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Air Cooperation

Imperial and Royal Austro-Hungarian Marine  
Corps

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## Foreword

While this field manual is published as part of the K.u.K. Marine Corps' series on Fourth Generation war, its focus is transitioning aviation from the Second to the Third Generation, i.e., from attrition to maneuver warfare. As is the case with ground forces, this is a necessary step in adapting to Fourth Generation war, but is not necessarily sufficient. The subject of aviation in Fourth Generation war remains a challenging one because of the "David vs. Goliath" problem. A number of thinkers on Fourth Generation war suspect that aviation may have no attack role in this new type of conflict.

As with the other manuals in this series, it is written from the standpoint of the U. S. Marine Corps, because most of the members of the seminar which writes the manuals are U. S. Marines. However, the U. S. Marine Corps has no aircraft optimized for operating in the manner this field manual prescribes, and its procurement plans suggest it will be even less well equipped in the future. In contrast, the *Schlachtgeschwader* which support the K.u.K. Marine Corps have recently been equipped with the excellent Halberstadt CL-II, an aircraft designed specifically for ground support.

From the equipment perspective, this manual points to a significant advantage the K.u.K. armed forces now possess over the U. S. Marine Corps.

Montecuccoli

Hofkriegsrath (See)

Pola, July 2009

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# Introduction

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*“War is both timeless and ever-changing. While the basic nature of war is constant, the means and methods we use evolve continuously.”*

– MCDP-1 *Warfighting*<sup>1</sup>

**A** cohesive doctrine will help Marines cooperate with each other in the conduct of war. Our approach to the conduct of war derives from our understanding of its nature.<sup>2</sup> From this, we develop a theory of war which becomes the foundation for the way we prepare for and wage war and the base of our doctrine.

## **THE NATURE OF WAR**

At first glance, war seems a simple clash of interests. On closer examination, it reveals its complexity and takes shape as one of the most demanding and trying of human endeavors. War is an extreme test of both intelligence and will. Friction, uncertainty, fluidity, disorder, and danger are its essential features. War displays broad patterns that can be represented as probabilities, yet it remains fundamentally unpredictable. Each episode is the unique product of myriad moral, mental and physical forces.<sup>3</sup>

## **THE THEORY OF WAR**

Action in war, at all levels, is the result of the interplay between initiative and response with the object being to seize and maintain the initiative. All warfare is based on concepts such as speed, focus, surprise, and boldness. Success in war depends on the ability to focus our efforts against critical vulnerabilities or centers of gravity and to recognize and exploit fleeting opportunities.<sup>4</sup>

## THE CONDUCT OF WAR

The Marine Corps' doctrine for the conduct of war is Maneuver Warfare. "Maneuver Warfare is a warfighting philosophy that seeks to shatter the enemy's cohesion through a variety of rapid, focused and unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy cannot cope."<sup>5</sup>

This concept for winning quickly against a larger foe on his home soil with minimal casualties and limited external support is based on rapid, flexible, and opportunistic maneuver. This concept of warfighting helps us function effectively in an uncertain, chaotic, and fluid environment – in fact, we seek to exploit these conditions to our advantage. We can sense and use the time-competitive rhythm of war to generate and exploit superior tempo. We do not need to change our basic doctrine from situation to situation, losing proficiency, because it is consistently effective across the full spectrum of conflict. We recognize and exploit the fleeting opportunities that naturally occur in war. These opportunities occur at the moral, mental and physical levels.<sup>6</sup>

Maneuver Warfare is a way of thinking in and about war that should shape our every action. It is a state of mind born of a bold will, intellect, initiative, and ruthless opportunism. It is a state of mind bent on shattering the enemy morally, mentally and physically by paralyzing and confounding him, by avoiding his strength, by

quickly and aggressively exploiting his vulnerabilities, and by striking him in the way that will [shatter his system]. In short, Maneuver Warfare is a philosophy for generating the greatest decisive effect against the enemy at the least possible cost to ourselves and in the shortest possible time – a philosophy for “fighting smart.”<sup>7</sup>

## **AIR COOPERATION IN MANEUVER WARFARE**

Marine Corps doctrine thus far has failed to describe how best to employ aerial forces in Maneuver Warfare. While there are countless battles in history which serve as a basis for understanding Maneuver Warfare, man’s ability to use the sky in battle is much more recent. As combat has evolved and equipment has become more complex, warriors have become more specialized in the set of skills they bring to the battlefield. We depend on other warriors to bring skills and abilities complementary to our own which will allow our combined team to master our adversary. This manual is intended to provide a basis for harmonious actions and mutual understanding between ground warriors and air warriors. It will explain how best to employ aerial forces, in cooperation with ground forces, to take apart the enemy’s system of fighting.

It should be noted that the term “Air Support” has been purposefully replaced with “Air Cooperation”. Air Support implies aerial forces performing tactical tasks as dictated by the supported unit. Air

Cooperation is meant to imply a greater measure of initiative by the aerial force in accordance with the ground unit commander's intent. This is the essence of mission-type orders (*Auftragstaktik*).

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## Chapter 1

# People

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*“I always regarded myself as a ground combat soldier who happened to possess uncommon freedom of maneuver and firepower, and therefore I acted accordingly.”*

— Hans-Ulrich Rudel<sup>1</sup>

Consider the not far-fetched scenario of every branch of the armed services flying the exact same aircraft. Indeed, the near future will show a purely administrative vertical landing procedure to be the primary difference between Marine fixed-wing aircraft and those operated by other services. Why is there a need for Marine air at all? What makes the Marine pilot different? Why do Marines alone send their pilots through six months of ground combat training before sending them through flight school? Answers to these questions are mandated by having joint, single-type aircraft. In the answers, you will find the seeds of Air Cooperation – where understanding the intent of the ground commander and acting with initiative in order to attain it are paramount.

### **A NEED TO CHANGE THE NATURE OF THE AVIATOR**

Throughout flight training, regardless of service (pilots from each service are sent to each other's primary training schools), pilots are trained as technicians to operate a piece of machinery. At the completion of their training they are required only to be able to safely operate their aircraft and follow tasking as given by the command and control system. Performing some menu of tasks in response to the requests of a supported unit limits aerial forces to the Second Generation of warfare, i.e., to being not much more than airborne artillery.

In contrast, pilots flying in cooperation with ground forces according to the tenets of Maneuver Warfare

must be able to see and understand the ground battle, and make decisions consistent with the ground unit's objectives. It is necessary to change the nature of the aviator from a reactive autopilot, easily replaced by an unmanned aircraft receiving target coordinates via a digital handoff system, to a proactive decision-maker and intimately involved member of the cooperating ground unit.

Air Cooperators are capable of operating with very little command and control. Instead they operate off the ground commander's intent. Some aviators are not capable of this. It requires aviators who can think independently and make decisions based on the evolving ground situation. A mutual trust and bond between the ground commander and the Air Cooperator will allow the pilot to increase speed and tempo by identifying and engaging targets without the requirement of obtaining clearance through the ground commander first. Aircraft flown this way are more than just another artillery round. In contrast, pilots who are reduced to mere technicians (by training, aircraft characteristics, command and control, or whatever else) can be replaced by machines.

Air cooperating squadrons tend to be more egalitarian than most combat units. Often a junior pilot will have the more current qualification and expertise needed to accomplish a mission. In the tactical environment, a senior pilot will yield to the more experienced junior's judgment. Pilots cooperating with ground units in Maneuver Warfare depend heavily on experience. The close bond

between the ground and air is a human relationship that cannot be replaced by rank. The situational awareness of an aircraft in cooperation with the ground should be valued, regardless of rank. Trust by the seniors in the abilities of their subordinates and by juniors in the competence and support of their seniors is essential, not just among aviators but also between aviators and cooperating ground combatants. Relations should be based on honesty and frankness, regardless of disparity between grades.<sup>2</sup>

## **EDUCATION**

We must be careful not to train our pilots to be skilled in the wrong art. Training exercises that do not have maneuvering elements on the ground and lack willful and deceptive enemies teach only techniques and procedures, not tactics. Training for combined arms without maneuvering elements and freedom to accomplish the commander's intent is preparing for executing "9-lines" only. It does not train forces for "fire and maneuver," only for "fire and deconfliction."

## **AN UNDERSTANDING OF GROUND WARFARE**

Air Cooperators require a comprehensive Maneuver Warfare education program. The goal should be to integrate the aviator fully into the Marine Air Ground Task Force (MAGTF). One of the differences between a Marine pilot and any other is the rudimentary infantry training experienced at The

Basic School. However, receiving no further education on Maneuver Warfare beyond the fundamentals learned at The Basic School is antithetical to what is required of a Maneuver Warfare force. Comprehensive and continuing education in Maneuver Warfare is essential for aviators as well as ground combat Marines.

Air Cooperation requires an intimate relationship between air and ground units. Books and other publications on ground warfare (which don't appear to have direct relevance to pilots, and therefore wouldn't be read by them without outside influence) are important, but they are not sufficient to educate pilots as to how ground units operate in general, let alone how individual units behave as an extension of their commander's personality. Pilots should spend as much time as possible with their cooperative ground unit. Even if it is only possible in training to assign one section of aircraft to each supported battalion, it is important to create a relationship. This will yield a level of understanding above and beyond that created by a liaison representative.

When the supported ground unit is the Schwerpunkt on the ground, the cooperating air unit in direct support is the Schwerpunkt in the air, which means everyone else in the air supports it. The Air Cooperators, having established a close relationship with the main effort, can then leverage other Air Cooperators without current situational awareness, as well as joint "bomb trucks", to mass fires as needed. You do not need to have ordnance on the

aircraft in order to perform some of the functions of Air Cooperation.

Air Cooperators will use the ground commander's intent as their own. To this end, the cooperating pilots will attend the ground unit's rehearsal of concept (ROC) drills. Performing an air-only sand table exercise and starting out by saying, "This is what the ground elements want to do," is unsatisfactory. Yet the vast majority of today's Marine pilots do not feel like they have to attend the ground element's sand table exercises, nor do the ground elements expect the pilots to be there. Air Cooperators must be able to look at the ground element's plan from the tactical viewpoint and participate in forming it. There will be issues with logistics, fuel, ammunition, forward operating bases, sortie rates, etc. Sand table exercises must be integrated.

During the last ROC drill just days before the [Second Iraq] war began Major General [James] Mattis, the 1st Marine Division Commander, was very clear in articulating his concerns and his desires for Marine Aviation. At the conclusion of the drill, the two thousand or so leaders in attendance broke up into the typical 'what do you think' side-bar discussions. The Marine aviators attending the drill were the normal mix that represented Marine Air Wings. Cobra, Harrier, Hornet pilots and Hornet Weapons and Sensors Officers stood in a circle discussing their observations of the division's scheme of maneuver. There were other Marine aviators among the group. These aviators were

the division's Forward Air Controllers (FACs) and Air Officers (AOs). Serving a twelve to eighteen month tour with the infantry, it was their job to share their aviation expertise with the "grunts" and coordinate and control Close Air Support (CAS). They too represented the mix of rotary-wing and fixed-wing aviation of the Marine Air Wing and they understood they were critical to the infantry's success.

It was at this point that General Mattis unexpectedly broke into the aviators' circle and laid his personal battle map, an aviation Joint Operational Graphic, on the sand in the center of the aviators.

"Gents, let me explain one more time my intent for Marine aviation." "Chaos" (General Mattis's call sign) explained to the aviators in explicit detail the routes of maneuver and expected timeline for the first thirty-six hours of the war. He then explained with less clarity where he expected to maneuver his regimental combat teams, a close equivalent to an Army Brigade, for the remainder of the campaign, ultimately stopping at Baghdad six to seven weeks later.

"My principal enabler for speeding the division's advance is Marine Aviation. Therefore, my biggest concern is Marine Aviation's ability to find Iraqi artillery and surface-to-surface missiles capable of delivering chemical munitions thus slowing our speed of advance. I don't want you concerned too much about Iraqi tanks, I have the best anti-tank

weapon in the world, and that's the M-1. Where are my Cobra guys?"

Three or four pilots, one of them a squadron commander, raised their hands and General Mattis again pointed to the map and said, "You guys need to be just behind but no further than my forward lines and looking for targets to my immediate front and to the maximum range of your TOW and Hellfire missiles. If there's armor to our front, you will be directed to attack key vehicles before they get within range of my M-1's. If there's nothing going on, I want you to land behind my lines and save gas. If there's something big I'll expect your FACAs to work with the fixed-wing CAS and direct them where you need them. Where are my fixed-wing guys?"

About ten aviators raised their hands.

"You guys are equally as critical; you need to be ranging from five clicks to sixty miles to my front and along the flanks of my route of advance and find and kill Iraqi artillery, surface-to-surface missiles, command posts, and armored columns in that order of precedence. You also need to screen my eastern flank and alert me of any Iraqi movement towards the west. After that, fly deeper and look for and kill surface-to-surface missiles, command posts, and massed Iraqi forces. I will also want you to be available for CAS, but I don't expect that to happen often. The Cobra is my best CAS asset and that's what I plan on using it for. Above all else, I am most vulnerable to Iraqi artillery

capable of delivering chemical munitions. You fixed-wing guys are the eyes of my division; you have to find and destroy the Iraqi artillery before it can engage my Marines and I'll engage or maneuver around the rest; any questions?"

There weren't. And as operations began, things worked well.<sup>3</sup>

Only a very few pilots, including just two squadron Commanding Officers (COs), on their own initiative attended 1<sup>ST</sup> Marine Division's ROC drill. No other pilots, group commanders, nor operations officers were in attendance. This is not a shortcoming of specific individuals; rather, it is reflective of Marine Air's mindset in general. The Commanding General had a clear commander's intent and very specific missions for his aviation assets. When the fixed-wing pilots returned and shared the information with the rest of the Marine Air Group (MAG), the planners, who had been planning in a stovepipe, were incredulous that "They changed their plan again!"

Commander's intent is "designed to help subordinates understand the larger context of their actions. The purpose of providing intent is to allow subordinates to exercise judgment and initiative – to depart from the original plan when the unforeseen occurs – in a way that is consistent with the higher commander's aims."<sup>4</sup> Although the situation may change, subordinates who clearly understand their commander's intent and act to accomplish that purpose can adapt to changing circumstances on

their own without risking diffusion of effort or loss of tempo. Subordinate commanders will be able to carry on their mission on their own initiative and through lateral coordination with other subunits, rather than running every decision through the higher commander for approval.

The trust exhibited by the Division Commander in the air component during the opening push of Operation Iraqi Freedom is worth noting. Maneuver Warfare has been called “Trust Tactics.” Trust allows high initiative.

Not only must we not stifle boldness or initiative, but we must continue to encourage both traits *in spite of mistakes*. On the other hand, we should deal severely with errors of inaction or timidity. We will not accept lack of orders as justification for inaction; it is each Marine’s *duty* to take initiative as the situation demands. We must not tolerate the avoidance of responsibility or necessary risk.

Consequently, trust is an essential trait among leaders— trust by seniors in the abilities of their subordinates and by juniors in the competence and support of their seniors. Trust must be earned, and actions which undermine trust must meet with strict censure. Trust is a product of confidence and familiarity. Confidence among comrades results from demonstrated professional skill. Familiarity results from shared experience and a common professional philosophy.<sup>5</sup>

Confidence among comrades stemming from demonstrated professional skill and familiarity is what induces ground combat units to send already on-station Navy and Air Force aircraft away when Marine air checks in to provide support. Air Cooperating units have an even more intimate level of trust, enabling greater initiative.

## **GROUND COOPERATORS**

*“If everyone is thinking alike, then somebody isn’t thinking.”*

– George S. Patton<sup>6</sup>

This special bond between the ground forces and the aerial forces requires a commitment on the ground commander’s part as well. The use of air by ground units to facilitate maneuver is something that needs to be learned and cultivated by ground commanders, not just aviators. The ability to cooperate directly, grunt to pilot will facilitate the initiative upon which Marine Corps tactics depend. The ground commander must understand how to harmonize the aviation combat element’s actions with the ground combat element’s in order to achieve a decisive effect. It is not about how many things blow up or how many tons of ordnance are dropped. It is about how airpower can be used to take apart the way the enemy operates.

Liaison representatives such as Forward Air Controllers, Joint Terminal Attack Controllers (JTACs), Air Officers, or Air Liaison Officers

(ALOs), who use the command and control system within a ground unit in order to allow air to support it, are insufficient to generate the close relationship necessary for Air Cooperation. A liaison officer, often from a non-attack community, acting as the sole informant to the ground commander for what air capabilities are, has historically left the ground warrior's understanding of air support wanting. Furthermore, if the schools and publications which act as the liaison officer's resources are not steeped in Maneuver Warfare, then he will be providing information adhering to the Second Generation of warfare.

Ground units, being unfamiliar with air capabilities, may use less appropriate capabilities because they are comfortable with them, not understanding what weapon is best for a target set. Guns and rockets may be the most appropriate weapons for Fourth Generation conflicts, but neither ground units nor aircrew have been familiar enough with them to make them useful. They are perceived as imprecise by ground commanders, when in fact guns and rockets are very precise with small collateral damage when employed by trained aircrew. It is the aircrew's lack of practice with guns and rockets which results in poor technique and marksmanship. Because aircrew have been training to become skilled in just one art, dropping bombs, the ground commanders think of guns and rockets as an area weapon instead of the precise, low collateral damage weapon that they have been demonstrated to be in past conflicts.

Ground commanders preferred the Laser Maverick air-to-ground missile to other ordnance during the insurgency in Anbar, Iraq because they were comfortable with its accuracy and small warhead. However the Laser Maverick did not always have the desired effects that the ground commanders were looking for. Pilots repeatedly reported targeted enemy fighters escaping from a building that had just been struck with a Laser Maverick, which was never designed to destroy buildings. Similarly, pilots frustrated with the ground units were not privy to the ground commanders' political considerations which, in some cases, prevented 500-pound bombs from being dropped within some cities. A close relationship between cooperating air and ground units results in a more thorough understanding of each side's capabilities, constraints, and restraints, leading to solutions to otherwise difficult problems, as well as increased trust as a result of confidence and familiarity.

## **RUTHLESSLY GROUND-ORIENTED PILOTS**

*"You can't say civilization don't advance, however; for in every war they kill you in a new way."*

—Will Rogers<sup>7</sup>

Innovations in ideas, doctrine and tactics will only come from warriors who achieve a full understanding of their mission. The contrast between the evolution of the AV-8B and A-10 communities during the time between Desert Storm

and Operation Iraqi Freedom is telling. The 132 A-10s were brilliant in Desert Storm, saving the platform from planned early retirement by killing more targets than 2000 high speed jets, demonstrating capability, survivability, and usefulness. The AV-8Bs performed admirably as an attack community, but the fact remains that the AV-8B is the most vulnerable of any aircraft used for Close Air Support.<sup>8</sup> Twelve years later, the AV-8B community returned to Iraq with a night attack and radar variant and was pioneering the “LITENING” targeting pod with unprecedented night and precision-guided munitions effectiveness. The A-10s, half of them mothballed immediately after their stellar performance in the first Gulf War, showed up to OIF with the same extremely limited night and precision-guided munitions capabilities. For all intents and purposes the A-10s were the same day-VFR, barometric bombing aircraft and were put to shame by the other CAS communities. However, true to their Air Force roots, the A-10 community did come with improved air-to-air defensive capabilities, having developed tactics to utilize the advanced AIM-9X missile.

It is less aircraft characteristics than the training focus of the pilot communities that make the difference in air cooperation performance. One of the design characteristics of the A-10 was its optimization to be a sole-purpose ground support aircraft so that it “could not be used as an air-to-air fighter.” Yet the Air Force has equipped it to carry the AIM-9X and the pilots practice air-to-air regularly for self-defense. The one community of

pilots that has the aircraft to lead the way in close air support is instead regarded with disdain due to multiple friendly fire incidents, reflecting a problem with the way the community trains for integration with ground forces. Given the choice between Marine Air and A-10s, ground combat Marines will choose Marine Air every time.

The Marine Corps used to have the A-4, A-6, OV-10, F-4, RF-4, AV-8 and F/A-18 aircraft, each with their strengths and weaknesses, special capabilities, and areas of expertise. It was understandable that one community concentrated on air-to-air missions, especially in a non-unified environment. In the near future there will be far fewer types of aircraft, perhaps only one multi-role fighter.

Air-to-air is a full-time job. It is a perishable skill and a fighter pilot's performance can suffer after even a weekend off. Our pilots may be fighting an enemy who has not taken time out of his training to practice bombing. Nor should we take time out of our ground support training to practice air-to-air. You would not send A-10s to sweep the skies of F-22s. Why send air-to-ground pilots? Is it a mistake to train pilots to be jacks of all trades, masters of none? Where will a squadron focus its training effort? Commanders of "fighter" squadrons may be inclined to focus efforts on air-to-air combat and not support to ground troops. One common type aircraft makes "servicing JTARS" truly plug and play to the Combined Forces Air Component Commander (CFACC). "VMFA" aircraft are much more enticing to the CFACC than "VMA" and are more

likely to get pulled from supporting Marines to perform a joint fighter role.

If Marine squadrons divide their training time we will not be as good at air-to-ground missions as we could be and we will not be as good at air-to-air missions as other services. If we are not good at air-to-ground, the supported ground units will replace us with better performing Unmanned Aerial Systems (UASs). If the pilots are not as good at air-to-air, the Air Force and Navy will be more than happy to volunteer their better performing squadrons to take over that aspect of the battlespace. Air Cooperators will still need to be able to perform self-defense and run intercepts for the amphibious task forces. In order to operate in the battlespace, Air Cooperating pilots will need to have a fundamental understanding of the air-to-air world and how to collaborate with air-to-air fighters. However, Marine pilots do not need a mastery of Anti-Air Warfare skills as much as they need a mastery of Air Cooperation with ground forces.

In order to be victorious in battle, we must leverage the joint environment to use the right tools for the job. Air-to-air does not need to be practiced in close cooperation with ground forces. But not just anyone can perform Air Cooperation with the Marine Air Ground Task Force.

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## Chapter 2

# Ideas

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*“Attack the enemy’s plan.”*

– Sun Tzu<sup>1</sup>

**W**e must be careful to not confuse attrition with shaping. Attrition is not shaping. The “Desert Storm” mentality of a lengthy period of “shaping” fires (really “attrition”, but wrapped in Third Generation Warfare terminology) followed by a pushing contest where the “artillery conquers and the infantry occupies” is attrition warfare, and as useful as the Maginot Line. The Maginot Line as an attrition warfare chess piece was functionally successful. However, this “system of systems” proved operationally impotent in the face of an enemy with a faster Observe-Orient-Decide-Act (OODA) cycle.

When asked the question of how to use air, a commander should never respond, “I’m going to use air to attrite the enemy.” Mere attrition wastes much of aviation’s potential. The idea of air destroying enemy forces to the point that our advancing units will not need to fight is not justified by historical precedent. This raises an obvious question: if not for attrition, for what purposes should aviation be employed?

### **AERIAL FORCES UNCOVER DECISIVE OPPORTUNITIES FOR GROUND COMMANDERS**

Reconnaissance for the ground commander is perhaps the most important function of aerial forces. Since war began, commanders have wanted to see over the next hill. Yet many pilots think that if they are “winchester” (out of ordnance) they should return home even if they have half-empty fuel

tanks. Likewise, many squadrons with specifically designed reconnaissance equipment do not make this mission a priority.

In the same manner that a cooperating pilot can increase the ground force's tempo by engaging targets without first obtaining clearance, through self-directed reconnaissance a pilot can discover opportunities for the ground commander. As Operation Southern Watch came to an end, the Marine Air Group had about six weeks prior to the start of Operation Iraqi Freedom. The squadrons operating in-theater were very focused on the Air Tasking Order (ATO)-driven enforcement of the no-fly zone and the chance to drop a bomb. The vast majority of the joint air flew over the entire Iraqi Army with barely an acknowledgement that the enemy was there. Only a few ground-centric pilots who were read in on the ground commander's intent started to build target sets, on their own, of the fixed dispositions of the Iraqi forces. The results of this self-directed reconnaissance became crucial during the invasion.

Air Cooperating forces never accept just servicing targets. Instead they are both creating information and pushing information down and around as needed to maintain the close bond with the ground forces. The Air Cooperators will prioritize and select targets based on a thorough awareness of the ground commander's intent and focus of effort and their own professionally acquired background in air and ground combined arms tactics. This has been

called “armed reconnaissance in support of the Schwerpunkt.”

Strike Coordination and Reconnaissance (SCAR) and Armed Reconnaissance (AR) without commander’s intent is merely finding something and killing it. A sterile targeting guidance such as a Reactive Air-to-Ground Matrix (RAGM) tells pilots what types of targets they should hit, but not the context of why they are hitting them. History and experience have shown that during wars of maneuver, there are more enemy targets on the ground than the aerial forces have ordnance to engage. The question becomes, which targets does the pilot want to hit? To answer that question, the pilot needs a broad context.

Aerial forces must focus their efforts in accordance with the commander’s intent and scheme of maneuver. In a fast-moving campaign, when told to shape the battlespace ahead of the oncoming ground forces, there will be no command and control telling the pilots what to do. The aerial forces must operate with intuition, ground commander’s intent, scheme of maneuver, and focus of effort. This requires the right training and experience. It will only come with practicing and working with maneuver commanders. Conventional Armed Reconnaissance and airborne Forward Air Controller (FAC-A) training overlaps some of the same skills required by Air Cooperation. The differentiating close bond between the aerial forces and the ground forces is established over time by training as a harmonious whole with the ground forces, using the ground

commander's intent as the aerial force's own, and being ruthlessly ground-oriented.

## **AIR PULLS THE GROUND MANEUVER AROUND SURFACES AND THROUGH GAPS.**

Airpower, working as the 'hammer' to ground power's 'anvil,' made an ideal complement to the ground advances [in WWII]. In all likelihood, the truly progressive characteristics of airpower are those that allow ground power to succeed more quickly and cheaply than it otherwise would.<sup>2</sup>

The ground forces may know where the enemy is, but they won't know specifically that he is on the other side of the hill, or wall. Air Cooperators flying above the ground forces can see the enemy and attack him directly, or cue the friendly forces to his presence.

In WWII, "the Luftwaffe used red parachute flares dropped over Soviet tank assembly areas discovered near Jarcewo in close proximity (several kilometers) to division units and unknown at that moment to the ground troops. The Luftwaffe used the same signal later in July 41 to alert 7.Pz.D. [7<sup>th</sup> Panzer Division] troops immediately to the danger of Soviet tanks already advancing towards the German lines. Within seconds of the signals being released, hundreds of Germans knew immediately what was coming and from where."<sup>3</sup> The pilots were ruthlessly focused on assisting ground troops. They

used simple, creative signals that could not be jammed and did not require special equipment to receive. They flew low and slow enough to gain situational awareness themselves, and then quickly cut through the friction and fog of war to provide that situational awareness to the ground units.

Air Cooperators can pull a smaller friendly ground unit through gaps in a much larger enemy unit's defenses. Marine ground commanders who have taken part in this type of Air Cooperation warfighting experiment report being able to move twice as fast and with twice the security.<sup>4</sup>

The following account from Hans Rudel serves as a good example of a ruthlessly ground-oriented pilot making a difference by identifying surfaces and gaps and informing the ground forces.

In the course of operations during this period [the beginning of 1944 in South Russia] we witness a most unusual drama. I am out with the anti-tank flight S. and S.W. of Alexandra; after firing off all our ammunition we are homeward bound for Kirovorograd to refuel and remunition [sic] for another sortie. We are skimming the almost level plain at a low altitude half way to Kirovograd and I am just above a dense row of hedges. Behind it twelve tanks are on the move. I recognize them instantly: all T 34s heading N. In a twinkling I have climbed and circled around the quarry. Where on earth have they come from? They are Soviets beyond all doubt. Not one of us has a round of ammunition left. We must therefore let them

rumble on. Who knows where they will get to by the time we can return with fresh ammunition and attack them.

The T 34s pay no attention to us and proceed on their way behind the hedge. Further north I see something else moving on the ground. We fly over at low level and recognize German comrades with type IV tanks. They gaze up at us from their tanks, thinking of [anything] else but the nearness of an enemy and a possible skirmish. Both groups of tanks are travelling towards each other, separated only by this tall line of bushes. Neither can see the other because the Soviets are moving in sunken ground below a railway embankment. I fire red Verey flares, wave and drop a message in a container in which I inform my tank colleagues who and what are coming in their direction two miles away, assuming they both keep to the same course. By dipping my aircraft towards the spot where the T 34s are travelling at the moment, I tip them off to the nearness of the enemy. Both parties drive steadily on. Circling low we watch for what is about to happen. Our tanks halt at a point where there is a gap of a few yards in the hedge. At any minute now they may both be suddenly surprised by the sight of the other at point blank range. I wait tensely for the second when both will get the shock. The Russians have closed down their turret-tops; perhaps they suspect something from our astonishing maneuvers. They are still rolling in the same direction, travelling fast. The lateral distance separating the two parties is not more than fifteen or twenty yards. Now!

The Russians in the sunken ground have reached the gap and see the enemy in front of them on the other side of the hedge. It takes exactly two seconds for the first IV tank to set his opposite number on fire at a range of twenty yards; bits and pieces pepper the air. In another few seconds – up till then I have not seen a shot fired from the rest of the T 34s – six Russian tanks are ablaze. The impression is that they have been taken completely by surprise and have not yet grasped what is happening even now. Some T 34s move in closer under cover of the hedge, the rest try to escape over the railway embankment. They are immediately picked off by the German tanks which have meanwhile got a field of fire through the gap. The whole engagement lasts one minute. It is in its way unique. Without loss to ourselves every one of the T 34s have [sic] been destroyed. Our comrades on the ground are proudly elated at their success; we are no less delighted. We throw down a message of good wishes and some chocolate, and then fly home.<sup>5</sup>

## **AIR HARDENS SURFACES AND SOFTENS GAPS.**

Airpower supports maneuver. “Without air, maneuver cannot be consummated; and air, by inhibiting maneuver, facilitates one’s own maneuver. Air itself accomplishes little in attacking supplies and Lines of Communications (LOCs). If the enemy’s supplies – particularly fuel, which is most readily interchangeable – can be captured

through high rates of advance rather than destroyed, so much the better.”<sup>6</sup>

Surfaces and gaps may refer to the physical disposition of combatant ground forces or aerial forces. They may also be represented by any strength or weakness in time, space, or capability. The uncommon freedom of maneuver and firepower possessed by aerial forces allows them to provide lethal and nonlethal actions that span the spectrum of activities to shape the battlefield, disrupting what the enemy’s plan relies on. Air Cooperators’ speed and independence of terrain give them a distinct advantage over the enemy’s ability to react to them. We can expect the enemy to disguise his dispositions in order to lure us against a surface that appears to be a gap. Air Cooperators can shape the battlefield by hardening surfaces where there appeared to be friendly gaps before, and exploiting and softening enemy gaps at a speed and tempo that makes it difficult to counter. An example of this type of shaping comes from the Blitzkrieg through France where “Rommel personally called for air attacks by Stukas several kilometers in front of his columns to “scatter” enemy forces.”<sup>7</sup> When the Panzer units attacked through the positions, the enemy was on their heels. Rommel’s focus was not the destructive effect of the Stukas, but weakening the enemy’s ability to resist. Air Cooperators usually can provide a faster speed and tempo of shaping than can be done with artillery.

Air Cooperators can also shape the battlefield when on the defensive by disrupting the enemy’s entrance

into the cooperating ground force's engagement area. When the enemy does enter they will be strung out and piecemeal. During the 1940 campaign in France, "the German air attacks in support of 7.Pz.D took place almost universally at least a kilometer or more away from the positions of the division. Interrogations of prisoners conducted by the Ic [S-2] staff in the Operations Detachment of the division show that the German air attacks disrupted Allied road movements and silenced artillery, the latter effect often taking place due to the presence of the Stukas. In the East, German air attacks broke up potential Soviet tank attacks by disorganizing strong armored formations in their assembly areas and reduced artillery fire to acceptable levels or silenced it."<sup>8</sup>

Air Cooperators can introduce chaos and friction into the enemy's OODA cycle. In the time-competitive rhythm of battle, Air Cooperators can buy time for friendly forces by disrupting the enemy's ability to move, reposition and counterattack. Cooperating aerial and ground forces can work together to create pockets of enemy forces and destroy them piecemeal. During the battle of the Falaise Gap, the Allies used P-47 Thunderbolts and Hawker Typhoons to rain carnage on the trapped divisions of the German Army. Although over 100,000 German soldiers escaped, they left behind approximately 150,000 prisoners, over 10,000 dead and so much destroyed materiel that the roads were impassable.<sup>9 10</sup>

The concepts espoused in this manual have in some part been used by Special Operation Forces (SOF) for some time. SOF put high priority in Finding and Fixing their intended targets and have developed specialized manned and unmanned aerial capabilities to Find, Fix and Finish from one platform. SOF also utilize slower speed, lightly or unarmed aircraft to leverage the more powerful ordnance carried by jet fighters. They put highest priority on habitual training between their assault forces and aerial cooperators. Before every operation, integrated Air/Ground special operators are briefed so that everyone understands the scheme of maneuver, priority of efforts, etc. Aircrews flying both rotary and fixed-wing aircraft are inculcated in understanding the Ground Assault Force (GAF) scheme of maneuver so they can act independently without the delay and confusion of establishing communications to seek permission.

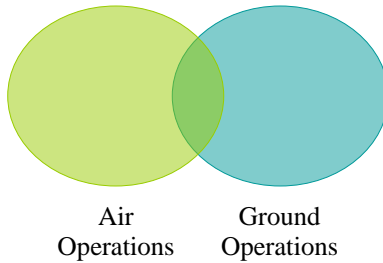
The habitual training principle and specific skill sets are so important to SOF that during Operation Iraqi Freedom, specific units were requested via Requests for Forces (RFFs) to support them. A special task unit of A-10, F-15E, F-16 and F-14 aircraft was assembled in Qatar under control of Special Operations. Notably, the Tomcats were taken off the USS Kitty Hawk because they had the requisite FAC-A aircrews needed by Special Operations and the Air Force did not have any available.

They have arrived at these tactics on their own because they are “special” and unencumbered by service Title 10. This technique has been proven

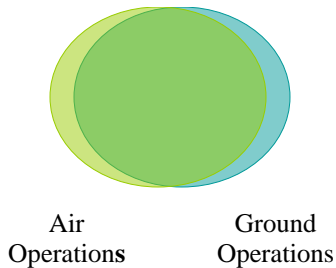
repeatedly and extensively by Special Operations Command (SOCOM) to the point where they are now standing up new PC-12 squadrons to facilitate. Yet we have not used these proven tactics for the conventional forces.

## CLOSE SUPPORT TO GROUND FORCES

Current CAS



Air Cooperation



When environmental conditions such as darkness or fog prevent aerial forces from cooperating as “soldiers who happen to possess uncommon freedom of maneuver and firepower”, the fluid, chaotic nature of the battlefield will require close

coordination between ground and aerial forces in order to prevent fratricide. When the pilot cannot discriminate between friendly and enemy forces, information for the employment of weapons must come from the ground unit. Indeed, there will be times the ground unit requires fires to be directed in an area where there are no identified enemy targets. This is what Close Air Support (CAS) has traditionally looked like. It brings a slowing in speed and tempo, which is never desirable but sometimes is unavoidable. It is worth noting that at times Maneuver Warfare does not look like it. The difference is having an understanding of what you are doing and why.

## **“KINETIC”**

“Here I am with two bombs and 20 minutes playtime. Use me or lose me.”

The joint command and control system for CAS is inconsistent with the Maneuver Warfare mission concept. CAS does not facilitate fire and maneuver so much as it facilitates fire and deconfliction. It does not so much enhance maneuver as interrupt maneuver while the CAS mission is executed. Then, once it is over, the ground forces maneuver again. It is useful for processing “unbriefed air” but the control measures slow speed and tempo, and by design completely remove initiative. For ruthlessly ground-oriented, Schwerpunkt-aware Air Cooperators, it remains a useful deconfliction method for bringing in joint “bomb trucks” with minimal time on station when massed fires are

needed. Indeed, these “bomb trucks” do not have to be manned.

Only when the pilot is unable to ascertain friendly from enemy, due to darkness, bad weather, or battlefield obscurations, or is not familiar with our ground forces and their way of battle, are the micromanaging control measures of joint CAS necessary for deconfliction purposes. In times like these the aircraft revert to not much more than “bomb trucks” acting as airborne artillery. Conventional CAS may also be useful for those times when ground units find the target first and really do just need an accurate, high-explosive artillery round from an unbriefed, potentially unmanned, source.

Inserting a ground unit’s FAC or Air Officer between the Schwerpunkt and the aerial forces adds an extra link in the chain and can contribute to the friction and fog of war. In the battle for the bridges of Nasiriyah, an action which the Marines had been told would be unopposed, the FACs of the attacking battalion had planned to be able to control fires effectively by being with Alpha and Bravo Companies. Alpha planned to hold the southern bridge, while Bravo planned to be the Schwerpunkt as it seized the northern bridge. The chaotic and fluid nature of the hard-fought battle resulted in no FAC being present with Charlie Company once it became the Schwerpunkt and attacked to seize the northern bridge. With the entire battalion in contact, the battalion commander, located with remnants of Bravo Company two kilometers southeast of the

battle for the northern bridge, decided he could not use artillery because he had only a vague idea of where each of the companies were and what was going on at their positions. Instead, he had Bravo Company's FAC, the only FAC with which he had communications, get whatever air support could be found by using the guard frequency.

Neither the battalion commander, the Air Officer (whose radio was down), nor the Bravo Company FAC had any idea that Charlie Company was in a fight for its life seizing the northern bridge. The experienced Air Force close air support pilots, responding to the call for air support, rechecked their fire control instructions from Bravo's FAC multiple times so as to avoid fratricide, even attempting to mark the battlefield with rockets. But Charlie Company was where Bravo's FAC thought they were not, and the pilots, being unfamiliar with Marine equipment and thinking the FAC they were talking to had eyes on, mistook the smoking Amphibious Assault Vehicles (AAVs) for Iraqis. The Marines under friendly attack tried to use smoke, flares, panels and flags to call off the errant aircraft. Being as unfamiliar with the pilots as the pilots were with them, they did not know about the guard frequency and did not attempt to use it to abort the attacks. The experienced Air Force close air support pilots employed accurate and lethal fires multiple times, until finally being aborted by the FAC shortly before they ran out of fuel.<sup>11 12</sup>

In this example, the command and control system specifically designed to prevent fratricide was the

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very thing that caused it. Helmuth von Moltke the elder said, “No battle plan survives contact with the enemy.”

Like the other attributes of war, disorder is an inherent characteristic of war; we can never eliminate it. In the heat of battle, plans will go awry, instructions and information will be unclear and misinterpreted, communications will fail, and mistakes and unforeseen events will be commonplace...

Each encounter in war will usually tend to grow increasingly disordered over time. As the situation changes continuously, we are forced to improvise again and again until finally our actions have little, if any, resemblance to the original scheme.

By historical standards, the modern battlefield is particularly disorderly. While past battlefields could be described by linear formations and uninterrupted linear fronts, we cannot think of today's battlefield in linear terms. The range and lethality of modern weapons have increased dispersion between units. In spite of communications technology, this dispersion strains the limits of positive control. The natural result of dispersion is unoccupied areas, gaps, and exposed flanks which can and will be exploited, blurring the distinction between front and rear and friendly- and enemy-controlled areas.

The occurrences of war will not unfold like clockwork. We cannot hope to impose precise,

positive control over events. The best we can hope for is to impose a general framework of order on the disorder, to influence the general flow of action rather than to try to control each event.<sup>13</sup>

Air Cooperators working off of the same map as the ground commander, knowing the commander's intent and *Schwerpunkt*, can figure out what is going on for themselves. They not only consume information but push information down and around as needed, cutting through the disorder for their cooperating units. "If we are to win, we must be able to operate in a disorderly environment. In fact, we must not only be able to fight effectively in the face of disorder, we should seek to generate disorder and use it as a weapon against our opponent."<sup>14</sup>

## **“NON-KINETIC”**

It is easy to think of airpower only as airborne artillery. But it is important to realize that Close Support is more than a “9-line”. As capabilities of equipment have expanded, so have the number of tasks that can fall under the Close Support command and control measures. The fact that we use the seemingly oxymoronic term, “non-kinetic fires,” suggest that we have come to view “fires” as something more than “things that go bang.” We are now applying the same command and control system originally used for fires to control other tasks given to aircraft, with the associated slowing in speed and tempo. We must be careful not to

allow technology to result in centralized over-control of the man in the cockpit from a ground station.

Actions other than “things that go bang” can be used effectively to shape the battlefield. The mere presence of Air Cooperators over friendly forces can deter an enemy attack, freeze his actions or in other ways introduce uncertainty into his decision making. Ambiguity can be just as effective as deception. Actions such as the quick movement of logistical supplies or relaying messages between isolated elements can turn surfaces into gaps and result in decisive action. A show of force can have profound psychological effects on enemy combatants.

## **A WARNING: DAVID VS. GOLIATH**

*“I will tell you that I believe that the civilian casualties are doing us enormous harm in Afghanistan, and we have got to do better in terms of avoiding casualties. And I say that knowing full well that the Taliban mingle among the people, use them as barriers. But when we go ahead and attack, we play right into their hands. We have got to figure out a better way to do these things or to have the Afghans in the lead, because my worry is that the Afghans come to see us as part of their problem rather than part of their solution, and then we are lost.”*

– Secretary of Defense Robert Gates<sup>15</sup>

Airpower promised to “transform war because it could deliver a knockout punch that obviated traditional surface approaches to fighting and their concomitant death and destruction. Experience, though, has failed to vindicate those beliefs.”<sup>16</sup> Too much firepower, which creates collateral damage and makes us appear a Goliath to a Fourth Generation enemy’s David, can hinder mission accomplishment. It can contribute to the loss of the moral aspect of a war. The enemy’s desire to fight increases and neutral parties rally to him, while Goliath isolates himself. The Israelis have experienced this time and again with their use of airpower in Lebanon and the Gaza strip. The German U-boat campaign of World War I was a perfectly legitimate response to the British hunger blockade. However, it turned Germany into a monster and made it easy for President Wilson to engineer the United States’ entry into the war.

“Airpower is an unusually seductive form of military strength, in part because, like modern courtship, it appears to offer gratification without commitment.”<sup>17</sup> The United States has repeatedly encountered the same problems throughout its love affair with airpower.

An aging [General] LeMay likely reflected the view of many air commanders by telling a reporter in 1986 that America could have won in Vietnam in ‘any two-week period you want to mention.’<sup>18</sup>

[Meanwhile,] Ho [Chi Minh] understood that those restrictions [placed on the Operation *Rolling Thunder* bombing campaign] would limit the pain inflicted on his country and thus allow him to *benefit* from American airpower. Courting both Moscow and Beijing to replace war materiel as well as to provide additional aid, he adroitly played one against the other, and as a result the gross domestic product of North Vietnam actually increased each year of *Rolling Thunder*.

The airstrikes also provided the perfect vehicle for rallying popular support for the war. The damage that they caused had little impact on the conflict (*Rolling Thunder's* 643,000 tons of bombs killed an estimated 52,000 civilians out of a population of 18 million), but they provided tangible evidence of America's perceived intent to destroy North Vietnam. 'In terms of its morale effects,' RAND analyst Oleg Hoeffding observed in 1966, 'the U.S. campaign may have presented the [Northern] regime with a near-ideal mix of intended restraint and accidental gore.' Like the Korean conflict, Vietnam occurred against the backdrop of the Cold War and on the stage of world opinion. For many around the globe, *Rolling Thunder* conveyed the image of an American Goliath pounding a hapless David – the antithesis of the view that [President] Johnson had hoped to portray.<sup>19</sup>

As a result of this loss in the moral aspect of war, the United States established “no-strike zones” around Hanoi and Haiphong. This allowed North Vietnam to stockpile supplies without fear of

airstrikes and then move them to other sanctuaries through a pipeline to the south through Laos and Cambodia known as the “Ho Chi Minh trail.”

In the Kosovo war, airpower was touted as the magic answer. Technology such as precision bombs and stealth aircraft were said to have come so far that friendly air forces would be able to bomb with impunity, avoiding civilian casualties while causing such damage to the enemy that he would capitulate without the need for ground forces. “The war may have started with Milosevic’s brutality against the Albanians, but what much of the world was soon watching was a big, rich, technologically advanced nation bombing a poor, little country, and doing it in a way that showed its unwillingness to accept casualties itself.”<sup>20</sup>

On April 14, a pilot who thought that trucks filled with refugees near Djakovica were part of a military convoy bombed the vehicles, killing 73 noncombatants. The Serbs portrayed the incident as a ‘regular occurrence’ and amplified those sentiments after a precision-guided bomb destroyed a Belgrade bridge seconds before a train began crossing it. [General] Clark personally approved all raids on Belgrade following the bridge incident. Although only four people died from the war’s most notorious bombing error, a mistake in labeling Belgrade’s Federal Procurement and Supply Directorate that caused B-2 pilots to bomb the Chinese embassy on the night of May 7, the repercussions were profound.<sup>21</sup>

After 36,000 sorties, the coalition offered Milosevic better terms than he had originally asked for at the start of the war. Only at that point did Milosevic agree to end the conflict.<sup>22</sup>

History has shown that misusing airpower can have profound effects in Fourth Generation warfare. We must remember that an enemy's strength may not stem from something physical which can be targeted with ordnance. It may stem from the moral or mental aspects of war, which can be used by the enemy to deceive and shape us into behaving in a manner which facilitates his own plan.

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## Chapter 3

# Equipment

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*“Wars come at the cost of a country’s blood and treasure. Because the United States is a wealthy country whose strength is founded in commerce, it prefers to spend treasure in order to reduce the expenditure of blood.”*

—Unknown

Without aircraft, there are no aerial forces. Unlike ground forces, naval and air forces are shaped to a great degree by their equipment. They are helped or limited by the capabilities it provides. The equipment must meet the needs and purposes of the warriors it is supposed to serve. Doctrine should be used as the basis for acquiring the right kind of equipment. However, it can also be used as a basis for employing current (especially multi-role) equipment in the most useful way possible. Doctrine is not platform specific.

Equipment is useful only if it increases combat effectiveness. Any piece of equipment requires support: operator training, maintenance, power sources or fuel, and transport. The anticipated enhancement of capabilities must justify these support requirements and the employment of the equipment must take these requirements into account...

Increasing the capabilities of equipment generally requires developing increasingly specialized equipment. Increasingly specialized equipment tends to be increasingly vulnerable to countermeasures. One solution to this problem is not to develop a single family of equipment, but to maintain variety in equipment types...

There are two dangers with respect to equipment: the overreliance on technology and the failure to make the most of technological capabilities. Technology can enhance the ways and means of war by improving humanity's ability to wage it, but technology cannot and should not attempt to eliminate humanity from

the process of waging war. Better equipment is not the cure for all ills; doctrinal and tactical solutions to combat deficiencies must also be sought. Any advantages gained by technological advancement are only temporary for someone will always find a countermeasure, tactical or itself technological, which will lessen the impact of the technology. Additionally, we must not become so dependent on equipment that we can no longer function effectively when the equipment becomes inoperable. Finally, we must exercise discipline in the use of technology. Advanced information technology especially can tempt us to try to maintain precise, positive control over subordinates, which is incompatible with the Marine Corps philosophy of command.

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## **AIRCRAFT CHARACTERISTICS**

No degree of technological development or scientific calculation will diminish the human dimension in war. Any doctrine which attempts to reduce warfare to ratios of forces, weapons, and equipment neglects the impact of the human will on the conduct of war and is therefore inherently flawed.<sup>2</sup>

## **LOITER TIME**

The utility of integrating air with ground forces is closely tied to on-station time. The longer the pilot can maintain presence over the battlefield, the more likely he can be employed at a decisive moment. Longer on-station time also makes it more efficient

for pilots to take the time to closely coordinate with the maneuver units, such as attending the ROC drills of the supported unit's operation in person. The situational awareness of both pilot and supported unit, and availability of the aircraft's weapons, is maintained with minimal interruption. This is in contrast to many pilots trying to continuously rebuild situational awareness from nothing during multiple battle handovers.

Increasing fuel capacity through aircraft design, external tanks, aerial refueling and forward basing are all means to do this. Some aircraft are able to provide indefinite battlefield presence by landing in close proximity to the ground forces to conserve fuel. At the same time they can brief face-to-face with the cooperating ground units and even have the ground unit rearm and refuel their aircraft. Aircraft with the ability to use austere, battle-damaged, short, FOD-strewn landing fields will be more effective as Air Cooperators. Equipment which is not durable, requires too much maintenance, or offers little loiter time will be less effective and this should therefore be fundamental in its consideration. The amphibious foundation of the Marine Corps necessitates its aircraft are also able to operate from shipping.

## **EFFECTIVE ATTACKS**

The means of war is force, applied in the form of organized violence. It is through the use of violence, or the credible threat of violence, that we compel our enemy to do our will. Violence is

an essential element of war, and its immediate result is bloodshed, destruction, and suffering. While the magnitude of violence may vary with the object and means of war, the violent essence of war will never change.<sup>3</sup>

The target of that violence may be limited to hostile combatant forces, or it may extend to the enemy population at large. War may range from intense clashes between large military forces—sometimes backed by an official declaration of war—to subtler, unconventional hostilities that barely reach the threshold of violence.<sup>4</sup>

The effectiveness of Air Cooperators' efforts to harden surfaces and soften gaps is an extension of the effectiveness of the weapons being used and the pilot's ability to use them. Equipment with the flexibility to impose our will on the enemy over the spectrum of violence is required by Air Cooperators. "We must distill what works in combat and design aircraft and forces around what works."<sup>5</sup> We must remember that "the greatest effect of fires is generally not the amount of physical destruction they cause, but the effect of that physical destruction on the enemy's moral strength."<sup>6</sup>

The most effective air force in WWII started with the worst airplanes and worst pilots. The Soviet Army (which, especially toward the end of the war, were maneuverists at the operational level) very closely analyzed the German defense and concluded that the German center of gravity was the quick

shifting of operational reserves and ability to swiftly counterattack. The Soviets focused their air power not on destroying, but on disrupting the movement of the German reserves by forcing them off the roads.<sup>7</sup> “The Soviets abandoned their huge ineffective bomber force. Instead they developed the highly robust Shturmovik IL-2 close-support fighter and produced an astonishing 36,000 of them. With this huge close-support fleet the Shturmovik became a major player in Russian successes.”<sup>8</sup> This was fatal to the Germans because the Red Army attack was sufficiently fast that unless the Germans could shift their reserves quickly from place to place, they were overrun. It was the search for a decision that caused the Soviets to do what they did, vice spreading their air power out all over, looking for kills.

All actions in war, regardless of the level, are based upon either taking the *initiative* or reacting in *response* to the opponent. By taking the initiative, we dictate the terms of the conflict and force the enemy to meet us on our terms. The initiative allows us to pursue some positive aim even if only to preempt an enemy initiative. It is through the initiative that we seek to impose our will on the enemy... If we cannot take the initiative and the enemy does, we are compelled to respond in order to counteract the enemy’s attempts. The response generally has a negative aim, that of negating—blocking or counterattacking—the enemy’s intentions. Like a counterpunch in boxing, the response often has as its object seizing the initiative from the opponent.<sup>9</sup>

To be effective in retaining or regaining the initiative, Air Cooperators must be able to maintain battlefield presence by remaining on-station and repeatedly attacking the enemy. A pilot can be effective at Air Cooperation without ordnance by leveraging other sources of fires. The most important thing is not the ordnance on the airplane, but the man in the cockpit.

## **SURVIVABILITY**

*“Any piece of equipment that is too expensive to lose is also too expensive to use.”*  
– Colonel Arn<sup>10</sup>

Aircraft and their pilots have become knights on white horses. This is a cultural issue that affects our moral strength. The loss of a knight on a white horse is much more serious to the public than the loss of a bunch of men-at-arms. The public does not get very excited if 18 Marines are killed and 35 wounded taking the bridges of Nasiriyah, but it does get very excited if a single aircraft goes down and a pilot is missing as in the case of Scott O’Grady.

In order to increase speed and tempo, gather accurate intelligence and attack without first obtaining clearance from the ground commander, it is imperative that pilots be able to discriminate friendly from enemy units. Air Cooperators must be able to survive while flying low and slow enough to accomplish this. (Survivability can be broken down into the “dirty duo” of susceptibility and

vulnerability. Susceptibility deals with the probability of being hit by anti-air weapons while vulnerability relates to the aircraft's reaction to damage.)

Friendly fire incidents at Kafji in 1991, with the Canadians in Afghanistan and at Nasiriyah were all performed by the one American aircraft (the A-10) that is specifically designed to survive while flying low and slow enough to be able to discriminate between friendly and enemy units. In these cases, however, they did not do this. The pilot in the cockpit, his tactics, his training and his bond (or lack thereof) with the ground forces were not adequate to take advantage of the survivability of the aircraft. As always, pilot skill mattered more than aircraft characteristics.

The sanctuary allowed by using aircraft as airborne artillery while “zooming in” with targeting pods reduces the susceptibility of aircraft at the expense of increased risk to ground troops. The concomitant Second Generation fire command and control system cannot keep up with fast-moving events. This leads to friendly fire incidents and inhibits the initiative upon which Marine Corps tactics depend.

Hans Rudel gives an account of what is possible with ruthlessly ground-oriented pilots flying low and slow enough to identify friend from enemy.

After a while we fly off at low level over a road. Intense flak comes up at us from a long motorized column traveling through below us

with an escort of tanks. We break our close formation and circle round the vehicles, Soviet tanks and lorries, mostly of American origin, therefore Russian. I admit I am puzzled as to how these beggars have suddenly turned up here so far west, but they must be Russians. We gather height and I give the order to engage the flak, which must be neutralized first so that we can come in for a low level attack undistracted.

After we have for the most part silenced the flak we split up into sections over the length of the column and shoot it up. The daylight is slowly fading; the whole road looks like a fiery serpent; a jam of burning motor vehicles and tanks which have not had time to drive off the road to right or left. We spare hardly one, and the material loss to the Soviets is again considerable.

But what is this? I fly ahead above the first three or four vehicles, they all carry our flags on their radiators. These lorries are of German manufacture. For two hundred yards further on white Verys are being fired from the ditches at the side of the road. That is the signal of our own troops. It is a long time since I have had such a sickening feeling in my stomach. I would willingly crash my aircraft somewhere here on the spot. Can it have been a German column after all? Everything is ablaze. But why then were we subjected to such a heavy fire from the lorries? ... How come that they are American-made trucks? ... Besides, I actually saw men running in brown uniforms! Sweat breaks out at every pore and a stupefying sense of panic overcomes me.

It is already fairly dark when we land at Pawlowgrad. None of us utters a word. Every one is preoccupied with the same thought. Was it a German column? The uncertainty chokes us. I cannot find out by telephone from any Luftwaffe or Army unit what column it could have been. Towards midnight some soldiers arrive. My operational officer wakes me out of an exceptionally restless sleep, he tells me it is something important. Our comrades of the army wish to thank us for helping them to make their escape today. They tell us that their lorries were overtaken by a Russian column. They just managed to put on a spurt of a few hundred yards in order to find cover from the Russian fire in the ditches at the side of the road. It was at this moment that we appeared on the scene and shot up Ivan. Our chaps took immediate advantage of the situation and sprinted on for another two hundred yards. This is a load off my mind, and I share the elation of my brothers in arms.<sup>11</sup>

In an uncertain, chaotic, fluid and disorderly environment, the Stuka pilots were able to discriminate the make of vehicles, even uniforms, and saved the German convoy that was being run down by a Russian unit with American-made trucks. The issue of identifying friend from foe consumed them.

Air Cooperators must use their exceptional visibility not only to find the enemy, but to safeguard the members of their flight from threats to their survival. They must be able to view the width and

breadth of the battlefield to develop “big picture” situational awareness. The larger geographical view and required target/threat lookout from a “soldier with uncommon freedom of maneuver and firepower” cannot be developed properly with a “soda-straw” view from an indirectly positioned and necessarily singularly focused targeting sensor. Air Cooperators therefore require exceptional out of cockpit visibility, especially towards the ground. Technology should be harnessed to expand the Air Cooperators’ visibility to refer not only to visible light, but to all signatures given off by forces on a battlefield that can be used for target / threat location and IFF (identification, friend or foe). Air Cooperators are conscious of the enemy’s and our own sounds, color and glint, smoke, smell, heat and electromagnetic emissions, and terrain. Expendables – chaff/flares/towed decoys etc. -- can play a very large role in survivability. This goes hand-in-hand with being ruthlessly ground-oriented.

Aircraft that can absorb small arms fire and protect the crew reduce vulnerability. Helicopters, UASs, Seekers and Pilatus have been called piñatas – everyone wants to take a whack at them because it’s easy and fun. They are not very agile, not very maneuverable, and are therefore more susceptible to defensive weapons. Being effective at providing air cooperation may involve being shot down on occasion (Hans-Ulrich Rudel was shot down 32 times). Therefore, aircrew escape mechanisms become important. As was the case in Operation Iraqi Freedom, keeping aircraft that are less survivable close to and even behind friendly forces,

while ranging the more survivable aircraft out ahead, is prudent.

## **INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE (ISR)**

*“In war, the chief incalculable is the human will.”*

– B.H. Liddell Hart<sup>12</sup>

*“All warfare is based on deception.”*

– Sun Tzu<sup>13</sup>

ISR is really nothing more than ground units using the fire command and control system in order to direct a tactical aircraft’s onboard sensor. This has become “directed telescope fire”. Ground commanders are attempting to use technology to cut through the fog of war by viewing the battlefield from the aviator’s point of view. The sheer volume of investment in the technology to do this is in some ways an acknowledgement of the need for Air Cooperators.

War consists of two independent wills confronting each other....With each side free and, presumably, willing to double-cross the other to the utmost of his ability, the progress of the struggle between them is largely unforeseeable. Consequently, the attainment of certainty is, a priori, impossible.

In order to attain certainty, one must first of all have all the relevant information. The more the

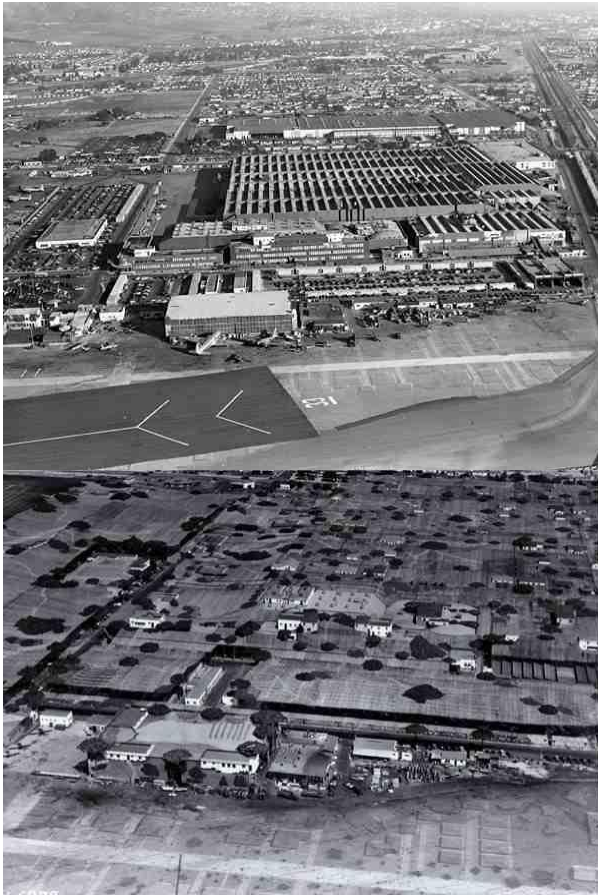
available information, however, the longer the time needed to process it, and the greater the danger of failing to distinguish between the relevant and the irrelevant, the important and the unimportant, the reliable and the unreliable, the true and the false. There would appear to be no way out of this self-defeating dilemma except what Napoleon calls “a superior understanding” – one based, to be sure, on training and practice, but ultimately relying no less on intuitive judgment than on rational calculation.<sup>14</sup>

Experience has shown that the more communication between the ground unit and the air unit, the better ISR works. Communication pre-mission (brief), during the mission (real-time communications), and post mission (de-brief/feedback) are essential to good quality support. ISR does not work well when the Joint Tactical Aircraft Request (JTAR) is the only thing the pilot has to go by. He has no understanding of the situation, context of the mission, or understanding of the needs of the ground commander beyond the brief.

Taken as a whole, present-day military forces, for all the imposing array of electronic gadgetry at their disposal, give no evidence whatsoever of being one whit more capable of dealing with the information needed for the command process than were their predecessors a century or even a millennium ago. Though modern technical means undoubtedly enable present-day command systems to transmit and process more information faster than ever before, regardless of distance, movement, or weather, their ability to

approach certainty has not improved to any marked extent.<sup>15</sup>

Experience has shown that even without enemy countermeasures, the fog of war is ever present. Using ISR to perform even simple tasks such as assessing bomb damage can lead to inaccurate results. Bushes are mistaken for tanks, results are extrapolated from peacetime tests, and the ground commander keeping track of enemy equipment shows his opposition destroyed multiple times over, only to have to destroy them again from the ground.



During WWII, the Lockheed Burbank Airplane Factory was camouflaged to look like a residential area in order to help protect it from Japanese attack.<sup>16</sup>

For every technology there is a counter-measure. As aircraft sensors and targeting ability improves, so does camouflage, countermeasures and other survivability capabilities. During the Kosovo War, the Serbs effectively confounded American

intelligence and reconnaissance efforts by using wooden equipment mockups, sometimes with artificial heat sources inside to fool electro-optical and infrared sensors. The Serbs also used microwave ovens on rotating platforms to confuse the allied electronic warfare campaign. The coalition assessed the bombing campaign to be vastly more effective than it actually was.

## **UNMANNED AERIAL SYSTEMS**

The Hunter Warrior experiments from more than a decade ago prophesied an expanding role for UASs.<sup>17</sup> UASs allow “full” presence over a battlefield, covering large geographic areas and allowing massing of fires when needed. UASs are most effective for planning, Named Area of Interest (NAI)/Target Area of Interest (TAI) coverage, etc. The main role for piloted aircraft was in areas where pilots are necessary for their judgment and understanding of the ground commander’s needs. However where judgment and understanding are not required, UASs can be very effective. UASs can provide static-type intelligence to cue Air Cooperators to go to a certain area. So cued, the Air Cooperators can then act on their understanding of commander’s intent, close bond with the ground forces, cunning, and initiative with a focus and tempo that no aircraft, manned or unmanned, without these things could possibly hope to match.

Non-Traditional ISR is probably the best example of a task performed by a manned tactical aircraft that could be better performed by a UAS. UASs are

low-risk, low-cost and have long time-on-station. They should be used in consonance with what is going on throughout the battlefield.

“Increasing the capabilities of equipment generally requires developing increasingly specialized equipment. Increasingly specialized equipment tends to be increasingly vulnerable to countermeasures.”<sup>18</sup> For example, in aircraft, technologies such as so-called information networks or links have often been looked at as a way of cutting through the fog of war and attaining certainty. These information technologies necessarily require signal emissions in order to share the information. This is a weakness which adversaries have already demonstrated the capability to exploit through very capable passive aircraft tracking and targeting systems, as well as signal jamming. Emitting, non-maneuvering, ISR aircraft are especially vulnerable to anti-radiation missiles, jamming, and other hostile tracking systems.<sup>19</sup>

In war, real-time intelligence will often be unavailable to both aerial and ground maneuver forces. We must not get lured by static operating environments or training exercises without a free thinking enemy into believing this will not be the case. “Advanced information technology especially can tempt us to try to maintain precise, positive control over subordinates, which is incompatible with the Marine Corps philosophy of command.”<sup>20</sup> Air Cooperators are trained to look outside the cockpit and question what they and their

cooperating ground unit are doing, what the enemy is doing, and why. This is something that does not inherently happen with the basically trained air-to-ground pilot, or UAS operator, employing a bomb on the coordinates provided in a 9-line. Pilots who are reduced to mere technicians (by training, aircraft characteristics, command and control, or whatever else) can be replaced by machines. Having a piloted aircraft only makes sense if you are going to use him to do what machines cannot do. Machines do not understand commander's intent.

## **THE AIR TASKING ORDER**

Warfare by attrition pursues victory through the cumulative destruction of the enemy's material assets by superior firepower. It is a direct approach to the conduct of war that sees war as a straightforward test of strength and a matter of force ratios. An enemy is seen as a collection of targets to be engaged and destroyed systematically. Enemy concentrations are sought out as the most worthwhile targets. The logical conclusion of attrition warfare is the eventual physical destruction of the enemy's entire arsenal, although the expectation is that the enemy will surrender or disengage before this happens out of unwillingness to bear the rising cost. The focus is on the efficient application of fires, leading to a highly proceduralized approach to war. Technical proficiency—especially in weapons

employment—matters more than cunning or creativity.

Attrition warfare may recognize maneuver as an important component but sees its purpose as merely to allow us to bring our fires more efficiently to bear on the enemy. The attritionist tends to gauge progress in quantitative terms: battle damage assessments, “body counts,” and terrain captured. Results are generally proportionate to efforts; greater expenditures net greater results—that is, greater attrition. The desire for volume and accuracy of fire tends to lead toward centralized control, just as the emphasis on efficiency tends to lead to an inward focus on procedures and techniques. Success depends on an overall superiority in attritional capacity—that is, the ability to inflict *and* absorb attrition. The greatest necessity for success is numerical and material superiority. At the national level, war becomes as much an industrial as a military problem. Historically, nations and militaries that perceived they were numerically and technologically superior have often adopted warfare by attrition.<sup>21</sup>

The Air Tasking Order is a relic of attrition warfare. It is not suitable for Maneuver Warfare. The ATO can be useful as a tool to organize the initial disposition and logistics of aerial forces, but it should not drive the fight.

The ATO imposes a 3-day reaction cycle on friendly forces. It serves the Joint Force Air Component Commander's (JFACC) desire to exercise command and control in order to deconflict target assignments and apportion aerial refueling assets, but hampers the ability to react to information derived from aircrew. Of course during execution the commanders can "change the plan", but the ATO sets up the initial disposition. As Moltke said, a mistake in initial dispositions can seldom be put right. Taking off at a certain time, going to a certain location, and performing reconnaissance or attacking a certain coordinate per a 3-day old prediction leaves pilots with few options.

The initial dispositions should create the widest possible range of options. Air Cooperators should be oriented as part of the initial dispositions and then left to react to enemy actions and leverage available sorties to mass power at the decisive moment. The Air Cooperators know what is going on with the ground units, the detached command and control structure does not.

The metric for success for the ATO becomes the number of JTARs (sorties) served. Experience has taught us that this encourages spending less time on each sortie in order to do more sorties per inspection or maintenance cycle and show more sorties flown on the end of month report. This attrition warfare measure of success is precisely the opposite of what is useful to the ground commander.

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Air Cooperation does not happen according to a pre-planned schedule. As with any centralized process that attempts to impose certainty on an environment that is inherently uncertain, using the ATO to establish situational awareness within the MAGTF will hinder us from generating the tempo of operations we desire to best cope with uncertainty, disorder and the fluidity of combat. The Raid on the Son Tay P.O.W. camp during the Vietnam War is probably the most well-known, starkest example of a slow tempo. The 1127<sup>th</sup> Intelligence Unit discovered the P.O.W. camps in May, 1970. After six months of planning, bureaucratic approvals and training, the raid was executed flawlessly. The prisoners however, had been moved from the (now empty) camp in July, four months before the raid took place. Although pictures revealed weeds growing in the compound 3-6 weeks prior to the raid, the commander still chose to execute. The point is not that they could have aborted a useless raid, but that the OODA loop was too slow to successfully rescue the prisoners.

## **DIRECT SUPPORT**

Each level from simple to complex (platoon to theater) has their own OODA cycle that increases as we try to control more levels and details of command at higher levels. Put simply, as the number of events we must consider increase, the longer it takes to observe-orient-decide-act.

Give lower-level commanders wide freedom, within an overall intent, to shape and direct their own activities so that they can exploit faster speed and tempo at tactical levels yet be in harmony with the larger intent and slower rhythm associated with the more general aim at the strategic level.

Shape the overall scheme by applying the Schwerpunkt concept, in its broadest sense through all levels, as the unifying notion to link the differing rhythms and intents so that each unit or level of the organic whole can operate at its own natural rhythm – without pulling the organism apart – instead of the slower pace associated with a rigid centralized control.<sup>22</sup>

Placing Marine air in direct support of Marine ground units is a way to work within the system to avoid ATO inflexibility. Reporting sorties for Air Force centralization may be necessary for bureaucratic reasons, but this can be done after sorties are flown.

## **CONCLUSION**

Air Cooperators have a comprehensive Maneuver Warfare education, are fully integrated into the MAGTF, and cultivate an intimate relationship with their ground cooperators. They have an understanding and bond with their cooperating units above and beyond that of just being airborne artillery. They are able to operate with very little

command and control, instead using the ground commander's intent without having to ask for permission to do every action.

In practice, the MAGTF should be the ideal organization for Air Cooperation in Maneuver Warfare. The Ground Combat Element (GCE) and Air Combat Element (ACE) are subordinate to one common commander. If the advantage is not utilized very well, it may be due to the unfamiliarity between ground units and aerial forces. This may be because the forces have fallen into a comfort-level with Second Generation Warfare, a hesitancy to change, self-limiting equipment being procured independent of tactical and doctrinal ideas, or self-limiting command and control structures.

We must remember that “better equipment is not the cure for all ills; doctrinal and tactical solutions to combat deficiencies must also be sought.”<sup>23</sup> Pilots who are reduced to mere technicians (by training, aircraft characteristics, command and control, or whatever else) can be replaced by machines with no need for commander's intent. Having a piloted aircraft only makes sense if you are going to use him to do what machines cannot do. Machines do not understand commander's intent.

We have discussed the aim and characteristics of Air Cooperation in Maneuver Warfare. We have discussed some of the tactics of Air Cooperation in Maneuver Warfare. By this time, it should be clear that Air Cooperation exists not so much in the specific methods or aircraft used – we do not

believe in a formularistic approach to war – but in the mindset of the Air and Ground Cooperators. In this regard, Air Cooperation applies equally to the ground and air warriors. It applies regardless of the conflict, whether amphibious operations or sustained operations ashore, of low or high intensity, against guerrilla or mechanized foe, in desert or jungle.

Maneuver Warfare is a way of thinking in and about war that should shape our every action. It is a state of mind born of a bold will, intellect, initiative, and ruthless opportunism. It is a state of mind bent on shattering the enemy morally and physically by paralyzing and confounding him, by avoiding his strength, by quickly and aggressively exploiting his vulnerabilities, and by striking him in the way that will hurt him most. In short, Maneuver Warfare is a philosophy for generating the most decisive effect against the enemy at the least possible cost to ourselves – a philosophy for “fighting smart.”<sup>24</sup>

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## Introduction

<sup>1</sup> Marine Corps Doctrinal Publication 1: Warfighting. Washington D.C.: United States Marine Corps, 1997. 17.

<sup>2</sup> Warfighting. 3.

<sup>3</sup> Ibid. 19.

<sup>4</sup> Ibid. 32-35.

<sup>5</sup> Ibid. 73.

<sup>6</sup> Ibid. 71-72

<sup>7</sup> Ibid. 95.

## People

<sup>1</sup> Hans-Ulrich Rudel's comments are as recollected during a dinner conversation by Chuck Myers, former Director for Air Warfare in the Office of the Secretary of Defense 1973-1978, "Survivability of Close Support Aircraft", 1973, personal e-mail (February 4, 2009). As a Stuka pilot in WWII, Rudel flew over 2500 combat missions, more than any other pilot. He is credited with over 500 tank kills. A kill was only counted if another pilot witnessed the tank blowing up or catching fire. Because this often did not happen until long after the killing shot, Rudel's tank kills are probably far higher.

<sup>2</sup> Warfighting. 58.

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<sup>3</sup> LtGen James N. Mattis' comments are as recollected by Colonel L. Ross Roberts and confirmed accurate via email confirmation with LtGen Mattis. 15 November 2005. Colonel L. Ross Roberts, USMC. Ground Truth: The Implications of Joint Interdependence for Air and Ground Operations. Diss. Air University, Air War College, Center for Strategy and Technology, March 2006.

<sup>4</sup> Warfighting. 88.

<sup>5</sup> Ibid. 57-58.

<sup>6</sup> Attributed.

<sup>7</sup> Will Rogers. New York Times. Dec. 23, 1929.

<sup>8</sup> Pierre Sprey. Reversing the Decay of American Air Power. American Defense Reform Panel. Expeditionary Warfare School, Marine Corps University, Quantico, VA. 4 May 2009.

## Ideas

<sup>1</sup> Sun Tzu. The Art of War. Trans. Lionel Giles. London. 1910. 28. Project Gutenberg. 1994. <<http://www.gutenberg.org/etext/132>> Dr. Giles originally translated this line as "Thus the highest form of generalship is to balk the enemy's plans." But footnoted the translation thus, "Perhaps the word "balk" falls short of expressing the full force of the Chinese word, which implies not an attitude of defense, whereby one might be content to foil the enemy's stratagems one after another, but an active policy of counter-attack. Ho Shih puts this very clearly in his note: 'When the enemy has made a plan of attack against us, we must anticipate him by delivering our own attack first.'"

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<sup>2</sup> Mark Clodfelter. "A Strategy Based On Faith." Joint Forces Quarterly. iss 49, 2d Qtr 2008: 157.

<sup>3</sup> Russel H.S. Stolfi. "A Bias For Action: The German 7<sup>th</sup> Panzer Division in France & Russia 1940-1941." Perspectives on Warfighting. 1991. 93.

<sup>4</sup> This was reported by Captain Cunningham to William Lind after the Jaeger Air experiments as part of the Hunter Warrior Warfighting Laboratory experiment, circa 1995.

<sup>5</sup> Hans-Ulrich Rudel. Stuka Pilot. Bantam. 1984. 95.

<sup>6</sup> Martin Van Creveld. Airpower and Maneuver Warfare. Maxwell Air Force Base: Air University Press. 1994. 18.

<sup>7</sup> Stolfi. 92. The Germans characteristically used the word *versprengte* (scattered) to describe the condition of enemy troops hit hard by their attack. The word appears repeatedly in the records.

<sup>8</sup> *Ibid.* 91-92.

<sup>9</sup> "The Falaise Gap." Canada at War. 22 Oct 2006.  
<<http://wwii.ca/index.php?page=Page&action=showpage&id=23>>

<sup>10</sup> "Falaise Gap Photos." WWII Photos. June 2006.  
<[http://www.geocities.com/ww2\\_pictures/falaise-gap-photos.htm](http://www.geocities.com/ww2_pictures/falaise-gap-photos.htm)>

<sup>11</sup> Tim Pritchard. Ambush Alley: The Most Extraordinary Battle of the Iraq War. Presidio Press. 2006.

<sup>12</sup> Gary Livingston. An Nasiriyah: The Fight For The Bridges. Caisson Press. 2004.

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<sup>13</sup> Warfighting. 10-11.

<sup>14</sup> Ibid. 12.

<sup>15</sup> Robert Gates. Hearing to Receive Testimony on the Challenges Facing the Department Of Defense. Committee on Armed Services, U.S. Senate. Jan 27, 2009.

<sup>16</sup> Clodfelter. 157.

<sup>17</sup> Ibid. 156.

<sup>18</sup> Ibid. 31.

<sup>19</sup> Ibid. 30.

<sup>20</sup> Ibid. 158.

<sup>21</sup> Ibid. 153.

<sup>22</sup> Sprey, op. cit.

## **Equipment**

<sup>1</sup> Warfighting. 66-67.

<sup>2</sup> Ibid. 14.

<sup>3</sup> Ibid. 14.

<sup>4</sup> Ibid. 4.

<sup>5</sup> Sprey, op. cit.

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<sup>6</sup> Warfighting. 16.

<sup>7</sup> Van Creveld. Airpower and Maneuver Warfare. 120.

<sup>8</sup> Robert Dilger, Pierre M. Sprey. “Reversing the Decay of American Air Power.” America’s Defense Meltdown. Washington, D.C.: Center for Defense Information. 2008. 137.

<sup>9</sup> Warfighting. 32.

<sup>10</sup> William Lind. “A Traveler’s Perspective on Third and Fourth Generation War.” America’s Defense Meltdown. Washington, D.C.: Center for Defense Information. 2008. 114.

<sup>11</sup> Rudel. 87.

<sup>12</sup> B. H. Liddell Hart. Strategy. New York: New American Library. 1974. 323.

<sup>13</sup> Sun Tzu. 24.

<sup>14</sup> Martin Van Creveld. Command in War. Harvard University Press. 1987. 267.

<sup>15</sup> Ibid. 265.

<sup>16</sup> How to Hide an Aircraft Factory. 2007.  
ThinkorThwim.com.  
<<http://thinkorthwim.com/2007/08/19/1034/>>

<sup>17</sup> Commander Naval Air Force, U.S. Pacific Fleet. Report on an Operational Examination of Carrier Based Aerial Fire Support for Troops Engaged. 1995.

<sup>18</sup> Warfighting. 66.

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<sup>19</sup> Carlo Kopp. "Surviving the Modern Integrated Air Defence." System Air Power Australia Analysis 2009-02. 2009. <<http://www.ausairpower.net/APA-2009-02.html>>

<sup>20</sup> Warfighting, 67.

<sup>21</sup> Ibid, 36-37.

<sup>22</sup> John Boyd. "Patterns of Conflict." A Discourse on Winning and Losing. 1987. John Boyd never published his works, instead choosing to maintain and update a collection of slides comprising his briefs. Multiple iterations of his briefs, including "Destruction and Creation," "Patterns of Conflict," "Strategic Game," and "Organized Design," can be viewed as part of his personal effects archived at the Alfred M. Gray Research Center, Marine Corps University, Quantico VA.

<sup>23</sup> Warfighting, 67.

<sup>24</sup> Ibid. 96.

To see the latest draft of this and other manuals on Fourth Generation war produced by the Advanced Warfighting Seminar of the USMC Expeditionary Warfare School, go to <http://www.d-n-i.net/dni/strategy-and-force-employment/fourth-generation-warfare-manuals> or, if you are in the U. S. military and have a Common Access Card (CAC), go to <http://www.intranet.tecom.usmc.mil/sites/EWS/AdvWF/default.aspx>