

# FAA William J. Hughes Technical Center

## Research & Development Flight Program

***“These flying laboratories are equipped, or can be readily modified in-house to support any and all FAA projects requiring flight test.”***

The FAA's Research and Development (R&D) Flight Program is located at the FAA William J. Hughes Technical Center, Atlantic City International Airport (ACY), New Jersey. The R&D Flight Program serves many customers throughout the FAA and encompasses aircraft operations, aircraft maintenance, aircraft engineering and modifications, and an aircraft tracking range.

The program currently operates, maintains, and modifies six aircraft of five different types as airborne R&D laboratories. The aircraft are certificated under Federal Aviation Regulation (FAR) Part 91, with a full deviation from Part 125 for the larger aircraft. These flying laboratories are equipped, or can be readily modified in-house to support any and all FAA projects requiring flight test.

When required by specific R&D projects, the Flight Program may also utilize rental and loaned aircraft. As an adjunct to the aircraft, the R&D Flight Program also operates and maintains a sophisticated aircraft tracking range. This range, which includes both laser and radar tracking systems, provides verification of aircraft "truth-in-space" location and track.



R&D Facilities



Our flight test capabilities have helped the following programs achieve success:

- Global Positioning System (GPS)
- Satellite Navigation (Local & Wide Area Concepts)
- Terminal Procedures (TERPS)
- Traffic Alert And Collision Avoidance System (TCAS)
- Data Link
- Spectrum Engineering
- Vertical Separation
- Precision Runway Monitoring (PRM)
- Microwave Landing System (MLS)
- Instrument Landing System (ILS)
- LORAN C
- VOR/DME
- ASR-8 And Asr-9 Radar
- Next Generation Radar (NEXRAD)
- Doppler Weather Radar
- Mode S
- Aircraft Fire Protection
- Alternate Fuels
- Crashworthiness
- Atmospheric Aircraft Electrical Hazards
- Aviation R&D Security
- Airport Safety

The capabilities/qualifications of the Flight Program personnel are:

Flight Operations

Flight test pilots; ATP, type ratings, engineering/science degree

Engineering/Modifications

Avionics/structures engineers; equivalent DER avionics/structures/flight test

Maintenance

Repair station, inspectors, A&P

Tracking Range

Range technicians, raw data reduction

Procedure to Request Flight Test

Contact R&D Flight Program Office for:

Meeting to discuss needs/requirements

Program Directive

Flight test plan

Schedule equipment installation

Schedule flight test

Federal Aviation Administration

William J. Hughes Technical Center

Atlantic City International Airport

New Jersey, 08405

Phone: 609-485-5581 or 609-485-6492

RESEARCH FACILITIES

R&D



# FAA William J. Hughes Technical Center

## Research & Development Flight Program

*Boeing 727-25C (100QC), N40  
Manufactured 1968*



Our Boeing 727, N40 provides high altitude (42,000 ft.), high airspeed (.9M), and limited range (2,000 nm) capabilities. Has a cabin cargo door and a high load bearing cabin floor to permit ready installation and removal of equipment. The 100QC designation indicates that this airplane is equivalent to a 727-100, however it can be Quickly Changed between a cargo configuration and a normal configuration. This is accomplished by the use of heavy-duty cargo pallets that, because of the cargo door, can be rolled in and out of the cabin. Due to its mission this airplane is maintained in the cargo configuration at all times.

The basic certified cockpit is equipped with various analog navigation and communication avionics representative of older jet transport category aircraft. It also has tie-down tracks for specially designed and equipped project racks. Numerous project racks have been fabricated and are available for installation as required. The cockpit has been modified to include a UHF/HF selector switch and transmitter/responder, INS controllers and displays, a remote FD course and Az control, an MLS Back Az switch panel, and a TCAS display. It is also wired for the

installation of a HUD, a TRU-2 transponder, cabin air/smoke evacuation, and runway friction parameters, including landing gear strain gages. Additionally, it has been provisioned for the installation of wing tip smoke generators for wake vortices studies.

To find out more about the FAA's flight-test program capabilities contact:

FAA R&D Flight Program

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R&D Facilities

# FAA William J. Hughes Technical Center

## Research & Development Flight Program

*Convair CV-580, N39 and N49  
Manufactured 1957 (2)*



The Convair CV-580 N39/N49 provides mid range altitude (23,000 ft.) and airspeed (300 kts) capabilities. Each has a cabin cargo door and a high load bearing cabin floor.

A major Supplemental Type Certificated (STC) modernization has equipped each airplane with modern digital avionics and flight control systems permitting interfacing with state-of-the-art R&D digital avionics. This equipment, all fully integrated, is as listed below:

- Dual digital integrated flight control system
- Five-tube EFIS system
- Dual digital air data computer system
- Dual attitude heading reference system
- Dual radio altimeter system
- Weather radar system
- Traffic collision avoidance system II
- Lasserref II inertial reference system
- Dual VHF communications system
- HF communications system
- UHF/VHF communications system
- Dual automatic direction finding system
- Dual VHF navigation system
- Dual distance measuring equipment system
- Dual mode S transponder system
- Dual radio tuning unit system

- TACAN system
- Dual flight management system
- Loran C & GPS sensor systems
- Radio reference system
- Interphone and audio integration system
- Public address system
- MLS and ILS
- Integrated annunciator system
- Project Nav switching system
- 2-inch engine / standby instruments

Additionally, these airplanes are equipped with NIKE/EAIR tracking transponders and retro-reflectors for LASER tracking and numerous project antennas. Also, numerous project racks have been fabricated and are available for installation as required.

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R&D Facilities



# FAA William J. Hughes Technical Center

## Research & Development Flight Program

*Beech King Air BE-200, N35  
Manufactured 1976*



The Beech King Air, N35 provides mid range altitude (31,000 ft.) and airspeed (280 kts) capabilities.

Avionics and flight control systems were upgraded in 1991 to fully digital systems via STC's in order to permit interfacing with state-of-the-art R&D digital avionics.

The airplane is equipped with a comprehensive project switching capability, an Electronic Flight Instrument System, a Digital Automatic Flight Control System, a Multi-Function Display, a Flight Management System, a new navigation/communication system, and weather radar. The airplane is also equipped with a NIKE/EAIR tracking transponder, a retroreflector for LASER tracking, an MLS and GPS for R&D purposes. The specific equipment is very similar to what has been installed in both Convaers.

Specifically designed project racks have been designed and fabricated to fit this small twin-engine airplane.

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R&D Facilities

# FAA William J. Hughes Technical Center

## Research & Development Flight Program

*Aero Commander AC680E, N50  
Manufactured 1959*



The Aero Commander, N50 provides low range altitude (12,000 ft.) and airspeed (180 kts) capabilities.

Equipped with avionics and flight control systems representative of older light twin, general aviation non-turboprop driven airplanes, permitting limited interfacing with R&D equipment.

This airplane is equipped with a junction box allowing easy access to aircraft power and other signals for various programs, NIKE/EAIR tracking transponders, 60Hz/400Hz/28Vdc project power, an angle of attack indicator, and a TRU-1 transponder.

A project rack sized for the airplane has been fabricated and can be installed in place of one of the seats. The airplane has been fitted for a limited number of project antennas, such as, a telemetry antenna and a VHF/DF EMI antenna. It has been wired for

MLS switching, wind shear, and GPS. Provisions are also in place to install a retroreflector for laser tracking.

This airplane has been, and currently still is being used for alternative fuels testing. Special provisions have been made to the fuel system to permit total separation of fuel flow to each of the engines as a safety factor.

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R&D Facilities



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## Research & Development Flight Program

*Sikorsky S-76A, N38*

*Manufactured 1980; two turbine engines*



The avionics and flight control systems of the Sikorsky S-76, N38 were modernized in 1988 and 1995 to be representative of modern commercial aviation and are configured to permit interfacing with state-of-the-art R&D digital avionics.

This aircraft is equipped with a Dual Digital Automatic Flight Control System, an Electronic Flight Instrument System, a weather radar, a radio altimeter, an Area Navigation System, an MLS, an FMS consisting of a CDU, NCU, DTU, RRSD, GPS, LORAN-C, ADT, and a TTP, and a project interface panel. It also has a single FM/UHF/VHF, an ICS, a MODE-S, and a camera port for external photos.

This aircraft is also equipped with tracks for project racks, a retroreflector, wiring for TCAS, air/air TACAN, and a smoke generator system.

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