

Air superiority is the prestige mission. Sooner or later, though, the war usually gets down to putting bombs on targets.

Improving the Odds In Ground Attack

BY JEFFREY P. RHODES, DEFENSE EDITOR

"You can shoot down every MiG the Soviets employ, but if you return to base and the lead Soviet tank commander is eating breakfast in your snack bar—you've lost the war, Jack."

—A-10 pilots' axiom

THE prestige mission for fighter pilots is air superiority. It always has been, and it will likely stay that way. If the enemy controls the air, he controls the battle on the ground, too. Besides, fighters pitted against fighters in aerial combat is the stuff of classic adventure.

But important as it is, air superiority alone is not enough. Sooner or later, aerial warfare gets down to putting bombs on a target. It's difficult and dangerous, flying on the deck and into the teeth of defenses to attack armor, airfields, troop concentrations, and command and control centers. But it can keep the enemy tank commander out of your snack bar.

Consequently—and regardless of where the prestige lies—a great deal of the serious work for tactical squadrons today is in the air-to-ground mission. Throughout history, most "pure fighter" aircraft—including P-51s, F-86s, and even F-15s—have come with structural provisions to take on an air-to-ground configuration. Nearly all eventually acquire the mission as well.

Any of USAF's first-line fighters—the F-15, the F-16, the F-111, and the F-4—can carry at least 16,000 pounds of air-to-surface munitions. That's nearly twice the bomb load of a B-24 in World War II. Even the F-5 can carry 1,000 more

pounds of ordnance than could a B-17G in its internal bomb bay.

The A-10 and the Air National Guard's A-7 exist to fight the air-to-ground war. Ordnance delivery is so crucial that Strategic Air Command, even though its main concern is delivery of nuclear weapons, dedicates several of its bombardment wings to conventional and theater roles.

For all of these aircraft and aviators, the air-to-ground job is getting tougher all the time.

"We fought a low-threat war in South Vietnam," said Lt. Col. Stephen O. Hammond, a former A-10 pilot and Forward Air Controller (FAC) who now works in Air Force Systems Command's Tactical Aircraft Division's Plans and Programs Directorate. "We could orbit at 1,500 feet, stay above the small-arms fire, and come in and hit the target.

"There is *no* low-threat scenario in Europe," continued Colonel Hammond. "There won't be too many targets that we will just roll in on. We are outnumbered and outgunned, and there are too many targets to kill. Even with one kill per pass, there are not enough passes in the world to do the job."

To improve the odds, the Air Force is counting on superior planning, the quality of its aircrews, and a familiar ally—technology.

Precision-Guided Munitions

The first generation of responses to the growing threat came in the form of precision-guided munitions.

Shortly after the Linebacker I operations began over North Vietnam in 1972, four aircraft carrying Paveway I laser-guided "smart" bombs knocked out the 540-foot-long railroad and highway bridge at Thanh Hoa. The previous 871 sorties, with losses of eleven aircraft, had produced no more than superficial damage to the "Dragon's Jaw." Although Paveway I (officially designated GBU-10) had been introduced in 1968, the destruction of this bridge is regarded as a watershed event in weapons evolution.

The laser designator of Paveway I and later munitions introduced weapons delivery of far greater accuracy than was possible with the radio guidance previously used. The significance of laser-guided weapons was shown by both the British in the Falklands War and by US forces in the April 1986 raid on Libya. Both countries effectively employed the much-improved Paveway II bombs, which can make midcourse corrections to destroy specific critical targets.

As US technology improved, so did that of the enemy. The Soviet SA-2 of the Vietnam era gave way to the SA-6 that was so devastating to the Israeli Air Force early in the

A view no enemy tank driver wants to see—an A-10 rolling in with its 30-mm gun blazing. With up to 16,000 pounds of ordnance on eleven hardpoints and the GAU-8/A cannon firing up to 4,200 rounds of armor-piercing shells per minute, the A-10 will be devastating in its close air support role.



1973 Yom Kippur War, and that led to the SA-10, which is said to be capable of intercepting cruise missiles. As the threat evolved, the need grew for standoff weapons that could be employed outside the target area and then guided in by lasers or TV for the kill.

"We are standing on the threshold of a major change in the performance capability of our tactical aircraft by the addition of a standoff capability," said Col. Richard K. Koehnke, Chief of the Tactical Weapons Division of the Air Force's Directorate of Operational Requirements. "The standoff weapon today is as revolutionary to the warfighting concept as the introduction of the Sidewinder [missile] was to air-to-air combat.

"Standoff weapons are needed in the early critical days of a war to attack airfields and command and control centers before our forces have had [enough time] to roll back their front lines," Colonel Koehnke added.

Limited Standoff Capability

Currently, the US has only a limited standoff capability with the Rockwell GBU-15 electro-optical glide bomb. Utilizing the 2,000-pound Mk 84 general-purpose warhead, the GBU-15 has a standoff range of roughly five miles, and the weapon is capable of destroying a

variety of heavily defended targets. More and different types of standoff weapons are in development.

The advantages of standoff weapons are great. Munitions can be delivered from farther away, thus minimizing the time the launching aircraft has to stay in the target area. This, in turn, lessens the chance of the airplane becoming a target for surface-to-air missiles (SAMs) or anti-aircraft guns. Sortie generation, or the ability to launch the same aircraft again and again, will improve, while attrition rates will fall. Furthermore, increased accuracy reduces the number of shots needed to "take out" a target.

The main disadvantage of standoff weapons—and laser-guided munitions as well—is that these sophisticated and capable weapons are very expensive.

"We can't afford to use standoff weapons for everything," said Col. Patrick R. Craig, Chief of the Avionics and Armament Development Division of the Directorate of Development at the Pentagon. "We have a large inventory of iron, or 'dumb,' bombs, and we will have to use them. The two types of weapons complement each other."

"The Air Force went down two avenues—precision munitions and precision airplanes," added Lt. Col. Stephen R. Pingel, who works in the Fighter Division of the Directorate

of Operations at the Pentagon. "With precision airplanes—such as the F-16, with its advanced electronics and computer-aided delivery systems—go the iron bombs." He went on to note that some targets can be destroyed more "economically" with inexpensive iron bombs than with costly precision-guided munitions.

Precision-guided munitions are too expensive to use in large quantities, and it would be impractical to use iron bombs alone against heavily defended targets far behind the battle lines. Overall effectiveness depends on finding the right mix of weapons to carry out the mission.

How the Mission Divides Up

In simplest terms, the air-to-ground arena can be broken up into three relatively distinct areas, but as with any battle, these distinctions can easily become blurred. Each of the areas—deep interdiction, battle-field air interdiction (BAI), and close air support (CAS)—have unique characteristics and associated problems.

"Air interdiction sorties are pre-planned, and a pilot will take off, won't talk to anybody along the way, and just go out and do his thing," said Colonel Hammond. "His thing" will include flying as deep as 800 kilometers behind the Forward Edge of the Battle Area

(FEBA) through radars, SAMs, and enemy fighters to attack targets that do not have a near-term effect on the battle, such as airfields, or critical chokepoints, such as bridges and POL (petroleum, oil, and lubricants) storage areas.

Currently, the responsibility for carrying out this segment of the mission falls to Air Force F-111s and, to a lesser extent, the multinational Tornados. "A typical mission in this area would consist of F-111s with either Durandal for cratering run-

behind the FLOT [Forward Line of Troops], your actions will have a relatively near-term effect on the battle," Colonel Hammond explained.

This intermediate area is best taken care of by F-16s, F-4s, and, to a much lesser extent, F-15s. Other players in this arena would be the Tornados and British Harriers. Destruction of targets in this second echelon—or Follow-On Forces Attack (FOFA)—is a cornerstone of current NATO strategy.

"In Europe, the primary role of

Close air support of ground troops in contact with the enemy is the most complicated segment of the air-to-ground mission. There must be coordinated attacks by Air Force A-10s and Army AH-1 Cobras and the soon-to-come AH-64 Apaches. These attacks will be over the heads of the infantry, and the pace of the battle will be fast. Additionally, tanks, troops, shoulder-fired and track-mounted SAMs, and Soviet Hukov and Havoc helicopters firing air-to-air missiles will intensify an already busy battlefield.

"The advent of the A-10 was a milestone in air-to-ground," Colonel Hammond said. "For the first time, there was an airplane specifically designed for the close air support mission." The A-10, officially dubbed Thunderbolt II but commonly referred to as the "Warthog" because of its ungainly appearance, will be particularly important in the first days of a war.

The A-10 has long loiter time, can carry up to 16,000 pounds of ordnance, and features the GAU-8/A 30-mm Gatling gun for attacking armor. Some sixty percent of its mission will be to destroy enemy tanks. To do this, the A-10 will employ its gun and up to six AGM-65D imaging infrared (IR) Maverick missiles. It can also carry the Combined Effects Munition (CEM) dispenser with its variety of submunitions for antipersonnel/antivehicle attack.

Air National Guard A-7 Corsair II aircraft will also be called on to play a vital part in any future large-scale air-to-ground war environment.

"In close air support, there are specific rules of engagement, and certain criteria have to be met before the release of any weapons," Colonel Pingel said. "The targets become a function of where the friendly troops are on the ground."

Colonel Hammond added that "close air support is extremely complicated because of the coordination required. People have to talk to one another. There are things the Army has to understand about working with the Air Force, and there are certain things pilots have to understand about working with the Army. There are also certain restrictions you have to put up with when delivering lethal ordnance next to your own troops."



An F-111F from the 48th TFW at RAF Lakenheath, UK, banks away. This F-111 is carrying four Paveway II laser-guided weapons and has its Paveway Tack laser designator deployed under the forward fuselage. F-111s with precision-guided weapons will be used for knocking out critical enemy targets far behind enemy lines.

ways and Mk 82 High Drags [iron bombs with either folding fins or 'ballutes' to slow the bomb's descent] to take out targets on airfields or precision munitions for small point targets, such as a railroad bridge," Colonel Pingel noted. These precision weapons could include GBU-15 or the BLU-109/B, a 2,000-pound weapon for use against such hard targets as bunkers.

"An F-111 mission in bad-guy country will have to be a one-pass thing," said Lt. Col. David B. Cecil, Chief of the Wargaming Branch of the Combat Operations and Exercises Division at the Pentagon. "In interdiction, the pilot's job, as it has been in every [air-to-ground] war, will be to engage, kill, and survive."

"BAI comes in the area between close air support and where what you do no longer has an immediate effect on the battle. Because you are attacking forty to eighty kilometers

the F-16 is air-to-ground warfare," Colonel Pingel noted. "The F-16 is a digital airplane, [relying on digital rather than analog computers], and it can accurately drop dumb bombs on the targets that need to be hit." The Gator mine system can also be used in this segment of the battle for area denial.

Still a Role for the F-4

Although the venerable F-4 Phantom II has largely been replaced in the active force inventory, it would be used for air-to-ground missions by Reserve and Air National Guard augmentation units. However, the Wild Weasel variant of the Phantom II, the F-4G, will be vitally important to the NATO effort. It uses advanced electronic equipment and the AGM-88 HARM (High-speed Antiradiation Missile) or the older AGM-45 Shrike missile to destroy or suppress enemy radar sites.

This coordination is accomplished by the use of a FAC or some other means, such as an Airborne Battlefield Command and Control Center (ABCCC). The FAC will be flying in an OA-37 or an OV-10 and generally will serve as the "traffic cop" over the battlefield, directing aircraft to targets.

An A-10 pilot, for example, will show up over the target area and get a briefing from the FAC that includes initial point, heading, and distance. The FAC will then clear the attack pilot to release ordnance.

It would be convenient for planners and participants if the air-to-ground war stayed in well-defined categories, but the battle will be in a constant state of flux.

"There is no set sequence or scenario once the war starts," Colonel Pingel summed up. "Daily planning is a long, involved process that is flexible. The Joint Forces Commander will divvy up the forces to what he sees as his biggest threat that day. The F-111s will go to interdiction, and the A-10s will be divided off for CAS. That leaves the swing airplanes—F-16s and F-4s—that are going to fly and do what they can, but initially they'll be used to help F-15s gain and maintain air superiority. If we have the air battle under control, then we'll be able to use F-16s and F-4s for bombing. The A-10s will not sit on the ground until the skies are clear, though. They will have to support the Army."

"The assets will go where they are most needed," added Colonel Hammond. "And the others will have to fend for themselves."

Not as Easy as It Sounds

There is ample evidence that coordination of the AirLand Battle isn't all that it should be.

The main bone of contention is coordination. "Like others, I read the media accounts of poor communications coordination in Grenada," noted Colonel Hammond. "It was certainly a matter of concern then, and it is now."

Things have improved a great deal since Grenada, but the Air Force's primary radios are UHF (ultra-high frequency), for communicating in the air, while the Army still primarily uses VHF (very high frequency) radios, which work bet-

ter on the ground. Thus, each service must carry two sets of radios. A positive side effect of this is that the enemy has more channels to jam.

Even though the US has such radios as Have Quick, which hops frequencies every few milliseconds, operators still worry about jamming. The communications network is a complicated system. It has to work, or there can be no coordination.

A-10 pilots regularly go to Fort Irwin, Calif., to practice Joint Air Attack Team (JAAT) operations with their Army counterparts. JAAT operations feature the use of an Air Battle Captain (ABC) flying in an OH-58 Kiowa helicopter to observe the ground battle, control the Cobra gunships, and direct the FAC, who, in turn, controls the A-10s. To eliminate the possibility of collisions at low altitudes, A-10s are required to stay at least 100 feet above the ground, and the Army helicopters will operate from the ground to the tops of the trees.

"The idea is that when a war kicks off, there will be enough Army chopper pilots and A-10 pilots who have played JAAT, so everything will fall into place," said Colonel Hammond. "It works out that the coordination is almost intuitive."

So far as other joint operations are concerned, Colonel Hammond said that "there shouldn't be any inherent conflict between the Air Force and the Navy, Marines, or allies that we can't overcome. We just haven't done [extensive joint operations with them]. Unless you practice, you could have problems."

A Different Set of Problems

A different set of problems involves aircraft.

The last O-2 was retired recently (see p. 36), leaving USAF with only the OA-37 (which has a relatively short loiter time over the target) and the OV-10 as the primary FAC aircraft. The aging OA-37 fleet is being depleted, because the US is selling off the airframes to allied countries through the Foreign Military Sales (FMS) program. The Rockwell OV-10 Bronco, introduced in 1967, is also getting long of tooth. The Air Force has not set a requirement for a new FAC aircraft, although a Request for Information (RFI) was cir-

culated among manufacturers almost two years ago. It is conceivable that the Air Force could take some aircraft "off the shelf" for this role, as it did in 1966 when the Cessna 337 Skymaster went military as the O-2.

An interim solution has been proposed that calls for the FAC pilot to fly with the Air Battle Captain in the OH-58. While this would be effective in some ways, it would seriously limit the FAC's perspective. He could not see over trees or beyond ridges, and if a distant platoon got in trouble, the FAC could not give effective relief.

The F-4G is aging, too. The Wild Weasels have had electronic upgrades and can still perform effectively, but the basic airframe is approaching the fifteen-year-old mark.

By 1995, the A-10 will be twenty years old, and USAF will have to think about providing for the next generation of close air support aircraft. It may decide to convert a fighter for this role rather than build a new aircraft specifically designed for long loiter and operation at low regimes.

Modernization of the Wild Weasel and close air support fleets will ultimately depend on budgets and the priorities they will allow.

"It is a touchy subject," Colonel Hammond observed. "When a need translates into actual bucks, it comes down to a question of whether we buy planes to fill an immediate need or a follow-on Wild Weasel. We have to stick by the priorities and do the best we can [in the other areas]."

Another area of concern is controlling the attrition that will take a heavy toll in any future war. Airplanes and crews will be lost to enemy action and to accidents. Sometimes, the resources just won't be available where and when they are needed.

"The key to an effective war is not to let attrition eat you alive," said Colonel Pingel, who flew F-4s in Vietnam. "Really simplified, you have to manage attrition by changing your tactics or changing your equipment. We have weapons and tactics officers, along with a squadron or wing electronic warfare officer (EWO), who are trained to do that. The intelligence community is

equally important in this process."

An additional area of concern is training. It requires roughly ten hours of academic work to learn to use the Pavé Spike laser designator on the F-4, and the Pavé Tack system requires a slightly longer time in the classroom.

"Your proficiency level drops off rather rapidly [if you don't continue to train]," said Colonel Cecil, who has seen time in the F-100 and F-111. "Not just anybody can sit down and use a radar [right away]. The image of a hill or a lake on a radar is not inherently obvious. Not only do we need to have trained people, we need to keep them proficient."

The Future of Air-to-Ground

The Air Force's Advanced Tactical Fighter (ATF) will certainly be a boon to the air-to-air community, and it will also be of great benefit to the AirLand Battle.

The combination of the ATF and the F-15 at the turn of the century should prove so lethal to the enemy that the swing-role F-16s will be freed up much sooner to begin air-to-ground operations. This will initiate a ripple effect on the rest of the conflict. For example, high-priority, second-echelon targets will be taken out much sooner. Close air support missions can then be carried out with more impunity. This, then, could end the conflict sooner.

One near-term improvement will appear this December with the rollout of the McDonnell Douglas F-15E. The dual-role Eagle will give the F-111s a new stablemate in the interdiction business while still retaining air-to-air capability. The tandem-seat F-15E will be capable of carrying 23,000 pounds of ordnance (almost as much as the F-111) and will have terrain-following radar and a wide-field-of-view, forward-looking infrared (FLIR) sensor. It, along with the F-16, will be outfitted early with Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) system pods for night and under-the-weather operations. Current plans call for the production of 392 F-15Es, and initial operational capability (IOC) is set for calendar year 1989.

Eight Holes in the Runway

Several new weapons develop-

ment programs are under way, all of which will greatly enhance capability.

The Sensor Fuzed Weapon (SFW), with its ten submunitions and forty warheads, will provide multiple kills per pass against massed armor. The SFW started full-scale development in November of last year and should enter production in 1989.

The Direct Airfield Attack Combined Munition (DAACM), which should enter full-scale development next year, will consist of eight Boosted Kinetic Energy Penetrators (BKEPs) and twenty-four area denial mines. "The DAACM will replace the French-built Duran-



The F-16 will play a crucial role in any future conventional war because of its ability to carry out both the air-to-air and air-to-ground missions. Because it is a "smart" airplane (with advanced electronics), the F-16 will employ iron, or "dumb," bombs to their fullest advantage.

dal, and instead of one hole in a runway, we'll get eight," said Colonel Craig, an acquisition specialist for the past ten years. "The mines will disrupt or prevent runway repairs, too."

The Hypervelocity Missile (HVM) will provide a low-cost, multiple-kill-per-pass, tank-killing capability. The HVM—which is basically a solid steel rod—travels at speeds exceeding 5,000 feet per second and defeats the target by means of its kinetic energy. This small missile carries no warhead, and all avionics will be located on the carrier aircraft.

The Rockwell AGM-130 is now about to enter production, and the Texas Instruments GBU-24 Paveway III bomb (also called the Low-Level Laser-Guided Bomb) has just completed follow-on test and evaluation (FOT&E). The AGM-130, which is a rocket-boosted GBU-15,

is the Air Force's first true standoff weapon. It has a range triple that of the GBU-15.

The most promising munition program currently under way is the Modular Standoff Weapon (MSOW). This seven-nation program will provide a standoff capability in a modular package that can be assembled in three different versions. "This is the first of the Nunn Initiatives [named for Sen. Sam Nunn (D-Ga.)], and it is a very exciting development," said Colonel Koehnke. "By using the same basic airframe and common flight controls, we can mix and match submunitions in the weapon, and with low-cost expendable engines, we

can have one standoff weapon that can be used for both long and short ranges." The MSOW should be ready around 1993.

Should war break out today, the Air Force and its NATO allies stand in pretty good shape, but this condition is not a permanent one. The force must be modernized to meet the threat. The airplanes in the field are adequate to do the job, and the F-15E will be an extremely capable addition to the lineup. A more accurate and broader-based standoff capability is needed and is coming, but it will take time. The standoff cause must continue to withstand congressional budget fights. Battle coordination is critical, and more joint exercises are a major way to prepare for war.

If all of these steps are taken and improved on, that Russian tank commander just might have to go hungry. ■