Patriot Watch. First Lieutenant Joan E. Hollein, Fire Control Platoon Leader from the 1st Battalion, 43rd Air Defense Artillery (1-43 ADA), 35th ADA Brigade, out of Korea, commands a Patriot missile team during Exercise Joint Red Flag at the Nevada Test and Training Range, Nellis AFB, Nevada. (Photo by Jeffrey Hall, 8 April 2005)

Patriot Priority Enhancements and "Pure Fleeting"—

Keeping the Force Relevant and Ready

By Colonel Anthony J. English, ADA

Air and missile defense (AMD) is a vital part of America's tactical and strategic defense force. From the Cold War through Operation Iraqi Freedom (OIF), Patriot AMD has been the backbone of the nation's defense against all types of threats, including air-breathing threats (ABTs) (for example, enemy aircraft), antiradiation missiles (ARMs) and tactical ballistic missiles (TBMs). To maintain relevance on today's and tomorrow's battlefields, Patriot forces must evolve and upgrade faster than the threats evolve. "Pure fleeting"—the transition of all Patriot units from the Patriot Advanced Capabilities-2 (PAC-2) configuration to the PAC-3 configuration—also is critical to that evolution.

History of PAC Upgrades. The Patriot weapon system originally was deployed to combat mass air attacks along the Fulda Gap in Germany, the most likely route for a hypothesized Soviet attack on West Germany. However, the threat of mass air attacks diminished with the end of the Cold War and the collapse of the Soviet Union. In the Cold War's aftermath, the US Army sought to develop Patriot's potential to defend against a different sort of threat—TBMs.

Five days after Iraq invaded Kuwait on 2 August 1990, the United States began deploying forces by air, land and sea to confront Iraqi forces, liberate Kuwait and defend Saudi Arabia. The initial Patriot forces that deployed for Operation Desert Shield had no capability against TBMs.

Patriot firing units had to incorporate software and missile enhancements as

they arrived in theater, giving the Patriot system an anti-TBM capability for the first time. By the time Operation Desert Storm (ODS) got underway on 17 January 1991, the Patriot force was prepared to carry out its new force protection mission—theater missile defense (TMD).

On 18 January 1991, A Battery, 2nd Battalion, 7th Air Defense Artillery (A/2-7 ADA), engaged the first surface-to-surface missile (scud) of ODS. During the course of that conflict, Patriots were deployed to Saudi Arabia, Israel, Bahrain and, eventually, Iraq where they performed admirably, serving as a deterrent to scud attacks.

After ODS, the Patriot went through a series of modifications to meet the rapidly proliferating TBM threat. The Patriot improvement program began with the Patriot Quick-Response Program (1992), which included PAC-1 (1995), PAC-2 (1996) and PAC-3 (2000). An enhanced version of PAC-3 as a post-deployment build was completed just before the start of Operation Iraqi Freedom (OIF) in 2003.

The Patriot role in OIF was to defend against TBMs and anti-radiation missiles. The Patriot deployment in OIF was substantial, involving 40 Patriot firing units from the US as well as 22 Patriot units from four allies in the Coalition Forces. These forces used two types of Patriot interceptor missiles: variations of the improved PAC-2 missile (the traditional Patriot interceptor) and a new "hit-to-kill" (direct hit) missile, using the enhanced guidance of the PAC-3 missile.

The Patriot force's performance against enemy TBMs was nothing less than spectacular. Patriot engaged all nine TBMs that threatened the operational environment. Independent sensors observed eight of these engagements, producing the data to declare the missions successful (conservatively). The ninth engagement was judged to be a probable success. The bottom line is that none of the attacking TBMs caused any loss of life to Coalition Forces or damage to critical assets.

Post-OIF Enhancements. After OIF, the Patriot weapon system's software and tactics, techniques and procedures (TTPs) had to be updated, just like they had been after ODS. Army identified fixes to correct deficiencies observed during OIF combat operations. ADA also continued its aggressive participation in joint interoperability programs to improve the commander's situational awareness (SA) and guard against fratricide.

1. **Air-Ground Communications**—Enhance voice networks for increased participation in intelligence, surveillance and reconnaissance (ISR) networks.
2. **Blue Air Protect**—Make software improvements to the classification of potential targets as they are tracked.
3. **Joint Tactical Information Distribution System (JTIDS) Joint Range Extension (JRE)**—Increase the range of the Link 16 communications system.
4. **Identification, Friend or Foe (IFF) Mode IV**—Increase the identification of friendly systems and decrease interrogator faults.
5. **Embedded Data Recorder (EDR) Replacement**—Increase the reliability of data recorders.
6. **Radar Shroud Monitor**—Reduce the degradation of the radar's data due to electromagnetic interference.
7. **Classification Improvements**—Improve the classification of threats in a stressing (high-density target) environment.
8. **Air and Missile Defense (AMD) Training Center at Fort Bliss, Texas**—Upgrade the training facility to reflect current Patriot technology.
9. **Battery Command Post (BCP) Fielding Acceleration**—Increase the situational awareness (SA) of Patriot batteries by fielding the equipment needed to upgrade their BCPs.

Priority List for Hardware and Software Patriot System Enhancements

At Fort Bliss, Texas, the Training and Doctrine Command's (TRADOC's) Capabilities Manager-Lower Tier (TCM-LT), 32nd Army Air and Missile Defense Command (AAMDC) and Lower-Tier Project Office developed a priority list to correct the combat deficiencies and obtained funding for nine hardware and software enhancements. These are listed in the figure.

The development, testing and materiel release for these nine enhancements are on schedule to be completed by the end of FY07. Several of these enhancements already have been fielded with the remaining in the process of being fielding. Based on the current Fort Bliss fielding schedule, all remaining fixes to OIF combat deficiencies will be fielded to Patriot units by the end of FY09.

The ADA School at Fort Bliss also has implemented doctrinal, training and organizational changes based on OIF lessons learned. These changes include requesting the addition of ADA fire control officer (ADAFCO) elements in the AMD command headquarters and developing fire coordination cells (FCC) in the AMD battalions.

Other ADA School changes include implementing the Patriot Top Gun Course, Patriot Master Gunner's Course and Joint Theater AMD (JTAMD) Course. These courses provide in-depth training on defense and mission planning for staff officers and NCOs at the battalion, brigade and theater command levels.

Pure PAC-3 Fleet. As the threat evolves, so does Patriot. The global proliferation of TBMs, cruise missiles, unmanned aerial vehicles (UAVs) and long-range rockets forces the AMD force to develop a mix of system improvements and TTPs to combat the proliferation.

Since OIF, every request for a contingency deployment of Patriot has required PAC-3 systems. Throughout the Pacific Command (PACOM), European Command (EUCOM) and Central Command (CENTCOM), combatant commanders have asked for PAC-3, our most modern and capable AMD weapon. In recognition of the high-demand/low-density of Patriot forces, in October 2006 the Army Chief of Staff directed the remaining three PAC-2 battalions be upgraded to PAC-3 by the end of FY09.

When the three PAC-2 battalions are fielded with the upgraded PAC-3 Patriots, the US Patriot force will reach pure-fleet status. Every Patriot battalion will be capable of the best AMD force protection that technology can provide and be configured to respond to any contingency.

PAC-3 Characteristics. The PAC-3 upgrades are to radar performance, joint interoperability and engagements with new generation threats with the hit-to-kill technology. The PAC-3 upgrades increase Patriot's range, accuracy and lethality to defend against TBM weapons of mass destruction (WMDs). PAC-3 missiles can defeat the vast majority of

short-range TBMs and destroy the full spectrum of warheads.

PAC-3 launchers can fire up to 16 missiles and still launch PAC-2 and Patriot guidance enhanced missiles, giving Patriot commanders the flexibility to engage targets with missiles best suited to the tactical situation. All PAC-3 equipment is transportable by C-17 and larger aircraft.

PAC-3 modernizations increase the missile's lethality and allow Patriot units to defend larger areas against TBMs. The PAC-3 upgrades increase coverage of the area of operations (AO) by tenfold. The upgrades to the missile system, radar and target processing enable the missile to intercept TBMs at higher altitudes with increased firepower.

Benefits of PAC-3 Pure Fleeting. As the Patriot force converts entirely to PAC-3 (becomes pure fleeted), there are clear benefits. Benefits in logistics and training area are some of the most important.

Logistics. Pure fleeting overcomes the mixed-configuration burden of having to buy, stock and ship two separate repair parts inventories. The current mixed configuration of the fleet adversely impacts the training and expertise of Soldiers in repair military occupational specialties (MOS), a consideration when assigning the right personnel to repair each equipment configuration.

Training. Currently, PAC-2 units are not deploying in support of rotations to replace units in Korea and other locations because they have not been trained or certified on PAC-3 and cannot "fall-in on" the PAC-3 units' equipment. To be eligible, PAC-2 units would have to train to standard on PAC-3 equipment before a rotation, requiring a minimum of four weeks of training (not including crew certifications to Tables V to VIII standards). That means PAC-2 units would have to borrow PAC-3 equipment for several months for conversion and deployment preparation training.

This complex situation is further complicated by recent re-stationing and transformation efforts. The result is that some PAC-2 and Patriot-based AMD composite battalions (Patriot and Avenger mixed) are not collocated with PAC-3 units, limiting their access to PAC-3 equipment.

Pure fleeting will resolve major logistical challenges and make all ADA battalions deployable and eligible for PAC-3 unit rotations.

Patriot remains the only combat-proven TBM killer; the modifications and improvements to Patriot will help ensure AMD success on the battlefields of tomorrow. The Chief of Staff's directive to pure fleet the Patriot force gives the combatant commanders the most modern AMD weapon available—keeping the Patriot force relevant and ready.

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Specialist Daniel Nebrida from C Battery, 1-43 ADA, performs a maintenance check on a Patriot missile launcher.