A-10 Storm Penetrating Aircraft Project

NSF Sponsored Mid-Size National Facility

A collaborative project between
CIRPAS/Naval Postgraduate School
And
South Dakota School of Mines & Technology

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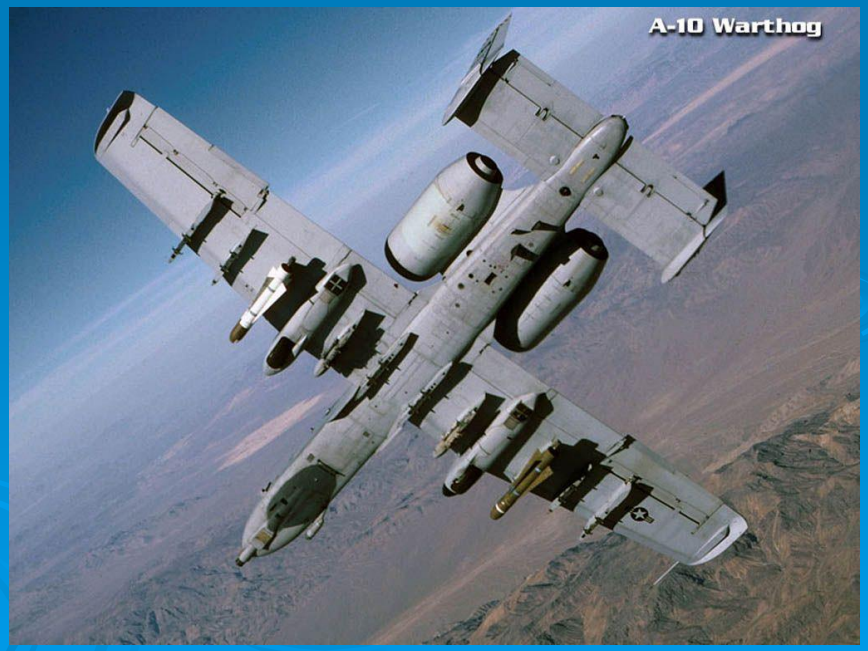
Perspective

- 1985: Special Advisory Panel recognizes need for improved storm penetration capability.
- 1989 &1992: Research Aircraft Fleet Workshops reiterate need for enhancement in storm penetration capability.
- 1999: SPA Workshop identifies science objectives that require enhanced storm penetration capability and identifies the Fairchild A-10 as prime platform candidate.
- 2004: SDSM&T's T-28 SPA retired after 35 years of service.
- 2008: NSF Facilities assessment identifies a "gap in the fleet" for lack of an SPA.
- 2009: US Air Force agrees to provide an A-10 to US Navy/CIRPAS for storm research.
- 2010: NSF selects a proposal from CIRPAS with collaborative agreement with SDSM&T to operate an A-10 SPA as a Mid-Size National Facility.

A-10 is rugged and heavily armored, which minimizes needs of modification for storm penetration.

A-10 has 11 hard points on wings and belly where 8000 lbs of instruments may be suspended.
It has a belly bay where 2200 lbs of stuff may be mounted.



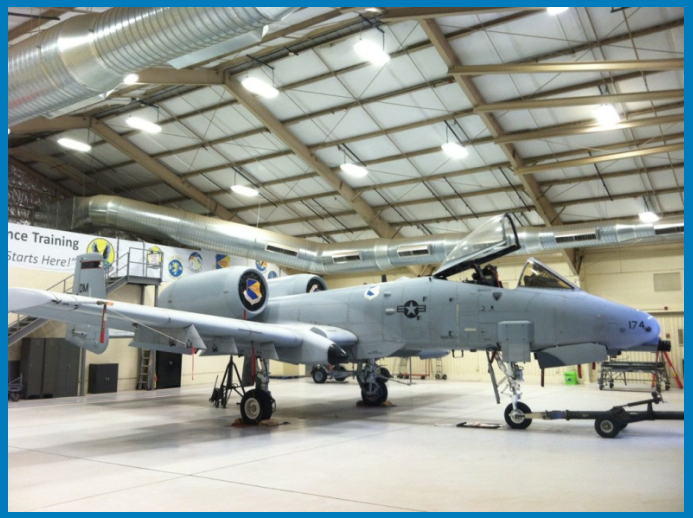
A-10 Capabilities

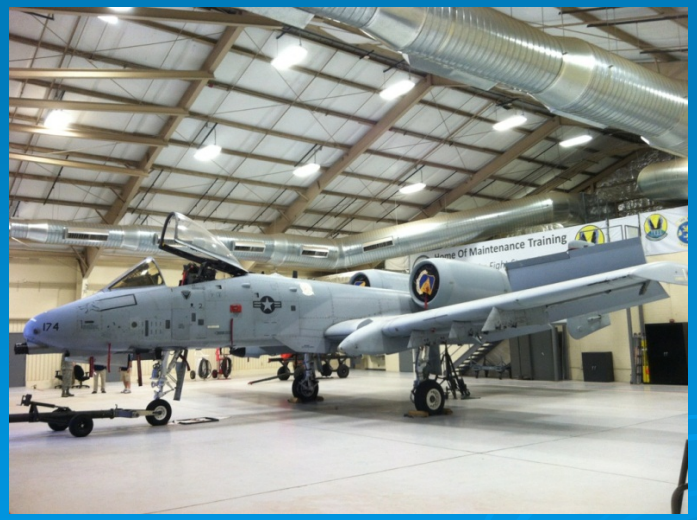
	SPA-10	Storm T-28
Max sampling altitude	~30,000 to 35,000 ft	23,000 ft
Max on-station time with 115 mi mission radius	~2.75 h at 10,000 to 30,000 ft	~1 h at 20,000 to 23,000 ft
Payload	2,200 lb internal, 8000 lb external (more if altitude is limited)	500 lb external
Pylons	7 pylons with triple ejector racks plus 4 Additional pylons for a possible total of 25 instrument pods	2 each single pod pylons + 2 modified wingtip instruments
Mission Radius w/ 1h on-station at altitude	400 mi with 1 h at 30,000+ ft	100 mi with ~1 h at 20,000 ft
Ferry Range	1040 mi internal fuel only; 1500 mi with single external tank	500 mi
Payload Power	15 kW AC (fully isolated from aircraft power) from hydraulic generator	2 kW DC (fully isolated from aircraft power) from secondary generator on engine

Potential Contributions to Climate System Science

- In situ observations in convective environments to address:
  - Cloud/aerosol/climate feedbacks
    - precipitation processes
    - radiative processes
  - Response of convective regimes to changing environmental conditions
  - Cloud electrification and the global electric circuit
  - Verification of models and retrievals from remotely sensed data
  - Influence of convective processes on atmospheric chemical cycles

Progress





Our Airplane

- USAF A-10 program office assembles parts for regeneration.
- Tail number 174 designated for regeneration and conversion.
- Loan Agreement between USAF and US Navy completed and signed.
- Contract awarded to Zivko Aeronautics for conversion and certification.
- Cooperative agreement between NPS and SDSM&T completed and signed.
- Statement Of Work for regeneration at the USAF AMARG facility completed but presently under review.
- Leading-edge wing sections have been provided to CIRPAS for Ice-Cannon tests.
- A-10 Certified Pods being evaluated for feasibility as instrument housings.

Certification Issues

- USAF issues flight worthiness certificates

  The US Navy (NAVAIR) does not operate A-10 aircraft and has no expertise in overseeing A-10 operations. USAF has agreed to do this.

  A Government Flight Representative at NAVAIR, however, will have to approve all operations.

  To maximize versatility, the plan is to seek certification (in addition to racks and baseline instruments) for wing-mount fixtures (pylons and pods) of various external configurations (i.e. different combinations of pylons and pods, where contents may be changed from project to project without any further certification.

  To expedite certification, the USAF has designated an engineer for consultation and advice during the conversion process.

Development Plan

- USAF:
  - Removal of armament and weapons systems.
  - General Inspection and overhaul.
  - Delivery to Zivko Aeronautics in Sept. 2012.
- Zivko Aeronautics:
  - Ice-Cannon tests of wing sections (reinforcement if needed).
  - Deicing systems' installation.
  - Lightning protection installation.
  - Installation of research infrastructure (mounting fixtures, power and signal distribution network, baseline instrumentation).
  - Completion estimated mid-year 2013.

Commencement of Research Activities

- Engineering test flights are planned in mid-year 2013 (including tests of baseline instruments and communication).
- Progressive science flights are planned in latter half of 2013.

Reminder

- A workshop is scheduled here on Wednesday, June 20, 1:30-4:30 PM to seek input from the science community on instrumentation issues and potential mission scenarios.