THEATER Ballistic Missile Defense

By RONALD R. FOGLEMAN

I look upon theater ballistic missile defense (TBMD) from an operational perspective—and as an observer of emerging technology with an eye to integrating current and future Air Force capabilities to assist joint force commanders (JFCs). As such, I view TBMD from a pragmatic, joint perspective. Ballistic missiles continue to spread around the globe. More than 15 countries possess operational missiles and others have programs to acquire them. This development, and the spread of weapons of mass destruction (WMD), is cause for grave concern and determined action. While we are hopeful that the missile technology control regime and state-to-state negotiations will help constrain ballistic missile proliferation, we must prepare to defend against ballistic and cruise missile attacks in future conflicts.

Desert Storm

This scenario was seen on a small scale in Desert Storm. Using low-tech Scud missiles, Iraq threatened coalition cohesion, affected planning for combat operations, and killed 28 American troops in Dharan. The proliferation of more sophisticated ballistic missiles with greater accuracies and submunition warheads poses a tougher challenge. Armed with them, an enemy could disrupt a U.S. or coalition response unless an effective counter is fielded.

Saturation ballistic missile attacks against littoral forces, ports, airfields, storage facilities, and staging areas could make it extremely costly to project forces into a disputed theater, much less carry out operations to defeat a well armed aggressor. Simply the threat of such attacks might deter the coalition from responding to aggression in the first instance.

General Ronald R. Fogleman, USAF, is chief of staff, U.S. Air Force, and formerly served as commander in chief, U.S. Transportation Command.

In the Gulf War we also had trouble defending against Scuds when delivery vehicles broke into several large pieces during the terminal phase. Debris made it difficult to identify and intercept the actual warhead; so terminal defenses are likely to be stressed by ballistic missiles fielded with warheads that release submunitions at or before apogee in the missile's flight.

During Desert Storm we also learned the importance of countering mobile ballistic missile capability. An aggressive Scud hunt with air assets paid significant dividends. Capitalizing on our dominance of Iraqi airspace, we denied the enemy use of fixed Scud sites and made it dangerous for mobile Scuds to move. The combination of sensor assets we had at that time—JSTARS, U–2, TR–1, and AWACS—flew with impunity over enemy territory. They cued ground- and airborne-alert aircraft to vehicular movement, frequently resulting in rapid attacks on suspected launchers. We dropped area denial mines to inhibit the mobility of Scud transporter-erector-launchers (TELs). After Scud launches, we concentrated attack aircraft in launch areas to hunt suspected launchers.

Our attacks against the Iraqi forces effectively suppressed rates of fire, disrupted operations tempo, and limited multiple launches. The enemy had 500–600 missiles and upwards of 36 TELs but fired only 88 Scuds. Having previously demonstrated a high launch rate in the Iran-Iraq War by firing almost 200 Scuds, Iraq should have been able to expend its entire Scud inventory. That it did not is a tribute to intense coalition air operations that destroyed launchers and related logistics or kept the enemy too busy hiding to fire its missiles. These operations also precluded coordinated launches of Scuds that could have overwhelmed our limited point defenses.

We can statistically show that Iraq launched Scuds more often during bad weather with low ceilings than in good weather—perhaps believing that bad weather offered protection from attack. The bottom line is that coalition dominance of Iraqi airspace apparently drove the enemy to seek the cover of clouds to protect its TELs. Despite claims to the contrary, the effort required to achieve these results was not excessive. Less than 4 percent of the 42,000 strike sorties flown during the war were against elements of the Iraqi ballistic missile target set. Ultimately, coalition domination of the air and vigorous attack operations provided a disincentive to launch Scuds.

less than 4 percent of strike sorties were against the ballistic missile target set

All of this argues strongly for the United States to develop a balanced TBMD. It also helps explain why that is a high DOD and Air Force priority. At present the bulk of the funding is going to the Army and Navy for development of several different systems primarily designed to intercept ballistic missiles in terminal phases. This is the catcher's mitt approach. We have not sought an Air Force role in this part of the equation except for early warning and theater command and control. Instead, we have focused on other elements that can capitalize on the unique capabilities of air and space forces to negate enemy missiles. They include attack operations, boost phase intercept, and battle management, command, control, communications, computers, and intelligence (BMC^4I).

Attack Operations

The Air Force is aggressively working to improve its ability to mount attack operations against mobile theater ballistic missiles (TBMs). These operations are part of the overall theater air battle orchestrated by the joint force air component commander (JFACC). The goal is to destroy enemy TBMs and the infrastructure that supports them—day or night, in good weather or bad. As indicated by Desert Storm, attack operations can have a tremendous impact on TBM effectiveness. Ultimately, we need a balanced mix of offensive and defensive operations to counter such missiles. In this context, we are developing and exercising operational concepts and capabilities to attack the breadth of the enemy TBM target system.

These efforts will rely heavily on accurate intelligence preparation of the battlespace. Prior to a conflict intelligence specialists will develop a comprehensive understanding of enemy TBM to include: missiles, related equipment, and launchers; support infrastructure; employment doctrine, tactics, and concept of operations; and likely operating areas and geographical limitations. Also, intelligence analysts will propose friendly force operations and tactics to counter enemy TBM. All this will be provided to the JFACC for development of a counter-TBM portion of the air campaign. A key object of that campaign will be to delay, disrupt, and destroy enemy mobile TBM operations through preemptive attacks. Barring that, we will seek to destroy TELs immediately after launch. Simply, if the missile flies, the TEL dies. Intelligence preparation of the battlespace will identify high payoff targets such as forward operating bases, command and control nodes, hide sites, pre-surveyed launch sites, and connecting roads in TBM operating areas.

Preemptive precision strikes against point targets and application of denial weapons will greatly hinder enemy near-term TBM activity. Meanwhile, lethal precision attacks against the TBM support tail will undercut long-term operations. Enemy preparations for mobile TBM launch at or near a launch site offer an excellent opportunity to identify and destroy a TEL with lethal air strikes and thus prevent launch. If an enemy launches a mobile TBM, detection of the launch will key our attack operations. We will capitalize on overhead and surface sensors, special operations forces, JSTARS, AWACS, Rivet Joint aircraft, U–2s, and unmanned aerial vehicles (UAVs). The inputs will identify the launch point and cue Air Force and other service assets for time-critical strikes.

Numerous initiatives are underway to streamline the sensor-to-shooter loop and to enhance the ability to detect, track, target, and destroy

DOD

BMDO Clementine 1 aboard Titan IIG.


DOD

TR–1.

mobile launchers. Upgrades to sensors on JSTARS, U–2, F–15E, and F–16 aircraft will provide automatic target cuing and recognition. Enhancements to the joint tactical information distribution system (JTIDS) will improve timelines of joint attack operations. The acquisition of UAVs with high resolution sensors, long range, and extended loiter time will enable us to zero in on TEL locations throughout the depth of a theater. Transmission of real-time intelligence directly to the cockpit from aircraft and overhead sensors via communication satellites will provide time-critical target and threat data. Near-real time digital targeting data from U–2s and UAVs to an F–15E will facilitate pilot identification of TELs for attack. Procurement of advanced precision munitions will help assure effective target engagement and destruction. These enhancements will advance time-critical targeting and attack of mobile ballistic missiles.

In Roving Sands '95 we successfully attacked the breadth of enemy TBM, with 17 percent of the air effort going to TBM attack operations over five days. Joint air forces (Air Force F–15Es and Marine Corps F–18s) attritted enemy TBM infrastructure (TELs, cranes, support equipment) by 40 percent. Also, numerous TELs were detected by U–2s and UAVs before missile launches. Such exercises refine our concept of operations and determine how best to use new capabilities.

Also of interest is a recent study by the Joint TMD Project Office that determined the added payoff from combining attack operations with terminal defenses in the early days of a conflict. The study showed a 61 percent reduction in enemy missile launches, 85 percent in TELs, 71 percent in active defense missiles employed, and 50 percent in leaker missiles that got through all defenses.

domination of enemy airspace will enable aircraft to attack TBMs with impunity

Ultimately, effective attack operations hinge on dominating enemy airspace. The F–22 will be crucial to seizing airspace and exploiting it to counter mobile ballistic missiles. Its domination of enemy airspace will enable friendly strike and sensor aircraft to conduct attack operations against TBMs with impunity. While flying combat air patrol, the F–22 will exploit real-time intelligence in the cockpit and deliver precision air-to-ground munitions against TELs or hide sites. This on-hand capability may well preclude the need to scramble other attack aircraft to strike pop-up targets. By dominating airspace in this fashion, the F–22 will provide a strong incentive for an enemy to forego robust TBM operations.

U.S. Army

THAAD.

Boost Phase Intercept

The second area of TBMD being emphasized is boost phase intercept (BPI). Developing the capability to destroy a missile in its boost phase is vital. As the director of the Ballistic Missile Defense Organization (BMDO), Lieutenant General Malcolm O'Neill, indicated in congressional testimony, ballistic missiles are best targeted in the boost phase when they are large, vulnerable, and highly stressed targets. An effective boost phase intercept capability means warheads from the intercepted missiles will fall back on enemy territory, not our own. This is a strong disincentive against TBMs—especially if mated to WMD. Moreover, developing warheads that fractionate before apogee greatly complicates the terminal defense task, potentially overwhelming it.

Recent developments in laser technology indicate that our most promising option for boost phase intercept is the Air Force airborne laser (ABL) program. Live-fire lethality tests indicate that ABL will accomplish speed-of-light catastrophic kill of theater missiles in boost phase when they are most vulnerable. The concept calls for ABL platforms to be air-refuelable, wide-body aircraft able to deploy worldwide and close with other early-arriving air assets. It will arrive within hours and quickly establish an on-orbit combat air patrol to protect arriving U.S. and coalition forces.

ABL will have an on-board, passive infrared sensor with a 360-degree sweep capable of autonomous detection, acquisition, and tracking of TBMs without external cuing, but equipped to fully exploit external cuing when available. It will incorporate a high energy, chemical laser in the multi-megawatt class with enough laser fuel for 30 to 40 engagements per 12 to 18-hour mission. Moreover, the airborne laser will engage TBMs above the cloud deck out to hundreds of kilometers as it stands off from enemy territory. An on-board system will slew the telescope, determine final target track, dwell the laser, and select other targets to intercept. It is anticipated that ABL can engage at least three nearly-simultaneously launched TBMs before booster burn out.

The airborne laser also will offer a limited capability to intercept enemy cruise missiles and high value airborne assets such as enemy sensor platforms and command and control aircraft. This capability will complement, not replace, that of the F–22. Initial funding for the design of an ABL demonstrator has been included in the FY97 program objective memorandum. We plan to field a demonstrator by the year 2002 that will offer significant operational utility in a contingency.

While ABL is the best solution to boost phase intercept, we continue to support the BMDO efforts to develop technology for a hypervelocity boost/ascent phase missile. This kinetic energy, airborne interceptor would be carried on fighters for high altitude release against ballistic missiles prior to reaching apogee. The Air Force is currently working with the Navy to address the concept of operations for employing it.

The Air Force recognizes that a boost phase intercept will not negate the need for highly capable terminal defenses. On the other hand, BPI weapons will contribute to a layered defense against theater ballistic missiles. First, BPI deters an enemy's use of WMD by keeping it out of the "WMD box." Second, it vastly expands the overall area protected by a layered defense. Third, terminal defense engagement tasks remain manageable, especially in light of submunition warheads that could fractionate before they enter the terminal phase or the defense engagement area.

On a related note, the potential payoff from BPI initiatives makes it important that Congress approve the entire $49 million requested in the President's budget for BMDO work on these programs. We've seen a tremendous shift in funding, and we see the remaining funding being cut. We think this is a mistake.

BMC⁴I

The third area involves improving battle management, command, control, communications, computers, and intelligence (BMC⁴I) required for TMD. In March 1995 the Air Force achieved an initial operating capability with the attack and launch early reporting to theater (ALERT) system. This builds on improved defense support payload (DSP) data processing hardware and software plus enhanced communications links with quicker warning of launches from space-based sensors, and better cuing data for theater defenses than during the Gulf War. A space-based infrared system is being developed that will report ballistic missile launches directly to affected theater forces and provide critical mid-course tracking and discrimination data for terminal defenses. This in effect will extend an interceptor's range and increase its effectiveness against ballistic missile warheads.

we must not undo improvements in integrating intelligence into combat infrastructure

JTIDS has become the primary data link for joint theater missile defense operations, and the installation of JTIDS terminals aboard sensor, command and control, and shooter platforms is now underway. Moreover, we are developing JTIDS enhancements to provide reliable connectivity that will reduce attack timelines and enhance the probability of success.

The Air Force is upgrading its theater air control system to provide responsive command and control for missile defense. With BMDO and the Advanced Research Project Agency we are working to automate processes, field advanced decision aids, and rapidly disseminate information to command and control nodes and joint shooters in near-real time. Also, the implementation of a contingency theater automated planning system will enhance the effectiveness of command and control while improving connectivity to forward units in the planning phase of missile defense.

In partnership with BMDO and the Marine Corps, we are developing a combat integration center to enhance decentralized execution of operations against mobile TBMs. The center receives sensor data from space-based assets and joint radar systems, then employs JTIDS to flash targeting and warning information across a theater. Meanwhile, it uses various decision aids to recommend offensive and defensive actions against a specific TBM threat. The initial prototype was employed with excellent results during exercise Roving Sands. It achieved robust connectivity with sensors and shooters throughout the theater. Operators routinely processed sensor inputs and tasked attack assets within one to two minutes.

Another Roving Sands success story was the JFACC situational awareness system which combines key theater intelligence information in a single easy-to-grasp visual presentation that can be viewed on a laptop computer screen. Both Marine and Air Force users lauded its contribution to the conduct of the air battle, particularly theater missile defense operations.

In consolidating management of imagery collection, analyses, and distribution to improve imagery support, we must not undo improvements made in integrating all types of intelligence into our combat infrastructure and architecture. The stresses placed on a commander's C⁴I to deal with time-critical targets, particularly TBMs, make it essential that imagery be integrated as a seamless element of his operations.

The Air Force is seriously pursuing its charter to work with the other services to develop a theater-adaptable, jointly integrated theater air defense BMC⁴I system. As executive agent, we will integrate existing architectures and develop future ones that provide warfighting CINCs a flexible, seamless command and control system.

Theater ballistic missile defense is a high priority for the Nation and the Air Force, and it is essential to maintaining our joint warfighting capability. Air Force initiatives in attack operations, boost phase intercept, and BMC⁴I will contribute significantly to achieving this goal. JFQ