

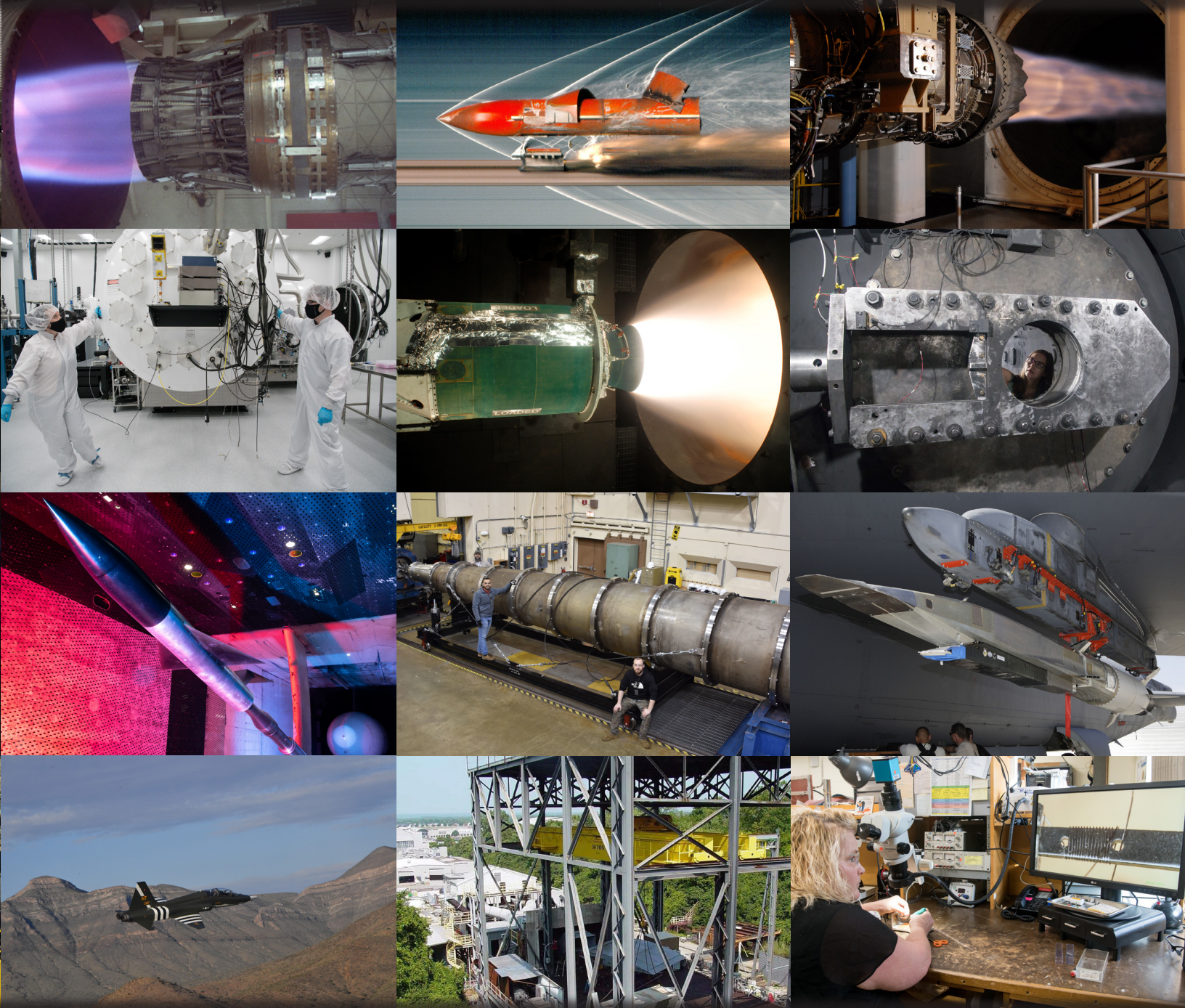


AEDC

ARNOLD ENGINEERING DEVELOPMENT COMPLEX



TEST CAPABILITIES GUIDE



AEDC

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TEST CAPABILITIES GUIDE

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704TH TEST GROUP

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ARNOLD ENGINEERING DEVELOPMENT COMPLEX

Arnold Engineering Development Complex, part of the Air Force Test Center, proves the superiority of systems required to meet the demands of the National Defense Strategy. AEDC utilizes its capabilities to deliver decision quality data and analysis to its customers including the U.S. government, industry, and international partners.

Headquartered at Arnold Air Force Base in Tennessee, the complex also includes geographically separated units in California, Colorado, Maryland, New Mexico, Ohio, and Utah.











AEDC MISSION

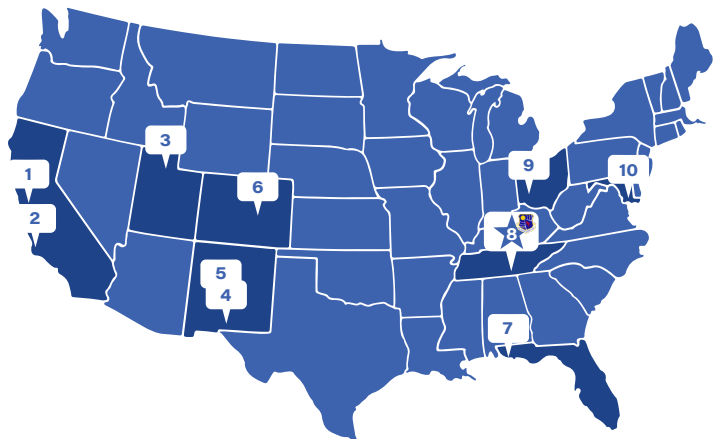
Provide world-class test expertise and environments, enabling early solutions that accelerate war-winning capabilities.

AEDC VISION

Our nation's aerospace advantage – relevant, resilient, collaborative and adaptive ... fully integrated into a digitally-based acquisition process, providing world-class test solutions for our defense partners.



- **Moffett Field**
716th TEST SQUADRON OPERATING LOCATION - A
- **Vandenberg SFB**
719th TEST SQUADRON OPERATING LOCATION
- **Hill AFB**
719th TEST SQUADRON
- **White Sands Missile Range**
704th TEST GROUP, DETACHMENT 1
- **Holloman AFB**
704th TEST GROUP
- **Peterson & Shriever SFB**
718th TEST SQUADRON OPERATING LOCATION - A
- **Eglin AFB**
715th TEST SQUADRON OPERATING LOCATION
- **Arnold AFB**
★ AEDC HEADQUARTERS
804th TEST GROUP
- **Wright-Patterson AFB**
704th TEST GROUP OPERATING LOCATION - B
- **AEDC White Oak, Md**
716th TEST SQUADRON OPERATING LOCATION - B



DOING BUSINESS WITH AEDC

AEDC offers extensive test and evaluation capabilities, and our team is focused on providing the best possible data and a positive test experience for our customers. The AEDC test capabilities can be used by government, private industry and academia. Test contracts are cost-reimbursement, advance-pay type arrangements that include the terms and conditions necessary to assure AEDC's compliance with applicable government statutes and regulations.

The following steps summarize how typical test programs are planned and conducted by Team AEDC:

1. The customer contacts an AEDC representative to inquire about our test and evaluation services. Lead time for using AEDC capabilities is primarily based on test complexity and can range from two weeks for less complex tests to 24 months for very complex tests.
2. The customer provides (with squadron point of contact (POC) support) a program introduction document (PID) to determine test scope, requested resources and schedule requests. The PID will contain the customer's requirements for testing, including test objectives and required data.
3. AEDC provides an initial rough order of magnitude (ROM) cost estimate and schedule availability for customer inquiries.
4. If the estimated cost and schedule are acceptable to the customer, AEDC requires that a test request be submitted.
5. AEDC contacts the customer to determine schedule dates and set up the initial pretest meeting. The customer is required to provide AEDC advanced funding for initial project planning and estimation.
6. After the initial pre-test meeting, the customer provides a detailed test plan containing the test objectives, scope, schedule, desired test program matrix, test article descriptions, instrumentation, data reduction and analysis requirements. AEDC prepares a statement of capability (SOC) or contract using this information, which will be the formal agreement between AEDC and the customer for test requirements scope, schedule, risks, and costs.
7. Once the SOC or contract has been signed, the balance of test funding is required by AEDC to proceed.
8. AEDC test group representatives will work closely with the test customer throughout the test planning phase to review and finalize the test plan, test matrix, and data reduction and analysis requirements, and prepare the necessary documents to schedule test periods and configure all systems to support testing.
9. The AEDC customer service representative (CSR) assists the customer with getting on base using the visit authorization letter (VAL) process, accessing AEDC computers, long distance access when at an AEDC location and general AEDC and local area information. Customers are free to contact the CSR at any time with questions.
10. During the testing process, the customer is billed for actual charges and costs for facility operations.
11. Once the test has been completed, AEDC provides analyses and data products as detailed in the SOC or contract.

**For additional information to begin your AEDC journey, contact
Arnold AFB, TN 37389-9010, 931-454-7621 / DSN 340-7621**

715th TEST SQUADRON

HYPERSONICS SYSTEMS TEST

The 715th Test Squadron provides test and evaluation (T&E) through the operation of multiple test facilities providing a range of supersonic to hypersonic speeds and high temperature environmental conditions.

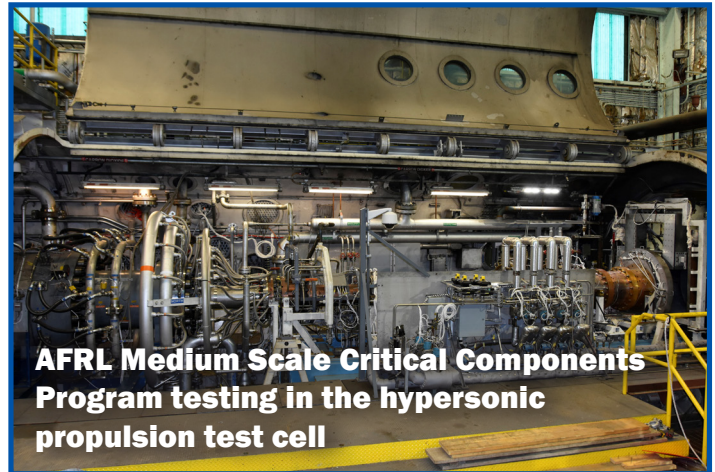
The 715 TS operates a combustion-heated, blow-down wind tunnel, used to evaluate the performance of hypersonic air-breathing propulsion systems. This test cell can be configured for direct connect or free-jet testing of systems. A data system with more than 1,400 channels can collect instrumentation and sensor data from the facility and test articles.

The wind tunnel provides T&E capability for performance of propulsion, materials, structures and aerodynamics of supersonic and hypersonic systems, and hardware at true flight conditions and enthalpies.

The 715 TS also operates arc jet test cells to evaluate the aerothermal, ablative and/or erosive (dust) characteristics of thermal

protection materials and system in a high-enthalpy heat flux environment. Arc jet heaters are used to simulate the aerodynamic heating and mid-to-high shear pressures of extreme environmental conditions experienced in re-entry and hypersonic flight. This T&E capability is crucial in developing hypersonic weapon systems and re-entry vehicles.

The arc jet test cells provide high-pressure, high-temperature test flows by confining the electrical arc discharge to a water-cooled plenum section capable of withstanding high chamber pressures. With the combination of DC electrical arc discharges used to heat the high-pressure air flow, this squadron provides simulated flight conditions of reentry vehicles and hypersonic systems.



AFRL Medium Scale Critical Components Program testing in the hypersonic propulsion test cell



Captive-carry flight test of the AGM-183A Air-Launched Rapid Response Weapon Instrumented Measurement Vehicle 2 using a B-52 Stratofortress

715th Test Squadron		
Test Facility	Nozzle Exit (in diam)	Speed Range (Mach No.)
Wind Tunnel	42	3.1
		4.3
		5.2
		6.3
High Temperature Test Cell	0.75 - 3.0 1.2 - 4.5 5.0 - 42.0	Pressure (Atm)
		54.5 - 96.4
		76 - 105
		88 - 110

716th TEST SQUADRON

AERODYNAMICS TEST

The 716th Test Squadron provides aerodynamic effects and captive trajectory ground-test capabilities through the operation of nine wind tunnels from subsonic to hypersonic speeds at simulated altitudes.

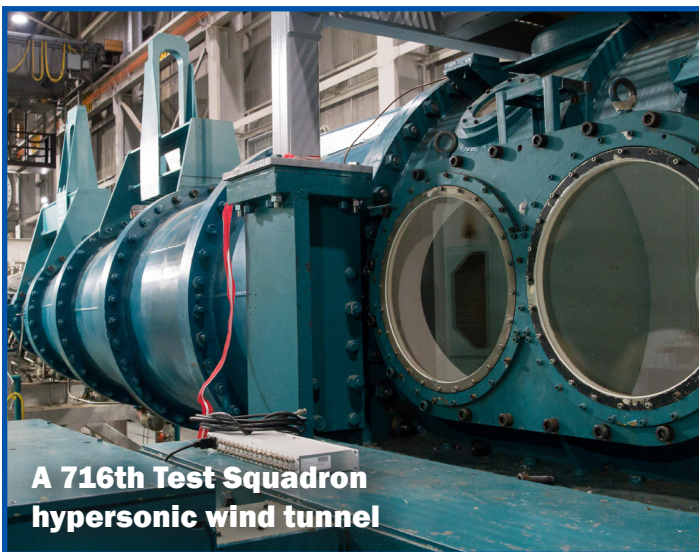
The wind tunnels are used to support test and evaluation in many areas including acoustics, captive flight, code validation, exhaust jet effects and reaction control systems, hypersonic flow physics, inlet/airframe integration, large- and full-scale component research and development, operational propulsion systems, proof-of-concept, space launch vehicles, system integration, thermal protection system evaluation, vehicle aerodynamic performance and weapons integration.

An extensive inventory of instrumentation is available, including force and moment balances, heat flux gauges and pressure modules. The 716 TS can provide design, fabrication and calibration services of select instrumentation.

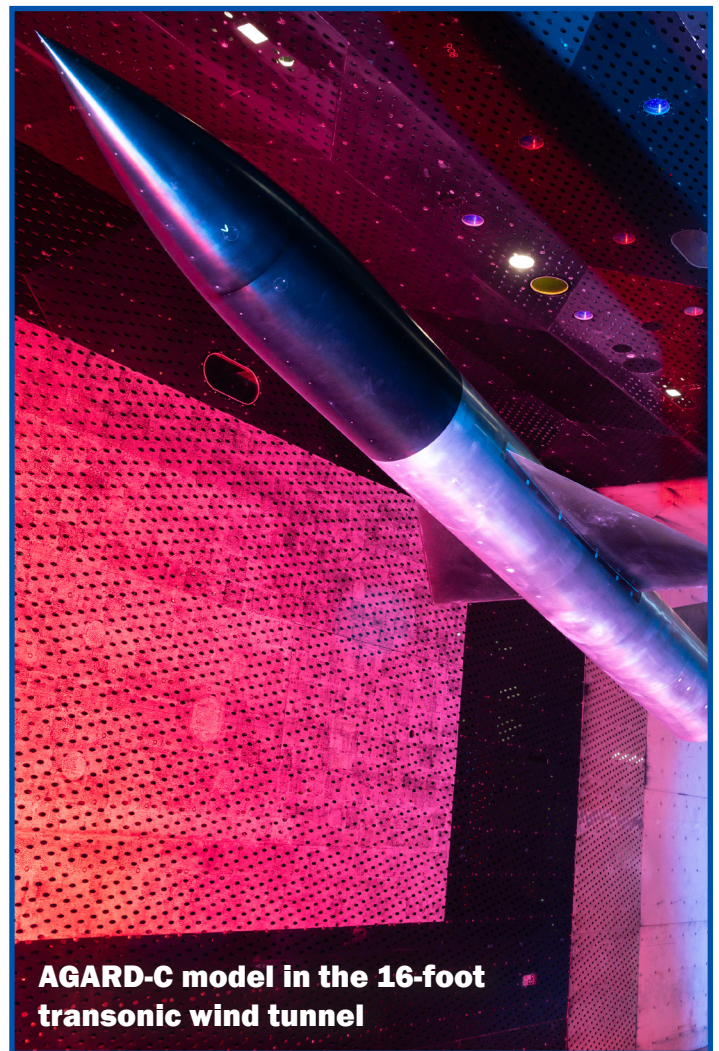
The squadron is also experienced with other wind tunnel test instrumentation, such as model

attitude measurement devices and dynamic pressure transducers along with a variety of flow visualization techniques. In addition, customers can choose to have AEDC design, fabricate and instrument wind tunnel test models to best meet program requirements. Existing systems can be modified to accommodate customer's digital or analog systems.

The 716 TS provides analysis support for all test programs performed within the squadron. Analysis support can cover the program's life cycle from analysis of alternatives throughout operation and sustainment. Customer test requirements and objectives are reviewed to ensure an adequate T&E campaign is planned to meet all objectives. Online technical support is provided which includes analysis and evaluation of the aerodynamic performance, data quality, repeatability characteristics of the system under test and real-time test data uncertainty.



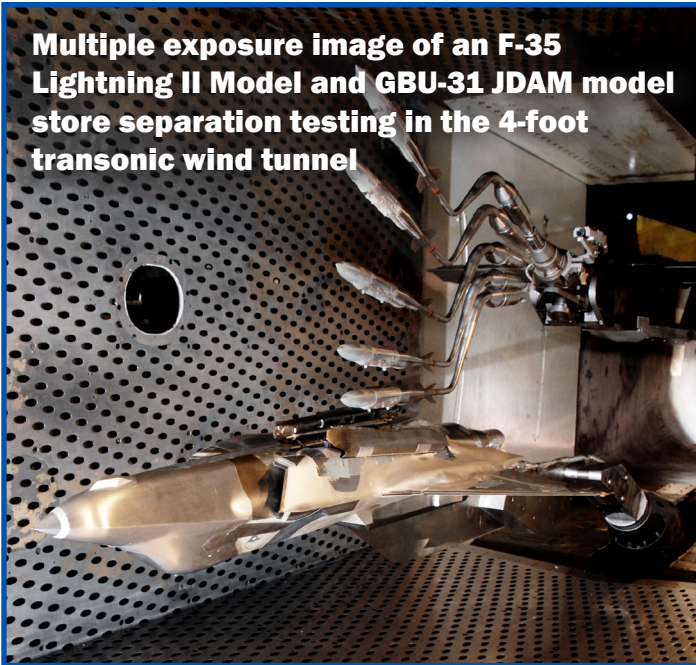
A 716th Test Squadron hypersonic wind tunnel



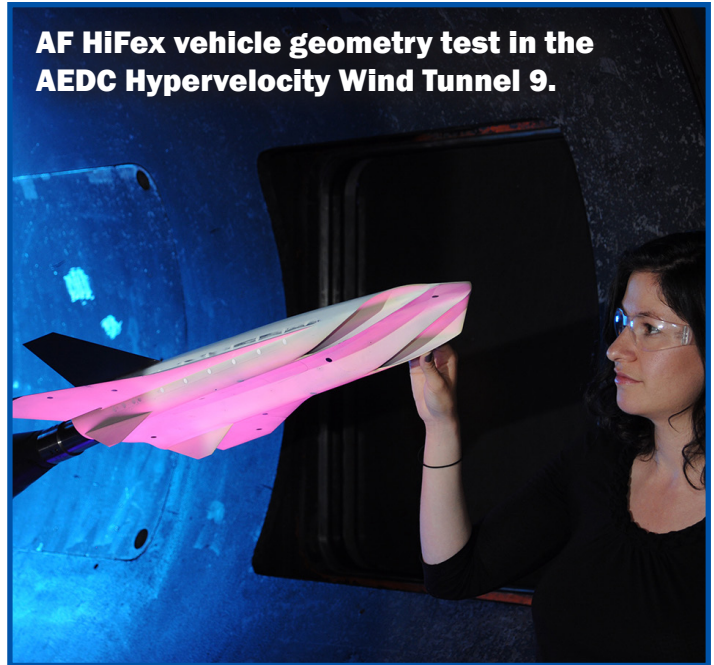
AGARD-C model in the 16-foot transonic wind tunnel

804th TEST GROUP

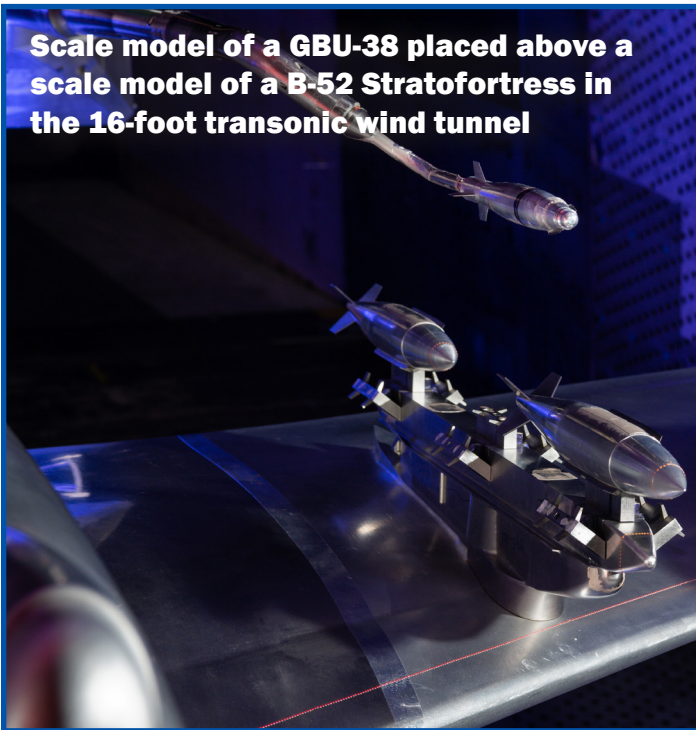
Multiple exposure image of an F-35 Lightning II Model and GBU-31 JDAM model store separation testing in the 4-foot transonic wind tunnel



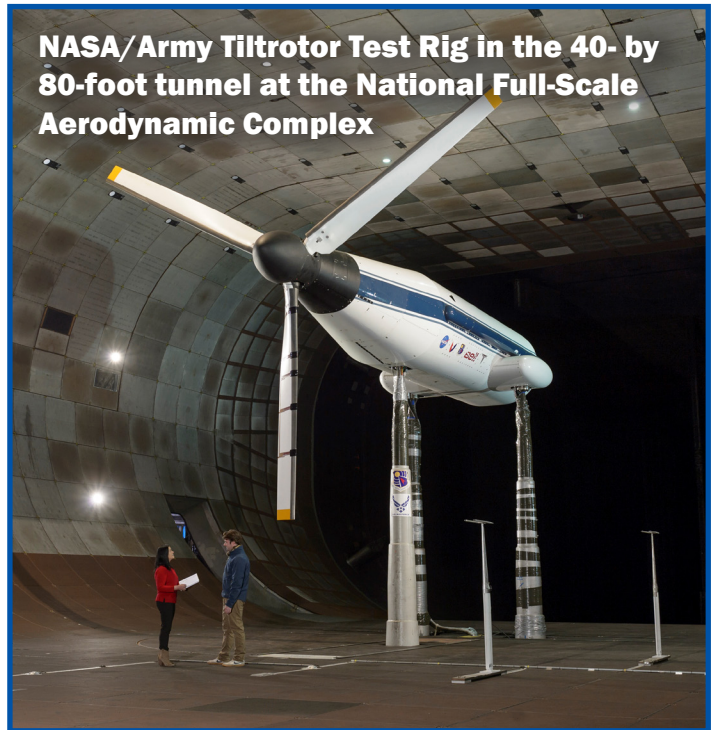
AF HiFex vehicle geometry test in the AEDC Hypervelocity Wind Tunnel 9.



Scale model of a GBU-38 placed above a scale model of a B-52 Stratofortress in the 16-foot transonic wind tunnel



NASA/Army Tiltrotor Test Rig in the 40- by 80-foot tunnel at the National Full-Scale Aerodynamic Complex



716th Test Squadron Test Facility Capabilities

Tunnel	Test Section Size		Speed Range (Mach No.)
	Cross Section (ft)	Length* (ft)	
Propulsion Wind Tunnels	16 x 16	40	0.05 - 4.75
Aerodynamic Wind Tunnels	4 x 4	12.5	0.05 - 2.46
Supersonic Wind Tunnels	2.08 - 4.17 diam	9	1.5 - 10
Hypersonic Wind Tunnels	2.9 - 5 diam	12	8 to 18
Aerothermal Wind Tunnels	0.94 diam freejet	9	4
Full-Scale Aerothermal Wind Tunnels	40 x 80	12	Knots 0 - 270 knots
	80 x 120	9	0 - 90 knots

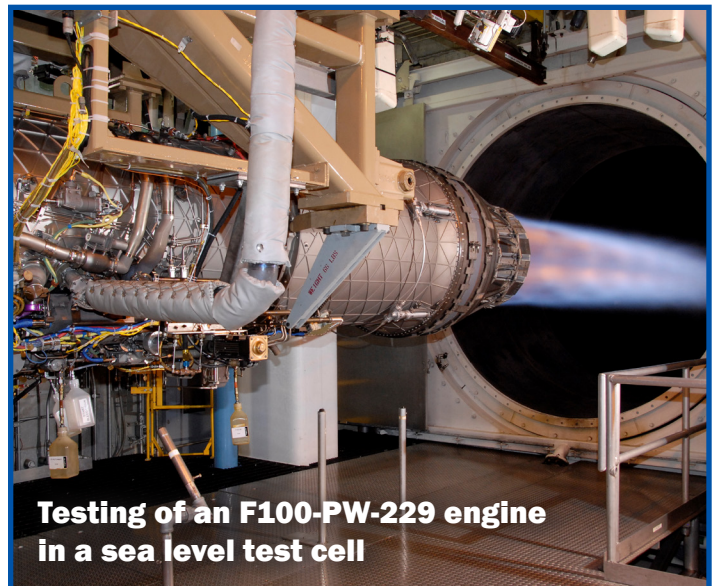
* Nominal test section length dimensions are shown. The actual model lengths that can be tested depend on Mach number and should be coordinated with the AEDC test engineering staff.

717th TEST SQUADRON

PROPULSION TEST

The 717th Test Squadron provides test and evaluation through the operation of multiple test facilities providing subsonic to supersonic speeds at simulated conditions. Across a suite of test cells, the 717 TS can support test and evaluation of performance, operability, aeromechanical, icing, corrosion, inlet pressure distortion and temperature distortion, accelerated mission testing, engine-inlet dynamics, mission simulations and engine component testing. Test cells are outfitted with instrumentation to measure a variety of variables including force, fuel flows, airflows, high-frequency response pressures, displacement, acceleration and digitally scanned temperatures and pressures. For required programs, high-speed video is also available.

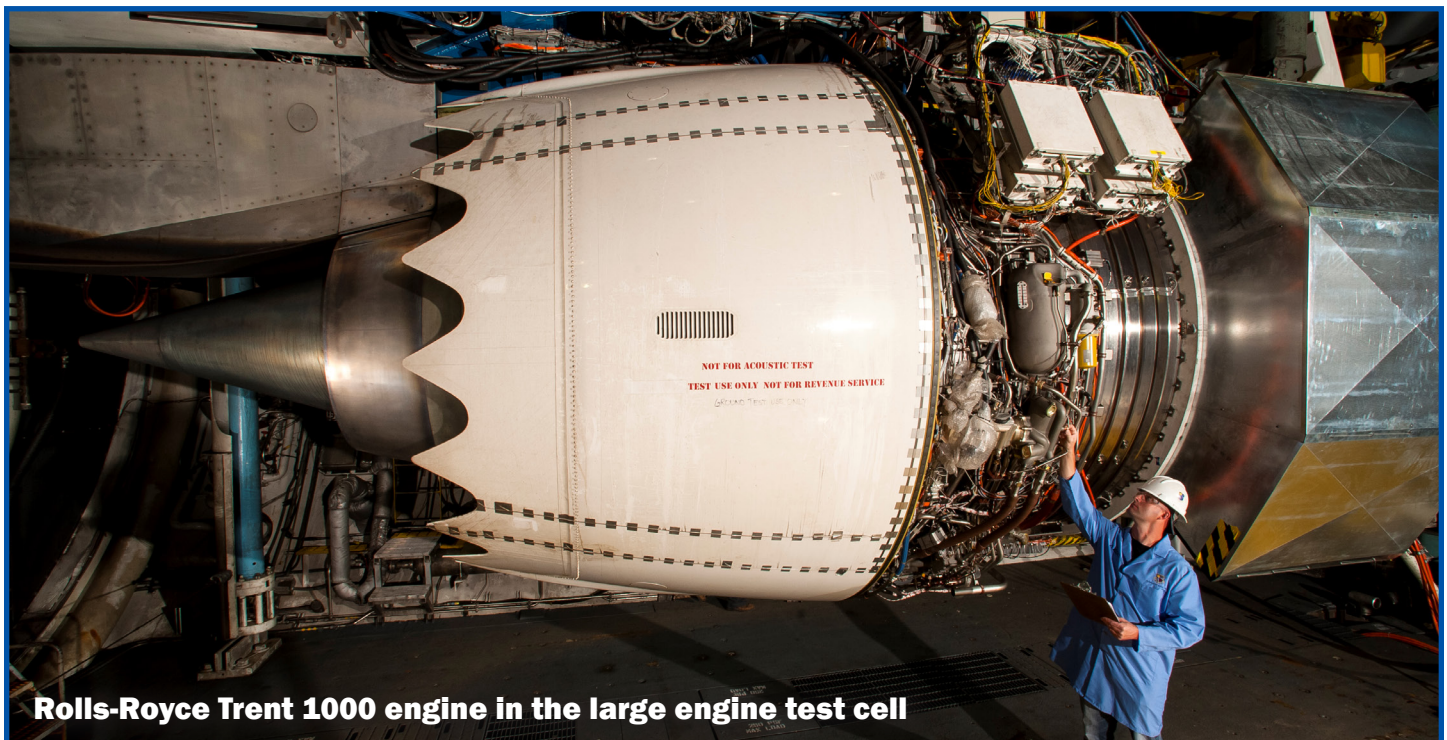
The 717 TS supports multiple engine configurations for testing in simulated altitude conditions. Military and commercial engine testing is performed for small, medium, and large engines. Small scale altitude support



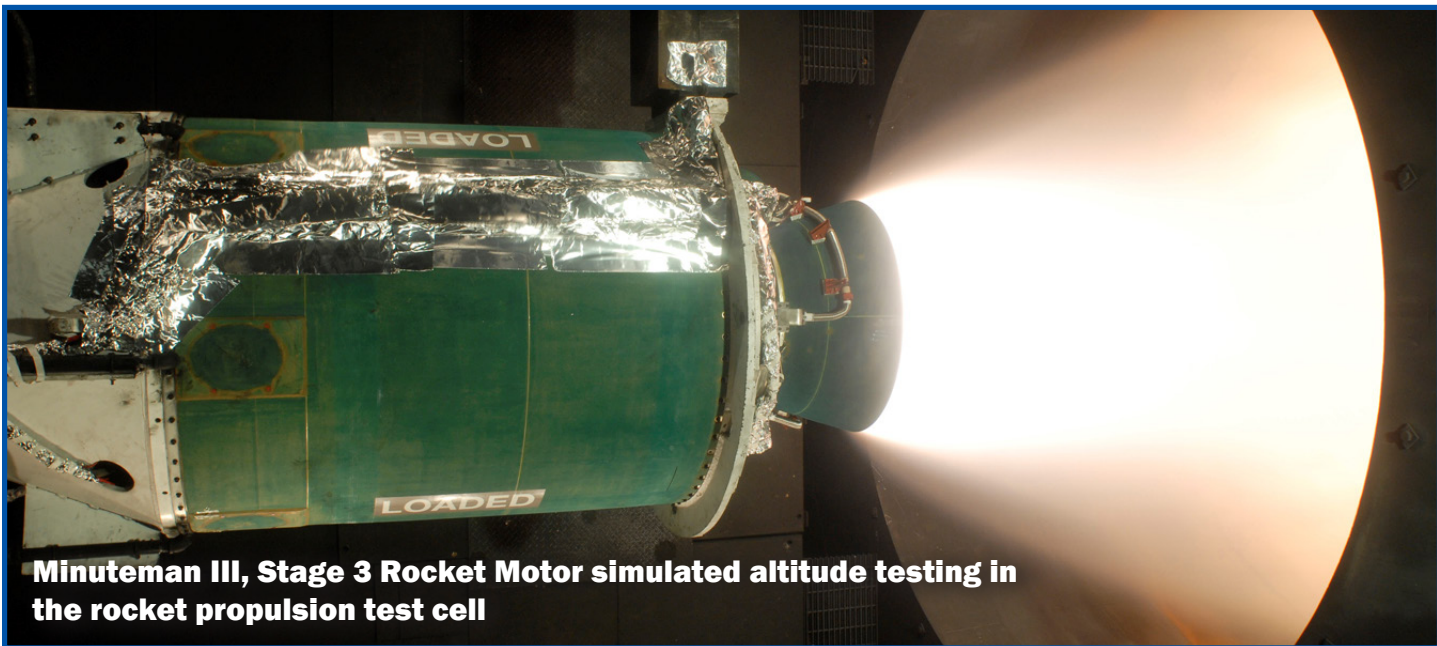
Testing of an F100-PW-229 engine in a sea level test cell

exists for testing in direct-connect, free-jet and icing configurations for turbine and cruise missile engines.

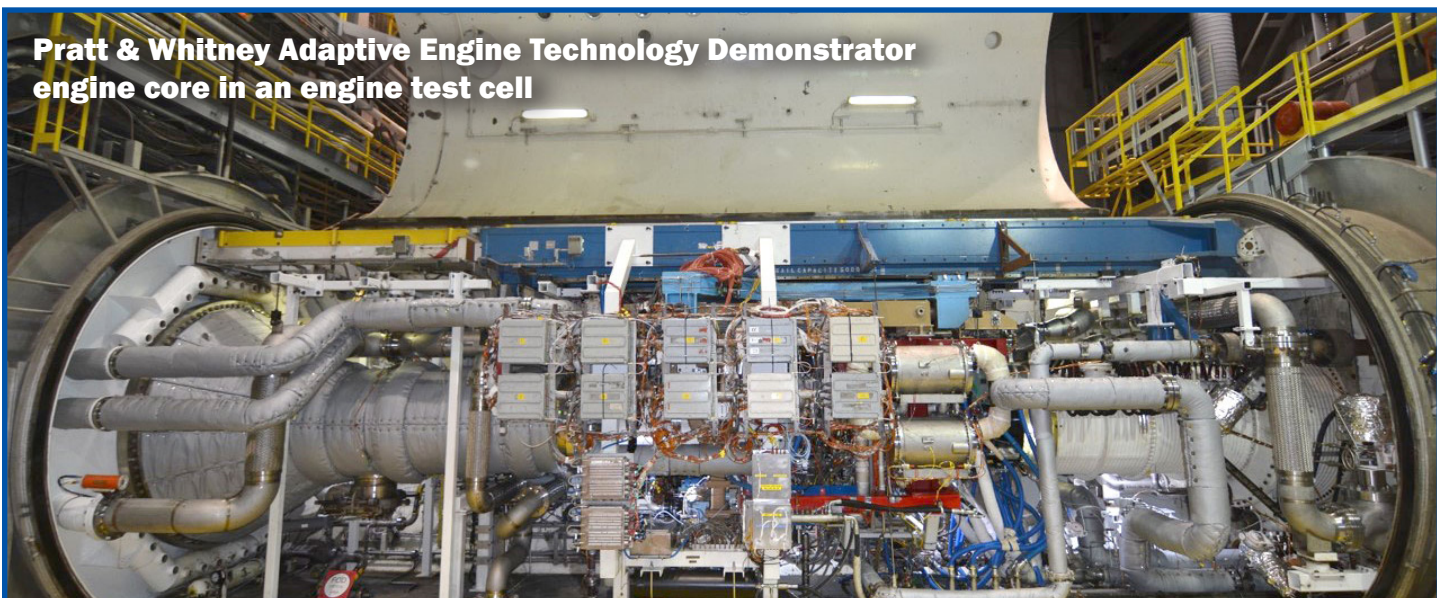
Additionally, rocket propulsion testing is supported for solid rocket motors. Motors are tested from ignition through steady state thrust production to thrust termination at simulated altitude conditions. Testing measurements support wideband infrared and ultraviolet radiometric coverage, emission/absorption detection, laser-induced fluorescence, plume surveys and real-time X-ray radiography are available for use.



Rolls-Royce Trent 1000 engine in the large engine test cell



Minuteman III, Stage 3 Rocket Motor simulated altitude testing in the rocket propulsion test cell



Pratt & Whitney Adaptive Engine Technology Demonstrator engine core in an engine test cell

717th Test Squadron Test Facility Capabilities

Propulsion Development Test Cell	Test Section Size		Speed Range (Mach No.)
	Cross Section (ft)	Length (ft)	
Large Engine	28 diam	45	0 - 3.0
		47	0 - 2.3
Medium Engine	16 diam	44	0 - 3.2
	20 diam	46	0 - 2.6
Durability and Endurance Testing	24 x 24	60	0 - 1.4
	24 x 24	60	0 - 1.4
Small Engine	12 diam	15	0 - 3.6
	10 x 10	17	0 - 2.0
Rocket Propulsion	26 diam	62	Thrust (lbf)
			5,000 - 500,000

NOTE 1: Expanded capability is available with custom upgrades to test cells.

NOTE 2: Maximum performance values (temperature, speed altitude) do not occur simultaneously. Comparison of specific test points to cell capability will be required to ascertain feasibility.

718th TEST SQUADRON

SPACE TEST

The 718th Test Squadron provides test and evaluation of space and missile weapon systems through the operation of eight test facilities.

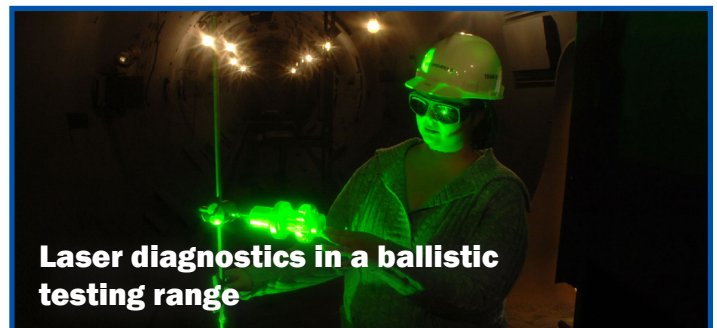
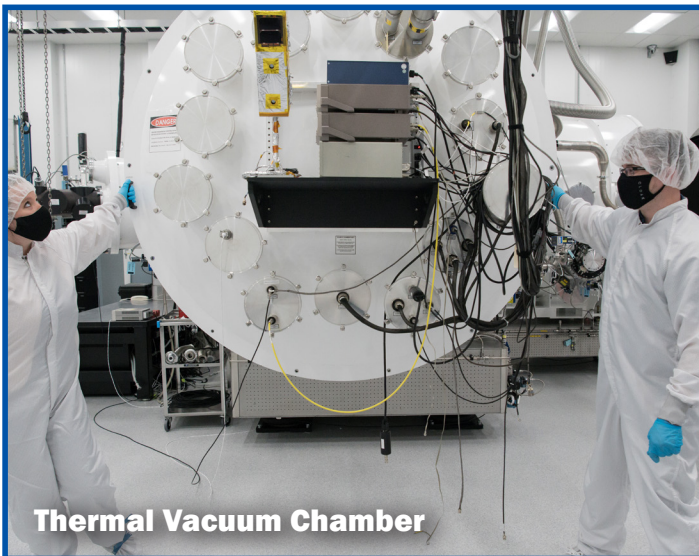
The 718 TS uses this suite of test cells to provide distinct test and evaluation capabilities, including high-altitude/space environmental effect and sensors ground T&E, hypervelocity flyout, impact lethality ground T&E and multi-spectral signature measurement and analysis. Together these T&E capabilities support and integrate the development of tactical missile interceptors, ballistic missiles, re-entry materials, hypersonic air vehicles, space sensors and satellite systems.

This squadron provides complete characterization and radiometric calibration of visible and infrared sensors (flood, point, polarized, spectral calibration and mission simulation) and hardware-in-the-loop testing. This capability evaluates interceptor and surveillance sensor technology by conducting ground testing of simulated space environments.

The Ballistic Ranges evaluate the effects of hypersonic flight in erosive environments and hypervelocity impacts by conducting kinetic energy lethality, re-entry vehicle wake physics, weather erosion and impact phenomenology testing.

The 718 TS also provides signature modeling expertise by evaluating target threat and battlespace environment signatures for missiles and other vehicles. This squadron conducts worldwide deployments to collect multispectral signature data on multiple test article types

Test cells are outfitted with instrumentation to measure a variety of conditions using infrared sensors, static and dynamic pressure sensors, temperature sensors, high-speed cameras, digital X-rays, high-speed data acquisition systems and laser triggering systems.



718th Space Test Squadron Test Facility Capabilities		
High-Altitude/Space Environmental Effects and Sensors ground T&E		
Vacuum Test Facility	Chamber Size (ft)	Environment
Hardware and Sensor Technology Characterization Chambers	7ft diam x 21 ft long	Low to High Earth orbit
	10 ft diam x 30 ft long	
Environmental Conditions Chambers	12 ft diam x 35 ft high	
	40 ft diam x 82 ft high	
	2.5 ft x 2.5 ft x 2.5 ft	
Hypervelocity Flyout and Lethality Ground T&E		
Test Facility	Launch Barrel (in diam)	Velocity (ft/sec)
Ballistic Test Range	.75 - 8.0	4,900 - 26,200

* Sea Level to Simulate Space Environment

719th TEST SQUADRON

ICBM DEVELOPMENTAL TEST

The 719th Test Squadron, located at Hill Air Force Base, Utah, provides developmental test and evaluation (DT&E) support for the modernization and life extension of the LGM-30 Minuteman III (MMIII), also known as Intercontinental Ballistic Missile (ICBM), and development of next-generation Ground-Based Strategic Deterrent (GBSD) ICBMs.

The Air Force Test Center is the MMIII and GBSD lead developmental test and evaluation organization and AEDC is the executing test organization (ETO), with the test division and Hill AFB organizations carrying out ETO duties. The squadron includes various personnel

with different skills necessary to support ICBM DT&E programs.

The 719 TS works alongside the Air Force Nuclear Weapons Center MMIII and GBSD System program offices, the 576th Flight Test Squadron at Vandenberg Air Force Base, California, and the Air Force Operational Test and Evaluation Center to support the MMIII and GBSD programs.

804th TEST SUPPORT SQUADRON

AEDC provides support to the test squadrons and customers through a broad range of services. Engineers, craft workers, and other personnel enable AEDC to maintain a competitive edge by providing comprehensive utilities services, model and machining work, integrated data acquisition and controls systems, instrumentation calibration and diagnostics, modeling and simulation support, a chemical laboratory, an aerothermal laboratory, and metallurgical and non-destructive evaluation laboratories.

Utilities provides support to the base and test customers. Available utilities include high pressure air, cooling (raw) water, potable water, wastewater treatment, steam, nitrogen, fuel and electricity.

The Model and Machine Shop at Arnold AFB is staffed by skilled craft workers such as welders and machinists. They can make incredibly precise models of aircraft and stores and can create the unique pieces of hardware required for tests or facilities. Capabilities available to execute these tasks include tuning, milling, EDM, grinding, braking, cutting/shearing, multiple lifting mechanisms, welding, materials treating and cleaning, and facility valve repair and testing. Also available is a five-axis CNC machine, and coordinate measurement equipment for inspecting and documenting complex contours.



Unarmed Minuteman III ICBM launch



Unarmed Minuteman III ICBM launch

AEDC provides complex wide capabilities for instrumentation, data acquisition, and control systems for test and utility support. AEDC offers enterprise-level baseline ID&C configurations in each test facility with the ability to add and customize ID&C solutions to support changing customer needs, facility operation configurations and facility upgrades. Test article control, facility control and facility and test data collection are supported. System control, data acquisition, redistribution, recording and processing is performed by interfacing to capability-unique sensors, COTS sensors, front-end hardware and customer systems.

The Precision Measurement Equipment Laboratory provides calibration and repairs for test measurement and test diagnostic equipment. PMEL ensures measurement traceability to NIST standards for all critical instruments across the complex to provide customers with precise and accurate test data.

The Chemical Laboratory team analyzes a variety of materials including metals, soils, rocket propellants, exhaust gases and water. The majority of testing is of oils and fuel used in the test facilities. The lab on-site at Arnold AFB provides personnel and AEDC customers with timely, cost-efficient access to chemical analysis.

The Aerothermal Measurement Laboratory team supports applied research in aerothermal

test measurement techniques using analytical tools and characterization equipment. The experts of ATML specialize in the fabrication and installation of sensors for measuring heat flux experienced by models under test. Their work often supports hypersonic testing.

The Metallurgical/Nondestructive Evaluation Laboratory provides direct support for customers. Services provided include stress, tensile strength, radiographic, ultrasonic, liquid penetration and magnetic particle testing.



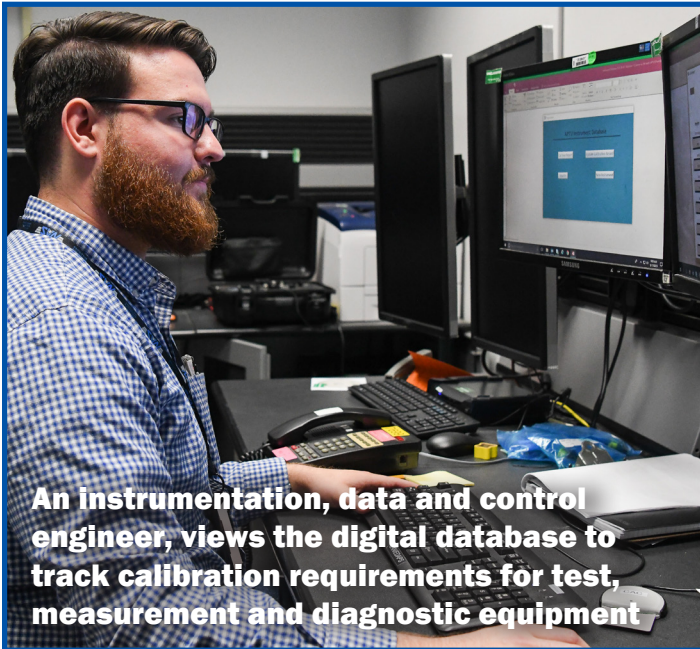
An inside machinist works on a part for a test model



A water sample test in the Chemical and Metallurgical Lab



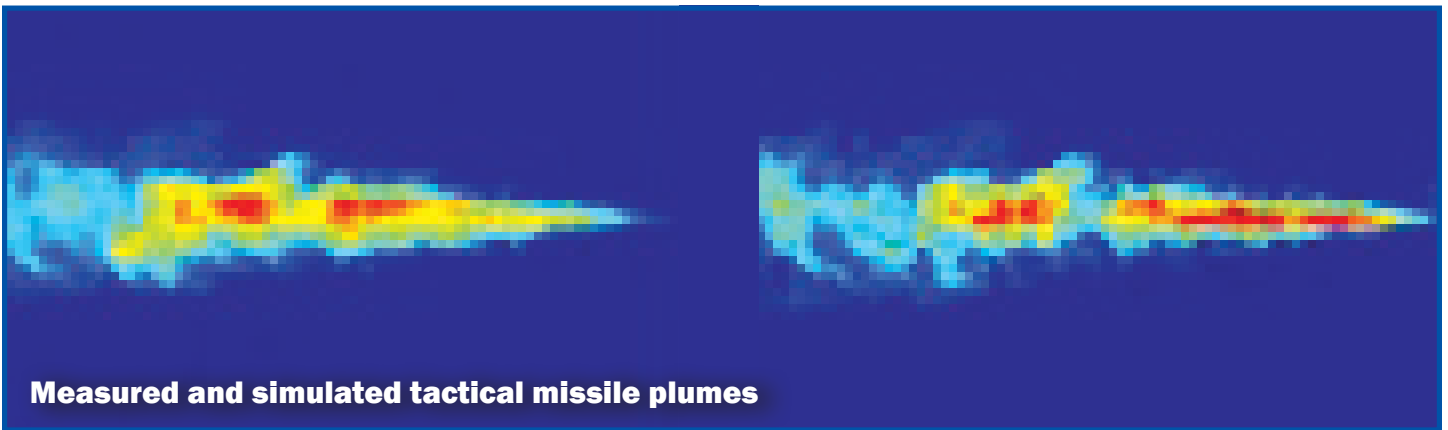
An instrument tech makes a Schmidt-Boelter heat flux gauge



An instrumentation, data and control engineer, views the digital database to track calibration requirements for test, measurement and diagnostic equipment



AEDC Test and Communications Branch provides secure data, communications capabilities



Measured and simulated tactical missile plumes



AEDC utility manager inspects a water pumping station

TEST SUPPORT DIVISION

The Test Support Division (TSD), located at Arnold Air Force Base, is responsible for mission support and medical activities. Mission support includes communications, information management, civil engineering, security, operation of the Medical Aid Station, logistics readiness, Services and resource management.

The AEDC Civil Engineering Branch (TSDC) executes programs focused on improving and sustaining AEDC. The TSDC staff order electrical power, coordinate cooling water demands, provide real-time utility services, and manage utility assets. The branch also works to ensure compliance with Air Force Instructions and state laws pertaining to wildlife and property. Additionally, the installation

management team works with a number of Federally Recognized Tribes.

Emergency management is also within the purview of the TSDC. Specialists within the branch are trained to handle response and recovery operations after natural disasters or manmade crises. They are further charged with evaluating the Arnold Fire and Emergency Services contract operation.

The AEDC Test and Communications Branch (TSDI) provides computer networks, test chamber data collection, analysis tools and functional expertise to ensure test data is collected, analyzed, and securely delivered to both local users and test customers. The TSDI team, comprised of Air Force civilians and contractors, works closely with units across AEDC to ensure access to the information technology systems necessary to meet mission requirements.



Arnold Air Force Base Security Forces personnel participate in an active shooter exercise



Arnold AFB Police enhance patrol capabilities with utility task vehicles (UTV)



Arnold Air Force Base Fire and Emergency Services personnel participate in live fire training

INTEGRATED ANALYSIS BRANCH

The Integrated Analysis Branch (TDA) of AEDC provides highly-skilled program office analysts, Modeling and Simulation (M&S) developers and facility analysts in support of acquisition program offices and others in the research, development, test and evaluation (RDT&E) process and uses M&S capabilities to design facilities, plan tests, understand test data, resolve anomalies and investigate future capabilities. M&S capabilities not otherwise available are developed in-house.

TDA provides additional capability to the Propulsion Test Branch, Aerodynamics Test Branch, Space Test Branch and Hypersonic Systems Test Branch analysis, as well as that of contractors and other government organizations by providing an integrated analysis approach using Model-Based Systems Engineering and Digital Engineering to provide a comprehensive understanding of Systems under Test/Development. The Integrated analysts, M&S developers and Facility analysts provide a value-added product to customers by working within the systems engineering frameworks and architectures to identify key models within the framework and how modeling and simulation, test and evaluation and analysis can support the work of using those models to make optimal programmatic decisions.

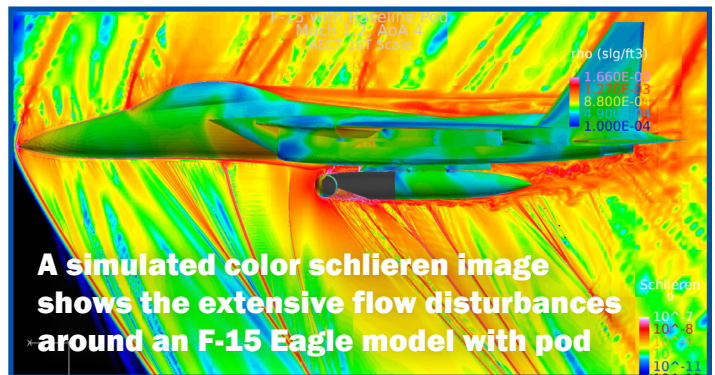
The Integrated Analysis Branch assists the program offices and technologists in answering questions such as: What is the purpose of performing the test? Is this the right type of test? Is the proper data and metadata being collected and utilized in the appropriate manner? Are the proper models being appropriately integrated into a framework that will allow test data and analysis to

be used to validate and improve the understanding of the system? Was sufficient data collected to improve the system model sufficiently and perform uncertainty analysis with enough rigor to provide system-level uncertainty quantification that supports programmatic decisions?

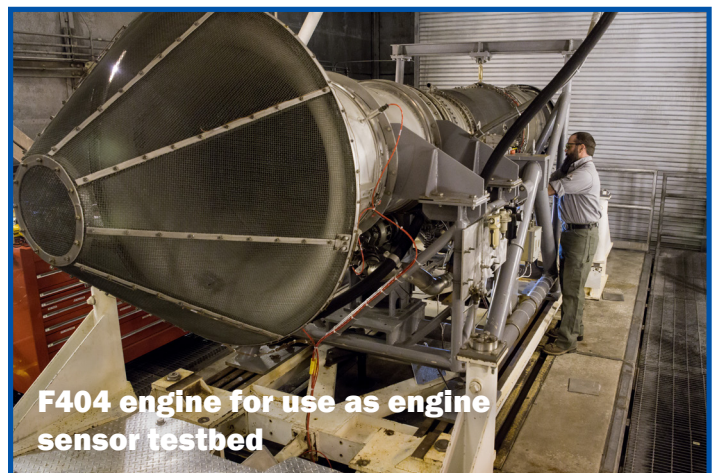
By understanding the stakeholders' needs, the Integrated Analysis Branch will continue to provide relevant support that program offices and the warfighters have come to depend on in advancing national interests and in weapon systems development.



Real-Time Test Display System used by AEDC analysts



A simulated color schlieren image shows the extensive flow disturbances around an F-15 Eagle model with pod



F404 engine for use as engine sensor testbed

704th TEST GROUP – DETACHMENTS 1 & 2

The 704th Test Group provides test and evaluation through the operation of multiple test facilities for flight test, GPS/inertial, radar cross section measurement, landing gear systems, aircraft survivability, high speed track testing and directed energy.

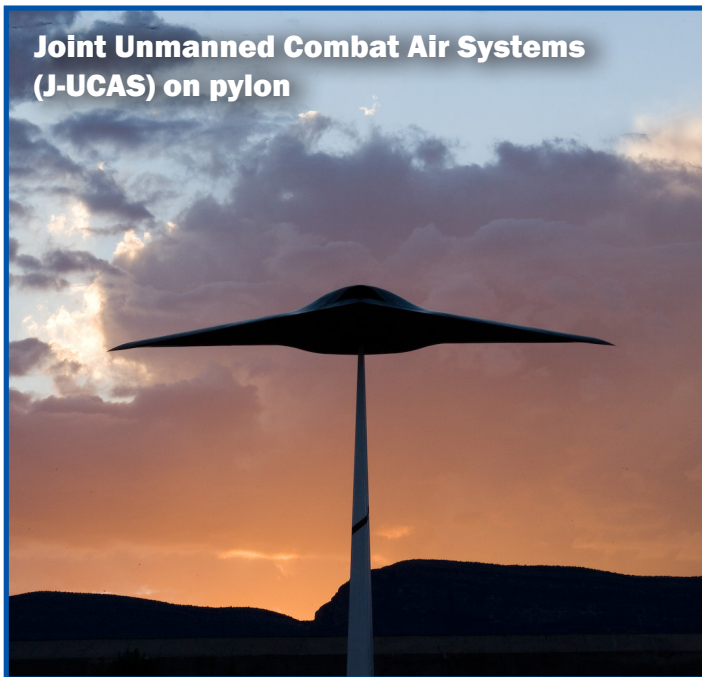
The 704th TG Detachment 1 is the National Radar Cross Section Test Facility operating the Radar Target Scatter Advanced Measurement

Systems, or RAMS, site. Det 1 conducts narrowband and wideband RCS signature characterization of scaled, full-scale, and flyable articles in a remote and secure location.

The RCS also support characterization of antenna radiation patterns and backscatter. Additionally, RAMS test support includes range support and coordination, rapid-response test preparation, model design construction and data collection/processing.

The NRFT enables strategic access to contested airspace through test and evaluation in RCS and antenna patterns and by providing comprehensive measurement capabilities and data products.

The 704th TG Detachment 2 acts as the liaison for coordination of test capabilities and test program execution for all Air Force test and coordination efforts at White Sands Missile Range.



704th Test Group Detachment 1 Test Capabilities			
RAMS Site	Dimensions (ft)	Target Support Pylon Ht. (ft)	Target Weight Support (lbs)
	8,900 ft x 300 ft paved, shadow-plane range	56 max.	60,000 max.
RAMS Coherent Measurement System	Frequency Range (GHz)	Modes of Operation	
	.6 - 18, 32 - 38	Narrowband RCS, radar imaging, other diagnostic radar	
RAMS VHF/UHF Measurement System	Frequency Range (GHz)	Distance Range (ft)	Operations
	30 - 600	1,500 - 2,500	Mobile radar system with adjustable height antennas

704th TEST GROUP – OPERATING LOCATIONS A & B

The 704th TG Operating Location A supports testing and deployment of direct energy systems to facilitate progress from research and development through test and evaluation to acquisition-ready status. OL-A supports testing of both high-power microwave and high energy laser systems.

The 704th TG Operating Location B conducts aerospace vehicle survivability, vulnerability and landing gear research, development, test and evaluation and modeling and simulation to contribute to the development, advancement and safety of aerospace systems.

The Aerospace Vehicle Survivability Facility consists of multiple sites for subjecting aerospace



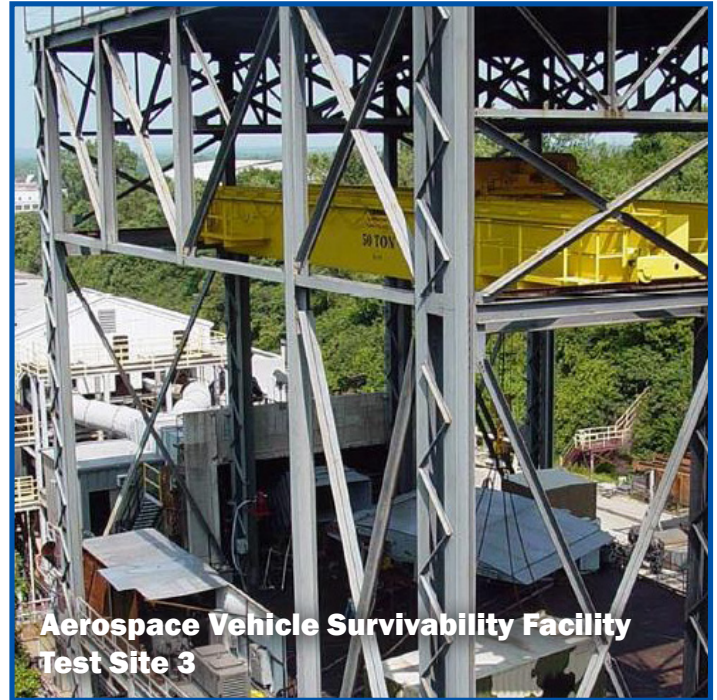
combat vehicles to realistic operating conditions, including threats, to predict and assess the magnitude of combat damage and provide model input and improvements for system-level vulnerability assessments.

AVSF integrates indoor/outdoor test sites to provide ballistic and high-energy data, realistic airflow environments, and modeling and simulation analyses to collect combat survivability data.





Landing Gear Test Facility tire force machine



Aerospace Vehicle Survivability Facility Test Site 3

The Landing Gear Test Facility utilizes multiple test machines and systems to provide tire, wheel, and brake lifecycle information, landing gear performance, component qualifications and accident causes. The LGTF provides ground testing of landing gear assembly systems under real-world operating conditions. Services include test engineering, custom instrumentation, test hardware design and fabrication and data reduction and reporting. LGTF has the capability

to measure runway conditions and provide landing surface replications to accurately conduct tire performance and wear testing. High-speed infrared data collection and 3D scanning technologies have enhanced the facility capabilities.

704th Test Group Operating Location B		
Landing Gear Test Facility		
Landing Gear Systems	Capability	Test Machines
Wheels & Brakes	Wheel Qualification Wheel Roll Brake Wear Brake Qualification & RTO Variable Anti-Skid Systems	84 in. Variable Inertia Dynamometer 192 in. Variable Inertia Dynamometer 120 in. Fixed Inertia Dynamometer
Tires	Missionized Tire Wear Mechanical Properties Tire Qualification & RTO	120 in. Fixed Inertia Dynamometer 168 in. Fixed Inertia Dynamometer Large Baldwin Tire Force Machine
Landing Gear Assemblies	Impact Testing Durability/Lifecycle Fatigue Testing Landing Gear Shimmy Full-Spectrum Landing Gear Testing	4 Drop Towers Fatigue Test Machine 120 in. Fixed Inertia Dynamometer
Aerospace Vehicle Survivability Facility		
Test Site	Testing Capability	Test Support Subsystems
1	Armor Qualification Threat Characterization Model Development	Explosives Storage and Handling Indoor Gun Tunnel Data Acquisition and Controls
2	Component-level Ballistic Testing	Fuel Conditioning and Fire Extinguishing Data Acquisition and Controls
3	Airflow, Fuel, Elevated/Oblique Ballistic Shotline Armor Angle and Enclosed Laser Operations	Upper and Lower Facility Airflow Fuel Conditioning and Fire Extinguishing Data Acquisition and Controls
A	Hydrodynamic RAM Simulator for Evaluation of Bonded and Mechanically Fastend/Skin/Spare Components	Hydrodynamic RAM Simulator Data Acquisition and Controls

586th FLIGHT TEST SQUADRON

The 586th Flight Test Squadron provides test and evaluation through the operation of multiple aircrafts for testing of developmental avionics and advanced weapons systems.

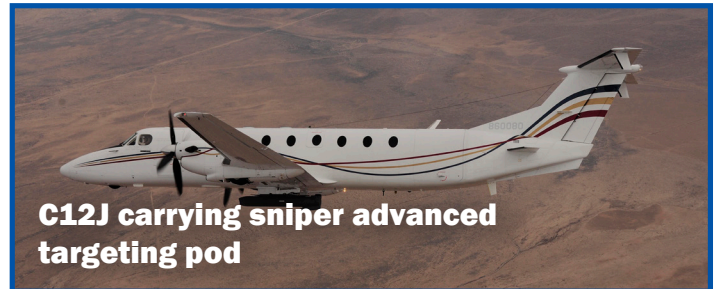
The 586 FLTS plans, coordinates, conducts and analyzes flight tests of advanced weapons and avionics systems. The squadron flies four highly-modified Northrop T-38C Talons, one Beechcraft C-12F and one Beechcraft C-12J. Support includes, but not limited to, testing of target surrogates, guidance systems, laser systems, air-to-air and air-to-ground systems, long-range and standoff weapons, live warheads and photo/safety chase.

The 586 FLTS works within a small test budget with low cost per flight hour that enables development programs to move beyond the laboratory environment without compromising support for larger and more complex programs and flight test solutions required for major acquisition programs.

Most of the flight testing is conducted at Det. 1, where Det. 2 serves as the Air Force liaison for all Air Force programs tested at the Range. As the liaison, Det. 2, maintains the relationships to coordinate range support (funding, targets, data) for test programs. Det. 1 assists customers by developing operational

requirements, scheduling range and airspace, assessing safety risks, and coordinating environmental assessments.

Test missions by the squadron are overseen from a control room with access to real-time aircraft and weapon telemetry, UHF, VHF and high-speed digital fiber-optic communication with WSMR and other test facilities for secure data collection, processing, reconstruction and transfer.



586th Flight Test Squadron Test Capabilities						
Aircraft	Airspeed/ Mach	Altitude (K ft)	Nz Load Factor (g)	Capabilities	Stores	Carriage/Employment
T-38C	160-600 KCAS / 1.3M	45	7	Time, Space, Position Information (TSPI); Real-Time Telemetry (TM); L/C/Ku/Ka/S Band; Rear Cockpit Modular Pallet; Mode 4/5; Ethernet; Captive Carriage; Chaff and Flare; Electronic Attack; Towed Carriage; Photographic Coverage	MAU-12 Centerline Pylon	1,000 lb capacity
C-12J	110-250 KCAS	25	3	TSPI, L/C/Ku/Ka/S Band, Targeting Pods, Link-16, ADS-B, Ethernet, Modular Customizable Racks, Captive Carriage	Dual MA-4 Pylon	2 Store Configuration: 500 lb capacity ea. 1 Store Configuration: 750 lb capacity

746th TEST SQUADRON

The 746th Test Squadron provides test and evaluation through the operation of the Central Inertial and GPS Test Facility. The 746 TS conducts subsystem and component level developmental and operational testing of guidance and navigation systems. The squadron provides expert test and evaluation of GPS, inertial navigation systems and embedded GPS/INS navigation and guidance systems.

The 746 TS evaluation of GPS includes all aspects of GPS receiver performance to include testing of new GPS satellite/receiver compatibility prior to launch and on-orbit, analyzing signal-in-space characteristics affecting receiver performance and assessing operational performance of GPS in the global airspace and electronic combat environments. The Squadron also performs trade studies, technical consultation services and analyses regarding Position, Navigation and Time platform integration.

The 746 TS, located in a seismically quiet location, has the most complete collection of large precision centrifuges, rate tables and environmental test beds in the nation.

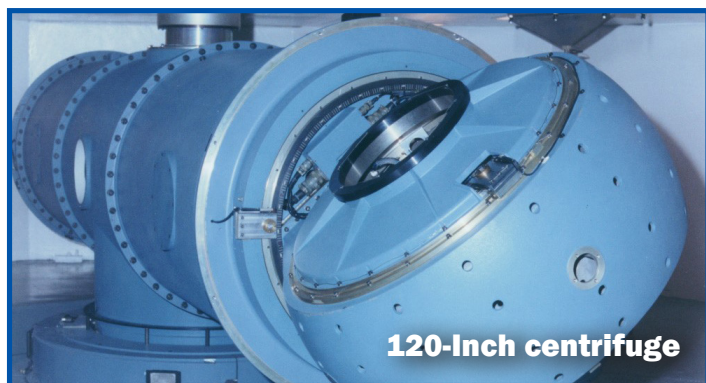
The inertial laboratory team operates a centrifuge test bed with a counter-rotating platform that subjects test items to sustained acceleration environments up to 50g. Other available test beds include: two- and three-axis test tables, magnetic field generators, linear vibrators, precision angle generators, combined environments chambers and a salt-fog chamber.

The 746 TS operates a GPS simulation laboratory, GPS satellite reference stations (fixed and mobile) and data analysis stations, as well as a variety of state-of-the-art portable box jammers and high-power jammers. These capabilities, combined with the Navigation Test and Evaluation Laboratory, support the

test and integration of either standalone GPS receivers or integrated/embedded GPS/INS navigators.

The squadron uses its GPS jamming systems to evaluate GPS performance in a navigation warfare environment and to support the development of receiver anti-jam technologies, GPS jammer location systems and counterthreat tactics, techniques and procedures. The 746 TS conducts these tests either statically on the Static Antenna Test Range, where open-air, precision, high jammer-to-signal ratio testing is available or dynamically on-board test vehicles or aircraft test beds at WSMR and other locations. Flight and field PNT systems can be measured against the Ultra High Accuracy Reference System, which provides cm-level truth accuracy in benign or GPS-challenged environments.

Additionally, the 746 TS operates several self-contained ground vehicles in support of PNT field testing and has access to a variety of aircraft including the C-12J, C-12D, AT-38B and HH-60 helicopter in cooperation with the 586th Flight Test Squadron and the local Army Aviation detachment.



846th TEST SQUADRON

The 846th Test Squadron provides test and evaluation through the operation of the Holloman High Speed Test Track for testing of developmental avionics and advanced weapons systems.

The HHSTT ground test facility provides a cost-effective, realistic, dynamic test environment using rocket sleds travelling along steel rails. The 846 TS evaluates system, sub-system and material performance up to hypersonic velocities. Sled testing provides a critical link between laboratory-type investigations and full-scale flight tests by simulating selected portions of the flight environment under accurately programmed and highly instrumented test conditions, often before flight-worthy hardware is available

The 846 TS is a one-stop shop providing test management, test design, structural design and instrumentation engineering/analysis, hardware fabrication, complex target construction and other specialized support for testing at subsonic through hypersonic velocities. Dynamic testing is accomplished by accelerating sleds carrying subscale and full-scale test articles to velocities up to 9,400 ft/sec.

The HHSTT complex includes an accurately surveyed impact test area with customizable target suites for penetrating or explosive

warhead tests, as well as an aircraft escape system test complex equipped with advanced instrumentation and photo-optics.

The squadron is responding to a significant increase in demand for hypersonic weapons testing with a focus on improving high-speed braking methods to recover sleds for post-test analysis. Additionally, the track's 6,000-foot simulated rain field has recently been upgraded to provide a more precisely controlled and measurable weather effects test environment.



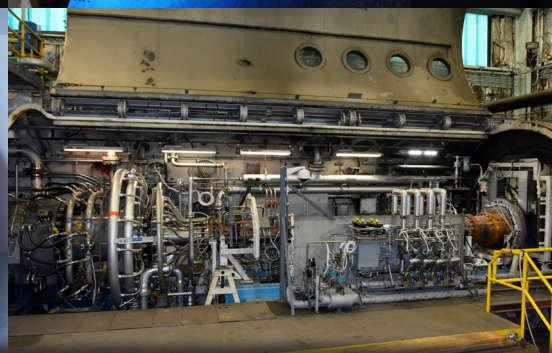
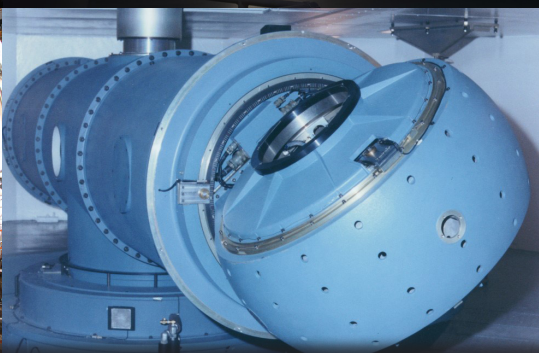
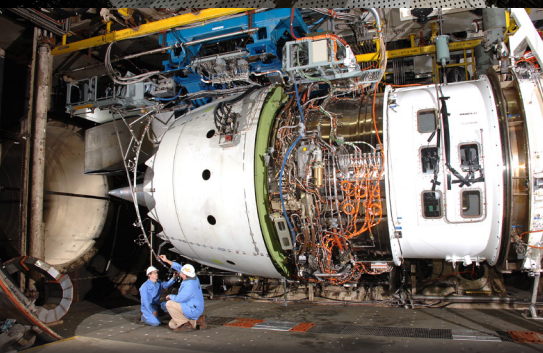
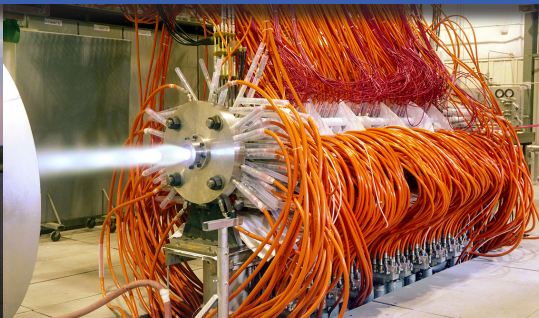
Penetrating payload speeds down the Holloman High Speed Test Track



Aircraft escape testing

Holloman High Speed Test Track Capabilities

Track Length (ft)	Max. Acceleration (g)	Free-flight Test Range Length (nautical miles)	Test Types		Instrumentation
			Test Type	Test Description	
50,971	200	50	Munitions	Warhead Lethality, Hard Target Penetrators, Missile Defense, Fuzing, Seekers	Onboard and Track-side Photo-Optical, Hardened Data Acquisition Systems, Telemetry, Weibel RADAR
			Crew Escape	Ejection Seats, Parachutes, Canopies, Rocket Catapults	
			Guidance Systems	Reference Measurement, Components and Full-Size Systems	
			Directed Energy/Electronic Combat	Infrared Countermeasures, Target Tracking/Illumination	
			Environmental Effects	Rain, Aerothermal, High G	
			Aerodynamics	Boundary Layer Transition, Dispensing Systems, Launch into Flight	



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