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"Check Six begins on the ground"

Responding to the Evolving Ground Threat to U.S. Air Force Bases

David A. Shlapak, Alan Vick

Project AIR FORCE

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PREFACE

Every novice military flier learns quickly that, in air-to-air combat, the unseen opponent is the greatest threat. An enemy pilot who slips onto your tail, your "six o'clock," is the one who is most likely to shoot you down. We believe there may be an underappreciated, if not invisible, ground threat to the bases used by the United States Air Force (USAF); as our title suggests, the classic fighter pilot dictum, "Keep checking six," may be as applicable on the ramp and on the runways as it is at 20,000 feet.

Presenting the results of an investigation of the evolving ground threat to USAF bases, this report discusses past, present, and possible future threat objectives and tactics. It should be of interest to Air Force Security Police in training, operations, and policy positions. It should also be of interest to those responsible for planning the defense of USAF bases and to others within the Air Force who have a responsibility for ensuring the availability of airpower as a ready instrument in the defense of U.S. interests.

The work supporting this report was conducted as part of a larger study on asymmetric strategies that future adversaries might use to counter U.S. airpower. That study was done under the auspices of the Strategy, Doctrine, and Force Structure program of Project AIR FORCE and was sponsored by the Director of Plans, Headquarters, United States Air Force (AF/XOX).

PROJECT AIR FORCE

Project AIR FORCE, a division of RAND, is the Air Force federally funded research and development center (FFRDC) for studies and analyses. It provides the Air Force with independent analyses of policy alternatives affecting the development, employment, combat readiness, and support of current and future aerospace forces. Research is being performed in three programs: Strategy, Doctrine, and Force Structure; Force Modernization and Employment; and Resource Management and System Acquisition.

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CONTENTS

Preface iii

Figures ix

Tables xi

Summary xiii

Acknowledgments xix

Acronyms and Abbreviations xxi

Prologue 1

Chapter One
INTRODUCTION 7
Background 7
Study Methodology 8
Purpose and Organization 9

Chapter Two
GROUND ATTACKS ON AIR BASES: WHY CARE? 11
Ground Attacks on USAF Bases: An Attractive Option 12
A Triple Threat to USAF Bases 15
Destroying High-Value Assets 16
Temporarily Disrupting Sortie Generation 18
Creating a Strategic Event 18
Summary 19

Chapter Three
HISTORICAL OVERVIEW OF GROUND ATTACKS 21
Objectives 23

Capture Airfield 25
Deny Enemy Use of Airfields 27
Harass Defenders 28
Destroy Aircraft and Equipment 29
Means of Attacks 33
Attack Tactics: Mode of Insertion 33
Attack Tactics: Mode of Attack 34
Opportunities Presented by Defense Deficiencies 35
Back to the Future 36

Chapter Four
THE EVOLVING THREAT TO AIR BASES 39
Threat Forces 40
The North Korean SOF Threat 40
Other Threats: Lesser, but Dangerous 43
Categorizing Overseas Threats to Air Bases 44
Theater Offensives 44
Battalion-to-Regiment-Sized Forces 45
Irregular Forces 46
Small Teams 48
New Technologies 48
Precision Munitions for Mortars 49
Large-Caliber Sniper Rifles 50
Antitank Weapons 51
Fiber-Optic-Guided Missiles 52
Man-Portable Surface-to-Air Missiles 52
Exotica 54
Targets 54
Tactics 56
Insertion 56
Engagement 57
CONUS Is Not Necessarily a Sanctuary 58
Summing Up 61

Chapter Five
COPING WITH THE THREAT 63
Defense in Depth 64
Strategic Defense 64
Tactical Defense 64
The Penetrating Threat 66
The Standoff Threat 67

Confound Adversary Mission Planning 68
Detect and Defeat Adversary Forces Prior to Attack 69
Protect Assets Against Attacks 73
Summary 74

Chapter Six
CONCLUSIONS 77

Bibliography 79

FIGURES

3.1. Locations of Ground Attacks on Air Bases, 1940–1992 22
3.2. Airfield-Attack Objectives 24
3.3. Insertion Techniques, 1940–1992 (except Vietnam) . . 33
3.4. Air Base Attack Tactics, 1940–1992 34
4.1. Notional Threat Standoff Footprints 59

TABLES

2.1. Selected High-Value USAF Aircraft 17
3.1. Ground Attacks on Airfields 32
4.1. Airborne and Special Forces of Sample Countries 41
4.2. North Korean Air Force SOF Lift Assets 42

SUMMARY

This report explores the possibility that future adversaries will use ground attacks on U.S. Air Force (USAF) bases as at least a partial countermeasure to overwhelming U.S. air superiority. It also identifies, in broad terms, the types of initiatives that have the most potential to counter this evolving threat.

Having watched the Gulf War being fought and read the reams of postwar commentary, future adversaries may feel strongly inclined toward neutralizing or, at a minimum, blunting U.S. airpower. Such an opponent has a menu of options available, among the potentially most effective being to attack USAF bases. Taking advantage of readily available forces and technologies, it could hope to reduce the effectiveness of U.S. air operations, at least temporarily, by destroying high-value assets or disrupting sortie generation. Alternatively or in tandem, it could hope to weaken U.S. or allied resolve by creating a *strategic event*, an incident that is as damaging politically to the conduct of a war as loss of a major battle is operationally or militarily.

THE GROUND THREAT TO USAF BASES

Our assessment of the ground threat derives from the "means, opportunity, and motive" motif familiar to fans of mystery novels. Our findings can be summarized as follows:

- Many possible adversaries have force elements—special forces, light infantry, airborne units—capable of conducting attacks on air bases.

- Historically, small-unit attacks on air bases have had great success at harassing defenders and destroying aircraft.
- Widely available technologies, including large-caliber sniper rifles, portable surface-to-air missiles, guided mortar munitions, and GPS receivers, are making small units more survivable and more lethal.
- In particular, the *standoff* threat—attacks carried out from outside, perhaps well outside, the base perimeter—should grow dramatically as these new, affordable technologies are exploited.
- U.S. reliance on small numbers of high-value aircraft—JSTARS, AWACS, etc.—makes those assets tempting targets for ground attack.
- Expeditionary operations—operations away from well-developed theaters—increase the USAF's vulnerability to air base attack.

RESPONDING TO THE THREAT

The USAF has many years of experience operating in the face of multiple threats to its air bases and has developed doctrine, equipment, and organizations to counter both airborne and ground-based threats. The Air Force concept of operations is one of strategic and tactical *defense in depth*, employing a wide range of capabilities and techniques to protect air bases and aircraft, all of which reduce the risk of ground attacks.

Defense of air bases is embedded in the overall rear-area defense scheme, the design and implementation of which is the responsibility of the theater land component commander (LCC). However, rear-area operations are typically a low priority for the LCC and commander in chief (CINC), whose attention is naturally—and appropriately—focused on the main action on and around the forward line of (his) own troops (FLOT). In general, U.S. military units operating in rear areas are expected to provide for their own security, and

few, if any, combat formations are available to assist.[1] Most past wartime experience suggests that tactical defense in depth will be the exception rather than the rule. As a result, air-base-defense commanders cannot count on other U.S. or allied forces' being available to support their operations; in an operationally meaningful sense, they will be on their own.

Given this background, we assess the capabilities of air bases to defend themselves against both standoff and penetrating threats, and recommend enhancements to those capabilities.

Against the Penetrating Threat

We assess USAF base defense capabilities for close-in protection against the *penetrating* threat—a small enemy force "inside the wire"—to be quite good. The primary challenges here are *detection* and *mobility*—Air Force Security Police (SP) are generally well-enough trained and equipped to cope with such a threat once it has been located and they have closed with it. We suggest a few enhancements to their capability against penetrating attack:

- USAF Defense Force Commanders (DFCs) need *better situational awareness*. Surveillance of avenues of approach to and on the base should be improved, and improved perimeter and flightline sensors should be acquired.
- Sufficient numbers of *uparmored HMMWVs*[2] should be procured to equip base quick-reaction forces and provide a limited number for patrols and convoy protection.
- These vehicles should be equipped with weapon mounts so that airmen or Security Police could use their M-19 grenade launchers, M-60 machine guns, and M-2 heavy machine guns while mounted.

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[1]Army Military Police (MPs) might be expected to play a prominent role in rear-area operations. In wartime, however, the Army defines and employs its MPs as a tactical force; MP units move forward when their parent formations do so.

[2]The uparmored HMMWV has additional armor to protect the crew from small-arms fire and shrapnel.

Against the Standoff Threat

Responding to the standoff threat is more challenging; currently, USAF capabilities to meet this threat are quite limited. We expect future adversaries to use this tactic heavily; *without a serious effort to improve U.S. abilities to detect and counter standoff attacks, the USAF is likely to lose high-value aircraft or have base operations otherwise disrupted in some future conflict.*

We envision a three-pronged strategy to counter the standoff threat:[3]

- *Confound* an adversary's mission planning and execution, using deception, decoys, camouflage, rotation of aircraft through multiple bases, and varying of operational patterns.
- *Detect* and *defeat* the adversary outside the wire, *before it launches the attack.* Doing so requires surveillance of the entire area from which attacks could be launched, which could be achieved by implementing options that include
  - using owner-user security arrangements on-base (e.g., maintenance personnel provide security for their work area) to free up SP for other duties
  - improving SP training—both individual and unit—for off-base operations. It may be useful to consider the Royal Air Force approach to air base security.[4]
  - providing the SP with air surveillance, firepower, and mobility, and training them to use these capabilities.
- *Protect* key assets against the effects of incoming ordnance. Useful steps in this direction could include sustaining air-base-operability programs that enhance survivability in expeditionary settings, and building a small number of shelters for large, high-value aircraft in likely operational areas.

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[3]Although designed to counter standoff threats, these measures should also help to counter penetrating attacks.

[4]Whether the RAF model *in total* is appropriate or feasible for the USAF, we see its training emphasis on strong infantry skills, its doctrinal emphasis on controlling the standoff footprint, and its organizational emphasis on using augmentees as three aspects worthy of evaluation and emulation.

A LARGER PERSPECTIVE ON AIR BASE DEFENSE

Defense of air bases against ground attack has been traditionally viewed within the USAF as a Security Police problem. We judge that it is more properly viewed as an *airpower* problem because airpower is so critical to U.S. national military strategy and the U.S. way of war. This criticalness makes air base defense ultimately a *joint* problem.

The USAF, as the nation's proponent of aerospace operations, must take the lead in ensuring that air bases can function in future conflicts. *Secure bases are a prerequisite for airpower operations; ensuring that they are available should therefore be a primary responsibility of USAF leadership.*

The ground threat to air bases is likely to vary greatly from scenario to scenario, and it may be difficult to predict which contingencies will be most stressing to air base defenses. Uncertainty, however, is not a reason to ignore a potentially serious threat; the USAF needs to take steps in peacetime to defeat the full range of threats. Ad hoc measures taken after air bases have been attacked are likely to be too little and too late in modern warfare.

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ACRONYMS AND ABBREVIATIONS

ABGD	Air base ground defense
ABO	Air base operability
ACC	Air component commander
AMRAAM	Advanced Medium-Range Air-to-Air Missile
AOR	Area of responsibility
APOD	Aerial port of debarkation
ATGM	Antitank guided missile
ATO	Air tasking order
AWACS	Airborne Warning and Control System aircraft
CAP	Combat air patrol
C3	Command, control, and communications
CINC	Commander in chief
COIC	Combat operational intelligence center
CONUS	Continental United States
DFC	Defense Force Commander
DMZ	Demilitarized zone
DRC	Defense Force Commanders
EFOG-M	Enhanced fiber-optic-guided missiles
FAC	Forward air control
FDC	Fire Direction Center
FLIR	Forward Looking Infrared Sensor
FLOT	Forward line of own troops
FOG-M	Fiber-optic-guided missiles
GPS	Global Positioning System

HMMWV	High-mobility multipurpose wheeled vehicle
HTACC	Hardened tactical air control center
IFF	Identification friend-or-foe
IR	Infrared
JFACC	Joint Forces Air Component Commander
JRTC	Joint Readiness Training Center
JSTARS	Joint Surveillance and Targeting System aircraft
LAWs	Light Antitank Weapons
LCC	Land component commander
MACV	Military Assistance Command, Vietnam
MAJCOM	Major command
MANPADS	Man-portable air defense system
MOB	Main operating base
MPs	Military Police
MRC	Major regional conflict
NBC	Nuclear, biological, or chemical [warheads]
NCO	Noncommissioned officer
NKAF	North Korean Air Force
NVG	Night-vision goggles
PAA	Primary aircraft authorized
PGM	Precision-guided munitions
POL	Petroleum, oil, and lubricants
R&D	Research and development
RAF	Royal Air Force
ROK	Republic of Korea
RPG	Rocket-propelled grenade
RPV	Remotely piloted vehicle
RTO	Radiotelephone operator
SAM	Surface-to-air missile
SAS	Special Air Service
SIGINT	Signals Intelligence
SKEET	"Smart" anti-armor submunition
SOF	Special operations forces
SP	Security Police

TAI	Total aircraft inventory
TASS	Tactical Automatic Surveillance System
UAV	Unmanned aerial vehicles
VC/NVA	Viet Cong and North Vietnamese Army

PROLOGUE

(NORTH KOREA, THE NEAR FUTURE)

It was right about sunset as Captain Park Ho Sam walked toward the ancient-looking biplane. He would never have known the time from looking at the sky, which was studded with arc-lights rather than stars; instead, he glanced at his watch while the concrete floor of the underground hangar echoed his every stride.

Captain Park would be the last of the 11 men to board the An-2 COLT light transport. As he climbed in, he looked around the faces of his troops in the dim light. Ready, every one. He knew that, at the same time, his section leaders were checking the other two planeloads of troops in his Special Reconnaissance Platoon. Tonight, finally, they would be striking a blow for freedom, for the long-delayed unification of the Korean people.

The plane rumbled aloft, flying low and slow; it seemed to bounce through the twisting mountain passes and valleys. Park was very glad that he wasn't prone to airsickness; he noticed with amusement that one or two of his young troopers were not so fortunate. He looked past them, to the cramped cockpit of the single-engine aircraft. Park knew that his aircraft, as a flight leader, was helping guide a number of other transports across the treacherous terrain through the darkness. The pilot's head turned briefly and, in profile, Park saw the night-vision goggles the aviator was wearing—a gift from the Chinese people, who had stolen the design from the American military. He knew the plane was also equipped with a GPS receiver set, purchased through a U.S. mail-order catalog. With the satellite fixes

and localizer beams from ground sets both north and south of the DMZ, this seemingly obsolete craft was slowly shepherding its "sheep" safely into the fold—where they would shed their sheepskins and become, Park hoped, the wolves of winter.

The COLT was built largely of wood and fabric, and flew so low that it was extremely difficult to detect on radar. Tonight, too, it flew with South Korean civil codes loaded into its IFF transponder—courtesy, like the navigation beacons, of the honest working people of South Korea who were supporting their northern brethren at this hour of liberation. Almost 200 of these lumbering craft trundled through the darkness tonight, along with about 50 troop-carrying helicopters. Park knew that planners hoped that half of these aircraft, and perhaps a few more, would actually survive long enough to deliver their troops and equipment. Tonight they were one part, the key part, of an aerial armada as the people's air force carried out a long-planned, coordinated effort to overwhelm and stun South Korean air defenses just long enough for the COLTs and other SOF transports to get through.

The North Korean air force was mainly equipped with old fighter-bombers that would fall easy prey to the F-15 and F-16 fighters that the South Korean government and its American allies would send against them. Park realized that many—no, most—of those fighter pilots would never make it home. However, their sacrifice would be a heroic one if he and his men could carry out their assignments. By offering themselves as targets to the enemy's air forces, the North Korean jet pilots would in actuality be defeating their adversaries; for it was hoped that in the confusion of those few hours as fighters raced after one another through the dark skies, many of the COLTs would slip through unnoticed to strike the "nests" whence came the feared and hated Eagles and Falcons.

Park saw a flash in the distance to the right of his aircraft and heard a soft crump through the drone of the piston engine: A mountainside had claimed a nearby An-2. Such losses were factored into the plan—not all pilots could be equipped with the precious NVGs or GPS units. Park hoped that his platoon remained intact; he would need every man if the attack was to succeed.

The captain was not an idiotic peasant; he was a realist. He knew that even if he and his men managed to survive their trip into South Korea they still faced great odds. Even if they succeeded in their mission, they would likely be caught or killed within a day or two after landing. If he could just keep himself and his men out of enemy hands for 48 hours...

It was an audacious plan, and his platoon had drawn the most daring part of all. They would attempt to actually land on the American air base at Osan, hoping that their stolen IFF codes and the reluctance of the base's defenders to fire at possibly friendly aircraft would get them safely to the ground. Once there, his small force would move toward the citadel of the enemy's air force—the hardened tactical air control center, or HTACC, a bunker half-buried in a hillside overlooking the base. Once there, the job was straightforward: Gain entry, flood the area with incapacitating chemicals from the grenades his troops carried, then kill everyone and destroy everything inside. With the HTACC out of commission, the enemy's air forces would be a viper without a head until they could reconstitute their command-and-control system. By that time, the army, it was hoped, would have smashed through the enemy's brittle defenses at the DMZ and would have reached and begun crossing the Han River, and invested Seoul. Then, with the people and industry of the south at its mercy, Pyongyang would offer peace and reconciliation—on its terms, naturally. Two days, maybe three. With a little luck, Park and at least some of his men would live to see the hour of victory.

Park's platoon had rehearsed the plan over and over again, in sandtable exercises, and on a full-size wood-and-canvas replica of Osan. From reading the highly classified intelligence reports smuggled in from the West—secret military journals with names like *International Defense Review* and *Aviation Week*—Park knew that he and his men were not as well-trained or -equipped as were, say, the U.S. Special Forces. But the Americans had the extravagance and wastefulness of wealth—they trained their commandos to do everything under the sun. Why, they even had a medic in every team! Each North Korean special forces unit, on the other hand, was trained to a particular task: Some of them would go into the south via rubber boats or midget submarines to attack ports and naval bases. Others would parachute in and strike communications facilities and logistics depots. Still others were trained to assassinate key

political and military figures. Many were like his platoon, prepared specifically and intensely to "take down" air bases.

If all went well tonight, his men would be landing at Osan just as several other platoons, who had parachuted in or whose COLTs had cut their engines and glided down into paddies and highways, were attacking the base from beyond the perimeter. Some would attempt to break through and help his troops lay waste to the HTACC and other key facilities. Others would set up mortars and sniper positions to suppress the base defenders and destroy aircraft and equipment. Why, he might even enjoy some air support of his own—a pair of Hughes MD-500 helicopters, similar to those used by the Southern army and painted in ROK marking—were allocated to support his mission. If successful, their rockets and automatic cannon would give him aerial firepower that he knew his opponents would probably lack.

The cabin of the COLT grew chillier, and Park was dozing when they crossed the DMZ into the south. A few minutes later his sergeant awoke him; they were approaching Osan. As they drew closer—here we go!—he shouted at his men to assume their landing positions. The plane touched down; even before it had rolled to a stop, the door swung open and his men poured out. The COLT's engine roared again as the craft struggled back into the air. It had perhaps reached 20 meters into the sky when there was a flash of light on the ground and the plane suddenly disintegrated. Park had no time to ponder the fate of the valiant crew who had gotten his men here; he had a job to do.

He signalled his men to begin moving out in the direction of the HTACC. Some light automatic weapon fire began reaching out in their direction. They know we're here, but don't know exactly where, Park thought. Having pulled on his own NVGs, he surveyed the base while his men fanned out according to a well-rehearsed drill. It looked just like the mockup.

A vehicle careered across the taxiway in front of him. There was an explosion, and suddenly a HMMWV was ablaze, skidding on its side down the tarmac. Score one for his men and their RPGs. Ignoring the rather desultory fire they were taking, his men coolly made for the HTACC at a trot, keeping low to the ground.

Behind him, Park heard mortar shells exploding. He knew that the American fliers were reluctant to allow their Security Police to use their mortars on-base—for fear of damaging their precious airplanes!—so he suspected that at least one other team had survived and gone into action. A furious firefight erupted somewhere near what Park knew was the western perimeter fence. Others had made it. The plan was working!

The platoon rounded a cluster of buildings on the edge of the flight line. They could see their objective a few hundred yards ahead. Someone yelled, then Park found himself caught in a hail of bullets. He and his radioman, his RTO—Park had barely noticed the young corporal, who had been glued to his side all along—dove into a muddy culvert for cover. Damn! Park knew that the Americans had deployed sophisticated sensors along likely routes of infiltration—something called TASS, that, he had been told, could even detect your heartbeat. But the Americans had bought so few of them that he had hoped to slip past unnoticed and avoid ambush. No such luck.

Park grabbed the radio handset and spoke to his team sergeants. "Keep moving forward! Forward! Use these drainage ditches and the foliage for cover! Rush in teams, support one another, but keep moving! You know the drill! If you stand still, you'll die." Park looked at the RTO as he handed the handset back; the boy was ashen faced, but he smiled. "Let's go, boy," Park grinned, grimly. "Victory is just up that hill."

They began moving along the culvert, the dirty water sloshing into their boots. The firing continued, punctuated by the occasional bang of a grenade or RPG round. They came to an intersection and leapt out of the ditch to begin the last sprint toward the target. Park heard something that sounded, crazily, like a sewing machine, and he found himself on his belly on the ground. There was a warmth in his shoulder that seemed slowly to be spreading. He was suddenly very tired.

He tried to get to his feet, but fell back. Something was pinning him down. He twisted his head around—why did his neck muscles seem so weak?—and saw the body of the RTO across his knees. The corpo-

ral's face was even more ashen now, and the glassy stare of unseeing eyes told Park all he needed to know.

The warmth was spreading across his whole back now. Park was about to close his eyes when he heard an enormous explosion. Looking back toward the HTACC, he saw a plume of smoke rising in the air. Then, another eruption, and he watched as pieces of concrete flew lazily into the air, then seemed to float back to earth.

It was done. His men had made it. Soon there would be nothing left inside the building but wreckage; in addition to demolition charges and RPGs, some of his men carried picks and axes, just to be sure. Looking to his right toward the flight line, he forced his eyes to focus on the pyres of a dozen or more burning aircraft. One or two probably marked where COLTs or helicopters had gone down; the rest were once F-16s or OA-10s, struck by mortar bombs from comrades who had bombarded the base from well outside the perimeter. Now they were the first glorious bonfires of the people's victory.

The warmth had reached his heart now; Captain Park had never felt so sleepy before in his life. Strange that in his hour of triumph he would want to nap! The warmth crept up his neck into his head. Captain Park smiled, and closed his eyes.

Chapter One

INTRODUCTION

> The United States relies on the Air Force and the Air Force has never been the decisive factor in the history of wars.
>
> —Saddam Hussein (1990)

> Gulf lesson one is the value of airpower . . . [it] was right on target from day one.
>
> —President George Bush (1991)

BACKGROUND

Airpower as an instrument of warfare came of age over the deserts of Arabia in 1991. For 42 days, the United States and its Coalition partners carried on an aerial onslaught against Iraqi forces, leadership, and military infrastructure that was unprecedented in its effectiveness. By the time Coalition troops launched their ground attack into Iraq and Kuwait, Baghdad's prized army—the fourth largest in the world when the war began—had been reduced to a hollow shell ready for cracking. The "hundred-hour war" that followed was marked more by the mass surrenders of hungry, demoralized Iraqi troops than by the pitched engagements many pundits had expected. When Iraqi forces did try to maneuver, they were detected and attacked by airpower—both fixed-wing and rotary-wing—then defeated in detail by vastly superior Coalition ground forces.

American air forces in particular demonstrated a remarkable virtuosity, playing the leading role in wrecking the Iraqi war machine. That they did so in the full glare of global media attention meant that, as the Coalition air campaign unfolded, observers worldwide were af-

forded important lessons about contemporary air warfare. Vivid television footage and reams of postwar commentary drove home the value of stealthy aircraft, smart bombs, and airborne surveillance systems when operated by highly trained personnel. The next adversary the U.S. faces in armed confrontation will not be able to claim ignorance of the value of the air weapon, as Saddam Hussein might have.

RAND's Project AIR FORCE has examined a variety of strategies and strategems that an opponent might employ to neutralize U.S. airpower. This report is the result of one part of that study and focuses on the potential threat to air bases posed by enemy ground forces.

STUDY METHODOLOGY

To assess the likelihood and potential effects of ground attacks on air bases, we conducted historical research to determine the occurrences and nature of previous attacks, asking why, how, and when previous combatants attacked air bases. This effort identified historical weaknesses in air base defenses, the most successful attack techniques, and those defensive countermeasures that appeared most effective. We also read official intelligence community threat assessments, visited U.S. special operators who have trained in air base attacks, and identified new technologies that could enhance adversary capabilities in this area. To better understand air base vulnerabilties, we also reviewed the literature on offensive air operations against air bases, air base defense, air-base-operability programs, and air operations more generally (i.e., how air forces live and work).

In parallel with this effort at understanding the threat to and vulnerabilities of air bases, we studied U.S. Air Force (USAF) and Royal Air Force (RAF) doctrine, training, equipment, and organization for the air-base-defense mission.[1] Working closely with the Air Force Security Police (SP), we observed ground defense training and exercises, and interviewed USAF and RAF ground defense professionals

[1]The RAF Regiment is a well-trained and highly respected force whose sole mission is air base ground defense. We studied their doctrine and operations to learn lessons that might have applicability to the challenges faced by the USAF.

at bases in the United States and Great Britain. We then used past RAND analyses on theater air warfare as yardsticks to evaluate the potential effect of the loss of high-value aircraft on U.S. campaign objectives.[2] Finally, we looked at past, current, and proposed Security Police, air base operability (ABO), and other programs that might enhance base defense, or base survivability if an attack were successful.

This study was not intended as a programmatic assessment; we did not, for example, attempt trade-off analyses to determine whether building shelters for larger aircraft would be more cost-effective than improved SP infantry training in countering likely base-attack tactics. Instead, we identify the broad classes of defensive countermeasures that appear to be promising and to deserve a second, more detailed look by the USAF leadership.

PURPOSE AND ORGANIZATION

The purpose of this report is (1) to explore the possibility that future adversaries will use ground attacks on USAF bases to at least partially counter overwhelming U.S. air superiority and (2) to identify, in broad terms, the types of initiatives that have the most potential to counter this evolving threat.

As any fan of mystery novels can attest, police seeking a suspect for some heinous crime look for a combination of means, motive, and opportunity. We argue in this report that these three factors are converging to create a worsening, and possibly acute, ground threat to U.S. air bases. The motive has already surfaced—the post–Gulf War recognition, by both the United States and its possible adversaries, that air forces are a vital component of U.S. military power that must be neutralized, or at least reduced in effectiveness, if an enemy is to succeed. We elaborate on this point in Chapter Two.

Chapter Three describes the three-factor combinations to be found in the historical record of ground attacks on air bases. Installations from Puerto Rico to Southeast Asia have been the target of over 600

[2]There was a strong subjective element in our analysis, since the studies we relied on did not model the effects of the loss of command, control, and communications (C3) platforms on theater objectives.

ground attacks over the past 55 years. Many of these attacks have been quite successful; for example, British attacks on Axis airfields in North Africa made a major contribution to countering the *Luftwaffe's* numerical advantage in-theater. Furthermore, in both the Pacific and North African theaters, the need to capture and defend airfields drove campaign planning.

With the historical record as background, in Chapter Four we discuss the evolving threat to U.S. air bases. We argue there that base vulnerability will be exacerbated by the kinds of expeditionary operations that are likely to be the most common variety of military action in years to come. Furthermore, the ongoing diffusion of affordable-yet-sophisticated light weapons, communications equipment, night-vision devices, and other military gear is making small attacking units simultaneously more lethal and less vulnerable to current concepts for air base ground defense (ABGD).[3] In particular, we believe that an enemy's ability to conduct damaging attacks from standoff positions, perhaps several miles "outside of the wire"—beyond the base's perimeter—is increasing dramatically. This combination of opportunity and capability (means), in the context of the motivation established in this and the next chapter, paints a worrisome picture of potential U.S. vulnerability.

There may be little that the USAF can do to affect an adversary's means or motivation for attacking its bases, but it can try to reduce the enemy's opportunities to do so. Chapter Five addresses ways of reducing the risk to air bases. In it we argue that surveillance and detection of enemy attack teams well outside the base perimeter are the key to protecting the base, its assets, and its personnel. We also suggest that increasing the capabilities of the SP against the standoff threat will require some changes in USAF training policies for both the SP and other personnel. Finally, since no defense can ever be perfect, the USAF must utilize passive measures—including deception, camouflage, and hardening—to protect its key assets and, further, must be prepared to operate under threat of, during, and in the aftermath of ground attacks on its installations.

Chapter Six presents concluding observations.

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[3]We use this term, despite its doctrinal obsolescence, to make clear that we are focusing on the ground component of the multidimensional threat to air bases.

Chapter Two

GROUND ATTACKS ON AIR BASES: WHY CARE?

Having an intellectual grasp of the capabilities of modern airpower is one thing; knowing how to defeat them is something else again. With the collapse of the Soviet Union, no power in the world seems capable of defeating American air forces *in the air.*[1] No other air force today appears to field the combination of platforms, weapons, and personnel—either in quantity or quality—that would be needed to defeat the USAF nose-to-nose at 35,000 feet.[2]

Instead, shrewd future opponents will attempt to counter U.S. airpower in other ways, rigging the game in their favor by exploiting those vulnerabilities that do exist. This chapter focuses on the USAF's vulnerability to ground attack. It argues that future enemies may find such attacks an attractive way of defeating U.S. airpower

[1]See Christopher Bowie et al., *Trends in the Global Balance of Airpower,* Santa Monica, Calif.: RAND, MR-478/1-AF, 1995. Possible proliferation of key technologies and systems (e.g., stealth or advanced air-to-air missiles, such as AMRAAM or the Russian AA-12) could make life in the air hazardous for a small USAF expeditionary force. There is, and will likely remain, considerable uncertainty about the modernization plans for several potential adversary air forces. Some opponents may choose to make the investments—not just in platforms and weapons but, e.g., in training, and command and control—needed to challenge the USAF in the air. However, we think most will look elsewhere for countermeasures to U.S. airpower.

[2]This report focuses on the threat to USAF land bases. We recognize that the USAF is one element of the broader array of U.S. airpower forces; to the extent that land installations are critical to the functioning of Naval, Marine Corps, and Army forces, those installations may also be vulnerable to the kinds of attacks we address here. Sea-based airpower has its own unique set of vulnerabilities (to submarines, mines, antiship missiles, and so on); we do not address those vulnerabilities here.

and describes the kinds of consequences that might result from successful attacks on U.S. air bases.

GROUND ATTACKS ON USAF BASES: AN ATTRACTIVE OPTION

A clever adversary, faced with the insurmountable dominance of U.S. airpower in the air, could employ what we call an "asymmetric strategy." Such a strategy could consist of many components; an adversary might

- protect its vital warfighting assets and infrastructure from air attack by hardening them, hiding them, or making them mobile
- develop innovative operational concepts for its own air force to deflect U.S. airpower into peripheral and resource-consuming activities
- deploy distributed, redundant air defenses that would be less vulnerable to the kind of suppression campaign that was waged against Iraq
- employ ballistic and cruise missiles—with or without nuclear, biological, or chemical (NBC) warheads—to disrupt U.S. rear-area operations, particularly on and around air bases
- employ small teams of ground forces to destroy key U.S. air assets and disrupt air base operations.

Some potential adversaries are already pursuing these strategies. For example, North Korea has deep, hardened facilities for weapons production, and other nations appear to be investing in buried shelters for key installations. Many nations are pursuing ballistic-missile technology, and North Korean special forces have targeted allied air bases for years.[3]

Whereas current R&D and procurement programs will enhance the USAF's capabilities against hardened facilities (although not necessarily against deeply buried sites) and DoD is investing billions in

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[3]See Defense Intelligence Agency (DIA), *North Korea: The Foundations for Military Strength*, Washington, D.C., 1991.

R&D to develop defenses against ballistic-missile threats, air base ground defense does not appear to be a priority issue within DoD at large. In our judgment, this could be a potentially dangerous oversight.[4] Relatively few nations have the fiscal, technological, or operational resources to develop, acquire, or employ advanced conventional ballistic or cruise missiles against USAF bases. Those that can may present a serious threat to USAF operations, but most will probably have to take less ambitious tacks. On the other hand, virtually all nations have armies. Although their quality and size vary greatly, all have some inherent capability against air bases. Many nations have competent airborne or special forces units that would be ideal in this role.

Therefore, the ground threat has increasing salience for the USAF and DoD, for several reasons:

- Many nations may see ground forces as their best option for countering U.S. airpower.
- Most nations have special forces or other ground forces capable of conducting some variety of air base attacks.
- The very technologies that have helped make the U.S. military dominant are proliferating, making threat forces potentially more lethal.
- The demonstrated capabilities of U.S. airpower may make USAF air bases a high-priority target for future enemies.
- Expeditionary operations, reliance on a small number of high-value aircraft, and the concentration of high-value aircraft at a few bases combine to make the USAF more vulnerable to ground threats than in the past.
- A successful attack on a U.S. air base may have a strategic effect out of proportion to the resources expended.

Simple infantry weapons, from hand-placed explosive charges to man-portable mortars, have proven effective against parked aircraft, as Chapter Three illustrates. Despite the great leaps aviation tech-

[4]We distinguish between *air base defense in general,* which has traditionally focused on protecting bases against air attack, and *air base ground defense.*

nology has made since World War II, parked aircraft today are no sturdier in withstanding high explosives or shrapnel than were their predecessors 50 years ago. Indeed, the complexity and sophistication of modern aircraft may make them *more* vulnerable. For example, superficial shrapnel damage to a stealthy aircraft's aerodynamic surfaces would do more than just affect flight characteristics: It would increase its radar cross section (RCS), making it more vulnerable to detection and, hence, impairing its operational effectiveness even if no vital components were damaged. Further, repairing the composite skin to restore the original RCS would not be a trivial undertaking. Alternatively, consider the effect of .50-caliber sniper rifle rounds fired through an AWACS radome, struts, or fuselage: Regardless of precisely where the bullets struck, substantial damage to the delicate electronics packed into this aircraft would probably ensue—in contrast to the P-51s and F-86s of the 1940s and 1950s, which were largely aluminum skins wrapped around empty space, making these aircraft much less vulnerable to one or two rifle bullets passing through the airframe.

The proliferation of advanced communications and information-processing tools, combined with the increasing availability of a wide variety of information, will give other nations mission-planning tools that can be exploited in attacks against air bases; commercially available satellite imagery and geographic information services are two examples. Furthermore, night-vision goggles, laser aimers for rifles, thermal sensors, body armor, and tactical communications equipment are all now available through mail-order companies and on the global arms market.[5] These devices and terminally guided munitions for mortars, advanced man-portable antitank guided missiles, and man-portable SAMs will give potential attackers increasingly deadly options for air base attack.

Expeditionary operations will probably be the most commonplace mode of U.S. military action in the post–Cold War environment; they pose unique challenges for air operations, for at least three reasons.

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[5]The authors, browsing through one such catalog, identified a kit of body armor, laser rifle sight, thermal sensor, FM radio, and night-vision goggles that could go a long way toward equipping a "robo-guerrilla" at a combined price tag of less than $4,500.

First, and in contrast to the main operating base environment found in Europe and Korea, facilities in the rest of the world typically lack high-quality host-nation support and infrastructure. Specifically, aircraft shelters and secure billeting for crews will be limited or nonexistent, and ramp space will tend to be crowded. Even military facilities are likely to lack fighting positions and a well-defined defense plan. Furthermore, U.S. security forces may have little or no experience working with host-nation military forces.[6]

Second, the increased use of insecure civilian airports exacerbates the problem. Jet fuel is typically stored above ground at these facilities, and access control is often quite poor. High-value aircraft—airlifters, tankers, even AC-130 gunships—often operate from these hard-to-protect sites.

Finally, U.S. expeditionary forces will often operate out of countries having a high internal threat. Indeed, U.S. operations in Somalia and the former Yugoslavia were triggered by internal disarray in those countries.

A TRIPLE THREAT TO USAF BASES

We do not expect that the ground threat to USAF installations will materialize as an armored offensive overrunning base after base as it rolls across the theater. Instead, adversaries will probably use small units of well-equipped, reasonably well-trained special or light-infantry forces—employing a range of weapons and tactics—to disrupt USAF operations and destroy assets. We expect that opponents might pursue three different objectives with these attacks: (1) destroy high-value assets critical to USAF operations, (2) temporarily suppress sortie generation at a critical moment in a crisis or conflict, or (3) create a "strategic event"—an incident as decisive politically as loss of a major battle is militarily or operationally—that could reduce

[6]There are in Southwest Asia in general, and in Saudi Arabia in particular, a large number of high-quality air bases, complete with shelters, crew facilities, ample ramp space, and so forth. In the Gulf War, such installations were put to good use and would be very valuable in future contingencies in the region. In this regard, the theater is similar to Cold War Europe and Korea. In other important ways—such as the lack of ongoing combined training with host-nation security forces—Southwest Asia more closely resembles an expeditionary theater.

U.S. public and/or leadership support for the ongoing military operation.[7] We discuss each objective in turn.

Destroying High-Value Assets

Current U.S. concepts for air operations envision an intricate interweaving of force elements—strategic and tactical airlifters, surveillance and reconnaissance platforms, heavy bombers and fighter jets, command-and-control assets, etc.—to accomplish a variety of combat and support tasks. If any of these assets should be taken away or become crippled, operations could be severely degraded, for several reasons.

USAF operations in particular, and joint operations more generally, depend on certain special assets, such as AWACS, JSTARS, and *Rivet Joint*[8] aircraft (Table 2.1 lists some of these aircraft).[9] For one thing, such platforms are very small in number and are typically too large to be parked in hardened hangars.[10] Also, because modern (i.e., late-twentieth-century) war allows no time to restart the B-2 or AWACS production line, the inventory the nation possesses at the beginning of the conflict is all there is. Consequently, the loss of even a few AWACS, JSTARS, or B-2 aircraft could have a catastrophic effect on the U.S. air campaign.[11]

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[7]Such events are by their very nature unpredictable and of uncertain impact. It is possible, for example, that an attack on a U.S. air base that resulted in significant loss of life could catalyze domestic support *for* the conflict as opposed to reducing it. Nonetheless, the historical examples of Tet and Beirut do convey a potentially important lesson.

[8]*Rivet Joint* is a code name for a specialized reconnaissance aircraft.

[9]What constitutes a "high-value asset" will vary. In many circumstances, a C-5 or C-141 could be extremely important; in others, a C-9 medical evacuation aircraft or a KC-10 tanker could be. The following discussion applies to these assets as well as to AWACS, JSTARS, and the like.

[10]Many of these aircraft are based on the Boeing 707 jetliner airframe, whose wingspan of over 145 feet prevents it from being fit into any existing hardened shelter. No U.S. bombers, tankers, or airlifters fit into existing hardened shelters.

[11]Note that when we refer to the "loss" of an aircraft such as a JSTARS, we do not necessarily mean that it is reduced to a blazing hulk on the tarmac or scattered wreckage across the countryside. As described above, a single well-aimed—or lucky—rifle bullet can render a complex aircraft not-mission-capable for hours, days, or even weeks.

Table 2.1

Selected High-Value USAF Aircraft

Aircraft Type	TAI/PAA
AC-130	19/18
B-1	95/86
B-2	20/16 (programmed)
B-52	136/118
C-5A/B	82/76
E-3 AWACS	34/29
E-8 JSTARS	20 (programmed)
EF-111	40/46
F-4G	27/20
F-117	54/47
KC-10	59/57
KC-135	19/15

SOURCE: *Air Force Magazine*, May 1994, p. 41.

NOTE: TAI=total aircraft inventory, the total number of airframes of the type owned by the USAF.

PAA=primary aircraft authorized, the number of the type in operational service.

How far-reaching the effect would be would depend on the details of the particular conflict. The Gulf War, for example, used virtually all the USAF inventory of the many specialized assets; even one or two losses would have been stressing. In a more demanding conflict, such losses could be devastating: RAND analysis of the force-structure requirements for a two-MRC scenario found that the USAF does not have enough specialized aircraft to fight two simultaneous contingencies, even with *no* attrition.[12]

As well, although the total USAF airlift fleet is large, it has been over-tasked in recent years and would be severely stressed during a major deployment. The loss of more than a few C-17s, C-5s, C-141s, KC-135s, and KC-10s could seriously disrupt U.S. operations; there simply is not enough slack in the system to absorb more than minor losses from ground attack. It is also likely that any successful attack on a U.S. airlift hub would produce significant *virtual attrition*—

[12]See Chris Bowie et al., *Analyzing Airpower's Changing Role in Joint Theater Campaigns*, Santa Monica, Calif.: RAND, MR-149, 1993, p. 77.

serials (airlift sorties) delayed or cancelled as units stood down, however briefly, to reassess security arrangements and neutralize any residual threat. Even a brief delay in executing a large overseas deployment could have disastrous consequences if an enemy exploited the interruption to score early victories.

Temporarily Disrupting Sortie Generation

Any conceivable adversary would be hard-pressed to mount ground attacks so intensive and extensive as to shut down USAF operations across most or all of a theater. However, much as the loss of a few airlifters could throw a sizable monkey wrench into U.S. power-projection plans, so could a handful of well-timed, well-placed attacks implode U.S. combat operations for a few critical hours or days.

Imagine, for example, an attack that cut off, or cut down dramatically, the supply of jet fuel to a base for some hours, or even a day or two. Clearly, operational tempo would be seriously slowed. If the attack were timed to coincide with a crucial moment in the campaign—perhaps, as suggested in the Prologue, the onset of hostilities in a theater such as Korea, where the first few hours and days would likely be extremely precarious ones for the United States and South Korea—the disruption of air operations might change the course of the conflict.[13]

Creating a Strategic Event

Beyond the immediate military effect of a successful air base attack, the broader impact on the attitudes of leaders in the allied coalition, on legislators and other political elites in the United States, and on public opinion must be considered. News reporters and critics are likely to seize on a successful air base attack as evidence of the ferocity and skill of the opponent, of U.S. ineptitude and vulnerability, and of the likely high costs of the campaign. During Desert Shield, there

[13]Attacks on air bases could potentially produce serious second-order effects on operations. For example, if just-in-time delivery of spare parts and other resupply items becomes more the norm for U.S. forces, even a temporary closure of a key APOD could disrupt the movement of important items into and within a theater.

were bitter arguments in the United States about the likely U.S. losses in a war against Iraq; at least one prominent senator, a strong supporter of DoD and a recognized defense expert, opposed U.S. intervention, predicting terrible losses in a war with Iraq. If, during the buildup to or early days of the war, the Iraqis had successfully attacked an air base, damaged an aircraft carrier, or otherwise demonstrated determination and competence, such an incident could have become a strategic event, providing ammunition for opponents of U.S. involvement and fundamentally undermining support for the President's decision to intervene.

However, the overall political impact of such an occurrence must not be confused with the operational or military-strategic implications of that occurrence. The 1968 Tet offensive in Vietnam, the bombing of the Marine barracks in Beirut, and "Bloody Sunday" in Mogadishu were all strategic events; yet none of them could be described as a major military defeat. The initially successful Tet offensive resulted in the annihilation of the Viet Cong as a militarily significant force; the loss of Marines in Beirut was a command failure and a profound human tragedy, but it did not materially affect U.S. military capabilities in Lebanon; and the Rangers in Somalia suffered relatively light casualties compared with those they inflicted on their adversaries. Nevertheless, each of these events was a watershed in U.S. involvement and led to dramatic reverses in U.S. policy.

SUMMARY

To recapitulate: Future adversaries may feel strongly inclined toward neutralizing or, at a minimum, blunting U.S. airpower, drawing from a variety of available options. Among the potentially most effective of those options would be to attack USAF bases. Taking advantage of readily available forces and technologies, they could hope to reduce the effectiveness of U.S. air operations, at least temporarily, by destroying high-value assets or disrupting sortie generation. Alternatively or in tandem, they could hope to weaken U.S. or allied resolve by creating a strategic event.

In the past, warring parties made extensive use of ground forces to attack an enemy's air bases. To see what might be learned from such operations, we turn next to a review of this historical record.

Chapter Three

HISTORICAL OVERVIEW OF GROUND ATTACKS

> It is easier and more effective to destroy the enemy's aerial power by destroying his nests and eggs on the ground than to hunt his flying birds in the air.
>
> —Giulio Douhet (1921)[1]

Douhet's maxim was directed toward his fellow airmen, who would pillage their adversaries' nests as might raptors. However, he could just as well have been forecasting the destruction of airpower's "nests and eggs" by more terrestrial predators. Between 1940 and 1992, ground attacks on air bases occurred at least 645 times in 10 separate conflicts, destroying or damaging over 2,000 aircraft[2] in locations worldwide, as shown in Figure 3.1. Attacking forces have run the gamut from regular armored columns to terrorist groups; from troops assaulting across land to amphibious forces coming by sea; to

[1]Giulio Douhet, *The Command of the Air*, Washington, D.C.: U.S. Air Force Office of History, 1983 (originally published in 1921), pp. 53–54.

[2]For a more detailed discussion of this history, see Alan Vick, *Snakes in the Eagle's Nest: A History of Ground Attacks on Air Bases*, Santa Monica, Calif.: RAND, MR-553-AF, 1995. This report includes case studies of the German 1941 airborne assault on Crete, British special forces' attacks on Axis airfields in North Africa and the Mediterranean, and Viet Cong and North Vietnamese Army (VC/NVA) attacks on USAF bases in Vietnam and Thailand.

Our attack total almost certainly *understates* the occurrence of ground attacks on air bases. For example, the database we compiled contains only two reports of rebel attacks on Soviet bases in Afghanistan; there undoubtedly were other attacks—perhaps many more—that were not recorded in any of the public sources we consulted. Thus, 645 should be treated as a lower bound to the number of incidents that have taken place.

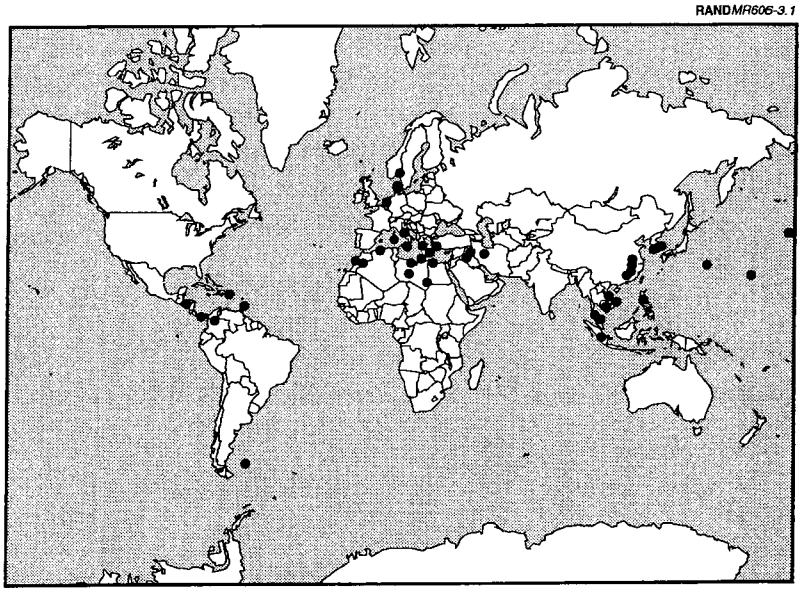

Figure 3.1—Locations of Ground Attacks on Air Bases, 1940–1992

airborne forces arriving by parachute, glider, and aircraft—both fixed- and rotary-wing—on or near the objective; to, finally, special forces, sappers,[3] guerrillas, and terrorists, making their contributions by any or all of the above means.

It is easier to relate the historical facts of these attacks than it is to pin down their significance. Many attacks on air bases appear to have been pure harassment—a few mortar rounds lobbed into the compound with no expectation of serious operational consequences. On the other hand, ground attacks have at the least destroyed valuable aircraft and materiel, have killed and wounded personnel, and have forced the expenditure of substantial resources on airfield defense.

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[3]Strictly speaking, *sappers* are military engineers who specialize in constructing field fortifications or laying minefields. During the Vietnam War, the term was widely used to describe enemy infantry who penetrated base defenses to place explosive charges.

But sometimes their effects have been consequential. British special forces' attacks on Axis airfields in North Africa caused losses of German and Italian aircraft that were so pronounced as to disturb an already-precarious airpower balance, probably determining the outcome of the campaign. In other instances, the use of captured airfields enhanced the operational effectiveness of the attacker's air force. For example, Japanese ground forces' capturing critical air bases in Malaya both removed the RAF as a threat and put Japanese air forces within easy reach of key British targets. Finally, in the Pacific theater, the need to capture and defend airfields drove both American and Japanese campaign planning; the epic struggle for Henderson Field on Guadalcanal is probably the most outstanding example of this.

Our analysis of these attacks makes clear that ground attacks on airfields in past conflicts cannot be dismissed as quaint historical artifacts. The simple-but-effective tactics and the strategic rationale for these attacks are as relevant today as they were in 1940. Indeed, as pointed out in the preceding chapter, the centrality of airpower to modern warfare may make airfields even more tempting targets than they have been.

This chapter summarizes statistics on these 645 attacks and integrates lessons learned to offer helpful historical insight to USAF officers responsible for air-base-defense planning. It begins with a discussion of objectives (or motives) for the attacks, then moves on to an analysis of more-tactical issues of insertion and attack modes (means), then describes defense deficiencies (opportunities), and offers conclusions.

OBJECTIVES

Air bases have been attacked as a way of pursuing a broad range of objectives, from the ambitious goal of capturing an airfield to the aim of simply harassing enemy operations. Discussions of air base defense often treat these threats as similar, but they are really quite different and demand different countermeasures. To bound the problem and make the range and nature of historical threats to air bases more visible, we categorize the attacks identified in this research according to the attacker's major objective. These attacks

can be grouped into the following four broad categories (the number of each attack type follows each objective):[4]

- Capture airfield (41)
- Deny defender use of airfield (47)
- Harass defender (173)
- Destroy aircraft and equipment (384)

As Figure 3.2 illustrates, the majority (60 percent) of these attacks sought to destroy aircraft and equipment. Only 6 percent of the attacks attempted to capture air bases to insert troops or so that the attacker could carry out its own air operations. Most of the larger attacks occurred during World War II, although Soviet forces in Afghanistan (1979) and U.S. forces in Grenada (1983) and Panama (1989) also seized airfields for use as airheads.

This section summarizes historical examples of attacks pursuing these four objectives. The discussion is largely descriptive and is in-

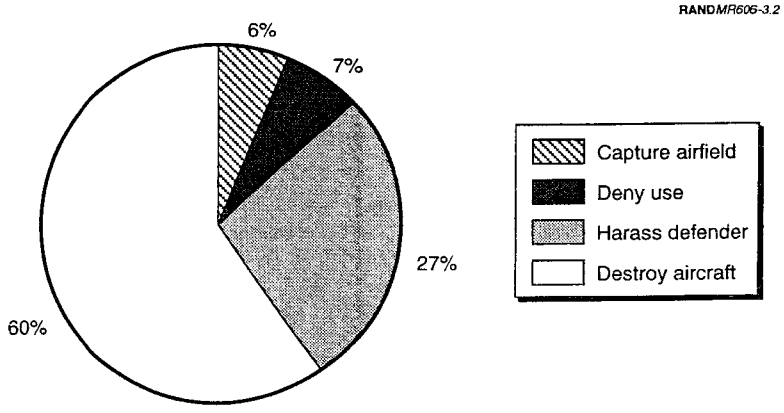

Figure 3.2—Airfield-Attack Objectives

[4]There is obviously some subjectivity inherent in defining these categories. For example, an incident that appears, in the historical record, to be a mere harassment attack may, in fact, have been an inept, unlucky, or abortive attempt to damage or destroy aircraft and other hardware.

tended to briefly introduce air base attack and to give some context to the analysis that follows.

Capture Airfield

Ground forces have sought to capture airfields on 41 occasions. In 16 cases, airborne forces attacked airfields to use them as airheads for the insertion of additional troops. In 23 cases, airfields were attacked so that the aggressor's air force could use their facilities. In 2 cases, both from the 1991 Gulf War, the airfields were attacked to destroy collocated ground forces.[5]

Seize Airfield as Airhead. The Germans were the first to recognize the value of an adversary's airfields as insertion points for their own forces. In the initial hours of the German attack on Norway on April 9, 1940, German paratroopers captured airfields at Aalborg, Denmark, and Sola, Oslo, and Stavanger, Norway. On May 10, 1940, German paratroopers captured three airfields at The Hague and another at Rotterdam in Holland as the *blitzkrieg* rolled through the Low Countries and into France. At The Hague, Dutch reserve forces drove the Germans off the airfields; German ground forces relieved their beleaguered comrades five days later, recapturing the airfields.[6] A year later, in the largest German airborne operation of the war, German paratroopers assaulted the three Commonwealth airfields on Crete in the Mediterranean. Two of the attacks were driven off with heavy losses; the Germans did, however, capture the field at Maleme. Using Maleme as an airhead, the *Luftwaffe* rapidly reinforced the tenuous German toehold, and all Crete fell to the invaders a week later.

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[5]On February 27, 1991, armored units from the U.S. 24th Infantry Division (Mechanized) captured Iraqi airfields at Jalibah and Talil, destroying 29 aircraft in the process. See Rick Atkinson, *Crusade: The Untold Story of the Persian Gulf War*, New York: Houghton Mifflin, 1993, p. 455.

[6]Donald E. Cluxton, "Concepts of Airborne Warfare in WWII," Master's Thesis, Duke University, Durham, N.C., 1967, pp. x, xi, xvii; Thomas E. Greiss, ed., *The Second World War: Europe and the Mediterranean*, The West Point Military History Series, Wayne, N.J.: Avery Publishing Group, Inc., 1984b, p. 29; Thomas E. Greiss, ed., *Atlas for the Second World War: Europe and the Mediterranean*, The West Point Military History Series, Wayne, N.J.: Avery Publishing Group, Inc., 1985b, Map 8a.

In 1979, Soviet airborne forces seized Kabul airport and several other bases for use by follow-on forces in their takeover of Afghanistan.[7] In 1983, American forces conducted similar attacks in Grenada during *Operation Urgent Fury,* capturing Salinas and Pearls airports by airborne and helicopter assault, respectively.[8] Finally, in 1989, during *Operation Just Cause,* U.S. Rangers captured Rio Hato and Tocumen airfields in Panama.[9]

Capture Airfield for Offensive Air Operations. In 23 cases, attacking forces sought to capture enemy airfields for their own use. This objective appears to be exclusive to World War II; no cases were found in other conflicts. In many of the 23 cases, the attackers were able to commence air operations hours or days after their ground forces had secured the airfield. In other cases, such as the U.S. capture of Japanese airfields in the Pacific, the airfield provided a logistics hub for the construction of the much larger airfields needed for B-29 operations.

Fighting in the Pacific theater during World War II was noted for its jointness, which integrated ground, naval, and air operations to an unprecedented degree. In particular, the campaign plans of both sides were largely determined by the need to capture and defend airbases. Thus, joint offensive operations were often launched to capture enemy airfields.[10] Subsequent air operations from these new bases extended the offensive reach of airpower, allowing for new naval and ground operations that seized new airfields.

In December 1941, Japanese ground and naval forces attacked Wake Island for its airfield. They were initially beaten off but returned several weeks later and captured the island. Also in December, Japanese forces invaded Thailand and Malaya. Their ultimate objective was to defeat British forces in Malaya and capture Singapore. An important intermediate objective was the defeat of the Royal Air Force. To do

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[7]Drew Middleton, "Soviet Display of Flexibility: Afghan Airlift Is Lesson in Moving Troops Fast," *The New York Times,* December 28, 1979, pp. A1, A13.

[8]Mark Adkin, *Urgent Fury: The Battle for Grenada,* Lexington, Mass.: Lexington Books, 1989, pp. 200, 214, 217, 236.

[9]Malcolm McConnell, *Just Cause: The Real Story of America's High-Tech Invasion of Panama,* New York: St. Martin's Press, 1991, pp. 73, 99, 191.

[10]We are indebted to RAND colleague Bob Howe for this observation.

so, the Japanese Air Force needed air bases in Thailand and northern Malaya. The Japanese 25th Army made amphibious landings at Singora and Patani, Thailand, and Kota Bharu, Malaya. In a week of fighting, they captured the Thai airfields at Singora and Patani, and RAF bases at Kota Bharu, Alor Star, and Sungei Patani, Malaya. Japanese aircraft used these bases to attack RAF installations throughout Malaya, quickly gaining air superiority. With strong air support, Japanese forces were able to move down the Malay peninsula and surround Singapore, whose garrison surrendered on February 15, 1942.[11]

Deny Enemy Use of Airfields

In 47 cases, the attacker sought to counter the defender's airpower by capturing or shutting down operations at air bases.

Four of the cases are from *Operation Torch*, the November 1942 Allied invasion of Algeria. Fearing that Vichy French aircraft might intercept Allied transports during the initial days of the invasion, Allied planners assigned airborne forces to capture French airfields at Duzerville, La Senia, and Youks-les-Bains, Algeria.[12]

Four additional examples are from *Operation Ichigo*, the Japanese theater offensive launched to capture General Claire Chennault's 14th Air Force bases in East China. Chennault's force had so disrupted Japanese logistics that the commander of Japan's North China Area Army felt compelled to launch a ground campaign to seize the air bases. Between September and November 1944, Japanese ground forces captured Chennault's bases at Ling Ling, Tanchuk, Kweilin, and Liuchow, China, severely disrupting Allied air operations.[13]

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[11]John F. Kreis, *Air Warfare and Air Base Air Defense*, Washington, D.C.: U.S. Air Force Office of History, 1988, p. 101; Thomas E. Greiss, ed., *Atlas for the Second World War: Asia and the Pacific*, The West Point Military History Series, Wayne, N.J.: Avery Publishing Group, Inc., 1985a, Map 7; B.H. Liddell Hart, *History of the Second World War*, New York: G. P. Putnam's Sons, 1970, p. 225.

[12]Wesley F. Craven and James L. Cate, eds., *The Army Air Forces in World War II, Vol. II*, Chicago, Ill.: University of Chicago Press, 1949, pp. 68–81.

[13]Craven and Cate, *Vol. V.*, 1953, pp. 220–225; Charles F. Romanus and Riley Sunderland, *United States Army in World War II, China-Burma-India Theater:*

Thirty incidents are associated with Japanese attacks on the British airfield at Meiktila, Burma, in March 1945. Virtually every night during that month, Japanese forces made multiple attempts to seize the airfield. Each night, the RAF pulled its aircraft into small perimeters defended by Royal Air Force Regiment and other Commonwealth ground forces. Every night the Japanese attacks were beaten back, and every dawn the airfield would be cleared of any remaining Japanese soldiers and flight operations would resume.[14]

Finally, after the United Nations (UN) landing at Inchon, Republic of North Korea, the U.S. Air Force tried to use the sod landing strip at Kunsan, but harassment from North Korean guerrillas prevented such use for several months.[15]

Harass Defenders

Enemy forces seeking to achieve the other three objectives certainly harassed defenders and disrupted base operations. The purpose of a separate category is to identify those attacks whose primary objective was harassment. All but one example of this class of attack are from the Vietnam War.

The Viet Cong and North Vietnamese Army (NVA) conducted 448 standoff attacks against allied air bases, 172 of which fired fewer than five rounds and did no damage to aircraft. Such attacks appear not to have been serious attempts to destroy aircraft. The strategic purpose of air base attacks in general was to kill Americans, cause damage, and demonstrate allied vulnerability—the ultimate objective being to undermine U.S. popular support for the war. These outcomes suggest that harassment was the primary purpose of smaller standoff atacks. Damage to aircraft was a bonus for such attacks, but not central to mission accomplishment. Conversely, the attacks that did the most damage were carefully planned, were given the necessary manpower and materiel, and were executed to maximize dam-

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Stilwell's Command Problems, Washington, D.C.: U.S. Department of the Army, 1956, pp. 316–328, 405–408.

[14]Nick Tucker, "In Adversity: Exploits of Gallantry and Awards in the RAF Regiment and Its Associated Forces," unpublished manuscript.

[15]Lawrence V. Schuetta, *Guerrilla Warfare and Airpower in Korea, 1950–53,* Maxwell AFB, Ala.: Aerospace Studies Institute, 1964, p. 38.

age to aircraft and equipment. Such attacks are counted against the next objective, to destroy aircraft and equipment.

The one incident outside of Vietnam is from *Just Cause,* the 1989 American intervention in Panama. About the time that the U.S. operations began, unknown gunmen fired small arms on a hangar at Albrook Air Station, Panama. The attackers may have hoped to get lucky and cause damage to aircraft, but their force was small and the attack was brief. These circumstances, combined with the fact that the attackers fired from outside the airfield fence, suggest that this incident belongs in the harassment category.[16]

Destroy Aircraft and Equipment

Sixty percent of the attacks discussed in this chapter sought to destroy aircraft and equipment. Our count of 2,000-plus aircraft destroyed or damaged in ground attacks since 1940 is based almost entirely on attacks in this category; although aircraft and equipment were almost certainly damaged or destroyed in attacks pursuing the other objectives, only one report listed aircraft losses for those operations.[17]

The first recorded attempt to destroy parked aircraft with ground forces was in October 1940, when British special forces destroyed an Italian bomber in North Africa. Over the next two years, these small teams, operating hundreds of miles behind enemy lines, destroyed at least 350 Axis aircraft. At the least, these attacks caused a significant loss of aircraft and materiel and disrupted Axis airfield operations on a routine basis. In a campaign plagued by shortages of materiel, Special Air Service (SAS) destruction of so many aircraft, fuel stores, munitions, and spares probably did have a major effect. Furthermore, Axis aircraft and ground forces were diverted from other missions to search for the raiders.

It appears that neither the *Luftwaffe* nor General Erwin Rommel fully appreciated the damage caused by the SAS. In at least one letter home, Rommel did mention Captain David Stirling, describing him

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[16]McConnell, 1991, p. 112.

[17]See footnote 4 in this chapter.

as "the very able and adaptable commander of the desert group [the SAS] which had caused us more damage than any other British unit of equal strength."[18] Rommel failed, however, to take any significant steps to stop these attacks.

There are only two documented cases of ground attacks on operating airfields during the Korean War.[19] The Vietnam War is responsible for 316 of the attacks in this category (82 percent of the total). Those attacks destroyed 393 U.S. and allied aircraft and damaged another 1,185. The most common attack technique was for a small team to fire 10 or fewer mortar, rocket, or recoilless rifle rounds at an air base, then flee. Conversely, only 21 sapper attacks were made against air bases in Vietnam and Thailand. An additional eight attacks combined sapper and standoff techniques.

On the other side of the world, an unknown number of Puerto Rican nationalists, the *Macheteros*, slipped through a hole in the fence at Muñiz Air National Guard Station (San Juan, Puerto Rico) on January 12, 1981, and, in a well-planned and -executed operation, planted satchel charges (bombs with timed fuzes) on 11 aircraft.[20] An hour after the *Macheteros* escaped undetected, the charges blew, destroying eight A-7D aircraft and damaging two. Two A-7s escaped damage because the satchel charges placed on them were duds. One nonoperational F-104 aircraft on display was also destroyed.[21]

A year later, on January 27, 1982, Faribundo Marti National Liberation Front (FMLN) guerrillas attacked Illopango AFB in El Salvador. Using rockets and sappers, the FMLN destroyed five helicopters, five fighter aircraft, and five transport aircraft; an additional seven aircraft were damaged.[22]

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[18]B.H. Liddell Hart, ed., *The Rommel Papers*, London: Collins, 1953, p. 393.

[19]Robert F. Futrell, *The United States Air Force in Korea 1950–1953*, Washington, D.C.: U.S. Air Force Office of History, 1983, p. 124.

[20]RAND's Terrorism Database contains 75 terrorist attacks on individuals or installations associated with various nations' air forces. The three included here were the only ones that appeared to be serious attempts to destroy aircraft.

[21]Jo Thomas, "Puerto Rico Group Says It Struck Jets," *The New York Times*, January 13, 1981, pp. A1, A12.

[22]"Guerrilla Attacks Intensify," *Facts on File*, February 5, 1982.

In 1982, during the Falklands War, the British SAS was again tasked to attack an airfield, raiding an Argentine-controlled airstrip on Pebble Island. Before sunrise on May 15, a 45-man SAS detachment was inserted onto Pebble Island by helicopter. The men walked the final 6 kilometers to the airstrip, then assaulted, firing small arms and 66-mm rockets at the Argentine aircraft while naval gunfire from HMS *Glamorgan* provided suppressive fire. Elements of the force then went onto the airstrip, planting charges on the aircraft.

Ten light attack aircraft were damaged or destroyed, along with one transport. A ton of ammunition and a radar station were also destroyed, and naval gunfire badly cratered the airstrip. Although several of the aircraft could have been repaired, the Argentinians lacked the facilities on Pebble Island to do so. The airstrip was out of action for the remainder of the conflict; after it suffered through several British air raids, Argentine helicopters evacuated the last personnel from Pebble Island on May 31.[23]

In 1986, Afghan guerrillas struck twice against Soviet forces at Shindad Air Base in Afghanistan. On May 27, they used an SA-7 man-portable missile to shoot down a Soviet transport on approach and, on May 30, they launched a 25-minute-long standoff attack. Using 60 107-mm rockets, they destroyed two jet fighters and six helicopters. A large fuel tank was also hit, and it burned for two days.[24]

Three years later, during *Operation Just Cause*, a 54-man detachment of U.S. Navy SEALs (seal/air/land personnel) destroyed Manuel Noriega's Learjet at Paitilla airport in Panama.[25] Also in 1989, unknown attackers firebombed a U.S. Department of State aircraft at Monteria, Colombia.[26]

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[23]Jeffrey Ethell and Alfred Price, *Air War South Atlantic*, New York: Macmillan Publishing Co., 1983, pp. 65–66; Max Hastings and Simon Jenkins, *Battle for the Falklands*, New York: W. W. Norton, 1983, pp. 186–187; Rodney A. Burden et al., *Falklands: The Air War*, Dorset, England: Arms and Armour Press, 1986; John Strawson, *A History of the S.A.S. Regiment*, London: Secker and Warburg, 1984, pp. 231–232.

[24]Barry Renfrew, *Guerrillas Report Attack on Major Soviet Air Base*, Associated Press Report, dateline: Islamabad, Pakistan, June 8, 1986.

[25]McConnell, 1991, pp. 47–72.

[26]RAND Terrorism Database.

In 1990, FMLN guerrillas attacked an El Salvadoran air base again, damaging one aircraft.[27] The year 1991 saw two attacks against airfields in Puerto Rico and Iraq. On March 17, terrorists again struck Muñiz airport, setting fire to one A-7 aircraft and causing $100,000 in damage.[28] On March 28, Kurdish insurgent sappers penetrated the defenses of Khalid Air Base in Iraq, destroying three Su-22 jet fighters in hardened shelters and four MI-8 helicopters on the ramp.[29] The most recent attack on an air base occurred on November 5, 1992, when 100 guerrillas attacked a Philippine air force base in the northern province of Isabela, destroying two OV-10 Bronco aircraft and damaging a Sikorsky S-76 helicopter.[30]

Table 3.1 breaks down these incidents by conflict. Seventy-six percent occurred during the Vietnam War; 20 percent occurred in World War II; and the remaining 4 percent took place in 8 other modern conflicts and terrorist attacks.

Table 3.1

Ground Attacks on Airfields

Conflict	Number of Incidents	Aircraft Destroyed/ Damaged
World War II	130	367/NA
Korea	3	0
Vietnam	493	393/1,185
Falklands	1	11
El Salvador	2	15/18
Grenada	2	0
Afghanistan	3	9
Panama	4	1
1991 Gulf War	3	36
Philippines	1	2/1
Terrorism	3	9/3
TOTAL	645	843/1,207

[27]Associated Press, "Salvadoran Rebels Hit Military Posts," *Chicago Tribune,* November 21, 1990, p. 3.

[28]"Intruders Damage Plane at U.S. Base in Puerto Rico," *Los Angeles Times,* March 18, 1991, p. A15.

[29]United Press International, *Kurdish Guerrillas Attack Air Base, Destroy Aircraft,* dateline: Athens, Greece, March 28, 1991.

[30]Agence France Presse, *Communist Guerrillas Destroy Two Air Force Planes,* dateline: Manilla, Philippines, November 6, 1992.

MEANS OF ATTACKS

Attack Tactics: Mode of Insertion

Air base attackers have used several modes of transportation for insertion. Virtually all attacks (83 percent) used foot travel at some point; in a majority of attacks, the operation was entirely unmotorized. Indeed, all 493 attacks from the Vietnam War were carried out by forces unaided by motorized vehicles. Viet Cong and NVA forces often used bicycles and boats to transport personnel and equipment; they probably used them for air-base-attack preparations also, but we have no means of counting the frequency of use. Figure 3.3 excludes the Vietnam data so that we get a picture of other techniques. Foot travel was the most common technique in other conflicts also, closely followed by vehicle-and-foot insertion. Many of the vehicle-and-foot cases come from SAS operations in North Africa. The numbers suggest that, even by the simple expedient of strapping the gear to their backs and walking, attackers in the past managed to move enough people and equipment cross-country to conduct attacks on air bases.

Other modes of insertion—including more-exotic options, such as high-performance parachutes and hang gliders—may be used by future adversaries where conditions permit or demand. Bases close

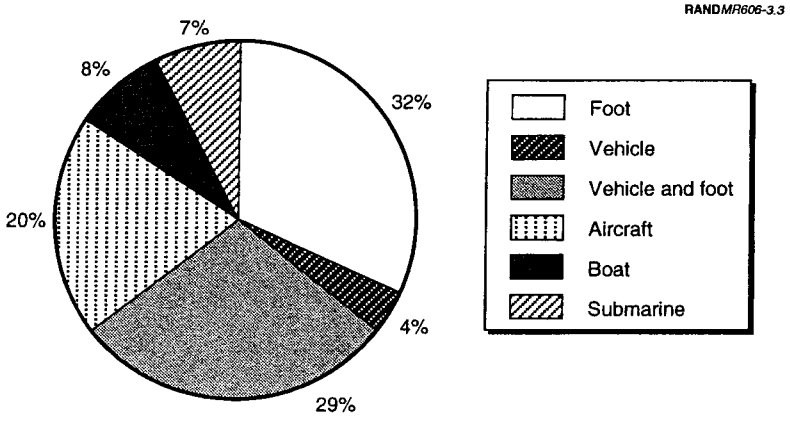

Figure 3.3—Insertion Techniques, 1940–1992 (except Vietnam)

to oceans or rivers may be vulnerable to attackers slipping in on small boats, for example. However, we find no reason to believe that the historically most common form of insertion—people walking to the vicinity of the target base—will present any greater difficulties to future attackers (or be any easier to control) than it has to their predecessors.

Attack Tactics: Mode of Attack

Figure 3.4 shows the distribution of attack tactics for the 645 attacks identified in this chapter. Of particular interest is the apparent evolution of air base attacker tactics since World War II. In that war, many attacks were intended to secure the base for one reason or another; they obviously required that the attacker put troops onto the base, usually in large numbers (typically regimental strength). However, even looking only at the attacks intended to destroy aircraft and disrupt operations without overrunning the base—the British attacks on Axis airfields most especially—we find small teams of attackers penetrating the perimeter and using either explosive charges or short-range direct-fire weapons to achieve their ends. In contrast, Viet Cong and NVA attackers rarely used penetrating tactics, relying on small units firing standoff weapons for a full 96 percent of their attacks.

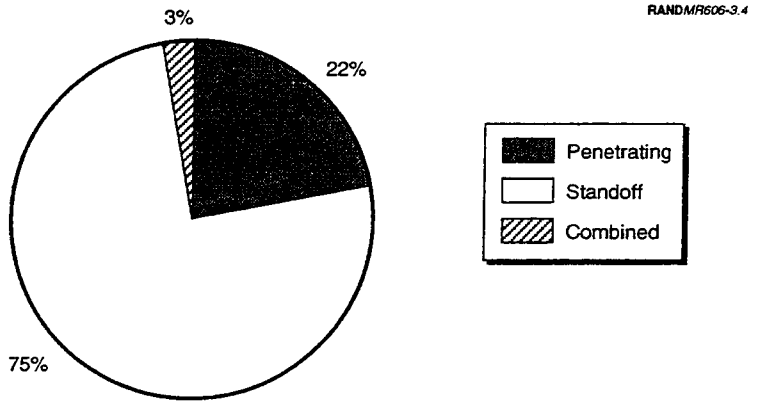

Figure 3.4—Air Base Attack Tactics, 1940–1992

Recent attacks have used both techniques, although all have involved small attacking forces. Kurdish and Filipino insurgents used penetrating tactics; insurgents in El Salvador and Afghanistan employed standoff weapons. The SAS attack against the Argentine air base on Pebble Island used both techniques, opening the attack with naval gunfire and light antitank weapons, then moving onto the airfield to plant charges on aircraft.

It is likely that both tactics will continue to be used in the future. Where perimeter defenses are weak, sappers will probably continue to penetrate; extremely unsophisticated foes—of whom there will be arguably fewer and fewer—may find this their only effective avenue of attack. Terrorists and others striking bases during peacetime may also preferentially be able to exploit penetrating attacks. More troublesome, however, is the possibility that new technologies, weapons, and precision munitions may give small standoff attacks a consistent lethality, which they lacked in the past.

OPPORTUNITIES PRESENTED BY DEFENSE DEFICIENCIES

Most large-unit attacks on airfields succeeded because the defending ground forces were outnumbered, outgunned, or outclassed. On Crete, for example, maldeployment of forces and poor Commonwealth leadership prevented effective use of well-trained and motivated forces. In this and many other cases, attacker air superiority also played an important role.

In attacks intended to destroy aircraft, shortages in high-quality rear-area security forces and a lack of surveillance assets were the most common weaknesses—for both standoff and penetrating operations. Axis forces in North Africa demonstrated another weakness in their notable slowness to develop countermeasures to SAS attacks. In particular, their failure to establish night listening posts and ambushes outside of airfield perimeters is perplexing, since it would not have taken large forces to do so and could have paid large dividends.

Conversely, U.S. forces in Vietnam demonstrated great innovation and creativity in their defensive countermeasures. Joint-force responses to the sapper threat proved quite effective. Consistently, however, Military Assistance Command, Vietnam (MACV)—the overall U.S. headquarters—refused to commit sufficient resources, in

both men and equipment, to air base defense, making it impossible to counter the standoff threat effectively. Without ground forces and airborne surveillance assets dedicated to controlling the standoff footprint,[31] USAF bases remained vulnerable to the end of the war.

Reliance on other services for the defense of air bases was a problem for British forces on Crete, the *Luftwaffe* in North Africa, and the USAF in Vietnam. In each case, air base defense had to compete with other missions on which ground commanders placed higher priority. On Crete, air base defense was also hampered by a failure to appreciate that the air bases were critical terrain that the attacker must be denied at all costs. In North Africa, *Luftwaffe* units reported up their own chain of command and were not integrated under General Rommel, the theater commander, which hampered the coordination of defenses.

BACK TO THE FUTURE

The main points of this chapter can be summarized as follows:

- The most common air base attack objective was to destroy aircraft.
- Seventy-five percent of such attacks used standoff weapons.
- Standoff attacks were extremely difficult to counter.
- Reliance on other services for air base defense proved problematic for the RAF on Crete, the *Luftwaffe* in North Africa, and the USAF in Vietnam.
- Small forces using unsophisticated weapons have successfully destroyed or damaged over 2,000 aircraft.

During World War II, ground attacks on air bases pursued three of the four objectives discussed in this chapter: capture an airfield, deny use of the airfield, and damage and destroy aircraft. Since then, virtually all air base attacks have been focused on only two objec-

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[31]The *standoff footprint* is the area around a base from which weapons can be fired onto aircraft and other targets. Its size varies with the type of weapon; typically, it extends 10 kilometers beyond the perimeter fence.

tives: destroy aircraft or harass defenders. Since 1945, only five attacks have been aimed at other, more ambitious goals; all five were carried out by either the United States or the Soviet Union to secure airheads. Few if any likely future adversaries will be able to mount such a threat to U.S. rear areas; therefore, to the extent that we wish to look to historical experience as a predictor of future challenges, these cases are probably misleading. Airborne insertion of fairly small groups of special forces is another matter and a distinct possibility in, for instance, a future Korean conflict.

Although the possibility of large-unit attacks on airfields should not be discounted completely, it is more a prospect for adversaries of the United States than for the United States. The threat facing USAF bases in future contingencies will likely resemble those presented by SAS operations in North Africa or the VC/NVA in Vietnam. If history is any indication, standoff threats will continue to pose a particularly daunting challenge because of the need to maintain reconnaissance and control over significant areas of real estate outside the base perimeter.

In conclusion, attacks by small forces (platoon size or smaller) with the limited objective of destroying aircraft succeeded in destroying over 800 aircraft and damaging another 1,200 between 1940 and 1992. This fact is powerful testimony to the effectiveness of small units using unsophisticated weapons against typical air base defenses and is a sobering precedent for those responsible for defending USAF bases against this threat. New precision-guided munitions (PGMs) for mortars and other standoff weapons will only exacerbate this problem. In the next chapter, we examine the characteristics of potential future threats such as these.

Chapter Four

THE EVOLVING THREAT TO AIR BASES

> You can shoot down all the MiGs you want, but if you return to base and the lead Soviet tank commander is eating breakfast in your snack bar—Jack, you've lost the war.
>
> —A-10 pilot's motto[1]

What happens on the ground matters to airmen. As the A-10 pilot's motto suggests and as history demonstrates, air bases are vulnerable to ground attack. In most cases, the threat is neither as obvious nor as dramatic as Soviet tanks on the tarmac, but it can be equally deadly to air operations.

As the historical discussion in the last chapter demonstrated, the ground threat to air bases has been manifested in attacks worldwide. Combatants from terrorist cells to advanced nations have recognized airpower as a threat to their operations and have concluded that ground attacks on airfields were an effective countermeasure. Those combatants often possessed only the most rudimentary intelligence capabilities; nevertheless, they were frequently able to identify key targets and airfield defense vulnerabilities. Likewise, although they often had only fairly primitive weapons at their disposal—mortars, unguided rockets, and even machine guns—attackers have been able to launch successful assaults, causing significant losses. Importantly, *most of the air base attacks identified in our historical research were*

[1]Cited in Richard Hallion, *Storm over Iraq: Air Power and the Gulf War*, Washington, D.C.: Smithsonian Institution Press, 1992, p. 55.

conducted by units that did not specialize in airfield attack. Indeed, the British SAS was the only unit formed with the express purpose of airfield attack. History proves that many kinds of combatants may choose to make a concerted attempt to attack air bases.

In this chapter, we discuss the whos, whats, and hows of ground attacks on air bases:

- What kinds of *forces* might be used, and in what numbers?
- What *weapons* might be used in these attacks?
- What sorts of *targets* are present on air bases?
- What *tactics* might an attacker employ?

THREAT FORCES

During the Cold War, Soviet *Spetsnaz* units presented the major ground threat to allied air bases in Central Europe. These unconventional warriors were trained to attack high-value targets, including military headquarters, nuclear weapons storage facilities, and air bases. With the end of the Cold War, potential adversaries have multiplied, in number at least, and many have light, airborne, or special operations forces (SOF) well-suited to air base attacks. USAF Security Police doctrine speaks to levels of threat that are tied to the size of the attacking force. Table 4.1 lists a sample of size capabilities from around the globe, and this section elaborates on forces at both ends of the size range.

The North Korean SOF Threat

North Korea is apparently the only likely adversary of the United States with sizable forces training *specifically* for the air-base-attack mission. Pyongyang deploys 22 special forces brigades and seven independent battalions, numbering in total almost 100,000 troops. Their formations include airborne, amphibious, and regular light infantry units, as well as reconnaissance brigades assigned more exotic tasks. North Korean special forces' capabilities are quite limited compared with those of their U.S. counterparts; however, they are competent and well-trained at their specialized tasks, and could pose

Table 4.1

Airborne and Special Forces of Sample Countries

Country	Airborne/Special Forces Units
China	3 Airborne divisions
Cuba	1 Airborne brigade
India	1 Airborne/Commando brigade
Indonesia	3 Airborne brigades
	4 Special Forces battalions
Iran	1 Special Forces division
Libya	19 Commando battalions
North Korea	22 Special Forces brigades
Brazil	1 Airborne brigade
Russia	5 Airborne divisions
	5 *Spetsnaz* brigades
Serbia	1 Airborne brigade
Syria	1 Special Forces division
Ukraine	2 Airborne brigades
	2 *Spetsnaz* brigades

SOURCE: International Institute for Strategic Studies, *The Military Balance, 1993–1994*, London: Brassey's. North Korea data are from DIA, *North Korea: The Foundations for Military Strength*, Washington, D.C., 1991, p. 5.

a serious threat to allied air operations in the initial nights and days of a conflict on the peninsula.[2]

As shown in Table 4.2, the North Korean Air Force (NKAF) has over 400 transport aircraft and helicopters that could support airborne operations. Of those, the 250 An-2 COLT aircraft and assorted helicopters have the best chance of penetrating allied air defenses.

The seemingly obsolete COLT, a biplane that first flew in 1947, handles extraordinarily well at very low speeds so that it can fly safely at

[2]See DIA, *North Korea: The Foundations of Military Strength*, Washington, D.C., 1991, p. 59.

Table 4.2

North Korean Air Force SOF Lift Assets

Aircraft	Number	People per Aircraft	Single-Lift Capacity (persons)
An-2 COLT	250	11	2,750
Mi-4 HOUND	40	14	560
Mi-8 HIP	20	24	480
MD-500D/E	86	5	430
Total Lift			4,220

SOURCE: Joseph S. Bermudez, *North Korean Special Forces*, Surrey, England: Jane's Publishing, 1988, p. 108.

low altitudes, through the twisting Korean canyons. The fabric-covered COLT has a low RCS and is likely to be difficult to detect by ground-based radars. Although COLTs are detectable by advanced airborne radars, Republic of Korea (ROK) and USAF interceptors could be overwhelmed by the sheer number of targets. Furthermore, the ROK air force has quite limited capabilities at night and in adverse weather—exactly the conditions under which an attack would be most likely. North Korean helicopters could also fly low-altitude approaches, although the radar return from their rotors should make a large radar signature for airborne radars. Joseph Bermudez estimates that these aircraft could make a one-time lift of 2,000–3,000 soldiers; DIA estimates 2,000 could be lifted.[3]

As the Prologue suggests, some percentage of these aircraft would turn back with mechanical problems, some would fly into the ground,[4] and many would be shot down by allied air defenses. The remainder, however, could set sizable forces down on and near allied airfields. The attacking force could conduct an airborne assault on

[3]Joseph S. Bermudez, *North Korean Special Forces*, Surrey, England: Jane's Publishing Company, 1988. Bermudez's estimate (p. 108) assumes that 30–60 percent of the aircraft would be either assigned other duties, grounded with maintenance problems, or held in reserve. See also DIA, 1991, p. 4.

[4]Low-level flight in rugged terrain at night and in combat is extremely difficult and dangerous. While the COLT is an ideal platform for this mission, it is not equipped for night or all-weather operations. Also, North Korean pilots fly very little and may not be up to this challenge. We expect many would crash during these infiltration attempts.

the airfields or land on nearby highways or sports fields. In some cases, COLTs might even try to land on allied airfields, counting on surprise and the reluctance of allied personnel to fire on an aircraft flying a landing approach, for fear of shooting down a friendly pilot. Helicopters could place the assault force pretty much anywhere.

The greatest threat to allied air bases would be during the initial hours of the conflict, particularly if North Korea attacked without warning. Were North Korean SOF able to shut down bases, destroy critical aircraft and C3, and reduce sorties during these initial critical hours and days, the airpower on which the allied concept of operations depends so critically to blunt a North Korean attack might itself be blunted, allowing the main attack forces to break through allied defenses. With Seoul so close to the border, any rapid enemy advance would endanger the southern capital. The actual effect is impossible to predict, but the loss of airpower in the early hours would be a grievous blow to allied defensive plans and would certainly raise the cost of the war to the allies. North Korean air losses are likely to be substantial on the first night of the war, and we would expect their ability to insert SOF by air to diminish to virtually nothing within the first few days. With no additional SOF flowing in and no air support, SOF inserted the first night are unlikely to last long.

Thus, the challenge for allied defense planners is to ensure that air defenses against low, slow-flying aircraft and air base ground defenses are sufficiently robust to turn back the attackers and continue operations during the first 48 hours. *Ground force reinforcements and other capabilities that arrive in-theater after the first few days arrive too late to make a difference in a surprise-attack scenario.* To paraphrase what a senior USAF planner in Korea told one of the authors, the war for air superiority in the next Korean war could well be decided in the allied rear area.

Other Threats: Lesser, but Dangerous

The USAF would probably encounter less sophisticated—and certainly less numerous—SOF and light forces when facing other foes. However, a quick glance at Table 4.1 shows that many forces worldwide are trained and equipped in a way that would make them useful for attacks on air bases. The North Koreans could, conceivably, send hundreds of SOF teams after U.S. and ROK bases; other opponents

might be able to mount only a few smaller attacks. However, the history of air base attacks suggests that small forces can do great damage. As we discuss later in this chapter, emerging technology, which is both accessible and affordable, has the disturbing potential of making such small units even more lethal.

CATEGORIZING OVERSEAS THREATS TO AIR BASES

Whereas USAF Security Police doctrine speaks of three levels of threat, tied to the size of the attacking force, from our historical work and analysis of current and future operational environments, we prefer a similar taxonomy consisting of four broad categories:

- Theater-level offensives
- Battalion-to-regiment-sized commando/infantry attacks
- Irregular forces
- Small-unit raids

In the following subsections, we briefly discuss each of the four threats and suggest a few methods of dealing with each of the first three. Our attention then focuses on the small-unit threat. The remainder of this report details various aspects of that threat—technology, targets, and tactics (in this chapter)—and suggests some ways of ameliorating it (Chapter Five).

Theater Offensives

In World War II and the Korean conflict, there were many instances of large forces deliberately or incidentally overrunning air bases. Generally, the attacking forces were—and would be—on the scale of multiple brigades, divisions, corps, and even field armies. Rear-area defense forces, including those dedicated to air base defense, cannot reasonably be expected to counter attacks of this size.

We believe this class of threat "belongs" to the theater commander (CINC) rather than to the USAF. An attack of this scale and scope would undoubtedly become the main focus of the theater command; indeed, an enemy offensive that threatened to overrun U.S. air bases

would be the CINC's headache for reasons well over and above the threat to his airpower!

Battalion-to-Regiment-Sized Forces

Attacks in this category might involve several hundred to one or two thousand enemy troops. The lower end of this range probably represents the largest plausible attacks that could be mounted by North Korean special forces or could have been executed by Soviet *Spetsnaz* units; the larger attacks in this class would most likely consist of regiment-sized airborne assaults.

Attacking forces of this size should be detected and, it is hoped, be significantly attrited well before they arrive anywhere near USAF facilities. However, even the remnants of a battalion-sized force could pose a significant threat to a base, if they can retain operational coordination and cohesion.[5] Base defenders, including locally available rear-defense forces, must be prepared to deal with these remnants and need to be able to detect and hold them at bay until reinforcements arrive.

We believe that USAF SP are, for the most part, reasonably well-equipped for this kind of tasking. Their armaments include mortars, automatic grenade launchers, and both heavy and light machine guns—weapons comparable, and in some cases superior, to those that will be ranged against them. Fighting on the defensive from well-planned positions, the Security Police should be able to fix and, in many cases, defeat these threats.[6]

---

[5]As an example: a U.S. Army airborne infantry battalion has over 700 officers and men. Even if such a force were reduced by 50 percent before reaching the vicinity of a targeted base, it would still be able to put over 350 troops into the fray. Most units are obviously no longer effective after suffering losses of this magnitude; however, SOF or elite infantry units—well-trained and often accustomed to operating in small, independent teams—are more likely than most to retain some effectiveness even after incurring substantial attrition.

[6]"Well-planned" fighting positions may be the exception rather than the rule in future expeditionary operations. Obviously, planning, siting, and building these positions are always high priorities for base-defense commanders; they are especially vital when there is a plausible threat of battalion-or-larger size.

Ironically, the one place where the United States expects to defeat opposing ground forces primarily, or even exclusively, with U.S. ground forces is on, and in the vicinity of, USAF bases. Although USAF base-defense doctrine includes air support for base defenders, procedures for providing and controlling such support are rarely practiced, and many in the base-defense community are skeptical that precious air sorties will actually be made available to assist in defeating attacks on USAF installations.

We suggest that the USAF consider making serious preparations to provide air support to air base defenders when it is required. This would mean, at a minimum, providing forward air control (FAC) capability to the SP, either by training some number of current SP as FACs or assigning existing teams to support air base defense. Air planners should also be prepared to set aside sorties—presumably a fairly small number—for air base defense. Once these steps have been taken, the capabilities should be exercised with sufficient frequency to ensure that air support could be efficiently and effectively employed if and when it is needed.[7]

Irregular Forces

The irregular threat to USAF bases come in many guises and could take many forms. Most permanent USAF overseas installations employ a sizable contingent of host-country nationals in a variety of capacities, ranging from kitchen help and landscapers to construction workers. It seems likely that the same would hold true at expeditionary bases, including host-country military airfields and civilian airports. It is not out of the question that some of these individuals might, in a crisis or war, find their allegiance resting with the adversary.

The activities of such "fifth columnists" could span a broad range. At the most nefarious end, properly trained and equipped saboteurs could insert biological agents into water and food supplies, contami-

[7]As an aside, we are intrigued by the potential value of the AC-130 gunship for support of air base defense. The precision firepower that the system can bring to bear is very impressive—and lethal to the kinds of light forces that it would encounter in such a situation. The sophisticated sensor suite on the AC-130—particularly its night-vision capabilities—would also help remedy some SP shortcomings in surveillance.

nate fuel and lubricant stockpiles, or assassinate specifically targeted individuals. More prosaically, and perhaps more realistically, local inhabitants familiar with the layout, personnel, and/or operational patterns of the base could provide invaluable intelligence to adversary SOF or guerrilla forces. We have come across anecdotal evidence from Vietnam suggesting that on-base intelligence, and even fire-spotting support, played a role in several successful attacks on U.S. air bases.

Standard access-control procedures help control this threat, as do counterintelligence operations by the Air Force Office of Special Investigations and host-nation intelligence and security services. Beyond these, it may be necessary during crisis and war to further restrict access of civilians to the base itself, and particularly to the vicinity of high-priority targets (e.g., flight lines, headquarters, communication facilities).[8]

A second irregular threat is terrorism. Although typically oriented toward symbolic rather than high-value military targets, terrorists have demonstrated the ability to penetrate perimeter defenses and destroy aircraft on flight lines.[9] Terrorists could use tactics similar to those used by small military units; alternatively, they might use private or commercial transportation, infiltrate disguised as civilian workers or delivery people, or take an otherwise different approach than would a typical military unit. Terrorists could use (and have) car or truck bombs to attack barracks, flight lines, or other facilities. A suicide bomber could also conceivably attempt to crash an aircraft full of explosives onto a flight line or other target.

A third, and often overlooked, irregular threat to flight operations is posed by refugees—a threat that could be of particular concern in Korea. Several million people live in the vicinity of Seoul, and many of them—including a large number of U.S. citizens and dependents—would probably try to flee the vicinity during the immediate prelude to, or the early days of, a second Korean war. It is entirely possible that many of these refugees fleeing south from Seoul during

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[8]If it is suspected that irregulars have chemical or biological weapons at their disposal, mess halls and water-treatment plants might also count as "high-priority targets."

[9]For example, in 1981, the *Macheteros* used satchel charges to destroy 8 A-7 jet fighters parked on the flight line at Muñiz airfield in Puerto Rico.

a future conflict would flock to Osan in the hope of shelter or escape. Numbering perhaps in the thousands, these people might, in desperation, break down perimeter fences and swamp the airfield in search of protection. Base Security Police and Korean forces might have to use extreme measures to control crowds of this magnitude; even if they succeeded, flight operations could be disrupted for hours or days.[10] It is impossible to predict the probability of refugee flows interrupting air operations; in our view, it is sufficiently likely that air-base-defense and other security planners should develop contingency plans to direct refugee flows away from key installations and to control large crowds and mobs if the worst case develops.

Small Teams

Small teams (from two-man to platoon-sized elements) can be defeated easily with typical SP forces and tactics *if* they can be detected. Unfortunately, small groups produce a small signature and can be extremely difficult to find. Both en route and in the neighborhood of their air base target, a small group—especially one on foot—could often blend in with the background noise of a host country.[11] Furthermore, small teams have proven to be very effective in air base attacks, destroying or damaging over 2,000 aircraft since 1940. In the future, they may be even more lethal.

We next discuss some new technologies that could dramatically enhance a small force's ability to wreak havoc on a USAF base.

NEW TECHNOLOGIES

The technological revolution that has helped make the USAF the best air force in the world is also making available a host of information, sensor, and weapon technologies that could be employed against that very force. For example, powerful mission-planning tools are worldwide computer networks, unclassified databases, television re-

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[10]The potential U.S. political ramifications of U.S. and/or ROK troops engaging in violent riot control on a U.S. base are painfully obvious.

[11]Especially a host country at or on the brink of war. Refugee flows and movements of forces from place to place would provide excellent cover—*background noise*, if you will—for small groups of troops moving toward air bases.

porting on the U.S. military (such as CNN), geographical information services, laptop computers, and widely available commercial satellite imagery. More and more adversaries—whether nations or groups—will have access to these tools, and a clever enemy could integrate them with more traditional forms of intelligence collection to produce "all-source" orders of battle: For example, by piecing together the beddown and base layouts of deployed U.S. forces, the enemy could identify high-value aircraft operating routines and locations, along with the most-promising attack tactics.[12]

Once threat forces are inserted near the target air base, the enemy could update target databases and change mission plans at the last minute, using cellular and satellite communications, portable faxes, and laptop computers. Reconnaissance of base defenses and target location could employ night-vision devices and thermal sensors.[13]

New weapon technologies are also likely to be exploited in attacks on air bases. In our judgment, the most promising technologies are PGMs for mortars, large-caliber sniper rifles, man-portable antitank guided missiles (ATGMs), fiber-optic-guided missiles (FOG-M), and man-portable surface-to-air missiles (e.g., MANPADS).

Precision Munitions for Mortars

At least three programs are under way to field guided munitions for 81- and 120-mm mortars. Laser, infrared, and millimeter-wave radar seekers are used in the German, Swedish, and British programs, respectively. Production was scheduled to begin in 1993 for the British *Merlin* warhead and in 1994 for the Swedish *Strix* program; both weapons are being evaluated for adoption by U.S. forces. The United States has also sought to develop fiber-optic-guided munitions for those two classes of mortars.[14] All of these munitions are intended

[12]We were told, for example, that U.S. airlifters flying into and out of Mogadishu airport had for a while followed a regular schedule. These operating patterns could have helped an attacker time its operation to inflict the most damage.

[13]Most of these technologies are available commercially. For example, night-vision devices, thermal sensors, handheld GPS receivers, laser aimers, and body armor can all be purchased by mail order.

[14]Ian Hogg, ed., *Jane's Infantry Weapons 1993–1994*, Surrey, England: Jane's Publishing Co., 1993, pp. 657, 691, 694, 697.

primarily as anti-armor weapons; nonetheless, they would have enormous potential against aircraft and other airfield targets.[15]

These weapons would enable an attacking force to hit high-value targets, whether individual aircraft or structures, with a small number of rounds. This capability would reduce both the time needed to execute the attack (and hence the vulnerability of the attacking unit) and the amount of ammunition needed by the team (perhaps reducing the size of the team and lessening its risk of detection).

Armed with traditional bombs, a skilled mortarman in radio contact with a forward observer can lay down extremely accurate fire, but doing so takes time: A few rounds are needed to set the mortar baseplate firmly in the ground; then individual shots are adjusted onto the target by the forward observer, giving the defender time to identify the firing position and to return fire. In contrast, a guided munition could, in theory, achieve first-round kills, allowing targets to be destroyed within seconds of one another and giving the attackers a much-improved chance of escaping.

These weapons are not without their limitations. The laser-guided projectile requires clear weather as well as a designator with a clear line of sight to the target; the infrared munition would be effective only against aircraft with running engines or some other heat source. None of them is inexpensive, particularly not the millimeter-wave radar guidance system. Nevertheless, if these weapons become more widely available, they will give air base attackers additional options and will further complicate the defender's life.

Large-Caliber Sniper Rifles

In recent years, firearms maufacturers have developed a range of very accurate, large-caliber, long-range sniper rifles. U.S. special forces added .50-caliber sniper rifles to their inventories in 1987, and there are now some 650 in U.S. service. During the Gulf War, Marine Corps snipers, using the Barrett Model 82A rifle and Raufoss armor-

[15]The firing range of mortars may also be extended by advanced munitions. The U.S. Army recently let a critical-components demonstration contract for a guided 120-mm mortar bomb that specified a range of "at least 10km." *International Defense Review*, December 1994, pp. 20–21.

piercing exploding bullets, disabled or destroyed Iraqi armored vehicles and artillery pieces. Such weapons also give light forces a portable and quite deadly option against parked aircraft, as noted in at least two published accounts.[16]

These rifles are effective against man-sized targets up to 1,600 meters away and could hit aircraft-sized targets at even greater ranges; one expert marksman has reported consistently hitting 8-×-10-foot targets over 2 kilometers distant.[17] Further improvements are undoubtedly on the way: A British company markets a combination scope–laser range finder for these rifles, for example.[18] The Barrett's popularity appears to be spreading beyond the 17 countries that now use it.[19] It seems only a matter of time before these or similar weapons find their way into the arsenals of potential adversaries, if they have not already done so.

Antitank Weapons

The British SAS used 66-mm Light Antitank weapons (LAWs) in their raid on Pebble Island, and U.S. SEALs used the AT-4 LAW to destroy Manuel Noriega's jet in Panama. LAWS and other ATGMs give an attacker a potent weapon against a variety of targets from aircraft to hangars. Designed to penetrate tank armor, most have some capability against concrete structures. Thus, they could be employed against aircraft in hardened shelters, as well as against command

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[16]Tillman suggests these rifles are effective against "radar vans, containerized electrical generators, surface-air missiles, light armored vehicles and *parked aircraft*" (italics added). See Andrew Tillman, "Sniper Rifles: Maximum Havoc for Minimum Expenditure," *International Defense Review,* December 1993, pp. 945–946, and "A Tale of Two Fifties: .50 Caliber Sniper Rifles Gain Popularity," *International Defense Review,* June 1994, pp. 67–72. John Plaster also singles out parked aircraft as targets for snipers. See John Plaster, *The Ultimate Sniper: An Advanced Training Manual for Military and Police Snipers,* Boulder, Colo.: Paladin Press, 1993, pp. 399–400.

[17]Skip Talbot, the U.S. national .50-caliber-rifle champion, achieved 85 percent hits at a distance of 9,000 feet—almost two miles away. Both Afghan insurgents (using 14.7-mm sniper rifles) and U.S. forces in Korea and Vietnam (using .50-caliber Browning M2 machine guns in single-shot mode) reportedly hit targets at similar ranges. See Plaster, 1993, pp. 218, 226–228.

[18]Plaster, 1993, p. 223.

[19]One sniper-rifle manufacturer described this as one of the few growth areas in the small-arms business. See Tillman, 1993, p. 946.

bunkers. Where local topography and foliage allow direct line of sight onto the airfield, ATGMs could be effective as standoff weapons fired from outside the base perimeter. Otherwise, the attacker would have to penetrate to near the flight line to get a clear shot, but the range of the weapon could help the attacker avoid flight-line defenses. Alternatively, an attacker who gained access to the runways or taxiways at a base could exploit open fields of fire in all directions to quickly strike multiple targets.

Fiber-Optic-Guided Missiles

Raytheon is developing an enhanced fiber-optic-guided missile, EFOG-M, for the U.S. military. A non–line-of-sight precision standoff weapon for use against armor, helicopters, and other targets 24 hours a day and under all weather conditions, EFOG-M is carried on a small truck and has a range of 15 kilometers. Guided by command inputs communicated via a fiber-optic link,[20] the missile transmits an optical or IR image to the operator's video display. If similar technology is developed by, sold to, or otherwise falls into the hands of adversaries, it would make an effective air base attack weapon. The operator could fly the missile over the air base, acquire the target (e.g., an AWACS parked on the ramp, base operations center, control tower), then fly the missile into the chosen impact point. Most troublesome might be a future FOG-M system that trades off some range for increased portability—a weapon with a range of, say, 10 kilometers that could be carried (disassembled) on the backs of a small team.

Man-Portable Surface-to-Air Missiles

Man-portable air defense systems (MANPADS) are typically short-range missiles, usually IR-guided. The former Soviet Union provided tens of thousands of their SA-7s to various client countries, and the United States has sold or given thousands of *Redeye* and *Stinger* SAMs to its allies as well. According to published reports, MANPADS

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[20]Department of Defense news release, November 2, 1994. See also "Frustrated with Army, Lynn Seeks New Sponsor for EFOG-M," *Defense Daily*, November 7, 1994, p. 185.

missiles are available on the black market for under $100,000. Indeed, the U.S. General Accounting Office alleges that inventory control over U.S. stockpiles of such weapons has been so shoddy that hundreds, if not thousands, might be unaccounted for.

The most recently deployed of these missiles can be very difficult to counter. For example, during the Gulf War, 12 of the 29 U.S. aircraft lost to Iraqi air defenses were shot down by SA-14 and SA-16 man-portable missiles.[21] Aircraft taking off are particularly vulnerable to such missiles; they are low, slow, heavy, have poor downward visibility as they climb out, and any attacker would know where they are coming from. If a pilot is worried about a SAM somewhere under his takeoff path, he can fly a high-performance profile; however, doing so entails some cost in range and/or payload.

Aircraft on approach are also low and slow, but at least have better visibility. Moreover, they can surprise a lurking SAM gunner by flying fast, low-level approaches or by staying above the SAM envelope[22] until over the base, then spiraling down. This latter technique may be of only limited value against newer portable SAMs, since as their range increases—current *Stinger*- and SA-16–class weapons have a range of about 3 nautical miles (n mi)—so does their ability to reach targets already over the base. The newest MANPADS—such as the SA-18—can reach aircraft at higher altitudes also.

This threat is a real one. Afghan guerrillas used *Stinger* missiles to down at least one Soviet transport on landing approach during the war in Afghanistan.[23] The British SAS on at least one occasion inserted *Stinger* teams near an Argentine airfield on West Falkland.[24]

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[21]Steven Zaloga, "Russian Manportable Surface-to-Air Missiles," *Jane's Intelligence Review*, April 1994, pp. 147–153.

[22]Older MANPADS missiles (e.g., SA-7s) are ineffective against targets above about 10,000 feet.

[23]Barry Renfrew, *Guerrillas Report Attack on Major Soviet Air Base*, Associated Press report, June 8, 1986.

[24]It does not appear that the SAS shot down any Argentine aircraft on this mission. The SAS did shoot down a *Pucara* near Goose Green with a *Stinger*, but it was attacking British forces not on approach to an airfield. See Tony Gerharty, *Who Dares Wins*, London: Warner Books, 1993, caption on last photo page and pp. 137–138. For a detailed analysis of Argentine aircraft losses during that war, see Rodney Burden et al., *Falklands: The Air War*, Dorset, England: Arms and Armour Press, 1986.

U.S. forces in Somalia took a number of special precautions to counter a possible SA-7 threat outside of Mogadishu. MANPADS have also been used by terrorists to down airliners and other civil aircraft in Africa.

Exotica

We can easily imagine other weapons that would make excellent additions to the air-base-attack arsenal and that are within the bounds of current or near-term technology. For example, very small, remotely piloted vehicles (RPVs) could be used to deliver guided submunitions, such as the shaped-charge SKEET, against individual targets. These "micro RPVs"—perhaps resembling oversized radio-control model airplanes—might be disassembled and carried by a two- or three-man team. Using a video data link for guidance, such a craft could be launched and controlled from long distances, if signal line of sight can be maintained, and would be able to deliver its payload with great precision.[25]

In describing new technologies here, we have mentioned their targets in passing. We now look specifically at possible targets on air bases that could be the objective for small-team attacks.

TARGETS

An air base is a classic "target-rich environment." Besides the aircraft themselves, air bases offer fuel-storage facilities, munitions bunkers, the control tower and operations center, navigation aids, crew housing, maintenance facilities, and aerospace ground equipment. Some bases, such as Osan in South Korea, also host important command-and-control facilities that could be targeted by attackers.

Fuel storage has proven to be particularly vulnerable to attack. Storage tanks are large, thin-skinned targets that, for routine safety purposes, are often placed on the base periphery. This location, however, exposes them to attack from direct-fire weapons and allows

[25]A somewhat more complicated operational concept can be conceived of: A radio-relay micro-RPV can extend the "killer" vehicle's range beyond the operator's line of sight.

sappers to reach them more easily. In some cases, fuel storage is off the base proper; pipelines, buried or above ground, carry the fuel to the flight line. Such off-base tank farms are generally even more vulnerable than fuel-storage sites on-base, both because of their isolated location and because Security Police units lack the manpower to adequately secure them.

Maintenance facilities are another high-payoff target; modern aircraft simply cannot remain mission-capable for long without their complement of avionics test equipment and other advanced support devices. AWACS and JSTARS—important platforms packed with sophisticated electronics and based on aging airframes—are especially dependent on specialized maintenance capabilities; their effectiveness could be greatly reduced if those facilities were disabled or destroyed.

Despite the attractiveness of the support infrastructure as a target, most ground attacks against these targets will not materially affect air operations. During the 1980s, many studies were done to assess the impact of Soviet offensive air operations against air bases in Europe; most concluded that air bases were resilient targets and very difficult to close for sustained periods. The USAF support infrastructure is too large, varied, and redundant, and its people are too adaptable and creative for limited attacks against support to have more than transitory effects. Furthermore, the many air-base-operability programs funded over the past decade have given the USAF outstanding base-recovery capabilities.

Certainly, however, at critical locations and times, attacks on support could seriously disrupt high-priority missions. In such cases, a sophisticated adversary will do well to attack support assets. However, under more-typical combat conditions, there simply are too many alternatives for these attacks to matter: Fuel can be trucked in, temporary storage bladders can replace fuel tanks, aircraft can temporarily collocate with sister units at other airfields, and replacement facilities and equipment can be built or flown in.[26]

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[26]The effects of attacks on support infrastructure may be more severe in less-developed theaters, where little redundant capability is in place to fall back on, basing may be so constrained that relocation of assets is difficult or impossible, and USAF facilities are arranged in a sufficiently ad hoc manner (e.g., crew quarters or fuel

It probably comes as no surprise to airmen that aircraft are the real plum on an air base. In particular, as we discussed in Chapter One, B-2s, AWACS, and other force-multiplier aircraft are, or will be, so integral to U.S. warmaking strategy that they will be the targets of choice. The destruction of even a small number of these aircraft could significantly constrain a U.S. air campaign; indeed, the overall theater campaign could be put into jeopardy.

We now shift our focus to a discussion of tactics for attacks on high-value aircraft.

TACTICS

Insertion

In some theaters, the greatest challenge facing air base attackers is insertion. In Desert Storm, for example, most allied aircraft were based hundreds of miles from the Iraqi border. Given interlocking AWACS coverage and F-15s on constant CAP, airborne insertion of SOF deep into Saudi Arabia would have been suicidal. If, however, the Iraqis had been more competent and determined, they might have pulled off an attack or two. For example, Tabuk Air Base, which played host to a squadron of U.S. F-15C fighters, is only 50 miles south of the Jordanian border. A small team could have used commercial trucks to cross into Jordan, then infiltrated the Saudi border to attack the aircraft at Tabuk with satchel charges, mortars, or MANPADS.

Alternatively, a team might have been inserted from the south via Yemen (an ally of Iraq) to attack Khamis Mushait, about 20 miles from the border. The F-117s at Khamis Mushait were certainly an attractive target, but the superb Saudi facilities there would have de-

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supplies are considerable distances from the flight line) as to make them much more vulnerable. Thus, we do not want to blithely dismiss this problem; indeed, it would be interesting to analyze U.S. operations from bare bases in some detail to see whether the threat to facilities might be potentially crippling. Also, a facilities-oriented attack—which produced CNN photos of a burning tank farm or interviews with survivors of an attack on a crew shuttle traveling from a downtown hotel to the base—could constitute a "strategic event" as easily as one focused on aircraft. Nonetheless, we believe that the threat to U.S. operational capability stemming from a successful attack on a small number of high-value aircraft is potentially so compelling that we pay it what may at first seem to be an inordinate amount of attention.

feated mortar or rocket attack on the parked aircraft. With all the aircraft locked in hardened shelters, sappers would have had a difficult time as well. Aircraft cannot fight from inside shelters, however, and no one has yet developed a way to put hardened roofs over taxiways and runways. Aircraft preparing to take off or rolling out after landing could have been vulnerable to small arms, ATGMs, and MANPADS. Mortars could have been preregistered on the ends of the runways and other points and rained down rapid and highly destructive fire when targets appeared.

Finally, Iraqi forces could have gone after the abundance of targets at King Khalid International Airport north of Riyadh or Riyadh itself, both within 200 miles of the border. This would have been a challenging insertion, but not impossible—the SAS *routinely* sent patrols this far behind Axis lines in North Africa. A small Iraqi team crossing the border in the west where there were few forces might have penetrated into the interior. Traveling at night and lying low during the day, this force could have destroyed tankers or AWACS aircraft in a night raid. Fortunately for Coalition forces, this scenario never played out, but U.S. planners should not assume that a desert environment will always be as benign as that experienced during the Gulf War.

In other regions, tropical forests, mountains, and urban areas may provide sanctuary for small teams as they travel to air base targets. In insurgencies, civil wars, and other lesser contingencies, adversary forces are likely to be living and operating within short distances of allied air bases. In such scenarios, insertion will not be a problem. This was the case in Vietnam and probably would have been so in Somalia had the oppositon been sufficiently organized, equipped, and motivated to go after U.S. installations.

Engagement

An attacker may choose penetrating, standoff, or combined tactics in the endgame of an air base attack. The penetrating approach has obvious advantages when

- the attacker lacks good standoff visibility of the air base or the appropriate weapons

- sappers can distinguish decoys from real aircraft, spot high-value aircraft in hangars or other concealment, and can place explosives in ideal locations on an airframe with a precision that few standoff weapons can match
- delay fuzes are to be placed. Sappers have the option of slipping in, doing their work, and escaping before the defenders are the wiser.[27]

These tactics work best on air bases with few sensors, barriers, or patrols. Bases with robust defenses, such as USAF bases during the Vietnam War, can be very difficult to penetrate undetected. Generally, when perimeter defenses are strong, standoff techniques will be more appropriate.

In our judgment, the standoff threat is the most worrisome. Attackers using relatively crude techniques—unadjusted mortar or rocket fire—have destroyed hundreds of aircraft on air bases with robust perimeter defenses. Defeating this threat is not a matter of guarding perimeter fences or flight lines; it cannot be handled without vigorous surveillance "outside the wire."

Figure 4.1 shows the standoff footprints for various weapons that have been used in past air base attacks. Countering these weapons can require defenders to control *several hundred square miles* of terrain around the air base. The new weapon technologies discussed earlier will both enlarge the attack footprint and increase the effectiveness of ordnance employed from these longer ranges.

CONUS IS NOT NECESSARILY A SANCTUARY

This research effort has focused on threats to USAF overseas facilities. In our judgment, this is where the threat is greatest and where we believe USAF leaders need to concentrate their attention and resources. Nonetheless, it should be pointed out that the tendency to assume that CONUS will be a sanctuary in future conflicts could be dangerous.

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[27]This is exactly what transpired at Muñiz Air National Guard Station in Puerto Rico in 1981.

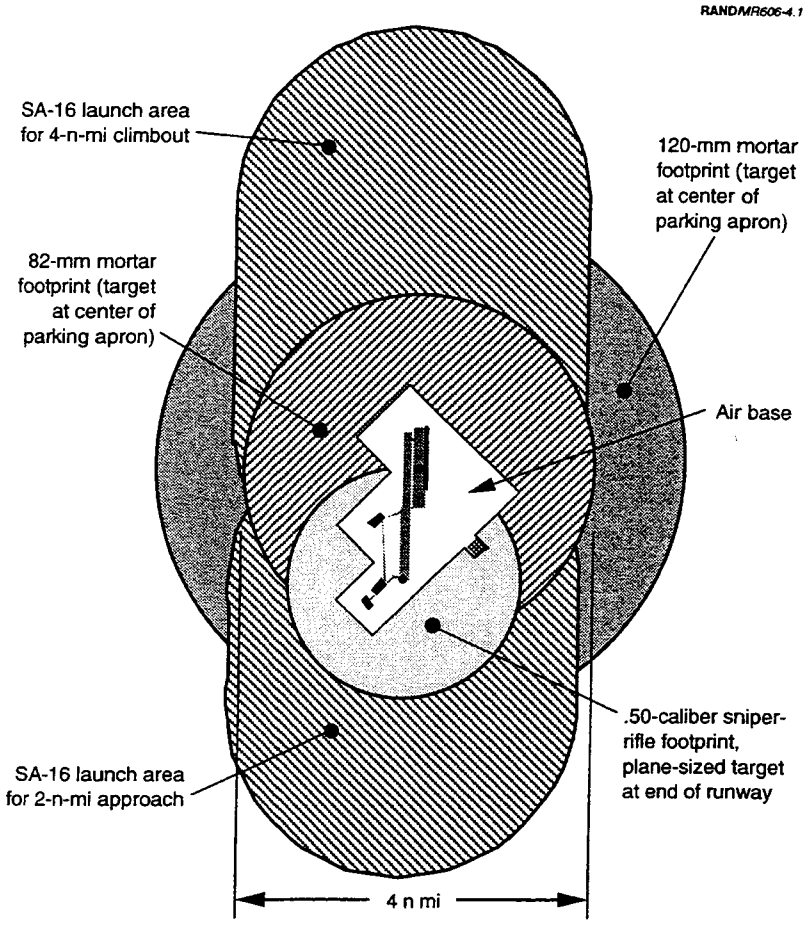

Figure 4.1—Notional Threat Standoff Footprints

The concentration of high-value assets at a few bases (e.g., B-2s at Whiteman AFB, Mo.; F-117s at Holloman AFB, N.M.; AWACS at Tinker AFB, Okla.; JSTARS at Robbins AFB, Ga.) could present a tempting target to an ambitious and determined adversary. A well-

trained and -equipped small team could do great damage at these facilities.[28]

The scale of illegal immigration and drug traffic into the United States demonstrates that the nation's borders are porous. Hundreds of thousands of people cross the U.S. border illegally every year, and individual drug shipments into the country are often as large as tens of tons. There is no reason to believe that a sufficiently motivated adversary could not duplicate the accomplishments of immigrants and drug smugglers. Indeed, a nation or terrorist group might *hire* smugglers for their expertise.

Security at most CONUS facilities, one SP noted, is aimed at keeping out "crazies and criminals." With the exception of nuclear weapons sites and special aircraft test facilities, security forces simply do not have the manpower, sensors, barriers, and weapons to counter professional adversaries. The USAF resource-priority system does assign additional security to high-value aircraft, and at least some bases for high-value aircraft have extra sensors. We have no evidence, even anecdotal, however, that these defenses have been tested in exercises by U.S. SOF in the way that nuclear facility defenses are tested. Without such tests it is difficult to assess the effectiveness of CONUS base security against a competent, irregular threat.

We recognize that constitutional restrictions on military operations off-base and a distaste for the inconveniences of strict security limit options to increase base security. Although bases cannot be sealed,[29] it may be possible to improve flight-line security at key bases—particularly during crises and wars. Ultimately, the FBI, the Customs Service, and other national agencies may be the best defense against this threat.

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[28]There are a number of other sites in CONUS—satellite downlink and control facilities, oil pipelines, and port facilities—whose destruction could seriously impede U.S. response to crisis or conflict. The logic outlined here regarding air base attacks would apply equally well to strikes against such valuable, and vulnerable, installations.

[29]A base is a small city with stores, schools, etc. There is much civilian activity (construction, deliveries, etc.). It would be impractical to search every vehicle entering the base or to guard every inch of its perimeter.

SUMMING UP

This chapter has presented a broad overview of potential threats to USAF bases abroad and in CONUS and has sought to demonstrate that this threat—particularly the standoff element—is likely to increase in the near future. In summing up, we would like to emphasize two points.

First, it appears likely that future USAF operations will increasingly be expeditionary. These "come-as-you-are" operations pose special dangers arising from at least four sources:

- Lack of host-nation support and infrastructure, including (1) shelters, (2) ramp space for dispersal, (3) secure billeting, (4) fighting positions, and (5) well-defined defense plans.
- Increased use of inherently insecure civilian airports, where there is little access control, and key resources, especially fuel, are frequently stored in vulnerable, above-ground tanks.
- Minimal U.S. experience with host-nation security forces, which will make operational planning and coordination difficult. Indeed, host nations may impose serious constraints on air base defenders' ability to operate effectively—for example, by restricting their ability to move off-base.
- Finally, many host nations will be confronted by a significant internal threat. Many post–Cold War operations have, in fact, been undertaken in response to internal disarray in a country: Haiti, Somalia, and Rwanda all fall into this category.[30]

We believe that under such conditions, it is important that extra attention be paid, in both operational planning and execution, to the need to maintain adequate, if not optimal, security at U.S. bases.

On the flip side, we most emphatically do not want to be perceived as warning about a falling sky. In many—perhaps most—cases, the

[30]In these circumstances, high-value assets are more likely to be transports and gunships than AWACS and JSTARS, and the kind of effects we are most concerned about will be on not only the "air campaign" per se but on the overall ability of U.S. forces to accomplish their mission and on potential deterioration in public and civilian leadership support for the undertaking.

USAF will confront ground threats that it can protect itself against quite effectively. The level of danger will vary with

- threat capabilities: Clearly a larger and more sophisticated opponent such as North Korea must be taken far more seriously than lightly armed Somalis in pickup trucks.
- strategic geography: A theater that allows the USAF to base its key assets further away from hostile territory and spread them across a larger number of bases will be less vulnerable than one where units are crowded onto a handful of installations in proximity to the enemy.
- tactical topography: A base located in the middle of an open plain will, all other things being equal, be easier to protect than one abutting a jungle or city.

The USAF should *not* travel the globe afraid of its own shadow; far from it. However, there are threats and circumstances that are worrisome and in which the consequences of a successful attack on an air base could be quite severe. It is to these cases that we wish to direct the attention of the USAF leadership.

Chapter Five discusses options for making modest improvements in the already-good defenses against penetrating threats, and will also make more-ambitious suggestions for countering current and future standoff threats.

Chapter Five

COPING WITH THE THREAT

Overestimating the threat has its own costs, both in dollars and in disrupted operations. A worst-case analysis could cause precious dollars to be sunk in expensive defensive programs; basing at unnecessarily long distances from the operational area could reduce sortie rates; excessive dispersion or rotation of air assets could complicate planning. On the other hand, underestimating the threat could lead to the loss of irreplaceable aircraft and personnel and could have a potentially disastrous strategic impact on the overall campaign. Ultimately, the decision will rest on the military judgment and experience of USAF leaders. The challenge Air Force leaders face is making a balanced assessment of the threat. Analysis can help by presenting a framework for thinking about the threat. The framework would enable integration of historical experience, current threat assessments, potential adaptive behavior by future adversaries, and trends in relevant technologies.

In this chapter, we describe various components of that framework for assessing the evolving threat to air bases and potential countermeasures to that threat. We address these measures individually in the context of specific kinds of ground attack. As the Prologue suggests, however, the most dangerous attacks on air bases may consist of multiple threats brought together against a specific installation. Hence, some combination of the kinds of measures described here will likely be needed to achieve a pronounced lessening of USAF vulnerability, a lessening of opportunity.

DEFENSE IN DEPTH

The USAF has many years of experience operating in the face of multiple threats to its air bases and has developed doctrine, equipment, and organizations to counter both airborne and ground-based threats. The Air Force concept of operation is one of strategic and tactical *defense in depth*, employing the full range of capabilities and techniques to protect air bases and aircraft.

Strategic Defense

Strategically, the USAF uses the long range inherent in many of its aircraft and its unique air-refueling capability to operate from bases far removed from enemy threats.[1] Second, it has invested considerable resources to guarantee U.S. forces' air superiority over most if not all adversaries. Thus, even if enemy aircraft can reach U.S. bases, few can be expected to get through the air defense screen. Third, USAF Security Police provide tactical defense against ground force attempts to penetrate the base.[2] Fourth, passive defenses—including aircraft shelters, camouflage, and decoys—are in place to minimize the impact of any attacks that actually do manage to put ordnance on target. Finally, ordnance disposal, rapid runway repair, and other capabilities are available to help bases recover from and operate during attacks.

Tactical Defense

At the tactical level, ground defense is in-depth also; at least, that is the theory. Defense of air bases is embedded in the overall rear-area defense scheme, the design and implementation of which are the responsibility of the theater land component commander (LCC). Typically, however, rear-area operations are a low priority for the

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[1]The USAF has also shown considerable tactical flexibility in managing the flow of aircraft, particularly airlifters, into and out of bases. In both Vietnam and Somalia, for example, strategic airlifters generally stayed on the ground only long enough to unload their cargo and take on any outgoing personnel and/or materiel. Refueling, crew changes, and other time-consuming activities were scheduled for other, safer bases outside the immediate theater.

[2]In Korea, the SP also provide some terminal air defense with *Stingers*. If necessary, SP could be given this capability in other theaters as well.

LCC and CINC, whose attention is naturally—and appropriately—focused on the main action, usually on and around the forward line of his own troops. Unless things are going very badly, this line is generally going to be far from USAF bases.[3]

In past conflicts, ground commanders have been reluctant to assign much more than token forces for rear-area security. U.S. Army Field Manual 100-5, the service's keystone document for land warfare, devotes only two paragraphs to rear-area operations.[4] In general, U.S. military units operating in rear areas are expected to provide for their own security, and few, if any, combat formations are available to assist.[5]

Host-nation forces are sometimes assigned this role, but the training and equipping of those units are inconsistent, to say the least. In some instances, the quality of those forces has been very high, and they have been full partners in defending key installations, including air bases. In other instances, those forces have been almost a hindrance rather than a help, imposing restrictions on SP operations that could have jeopardized base security had a serious threat manifested itself.

Overall, past wartime experience suggests that defense in depth will be the exception rather than the rule. Consequently, air-base-defense commanders cannot count on other U.S. or allied forces being available to support their operations; very likely, they will be on their own.[6]

The good news is that, in most cases, it is unlikely that large enemy formations will suddenly appear in the rear area. Large airborne op-

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[3]This applies only to conventional warfare. In counterinsurgency operations, there often is not a true rear area; enemy forces can be found virtually everywhere.

[4]U.S. Army, Field Manual 100-5: *Operations*, Washington, D.C.: Headquarters, U.S. Army, 1993.

[5]Army Military Police (MPs) might be expected to play a prominent role in rear-area operations. However, in wartime, the Army defines and employs its MPs as a tactical force; MP units move forward when their parent formations do so.

[6]It is important to note that the United States is not alone in paying little attention to rear-area security. Neither the *Luftwaffe*, the Italian air force, nor the RAF received much help from their army comrades when their bases were threatened in World War II.

erations would be foolhardy, given the superiority of U.S. air defenses; on the ground, the enemy forces would presumably be stopped, or at least reduced in size, by ground forces friendly to the United States. Thus, as discussed in Chapter Four, we see the SP challenge as defeating small units attempting to penetrate or conduct standoff attacks. In particular, we see great danger in the fact that *no friendly force is both responsible for and capable of controlling the areas outside the wire from which standoff attacks can be launched.* As we discuss in the section after next, "The Standoff Threat," dominating these standoff footprints will be the key challenge facing air base defenders.

THE PENETRATING THREAT

We assess USAF SP capabilities for close-in protection as being quite good. Using patrols, defensive fighting positions, flight-line security elements, and small, quick-reaction forces could enable the SP to defeat threats up to company size, and perhaps even larger forces under favorable circumstances.

A typical air base may have a 15–20-mile perimeter, a huge area for a 300–500-man defense force to protect.[7] With manpower drawdowns reducing their manpower, the SP will increasingly rely on sensors, mobile quick-reaction forces, and other force multipliers to detect and respond to attempted penetrations. In particular, *detection* and *mobility* appear to be the keys to defeating penetrating attacks.

USAF Defense Force Commanders (DFCs) need better situational awareness.[8] In Korea, Seventh U.S. Air Force's creation of a rear-area threat assessment group with data links to Army and other intelligence reports is an important step and could be a model for other theaters. Improved surveillance of avenues of approach to and on the base and improved perimeter and flight-line sensors are also necessary so that these relatively small defensive forces can detect and defeat penetration attempts.

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[7]By way of comparison, a 15–20-mile stretch of FLOT would probably be defended by a force on the order of an army division—some 15,000–18,000 troops.

[8]*Situational awareness* is knowledge of the state of activity of one's own forces and, more important, the capabilities, intentions, and activities of the opponent.

The Tactical Automated Surveillance System (TASS), currently in production, offers one potential solution. Experience with a prototype system during the 1993 *Foal Eagle* exercise in Korea enabled defenders to detect and defeat every penetration attempt. If acquired in sufficient numbers—enough to provide coverage of likely avenues of approach and point surveillance of key facilities and assets—TASS should signficantly enhance defense against penetrating threats.

Once enemy elements are detected, forces must be ready to contain and destroy them. Currently, SP quick-reaction forces would travel by foot or vehicle to the area of penetration. Those arriving in vehicles—typically HMMWVs—would then dismount their weapons and engage the enemy force. This procedure is obviously less than ideal in many tactical situations. It would be far better to have lightly armored vehicles with quality weapon mounts so that troopers could use their M-19 grenade launchers, M-60 machine guns, and M-2 heavy machine guns while mounted.

The uparmored-HMMWV program, which provides protection against small-arms fire, shrapnel, and land mines, is a step in the right direction; if equipped with stable weapons mounts, these vehicles could be an important enhancement. Sufficient numbers need to be procured to equip base quick-reaction forces and provide a limited number for patrols and convoy protection. To the extent that the USAF must patrol standoff footprints entirely on its own, the requirement for this or similar vehicles could be increased.

THE STANDOFF THREAT

Currently, USAF capabilities against the standoff threat are quite limited. As discussed in Chapter Three, standoff threats were both the most common and the most problematic in the Vietnam War. We expect future adversaries to use this tactic heavily; without a serious effort to improve U.S. abilities to detect and counter standoff attacks, the USAF is likely to lose high-value aircraft or have base operations otherwise disrupted in some future conflict.

We envision a three-pronged strategy to counter the standoff threat:[9]

- *Confound* adversary mission planning and execution.
- *Detect and defeat* the adversary outside the wire, before it launches the attack.
- *Protect* key assets against the effects of incoming ordnance.

Confound Adversary Mission Planning

The first step in countering standoff threats is to make it difficult for the enemy to identify the location of high-value assets long enough to conduct attacks. The Air Force already does this in overseas theaters by treating the operating locations of particular aircraft as sensitive information. News coverage of deployments can make this difficult but well worth the effort.[10] Other techniques include the use of decoys, camouflage, rotation of aircraft through multiple bases, and varying operational patterns.

Decoy programs already exist for some tactical aircraft, including at least one high-value platform. Decoys for larger aircraft would obviously be more expensive but could pay for themselves quickly if they saved even a single aircraft.[11] Decoys have always been designed to fool airborne threats; it is not clear whether the same decoys would trick ground forces who might be able to observe for prolonged periods and possibly from multiple angles. This is an area that deserves further exploration.[12]

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[9]Although designed to counter standoff threats, these measures should also help to counter penetrating attacks.

[10]As high-resolution satellite imagery becomes more widely available from a variety of commercial sources, it will become increasingly difficult for the USAF to keep its main operating locations secret from even modestly financially solvent or technologically competent opponents.

[11]For example, the flyaway cost for a single E-3 AWACS is $150 million (FY92 constant dollars). See Air Force Regulation 173-13: *Unit Flyaway Costs*, Attachment A10-1, Washington, D.C.: U.S. Department of the Air Force, January 1992.

[12]If enemy ground forces can employ smart or brilliant weapons, the decoy problem becomes even more difficult. If the attacking warhead relies on target signatures other than simple visual resemblance, effective decoys would have to mimic their real counterparts more than visually.

Camouflage and visual barriers could also be used to confuse the attacker. Nets, high walls, and existing hangars all might be used to keep high-value aircraft out of sight. Aircraft that fly missions around the clock will, however, likely be spotted during the day in approach patterns, on the runway, or taxiing. Those aircraft that fly primarily at night (e.g., F-117s and B-2s) would be easier to hide; however, as night-vision capabilities become more widespread, the sanctuary of the night enjoyed by such platforms may be reduced somewhat.

Another approach would rotate high-value aircraft through different bases so that they are not consistently on the ground at the same base. This aircraft "shell game" is potentially attactive for aircraft with minimal or generic support requirements. A high-value aircraft that requires special support personnel, equipment, and mission-planning facilities for each sortie could significantly degrade the operational effectiveness of rotation. The resulting "cost" would have to be weighed against the increased survivability gained by the deception. A compromise that could provide some survivability enhancement at less operational cost might be to operate from one base for some amount of time—say, one or two weeks—then move on to another base. In theory, this procedure could work; however, moving an entire unit can be a huge undertaking—certainly not something to be considered lightly in the middle of a conflict.

Another possibility that might prove less operationally costly would be to vary operational patterns at home bases.[13] According to this concept, the aircraft would not rotate but would operate at unpredictable times so that the attacker would never know ahead of time when the aircraft will be on the ground (or on approach, or taking off). Again, this concept may not be compatible with the operational requirements associated with some platforms.

Detect and Defeat Adversary Forces Prior to Attack

The next step in countering the threat is to detect and defeat adversary forces in the standoff footprint outside of the air base *before*

[13]For airlifters this might mean varying arrival times at high-risk destinations, as was done in 1993 by USAF transport aircraft flying into Mogadishu, Somalia.

those forces launch their attack. To do so requires surveillance of the entire footprint area, and especially of the likely firing positions for MANPADS, mortars, and the like. Depending on the terrain, foliage, and number of threat forces thought to be operating in the area, a large infantry force—perhaps a brigade or more—could be required to cover the several-hundred-square-mile footprint. In scenarios with platoon- and company-sized enemy formations nearby, the joint-force commander would have to assign regular ground forces to this mission. In contingencies with a smaller threat, USAF SP could man listening posts, set up ambushes, and conduct patrols. Most likely, they would attempt to observe or control the best firing positions for enemy snipers, forward observers, MANPADS operators, or mortarmen. At the least, their visible presence might deter an enemy who was seeking easy prey for its attack.

Increase Off-Base SP. As a first step toward controlling the standoff footprint, some means must be found to increase the number of SP available and trained for off-base operations. In contrast to Vietnam, where most air operations were conducted during daylight, modern air warfare is a 24-hour-a-day affair. On the one hand, this fact limits the availability of ground crews and other support personnel as potential security augmentees; a crew chief working 18-hour days maintaining aircraft cannot be expected to man a defensive fighting position during his few hours of rest. On the other hand, this fact also means that flight lines are no longer deserted places where sappers might move undetected: Flight lines, hangars, and related facilities are manned and busy around the clock.

If crew chiefs and other flight-line personnel were given sidearms and some basic weapons training, they could fulfill a limited security function. Security Police would still need to man the perimeter and provide quick-reaction forces, but an emphasis on *owner-user* security (e.g., maintenance personnel provide security for their work area) could free up SP manpower for such challenging tasks as off-base patrolling, ambushes, etc. Expanded use of sensors might also reduce the manpower requirements for close-in defense, allowing for more patrols over a larger area.

If the SP are going to conduct small-unit operations off-base, they will need additional infantry training. During our visits to Security Police field locations, air-base-defense specialists repeatedly told us

that they simply do not get to practice their craft often enough. Security Policemen spend most of their work year guarding flight lines and sensitive facilities or doing base law enforcement and gate-guard duty; few get more than a few days per year training in ground defense. The Joint Readiness Training Center (Ft. Polk, La.) and MAJCOM facilities around the world offer excellent training opportunities, but the typical Security Policeman gets this training only once every few years.

Beyond the individual training shortfalls, SP need to train routinely in the tactical formations for actually conducting combat patrols and other off-base missions. In most peacetime exercises, air-base-defense forces are an amalgamation of flights and elements from many bases; even where individual skill levels are high, the units lack the cohesion found in professional infantry. We fear that such units might simply be outfought by a small, well-trained enemy light infantry or SOF unit.[14]

RAF Regiment Approach. It may be useful to consider the Royal Air Force approach to air base security. Since 1942, the RAF has had a dedicated infantry force, the RAF Regiment, for air base defense. Organized into several field and air defense squadrons, the Regiment operates *primarily* off-base. Regiment personnel plan and command air base defense, but the RAF concept relies heavily on augmentees for inside-the-perimeter posts, patrols, etc. Regimental officers and NCOs train augmentees to proficiency standards determined by the Regiment; that training is ongoing, with regular refresher courses. Personnel assigned to Regimental Field Squadrons are full-time infantrymen who are considered among the best in the entire British military establishment, to the extent that Field Squadrons accept regular rotations to garrisons in Northern Ireland.

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[14]We cannot emphasize strongly enough that we do not mean to criticize the SP troops or their leaders. We were uniformly impressed by the caliber and dedication of the officers, NCOs, and enlisted personnel we encountered as we cut our fairly broad swath through the Security Police community. The shortfalls we describe do not arise from a lack of personnel quality, initiative, or leadership; instead, they are the natural outcome of an organization that, like many others throughout all four services, is trying to do too much with too little.

In our judgment, this model has much to recommend it. Some would counter that the USAF, in its *Safeside Squadron* program, tried and rejected this model during the Vietnam War. *Safeside's* failings, however, originated less in any weaknesses of the approach itself than in the peculiarities of Vietnam-era personnel policies and command arrangements. In particular, the routine use of *Safeside Squadron* personnel as individual attrition fillers to air bases with manpower shortages went entirely against the RAF Regiment model; it undermined unit integrity and doomed the program to failure.[15]

Whether the RAF model *in total* is appropriate or feasible for the USAF, we see its training emphasis on strong infantry skills, its doctrinal emphasis on controlling the standoff footprint, and its organizational emphasis on using augmentees as three aspects worthy of evaluation and emulation.

Surveillance, Firepower, and Mobility. The final elements necessary to detect and defeat the adversary outside the wire are *air surveillance, firepower,* and *mobility.* A several-hundred-square-mile footprint simply cannot be observed adequately by ground patrols. Listening and observation posts, ambushes, and patrols (both mounted and dismounted) need to be supplemented by SIGINT, imagery, and tactical reconnaissance. Unmanned aerial vehicles (UAVs) with simple TV and FLIR sensors, wing-organic assets (e.g., F-16s, A-10s, HH-60s), and other USAF and joint assets (e.g., AC-130s, AH-64s, UH-60s) can provide surveillance, firepower, and mobility for base defenders.[16] Uparmored HMMWVs could also be used for ensuring ground mobility.

In some cases, the USAF can unilaterally assign these assets to fly surveillance; in most, however, air-base-defense sorties need to be built into theater air tasking orders (ATOs). The air component commanders (ACCs) for the various unified commands may need a better understanding of the ground threat in their AORs; where nec-

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[15]See Roger Fox, *Air Base Defense in the Republic of Vietnam: 1961–1973,* Washington, D.C.: U.S. Air Force Office of History, 1979, pp. 110–112.

[16]We have heard anecdotes of light aircraft from the base aero club (a flying club with light planes such as Cessnas) being used to overfly possible MANPADS launch areas in advance of mission launches, for example. In at least one other case, host-nation forces provided helicopters that performed a similar function.

essary, they should take the lead in negotiating the assignment of joint resources for base defense.[17]

Finally, air support for base defense needs to be written into Air Force[18] and joint doctrine and must be incorporated into training and exercises. For example, during *Foal Eagle 94*, close-support missions were planned for air base defense.

Protect Assets Against Attacks

Despite the best efforts of the Air Force, we must recognize that some of the time the attackers will succeed in their mission, and that some percentage of those attacks will do significant damage.

During the Cold War, U.S. and NATO concern about air base survivability led to major program initiatives under the general rubric of air base operability (ABO). Aircraft and personnel shelters, bunkers for munitions and POL, rapid runway repair, and other programs were given priority funding for many years. By the end of the Cold War, USAF main operating bases (MOBs) in Europe were well-prepared to both defend themselves against and operate during air and ground attacks.

With the shift to power-projection operations, many in the Air Force argue that ABO programs can be terminated. They correctly point out that the USAF no longer faces a large, capable air force or special forces the caliber of Soviet *Spetsnaz*. While conceding these points, we believe that USAF reliance on a small number of high-value assets means that limited attacks on a small number of bases could have serious consequences.

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[17]The 7th Air Force Commander and staff in Korea are the only JFACC and staff that we are aware of who have made air base defense against ground threats a priority. During *Foal Eagle 94*, they assigned close-support sorties to air base defense and created an air-base-defense operations center in 7th Air Force's Combined Operations Intelligence Center (COIC).

[18]USAF Security Police doctrine calls for air support, but we are unaware of any other Air Force or joint doctrine that does. For example, Air Force Manual 1-1 contains one short paragraph (3.7a) on air base defense; ground threats are not even mentioned. See U.S. Department of the Air Force, Air Force Manual 1-1: *Basic Aerospace Doctrine of the United States Air Force*, Washington, D.C., 1992. As mentioned earlier, Army Field Manual 100-5 treats rear-area security as a low-priority mission and contains no discussion of air base defense.

It would be dangerously optimistic to assert that the USAF will not encounter such threats in future operations. If anything, ABO is *more* of a challenge during expeditionary operations, in which U.S. forces will lack the amenities of MOBs. Although some programs designed to confuse or defeat air attacks by sophisticated opponents may be less necessary, asset protection and rapid repair are critical if the USAF is to sustain operations under attack.

In particular, we recommend investigating the feasibility of building a small number of hardened shelters for large, high-value aircraft in high-threat theaters; our initial first-order cost estimate for each structure is between $3 and $8 million apiece—not cheap, but far less expensive than the aircraft they would protect. For such aircraft deployed elsewhere, we suggest developing Kevlar blankets[19] or other kinds of expedient protection from shrapnel and small arms for large aircraft that cannot be protected by revetments[20] or shelters, devising plans and kits for rapid shelter and revetment construction, and continuing rapid repair and other programs that help sustain operations during and after attacks. In developed theaters such as Southwest Asia and Korea, additional shelters should be constructed for forward-based[21] and high-value aircraft.

SUMMARY

The USAF is likely to find itself responsible in large measure for protecting its own bases; it cannot rely on either the U.S. Army or host-nation forces to defend it. We believe that securing USAF bases against ground attacks will require some changes in USAF equipment, training, and operations.

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[19]RAND colleague Brian Chow suggested the possibility of Kevlar blankets.

[20]*Revetments* are walled enclosures built to protect aircraft from blast and fragmentation effects of nearby explosions. They are not covered and provide no protection from direct hits.

[21]For example, a squadron of A-10 aircraft are now based at Al Jaber Air Base in Kuwait. Although not intrinsically "high-value" aircraft, these aircraft would play a crucial role in turning back any future Iraqi armored offensive and would deserve a higher level of protection than they might in another context. Their forward position also makes them more vulnerable to various ground and air threats.

Against the penetrating threat, the USAF should take the following steps:

- Improve the situational awareness of base-defense commanders by
  - — providing them with better access to theater and tactical intelligence sources and products
  - — procuring sufficient quantities of advanced sensors such as TASS to ensure that key avenues of approach and important targets are well-protected.
- Improve the tactical mobility and firepower of the defenders by acquiring vehicles such as the uparmored HMMWV.

Defeating the standoff threat demands effort in three primary areas:

- The USAF should employ camouflage, decoys, and deception to confound the adversary's mission planning.
- The USAF should organize, equip, and train its air-base-defense forces to operate off-base in order to secure the areas from which standoff attacks could originate. The USAF should also exploit airpower to acquire intelligence, provide mobility, and apply firepower in support of air base defense.
- Finally, the USAF should maintain its ability to operate successfully during and in the wake of ground attacks on its bases.

Chapter Six

CONCLUSIONS

Defense of air bases against ground attack has been traditionally viewed within the USAF as a Security Police problem. We judge that it should be more properly viewed as an *airpower* problem, because airpower is so critical to U.S. national military strategy and the U.S. way of war. And because of this criticalness, air base defense is ultimately a *joint* problem.

The USAF, as the nation's proponent of aerospace operations, must take the lead in ensuring that air bases can function in future conflicts. *Secure bases are a prerequisite for airpower operations; ensuring that they are available should therefore be a primary responsibility of USAF leadership.*

Specifically, the USAF should define a set of key operational tasks associated with base defense and challenge both itself and the broader DoD community—the Joint Staff, OSD, and theater CINCs—to develop innovative ways of accomplishing those tasks. Doctrine, training, exercises, deployment timelines, and war plans all need to be modified to recognize the importance of base defense and to prepare joint forces for their respective roles in ensuring the safety of U.S. land-based airpower.

The ground threat to air bases is likely to vary greatly from scenario to scenario, and it may be difficult to predict which contingencies will be most stressing to air base defenses. Uncertainty, however, is not a reason to ignore a potentially serious threat; the USAF needs to take steps in peacetime to defeat the full range of threats. Ad hoc measures taken after air bases have been attacked are likely to be too little and too late in modern warfare. As Air Force Manual 1-1 rightly

observes, "Waiting until a war has started before correcting deficiencies identified in peacetime has proved disruptive and costly."[1] We earnestly hope that the importance of air base defense need not be a lesson written in blood and loss.

The relatively low-cost measures outlined in this report have the potential to significantly enhance air base defenses against ground attacks. Our assessment points toward a multifaceted approach to air base defense in which both the depth of the defense and the variety of countermeasures envisioned would be intended to make air base attack too daunting to be a reliable countermeasure to U.S. airpower.

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[1]U.S. Department of the Air Force, Air Force Manual 1-1: *Basic Aerospace Doctrine of the United States Air Force, Volume II,* Washington, D.C., 1992, p. 203.

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