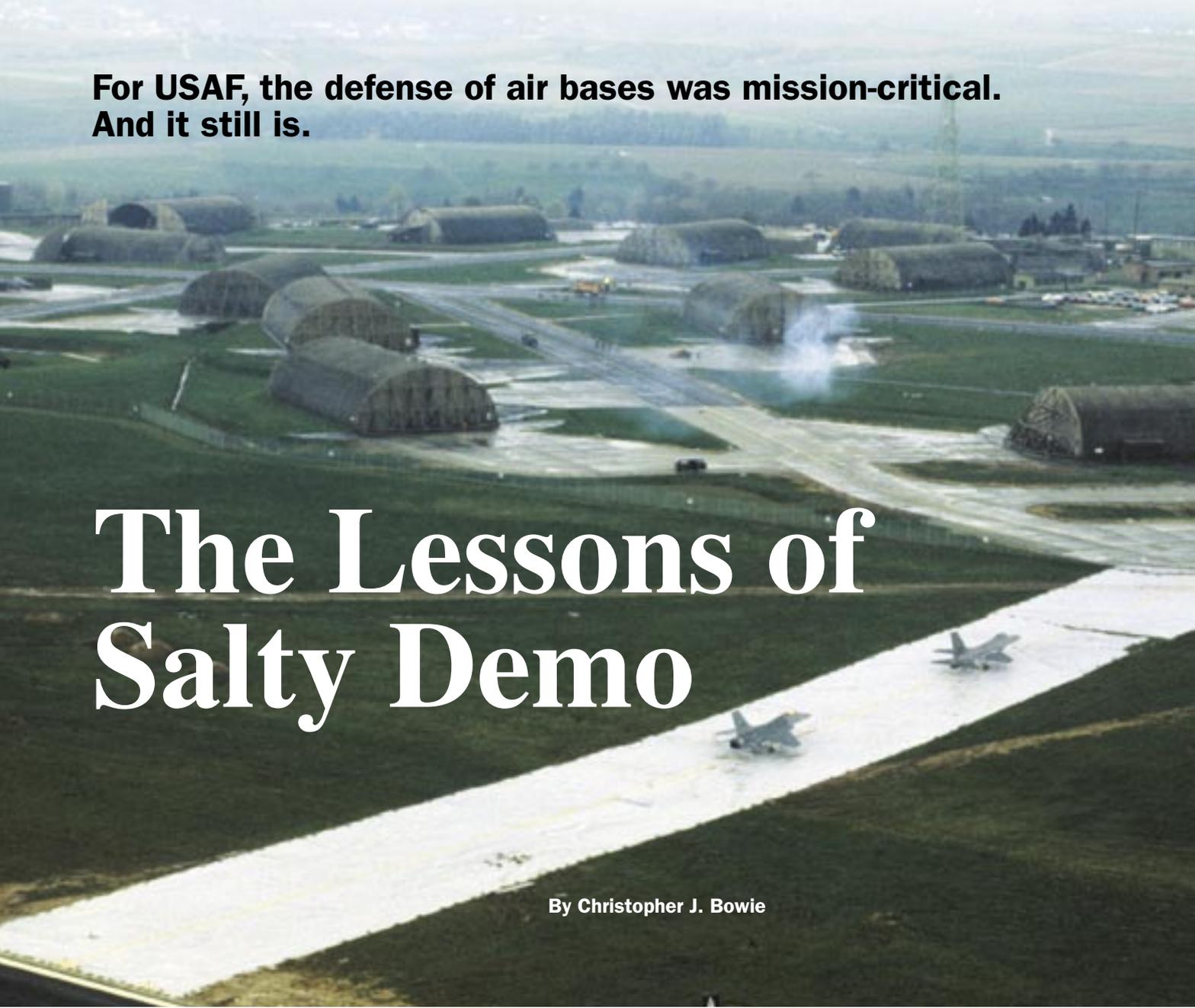


**For USAF, the defense of air bases was mission-critical.
And it still is.**

An aerial photograph of an air base, likely Spangdahlem Air Base in Germany. The image shows several large, dark hangars scattered across a green landscape. A long, light-colored runway or taxiway runs diagonally across the frame. In the foreground, two fighter jets are parked on the tarmac. The sky is overcast and grey.

The Lessons of Salty Demo

By Christopher J. Bowie

In the spring of 1985, the countryside around Spangdahlem Air Base in Germany's Eifel Region reverberated to the shrieks of low-flying jet fighters, the moan of sirens, and the crump of heavy explosions. USAF was conducting Salty Demo, a multiweek airpower exercise. Its goal: Assess whether a modern air base could survive in the face of a heavy and sustained attack.

The Air Force was then in the throes of a major effort to guard its ability to generate airpower in Europe. Salty Demo put the effort to the test. USAF was surprised by much of what it learned. Casualties were high. Confusion was great. Sorties were curtailed. Lowly pieces of equipment—for instance, the humble bulldozer—proved to be critically important.

The findings helped guide the Air Force's investment plans in Europe during the waning days of the Cold War. Even today, though, many of the lessons that emerged from Salty Demo can be and, in the view of many, should be applied to overseas air bases.

The idea of Salty Demo could be traced to the June 1967 Middle East War. In that conflict, Israeli Air Force fighters and medium bombers executed a devastating pre-emptive strike against the Egyptian Air Force and delivered serious blows to the air arms of other Arab nations.

Egypt was the main target. The Israeli aircraft struck nine Egyptian bases simultaneously in the opening minutes of the conflict. They closed Egyptian runways using rocket-assisted runway penetrating weapons and then shot up

the trapped Egyptian aircraft on the ground.

Within an hour, Egypt had lost more than 100 aircraft. The IAF fighters recovered, rearmed, and took off for a new round of attacks. This was repeated several times. Five hours after the first shot, 300 Egyptian aircraft—half of the Arab nation's air arm—had been destroyed.

The IAF also struck at targets in Syria, Jordan, and Iraq to destroy a total of 400 aircraft during the first day of combat.

For NATO military men looking on, the implications of this strike for their own forces were profound. The Atlantic alliance relied on airpower as its trump card in the balance of military power to support NATO's flexible response strategy. NATO military commanders assumed that they would gain control



Two F-16 mock-ups wait on a fake runway during Salty Demo in 1985.

DOD photo

of the air and thus exploit this advantage to execute ground attack missions against invading Warsaw Pact armies and, importantly, to remain poised to launch nuclear strikes if necessary.

Now, they weren't so sure. They worried about the possibility that massed Soviet air forces could launch a big and successful strike on alliance airfields, much as Israel had done to shattering effect. A rerun of this in Europe could blunt NATO's airpower edge and undermine the West's overall military position.

France's withdrawal from NATO's unified military command structure in 1966 already had aggravated the air base problem in the crucial Central Region. French territory, which housed nine USAF air bases and numerous Army installations, provided critical strategic depth and lines of communication for

US forces, yet France had demanded the departure of all of these units.

US and NATO plans called for the Air Force to augment its forward based fighter forces with hundreds of additional aircraft from the United States. In response to their eviction from French soil, US forces were soon concentrated on a smaller number of airfields closer to enemy airpower. Moreover, the Warsaw Pact was fielding growing numbers of longer-ranged, more capable aircraft to bolster its offensive strike power.

Many in NATO also studied results from the next round of the Arab-Israeli conflict—the October 1973 Middle East War.

NATO's Initiatives

Stung by the 1967 disaster, Syria and Egypt had hardened their airfields, and the results were instructive. Because the IAF did not have munitions capable of penetrating the thick Syrian and Egyptian shelters, Israel employed runway attacks.

After F-4 Phantom strikes, the Israelis observed that the Syrian fields were capable of generating aircraft sorties in less than an hour. With sustained attacks, however, the time required for repairs increased to the point that some Syrian pilots were forced to eject from their aircraft because of their inability to find an undamaged landing surface.

After flying hundreds of sorties against Syrian and Egyptian bases, however, the IAF was able to destroy only an estimated 22 enemy aircraft on the ground—compared to more than 400 just six years earlier. The hardening had made the main operating bases much tougher targets.

Recognizing the danger of airfield attacks, NATO planners worked diligently to mitigate the threat to its air forces.

One critical initiative was the Collocated Operating Base program. The COB program would expand the number of available combat airfields, which would reduce force concentration and decrease vulnerability.

By 1984, the US had agreements to some 60 COBs in Europe, with plans to develop similar agreements with Greece and Turkey. In NATO's Central Region alone, USAF planned to operate from almost 30 fighter COBs in addition to its roughly 20 main fighter bases. Some strategists argued that NATO should move to an even more dispersed posture by operating small flights of aircraft from roads or other dispersed airfields, but the logistics required to support such

operations made the concept highly unattractive.

A second initiative called for raising the lethality of NATO's air defenses. This was accomplished in several ways: by fielding advanced air superiority fighters armed with advanced missiles; by emplacing advanced surface-to-air missile systems such as Patriot batteries in the forward and rear area missile belts; by adding better radars to maintain coverage; and by developing procedures to coordinate defensive activities.

Attacking enemy fighters would need to fly through a gantlet of short-range guns and missiles, then radar guided SAMs, and finally NATO fighters.

NATO worked to increase its offensive striking power by fielding more capable strike forces to take the war to the enemy's bases. These included such aircraft as the European Tornado and USAF's F-111.

The alliance also developed and fielded more lethal specialized weapons to attack airfields, such as the French-US Durandal runway penetrator and Britain's JP 233, a pod containing both runway-cratering munitions and area-denial mines.

Finally, NATO, recognizing that there would always be "leakers," embarked on an extensive base hardening program. By the end of the Cold War, approximately 100 of some 400 fighter-capable airfields in NATO featured hardening. The most visible symbol of this effort was the erection of protective shelters (known in USAF as TAB-Vs) for aircraft and maintenance gear.

These large shelters, shaped like a half-cylinder, were equipped with heavy doors and their own power generation systems. The hardened aircraft shelters offered protection from blast and fragments (but typically not a direct hit), and can still be seen dotting the landscape of Europe. Other, smaller shelters were constructed to provide protection to air base personnel and flight crews.

The critical question was this: How would the various NATO initiatives fare in the face of sustained Warsaw Pact attacks?

The RAND Corp. had developed a highly detailed computer simulation of an airfield that, in the early 1980s, indicated Warsaw Pact strikes against USAF bases in Europe during the first week of hostilities would cut sortie generation rates by almost 40 percent and destroy 40 percent of deployed aircraft. Such results would obviously severely damage the alliance's military position.



Snow-covered F-16 mock-ups crouch on a Salty Demo “runway” at Spangdahlem AB, Germany. USAF also built a parallel operating surface to realistically assess repair techniques following the Salty Demo “attacks.”

Another group of RAND analysts stated in the mid-1980s, “In Europe, main operating bases (MOBs) and support equipment previously thought survivable may become extremely vulnerable.” These were, at best, educated guesses. Nothing could take the place of real-world experience, but the Air Force thought an exercise might answer some questions. USAF therefore thought up Salty Demo, the purpose of which was to provide a realistic assessment of the various NATO initiatives.

Maj. Gen. Lawrence E. Day was the wing commander at Spangdahlem during the Salty Demo exercise. In an interview long after the event, Day recalled that the wing spent about a year preparing and practicing for the exercise.

In the buildup, Spangdahlem’s manpower was increased significantly—the Air Force housed around 1,500 additional people in a tent city outside the airfield. Among these were an additional 25 explosive ordnance disposal personnel. The Air Force also deployed heavy construction gear: bulldozers, excavators, dump trucks, and heavy equipment operators to help repair damaged runways and facilities.

Finally, USAF built a new parallel operating surface to realistically test runway repair techniques following test explosions. The additional runway would also provide operating surface redundancy when the exercise was over.

US planners estimated the number of Warsaw Pact strike aircraft that would penetrate NATO’s defenses. The Air Force then simulated an attack of “moderate severity” on Spangdahlem.

For training realism, the 50th Tactical Fighter Wing at nearby Hahn Air Base

conducted the simulated attacks, hitting Spangdahlem two or three times a day using raids of 16 aircraft delivering 30 to 40 weapons per attack.

Evaluators then calculated the damage, hung “damaged” placards on buildings, turned off power to simulate the cutting of electrical lines, and told some personnel that they had become “casualties.”

When Everything Goes Wrong

“The results were a sobering demonstration of the synergistic chaos that ensues when everything goes wrong at the same time,” wrote John T. Correll in *Air Force Magazine*’s 1988 review of the exercise.

Correll’s article went on: “Thirty-one percent of the base’s personnel were casualties, half of them killed and nearly a third of the wounded unable to return to duty. There was considerable

destruction and heavy damage to aircraft, vehicles, buildings, communications, and power systems. ... Fires burned all over, and unexploded ordnance lay about everywhere. It was difficult to assess the damage accurately. Repair teams were shorthanded and, in some cases, did not have the equipment and supplies they needed.”

Day, reflecting on the results, said properly delegating authority is critical to operating an air base under attack. He delegated flying operations to his director of operations and focused his attention on “fighting the base.”

Following an attack, Day noted, the most important issue was to get a damage assessment. How many personnel were killed or injured? Which surfaces and facilities were damaged? Were submunitions scattered about? What were the locations of unexploded ordnance? Was it possible for aircraft to launch from the remaining surfaces? If not, which craters had to be repaired first?

Once a picture of the damage was formed, Spangdahlem’s staff had to prioritize repair efforts. Decisions on where aircraft should land, which take-off surfaces could be used, and how to coordinate sortie generation activities were complex but needed quickly.

Communications were not a major problem: Spangdahlem had multiple buried landlines, and if these were cut, personnel could use backup radios.

Besides people, the most critical resource turned out to be heavy equipment. Day said this machinery was used 24 hours a day in the exercise and was so critical he elected to put it in shelters to protect it. With the airfields and structures requiring constant repair,



Mock F-16s were placed on a fake flight line to simulate what would no doubt be a tempting target for enemy firepower.



An armored bulldozer clears debris and live ordnance from the runway after one bombing run during the base survivability exercise.

Day was paradoxically willing to lose an aircraft, but not a bulldozer.

The loss of the wrong piece of heavy equipment could totally shut down sortie generation capability.

Another critical piece of equipment was the mobile arresting gear supplied by the Marine Corps. If a runway was damaged, Spangdahlem's staff would plot out a surface to recover aircraft, fill craters if necessary, and then position the arresting gear.

In Salty Demo, the Air Force did not simulate losing fuel. Spangdahlem was supplied by three large above-ground tanks, and fuel trucks distributed the fuel to fighters. Yet if the tanks were lost, the base would have to shut down operations until alternative means (such as bladders) were positioned.

Power supplies, which Day had been concerned about before the exercise, did not prove a significant problem. All important buildings and shelters had been equipped with emergency backup power generators. The wing had prepped these during the buildup to the exercise and rarely had any problems—Day said the generators were “in tip-top shape.”

A few times, people forgot to fill fuel tanks, causing a short-term blackout, but these cases were rare.

A variety of alternative techniques—quick-set concrete, slabs, and aluminum planks—was employed to heal the dozen jagged craters left by test explosives on the newly constructed alternative launch and recovery strip.

All three techniques proved successful; the wing was able to conduct takeoffs and landings on the alternate runway after the repairs.

“We were impressed by how much we learned going through it, compared

to what we thought we knew,” Day said after the exercise. “We were impressed that we could fly at all, given all the damage.”

Severe Degradation

It became clear that NATO's bases needed an adequate supply of bulldozers and a tank-like specialized vehicle to sweep mines. Maintaining sufficient manpower was an important issue. The tent city housing the 1,500 additional personnel was deemed off-limits to attack, but without these airmen, air base operations would have been difficult.

The Spangdahlem staff also found that access to the operating surfaces from the shelter complexes was a major headache.

Single runway, opposite direction takeoffs and landings had to be used frequently to get aircraft back to available shelters.

As a result, additional access points to the runways and taxiways were added in subsequent years.

Day concluded that to operate effectively under attack, the Air Force needed to exercise under those constrained conditions more regularly.

Even with all the preparation, Day felt that USAF had a lot to learn to effectively manage the “recovery after attack” phase. It was critical to establish the repair priorities for sortie generation. The unit had the aircraft, the aircrews, and the munitions but needed to find better ways to get them airborne.

“The results,” said Tidal W. McCoy, then assistant secretary of the Air Force for readiness support, “showed even a fairly moderate Soviet attack could reduce our ability to generate sorties. The degradation was especially severe in the first critical week of this demonstration.” McCoy also observed that the outcome of the simulated attacks proved a “shock” to the Air Force.

Over the next several years, Air Force planners developed detailed proposals to coordinate air base improvements. With the knowledge provided by Salty Demo, the Air Force proposed to commit significant resources to:

- Better defend against attacks by enemy special operations forces and commandos.

- Construct more personnel shelters.

- Develop and deploy better chemical suits.

- Increase use of camouflage, concealment, and deception.

- Improve the damage assessment process.

- Deploy more heavy construction vehicles, including armored bulldozers.

- Increase the number of operating surfaces and taxiways.

- Deploy more sets of mobile arresting gear.

- Stockpile runway repair equipment and supplies.

Before the project could get firmly under way, however, history intervened. The Soviet Union began to wither, Warsaw Pact satellite states began to pull away, and the Cold War began to flicker and fade out. In turn, the US defense budget went into decline, and only the most critical military construction projects managed to get funding. Moreover, Congressional enthusiasm for spending money on airfields in Europe was never strong, and the lessening of the threat there only increased the antipathy on Capitol Hill.

The Air Force did carry out some of the planned improvements, but did not come close to executing the full range of initiatives envisioned in the air base operability program. Those monuments to the Cold War—the hardened aircraft shelters and runways—will remain in Europe for decades to come. ■

Christopher J. Bowie has held a variety of positions with RAND Corp., the aerospace industry, and the Air Force. He served recently as USAF's deputy director for strategic planning and today is director of strategic studies for Northrop Grumman Integrated Systems. His last article for Air Force Magazine, “How the West Would Have Won,” appeared in the July 2007 issue.