NAWCAD Mission

Naval Air Warfare Center Aircraft Division (NAWCAD)

To conduct research, development, acquisition, test and evaluation of Naval air-platforms; air platform systems; training systems; aviation support equipment; aircraft launch and recovery systems; air traffic control systems; and ship, shore, and air special mission equipment; and conduct air-platform systems integration; mission and cost analysis; and provide air platform life-cycle services in support of the operating forces, Department of Defense, and as directed.*

*NAVAIR INSTRUCTION 5451.65B, 4 January 2016

“Why we come to work every morning”
### NAWCAD Mission

<table>
<thead>
<tr>
<th>Air Vehicles</th>
<th>Propulsion Systems</th>
<th>Avionics</th>
<th>Mission Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Systems</td>
<td>Aircraft Launch and Recovery Equipment</td>
<td>Landing Systems</td>
<td>Air Traffic Control</td>
</tr>
<tr>
<td>Communications</td>
<td>Ship/Shore/Air Operations</td>
<td>Training Systems</td>
<td></td>
</tr>
</tbody>
</table>

**NAVAIR** | **DoD activities** | **Federal Agencies** | **Coalition Forces**

**National Security Needs**

*Complete lifecycle support for manned and unmanned Naval aircraft*
ORLANDO
LAKEHURST
PATUXENT RIVER
ORLANDO

Value Proposition

- **Workforce**: 13,000 engineers, flight testers, scientists, RDATE professionals. Naval Aviation’s intellectual capital works here.

- **National Ranges and Labs**: Integrated, unique, MRTFB invested, joint facilities, and not duplicated by industry.

- **Customer**: PEO/PMA, but strong history in Joint, Inter-Service, Inter-Agency, FMS and Industry collaboration.

- **Business Model**: Navy Working Capital Fund (NWCF) supply and demand model incentivizes cost consciousness.

- **Flag Officer with Command responsibilities (NAWCAD) and Technical Authority (Air 4.0)**.

- Horizontally integrated with other Warfare Centers and National Labs

- Warfare Centers shaped by BRAC (Indianapolis, Trenton, Warminster closed & consolidated at Pax)

- The only combined Air/Ship/Shore C4I and Interoperability DT&E activity

NAWCAD Pax: The Busiest Test Center in the World
NAWCAD Key Resources

- 123 Structures totaling 1,057,831 Sq. Ft. on 7,400 Acres
  - Aircraft Platform Interface Lab
  - EMALS Test Site
  - Steam Catapult Complex
  - Runway Arrested Landing Site
  - Jet Car track Site
  - Jet Blast Deflector Site
  - Carrier Analysis Facility
  - Prototype & Manufacturing Facility

- 665 Structures on 13,812 Acres, 10 Hangars, 5 Runways
  - Airspace (Sq Mi):
    - 4,000 Restricted, 5,000 Controlled
  - Anechoic Chamber, Becker Lab,
  - ACETE, SAIL, APF, P&P
  - Test Wing Atlantic, USNTPS, NACRA,
  - Webster Field
  - Controlled RF environment
  - Over-water approaches
  - Instrumentation & Fabrication

- 60 Buildings on 852 acres with 2 Active Runways
  - Shipboard ATC / Combat ID
  - Ship / Shore Communications
  - Control tower
  - Controlled RF environment
  - Over-water approaches
  - Aircraft tracking opportunities
  - Secure base – isolated, limited access
  - Pier and shoreline access
  - 2 tenant activities:
    - MD Army National Guard
    - US Coast Guard

- 40.5 Acres, Co-located with Team Orlando
  - Navy - NSA, NAWCTSD
  - Army - PEO-STRI, RDECOM
  - USMC - PMTRASYS
  - USAF - AFAMS
  - Coast Guard

- Chesapeake Test Range
  - Restricted Airspace
  - 2,400 square miles
  - Surface to 85,000 ft
  - Offshore Ranges
  - Warning Areas
  - 18,000 square miles
  - Surface to unlimited

- Atlantic Test Ranges

- Orlando
April 1, 1943
NAS PAX Commissioned

1945
Naval Air Test Center established

1958
U.S. Navy Test Pilot School established

1992
Reorganized as the Naval Air Warfare Center Aircraft Division (implemented BRAC 1991 decision)
- Consolidated research and development facilities (Warminster PA & Trenton NJ) with existing test and evaluation mission
- Relocated Naval Air Systems Command HQ and acquisition offices from Northern Virginia (1997)

2003
Regionalization: Naval District Washington (NDW) Commander Navy Installations Command (CNIC)
Naval Air Station (NAS) Patuxent River

- Naval Air Systems Command
- Naval Air Warfare Center Aircraft Division
- Naval Test Wing Atlantic
  - Air Test And Evaluation Squadron Two Zero (VX-20)
  - Air Test And Evaluation Squadron Two One (HX-21)
  - Air Test And Evaluation Squadron Two Three (VX-23)
  - Unmanned Aircraft Test and Evaluation Squadron Two Four (UX-24)
  - U.S. Naval Test Pilot School (USNTPS)
- Naval Health Clinic
- NAVFAC Washington
- Marine Aviation Detachment
- Advanced Maritime Technology Center
- Naval Criminal Investigative Service Regional Office
- Navy Munitions Command Detachment
- Defense Commissary Agency
- Fleet Weather Center – Norfolk, Forecast Component Pax River
- Defense Logistics Agency Document Printing Service Pax River
- Naval Aerospace and Operational Medical Institute
- Fifth Coast Guard District
- Maryland Army National Guard

Air Test & Evaluation Squadron One (VX-1)
Scientific Development Squadron One (VXS-1)
Fleet Air Reconnaissance Squadron Four (VQ-4)
[NAWCTSD MISSION]

To be the principal Navy center for research, development, test and evaluation, acquisition and product support of training systems, to provide inter-service coordination and training systems support for the Army, Marine Corps, and Air Force, and to perform such other functions and tasks as directed by higher authority.
[COLLABORATING ORGANIZATIONS]

- NAWCTSD
- PEO STRI
- PM TRASYS
- NAWCTSD
- PEO STRI
- NAWCTSD
- PEO STRI
- FLECT Liaison
- AFAMS
- NSA Orlando Secured
- ARL-STTC
- Joint ADL Co-Lab
- UNIVERSITY OF CENTRAL FLORIDA
- NSA Orlando
- State / UCF or Leased Secureable Boundary
- Un-secured Boundary
- Un-secured
[TEAM ORLANDO]

+ Military
+ Government
+ Industry
+ Academia
Systems Engineering
Air Vehicle RDT&E
Propulsion and Power RDT&E
Ship/Shore Air Operations and Communications
Rapid Capability Engineering & Integration
Avionics RDT&E
Human Systems RDT&E
Training Systems Division (TSD)
Mission Engineering & Analysis
Flight Test Engineering (FTE)
Naval Test Wing Atlantic (NTWL)
Atlantic Test Range (ATR)
Atlantic Targets and Marine Operations (ATMO)
Integrated Battlespace Simulation and Test (IBST)
Advanced Prototyping
Joint Simulation Environment (JSE)
National Cyber Range (NCR)
Aviation Logistics
Air Vehicle
Research, Development, Test and Evaluation (RDT&E)
Air Vehicle RDT&E

TC-7 Test Steam Catapult

Shipboard Compatibility

Weapons Separation

Flying Qualities

In Flight Refueling
Materials Research, Development & Testing

Scanning Electron Microscope for Failure Analysis

Application of an Experimental, Environmentally-Friendly Surface Treatment for In-Service Testing

Autoclave for Composite Materials RDT&E

Exposure Chamber to Simulate Operational Environment

Non-Destructive Inspection for Cracks Using Eddy Current Technique

NAVAIR Public Release SPR 2018-87; Distribution Statement A - Approved for public release; distribution is unlimited.
Currently, Sailors terminate arresting gear purchase cables by pouring 1000°F zinc into a socket.

The process requires 4 to 6 Sailors 8 to 12 hours.

Creare developed the Compact Swaging Machine, reducing risk, rework and the overall process to one hour.

The Compact Swaging Machine

Using the CSM on deck REAGAN

Attaching the CDP to the purchase cable

Ready for traps
Air Force E-4B fit-check at EMP
Cargo Lab

Lab Services
- Tie-down analysis
- Air Transportability Assessments with V-22 and CH-53K Mockups
- External Cargo Mockup
- Aerial Port Services

Certification
- Tactical Vehicles
- Infiltration
- Exfiltration
- Aerial Delivery
- Unique Cargo Systems

Training
- Special Operations
- Cargo Loading
- Vehicle Loading
- Rescue Operations

NAVAIR Public Release SPR 2018-87; Distribution Statement A - Approved for public release; distribution is unlimited.
Propulsion & Power
RDT&E
Propulsion and Power Systems RDT&E

**Rotor Spin Facility**

**Helicopter Drive System Test Facility**

**Small Engine Test Area**

Safety and performance of engine operations throughout the engine life cycle.

**Fuels and Lubricants Testing**

**Altitude Environmental Chamber**

Critical Facility supporting SECNAV’s Energy Conservation and Sustainment Strategy

Expanding Requirement and longer missions require more robust systems
Aircraft T&E Facility: the Hush House

Environmental Testing

Uninstalled Engine Testing
Ship/Shore Air Operations & Communication
Clockwise from top left:
- F/A-18 JPALS landing
- AN/TRN-47
- AN/TPN-31A
- NAPIE pallet
Clockwise from top left:
- SCRIFF production line
- CASPER communications suite
- SCMS comms van
Avionics RDT&E
Facilities for Antenna and Radar Cross Section Measurements (FARM)

Three Outdoor Ranges
- Two capable of supporting full size aircraft shells
- Wide operating frequency range from 20 MHz to 18 GHz

Three Indoor Anechoic Chambers
- Wide operating frequency range from 100 MHz to 40 GHz

Indoor and Outdoor GPS Anti-Jam Testing

Rain Erosion/Impact
- Test 1” samples at velocities of up to Mach 2 in a controlled rain field

Critical for RCS measurements, receiver performance, and antenna-to-antenna isolation

Radar and Computational Electromagnetics Modeling (RACEMM)

- Radar Design and Modeling analysis
- On-platform antenna performance and placement studies/analysis

Lab provides Low Cost risk mitigation for:
- Radar Modeling (Any band)
- Antenna and/or structural changes.
- Full platform spatial area analysis

Critical modeling and analysis to understand a platform’s electromagnetic profile

NAVAIR Public Release SPR 2018-87; Distribution Statement A - Approved for public release; distribution is unlimited.
Acoustic/Optical Tank Facility
37,000 gallon water tank for research, development, and testing of novel in-situ underwater phenomena

Airborne Antisubmarine Warfare (ASW) Intelligence (AAI) Lab
Provide Intelligence Data that feeds ASW Modeling
Collect and analyze acoustic and non-acoustic threat data

Acoustic Modeling and Simulation Lab
Concept studies for active and passive ASW missions
Tactics and prototype sensor development
System/Platform performance assessments for both engagement level and campaign level models

Modeling and simulation for air ASW mission planning and mission system optimization
Crew Station Technology Lab

Coast Guard’s HC-130H Mock-Up
Flight Test Engineering
Flight Test Engineering

Provide:
• Test Program Management
• Flight Test Engineering Support

Plan, Test, Evaluate, and Report on RDT&E:
• Fixed wing and rotary wing
• Manned and unmanned

Test and Evaluation Products:
• 20 Test and Evaluation Master Plans
• 600 annual Test Plan approvals
• >200 annual Reports of Test Results
• >1,150 annual Deficiency Reports
• > 4,000 annual Daily Status Test Reports

Program Management:
• T&E Management and Resourcing and Metrics
• Test Team Leadership and execution

Primary areas of test and evaluation include:
• Flying qualities and performance
• Shipboard suitability
• Propulsion and mechanical systems
• Tactical, assault, maritime surveillance avionics mission systems
• Ordnance compatibility and ballistics efforts
• Reliability and maintainability assessments
• Flight fidelity simulation
• Flight control software development
• Precision Approach Landing System and deck interface certifications

NAVAIR Public Release SPR 2018-87; Distribution Statement A - Approved for public release; distribution is unlimited.
Naval Test Wing Atlantic
Naval Test Wing Atlantic

Provide:
• Aircrew and aircraft assets
• Maintenance, operational and safety oversight
• Facility support

Conduct RDT&E:
• Fixed wing and rotary wing
• Manned and unmanned
  >13,000 annual sorties
  >20,800 annual flight hours

Train:
• Test Pilots
• Test Naval Flight Officers, and
• Flight Test Engineers

3,800 Personnel
• Military: 400
• Civilian: 800
• Contractor: 2,500
• Students: 65

259 Aircraft
• Manned: 141
• UAS: 131
• >30 unique models
• >50 different series

Facilities
• Buildings: 87
• Structures: 5
• Relocatables: 2
• Square Ft: 1.5M
• Value: $460M

$5.2B Total Asset Capital
NTWL Squadrons & Aircraft

- VX-20
  - C-2A
  - UC-12M
  - C-38A
  - E-2C
  - E-2D
  - E-6B
  - P-8A
  - KC-130J
  - KC-130T
  - MQ-4C
  - T-6A

- HX-21
  - AH-1W
  - AH-1Z
  - UH-1Y
  - VH-3A
  - CH-53K
  - TH-57C
  - MH-60R
  - MH-60S
  - NSH-60F
  - VH-92A
  - S-92
  - MV-22B

- USNTPS
  - C-12C
  - C-26A
  - F/A-18F
  - OH-58C
  - UH-60A
  - UH-60L
  - UH-72A
  - T-6B
  - T-38C
  - NU-1B
  - U-6A
  - X-26A

- VX-23
  - EA-18G
  - NEA-18G
  - F/A-18B
  - F/A-18C
  - NF/A-18C
  - F/A-18D
  - NF/A-18D
  - F/A-18E
  - F/A-18F
  - F-35B
  - F-35C
  - T-45C

- UX-24
  - MQ-8B
  - MQ-8C
  - RQ-11
  - RQ-20A
  - RQ-21A
  - RQ-26A
  - Multiple Group I and II UASs

Total Manned Aircraft - 141
Total UAV – 131
Atlantic Test Range
Atlantic Test Range
Patuxent River Complex

NAS PAX River Assets
- Chesapeake Test Range
- Supersonic Corridor
- UAV Routes
- Helicopter Operating Areas
- Military Training Routes also used by
  - Andrews AFB
  - Dover AFB
  - Delaware ANG
  - DC ANG
  - Other military

Expanded Air Space

Atlantic Test Ranges
- Chesapeake Test Range
- Restricted Airspace
- Offshore Ranges
- Warning Areas
Atlantic Targets and Marine Operations
Atlantic Targets & Marine Ops

BQM-74 Launch

SA-6 Gainful

Coyote Launch

Hellfire SEPTAR
Integrated Battlespace Simulation and Test
Air Combat Environment Test & Evaluation Facility
Installed Systems Test Facility

Large Anechoic Chamber

Manned Flight Simulator

Shielded Hangar

Electronic Warfare Integrated Systems Test Lab

Warfare Simulation

Threat Air Defense Lab

Distributed Test

Communication, Navigation, IFF Lab

High Performance Computing

NAVAIR Public Release SPR 2018-87; Distribution Statement A - Approved for public release; distribution is unlimited.
Anechoic Chamber
Electronic Warfare Testing

EA-18G

EA-6B

H-60

F-35
Advanced Prototyping
Advanced Prototype Facility

APF Phase I Secure Facility
- 28,309 sq ft. (< P-3 sized aircraft)
- 5 ton capacity overhead crane
- $2.5M of tooling and infrastructure equipment
- Internal and external secure comms

APF Phase II Secure Facility
- 72,800 sq ft. (747-class sized aircraft)
- Capable of 4 independently compartmentalized hangars

APF Phase III (2020 Funding)
- 33,928 sq ft.
- Secure capable modification hangar
  - Composite materials laboratory
  - Composite materials preparation room
  - 3 secure room capable office spaces
Integrated Approach to Prototyping

Requirement

Solution

Modeling and Simulation

System Development

HWIL Developmental Testing

A/C Prototype Fab

Production Transition

Flight Test Support

Integrated Ground Test

Prototype Installation
Summary

- Provides full spectrum aircraft research, development, test and evaluation and logistics support services
- Increasing focus on Rapid Prototyping and Irregular Warfare
- Demand continues for our unique intellectual capital/capabilities

Busiest Flight Test Center in the world!
NAWCAD – Leveraging Resources for Technology Development
FOR QUESTIONS OR MORE INFORMATION PLEASE CONTACT

+ orlo_pao@navy.mil
+ orlo_BusinessSupportTeam@navy.mil
+ #NAWCTSD
+ (407) 380-4000