Narrative Description
Of
Electronic Warfare Facilities
At
NAVAIR Point Mugu, CA

Prepared at the request of
BRAC Commission Staff
Mr. Les Farrington
Mr. David Epstein

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Sirs

During your tour of the Electronic Warfare Laboratory Building at Point Mugu, you requested a "layman's description" of the laboratories and facilities you had visited. The following is a simple narrative of the facilities you observed with a description of their use. I will also gather and include with this narrative any currently available brochures, which may help in your analysis.

Clifton Evans Electronic Warfare Laboratory
Building 3008
Point Mugu, CA

This building was a MILCON specifically designed to house the Electronic Warfare support efforts at Point Mugu. It was completed in 1988, and cost approximately $15M to construct in then year dollars. While it doesn't house the entire complement of 369 EW personnel at Point Mugu, it does provide for collocation, or close proximity for most of the key laboratory facilities. These personnel and facilities are connected to the 12 EW personnel at China Lake via SIPRNET and other high-speed data links, as well as other pertinent sensor and integration folks that we work with on a routine basis. The building was designed to not only allow full electronic networking but also to facilitate interchange between members of teams doing separate but related functions in the Electronic Warfare arena. An example is the constant interchange of ideas on effective radar jamming techniques between the jammer experts in the Tactical Aircraft EW suite arena and their counterparts in the Airborne Electronic Attack (EA-6B and EA-18G) arena.

EW is to a large degree a responsive science. It is a cat and mouse game, with each side striving to develop systems, tactics, and techniques to allow their own systems free play within and control of the electromagnetic spectrum. So these laboratories and the skilled personnel that utilize them provide not only continuous product flow via a scheduled release cycle for required updates, but also quick reaction responses to urgent Fleet requirements driven by wartime issues. As an example, you heard earlier about how this integrated functional capability allowed us to respond to over 31,000 Fleet requests in FY-03 alone. The depth of the knowledge in our personnel allows us to do both of these with minimum staffing levels and interruption to the scheduled product releases.

You saw three distinct but connected lab complexes. They support separate portions of EW but share a large number of assets and processes. The labs are the ECSEL laboratory, the AEA complex, and the EWDS/ETIRMS labs.

These labs support the development and delivery of a large number of products to Fleet, Joint, and coalition users.

We were not able to show you one of our unique product areas, the JATO vans, as they are currently deployed to a classified location in support of the classified mission we discussed with you. These mobile assets, and more importantly the extremely expert personnel that man them, provide an invaluable function for the warfighter in support of the development and acquisition of new receiver and jamming systems as well as technique development in support of the rapidly changing EW environment.

ECSEL

This is the primary tool we use in the development and integration of the EW systems used on our tactical aircraft (referred to as TACAIR EW). This lab supports TACAIR EW for over 20 different aircraft types. It is in this laboratory where EW products are built and tested for their ability to warn aircrew and protect the aircraft from radar guided missiles and anti-aircraft artillery.

It consists of a number of radio frequency (RF) shielded rooms within an overall shielded enclosure. These "cans within a can" allow us to test highly classified systems as well as provide support to approved FMS customers without the danger of releasing intelligence data outside its intended audience.

ECSEL provides a laboratory environment that gives engineers complete access to every level of the integrated EW suite while the EW equipment believes it is flying in a realistic operational environment. A worldwide threat environment is available to engineers on a daily basis.

The central features of the lab are the avionics "hot benches", which allow us to operate the various EW systems and suites, and the variety of simulators, stimulators and instrumentation allowing us to stimulate the systems and measure their response to the environment. This allows the engineers to assess the response of the systems to the threat as well as the effectiveness of the techniques proposed to thwart the threats.

The hot benches also allow us to integrate the various separate EW systems, such as the Radar Warning Receiver (utilized to survey the environment for enemy threat) and the On-Board Jammer (utilized to supply RF energy and appropriate jamming techniques to spoof the enemy radars) into the suite configuration normally utilized in the actual aircraft.

This lab is essentially a high fidelity indoor range, which allows us to deliver high quality products directly to the Fleet users. These simulations have been determined to be high enough fidelity that we no longer require expensive and time consuming flight test in order to deliver our User Data Files to the Fleet.

The products supported by the ECSEL are conceived, developed, tested, and delivered here. The tools you saw in the SATS portion of the lab allows the engineering level analysis of techniques we are developing to thwart the guidance of enemy missiles. In

this lab you were shown the effectiveness of a particular enemy radar system in tracking and engaging a friendly aircraft without jamming, and then shown the effect of a real EW system, the Integrated Defensive Electronic Countermeasures System (IDECM) injecting a jamming technique into the threat radar. You were shown a similar display depicting the effect of an EA-6B jamming signal on an EW Acquisition radar.

Airborne Electronic Attack Complex (EA-6B/EA-18G)

We transited to the ICAP-III laboratory. This is the lab that was designed and built by the government team at Point Mugu to be a copy of the ICAP-II Block 89A laboratory (the baseline from which the ICAP-III derived). After completion and acceptance testing, the lab was then "sold off" to the prime contractor for the ICAP-III for modification to the new avionics configuration.

This is the lab that has supported the development of the ICAP-III version of the EA-6B. This is the latest version of the aircraft, and includes many new systems to increase the capabilities of the aircraft over its predecessors such as new displays, a new bus structure, and higher speed computers with increased memory. Probably the main new feature is a channelized receiver which allows high speed and highly accurate viewing of the threat environment. It uses a technology called phase interferometry, which essentially has an array of antennas around the airframe, which allow the system to accurately measure the direction of arrival and range of the incoming signal. What that means to the lab is that we had to develop a highly sophisticated stimulator for this system. It's called the AMES III. This is a very complex and expensive (multi-million dollar) piece of equipment, and any future system with capabilities similar to the ALQ-218 receiver will require this simulator for development and evaluation. In addition, AMES III requires significant expertise to calibrate and program. This asset is being shared between the ICAP-III lab and the EA-18G laboratory next door.

During the development of the ICAP-III avionics suite, our expertise was recognized to the point that the prime contractor, Northrop Grumman, actually found a way to utilize some of our people as contributors to the prime development project, almost in a subcontractor role. (At Air Force request, the Point Mugu EW team is participating in the B-52H AEA system definition and source selection process.)

EA-18G

We then transited to the area of the laboratory complex, which houses the EA-18G avionics suite. This lab is very transformational in nature. When PMA-265 (the F/A-18 program manager) was given the task of developing the follow on platform to the EA-6B, they decided that the best development approach was to take full advantage of the intellectual capital at both NAVAIR WD sites. PMA-265 has historically had a strong relationship with the China Lake site, where the F-18 WSSA has been hosted for many years. The PM decided that it was a lower risk approach to build a distributed laboratory structure, which would take full advantage of the expertise at each site. The China Lake site is responsible for all of the portions of the legacy F-18 that are part of the EA-18G.

The EA-18G's AEA suite is essentially a repackaging of the ICAP-III avionics suite. The expertise for that system is here. The lab has been set up with a high-speed fiber optic line between the labs. Each lab will have a small emulation of the "other lab" so that they may operate and develop portions of their subsystem in a stand-alone mode. You saw the F-18 mission computer and cockpit display emulator. This supplies the inputs required by the AEA subsystems for isolated development. When complex interactions or higher-level integration is required, the labs hook up via the high-speed channels, and essentially operate as a whole aircraft spread across the miles. Technology and transformational thinking allow us to leverage the truly high value assets – the people and their expertise – at each site to make an effective solution set for the Warfighter.

I mentioned that the AMES-III we saw next door was shared between the ICAP-III and the EA-18. This EA-18 lab will also share a number of other pieces of fixed hardware. The EA-18G, ICAP-III lab and ICAP II lab will all share access to the pod station gantry, they also share the same RF threat generators, central computer facilities, and remote terminal room used as a quiet development environment by our s/w programmers. These labs were built to be an integrated complex, and were never designed to be easily or cheaply separated.

We next saw the pod gantry. This gantry allows us to radiate high power transmitter signals into dummy loads to allow us to characterize the transmitters and exciters. To do this, the lab must supply not only power and interconnectivity to the various lab configurations, but we actually have a cooling cart in the corner of the lab. We are currently developing a solution for our troops in Iraq by modifying an engineering model of the latest transmitter to ship to Fleet users as a quick reaction fix for the problem I mentioned earlier.

The next stop was the ICAP-II Blk 89A development and integration facility. It is the only one in the world, and is the sole support tool for our deployed EA-6B's. During the early 80's, Grumman had developed the ICAP-II EA-6B. They turned over long-term support to the government, and focused their energy on the next generation of the aircraft, called the ADVCAP. When that update was cancelled, Point Mugu remained as the only support structure for the EA-6B community. In addition to our more traditional role of EW product development and software support, we had to take on the role of full systems developer and integrator. We have added features well beyond the traditional EW roles such as new navigation systems, the ability to communicate with GPS systems, the ability to employ satellite communications and Link 16 messages, as well as other common avionics upgrades. This is in addition to delivering regular s/w product updates and quick reaction capabilities to the fleet users. Any degradation of this capability will directly impact the deployed fleet users, as there simply is no backup capability. Although the Navy will transition in the 2010-2015 timeframe to the EA-18G, our expeditionary Marine Corps squadrons have decided to stick with the EA-6B airframe until they make a decision regarding their EW requirements after 2015 (possibly a JSF variant).

EWDS

We next went to Intel center of our lab complex to see the Electronic Warfare Database Support system (EWDS). This is where a small group of very talented individuals does essentially three tasks. First, they continuously scour the world's intelligence data sets and attempt to determine the current and future threats in areas of interest in the world. They resolve those threats in concert with their intelligence community spread across the country, and build the routine updates that are shipped regularly to all fleet users of their product. Second, they are the front end for all fleet requests for information and updates on a quick reaction basis. The goal of this group is to respond to all fleet requests within 24 hrs. The much more typical time is less than four hours, and we have instances with local response time of 1 hr. This small (6-8 people) dedicated group provides this service on a 24/7/365 basis via a network of pagers and cell phones. Interconnectivity to the fleet is via all methods from secure phone to SIPERNET to naval messages. They are able to accomplish the full task by working in concert with the specialists from other areas of the complex, including the jammer technique group and the s/w programmers. Being collocated with these experts and facilities is vital to rapid turn around time. As an example, on 9/11/2001, we kept one analyst, a jammer expert, and two s/w programmers here while everyone else went home. They were able to produce a whole new HARM file as well as jammer techniques reports and new intelligence files in less than 8 hours. These files readied the fleet to retaliate in areas of interest in the world the same day as the attack had the President ordered that action.

The third product set they produce is a sophisticated set of tools comprising the Electronic Warfare Tactical Information Report Management System (ETIRMS), which are used by multiple communities. The complex architecture they developed has impressed a great many communities outside of their traditional EA-6B customer base. They now produce intelligence-based products for not only the EA-6B but also the E-2C, the MH-60R, and the SH-60S. They are also the producer of the Electronic Order of Battle (EOB) for the Joint Mission Planning system (JMPS) system used by all tactical aircraft and the specific planning module for the EA-18G segment on JMPS. The JSF program has become very interested in their architecture and tools, and is leaning heavily towards adopting it for the EW reprogramming required for that platform.

EWDS Database Access

ETIRMS is the front-end of a database that contains raw data, sensor-engineered data, data from foreign military exploitation, and data extrapolated from national intelligences sources. The EWDS database contains characteristics and performance, parametrics, tactics, electronic intelligence (ELINT), pictures, and Modernized Intelligence Database (MIDB) location information on platforms and weapon systems including their associated radars and communications systems worldwide. It also provides processed MIDB locations data with associated equipment and cross-references to the EWDS parametric, tactics, and jammer effectiveness data types.

Platforms/Weapons (ONI/MSIC/DIA, AFTTP 3-1, JANES, STAN SEMCIP, SIPRNET, ASDB, and JATO FME)

Locations/OOB (IDB and Messages)

ELINT (SPIRIT, EWIR, KILTING, AFIWC Blue, EPL, DIA, SIPRNET, JATO FME, JANES, NAIC and NGIC Data)

Engineered Data (HARM, jammer employment, jammer technique (JT), JATO, and preemptive assignment (PA)

EWDS Database Access Layer (DAL)

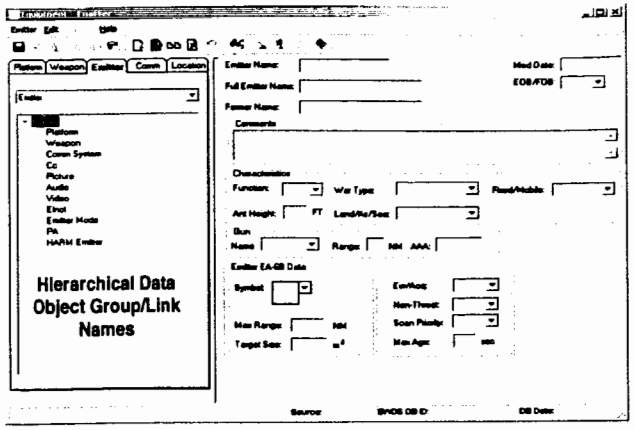
ETIRMS employs a JMPS compliant data access layer (DAL) to access and update generic and platform specific (e.g., EA-6B) platform, weapon, emitter, communication system, communication antenna, communication receiver, communication transmitter, location, HARM, EA-6B radar jammer, EA-6B communication jammer, EA-6B JATO, EA-6B communication PA, EPL, EA-6B EWDS, and Tactics data types, each one a collection of data from multiple physical database tables related by a specified key.

ETIRMS Database Display/Update

ETIRMS data is displayed and maintained in a dual-pane main window. The left pane is for selection of a named collection of data fields to be displayed/maintained, and the right pane is for display/update of individual data fields and/or links to other data objects within that selected data collection.

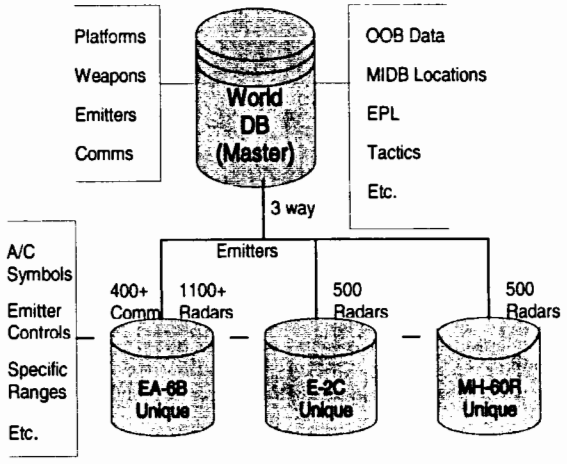
ETIRMS data display and maintenance is based on user permissions and authorization. ETIRMS data displays are sensitive to user roles and privileges assigned by the database administrator and associated with the user logon ID. ETIRMS data is never disclosed to users lacking proper credentials.

Revision 2, 31 JAN 2004



Database Segmentation

The EWDS database is enabled/protected by COE segmentation of the data store so that platform specific data is logically separated by platform type, yet accessible to any user with proper credentials.



POC Information

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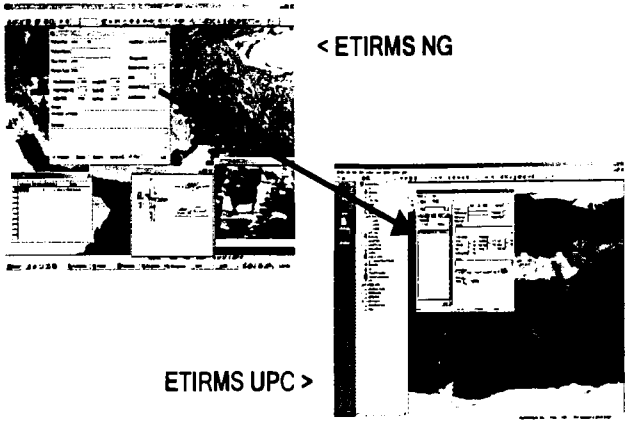
JWICS(TS/SCI) Web: http://navair.mugu.pacom.ic.gov/ewdsjato/
DOD Message address: NAVAIRWARCENWPNDIV PT MUGU CA//452200E/EWDS//

ETIRMS UPC

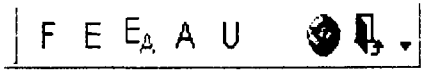
Electronic Warfare Tactical Information and Report Management System - Unique Planning Component

NAVAIR

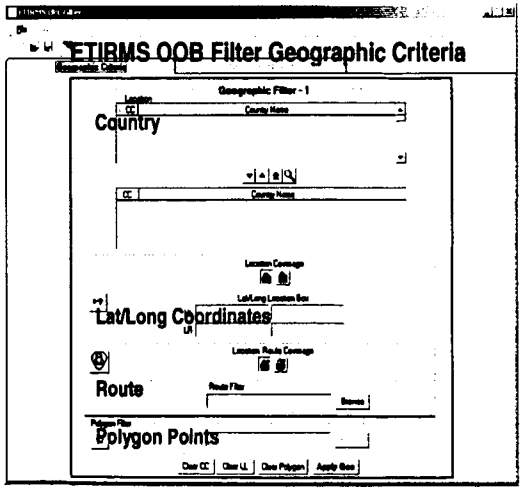
Proven Functionality



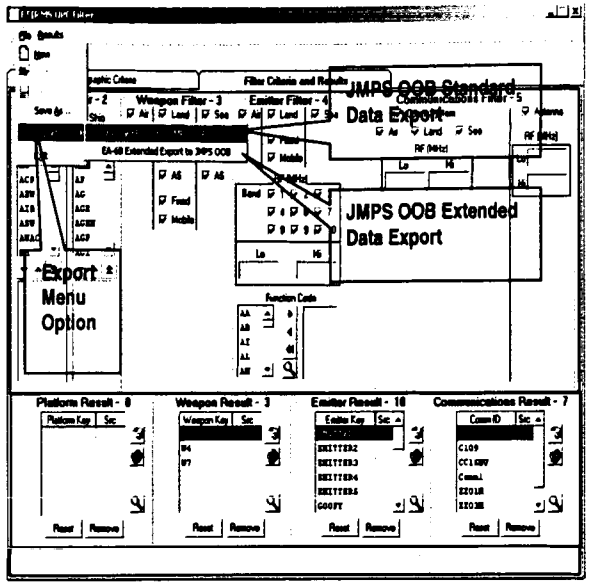
ETIRMS is an intelligence analysis and mission-planning tool currently deployed in military service using Windows NT and 2000. End-users include training and operational Aviation Squadrons (Air Force, Navy, Marine Corps), Fleet Intelligence Centers, Advanced Electronic Warfare Schools, and National Analysis Centers. ETIRMS UPC incorporates the user accepted and field proven functionality of its predecessor into the JMPS framework.



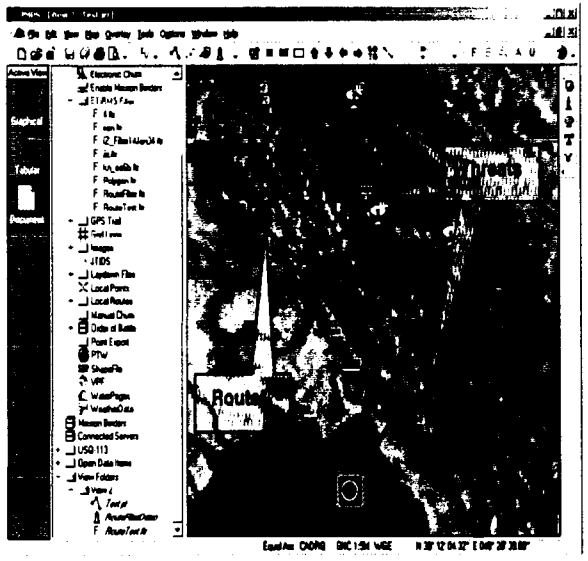
- **Filter** (Selection mechanism based on user-supplied geographic criteria such as country name, route filter, lat/long coordinates, or polygon points - applicable to equipment, electronic attack, and analysis tools)



Export OOB Filter (Output ETIRMS OOB filter in standard JMPS format or in extended EA-6B format)

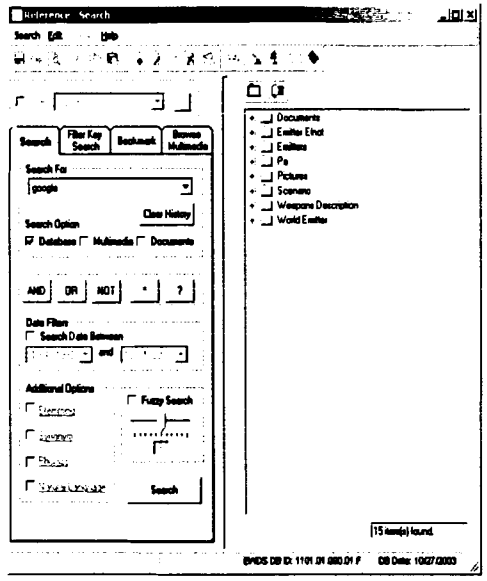


Route Threat Display (ETIRMS OOB overlay on JMPS map)



- **Equipment** (Worldwide locations plus characteristics and performance data on Platforms, Weapons, Emitters, and Communications Systems)
- Electronic Attack (Warfare strategies, scenarios, engagement sequences, jammer employment, jammer techniques, and pre-emptive assignment information)
- **Analysis Tools** (One-to-many and many-to-many emitter ambiguity analysis, signal identification, platform candidate analysis, direct attack candidate analysis, and HARM analysis incorporating seeker, harmonic rejection, and listing logic.)

  The ETIRMS UPC provides ambiguity analysis for the HARM UPC missile Field of View (FOV) or the User Defined polygon against the EWDS DB threat list. Resultant ambiguities are displayed on the HARM UPC VPS.
- **USQ-113** (USQ-113 mission planning and maintenance including import and export of mission data and/or configuration files)
- (Multi-level multimedia and database search tool)



Open Search (user defined search via a text string)

Key Search (key word search for weapons, weapons, emitters, and communications systems)

Advanced Search (stemming, phonics, synonym, and Boolean search adjusted for accuracy; e.g., fuzzy search)

Templates (selection from a list of templates for generating test plans, test reports, and mission reports - MISREPS)

-  (Allow ETIRMS OOB filter icons to be displayed on a JMPS Virtual Planning Surface (VPS) overlay)
-  (Close/Terminate ETIRMS UPC application)