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**Testing Technology and C2 Structure Develops Tactical
Tomahawk's Quick Reaction Precision Strike Capability (U)**

**Brief to PSTS
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Objective

- Describe how the Sea Trial program has been used to develop and validate Tactical Tomahawk capabilities to be used in the development of Joint Tactics Techniques and Procedures (JTTPs)

Tomahawk Myths: “We don’t task TLAM because . . .

- It’s too hard to communicate with the firing unit.
- Tomahawk isn’t responsive enough for a TST.”
- Tomahawk can’t provide any BDA.”
- Tomahawk can’t be recalled or redirected to a higher priority target.”

FALSE

PROBLEM and SOLUTION

PROBLEM

- **How to develop, validate and demonstrate JTTPs (Joint Tactics Techniques and Procedures) that take full advantage of new capabilities?**

SOLUTION

- **Use Sea Trial process**
 - **Greyhound Express Exercise Series**
 - **JHAWK Quick Reaction Test**
 - **Joint Experimentation**
 - **Urban Resolve 2015**
 - **Joint Expeditionary Force Experiment (JEFX) 08**
 - **Operational Test Launches**

Greyhound Express

- **Established at COMSECONDFLT**
- **Experimentation with TLAM C2 to shorten the kill chain**
- **3rd Party Targeting using SOF to fix targets**
- **Led to COMSECONDFLT publishing 3PT TACMEMO**

JHAWK QRT

- **USSOCOM-sponsored quick reaction test**
- **One-year charter to develop and publish MTTP for 3PT of Tomahawk**
- **Used C2F TACMEMO as starting point**
- **Developing and validating TTP for immediate employment at joint operational level**
- **Publish MTTP May 2008**

Joint Experimentation

▪ Urban Resolve

- Simulation of joint campaign in year 2015
- COMSECONDFLT demonstrated fielded Block IV TLAM capability
- Demonstrated dynamic targeting at joint operational level
 - JSOTF providing 3PT
 - JFACC clearing airspace
 - JFMCC retargeting missiles in flight

▪ JEFX 08

- Time-sensitive planning in support of USSTRATCOM Global Effects Integration
- Again demonstrating fielded Block IV TLAM capability

Operational Test Launches

- **Validate technology and JTTPs using Operational Test Launches**
 - **Operational SOF equipment and procedures**
 - **Field Targeting Devices**
 - **9 line message**
 - **Tactical Tomahawk Capabilities**
 - **Launch Platform Mission Planning (LPMP)**
 - **Missile loiter**
 - **Redirection in flight**
- **3 Test Launches from December 2005 to September 2006**
 - **OTL 309**
 - **OTL 437**
 - **OTL 454 (JFCOM sponsored)**

OTL 309 Objective

- Objective is to demonstrate the ability of Tomahawk to engage a target using coordinates provided by Special Operations Forces (SOF)

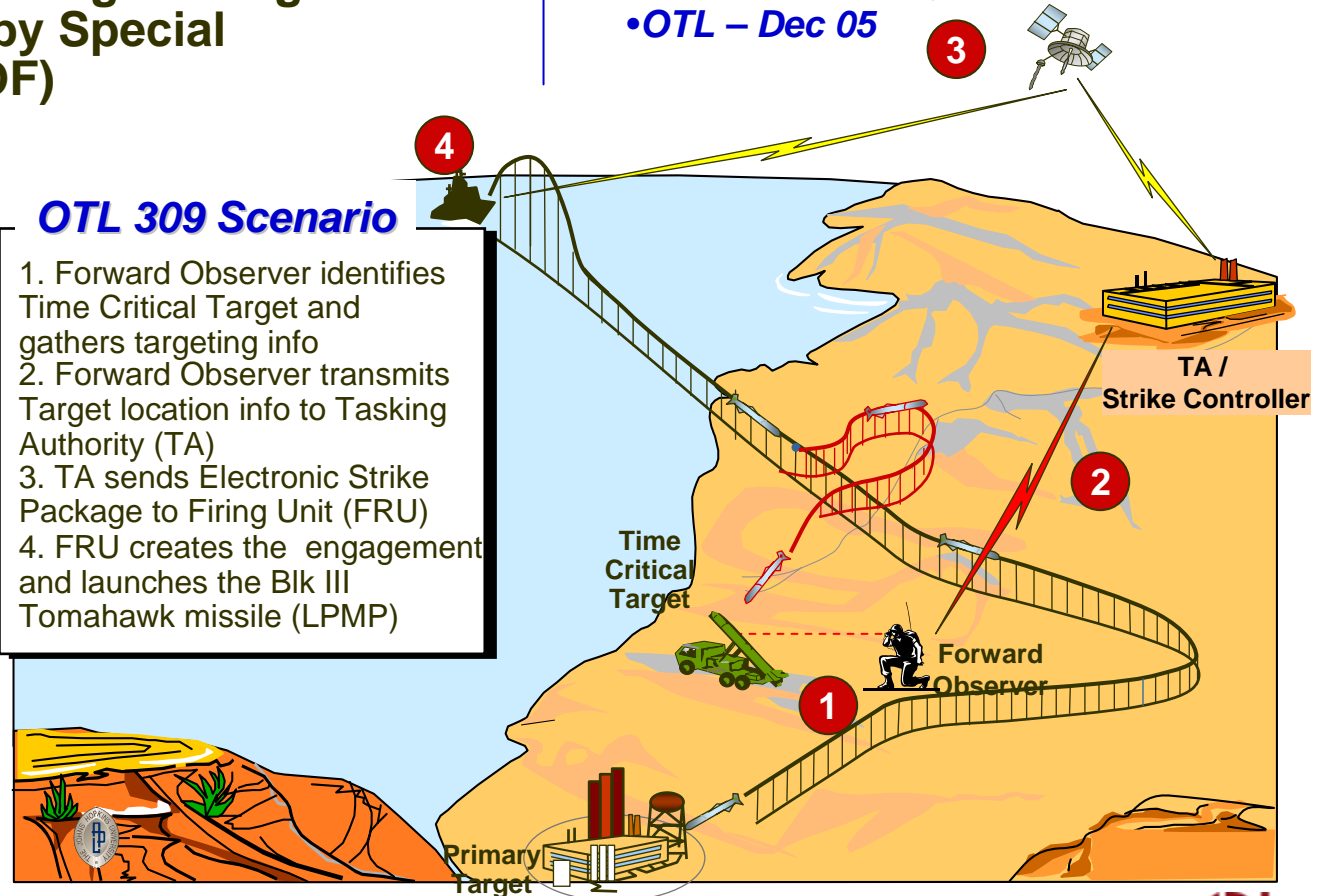
- OTL-309 successfully conducted on 7 Dec 2005 at China Lake*

OTL 309 Project Events

- Targeting Phase – Aug 05
- Mission Planning Phase – Sep 05
- OTL – Dec 05

OTL 309 Scenario

1. Forward Observer identifies Time Critical Target and gathers targeting info
2. Forward Observer transmits Target location info to Tasking Authority (TA)
3. TA sends Electronic Strike Package to Firing Unit (FRU)
4. FRU creates the engagement and launches the Blk III Tomahawk missile (LPMP)



Evaluation of OTL-309 Objectives

- **Suitability**
 - **In this test, the TLE was small enough to fit within the GPS-only TPS error allocation**
 - **Not as accurate as the TPS is able to demonstrate**

- **Coordination**
 - **OTL-309 gave strong support to the 3PT feasibility in the areas of time and procedure**
 - **Communications are not fully evaluated, but are not unique to requesting support from Tomahawk**

OTL 437 Objectives

- **Use trained observers (SOF) to gather the target coordinates**
- **Send redirection tasking to the TA from SOF forces in the field**
- **Use aim point update to redirect an in-flight Tomahawk using SOF provided coordinates**

Targeting System Phase

Targeting Devices



LH-41C

- Eye safe laser rangefinder
- Integrated digital magnetic compass
- Night vision enabled
- External communication connector
- GPS interface (PLGR or Garmin)



Vector / Viper

- Eye safe laser rangefinder
- Integrated digital magnetic compass
- Night vision enabled
- External communication connector
- GPS interface (PLGR)

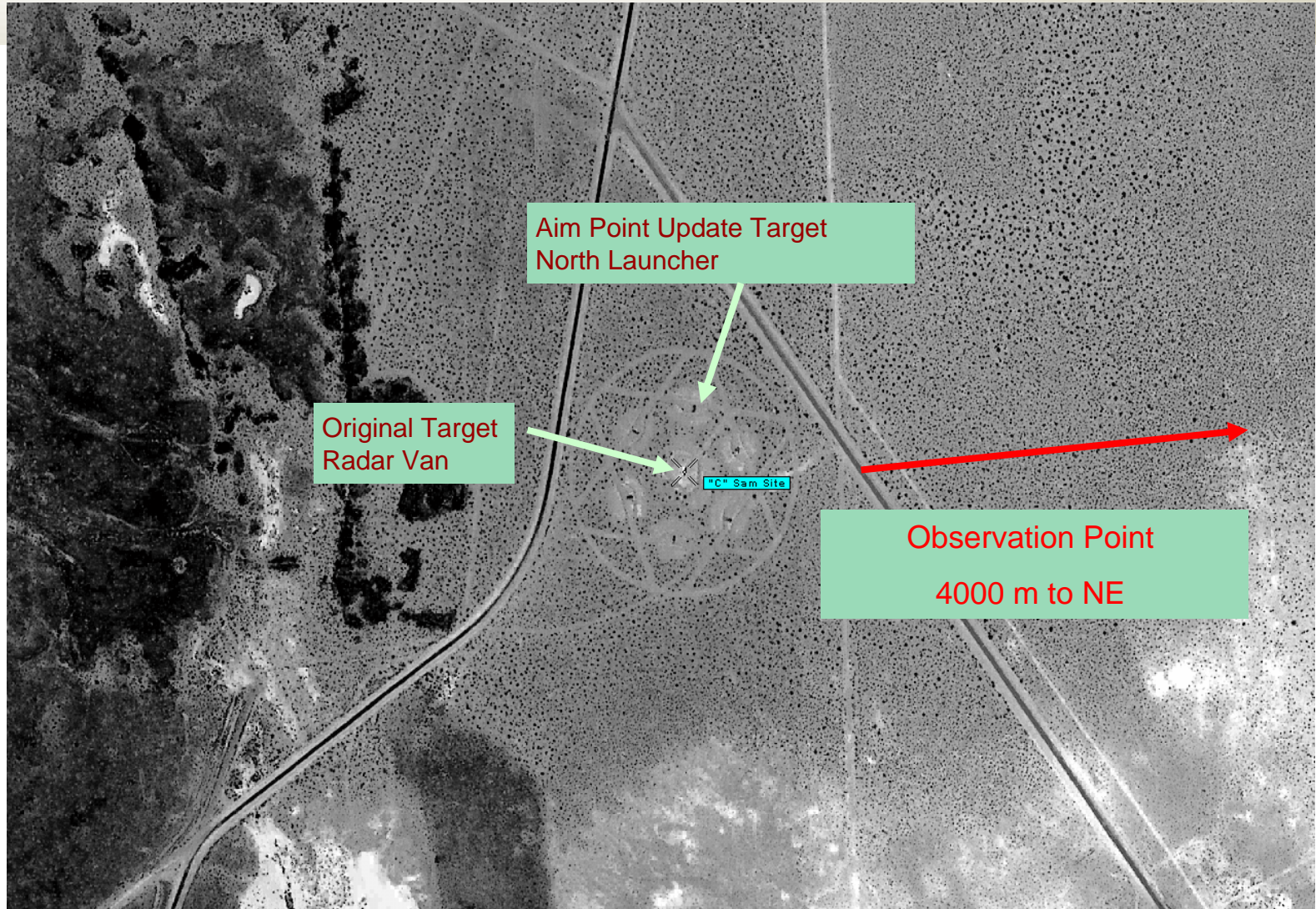


HPMF (High Performance Mobile FLIR)

- Vehicle Mounted
- FLIR Sensor
- Image Intensifier
- Laser Range Finder
- Inertial Navigation System
- Anti Spoofing GPS
- Goal of 7m TLE at 7km

Targeting System Phase Layout

"C" SAM Site



M59

Evaluation OTL 437 Objectives

- SOF have ability to provide acceptable Tomahawk coordinates from 4000m
- Not all equipment acceptable for Tomahawk 3PT
- Software improvements facilitated



OTL 454

JFCOM J9 Sponsored Live Retarget Event

- OTL 454 was first to demonstrate retargeting a Tomahawk in flight with coordinates gathered during the test flight
 - SOF team used hand held device to generate precision coordinates on an image chip. PFI (Precision Fires Image) viewer allowed operators to view the image chip using a PFED (Portable Forward Entry Device) and generate precision coordinates.
 - 9-line relayed from the field via PRC-117 to Tactical Operations Centers to Third Fleet for successful aimpoint update.



What Comes Next?

- **Greyhound Express 08-01 in November 07 validates TTP, this time using non Navy SOF (JHAWK QRT)**
- **Greyhound Express in February 08 demonstrating Tomahawk targeting with UAS**
- **Use OTLs to develop techniques for BDII**

Summary

- **Greyhound Express provides validation of TTP with all portions of Tomahawk C2 except for the missile.**
- **OTLs – progressed from scripted to live.**
- **3rd Party targeting capability of Tactical Tomahawk has been proven, and procedures are in place.**