

Benefield Anechoic Facility



BAF HANDBOOK

**Air Force Test Center
412th Test Wing**

Electronic Warfare Group/772d Test Squadron
Edwards Air Force Base, California

412TW-PA-12723
October 2012

412 TW EWG MISSION

Provide our nation and its allies the
expertise and credible capabilities to

perform Electronic Attack and Survivability

Test and Evaluation ensuring our continued

world-wide air dominance

BAF MISSION

The Electronic Warfare Group (EWG) 772d Test Squadron's *Benefield Anechoic Facility (BAF)* will provide a *comprehensive, robust and scalable radio frequency (RF) test and evaluation (T&E) infrastructure and capability* to ensure *weapons system survivability and mission effectiveness for the DoD, industry and our allies*. We will provide invaluable resources within our technical support and capabilities *as uniquely required by the specific program in the areas of:*

- *An exclusively large anechoic chamber facility*
- Complete *end-to-end installed systems test*
- *Dense, high fidelity RF* threat simulation and verification
- Electronic countermeasures *collection, measurement and analysis*
- *Radar target* return and ECM simulation
- *Antenna pattern* measurement
- Intra- and Inter-Systems Electromagnetic (EM) Interoperability and Compatibility (*EMI/EMC*)
- Electromagnetic environmental effects (*E3*) measurements
- Global positioning system (*GPS*) signal generation
- *Proficient RF and EW systems and systems test engineering* expertise and know-how
- *State-of-the-Art* RF, digital and video instrumentation infrastructure
- *Documentation* from *test requirements to the final test report*



Singapore F-15 EW Suite and Radar Tests

OVERVIEW

This handbook presents the test capabilities and applications of the BAF for the test and evaluation of current and future RF systems.

The BAF is located at Edwards Air Force Base (AFB), California, at the southwest end of the Edwards AFB flight line. It is the largest anechoic test facility in the world—providing a **“virtual open-air range (OAR) within four walls and ceiling.”** It is capable of supporting and handling virtually all Department of Defense (DoD) aircraft with very few exceptions.

The 772TS provides comprehensive systems and test engineering applied to the development and the T&E of military and commercial RF systems. It supports developmental engineering tests, Developmental T&E (DT&E) as well as Operational T&E (OT&E). Typical users of the BAF had been the developers, integrators, testers and users of Electronic Combat systems (e.g. radar warning receivers, electronic countermeasures, etc.) in a secure, controlled installed system test facility. Today, with the increased demand posed by integrated and newer net-centric RF systems and their required compatibility and interoperability, it has also matured and improved into **a valuable tool** for today’s highly integrated weapons systems. It is used to test manned and unmanned systems in the areas of:

- SIGINT and ELINT systems
- Network centric systems of systems
- Communications and navigation
- Identification friend and foe (IFF)
- GPS
- Radar systems
- Radar warning receivers
- Electronic Countermeasures (On-board and off-board)

The BAF's main anechoic chamber measures **264 ft L x 250 ft W x 70 ft H**. The size allows for far field RF radiation, thereby making simulations more accurate. Inside the chamber is a **175 ton, 80-ft diameter turntable** that can rotate an aircraft **±180°**. The chamber also utilizes **two 40-ton capacity** hoists to lift a fighter-sized aircraft.

The RF shielding effectiveness of the chamber from the outside world from **0.01 to 18 GHz is approximately 100 dB**. The approximate **quiet zone isolation** inside the chamber is shown below for the following frequencies:

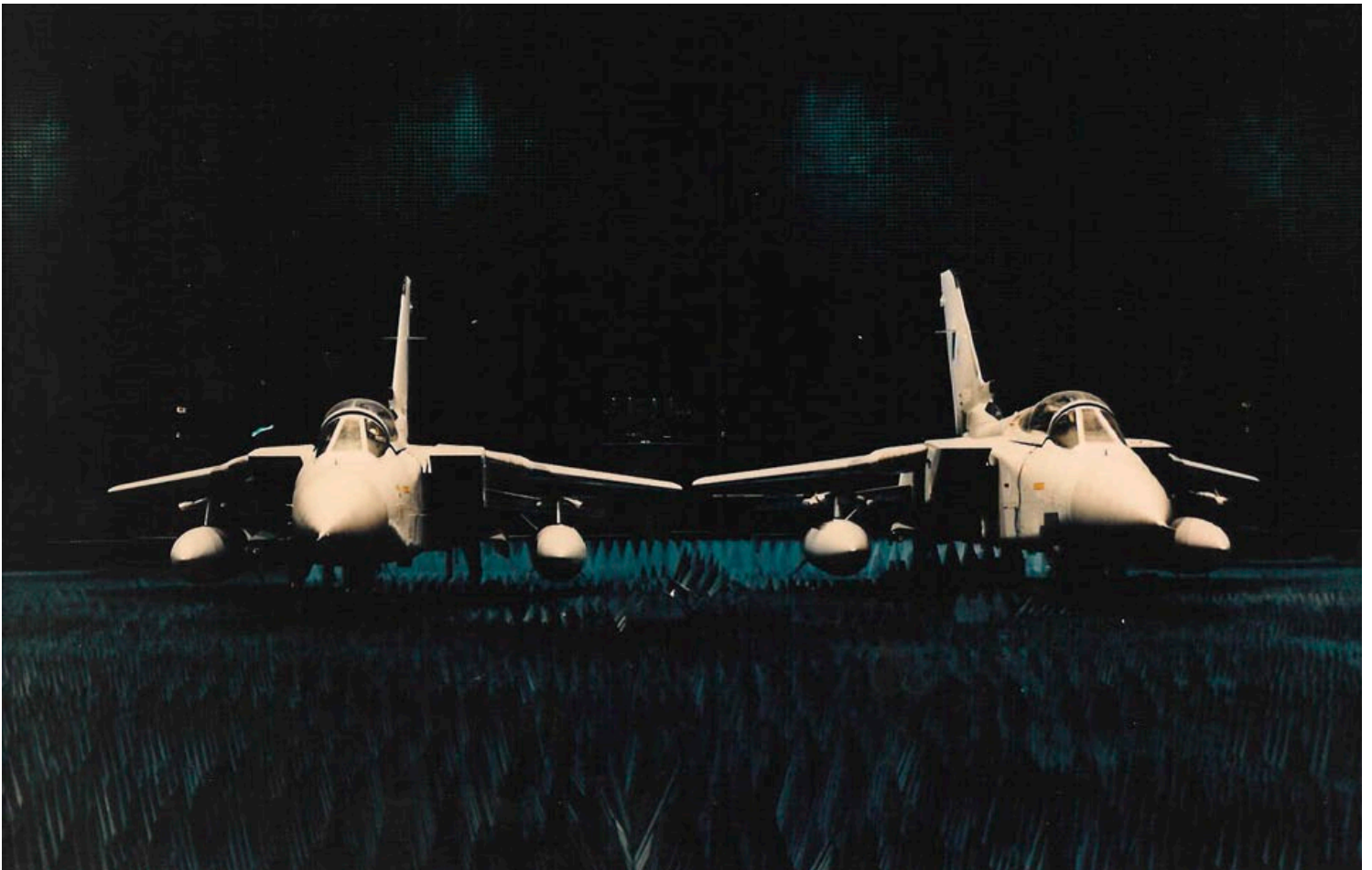
- | | | |
|----------------|---|--------|
| • 500 MHz | ≥ | 72 dB |
| • 1.0 GHz | ≥ | 84 dB |
| • 2.0 GHz | ≥ | 96 dB |
| • 3.0–18.0 GHz | ≥ | 100 dB |

Below 500 MHz, we achieve desirable quiet zones on unique case-by-case configurations (based on the unique test objectives and SUT characteristics). We use special techniques available at the BAF to isolate the system-under-test (SUT) from potential chamber reflections. See pages 20 and 21 “*time-gating*” discussions.

The BAF facilitates the testing of integrated avionics systems in a secure, controlled and repeatable ***electromagnetically-managed environment*** using simulation and stimulation technologies that closely replicate real combat mission environments. The facility provides ***multiple simulated ground, sea, and airborne threat systems*** (EW and communications signals) radiated into the large test chamber—creating a complex and dense ***electromagnetic environment*** which provides a realistically representative battle-space.

The BAF test facility is used to characterize a system’s performance or to investigate anomalies associated with ***source and victim RF systems installed*** on a ground or air vehicle, or simply due to basic installation effects. The ***electromagnetic susceptibility or vulnerability of critical mission systems*** is tested in the BAF with its instrumented, very capable, ***Radiated Susceptibility Test System***.

The BAF is part of a major range and test facility base (MRTFB) that provides unique test capabilities to the DoD and the Defense Acquisition System, industry and our allies with cost-effective rates and core capabilities. Contact the BAF to discuss your unique test requirements, our capabilities, cost estimates and schedule.



RAF Tornado Multi-Ship Radar ECCM Test

CAPABILITIES . . .

EW RF THREAT ENVIRONMENT GENERATION

The BAF has highly *sophisticated RF signal generation and monitoring capabilities* to test *RWR, ESM, ECM (Electronic Combat/Attack or “Jammers”), Radar, SIGINT or ELINT systems*. Virtually any threat or friendly emitter can be reproduced for free-space radiation or direct injection for the stimulation and test of EW/IO systems. This capability is also important for the comprehensive EMI/EMC testing of both integrated and stand-alone RF systems and other avionics such as a radar system on an air vehicle. Installed systems *RF compatibility-interoperability* testing, which is paramount to ensure that systems are ready to provide the *mission effectiveness and survivability*, can be accomplished. “Flying” the system in the BAF using a build-up approach into a heavy dense environment allows discovery of system issues prior to costlier flight test and provides scenarios or densities that may not be available at open air ranges for *installed systems test*.

At the heart of the RF generation complex for these tests is a Combat Electromagnetic Environment Simulator (CEESIM, MKN Version). The RF generation and injection system provides *high-fidelity, dynamic and dense RF environments* which can include threat and friendly radars and typical background signals. The BAF with the CEESIM and its free-space RF generation capability provides “world-class” *high fidelity stimuli* to EW/IO systems. Any known threat in the national databases can be simulated. Engagements (scenarios) and RF power levels at the SUT can be programmed to represent a large segment of the geographical battle-space. Threat lay-downs are tailored or newly designed to match the SUT’s test requirements and the expected battle-space for the weapons system. Libraries can be existing ones that include hundreds of emitters that can be reused, tailored, or newly built from customer inputs.

The main RF free space transmission subsystem (see figure on next page) is highly mobile within the BAF and consists of twenty (20) mobile RF transmission systems (threat sites) (24 channels total) while the direct injection method provides up to 80 ports of phase and amplitude controlled RF injection.

The system operators can program and radiate the frequency, power, pulse width, pulse shape, pulse modulation (inter- and intra-pulse), pulse repetition interval, pulse repetition frequency, transmit antenna patterns, and perform complex AM, FM, PM, FSK, and PSK modulations. The number of simultaneous threats depends on the duty cycle of the chosen emitters and the desired fidelity of the simulation (e.g., 1.35 million pulses per second with 10 CW emitters and a dropout of $\leq 3\%$).

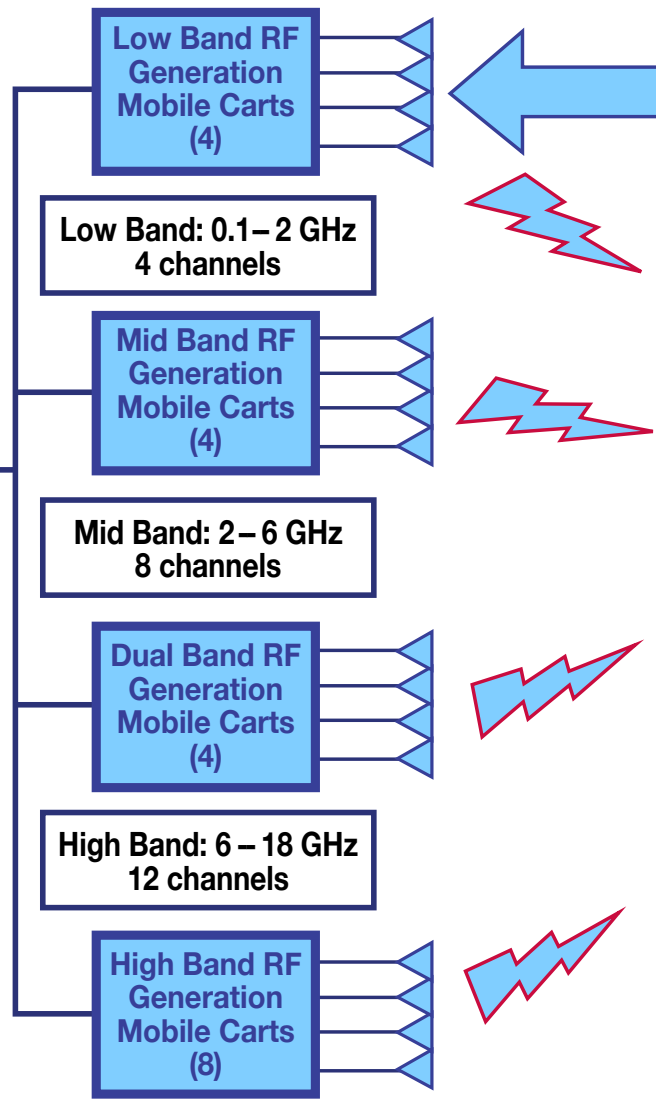
For direct injection, the system performs angle-of-arrival (AoA) antenna response modeling, which supports the testing of sensors that use amplitude-based and/or phase interferometer-based angle measurements. This allows for full motion simulation of the RF emitters.

CEESIM provides:

- Land-based, Sea-based, Airborne radars
- Early warning, acquisition, tracker, launch simulations
- CW, pulsed ranging, Doppler
- Various high fidelity modulations
- Dynamic scenarios of these signals as scripted by the customer requirement



Modulations include AM, FM, PM, FSK, PSK, and others.



- Antenna Height adjustable from 7 – 35 ft
- Aircraft Position: Up to approx. 50 ft depending on aircraft (or SUT on turntable)
- 20 carts provide up to 24 highly mobile reconfigurable and reprogrammable channels as dedicated or multiplexed channels for higher density scenarios



Free-Space CEESIM RF Scenario Generation

... CAPABILITIES

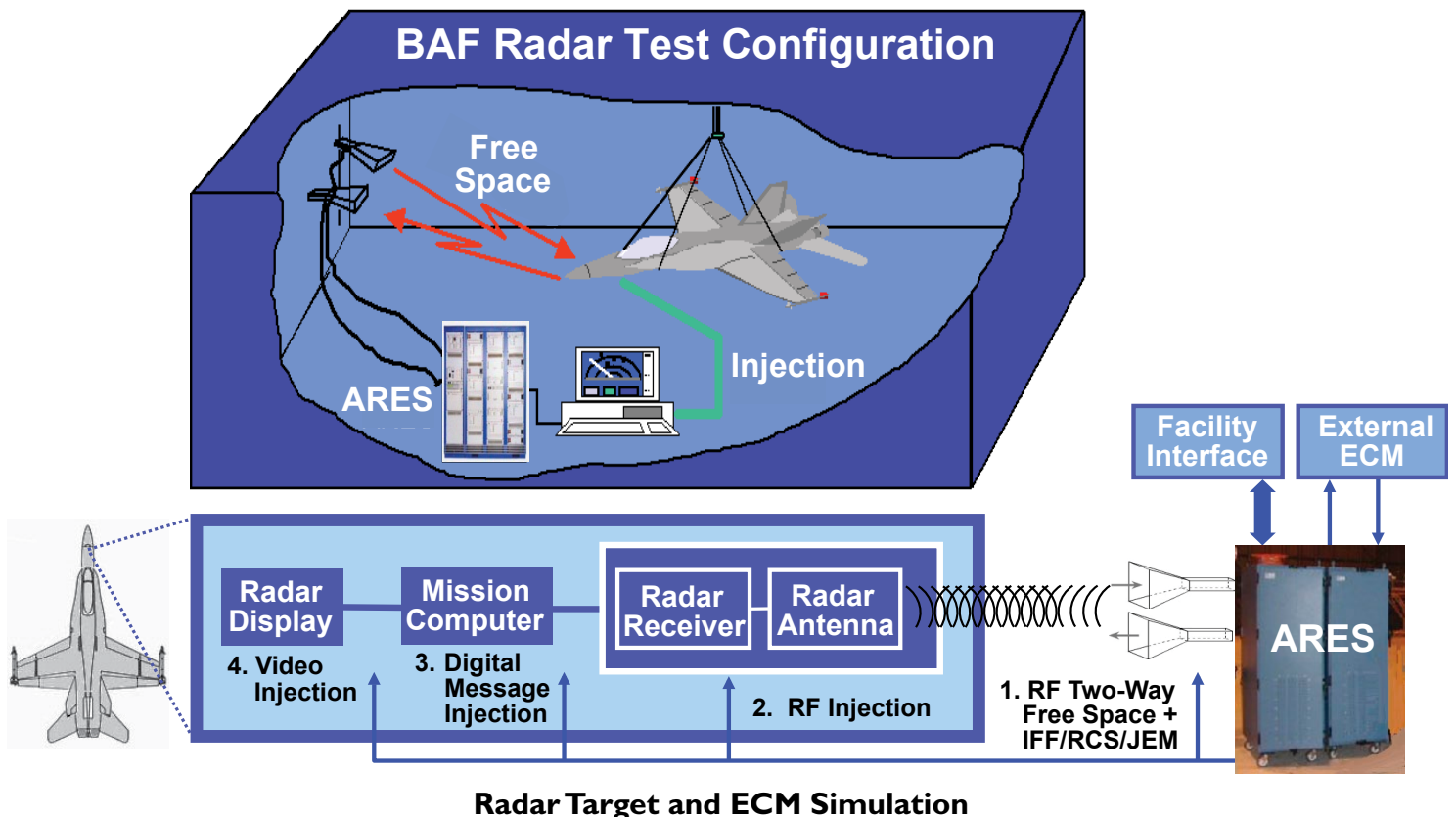
RADAR TARGET AND ECM ENVIRONMENT SIMULATION

The BAF provides a *programmable radar target and ECM generator (RTG)* capable of generating synthesized radar targets (returns or echoes) which are observed by an on-aircraft radar system as it would in flight. The *Advanced Radar Environment Simulator (ARES) RTG* system has three channels simulating and delivering returns with correctly simulated range, range rate, target radar cross-section and Doppler (\pm shifts) in response to the radar's emission. At the BAF the tester can evaluate radar performance in an installed configuration independently or in the presence of EW systems (RF threats) and ECM (jamming on-board and off-board) for interoperability testing.

The digital RF memory (DRFM) based RF generation system consists of a Low Band (0.3 GHz to 18 GHz) and a High Band (18 GHz to 40 GHz) at an operating instantaneous bandwidth of 250 – 850 MHz centered at any point within each band. The low band can generate two (2) simultaneous time coincident returns and the high band generates one (1). Range is programmable out to 200 nm. Additionally, radar targets have programmable features or characteristics that can include:

- Scintillation effects, jet engine modulation (JEM) patterns and variations
- Various non-coherent noise ECM response with variable J/S
- Coherent ECM coordinated (time and J/S) with an external jammer to augment ECM techniques

The ECM capability (reactive and non-reactive) utilizing the ARES external jammer support feature is beneficial when testing a radar with ECM pods or jammers to test interoperability or electronic counter-countermeasures (ECCM).



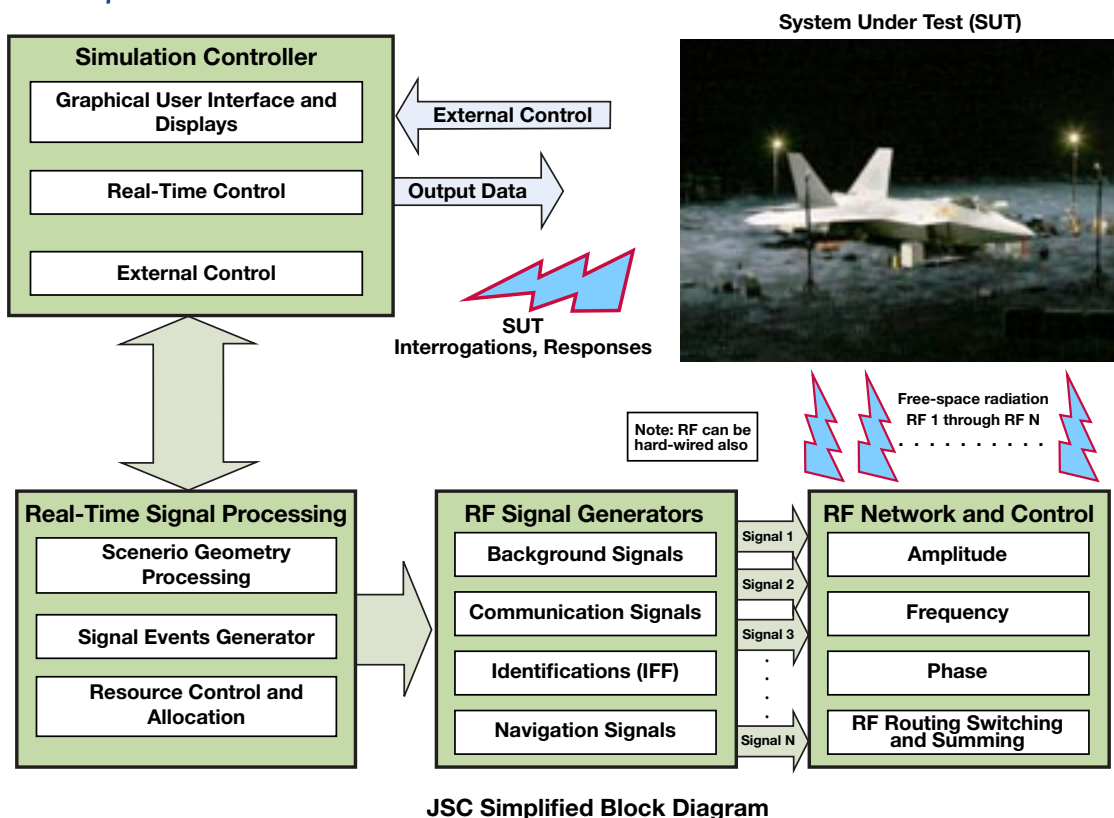
... CAPABILITIES

COMMUNICATIONS, NAVIGATION, AND IDENTIFICATION (CNI) SIMULATORS

The BAF's *CNI suite* consists of the *Joint Communications Simulator (JCS)* for friendly and hostile signals, the *Strategic Data Link Simulator (SDLS)* for friendly situational awareness information, a *Link-16 Simulations and Stimulation Suite* and the *Global Positioning System Simulator (GPSS)*. A *GSM Cell network* is also available. The Link-16 suite, the *KU-Band SatCom Link and Digital Integrated Air Defense system (DIADS)* capabilities enable network-centric operations and distributed test possibilities. These tools provide the capability to test and the visibility to understand a system's operation in system of systems, RF dense, operationally representative environments with coherent, secure, and known conditions.

Joint Communications Simulator (JCS)

The JCS system provides customers with a programmable, scenario based, complex *RF signal generation system* capable of creating a realistic *CNI RF environment of up to 72 simultaneous emitters* for up to *2000 CNI emitters (per scenario)* covering frequencies from *500 kHz to 18 GHz*. There is a robust JCS library of friendly and hostile signals; many basic waveforms such as AM, FM, SSB, DSB, pulsed, phase, and frequency shift keying; and new waveforms can be programmed. Pulsed signals such as *IFF signals* can be time shared providing *RF emitter densities well in excess of 100's of signals*. Interrogations in Modes 1, 2, 3/A, C, S (all uplink formats) and 5 (Levels 1 and 2) and replies in Modes 1, 2, 3/A, C, and 4 are available. The data content of SUT IFF interrogations and transponds in any mode can be decoded and deciphered by *the JCS' SUT data capture capability*. As part of the 72 simultaneous signals, JCS provides *FRUIT (Friendly Replies Unsynchronized in Time)* to a SUT interrogator to supply more realistic environments. The JCS has a portable capability and is currently undergoing *AIMS certification* (late 2012). The BAF also has *AIMS-certified test sets*.



Strategic Data Link Simulator (SDLS)

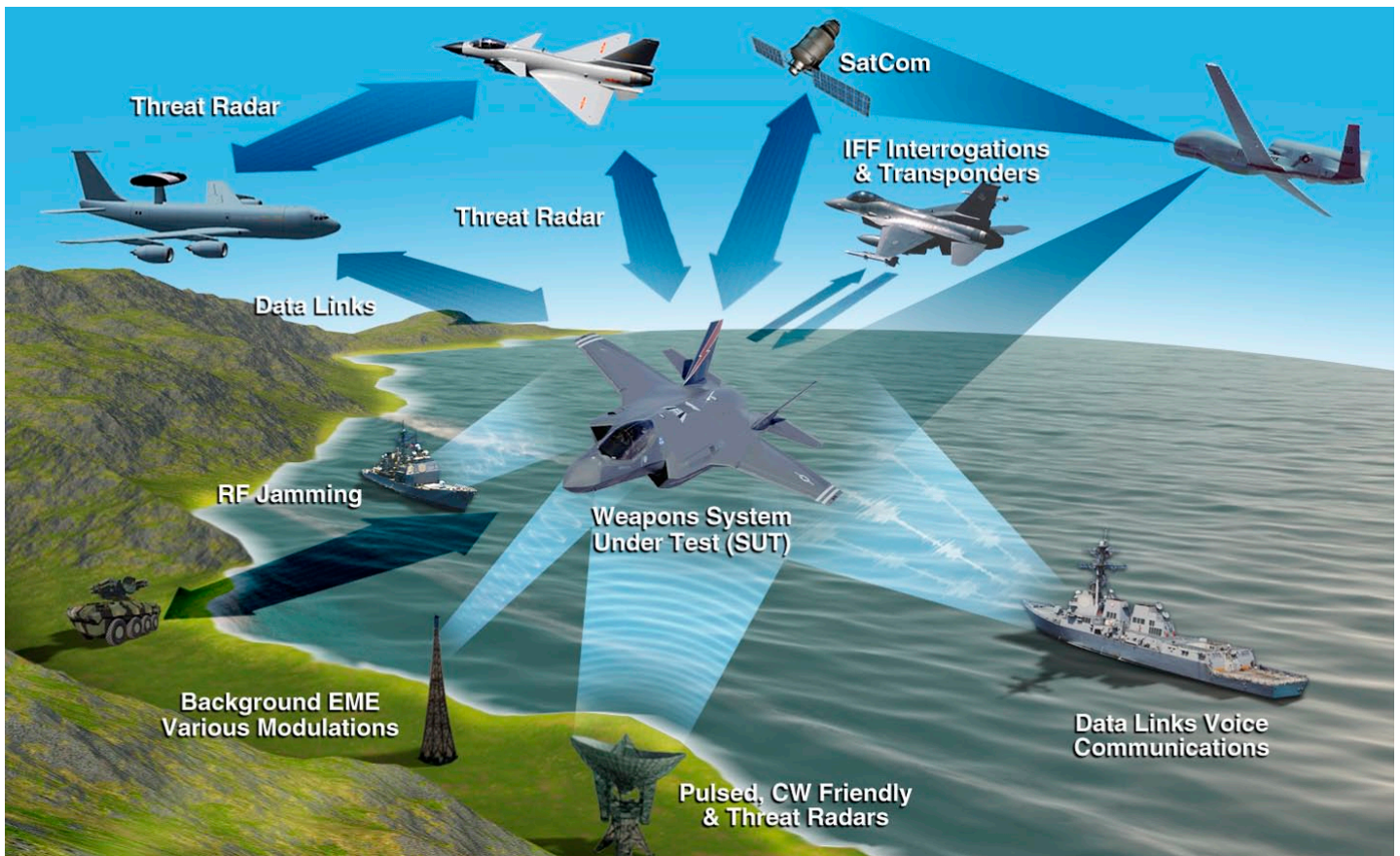
The *SDLS* system provides a scenario-based, computer-controlled simulator with operational *multi-channel UHF radios* providing real world broadcasts of selected *line-of-sight or satellite communication tactical data links*. This creates a realistic joint battlefield environment for evaluating system performance, interoperability, off-platform cueing and situational awareness. *Data links available* include the *Tactical Information Broadcast System (TIBS)* and the Tactical Digital Information *Link-11* (limited).

Link-16 Network Simulation and Stimulation

The tool suite needed to monitor, test, and document Link 16 performance is available. The *Advanced Communication Environment (ACE)/Faithful Timeslot Messaging (FTM) system* renders a *high-fidelity, operationally representative Link-16 network* test environment with precise timeslot by timeslot signal time of arrival, signal strength, and message content per the network design and scenario. Propagation delay is based upon scenario ranges while attenuation is based upon ranges, power, and antenna patterns.

The BAF *Link-16 suite* also includes the *Multi-Link System Test Training Tool (MLST³)*. It presents a *comprehensive RF rest-of-the-world simulation* for testing Link-16 terminals and their platforms in fully populated, dynamic *L-Band RF environments*. The MLST³ and ACE-FTM both operate *stand alone* or as part of *actual networks* and have the ability to *interactively exchange* Link 16 messages in a *distributed environment*. It can introduce Link 16 message errors to test interoperability and error handling.

The *Link Environment Gateway Simulator (LEGS)* provides an additional Link-16 simulation capability as well as providing Link 16 terminal operational insight and recording. A *Link-16 Management System (LMS-16)* provides independent data capture of Link-16 RF transmissions.



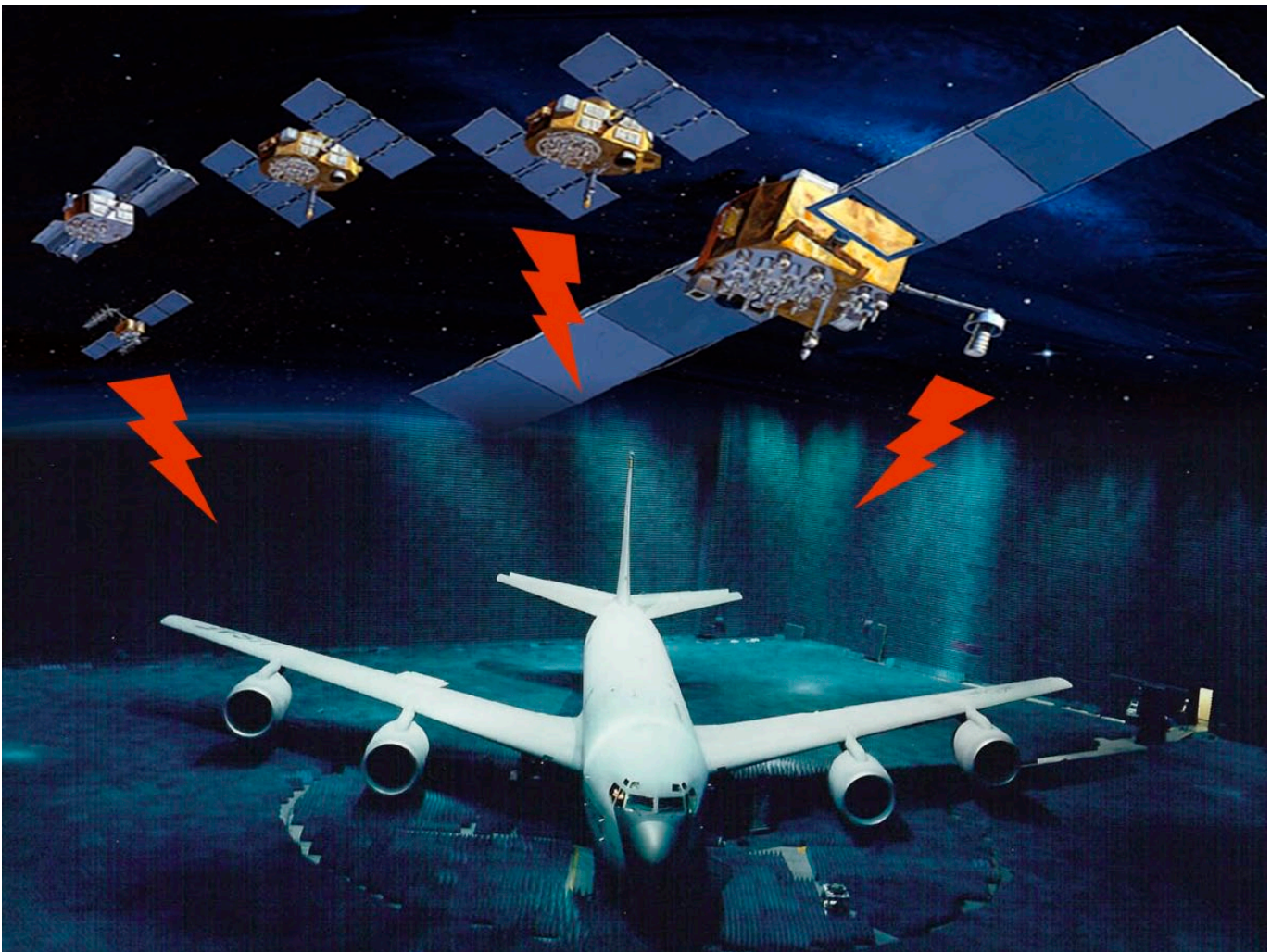
BAF "Real-World" Free-Space EME

GLOBAL POSITIONING SYSTEM (GPS) SIMULATION AND TEST

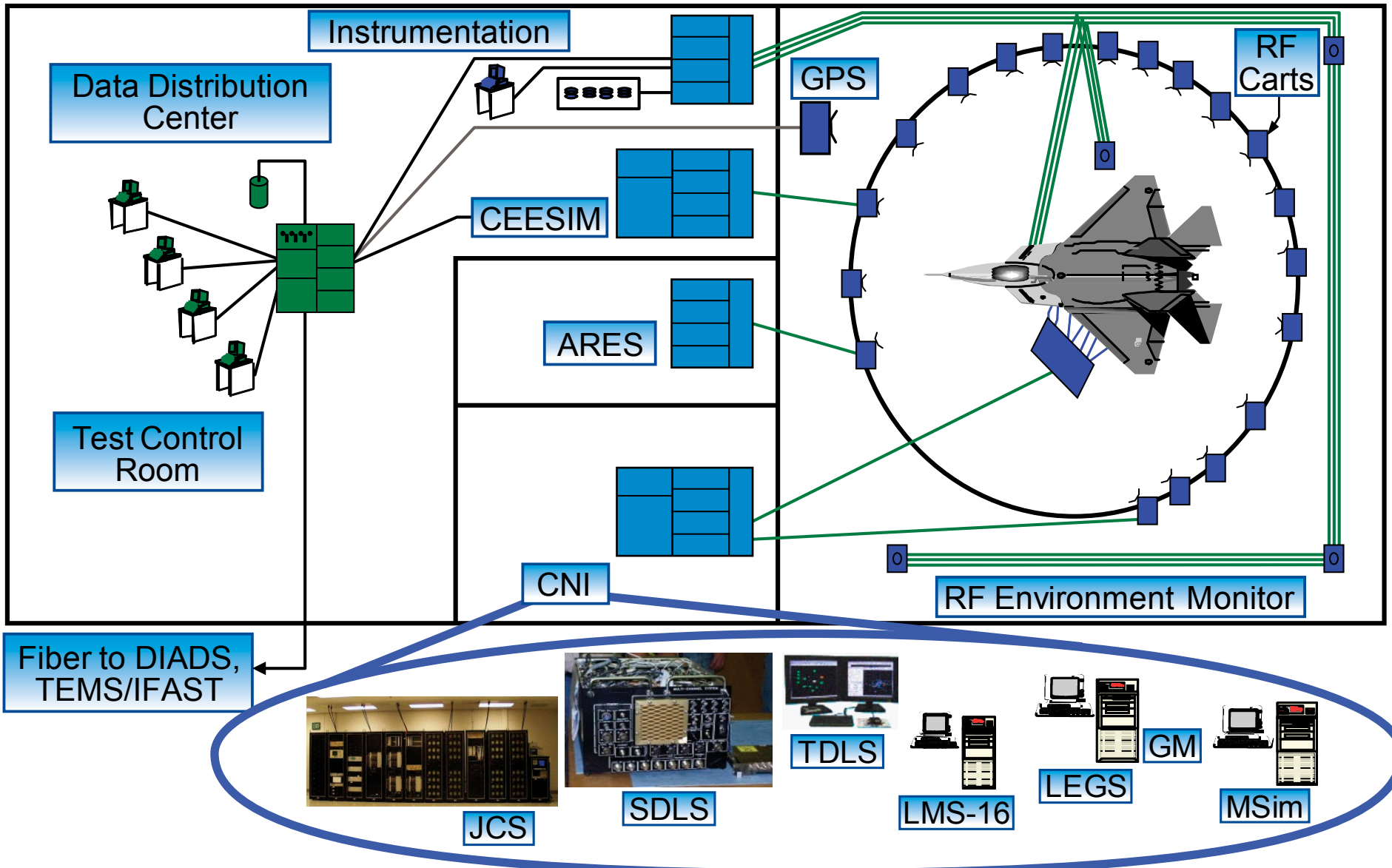
The BAF is an excellent facility to conduct **GPS testing**. The chamber shielding effectiveness ($\geq 100\text{dB}$) allows GPS tracking and jamming tests without FCC, FAA, or Base Frequency Management approval. **GPS signals can be transmitted free-space to the SUT** using one of three simulators: the **GPS Simulation system, GPS Retransmission System or the Advanced Global Navigation Simulator (AGNS) GPS simulator**.

The Interstate Electronics GPS Simulation System is capable of generating **24 fully independent RF channels of L1 (1575.42 MHz) and L2 (1227.60 MHz)** GPS signals. It can be configured in combinations of GPS Space Vehicle signals, GPS Ground Transmitter signals, GPS multipath signals, GPS “spoofers”, and jammers, or up to 12 full up L1/L2 satellites transmitted over a single RF channel. The systems can be used to quickly setup or modify a signal with both Course Acquisition (C/A) code and Precision (P(Y)) code and simulates receiver vehicle motion. The **GPS Retransmission System** repeats an external GPS L1 signal from outside the BAF into the chamber.

The Government-developed **AGNS GPS simulator** (available late 2012) **provides sixteen (16) RF channels into seven (7)** separate L1 and L2 transmit antennas. This is significant for testing GPS steering and nulling antenna systems (e.g. CRPA). The AGNS system can simulate C/A, L2C, P and P(Y) and M codes to support Advanced Encryptions Code (AEC). The system can be configured for L5 carriers and the Modernized NAVSTAR Security Algorithm (MNSA).



GPS Illustration



See CNI sections for details of these capabilities.

A Sample of a Complex Battlespace Electro-Magnetic Environment (EME)

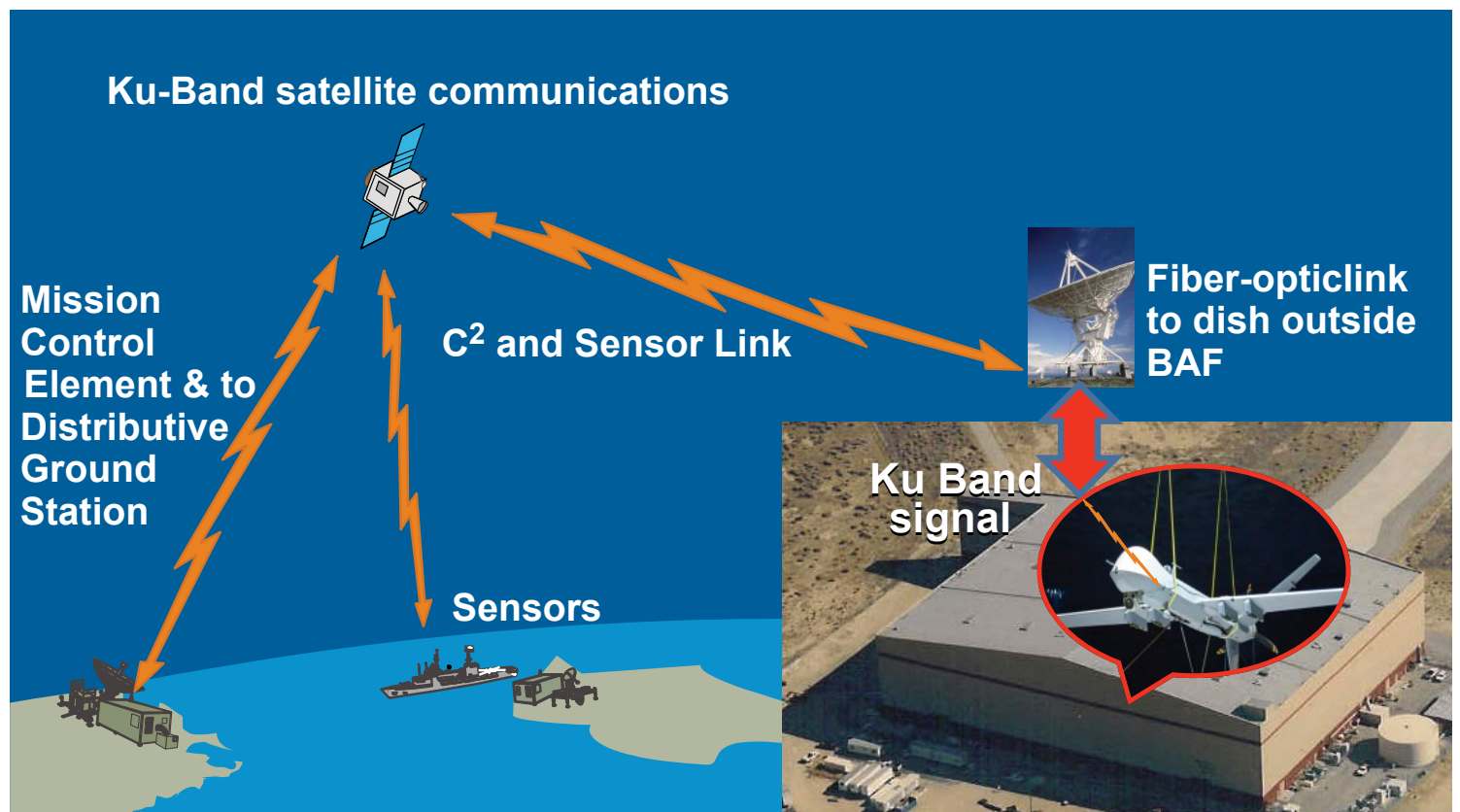
... CAPABILITIES

DISTRIBUTED TESTING AND CONNECTIVITY

KU-Band SATCOM Link

The KU-Band SATCOM system installed in the BAF provides bi-directional, uplink and down link connectivity between a SATCOM-equipped SUT in the chamber and its ground station or Mission Control Element (MCE). With the up and down converters, filters, and RF over fiber transceivers, chamber emissions are isolated from the outside world and all security and links are preserved.

With this capability, the remote MCE or other ground stations are able to communicate with the SUT, control and monitor SUT operations, and obtain KU-Band data streams all while testing in the chamber. Data can be captured real-time at the vehicle's ground stations. This capability, used for the RQ-4 Global Hawk test efforts, is available for use with other manned or unmanned vehicles that are equipped with a KU-Band SATCOM capability.



BAF KU-Band SatCom Illustration

Joint Mission Environment Test Capability (JMETC)

The BAF is a member facility of the *JMETC* group and can provide *distributed testing* or the capability for *linking distributed facilities*, enabling DoD customers to develop and test warfighting capabilities in a Joint context. Distributed test architectures available include DIS, TENA and JREAP utilizing the DREN and SDREN networks.



... CAPABILITIES

RF ENVIRONMENT MONITORING SYSTEM

The *RF environment is monitored* by a robust but flexible suite of *mobile and reconfigurable RF monitoring equipment* that provides real-time quality checks of the active test scenarios as well as checks for intentional and unintentional RF emissions from the System Under Test (SUT). Data, such as precision pulse widths, RF frequency, pulse intervals, and high resolution power are available to the customer in *real-time and as part of a data package*. At the heart of the suite are the Agilent 4400 series spectrum analyzers and the SP-500 and CS-3002 ELINT or RF collection systems. Post-test, the data is provided on media to the customer.

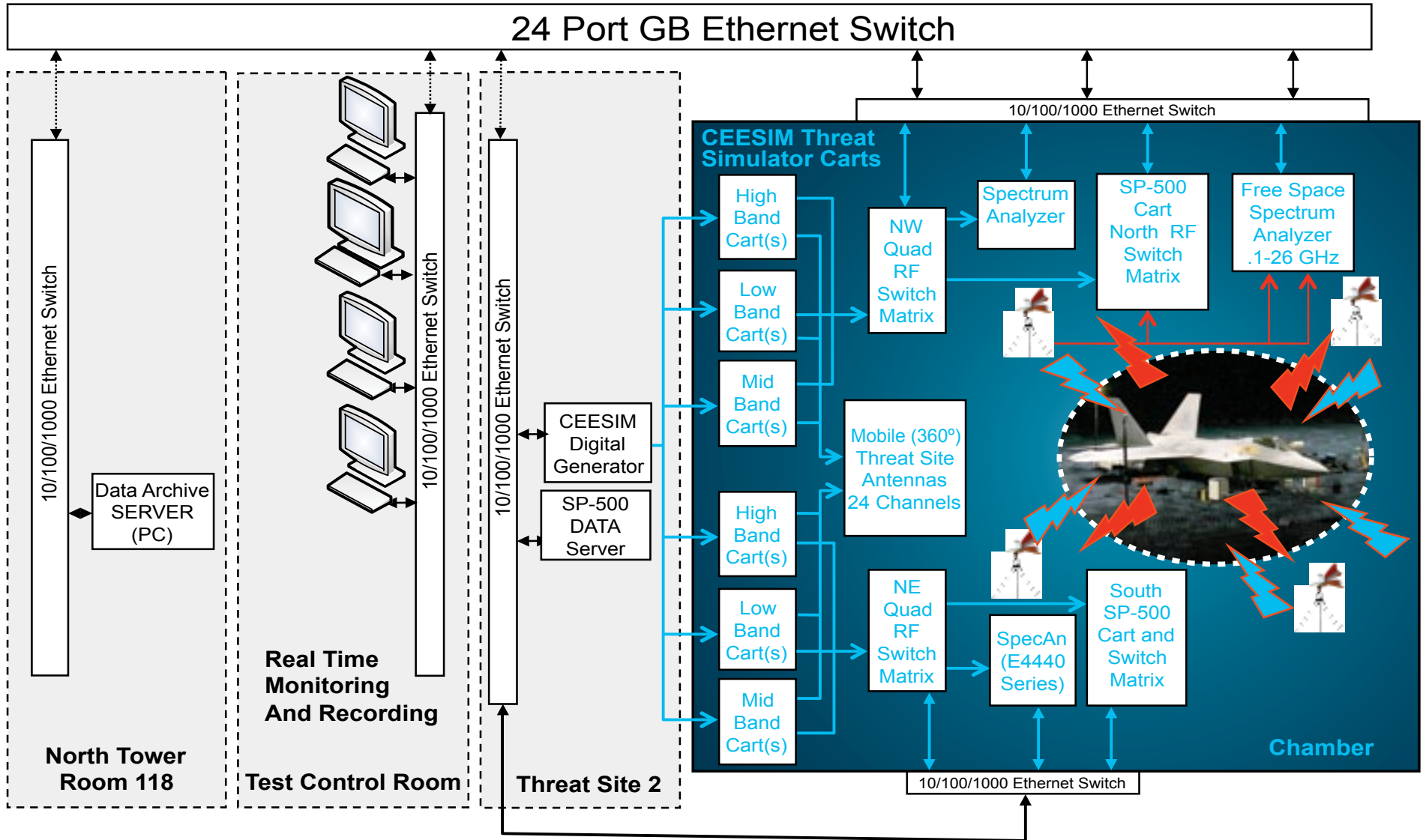
The monitoring carts provide *data collection, processing, monitoring, display, and storage of the Radio Frequency (RF) environment*. Normally one or two carts are designated as CEESIM direct monitoring carts that are directly coupled to the CEESIM channel outputs and provide health and RF power truth data for the scenario emitters at the antennas. Agilent 4400 series spectrum analyzers are used in these carts along with remote switching devices, amplifiers, and video transmitters to remotely collect and display this information in the Test Control Room (TCR) for the test engineer or customer personnel.

The SP-500, Radio Frequency (RF) pulse analyzer, is at the core of the suite of collection devices and allows each RF pulse that is generated to be captured for up to *one million pulses per second, from 250 MHz to 18 GHz*. The captured RF and its signal characteristics are available as Pulse Descriptor Words (PDWs). The SP-500 is used for both capturing data during BAF test missions and at the open air ranges for signal correlation work. SP-500s are mobile and reconfigurable for each test requirement. Available in the TCR, these PDWs are also used at the workstations in the TCR to identify all RF threat emanations in the chamber and are compared real-time to the test's library and displayed on an active emitter display with the appropriate parameters and ID. The SP-500 tuners can constantly sweep the environment or be set to specific frequencies or spectrum of interest in a number of selectable bandwidths.

The CS-3002 Pulse Analyzer Unit (PAU) consists of a Dual-Channel (RF) pulse analyzer unit (PAU), *two 500 MHz–18 GHz* tuners and its User Interface. It captures each RF pulse that is generated for up to four million pulses at a rate of *2.5 million per sec*.

RF monitoring configurations uniquely designed for each customer or test provides necessary real-time data and control while also making it available for post-test analysis.

A RF monitoring configuration is illustrated on the following page.



Sample of RF Monitoring Configuration for Chamber Testing

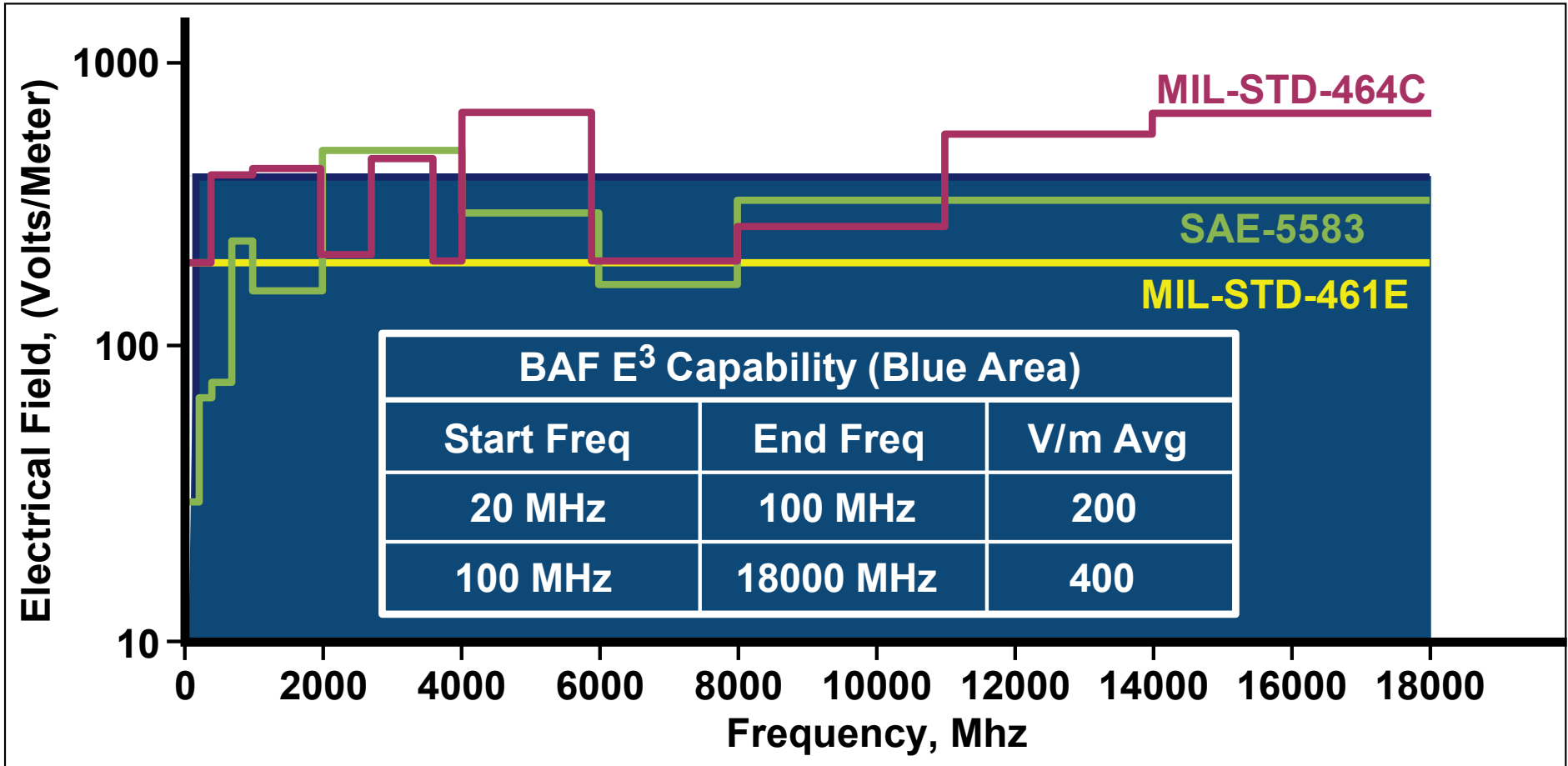
... CAPABILITIES

ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E³)

E³ test capabilities at the BAF include *radiated and conducted emissions, radiated and conducted susceptibility, victim-source EM compatibility, antenna-to-antenna isolation, radio scan, EMI/EMC and effective radiated power (ERP)*. Full aircraft testing is accomplished in the large chamber and line replaceable unit emission and susceptibility testing is conducted in a small adjacent anechoic chamber.

The BAF radiated susceptibility (RS) test system provides an integrated, turnkey solution to our customers' requirement to test *installed aircraft system operation in the presence of high power RF fields*. Fielded systems have a greater dependence on electrical and electronic systems to perform functions required for continued mission effectiveness, safe flight and landing of aircraft in a *high intensity RF environment*. The need for this type of testing is due to reduced electromagnetic shielding afforded by some composite materials used in various applications and designs, and an increased *presence of high power RF signals* in the everyday electromagnetic environment. There is also an increased susceptibility of electrical and electronic systems to *high intensity radiated fields (HIRF)*. This is due to increased data bus or processor operating speeds, higher-density integrated components and circuit cards that create a generally greater sensitivity of the electronic equipment in aircraft. This makes *RS testing imperative to ensure system effectiveness and flight safety*. The BAF provides a powerful capability in this area and compares to the military and commercial standards (for example, *MIL-STD 464 and SAE 5583*) shown on the following page.

Electromagnetic Interference (EMI) testing is available for unintentional emissions, and out-of-band emissions. EMI receivers have frequency range coverage from *100 Hz to 40 GHz*. They are capable of a large RF dynamic range for sensitive EMI measurements in conformance with *MIL-STD 461F* standards or customers specified requirements.



Radiated Susceptibility Test Capability

... CAPABILITIES

ANTENNA PATTERN AND ISOLATION MEASUREMENTS

The BAF offers a variety of antenna pattern measurement methods. The antenna measurement equipment functions in the frequency range from *100 MHz to 50 GHz* (chamber/SUT interactions are considered at low frequencies). The antenna pattern measurement system is capable of *collecting data on twelve (12) antennas at a time in both amplitude and phase as frequency is stepped through the operating band*. The antenna pattern can be measured in vertical, horizontal, right hand circular, left hand circular, slant linear and axial ratio. The BAF can typically measure 30 degree elevation swings for a hoisted aircraft and depends on SUT specific geometrical considerations and frequency of interest.

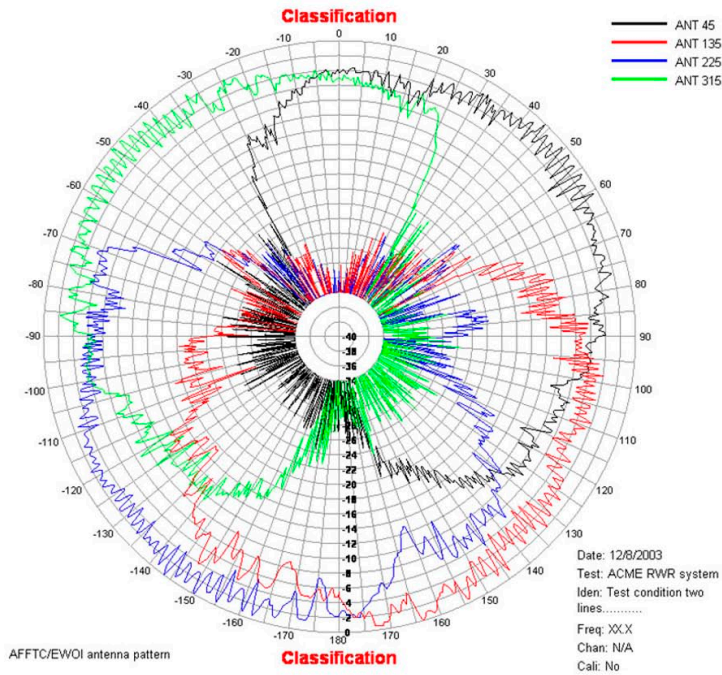
Both standalone and installed patterns are provided. Installed patterns can be supplied for any size aircraft up to that of a C-17. Data options include phase and amplitude data for varying elevations, and up to 360° of azimuth. Azimuth data resolution can be as granular as one degree.

To increase the chamber's "measurement space," *time gating (in the low nanosecond range) techniques* are applied for lower frequencies (≤ 500 Mhz) or for other special requirements. This virtually expands the chamber's usable measurement volume by negating potential reflections from the walls, ceiling and floor. See figure on page 21.

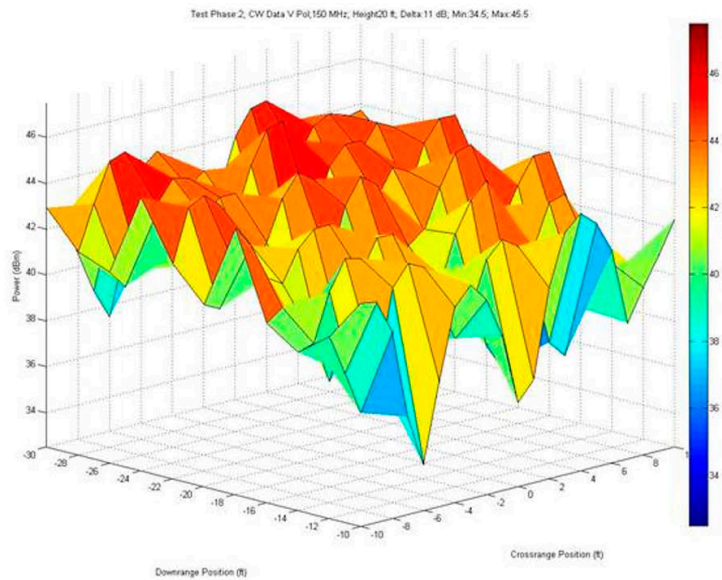
Key to *system interoperability and compatibility* is own-ship inter- and intra-system antenna to antenna isolation. At the BAF, with today's RF-reliant weapons systems with numerous mission systems operating in the same spectrum, typical flight configurations and modes can be characterized so that the developer and user know how systems will behave in-flight. This information is essential to evaluate mission effectiveness and suitability requirements.



RAAF F-18 Installed Antenna Pattern Tests

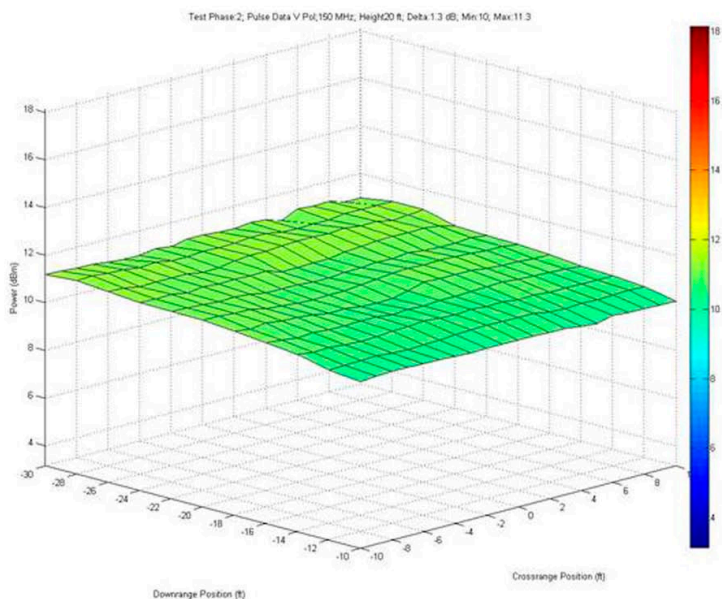


Sample antenna pattern data product from a BAF test.



Without time gating:

Unreliable or unstable data perturbed by effects of chamber reflections. Test run at 150MHz.



With time gating techniques:

Data is reliable and effectively measures SUT response or performance. Test run at 150MHz.

... CAPABILITIES

DIGITAL INTEGRATED AIR DEFENSE SYSTEM

The 772 TS developed and maintains the Digital Integrated Air Defense System (DIADS). It accurately simulates command and control (C²) system impacts on the battlespace. DIADS incorporates a software representation of the algorithms used by modern enemy air defense systems currently deployed throughout the world. The simulation can be operated stand-alone, faster than real-time for constructive use, or in various Operator-in-the-Loop/Hardware-in-the-Loop real-time modes. DIADS simulates several generations of surface to air missile systems, radars, tracking algorithms and command and control nodes many of which represent real systems that are deployed or are expected to be deployed. DIADS provides critical insight into the survivability of DoD weapon systems operating in hostile airspace.

The modeling allows testing against individual threats in a 1v1 or 1vMany scenario up to full up mission level testing to stress operational plans and support full scale Red Flag exercises. It provides insight into the total RF environment expected in combat by faithfully representing the signals that pilots and systems will encounter when facing the enemy. DIADS has extensive interfacing capabilities and can be used in support of a larger test or to host the entire test using standard interfaces such as DIS, TENA, and ASTERIX to interact with test customers as well as participate in distributed test and training exercises.

DIADS provides insight into the total RF environment expected in combat with extensive interfacing capabilities and is integrated with multi-spectral environment generators, external simulations, models, and T&E assets.

The screenshot displays the DCADS - Console 1 interface. The main window is titled "Air Picture View 1.2 - Console 1" and shows a map with several tracks and assets. A "Track Table 1.1 - Console 1" is visible on the right, listing tracks with their affiliations, speeds, headings, and altitudes. Below the map is a "Filter" section with options for None, Src ID, Src Name, and Description. A "Surface Asset Hierarchy" table is also present, showing a tree structure of assets. At the bottom, a "Weapon Status Table 1.1 - Console 1" provides details on weapon assignments and readiness.

Track Id	Affiliation	Speed (m/s)	Heading (°)	Altitude (m)
1	Hostile	139.169	97.4314	9025
2	Hostile	180.228	96.6913	7960
4	Hostile	119.971	111.003	7982
5	Hostile	229.201	142.98	7875

Name	Source #	Link	Type
FC-HQ	0	None	C2Node
FC-China_Lake_SOC	0	None	C2Node
FC-Inyokern_CRC	33	AAF	C2Node
RP-Inyokern_CRC	0	None	C2Node
FC-Echo_Range_CRC	0	None	C2Node
RP-Echo_Range_CRC	0	None	C2Node
FC-Red_Mt_CRC	0	None	C2Node
RP-Red_Mt_CRC	0	None	C2Node
FC-Trona_CRC	0	None	C2Node
RP-Trona_CRC	0	None	C2Node
WP-Inyokern_CRC	0	Local	C2Node
WP-Echo_Range_CRC	0	None	C2Node
WP-Red_Mt_CRC	0	None	C2Node
SAM-Red_Mt_SAM	0	None	SAM
WP-Trona_CRC	0	None	C2Node
FC-Shoshone_SOC	0	None	C2Node

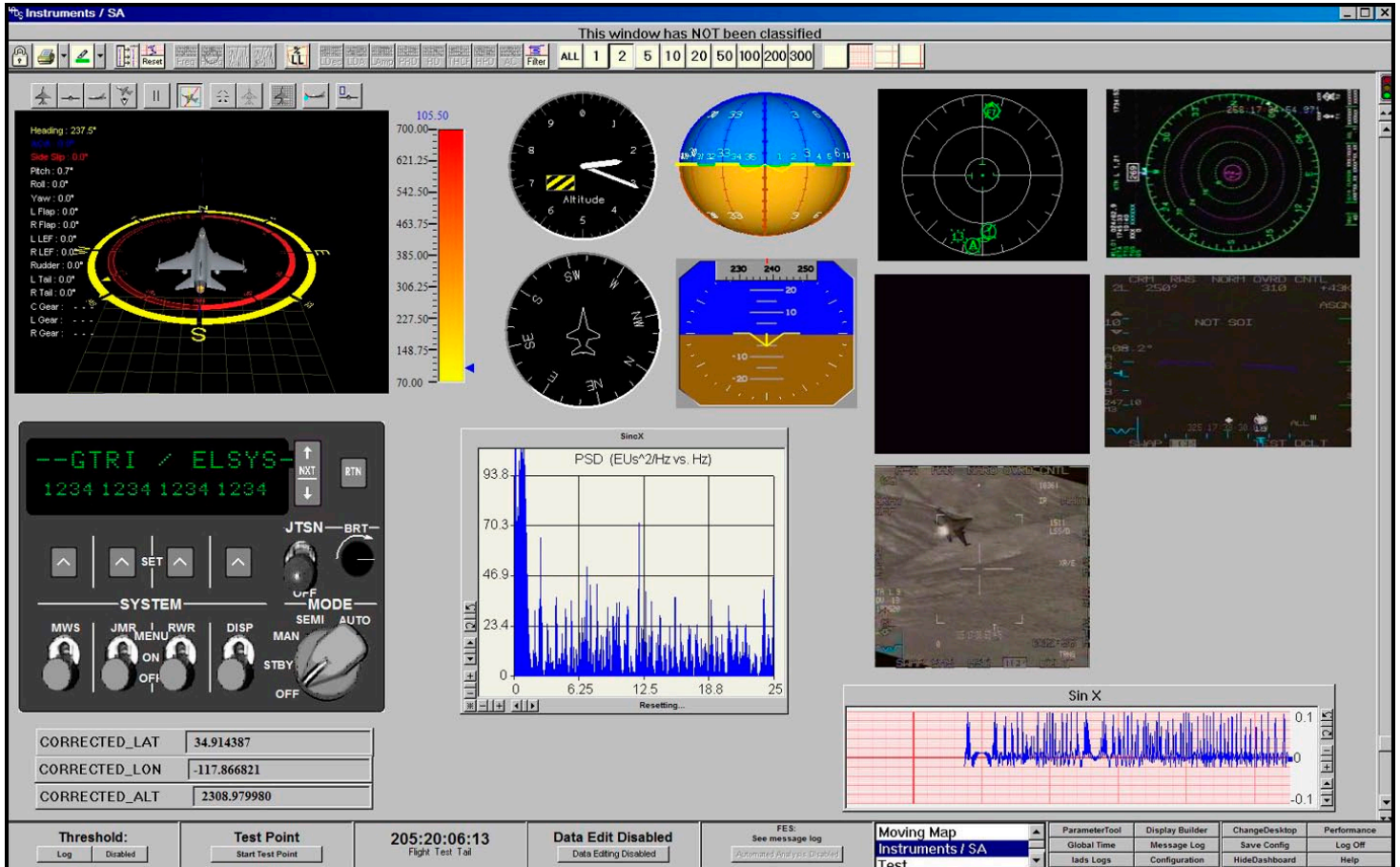
Channel Number	Name	Weapon Type	Weapon State	Num Assignments	Assignments	Missiles Free	Missiles Ready	Target Line
1	SAM-Inyokern_SAM	3	Assigned	1	1	34	12	0

Sample DIADS Engagement Simulation

DATA RESOURCES

The BAF provides *graphical displays* and a *variety of formatted data types* during a test for *real-time test visualization* and control in the *Test Control Room*. Post test data reduction, formatting, and plotting is performed in-house to meet customer needs, as required. *Flexible and Comprehensive time-correlated data products* include merged and singular products of:

- Real-time displays of data from SUT, chamber videos and data collection and measuring systems (see figure below)
- PCM, RS422, RS232
- Eight (8) channels real-time monitoring of Mil-Std-1553B data streams (four (4) channels recorded 1553B)
- RF threat generation activity files
- Turntable position data or position representing TSPI
- RF environment monitoring system data
- Digitized video and intercom audio
- Antenna pattern and antenna coupling (isolation) plots
- Formats common to the EW open air ranges (OARs) – allows the use of common tools and data products for ground (BAF) and flight test (OAR) comparisons



Sample Real-Time TCR Display During Test

Programs that have taken the BAF Advantage...

- CV-22 self protection suite performance and antenna measurements
- Global Hawk and Euro Hawk Tests
- RAAF F-18 Avionics-Radar-Jammer Interoperability characterization
- RAF Tornado Multi-ship Radar ECCM Trial
- DIADS support for Air Force Operational Test and Evaluation Command (AFOTEC) F/A-22 and F-35 JSF test
- C-130J EW Suite (ground test risk reduction prior to EW open air flight test)
- F-16 HARM Targeting System, ALR-69, AIDEWS (AN/ALQ-211)
- F/A-22 Test
- F/A-18 Antenna Pattern Measurement Test
- F-16 RWR Uninstalled Antenna Pattern Measurement Test
- BMW automobiles (first foreign commercial test, electromagnetic compatibility test)

FLY YOUR SYSTEM IN THE BAF!

- **Established robust capabilities – scalable and reconfigurable to meet your program requirement whether your system is at a Technology Readiness Level 4 or Level 9**
- **Breadth includes a full complement of avionics and ground systems’ simulation and stimulation along with measurement and reporting capabilities**
- **Evaluate system maturity and baseline at installed air vehicle level to reduce risk and increase productivity in future testing, including open-air-range (OAR) testing**
- **Reduces cost, schedule and risk — Can reduce flight time (runs), unknowns and re-fly rate**
- **Obtain statistically significant samples sizes – rapid test execution of numerous runs and repeatability of test points**
- **Explore areas of specific interest on systems that cannot be tested on flight line or in flight**
- **Exercise classified capabilities in a protected environment with “realistic” EME densities or capabilities restricted by regulatory agencies such as FAA, FCC or frequency management**
- **Obtain data for airworthiness certification**

SECURITY and ACCESS

CLASSIFICATION LEVELS

The BAF is capable of supporting both commercial and government tests at unclassified or classified levels up to Top Secret with special access or compartmental requirements.

PHOTOGRAPHY

Photography is restricted at the BAF, but is permitted with approval from the 772 TS and the EWG Security Office. All photographs will be reviewed before release to the user and all photographs must be approved by the Air Force Test Center (AFTC) prior to approval for public release.

BAF SECURITY/ACCESS

All U.S. Government, Contractor, Commercial and Foreign customers need to coordinate visit requests through the assigned Project Officer and the EWG security office prior to visiting the BAF. The BAF does not allow any weapons or camera/recording equipment without approval from the 772 TS and the EWG Security Office.

EDWARDS AIR FORCE BASE ACCESS

Customers requiring assistance with Edwards AFB installation access must notify the EWG Security Office or Project Officer preferably 72 hours (3 business days) prior to the scheduled visit.

For more information on the Edwards location or the BAF or to arrange a visit please contact us through the information provided on the back of this handbook.



The BAF at the Avionics Test and Integration Complex (ATIC)



U.S. AIR FORCE

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