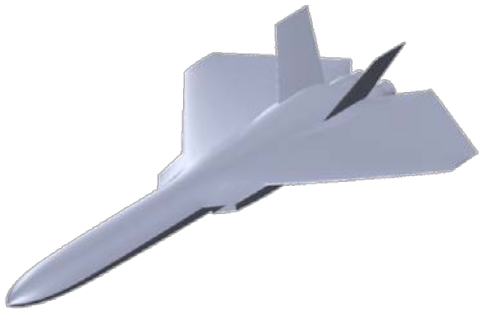


# 5th Generation Aerial Target (5GAT) Study Overview

Presented at NDIA, 3 October 2012

By: Steve Fendley

5-D Systems

# Agenda

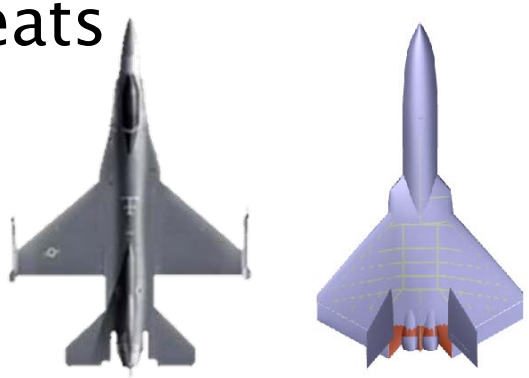
- 5GAT Need
- 5GAT Purpose
- 5GAT Concept Evolution
- 5GAT Study Details
- 5GAT Study Status
- 5GAT Future

# 5GAT Need

- QF-16 is a 4th Generation Threat Representation
- Future weapons programs will need to verify performance against advanced threats; programs include F-35, upgrades to F-22, PATRIOT, AMRAAM, Aegis, STANDARD Missile, and Sidewinder


# 5GAT Purpose / Mission

- 5GAT is intended to augment QF-16
- 5GAT represents an affordable solution to complement the QF-16 with 5th Generation characteristics
  - Reduced signature platform
  - Internal carriage for advanced augmentation devices to meet requirement to represent current / future 5th Gen threats
- Government Owned Design



# 5GAT Concept Evolution

- Government Baseline
  - Developed Conceptual Design
  - Developed OML – Supported by wind tunnel testing
  - Identified likely suitable engines
  - Determined Resulting Performance
  - Developed Initial System Requirements & Specs
- Approached Industry for Study
  - 5GAT Study (design / cost)

# 5GAT Basics

- Physical Size – comparable to F-16
- “Characteristics” – equivalent to 5th gen threats
- 12,000 lb class GTOW
- Twin Jet Engines
- Full Scale Mission
- Operation – Effectively a full scale subscale
  - Fully unmanned; not optionally piloted like previous full-scale drones
  - Operational differences from subscale
    - Runway takeoff
    - Runway landing
    - Redundancy rather than parachute as “failsafe”

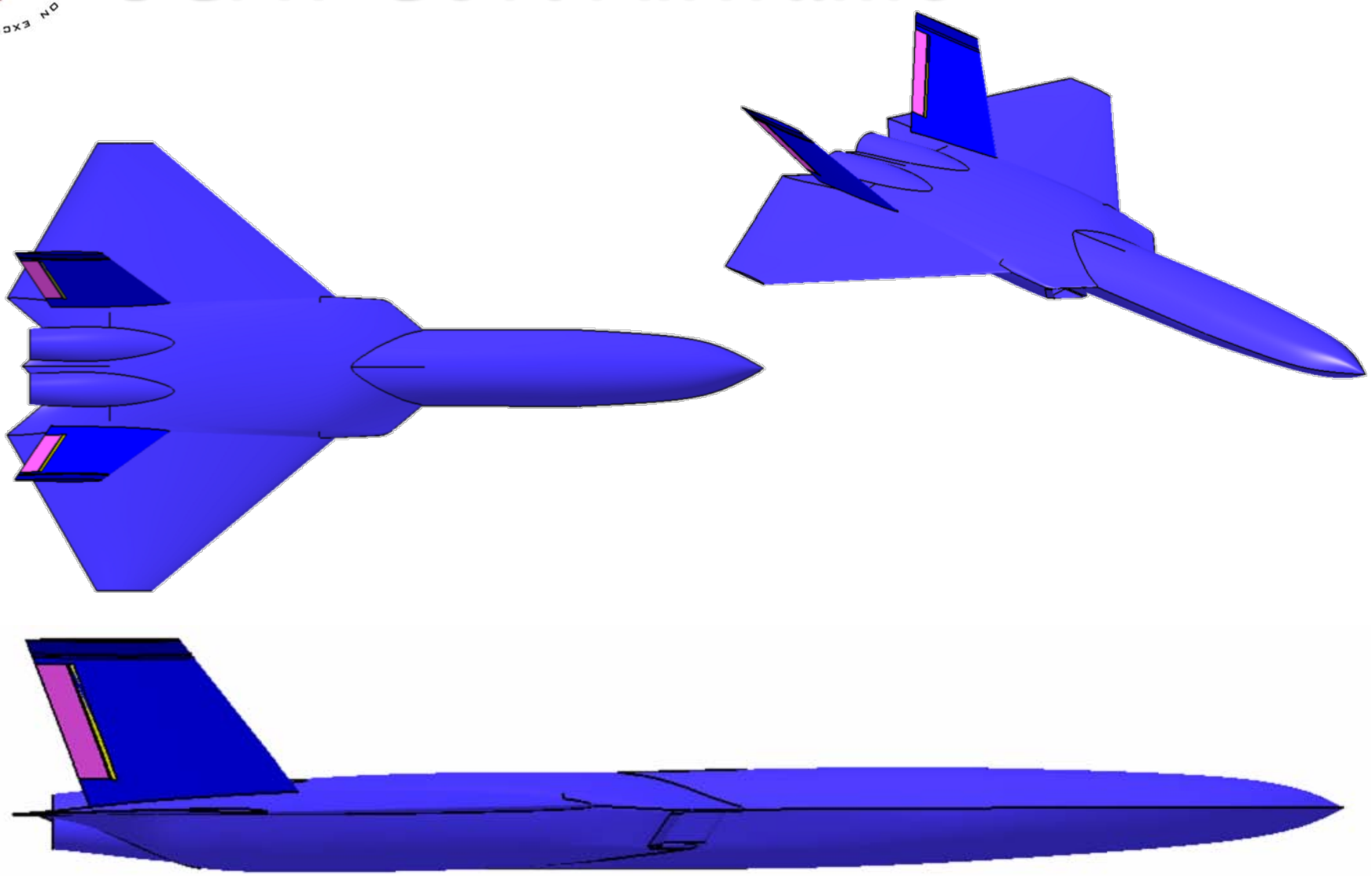
# Design and Cost Study Program Objectives

- Increase confidence in:
  - Unit Cost
  - Program Cost
  - Operational and Support Cost
- Study Strategy
  - Mature the government conceptual design to a “possible” Preliminary Design state
  - Encourage use of value added existing GFE
  - Encourage proven low cost techniques from other aircraft classes
  - Price the resulting design
    - Provide traceability to contractor historical cost data

# 5-D and CEi Teamed to Pursue the 5GAT Study

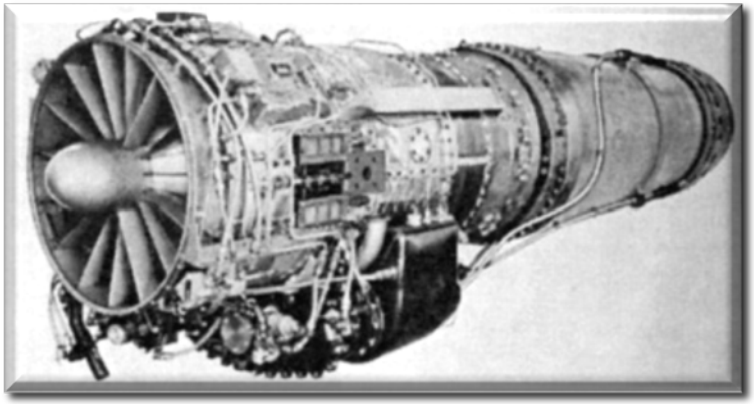
- 5-D
  - Full scale target experience dating back to 1980s
  - Sub scale target experience
- CEi
  - Target development and manufacturing experience
  - Wide range of subscales from subsonic to supersonic for USAF, US Navy, and foreign customers

# 5GAT Govt Airframe



# GE J85-5 Engine

- Used on T-38 jet trainer
- Turbojet with afterburner




***Standard Day Sea Level Static Performance***

| Engine Speed | RPM | Thrust | Specific Fuel Consumption |
|---|---|---|---|
| Military | 16,542 | 2,680 lbs (min) | 1.03 lb/hr/lb of thrust (max) |
| Maximum Afterburner | 16,542 | 3,849 lbs (min) | 2.20 lb/hr/lb of thrust (max) |

# 5GAT Keys to Success

- Three considerations determine the keys to success for 5GAT – Cost, Cost, Cost
  - Must be more cost effective than converting 5th gen manned fighter
  - Must be more cost effective than modifying existing 4th gen fighter and incorporating 5th gen characteristics
  - Must be more cost effective than conventional military high performance aircraft development and production approach

# 5GAT Low Cost Considerations

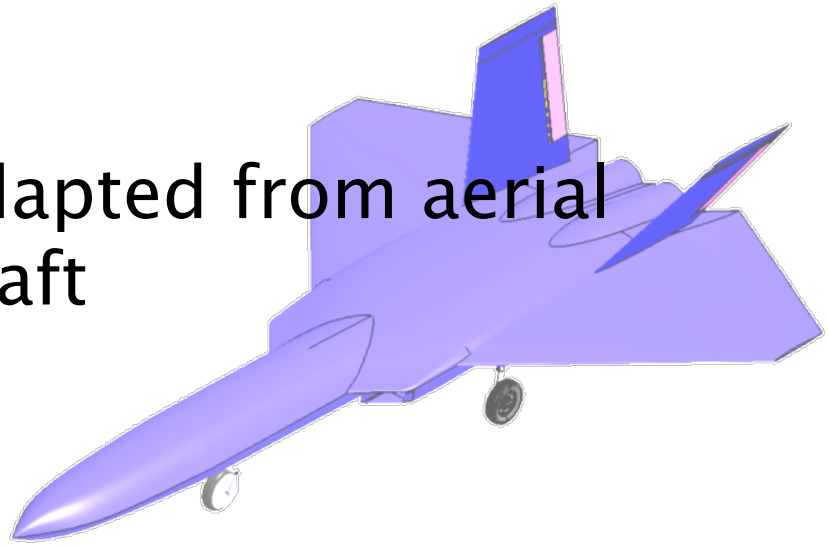
- Consideration – how are general aviation aircraft companies able to develop and produce lower cost aircraft?
- Consider VLJ aircraft in production
  - Acknowledge performance differences
  - Acknowledge some military requirements differences
  - Are there VLJ elements that can be applied?
- Consider other aircraft classes including high performance kit aircraft
  - Are there elements that can be applied?

# Production Cost "Sanity Check"

- Cost of commercial business jets scales well with empty weight
- Consider Eclipse 500
  - Current price: $2.75M
  - Empty weight = 3,550 lb
- 5GAT weight is 2.03x Eclipse 500
  - Empty weight = 7,221 lb ➔ $5.5M

# 5GAT Low-Cost Approach

- All-composite airframe with low cost manufacturing approach
  - Large parts of airframe made as single components (skins and substructure)
  - Sparse internal structure for finite airframe lifetime
- GFE surplus jet engines
- Avionics and software adapted from aerial targets, not tactical aircraft



# 5GAT Study Status

- Study cost data submitted
- Study preliminary design basis established
  - Not the only way to configure/build, but the basis for the cost submitted in the study
- Represents substantial departure from
  - Conventional military manned aircraft development
  - Legacy Full-Scale target development
- Approach is “morph” of subscale and full-scale development
  - Cost basis partially dependent on “similar to” analysis of target system efforts, subsystems, components, and integration

# Future 5GAT Actual Program

- Varying level of confidence among community / Government with respect to cost
- Risk reduction opportunities being researched – intent would be to improve confidence across community / Government
- Future program TBD