Newport site include the: A-10, F-16 (A/C), F-15 (A/C,E), F-18 (A/C), F-22, F-35 (CTOL, STOVL, CV) MH 60 SEAHAWK and sections of the B-1B and KC-135. Five foot, 14 foot, and 40 foot Ground Planes are available and may be installed as required.

Measurements of aircraft antenna radiation patterns are accomplished by illuminating the antennas, mounted on the specified airframe, with a uniform RF field at the frequencies of interest. The airframe is then slowly rotated or tipped as data is continuously collected to produce patterns of amplitude and phase versus azimuth angle or elevation angle. AFRL uses a state-of-the-art FARO laser location system (a 3D measurement system with accuracy of .001 inches at approximately 30 feet) to precisely position antennas on the full-sized airframes.

Measurement Instrumentation

Each range operates with a state-of-the-art automated RF measurement system. Three networked and distributed computer systems based on the Linux operating system are used for real-time data acquisition, real-time operator graphical data visualization and RF transmitter control. The system provides extremely efficient and accurate RF measurements by managing the high speed switching and multiplexing of antenna elements, RF frequency, transmit polarization and other parameters that may be required for the specific test program. Locally developed and maintained measurement system software provides the flexibility required for the measurement, control and monitoring of modern antenna systems. Data quality control is maintained with real-time and off-line graphical data visualization tools and anomaly detection software.

Range Uses

In addition to antenna pattern and isolation measurements, Newport is an ideal facility for characterizing installed system level performance parameters. The performance of direction finding systems, communications systems, EW systems, and experimental systems can be assessed in a realistic free-space environment with both the antenna and the system hardware in the loop.

Coordinate System

Measurement angles are referenced to the pilot's position. They represent the angular direction to the transmitted signal with respect to the airframe. Two types of cuts are taken around the airframe with respect to this coordinate system. Conic cuts are taken by varying the azimuth angle around the airframe's yaw axis. Elevation cuts are taken vertically around an axis lying in the plane of the pitch and roll axis.

Data

All antenna pattern data is provided on CD in a standard ASCII format which is easily imported and viewed by common software applications (i.e., Matlab, Excel, Linux suite of Open Office Tools). The data is separated and categorized according to the measurement parameters. The CD contains a directory structure organizing the data in a convenient html, 'browser readable' format.

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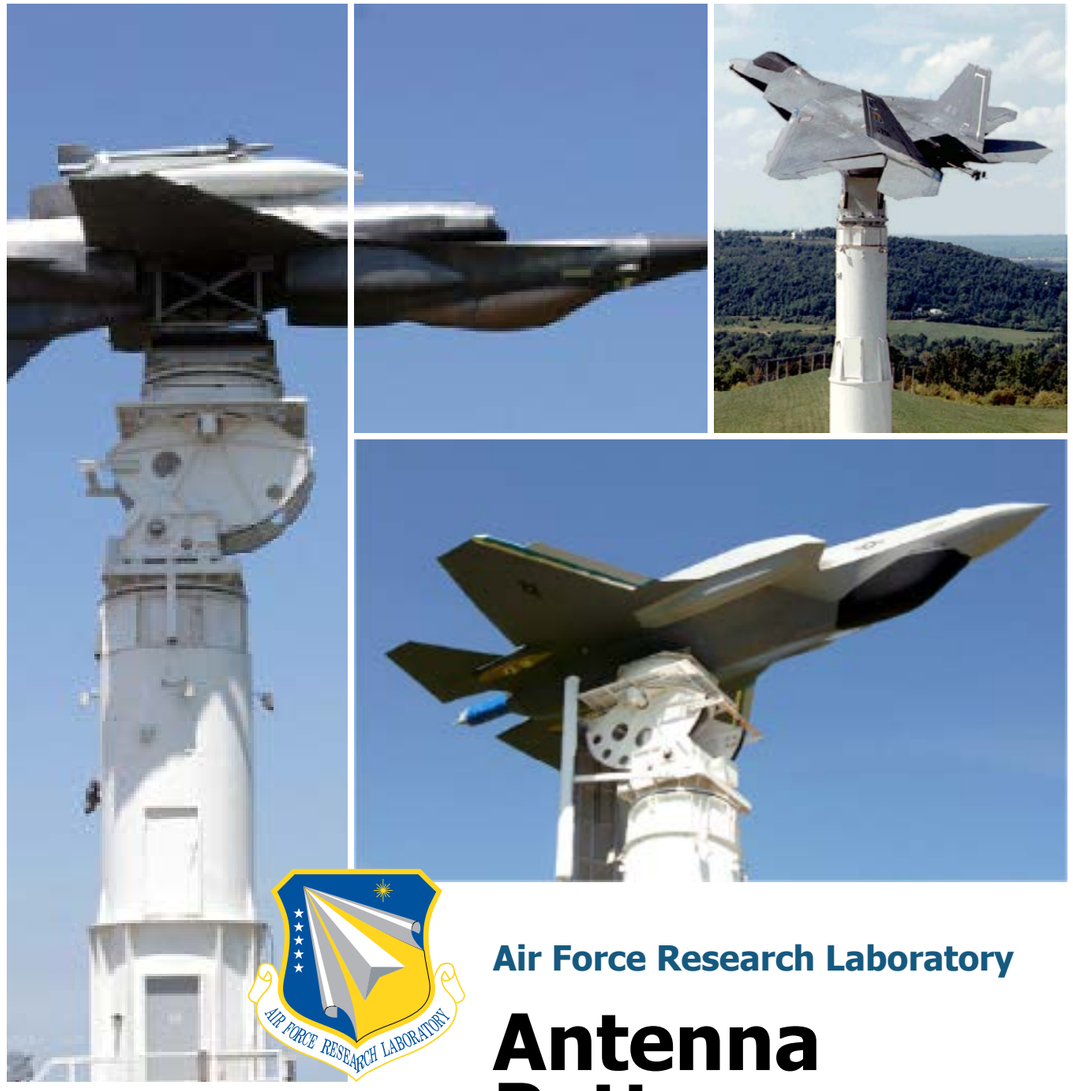
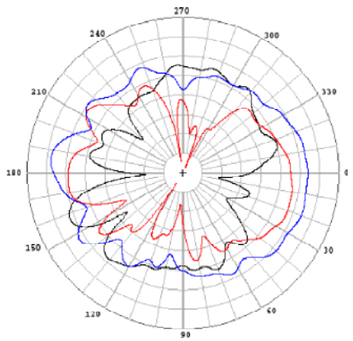




Air Force Research Laboratory

Antenna Pattern Measurements

Newport, NY

Air Force Research Laboratory's

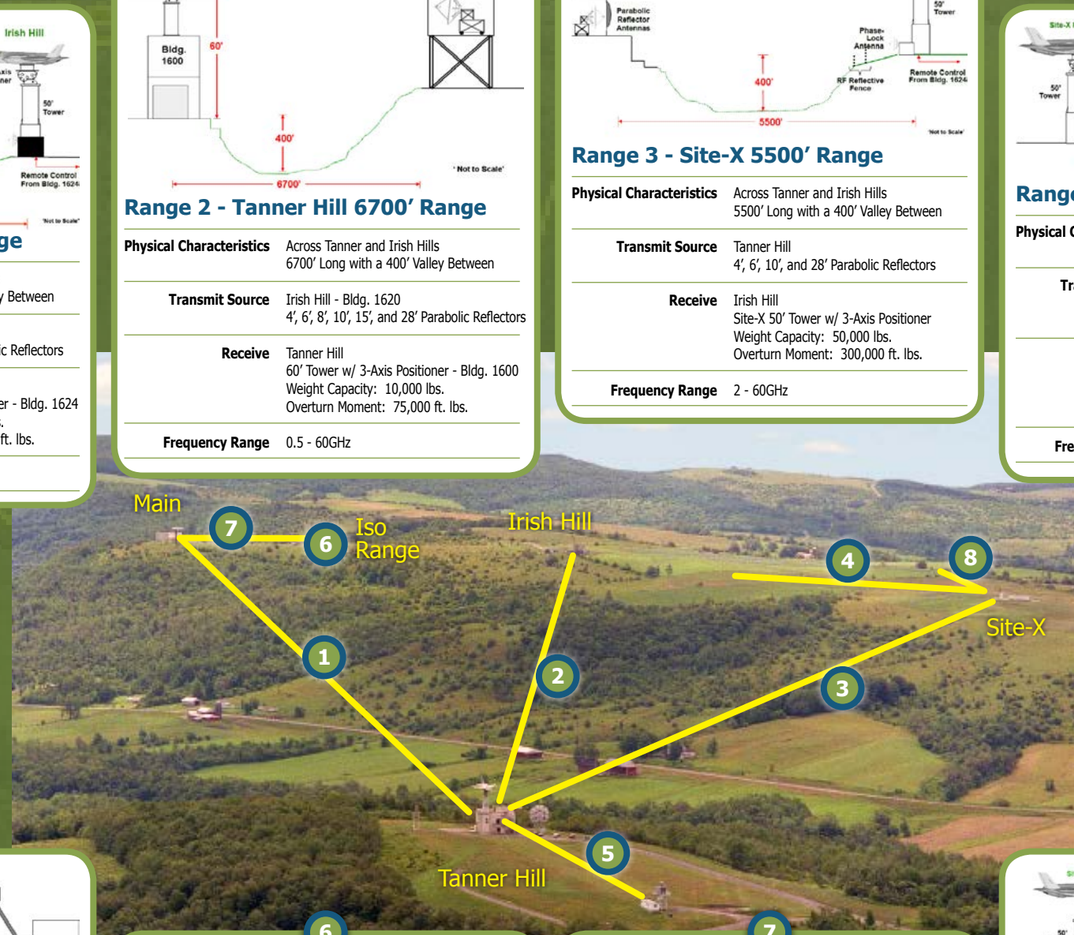
Newport Antenna Measurement Facility

The Newport Measurement Facility is located 30 miles southeast of Rome, NY. The facility is split between two hilltop locations: Irish Hill and Tanner Hill. The hilltops are separated by a distance of 1.5 miles with a 400 foot deep intervening valley. These hilltops, and the facilities on them, have been developed by the Air Force into a state-of-the-art 'far-field, elevated' outdoor antenna test range. The total facility consists of 78 acres of land with over 24,000 sq. feet of laboratory, office, maintenance, and aircraft modification space.

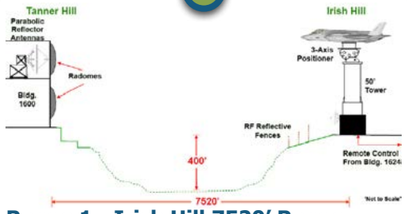
This antenna range is used routinely to measure antenna radiation patterns, antenna to antenna isolation, full up radio frequency system performance and for the development of state-of-the-art antenna measurement technologies. The uniqueness of this facility lies in the techniques, developed by AFRL, for measuring the effects of airframe interactions on aircraft antenna radiation patterns in a simulated flight environment. Interactions include those caused by metallic structures such as external weapons, electronics pods, and fuel tanks. The data obtained is used to: characterize antenna performance for various aircraft configurations, to optimize an antenna design or physical placement to achieve specific performance levels, or to validate antenna modeling and simulation software. The site is open and operational year round and can operate up to the secret level. Newport, as part of AFRL Rome, is included in the NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management as an "Experimental Station" with the inherent broad range of frequency authorizations and flexibility.

The Newport facility is configured into eight independent measurement ranges. The eight ranges are fully instrumented with signal sources, antenna, amplifiers, receivers, computers, displays, recording systems, fiber optic interfaces, positioner controllers, and high speed multiplex systems covering the frequency ranges of 50 MHz to 60 GHz. The ranges are typically operated with full-size airframes installed on special heavy-duty, high angular accuracy (+/- .050), 3-axis positioners to accurately simulate all possible flight attitudes. All ranges and both hills are interconnected with a fiber optic network which interfaces the range control centers to range instrumentation as well as to a high speed link connection back to the AFRL facilities in Rome, NY.

There are many significant beneficial features associated with range testing at Newport. To be specific: data collected at the Newport facility can be done for a fraction of the cost of data collected via flight testing. These tests are repeatable with a very high level of accuracy which allows for comparative evaluations following system design changes or modifications. Newport is a developmental environment with an emphasis on flexibility. Customers are not locked into a formal Test Plan and are able to modify their requirements as needed. Additionally, to support this flexibility, AFRL has a complete fabrication facility located in Rome. The sheet metal, wood, plastics and paint shops are capable of building antenna mounts, whole airframe sections, which included fuselages, wings, and tail sections. A wide variety of mock weapons, pods and fuel tanks have also been fabricated by the craftsmen at Rome.



Range 1 - Irish Hill 7520' Range



Physical Characteristics	Across Tanner and Irish Hills 7520' Long with a 400' Valley Between
Transmit Source	Tanner Hill 4', 6', 8', 10', and 28' Parabolic Reflectors
Receive	Irish Hill 50' Tower w/ 3-Axis Positioner - Bldg. 1624 Weight Capacity: 50,000 lbs. Overturn Moment: 300,000 ft. lbs.
Frequency Range	0.5 - 60GHz

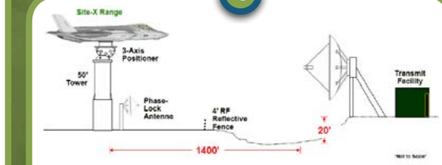
Range 2 - Tanner Hill 6700' Range

Physical Characteristics	Across Tanner and Irish Hills 6700' Long with a 400' Valley Between
Transmit Source	Irish Hill - Bldg. 1620 4', 6', 8', 10', 15', and 28' Parabolic Reflectors
Receive	Tanner Hill 60' Tower w/ 3-Axis Positioner - Bldg. 1600 Weight Capacity: 10,000 lbs. Overturn Moment: 75,000 ft. lbs.
Frequency Range	0.5 - 60GHz

Range 3 - Site-X 5500' Range

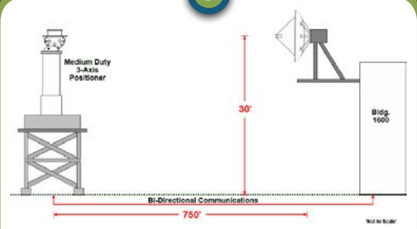
Physical Characteristics	Across Tanner and Irish Hills 5500' Long with a 400' Valley Between
Transmit Source	Tanner Hill 4', 6', 10', and 28' Parabolic Reflectors
Receive	Irish Hill Site-X 50' Tower w/ 3-Axis Positioner Weight Capacity: 50,000 lbs. Overturn Moment: 300,000 ft. lbs.
Frequency Range	2 - 60GHz

Range 4 - 1400' Range



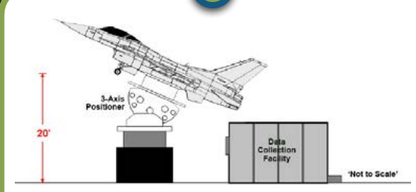
Physical Characteristics	Irish Hill 1400' Long with a 20' Valley Between
Transmit Source	Irish Hill 8' and 15' Parabolic Reflectors Optimized for low side lobes
Receive	Irish Hill Site-X 50' Tower w/ 3-Axis Positioner Weight Capacity: 50,000 lbs. Overturn Moment: 300,000 ft. lbs.
Frequency Range	0.5 - 2.0GHz

Range 5 - Short Range



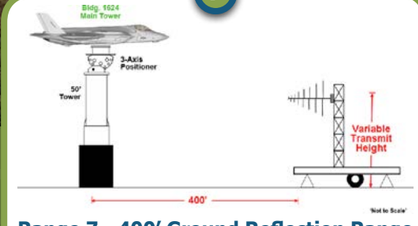
Physical Characteristics	Tanner Hill 750' Long - Flat Range
Transmit Source	Short Range Facility 2', 4', 6', 8', 10' and 15' Parabolic Reflectors mounted up to 30' above range level
Receive	Tanner Hill Two 3-Axis Positioners Range can be operated in both directions Weight Capacity: 10,000 lbs.
Frequency Range	0.03 - 60GHz

Range 6 - Isolation Range



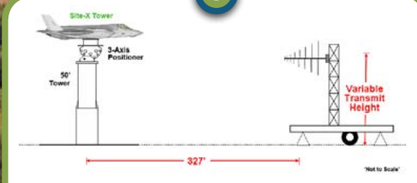
Physical Characteristics	Irish Hill 20' Tower w/ 3-Axis Positioner Weight Capacity: 50,000 lbs. Overturning Moment: 300,000 ft. lbs.
Purpose	Measure inter/intra system antenna isolation and coupling data

Range 7 - 400' Ground Reflection Range



Physical Characteristics	Irish Hill Adjacent to Bldg. 1624 and Range 1
Transmit Source	Irish Hill Various log-periodic transmit antennas mounted to a variable height tower
Receive	Irish Hill 50' Tower w/ 3-Axis Positioner (SEE RANGE 1)
Frequency Range	30 - 500MHz

Range 8 - 372' Ground Reflection Range



Physical Characteristics	Irish Hill Adjacent to Site-X and Range 3
Transmit Source	Irish Hill Various log-periodic transmit antennas mounted to a variable height tower
Receive	Irish Hill 50' Tower w/ 3-Axis Positioner (See Range 3)
Frequency Range	30 - 500MHz