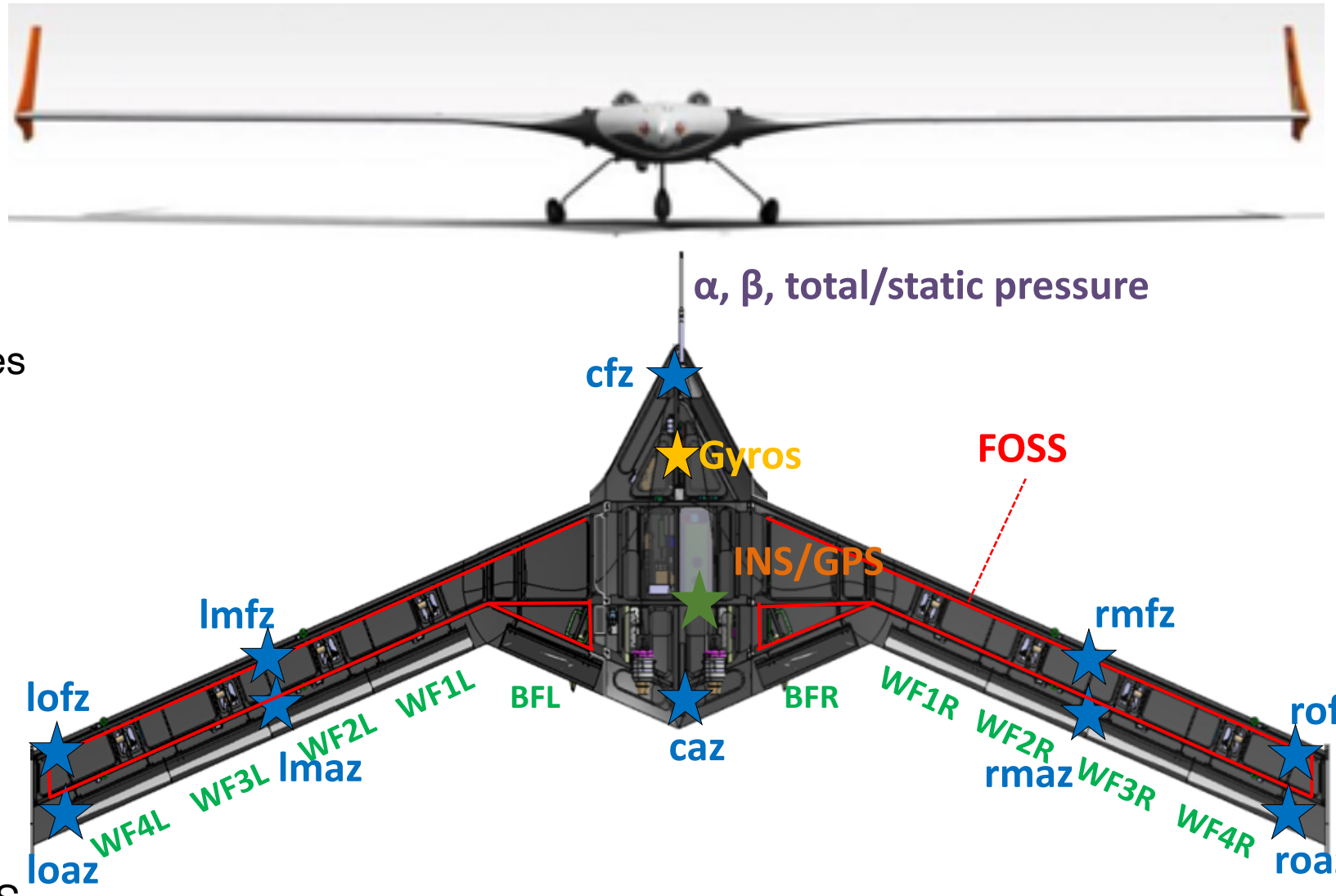
Requesting Co-sponsoring between Structural Dynamics TC & Applied Aerodynamics TC:
- **Specific SDTC items are in Blue**
- **Specific APATC items are in Green**

- IFASD 2019 Discussion Session
- SciTech 2020 Evening Discussion Sessions
- Aviation 2020
  - Special session on Large Deflection FSI (oral presentations only)
  - Evening discussion sessions: Kick off meetings for AePW-3
- SciTech 2021
  - Special session reporting intermediate results (oral presentations only)
  - Evening discussion sessions for collaboration among participants Flight Test Working Group?
- Aviation 2021 and/or IFASD 2021
  - AePW-3 (breakout session/oral presentations only)
  - If still virtual, better to just have a standalone meeting?
- SciTech 2022 Special sessions on results (technical publications & presentations)



Aircraft Description

- Specifications:
  - 500 lbs MTOW
    - 80 Lbs Fuel
  - 28 ft span
  - BRS parachute
  - two P-400 JetCat engines
  - 10 trailing edge control surfaces
- Instrumentation (selection)
  - 3 axis high rate gyro
  - 10 z-axis accels
  - Fiber Optic Strain Sensing (FOSS)
- Airspeeds:
  - Takeoff ~65KCAS
  - Max Level ~135KCAS
  - Open Loop Flutter 105-120 KCAS



Aeroelastic Prediction Workshop Proposal

- Part 1: Predict blind flutter speed with flutter mode trends
  - 0 to 200 KEAS
    - Although we only have flight data to verify first flutter mode, BFF, we can still examine secondary flutter modes at higher speeds for comparison
  - Based on mass condition (fuel) dependency
  - Aero model formulation
  - Vg and Vf trend plots
  - Leverage flight data as truth model for comparison studies (measured damping and frequency)
- Part 2: X-56 aeroelastic models for control
  - Compare with Low Order Equivalent System (LOES) models derived from flight data
  - Input/Output control surface to sensor transfer function comparisons

Document and present modeling approaches and assumptions