V-Jet II* Model 271
Brief Program Summary
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Burt Rutan
* AKA Spike
The Sam Williams Plan: Revolutionary Turbofan Breakthrough

FJX vs. conventional turbofan

- Ultra-high bypass turbofan for General Aviation. Efficiency 25+\% improvement
- One 20\textsuperscript{th} the cost of conventional
  - 1/10\textsuperscript{th} due omissions and parts count
  - 1/10\textsuperscript{th} due mass production
- Engine weight ~ 2/3 of conventional
- The missing parts in a “one moving part” engine:
  - FADEC – engine is controlled by the Aircraft’s computer
  - Gears (starter/Gen, fuel/oil pumps – are all integrated to main shaft)
  - Mounts – ring mount fan shroud
  - Fan and turbines single-piece machined forgings
  - Plumbing eliminated via internal integrated design
The Sam Williams Vision: Aircraft Applications for the New Propulsion

• All Categories included:
  – A Turbofan entry-level trainer – The new ‘Cessna 150’ has a 48-lb, 20k$, 400 lb thrust high-bypass turbofan. Engine change done in 15 minutes.
  – Four-engine Business Jets with scaled-up FJX-type engines. Low cost and high efficiency.
  – Airliners with low-cost, ultra-high bypass, low parts-count engines. Engine replacement during gate turn-around

The Goal - In a single generation, Obsolete propellers, for all aircraft categories
V-Jet Program Timeline

- Sam Williams original concept, forward sweep, spike nose
  - 1985 NBAA convention - V-Jet mockup, sized for FJ44s
- First Scaled Discussions and criteria – Early 1995
  - Mass-production, automotive style, no TC’d aircraft systems
- Tiny twin using the future FJX engine concept
  - Scaled helped Williams pitch NASA for GAP propulsion research contract.
  - Start fabrication ~ April 1996
  - First flight April 1997 using cruise-missile engines
  - Oshkosh flight unveiling July 1997
  - V-Jet II never flew with the new FJX engines
History of the Design’s Growth

• ~1994 - Original Concept, Sam Williams
  – FJX engine - 80-lb weight, 700-lb thrust, cost ~ 20k$
  – Production Goal – Aircraft price ~ 80k$, 4-place.

• Scaled 1995 Design Study
  – Tight, 5-place cabin, two 85 lb engines, GW = 3,600 lb

• The POC program using Scaled M-271 design
  – Staggered cockpit, 5-place, GW = 3,700 lb (with FJX-1 engines)

• The Pronto Program at Williams
  – Cabin grows ~ 40% by volume, GW ~ 4,400 lb.

• Eclipse Program at Albuquerque
  – Conventional systems and aluminum structure, GW ~ 4,900 lb
  – Williams EJ-22 production engine, still at 85 lb, now too small for Eclipse
  – Weight grows to 6,034 lb at certification with new P & W engines
  – “Just a small Learjet”, none of original revolutionary concepts intact.
Scaled Designs from Concept Study

Spike Model 266
Single engine

Spike Model 271
FSW Twin
A plan to Replace Sandwich Fuselage Structure with Geodesic Structure

Pioneered by Mosquito and Boomerang
Propulsion Integration
The tiny cruise missile engines installed in nacelles sized for the ultra-high bypass ratio FJX engine design
Six-Bolt Wing Attachment
Static Thrust Measurement
First Flight April 1997
The V-Jet II test team

The entire company
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