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THESIS

**The Evolution Of Russian Offensive Air Warfare
Theory: From Deep Battle To Aerospace War**

by

Mark A. Admiral

June 1993

Thesis Advisor: James J. Tritten

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THE EVOLUTION OF RUSSIAN OFFENSIVE AIR WARFARE THEORY:
FROM DEEP BATTLE TO AEROSPACE WAR

by

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Lieutenant, United States Navy
B.A., University of Southern California, 1986
Submitted in partial fulfillment
of the requirements for the degree of

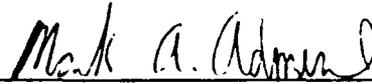
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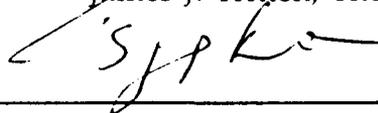


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ABSTRACT

This thesis examines the development of Russian offensive air warfare theory from 1930 to the present day. The revolution in military affairs caused by the development of high-precision weaponry and advanced methods of detection has transformed traditional concepts of warfare, making "remote strikes" by aircraft and missiles an increasingly vital factor in modern war. To Russian observers, the Persian Gulf War offered proof that a paradigm shift has indeed taken place.

Despite radical technological change, the traditional concepts of airpower employment developed in the 1930's and perfected during the Second World War remain essentially valid despite visionary views on independent air warfare strategy. However, the battle between offensive airpower and air defense is now considered the critical factor in determining the course and outcome of a war, but within the context of combined arms operations and not independent strategic action. The high effectiveness of emerging strike technology in the Gulf War has led to priority Russian development of both countermeasures and analagous capabilities. However, there is agreement that the means of air defense alone are not sufficient, and preemptive offensive conventional strikes are widely viewed as the only acceptable alternative, even in the framework of a defensive strategy.

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EXECUTIVE SUMMARY

The Evolution of Russian Offensive Air Warfare Theory: From Deep Battle to Aerospace War

**LT Mark A. Admiral, USNR
June 1993**

This thesis examines the development of Russian offensive air warfare theory from 1930 to the present day. The revolution in military affairs caused by the development of high-precision weaponry and advanced methods of detection has transformed traditional concepts of warfare, making "remote strikes" by aircraft and missiles an increasingly vital factor in modern war. To Russian observers, the Persian Gulf War offered proof that a paradigm shift has indeed taken place.

Despite radical technological change, the traditional concepts of airpower employment developed in the 1930's and perfected during the Second World War remain essentially valid despite visionary views on independent air warfare strategy. However, the battle between offensive airpower and air defense is now considered the critical factor in determining the course and outcome of a war, but within the context of combined arms operations and not independent strategic action. The high effectiveness of emerging strike technology in the Gulf War has led to priority Russian development of both countermeasures and analagous capabilities. However, there is agreement that the means of air defense alone are not sufficient, and preemptive offensive conventional strikes are

widely viewed as the only acceptable alternative, even in the framework of a defensive strategy.

Chapter One provides an introduction and overview. Chapter Two provides a brief overview on the origins of Soviet airpower theory from the early 1930's to the end of the Second World War. This chapter shows how concepts of centralized control, massing of air reserves and combined arms employment were developed into comprehensive operational art for air warfare. Chapter Three covers the period between the end of the Second World War and the Ogarkov era and examines the continuity and change in airpower theory in the light of the development of nuclear weaponry. The rebirth of the concept of the air offensive as an integral part of a conventional war scenario is examined and the impact of the military-technical revolution caused by the integration of the computer into all aspects of warfare. Chapter Four examines the lessons of the Persian Gulf War related to airpower, including the increasing importance of remote strike warfare and the introduction of new weapons systems such as the reconnaissance-strike complex, precision-guided weaponry and stealth technology. Chapter Five examines how these changes impact Russian theory for the employment of offensive airpower. The concept of aerospace war, which advocates an independent strategic role for airpower, is addressed and the shift in emphasis towards means

of offensive strike warfare as embodied in the 1992 Draft Military Doctrine is examined. Chapter Six provides conclusions and examines the impact on the U.S. Navy of the changes caused by the military-technical revolution.

I. INTRODUCTION

After the Persian Gulf War, some Russian military thinkers began to consider airpower as a force which could independently influence the course and outcome of an armed conflict. While the concept of an independent airpower strategy has been common in the West since the end of the First World War, the influence of the Soviet General Staff has historically suppressed ambitions for an independent role for any single military service and has instead viewed airpower within the context of joint and combined arms operations.

The Persian Gulf War, in the Russian view, represents a fundamental turning point in the nature of armed conflict. The impact of high-precision weaponry and advanced sensor technology has resulted in the massing of firepower rather than the massing of maneuver forces. Increasingly, wars will be fought by the means of "fire strikes" throughout the full depth of the battlefield. Increasingly, the central role of ground forces in short duration, high-intensity conventional warfare is being questioned by airpower advocates and military reformers.

An emerging school of "aerospace war" proponents see the Gulf War as a prototype for future conflict in which aerospace striking means can influence both the course and outcome of an

armed conflict. In Russian writings, a force which can influence the course and outcome of a war is what would be called in the West a force capable of independent decisive strategic action. The aerospace warfare school envisions a short, sharp armed conflict fought between cruise missiles, unmanned air vehicles, stealth aircraft, ballistic missiles armed with conventional warheads, and spaceborne weapons and sensor systems as a model for future war. These forces are viewed as so capable that they now can accomplish missions which previously could only be carried out by nuclear weapons.

Taking into account the changes in the fundamental nature of war brought about by the revolution in military affairs, the primary object of this thesis is to understand how Russian concepts for airpower employment have changed and determine whether an independent airpower strategy will replace the traditional emphasis on joint and combined arms warfare. This analysis will provide the basis for briefly examining the implications of the revolution in military affairs as it concerns the United States Navy.

The first substantive chapter of the thesis provides a view of Russian offensive airpower theory from the 1930's to the end of the Second Great Patriotic War (1939-1945).¹ It

¹ The Russians now refer to the portion of the Second World War waged on the Eastern Front as the Second Great Patriotic War, the first Great Patriotic War being

was in this period that the Western concept of an independent air strategy was rejected and operational art emphasizing combined arms employment was perfected.

The second substantive chapter covers the postwar period up to the Persian Gulf War. In this time, traditional methods of airpower employment in an operational role were supplanted by the necessity to develop strategic nuclear strike potential and strategic defenses. However, even with the development of the nuclear bomber and ballistic missile, the Soviet Union did not advocate a truly independent nuclear strategy, but viewed nuclear strike potential as highly effective but not capable of providing victory alone. The concepts of operational air employment developed in the 1930's also saw renewed interest as the Russians attempted to cope with the possibility of a conventional conflict with the West.

The third substantive chapter includes recent lessons from the Persian Gulf War. To many Russian observers, the Gulf War demonstrated that Marshal Ogarkov's prediction of a new revolution in military affairs was accurate. Of critical importance is whether Russian observers view the Gulf War air campaign as a traditional air offensive in a combined arms context or whether the war demonstrates that airpower can

Napoleon's Russian Campaign of 1812.

accomplish independent strategic tasks.² The impact of a new generation of weaponry, including stealth aircraft, reconnaissance-strike complexes and high precision weaponry is examined and their impact on the future nature of war is assessed.

In the fourth substantive chapter, the implications of the military-technical revolution for Russian offensive airpower will be discussed, including the development of the "aerospace warfare" concept and the Strategic Non-Nuclear Force. The effect of the Gulf War on the new Russian military doctrine will be examined. The future composition of Russian offensive conventional strike forces will be covered. Finally, a conclusion chapter will summarize the author's conclusions and discuss implications for the U.S. Navy.

² If airpower alone can accomplish strategic tasks, an independent airpower strategy would logically result. As a comparison, no matter how vocal Fleet Admiral Sergei Gorshkov was on the value of navies, no independent naval strategy ever existed in the Soviet Union.

II. THE DEVELOPMENT OF THE OPERATIONAL ART OF AIR WARFARE

The evolution of Russian and Soviet offensive aerospace warfare doctrine has occurred along a markedly different path than Western thinking on the subject. In particular, the emphasis on the operational level of warfare and the necessity for the use of combined arms are vital principles which are only now being considered by Western military thinkers. This chapter will examine the continuity and change in Russian military thought on the employment of offensive airpower and compare and contrast them with Western concepts of air warfare. The primary focus is on the use of airpower against terrestrial targets.

To accomplish this, several key periods will be examined, including the 1930's development of operational art for aviation and the rejection of the Western concept of independent strategic airpower and the Second Great Patriotic War, where Russian combined arms operational concepts were validated.

This analysis will concern itself primarily with the operational and strategic employment of airpower, and only consider such elements as tactics and equipment as they pertain to the study of airpower theory. As this study will

be primarily based on analysis of Russian literature, it is important to understand that a tremendous gulf may in fact exist between theory or doctrine itself and the ability to successfully implement it. This has been a recurring theme in Soviet and Russian history and is an especially important consideration when looking at the present and projected future military situation in Russia.

However, declaratory military doctrine and theory can have inherent value despite its inability to be successfully implemented at a given time and place. For example, the concept of deep battle, developed by Russian theorists in the 1930's, has proved very visionary and can be considered an accurate model for current combat operations; this being in spite of the Red Army's inability to fully carry out such a doctrine until the third phase of the Second Great Patriotic War.

A. THE INTER-WAR PERIOD

The inter-war period marked the dramatic rise of Soviet airpower from humble beginnings during the Civil War to its status as the largest air arm in the world in the 1930's. Under Stalin's first two five-year plans, Soviet aircraft industry made phenomenal advances and the Red Air Fleet grew in size and capability to become among the most advanced air

forces in the world. The relative importance of aviation increased as well. The size of the Air Force as a portion of the Red Army personnel increased from 5.2 percent to 12.8 percent from 1929 to 1938.³

1. The Development of Operational Art for Air Warfare

As the strength and sophistication of the Red Air Fleet grew, the need for defining a theory of air warfare became apparent. During the 1920's, the great majority of military thinking in the Red Air Fleet focused on air-to-air and air-to-ground tactics. However, thinking on the operational and strategic role of airpower soon followed. As early as 1924, there is mention in official air fleet regulations of using airpower in an operational context; including special air operations both to gain superiority over a front and to interdict headquarters, supply, reserve forces and rail communications.⁴

The period of the 1930's was marked predominantly by interest in the use of the heavy bomber. During the 1930's, over 800 TB-3, four-engine heavy bombers were produced; and at the time of their introduction, they were among the most

³ Col. V. S. Yelizarev, "On the Question of Air Force Organizational Structure," *Voennaya Mysl*, No.1, Jan 1990, 30-36 (JPRS-UMT-90-001-L, 22 Feb 1990, 17)

⁴ Col V. V. Anunchin and Lt Col O. N. Zhdorov, "Genesis, Development of the Theory of Combat Employment of Air Forces (1917-1938)," *Voyenno-Istoricheskiy Zhurnal*, No. 8, Aug 88, pp 19-26 (JPRS-UMJ-89-002, 13 Feb 89, 15)

capable in the world.⁵ The TB-3 bomber force had the potential capability to strike both of the Soviet Union's probable adversaries, Germany and Japan, from bases inside the Soviet Union.⁶

However, doctrinal differences were evident in the perceived role of the heavy bomber. The theory of air warfare advocated by Italian theorist, Giulio Douhet, incorporating both the concept of an independent strategic bomber force and the destruction of an enemy's will to resist by bombing civilian targets, were never completely adopted by Russian thinkers. During the 1930's, there was considerable debate over whether military or economic and political objectives should be targeted. There was a dialogue in Soviet military journals considering the nature of the target set and the role of independent strategic bombardment. Air theorist, A. Algazin, for example, advocated an independent air campaign directed against the enemy's industrial infrastructure. To aid in effective targeting of industry, he recommended including those familiar with industry and trade to serve as staff advisors to assist in the determination of critical

⁵ Mikhail Tsyarkin, "The Origins of Soviet Research and Development System (1917-1941)" (Ann Arbor, Mich: University Microfilms, 1986), 155

⁶ AVM R. A. Mason and John W. R. Taylor, Aircraft, Strategy and Operations of the Soviet Air Force (London: Jane's Publishing Company, 1986), 127

nodes or bottlenecks (*uskiye myesta*) in the industrial infrastructure. As an example of bottleneck targeting, he noted that only two factories in France produced 90 percent of total engine production. He also noted the vulnerability of ports and rail lines as these could not be dispersed or moved out of striking range, unlike industrial targets.⁷ These concepts were very similar to emerging American views of airpower employment developed by the Air Force Tactical School which argued that the "application of military force against the vital structure of a nation directly and immediately upon the outbreak of hostilities is the most important and far reaching development of modern times."⁸

Douhet's concept of targeting population centers and industrial capability was rejected in favor of deep strikes against military objectives. The heavy bomber force was assigned the role of supporting the deep-battle concept pioneered by various Russian military theorists in the 1930's. A.I Egorov, Chief of the Red Army Staff, described the role of the bomber force as follows:

⁷ A. Algazin, "Vozdushniye Operatsii Protiv Prom'shlennosti", *Voennaya Mysl*. No 8-9, 1937, 99-104

⁸ Robert Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960 (Maxwell AFB: Air University Press 1989), 81-82

In the event of an attack on the USSR by a capitalist power or coalition... the task of our air force is to strike at the roots of mobilization and at the concentration of enemy armies, and to destroy the economic-industrial life of whole regions, primarily those of military significance.'

While industrial targets remained in the target set, Egorov emphasized the priority of striking military targets in the depth of the rear in support of the strategic goals of the "deep battle." A key element in the ultimate rejection of true independent strategic bombing, as advocated by Douhet, can best be explained by geography and the Russian continental mind set. With its large frontier and lack of defensible terrain, Russia has historically been highly vulnerable to invasion. Conversely, Russia could effectively strike offensively on the ground using these same avenues. Therefore, the vital center of gravity in the Russian mind has been ground forces. By contrast, Douhet's theories, enunciated in his 1921 book, Command of the Air, were uniquely tailored to Italy's very different geostrategic position, with Italy relatively invulnerable to ground assault by the natural barrier of the Alps. Unlike Russia, Italy had difficulties carrying out offensive operations with its ground forces

⁹ Mason and Taylor, 127

because of these same strategic realities.¹⁰ These geostrategic factors led to a Russian view that airpower would be most effectively employed as an element of a combined arms force. V. V. Khripin, Chief of Staff of the VVS (Air Force) was probably the most vocal advocate of the strategic bombing force and wrote the foreword to the first Russian edition of Command of the Air.¹¹ Even he, nevertheless, rejected Douhet's assertion that airpower was the only means of achieving victory in war and called those who advocated such a theory "mechanistic visionaries."¹²

Soviet air theory with regards to air superiority differed from Western concepts as well. For instance, the Soviet concept of air supremacy has subtle but significant differences with the Western concept of command of the air. Brigade Commander, Aleksander N Lapchinskiy, an instructor of air warfare theory at the Frunze Academy, provided great insight into the nuances of the Soviet concept of air superiority. Firstly, he noted that the concept of command of the sea should not be applied to air combat as Western nations with maritime traditions did. He noted that naval warfare is

¹⁰ James L. Stokesbury, A Short History of Airpower (New York: William Morrow and Co., 1986), 126-127

¹¹ Mason and Taylor, 126

¹² Tsytkin, 148

more decisive because the means of destruction of naval forces outpaces the ability to produce vessels. Air warfare, because a nation can produce quickly both pilots and aircraft, begins to resemble the attritional nature of ground warfare rather than the decisive nature of naval combat.¹³ According to Lapchinskiy, an air force could not lose the war in an afternoon. Lapchinskiy preferred a concept of local air superiority, occurring at a given place and time, rather than Douhet's concept of command of the air because the attritional nature of air combat made such a decisive result impossible to attain without a protracted struggle. The ultimate success of the Red Army following the devastating aerial blows inflicted on the Red Air Force during Operation Barbarossa indicate that Lapchinskiy was prophetic in this regard.

Secondly, air superiority in the Russian mind has an element of combined arms thinking which was virtually absent from Western airpower theory. According to Lapchinskiy,

...it would be prejudice to think that air supremacy is achieved through the efforts of aviation alone. Both air and land forces participate in achieving this supremacy, in which case the latter not only defend but also attack.¹⁴

¹³ Aleksander N. Lapchinskiy, "The Fundamentals of Air Force Employment" in The Soviet Art of War: Doctrine, Strategy and Tactics, Harriet Fast Scott and William F. Scott (ed.) (Boulder, Co.: Westview Press, 1982), 63

¹⁴ Ibid.

In his work, Tekhnika i Taktika Vozdushnogo Flota, Lapchinskiy notes that ground forces can play a vital role in the attainment of air superiority by the use of not only bomber, fighter and ground-attack aviation, but also mechanized corps, cavalry, artillery and airborne assault to strike at hostile airfields.¹⁵

The third difference was that air supremacy was not simply sweeping the skies of enemy aircraft but being able to effectively support ground operations and prevent the enemy from doing the same.¹⁶ The broader Soviet definition avoids the problem of viewing the destruction of an enemy's air force as an end rather than a means.

2. The Eclipse of the Heavy Bomber

As the decade wore on, the bomber lost its pride of place in Russian air theory. In 1936, The Special Air Arm (AON), consisting of all VVS heavy bomber forces, was established and directly subordinated to the Defense Directorate; V. V. Khripin was selected as commander. This reorganization was more to increase the centralization of control for the bomber force to ensure an effective concentration of airpower supporting a ground war rather than

¹⁵ A. N. Lapchinskiy, Tekhnika i Taktika Vozdushnovo Flota (Moscow: Gosvoenizdat, 1932) 103-104

¹⁶ Ibid.

for the purpose of waging an independent strategic air campaign. The mission of AON was to provide air superiority "on the main axes in the form of air-land (sea) operations."¹⁷ However, the formation of AON was the high water mark of the heavy bomber in Soviet airpower theory as a variety of events conspired to change the nature of Russian airpower employment.

Perhaps the most influential cause of the demise of the heavy bomber was Stalin's purges. All the major air theorists of the time were victims of the purge, including Khripin and Algazin. In addition, Russia's premier bomber designer, Andrei Tupolev, was sent to a prison design bureau.¹⁸

The bomber force suffered severe setbacks in the period before the Great Patriotic War. By 1937, the preeminence of the heavy bomber was being questioned. Lapchinskiy believed that the heavy bomber's role was threatened by the advent of very fast monoplane fighters and began to favor the use of smaller fighter-bombers as a more survivable alternative.¹⁹

¹⁷ Col. Y. S. Yelizarov, "On the Question...", 17

¹⁸ AVM R. A. Mason, Aircraft, Strategy and Operations of the Soviet Air Force, 127

¹⁹ Tsyarkin, 149

Subsequent combat experience in both the Spanish Civil War and Winter War with Finland proved Lapchinskiy correct. Soviet SB-2 medium bombers, while scoring initial successes in the Spanish Civil War, suffered very heavy losses when confronted with the German BF-109; an example of the new generation of fast monoplane fighter. Likewise, Soviet bomber forces suffered extremely heavy losses in the Winter War. Nearly half of the 700-900 Soviet aircraft losses in this war were bombers, including DB-3, SB-2 and TB-3 aircraft.²⁰ These losses occurred in the face of a crushing numerical superiority as the Russians employed over 2,000 aircraft in the campaign and the Finns could rarely muster more than 100. The belief that the bomber would always get through had been shattered. Bomber aviation also struggled with navigational difficulties, coordination problems with fighter escorts and problems with bombing accuracy which further undermined its potential.²¹

In addition, the crippled Soviet aircraft industry was encountering difficulties in the development of a follow-on, four-engine bomber to replace the venerable TB-3. As interest waned in the heavy bomber following the purges, development of

²⁰ Von Hardesty, Red Phoenix: The Rise Of Soviet Airpower 1941-1945, (Washington D.C: Smithsonian Press, 1982), 52

²¹ Ibid.

the TB-7, which eventually became the PE-8, occurred at a leisurely pace.²² At the beginning of the decade, the general belief was that the bomber could easily penetrate air defenses and Russia was in the enviable position of having the world's largest bomber fleet. However, a classical dialectic developed with the means of defense (fast monoplane fighters and later radar) gaining a measure of ascendancy over the heavy bomber. Russian airpower employment changed from an emphasis on heavy bombers to an emphasis on tactical fighter-bombers and ground-attack aircraft. Operations in the tactical depth of the enemy's rear became the rule rather than in the operational or strategic depth.

3. Air Warfare and the Three-Dimensional Battlefield

Despite the lack of an independent strategic vision for airpower, Russian operational air theory was, with its emphasis on combined arms employment and centralized control, highly sophisticated. In 1936, the "Provisional Instructions for Independent Operations by the Air Force of the Worker's and Peasants Red Army" were published which officially established the concept of the independent air operation, which included only aviation assets. These regulations were the foundation for the operational employment of airpower in

²² Tsypkin, 156

the Great Patriotic War and the basic concept of which still applies today.²³ However, the term "independent" does not refer to the pursuit of an independent strategy, but to an operation (*operatsiya*) involving only aircraft which is subordinated to the objectives of the ground commander.

As the role of the heavy bombing force faded, the role of ground-attack aviation was expanding. The rise of ground-attack aviation was intellectually spearheaded by Col. A.K Mednis in the late 1930's and fueled by the example of Luftwaffe operations in Spain. Mednis realized that ground-attack aircraft were far more effective against small, mobile targets than were high-altitude bombers.²⁴ He advocated employment in the tactical and operational rear beyond the range of artillery and was a firm believer in the centralized control of air power. "If ground-attack aviation is spread around and subordinate to too many commanders, it will deliver uncoordinated and unwise attacks."²⁵ His description of ground-attack missions include the following goals:

²³ Mar Avn P. S. Kutakhov, "The Conduct of Air Operations," *Voyenno-Istoricheskiy Zhurnal*, No. 6, Moscow, 1972 in Selected Soviet Military Writings 1970-1975, (Washington D.C., U.S Government Printing Office, 1976), 240

²⁴ Artur K. Mednis, "Fundamentals of the Operational-Tactical Use of Ground Aviation" in The Soviet Art of War: Doctrine, Strategy and Tactics, Harriet Fast Scott and William F. Scott (ed.) ,66

²⁵ *Ibid.*, 66

destruction of the enemy air force, destruction and delaying of enemy troop reserves which are being brought up, attacking detected troop concentrations and disrupting supply and command and control.²⁶ Lapchinskiy, in his book, Vozdushnaya Armiya, published after his death, provided the ultimate expression of prewar Soviet thinking on airpower and its role.

...Ground and Air Forces must operate together to achieve a common goal. Aviation will help the land front to the extent that it offers greater possibilities for offensive action in comparison to the enemy by conducting a number of its own successive independent operations... When a massive offensive Army is at hand, the main mission of the Air Army is to support the forward movement of this army. When a war of maneuver is waged, we must win the air-land battle encounters that begin in the air and end on the ground; this would require the concentration of all air forces.²⁷

At the eve of the Great Patriotic War, the Soviet Union had made great strides in the development of aviation theory and developed an alternative vision to that of Western air theorists based on centralized, but not independent, control of air assets and combined arms operations. However, a combination of organizational handicaps and shortcomings in

²⁶ Ibid.

²⁷ A. N. Lapchiskiy, Vozhdushnaya Armiya, Moscow, 1939, 98, 119, 137, 144, quoted in M. N. Kozhevnikov, The Command and Staff of the Soviet Army Air Force in the Great Patriotic War 1941-1945, (Moscow, Nauka, 1977) (Washington D.C.: U.S. Government Printing Office, n.d) 27

both aircraft and personnel quality made advanced theory irrelevant.

B. THE SECOND GREAT PATRIOTIC WAR

In 1940, a reorganization of the Air Force was conducted in the wake of the Russo-Finnish War and the Khalkin-Gol border skirmish with Japan which was intended to increase the responsiveness of air assets. Aviation was divided into High Command Aviation (*Stavka Asset*), Frontal Aviation (*Military District Asset*), Army Aviation (*Combined Arms Army Asset*) and Troop Aviation (organic to ground forces).²⁸ Because of these reorganizations, the multi-layered nature of Soviet air organization led to a "penny packet" approach to the employment of airpower.

1. The Initial Phase (June 1941-Mar 42)

On 22 June 1941, the German military commenced Operation Barbarossa with a series of devastating strikes on airfields in the Western U.S.S.R. Between 22 and 30 June 1941, the Soviets lost over 4,000 aircraft, out of an estimated 8,000 to 10,000 total aircraft in service.²⁹ The majority of the aircraft destroyed were fighters, as they were deployed in an offensive posture near the border.

²⁸ Col. Y. S. Yelizov, 18

²⁹ Von Hardesty, Red Phoenix, 15-17

The Soviet long-range bomber fleet, subordinated to the Stavka High Command, were located well to the rear and survived the initial air strikes. The desperate situation on the ground and the fact that the Axis had attained almost complete air superiority meant that the vast majority of Long-Range Aviation's sorties would be in direct support of ground forces.³⁰ In desperation, these bombers were thrown at advancing panzer spearheads in daylight many times without fighter escort and suffered heavy attrition.

While the vast majority of the bomber forces were attacking tactical targets, some use was made of long-range bomber forces and bombers from naval aviation to strike at Berlin and other targets, such as Ploesti. However, these raids were too small to have any other effect than propaganda value and in this regard were very similar to the U.S Doolittle Raid.³¹

As bomber attrition took its toll, the Air Force became ever more reliant on ground-attack aircraft and fighter bombers to accomplish its mission. Mednis' vision of ground-attack aviation being more effective than the heavy bomber in

³⁰ Col Gen Avn V. V. Reshetnikov, "From the Experience of Launching Long Range Raids Against Military-Industrial Objectives," *Voyenno-Istoricheskiy Zhurnal*, No.9, Sept 86, 34-40

³¹ Von Hardsy, Red Phoenix: The Rise Of Soviet Airpower 1941-1945, 85

combined force operations proved accurate. In particular, the Ilyushin Il-2 *Stormovik* proved exceptionally effective in supporting ground operations. While only 249 of these aircraft were on hand at the beginning of the war, production of these highly effective ground-attack aircraft became a priority. However, by December 1942, daily production of Il-2's reached 40 per day and they then represented 30 percent of the Russian Air Force.³² The wartime priority on the production of ground-attack aircraft was best illustrated by Stalin's confrontation with aircraft factory directors who were emphasizing fighter production in December 1941. Stalin stated:

You have let down our country and the Red Army. You are still not facilitating the production of IL-2's. The Il-2 is as vital to our Red Army as air or bread.... I demand the production of more Il-2's. This is my last warning. Stalin.³³

As a result of both enemy air superiority and the emphasis on ground-attack, the trend away from operations in the deep rear of the enemy and towards close air support on the battlefield became pronounced.

³² Col. V. V. Anuchin, "Aviation Tactics Against Tanks," *Voyenno-Istoricheskiy Zhurnal*, No. 7 July 1987, 29-36 (JPRS-UMJ-88-001, 19 Feb 1988, 16

³³ Yakovlev, *Tsel' Zhizni*, quoted in Alexander Boyd, *The Soviet Air Force Since 1918*, (New York: Stein and Day, 1977) 190

2. The Second Phase (Apr 42- Dec 43)

A critical element in developing the operational art of airpower employment was the development of a High Command Reserve for air units. As early as late July 1941, six reserve air groups were formed to increase the ability to mass airpower over critical sectors. Skillful use of High Command Reserves in the winter counteroffensive near Moscow enabled the Soviet Air Force, for the first time, to gain local air superiority.³⁴ By Fall 1942, 13 Air Corps, each consisting of two divisions of 120 to 270 aircraft, had been created, including not only heavy bombers, which had been a traditional Stavka asset, but also fighters and ground-attack aircraft. By war's end, over 30 such corps had been created.³⁵

In addition to the establishment of a Stavka Reserve, an overhaul of Air Force organization was also necessary. The basic air organization resulting from the 1940 reforms proved inadequate for concentrating effective force. In April 1942, General A. A. Novikov assumed Command of the Air Force and set about the urgent task of reforming the Air Force. Prior to the Novikov reforms, both Military Districts and armies had air assets attached to them. Over 50-55 percent of air assets

³⁴ Lt Gen Avn N. N. Ostroumov, "At the Head of the Soviet Air Forces," Voennaya Mysl, No.11, 1990, 57-60 (JPRS-UMT-003-L, 25 Feb 1991, 34-35)

³⁵ Col Y. S. Yelizarov, 19

were located at the army level which led to a dissipation of effect.³⁶ The consolidation of aviation assets at this level enabled a large concentration of air assets over critical areas of the front by massing Air Armies from adjacent fronts and increased the ability to conduct operational-strategic missions and enabled the air superiority battle to be waged far more effectively.³⁷

The new organizational changes, coupled with the increased numbers and quality of Soviet aircraft production, allowed for the increasingly effective use of the air offensive operation. For example, an air offensive in the Kuban region in April 1943 was conducted for nine days in order to gain air superiority for an upcoming offensive. Eighteen German airfields were attacked by aircraft from four air armies, Black Sea Fleet Naval Aviation and elements of Long-Range Aviation which struck as deep as 300-350 kilometers behind German lines.³⁸

As air superiority was obtained over the battlefield, the Red Air Force began to conduct independent air operations

³⁶ Col Gen Avn B.F Korolkov "Improving Command System of Frontal Aviation", *Voyenno-Istoricheskiy Zhurnal*, No. 5 May 1987, 33-38 (JPRS-UMJ-87-004, 22 Sep 1987, 31)

³⁷ Col V. S. Yelizarov, "On the Question of Air Force Organizational Structure", *Voennaya Mysl*, No. 1 Jan 1990, 30-36 (JPRS-UMT-90-001-L, 22 Feb 1990, 19)

³⁸ Kutakhov, 242

against the operational rear of the German Forces. In early 1943, long-range bomber forces conducted a series of air operations against rail lines of communication up to a depth of 400 kilometers in order to disrupt the preparations for the Kursk battle.³⁹ In preparation for the German summer offensive in 1943, a large independent air operation was conducted by six air armies from 6-8 May, with the objective of the destruction of enemy aviation over a 1200-kilometer front from Smolensk to the Sea of Azov.⁴⁰

3. The Final Phase (1944-45)

The final phase of the war was marked by decisive Soviet air superiority, overwhelming application of airpower and a new flexibility in employment. The use of the *Stavka* reserve and the massing of multiple air armies on a single front enabled the Soviets to mass crushing air superiority over the main axes of the offensive. Whereas 1,400 Soviet combat aircraft fought at Stalingrad, more than 6,000 aircraft participated in Operation Bagration and over 7,500 aircraft in the final offensive on Berlin.⁴¹

³⁹ Col. N. I. Belousov, "Use of Long-Range Aviation to Disrupt Enemy Rail Traffic," *Voyenno-Istoricheskiy Zhurnal*, No. 10, Oct 87 32-37 (JPRS-UMJ-88-004, 17 Mar 1988, 20-21)

⁴⁰ Kutakhov, 243

⁴¹ Kozhevnikov, 228

In the concluding phase of the war, Soviets showed increasing flexibility with regards to the concentration of air assets. New concepts were developed during the Lvov-Sandomierz, Vistula-Oder and East Prussian offensives to support rapidly moving armored forces conducting exploitation on an increasingly fluid battlefield. Air assets, especially fighters and ground-attack aircraft, were operationally subordinated to tank armies and mechanized groups (operational maneuver groups) conducting deep penetrations in a manner analogous to direct support artillery.⁴²

Long-Range Aviation was also used far more effectively in the third stage of the war. During the Byelorussian offensive, all eight corps of Long-Range Aviation were used in a single operation for the first time, primarily targeting lines of communication.⁴³ In 1944, Long-Range Aviation began to conduct a series of independent air operations against industrial and economic targets in both Hungary and Finland with the intention of demoralizing these minor axis allies

⁴² Col Gen Avn B. F. Korolkov, "Improving the Command System Of Frontal Aviation", *Voyenno-Istoricheskiy Zhurnal*, No 5, May 1987, 33-38 (JPRS-UMJ-87-004, 22 Sep 87, 32)

⁴³ Belousov, 21

into making a separate peace."⁴⁴ By 1945, Long-Range Aviation, now redesignated the 18th Air Army and subordinated to the Air Force, began to conduct strategic operations against Germany. In April 1945, Long-Range bomber forces conducted a strike on Konigsberg (Kaliningrad) which included over 500 bombers and 200 escorting fighters.⁴⁵ Despite these strategic raids, the overwhelming emphasis of Long-Range Aviation remained support of ground forces in the operational and tactical depth. Over the course of the war, Long-Range Aviation flew only 3.1 percent of the total sorties versus strategic target sets. Forty and four-tenths percent of the sorties were in direct support of the battlefield, 30.6 were against operational targets such as reserves and rail communications, and 9.6 percent were sorties against airfields.⁴⁶ These figures demonstrate the predominate use of even Long-Range Aviation in the operational and tactical roles.

⁴⁴ Col Gen Avn V. V. Reshitnikov, "From the Experience of Launching Long-Range Air Raids Against Enemy Military-Industrial Objectives," *Voyenno-Istoricheskiy Zhurnal*, No.9, Sep 86, 34-40

⁴⁵ Ibid.

⁴⁶ Reshitnikov, 34-40

4. Soviet and Western Air Theory

Soviet prewar theory on air operations which emphasized the attritional nature of air combat, centralized control, and the necessity for combined arms operations, were proved valid by combat conditions on the Eastern Front. Soviet military thought had been tempted by, but ultimately rejected the principle of victory through the independent use of strategic airpower. Unlike the American vision of airpower developed by the Air Force Tactical School, which advocated targeting the industrial infrastructure first, Soviet Air operations placed primary emphasis on targeting military-industrial targets only when conditions at the front enabled aircraft to be spared. Operations against economic and industrial centers were predominately contingent on adequate support being available to support ground operations.

Another important factor was the view of air warfare as attritional in nature rather than immediately decisive. In stark contrast, American air planners took a very deterministic view of air power's potential. The initial American plan for the strategic air campaign against Germany, AWPD-1, implied that airpower could be the decisive force in the war. Airpower was to support an invasion of Europe "only

if it became necessary."⁴⁷ The Combined Bomber Offensive by both Britain and the United States proved to be very costly in both men and equipment. It is estimated that the British strategic bombing campaign at times took fully a third of the British war effort.⁴⁸ Likewise, losses were staggering, with America losing over 8,000 B-17 and B-24 bombers in the European Theater and the British losing over 4,000 heavy bombers.⁴⁹ With the Soviet Union engaged in a struggle in which the center of gravity was the German Army, such a costly campaign was simply beyond their means.

However, the effectiveness of Soviet airpower in support of the ground war was not inconsequential. Over 75 percent of all German aircraft destroyed during the Second World War were destroyed on the Eastern Front.⁵⁰ Another indicator of the effectiveness of Soviet airpower is the amount of kills scored by Russian aces during the war. Eight pilots scored 50 or more kills while the highest-scoring U.S.

⁴⁷ Robert Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960, Maxwell Air Force Base, 1989, Air University Press, 109

⁴⁸ Lee Kennet, A History of Strategic Bombing, New York, 1982, Charles Scribner's Sons, 181

⁴⁹ Arthur B. Metcalf, "Strategic Bombing in Conventional Warfare: Some Considerations", Strategic Review, Spring 1991, 19

⁵⁰ Kozhevnikov, 226

pilot scored only 40.⁵¹ The attritional air battles over the Kuban and Kursk played an important role which is often overlooked because of the lack of an independent air strategy.

C. CONCLUSION

The period between 1930 and 1945 saw the evolution of air power theory from untested concepts to operational art proven in the crucible of battle. However, Russian airpower theory developed upon a significantly different path than Western airpower concepts, driven by geostrategic factors, technological shortcomings and the influence of the Stavka. The Russian heavy bomber force, despite being the largest in the world in the early 1930's, did not subscribe to a concept of independent strategic bombing along the lines advocated by the Italian air theorist Douhet. Instead, a target set which could most effectively influence the conduct of the ground war was chosen.

During the late 1930's, a shift towards tactical employment of airpower became prominent as the heavy bomber was proven increasingly vulnerable to defenses and technological progress stagnated. The fighter-bomber and ground attack aircraft became the dominant element in Russian

⁵¹ Von Hardey, 256

air warfare theory. Air theorists such as Lapchinskiy and Mednis defined new concepts of operational employment for airpower which would prove a sound framework for a resurgent Red Air Force. By emphasizing centralization of control and combined arms operations, the Red Air Force waged a series of highly effective air operations, gaining air superiority by attrition and eventually dominating the three-dimensional battlefield. However, because of a lack of an independent strategy, the effectiveness of the Red Air Force in combined arms operations is often underestimated. Given the tremendous opportunity costs of building a strategic bombing force, the Russian concept of air warfare as a combined arms element was a cost effective alternative to an independent strategic force. However, the development of nuclear weaponry would in one stroke change the Russian concept of airpower employment.

III. THE POST WAR PERIOD: TECHNICAL REVOLUTION

A. 1950-1953

The Soviet Air Force experienced a tremendous growth in both size and capability during the immediate postwar period. By 1953, the amount of troops in the Air Force as a percentage of the total military more than tripled.⁵² As a result of the development of nuclear weaponry, the greatest threat to the survival of the Soviet Union was now the long-range nuclear bomber, not the massed ground forces of the Great Patriotic War. This forced the Soviet military and Air Force to adopt by necessity the principles of strategic air warfare which had been rejected during the Great Patriotic War. Primary emphasis was placed on both an effective air defense system and a strategic offensive bombing capability.

The windfall from captured German technology allowed the Soviet Union, through determined effort, to close the technological gap with the West. New jet fighters, such as the MiG-15, were fully equal to their Western counterparts. Priority production was placed on interceptor aircraft which could both provide for homeland defense and win the vital

⁵² Yelizarov, 19

battle for air superiority over the battlefield. However, the reality of airpower in the nuclear age led to a priority being placed on air defense and offensive strategic bombing. As an example, initial production of the advanced MiG-15 fighter was allotted not to frontal aviation but to National Air Defense.⁵³

Intense effort was also placed on developing a strategic bombing force. The weight of the Soviet military-industrial complex was placed behind the development of both nuclear weaponry and means of delivery. The Soviets rushed into production a carbon copy of the B-29, the Tu-4 Bull. In marked contrast to the lack of interest in heavy bomber aircraft during the war, over 1,500 Tu-4's were built until production ceased in 1954.⁵⁴ However, the Tu-4 could not reach the continental United States from bases in the Soviet Union so development work began on two truly intercontinental bomber aircraft, the turboprop TU-95 Bear and the turbojet M-4 Bison, as well as the TU-16 theater bomber.⁵⁵ Despite the priority development of a strategic bombing force, the Western concept of victory through the independent use of airpower was

⁵³ Dr Jacob Kipp, "Soviet Tactical Aviation in the Post-War Period," Airpower Journal, Spring 1988, 16

⁵⁴ Alexander Boyd, 216

⁵⁵ Ibid., 222-223

still not fully accepted by the Soviet military: According to a 1949 Voennaya Mysl article:

Soviet military science considers that the outcome of a war under current conditions is decided on the field of battle by means of the annihilation of the armed forces of the enemy, and that one of the most important tasks of aviation is active assistance to the ground and naval forces in all the forms of their combat activity. The fundamental mission of aviation is not contradicted by the need to strike deep in the rear of the enemy, on his military-industrial targets, but our military science does not view such blows as an end in themselves, but only as a helpful means of creating favorable conditions for the success of combat operations of the ground and naval forces.⁵⁶

This statement demonstrates the continuity between prewar and postwar thinking on the employment of the strategic bomber as an element of combined arms warfare in spite of the development of nuclear weapons.

B. THE KHRUSHCHEV ERA AND THE NUCLEAR REVOLUTION (1954-1964)

The emphasis on nuclear weaponry increased during this time and the trends continued to support strategic nuclear forces, such as offensive means of delivery and air defense, over conventional forces. Furthermore, advances in both ballistic missile and anti-aircraft missile technology were believed to be rendering the manned aircraft obsolete.

⁵⁶ Col Gen Avn Nikitin, Voennaya Mysl, February 1949, quoted in Mason and Taylor, 133-134

These shifting priorities led to a relative decrease in the importance of aviation. Between 1950 and 1960 the size of Frontal Aviation drastically decreased from 16,000 to less than 4,000 aircraft.⁵⁷ This was largely in light of the belief that the air operation which was developed during the Great Patriotic War was deemed to have little utility in the age of nuclear weaponry.⁵⁸ Ground-attack aviation, the backbone of the Soviet Air Force in the Great Patriotic War, was disbanded in 1956. Simultaneously, the development of a turbojet follow-on to the long serving Il-10 *Stormovik* was curtailed despite it showing great potential.⁵⁹

To the Soviets at this time, the decisive weapon in a future war at both the theater and strategic level would be the long-range nuclear missile. In 1959, the Strategic Rocket Forces (SRF) were established as a separate command, and were given immediate priority ranking among the services.⁶⁰

⁵⁷ Robert P. Berman, Soviet Air Power in Transition, Washington D.C., Brookings Institute, 1978, 29

⁵⁸ Jacob Kipp, "Soviet 'Tactical' Aviation", 18

⁵⁹ Col Ye A. Lavrentev, "Soviet Air Forces Ground Attack Aviation in the Postwar Years," Voennaya Mysl, No.4, Apr 90 42-47 (JPRS-UMT-90-004-L, 21 May 1991, 26)

⁶⁰ Harriet Fast Scott and William F. Scott, The Armed Forces of the USSR, 3rd Ed. (Boulder, Co: Westview Press, 1984), 145-147

The development of the thermonuclear weaponry and an effective rocket delivery system led to Douhet's vision of strategic warfare against the military economic potential being realized. According to Marshal V. D. Sokolovskii, strategic air warfare in the Second World War was not decisive to the course and outcome of the war, only the defeat of an enemy's armed forces and seizure of an opponent's homeland could achieve victory. However, a single missile with a thermonuclear warhead could deliver many times more explosive power than the two million tons of bombs dropped by the British and American bomber offensives against Germany from 1940 to 1945.⁶¹ As a result of this the SRF were viewed as capable of independent strategic warfare. Sokolovskii makes it clear that these forces are the primary element in warfare and do not exist to support ground forces.⁶²

While the Soviet missile programs for both intercontinental and submarine-launched ballistic missiles were advancing rapidly, development of intercontinental bombers proved difficult. Furthermore, the development of surface-to-air missiles seemed to indicate that the manned

⁶¹ V. D. Sokolovskii, Soviet Military Strategy, H. Dinerstein, L. Goure and T. Wolf (ed.) (Santa Monica: Rand Corporation, 1963), 300-306

⁶² Ibid., 402

bomber could not effectively penetrate a modern air defense network. Sokolovskii states:

In recent years there has been keen competition between bombers, missiles and air defense weapons. In this competition, air defense weapons have gained the advantage over bomber aircraft... Consequently, bombers are yielding rapidly first place intercontinental and intermediate range ballistic missiles. Front-line (tactical) bombers are also being gradually replaced by missiles.⁶³

Thus, while the vision of Western air power theorists in which decisive strategic strikes decide the course and outcome of the war had finally been completely accepted by the Soviets, the means was the nuclear missile and not the traditional heavy bomber.

The Soviets also did not accept Douhet's concept of targeting population centers. Rather, the target set would closely resemble the target set allotted to the heavy bomber force during the past, the destruction of command and control, military targets, military economic potential and lines of communication in the deep rear.⁶⁴ In addition, while deep strikes with nuclear weaponry may be decisive, they continued to be viewed as only one element in a war which includes

⁶³ Ibid, 346

⁶⁴ Maj Gen Kh. M. Dzhelaukov, "The Infliction Of Deep Strikes", *Voennaya Mysl*, No. 2, Feb 1966 in Selected Readings From Military Thought 1963-1973 (Washington, D.C.: U. S. Government Printing Office, n.d), 110

operations by ground, air and naval forces as well, including the occupation of "strategically important regions."⁶⁵ Destruction of an enemy's military industrial potential was now given a coequal status to the destruction of ground forces, but did not replace it as a mission.⁶⁶ It is clear from Sokolovskii's writing that nuclear strikes, despite their decisive nature, are a means to victory rather than an end. The nuclear destruction of targets in the United States, while deciding the course and outcome of the war, would have been a means to allow the occupation of vital areas, such as Western Europe, as a final war aim.

C. AVIATION RESURGENT (1964-1982)

While military thought associated with the Revolution in Military Affairs had assumed that a war with the West would be nuclear from the beginning, this was soon to change. After the October 1964 Communist Party Plenum, it was accepted that Khrushchev had placed too much of an emphasis on nuclear weaponry and that a future war in Europe could have an initial conventional phase. In such a conventional phase, it would be necessary to neutralize both NATO's theater nuclear potential

⁶⁵ Ibid., 302

⁶⁶ Ibid., 305

and impressive airpower capability.⁶⁷ Therefore, conventional aircraft striking power had assumed the mission of theater nuclear forces in the initial phase of a conflict.

As Soviet interest in a possible conventional phase of conflict increased, the Israeli air strikes during the Six-Day War demonstrated the strategic effectiveness of airpower in a conventional strike role. On the morning of 5 June 1967, the Israeli Air Force launched a surprise preemptive strike on 16 Egyptian airfields. During the afternoon, airfields in Syria and Jordan were targeted. By dusk, over 270 Arab aircraft had been destroyed both in the air and on the ground, representing over 60 percent of their total inventory; Israeli losses were less than 10 percent. Having gained air superiority, on 6 June, the Israeli Air Force went over to supporting the ground battle.⁶⁸ This highly successful air campaign would serve as a model for evolving concepts of airpower employment in a conventional war scenario.

The developing realization that there might be an initial conventional phase to a conflict led to an increasing emphasis on airpower to conduct deep strikes with the primary target set being the enemy's nuclear means, which had previously been

⁶⁷ Phillip A. Petersen and John G. Hines, "Soviet Air and Anti-Air Operations" Air University Review, April-March 1985, 36-54

⁶⁸ I. E. Shavrov, Lokalniye Voini (Moscow: Voroshilov Academy, 1975) 265-66, 476

assigned to nuclear weapons. In 1970, A. A. Sidorenko stated in his book, The Offensive, that airpower should accomplish the following tasks:

Modern front aviation...can launch powerful and accurate strikes against the enemy with nuclear and conventional ammunition to a great depth under the most varied weather conditions and destroy the means of nuclear attack, personnel and equipment... An important quality is its capability to discover independently and immediately destroy enemy means of nuclear attack.⁶⁹

Soviet air theory was also greatly impacted by the experience of local wars occurring in the 1970's. The air war in Vietnam, while not having as great an impact on Soviet thinkers as the Six-Day War, nevertheless provided important lessons. Vietnam saw the first employment of precision-guided munitions, the widespread use of electronic countermeasures and the long awaited contest between surface-to-air missiles and strategic bombers.

Perhaps the most important element in the conflict was the development and employment of precision guided weapons for the first time. According to Soviet sources, the guided bombs

⁶⁹ A. A. Sidorenko, The Offensive: A Soviet View, 1970 (Washington, D.C.: US government Printing Office, 1973), 47

enabled a ten-fold reduction in the amount of aircraft assigned to destroy a target.⁷⁰

The advent of electronic countermeasures and suppression tactics led to a reassessment of the deterministic view that surface-to-air missiles meant an end to the viability of manned aircraft. This new view acknowledged "the systematic development of two types of forces (air forces and air defense) and an absence of clear superiority of one over the other."⁷¹ The best example of this was the Linebacker II raids conducted against North Vietnam in late 1972. The B-52 force suffered a two percent attrition rate which, while significant, clearly did not demonstrate the ascendancy of the surface-to-air missile over the strategic bomber. However, this was credited in part to the tremendous amount of supporting strikes against airfields and air defense facilities by tactical aviation as well.⁷² This fact also underlined the growing role of support aircraft. Of total sorties over the North, 25 percent were for electronic warfare and 25 percent were for active suppression of defenses.⁷³

⁷⁰ V. K. Babich, Aviation in Local Wars, Moscow, Voyennizdat Publishing House, 1988, 1-207 (JPRS-UMA-89-010-L, 2 Oct 1989, 64)

⁷¹ Ibid., 67

⁷² Ibid., 49-50

⁷³ Ibid., 68

The 1973 Yom Kippur War confirmed that air warfare had primarily become dependent on control of the electromagnetic spectrum. The Israeli Air Force by the end of the war had lost almost a third of their inventory of aircraft, 90 percent of which were destroyed by sophisticated ground-based air defense systems, to which the Israelis initially lacked effective countermeasures.⁷⁴ Soviet sources acknowledged that,

Surprise in ECM warfare came to be valued no less than in (sic) the tactics of the aviation strike force. Survivability in both cases depended on the lack of readiness of the enemy to adopt effective answering measures.⁷⁵

Another important element was the lack of effectiveness of Israeli airstrikes versus airfield targets. Unlike the Six-Day War, in which Arab aircraft were parked wingtip to wingtip in the open, during the Yom Kippur War Arab aircraft were deployed in concrete shelters which made them difficult to destroy. Also, strikes against runways could be easily repaired overnight and therefore had little effect.⁷⁶

⁷⁴ Ibid.

⁷⁵ Ibid.

⁷⁶ Ibid., 52

Consequently, air superiority had to be gained as a result of air-to-air combat.

The concept of the Air Operation became more fully developed in this period as increasing capabilities of conventional weaponry allowed airpower to fulfill roles that had previously been reserved for nuclear weapons. In the early 1970's, a new generation of highly capable aircraft entered the inventory, including the MiG-23 fighter, the SU-24 Fencer deep strike aircraft, the TU-22M theater strategic bomber, and the SU-17 and MiG-27 tactical strike aircraft which offered greatly improved capability in the offensive strike roles. As the range and effectiveness of aircraft increased, the Soviet concept of air supremacy evolved to encompass an entire theater of operations. In a 1968 Voennaya Mysl article, Col N. Semenov describes the changes that have occurred in the concept of air supremacy since the Second Great Patriotic War:

In contrast to the past, the capabilities of modern aircraft permit them to carry out in short periods broad maneuver for the purpose of gradually increasing the efforts and replenishing the losses in any zone of a theater. Therefore, in all likelihood it is impossible to gain air superiority in a limited region or zone. The question of achieving air supremacy can now only be raised on the large operational or strategic plane.⁷⁷

⁷⁷ N. Semenov, "Gaining Supremacy in the Air", Voennaya Mysl, No 4, April 1968 in Selected Readings from Military Thought 1963-1973 (Washington D.C.: U.S. Government

Because of these factors, the air operation became a theater level strategic undertaking which greatly increased in scope over the majority of the air operations in the Great Patriotic War. The most instructive view of the nature of the theater air operation comes from the Voroshilov Academy Lectures, which describes the nature of the air operation in the mid-1970's.

The goals of the air operation were delineated as follows:

- destruction of enemy aircraft and flight personnel at airfields;
- destruction of enemy aircraft and flight personnel in air combat;
- destruction of enemy naval strike aircraft in their combat maneuver areas or at their bases;
- destruction of enemy control and air navigation systems;
- destruction of enemy nuclear ammunition depots, POL, ammunition and material-technical supply depots;
- destruction and mining of enemy runways and airfields.⁷⁸

The influence of the Six-Day War experience is evident in the concept of the air operation. Success in the operation

Printing Office n.d), 205

⁷⁸ Ghulam Wardak, The Voroshilov Lectures: Materials from the General Staff Academy, Vol I, Graham Hall Turbiville (ed.) (Washington D.C.: National Defense University Press, 1989), 317

was calculated as destruction of 50-60 percent of the an opposing force's air assets and this was to be accomplished within 24-36 hours. After such time, control of frontal aviation assets will be returned to frontal commanders to provide support for ground operations.⁷⁹ The initial air operation in the Western Theater of Military Action (WTVD) was expected to encompass a depth of 1,000-1,200 km and a width of 800-1000 km.⁸⁰ An essential element in the successful conduct of this operation was deemed to be successful penetration of the NATO integrated air defense system. The suppression of ground-based air defenses in several breakthrough corridors, supplemented by heavy use of electronic warfare, was considered vital to the success of the operation.⁸¹

The concept of the air operation employs traditional elements of Russian combined-arms thinking. In addition to the use of Long-Range and Frontal Aviation, attacks by Rocket Troops of the ground forces, using missiles with improved conventional munitions warheads, played a vital role in airfield destruction and air defense suppression. Also

⁷⁹ Ibid., 319-320

⁸⁰ Ibid., 319

⁸¹ Ibid., 330

envisioned was the use of artillery, attack helicopters, airborne and special forces troops.⁸²

The concept of the air offensive with its emphasis on centralized control of air assets and combined arms employment shows a remarkable doctrinal continuity in Soviet air warfare theory married with the greatly increased effectiveness of modern airpower.

D. OGARKOV AND THE SECOND REVOLUTION IN MILITARY AFFAIRS

In the early 1980's, it was realized by some visionaries in the Soviet military that another Revolution in Military Affairs was occurring, caused by the integration of the computer into all facets of warfare and by the development of precision-guided weaponry. There was an emerging view that conventional weaponry was acquiring a destructive power equal to that of nuclear weapons. According to Marshal of the Soviet Union Nikolai Ogarkov, then Chief of the General Staff,

...rapid changes in the development of conventional means of destruction and the emergence in the developed countries of automated reconnaissance-and-strike complexes, long-range high accuracy terminally guided combat systems, unmanned flying machines, and qualitatively new electronic control systems makes many types of weapons global and makes it possible to sharply increase (by at least an order of magnitude) the destructive potential of conventional weapons... The sharply increased range of conventional weapons makes it

⁸² Petersen and Hines, 36-54

possible to immediately extend combat operations not just to border regions, but to a whole country's territory, which was possible in past wars.⁸³

The increasing scope of operations of modern weapon systems required taking a new view of looking at the conduct of combined arms operations. Front-level strike means, especially missiles and aircraft, had the ability to act in such depth that the concept of front-level operations was becoming outmoded. Ogarkov stated that the basic combat operation in future war would be the theater-level operation, not the frontal operation.⁸⁴

These new concepts had significant ramifications for Soviet airpower theory. Ogarkov noted that, "the air domain, which gives modern operations its three-dimensional character and depth, is assuming an ever increasing role in combat actions and operations."⁸⁵ In 1981, Long-Range Aviation was reorganized into five Air Armies of the Soviet Union, and tailored to specific theater requirements. These Air Armies

⁸³ Interview with MSU Ogarkov: "The Defense of Socialism: The Experience of History and the Present Day," *Krasnaya Zvezda*, 9 May 1984, First Edition, 2-3 (FBIS-SU V.3 No. 91, R19)

⁸⁴ MSU Nikolai Ogarkov, "Guarding Peaceful Labor," *Kommunist*, No. 10, Jul 81, 80-91 (JPRS 79074, 25 Sep 1981, 93)

⁸⁵ MSU Nikolai Ogarkov, Always in Readiness to Defend the Homeland, (JPRS-L-10412, 25 Mar 82, 32)

were believed to be subordinated to *Stavka* control during wartime to allow for centralized control of the deep strike mission in Theaters of Military Operations.⁸⁶

Even more significant than the increasing scope of operations was the essential change in the nature of warfare itself. The dominant weapon system on the future battlefield was expected to be the reconnaissance-strike complex. These systems have the capability for "the faultless selection and the rapid engagement of targets at any depth on the first strike."⁸⁷ Examples of such systems under development by the United States include the operational-level PLSS (Precision Location Strike System), designed for the suppression of enemy air defenses, and the tactical-level JTACMS (Joint Attack Missile System), intended primarily to counter second echelon armored forces.⁸⁸

The functional components of a recce-strike complex include both a means of detection and a means of attack linked by advanced automated control links. In most recce-strike systems, airborne elements conduct the detection and targeting function. For example, PLSS uses ten TR-1 reconnaissance

⁸⁶ Mason and Taylor, 141

⁸⁷ Mar Avn N. M. Skomorokhov, "Reconnaissance-Strike (Weapon) Complexes" *Voennaya Mysl*, No. 9, Sep 91, 22-27 (FBIS-UMT-92-001-L, 12)

⁸⁸ *Ibid.*

aircraft, of which three are on station at one time. These aircraft are assessed to be able to target hostile air defense systems within 30 seconds of emission with an accuracy of 15-30 meters to a total depth of 500 kilometers. Information is relayed to a ground control center and passed to F-16 aircraft, which comprise the strike element of the system. The system is regarded as a grave threat to the combat stability of air defense forces.⁸⁹

These revolutionary weapons systems were expected to fundamentally alter the nature of conflict, with the massing of firepower replacing the massing of maneuver forces. A vision of future warfare between such systems is provided by Colonel Yu. Molostov and Major A. Novikov in a 1988 article in Soviet Military Review:

Each side in battle will strive for firepower superiority. This aspiration will inevitably assume the form of a duel, frequently from maximum distances. The duel will be won by the side which organized reconnaissance better, outwitting the adversary in fighting technique, maneuvering quickly and more skillfully, and destroying enemy installations the first time out. Speed will therefore be vital, as well as knowledge of enemy strong and weak points and a creative approach to fire neutralization of the opposing side.⁹⁰

⁸⁹ Ibid.

⁹⁰ Col Yu. Molostov and A. Novikov, "High-Precision Weapons Against Tanks", Soviet Military Review, No. 1, Jan 1988, 12-13, as cited in "The Soviet Strategic View", Strategic Review, Winter 1988, 81

E. CONCLUSION

The development of Russian air doctrine has displayed a tremendous continuity since its inception. Prior to the new Revolution in Military Affairs, the increasing capabilities of modern weaponry had not changed the fundamental concepts of the necessity for air superiority and the use of airpower in a combined arms role in support of strategic objectives in a conventional war scenario. Douhet's concept of victory through the use of airpower (in this case, strategic nuclear means) alone was not fully accepted in Russian doctrine. The nuclear missile was viewed as long-range artillery which could strike independently in the enemy's deep rear but its purpose was to create conditions for the ultimate success of the general purpose forces. However, the concepts of air superiority meant little because of the inability to effectively intercept these systems. Warfare would be reduced to a series of overwhelming offensive strikes.

The increasing conventional strike potential of aviation and ground forces missile troops enabled them to fulfill the role previously assigned to nuclear weapons. The development of such systems as recce-strike complexes and precision-guided weaponry has accelerated the trend towards warfare being waged primarily with "fire strikes" rather than contact between forces. The question exists whether the new paradigm for the

use of high-precision strike forces will be developed from existing concepts of conventional air warfare employment, such as the air offensive, or will it be taken from concepts of nuclear weapons employment.

IV. RUSSIAN LESSONS OF THE PERSIAN GULF WAR: AIRPOWER AND THE NEW MILITARY-TECHNICAL REVOLUTION

The Persian Gulf War seemed to represent a change in the fundamental nature of warfare. Marshal Ogarkov's concept of a revolution in military affairs appears in the light of Operation Desert Storm to be highly prophetic. This chapter will examine the lessons of the Gulf War with respect to the concept of warfare by "remote strikes." Of particular importance is the question of whether a paradigm shift has occurred in which aerospace striking power embodied in precision-guided weaponry and reconnaissance-strike complexes have supplanted massed ground forces as the dominant force on the battlefield.

A. THE INCREASED EFFECTIVENESS OF AIRPOWER

On 16 January 1991, Coalition forces began a six-week air campaign in support of Operation Desert Storm. The air campaign provided a unique chance to examine the stand-alone effectiveness of airpower on the modern battlefield. This application of airpower proved to be very effective compared with previous uses of airpower. During the campaign, the Coalition was able to "to win absolute supremacy in the air,

to disrupt the leadership of the country and troops, [and] to disable more than 70% of the military-industrial facilities."⁹¹ The input measures of the Coalition Air Campaign were equally impressive to Russian observers. Over 110,000 sorties were generated in the course of the war (six-weeks) and an estimated 88,000 tons of ordnance were employed. In contrast, an average of only 17,000 sorties a month were generated in 1966 during the war in Vietnam.⁹²

1. The Role of Airpower

While the effectiveness of airpower was convincingly displayed in the Gulf War, the question exists of whether it was independently decisive or merely a constituent element in a combined arms warfare in accordance with traditional Russian military thought.

Some Russians saw the Gulf air campaign as an analog to the traditional concept of the independent air operation which had existed since the 1930's. Lieutenant General Malyutkov, Air Force Chief of Staff, spoke of the Gulf air war in such a light. The air war, in his opinion, was a

⁹¹ Col G. Vasiliev, "The Concluding Phase of Desert Storm", *Zarubezhnoye Voennoye Obozreniye*, No.4 April 1991, 7-11 (JPRS-UFM-92-001-L, 10 March 1992, 6)

⁹² Col Yu. G. Sizov and Col A. L. Skokov, "The Significance of Precision Weapons in Modern Warfare", *Voennaya Mysl*, No 12, Dec 92, 37-42 (JPRS-UMT-93-003-L, 7 Apr 1993, 23)

"classical air offensive" in which air power "took care of almost all the main tasks." However, he did not view this as an affirmation of Douhet's theories on airpower. According to Malyutkov, airpower was a powerful tool which worked within the context of the classical combined arms operation; the nature of the target set demonstrated this fact.

Primary efforts of multinational forces aviation were directed above all at weakening Iraqi force groupings and creating favorable conditions for conducting an offensive operation by ground and naval forces, and not at achieving the goals of the war directly by independent air operations.⁹³

In fact, General Malyutkov viewed the strategic attacks conducted against Iraqi military-industrial and administrative centers as a dispersion of effort which contributed little to the outcome of the conflict and reduced the overall effectiveness of the initial air offensive.⁹⁴ Colonel A. N. Ionov also mentioned that the destruction of military-industrial and administrative targets required a large portion of available airpower and noted that their destruction "was

⁹³ Col V. P. Chigak, "The First Lessons of the Gulf War," *Voennaya Mysl*, No 5, May 1991, 60-71 (JPRS-UMT-92-002-L, 16 Jan 1992,39)

⁹⁴ *Ibid.*, 37

not dictated by situational conditions."⁹⁵ He also stated that the current Russian concept of airpower employment differs from that used by the Coalition in that Russian doctrine links air operations more closely to ground force missions.⁹⁶

I. M. Maltsev, Chief of the Main Staff for Air Defense Forces, was also a supporter of the traditional model. He noted that Douhet's theory may apply to small scale wars, such as the Six-Day War or the 1982 Operation Peace for Galilee in Lebanon, but in larger scale conflicts all types of forces are necessary. He pointed to the fact that the Coalition movement of large ground and naval forces to the Gulf demonstrates that the Multi-National Coalition too could not fully accept Douhet's theory.

He, like General Malyutkov, also described the role of aerospace forces within the traditional context:

... [the] role of offensive aerospace forces will constantly grow in continental TVD's using ground, air and naval forces. But evidently the entire scope of missions will not be able to be accomplished just by them. As a rule, success in warfare is achieved

⁹⁵ Col A. N. Ionov, "Some Lessons of a Small War," *Voennaya Mysl*, No 3, Mar 1992, 78-80 (JPRS-UMT-92-009-L, 22 July 1992, 43)

⁹⁶ Ibid.

through joint efforts of all branches of the armed forces.⁹⁷

However, the tremendous effectiveness of airpower in the Gulf led others to reject the traditional combined arms concept as rendered obsolete by the military technical revolution. According to some Russian observers, the Gulf War instead validated the thesis that airpower can now by itself win a war. For example, Major General I. N. Vorobyev stated in a Voennaya Mysl article that airpower alone could be victorious in future conflict.

One of the characteristic features of a technological war is that the goal of operations conducted in it can be achieved under certain conditions without ground troops ever invading enemy territory--just by conducting an electronic-fire engagement.⁹⁸

Such views were echoed by other military analysts as well. Major General Vladimir I. Slipchenko, who was a professor at the General Staff Academy and had studied the problem of the nature of future war at the Academy's Operational-Strategic Center, attempted to distance the Persian Gulf War from past uses of airpower.

⁹⁷ Ibid., 38

⁹⁸ Vorobyev, 40

For a very long time we focused on a stereotype; the enemy, at the very onset of a war, after a three to five day offensive air operation, would have to invade with ground forces, and that the ground forces invasion would itself be considered the main element of the war. But now it turns out that it is possible not to do that at all. Having at its disposal enormous means of air attack, in the main unmanned, the probable enemy can begin and conduct purely an air war."⁹⁹

Thus, two very different views of airpower's role in future conflict were developed as a result of the Gulf War. To assess which view is more correct, an analysis of both emerging technology and the changing nature of warfare is necessary.

B. NEW OFFENSIVE TECHNOLOGY AND POTENTIAL COUNTERMEASURES

The Gulf War saw the introduction of several revolutionary military technologies for offensive air warfare which have caused a considerable impact on Russian military thinkers. Among these are stealth technology, precision-guided weaponry and reconnaissance-strike complexes.

1. Stealth Technology

The introduction of stealth technology has created a fundamental change in the conduct of offensive air operations.

⁹⁹ Major General V. I. Slipchenko, "Impending Changes From the Reform Plan for Employing the Soviet Armed Forces," Manuscript [in English] of Presentation at the National Defense University, Washington D.C., March 15 and 20, 1991, 11-12

Now, one can strike at the heart of an opponent without having air superiority in the traditional sense. This was demonstrated in the opening hours of Desert Storm when F-117's struck with impunity very heavily-defended targets and suffered no losses.

The ability of stealth aircraft to penetrate sophisticated air defense systems essentially means a return to Douhet's concept that the bomber will always get through.¹⁰⁰ Moreover, the ability to strike with precision-guided weaponry can inflict damage unattainable in the past.

The Russians view stealth aircraft as a very significant threat in spite of a general tendency to downplay its effectiveness. Russian sources noted that while F-117's comprised only five percent of the strike aircraft sorties in the first 24 hours, they were able to destroy over one-third of the assigned strategic target set without loss.¹⁰¹ General Malyutkov noted that while stealth technology "has opened a new direction in aircraft development", the F-117 would "not have been able to roam so freely" in a European war scenario with rugged terrain and advanced air defenses and

¹⁰⁰ Maj Kevin J. Kennedy, "Stealth: A Revolutionary Change in Air Warfare," Naval War College Review, Spring 1993, 121

¹⁰¹ Viktor Bakurskiy and Vladimir Ilin, "Persian Gulf Air War", Kryla Rodiny, No 12, Dec 1991, 25-27 (JPRS-UMA-92-004-L, 8 July 1992, 9)

countermeasures. He further noted that financial difficulties will limit research in this area, and although stealth will be considered in designing future combat aircraft, no special aircraft designed specifically to incorporate stealth to the exclusion of more traditional requirements will be developed.¹⁰²

For these reasons, the Russian counter to stealth aircraft will likely be an asymmetric response. Firstly, there is a belief that current second-generation, surface-to-air missile systems can have some capability against stealth aircraft. Effectiveness depends on tactical measures such as attacking stealth aircraft from above and the use of a variety of different homing systems such as infra-red, passive and active radar. The integration of these systems with area search electro-optic sensors may be useful in solving the detection problem.¹⁰³

More esoteric means of detection and destruction are also being considered. These include airborne and spaceborne systems, including the use of dirigibles, and multi-frequency and over-the-horizon radar systems. Of particular interest is

¹⁰² Dmitriy Grinyuk and Petr Butovski, "Chief of Air Force Staff Interviewed," *Kryla Rodiny*, No 11, Nov 1991, pp C1-2 (JPRS-UMA-92-014, 22 Apr 1992, 7)

¹⁰³ Lt Gen V. Malanichenko, "Stealth Threat to Air Defense, Part II", *Vestnik Protivovozdushnoy Oborony*, No.1, Jan 1992, 47-49 (JPRS-UMA-92-014, 22 Apr 1992, 11-12)

a loitering cruise missile-like surface-to-air missile, similar in concept to the abortive TACIT RAINBOW anti-radiation missile. This system would cruise under inertial guidance in a patrol area, using infra-red sensors for terminal guidance.¹⁰⁴

The question remains as to whether these measures will mean a return to the status quo ante and which will relegate stealth to the just another evolutionary development in the history of radar countermeasures or whether, as with the submarine, stealth will be relatively unaffected by attempts at countermeasures.

2. The Reconnaissance-Strike Complex

According to the Russians, the Gulf War saw the first use of the reconnaissance-strike complex in battle. The E-8 JSTARS battlefield surveillance aircraft, operating with Army MLRS multiple rocket launchers and ATACMS battlefield missiles, represented the fulfillment of Okarkov's conception of a reconnaissance-strike complex as they reduced greatly the time between detection and destruction of highly mobile targets operating well behind the front line.¹⁰⁵ A single JSTARS aircraft is credited with being able to monitor 90,000

¹⁰⁴ Ibid.

¹⁰⁵ Vorobyev, 42

square kilometers of territory and accurately distinguish classes of ground vehicles and helicopters.¹⁰⁶ The development of highly capable airborne platforms that can track both air and ground targets at great distances are a crucial element in the conduct of this new type of war.

The question of defense against the recce-strike complex is an issue which has received a great deal of attention in the Russian military press. The critical element of vulnerability in such systems is assessed to be the airborne component of the system. During the Gulf War, it was noted that 2-3 RC-135, 3-6 TR-1, 4-6 E-3A, 2-4 E-2C and 1-2 E-8 JSTARS aircraft were constantly on alert in the war zone.¹⁰⁷ The most effective counter to such a system is assessed to be free roving fighters and mobile long-range surface-to-air missiles against the air platforms. The ground-based elements are considered to require more assets for destruction and entail heavier losses. It is estimated that the incapacitation of the recce-strike system for one hour (the time needed to replace the destroyed high value air assets) would require up to six fighters per target and

¹⁰⁶ V. Dubrov, "MNF Direct Air Support in Desert Sword Operation Reviewed", *Aviatsia i Kosmonavtika*, No 11, Nov 91, 26-27 (JPRS-UAC-92-006, 22 June 1992, 20)

¹⁰⁷ Skoromkov, 12

overall friendly fighter losses could be as high as 20 percent. One author recommends the development of specially-trained fighter units consisting of highly experienced pilots who can operate autonomously for the destruction of these platforms. Continuous pressure is to be applied until the systems are rendered completely combat ineffective.¹⁰⁸ It is obvious that the destruction of these platforms will be one of the highest priorities in a future conflict.

3. High-Precision Weaponry

Another revolutionary aspect of the Gulf war was the use of precision weaponry on a scale not seen in earlier local wars. Colonel John Warden, a principle architect of the air campaign concept that was used against Iraq, summed up the revolutionary nature of these new weapon systems by stating that the Gulf War "...was the very first war in which single airplanes were able to fly to their targets and accomplish, what in the past, could not have been accomplished at all or would have taken literally thousands of airplanes to accomplish."¹⁰⁹

The conventional land-attack cruise missile played an especially important role in the conflict. Russian observers

¹⁰⁸ Ibid., 14-15

¹⁰⁹ "Can Bombing Win A War?," Nova Show No 2002, 19 Jan 1993, Journal Graphics Transcript, 1

were extremely impressed by its long-range, relative invulnerability to countermeasures, and pinpoint accuracy of these missiles, crediting them with an accuracy rate of over 80 percent and a circular error probability of as little as three meters.¹¹⁰

Russian military experts have given consideration to both active and passive defenses against high-precision weaponry. The latest Russian surface-to-air missile systems are touted in the Russian military press as having capability against such systems. Emphasis is placed on long-range, second-generation air defense systems such as the SA-10 which can destroy tactical missiles and aircraft in flight before weapon release.¹¹¹ However, some newer systems, such as the SA-15 *Tor*, have the capability to intercept not only aircraft but guided bombs, anti-radiation missiles and unmanned air vehicles.¹¹²

Passive measures also are deemed to have great utility in combating high-precision weaponry. Indeed, this is one of the few areas where Iraq achieved success during the war.

¹¹⁰ Capt 1st Rank Kzheb, "Early Analysis of the Naval Role in the Gulf," *Morskoy Sbornik*, No 2, Feb 1991, 59-63 (JPRS-UMA-91-015, 21 June 1991, 64)

¹¹¹ Col Yu. Sizov and Col A. L. Skokov, Significant of Precision Weapons in Modern Warfare", *Voennaya Mysl*, No 12, Dec 1992, 37-42 (JPRS-UMT-93-003-L, 7 Apr 1993, 23)

¹¹² Col. Anatoliy Dokuchayev, Performance, Specification of 'Tor' Air Defense Missile System," *Krasnaya Zvezda*, 23 Dec 1992, 2 (JPRS-UMA-93-006, 24 Feb 1993, 23-24)

Russian sources credit Iraq with waging an effective campaign of camouflage, concealment and deception, using hundreds of fiberglass mock-ups of combat aircraft and missile launchers. They go so far as to say that up to fifty percent of initial coalition airstrikes fell on false targets.¹¹³ While the Russians may be overstating the case, elements of the Iraqi deception campaign were also noted by Western analysts. Barry Watts, an author of the Gulf War Air Power Survey, also points to elements of this extensive Iraqi effort. For example, the nuclear fuel of the Al-Tuwaitha Nuclear Power Plant was taken from the reactor and placed in a field and covered with dirt, rendering this vital element invisible to Coalition means of detection.¹¹⁴ The degree of Russian interest in the use of maskirovka (camouflage, concealment and deception) as noted in professional military articles would tend to indicate that much effort will be placed on passive means of defense against these systems.

C. THE IMPORTANCE OF INTANGIBLES

The Gulf War not only highlighted a dazzling array of modern technology but demonstrated the necessity for both

¹¹³ Col V. P. Chigak, "The First Lessons of the War," *Voennaya Mysl*, No 5, May 1991, 60-71, as translated in JPRS-UMT-92-002-L, 16 Jan 1992, 37

¹¹⁴ Barry D. Watts, "17 February 1993 SAIS [School of Advanced International Studies] Seminar on the 'Revolution in Military Affairs,'" 10

effective training and support for the successful conduct of offensive air operations as well as the importance of qualitative over quantitative superiority.

Traditionally, the Russians have emphasized combat capabilities over support systems. However, modern aircraft are only a portion of the overall combat system which includes logistic and maintenance support, and communications and intelligence capabilities. According to General Malyutkov:

What we need is an optimum correlation between combat and backup means. As the experience of the war has shown, the main NATO armed forces have solved this problem. In our country, the trend towards priority development of combat hardware, of its visible combat potential, unfortunately has persisted for a long time, while operational and material and technical backup has remained in the background.¹¹⁵

The serious deficiencies in Russian aircrew training took on a disconcerting light in the wake of the coalition air offensive. Due to such factors as an overabundance of flight personnel and increasingly serious maintenance difficulties, average annual flight time for Russian pilots is now a third to a quarter what it is in the United States.¹¹⁶

¹¹⁵ Capt S. Sidorov, "Air Force Chief of Staff on Gulf War Lessons," *Krasnaya Zvezda*, 14 Mar 1991, 1st ed., 3 (FBIS-SOV-91-053, 19 Mar 1991, 51)

¹¹⁶ "Air Force Deputy CinC on Gulf War, Combat Training Support," *Aviatsiya i Kosmonavtika*, No 7, Jul 1991, 2-3 (JPRS-UAC-92-002, 3 Feb 1992, 2)

Against this backdrop, the capabilities of new equipment and the changing nature of conflict require aircrew to be more skilled. The previously mentioned use of free-roving fighters to combat recce-strike complexes demands aircrew with both experience and individual initiative.

These lessons dictate an increased emphasis on qualitative superiority rather than the traditional Russian method of quantitative superiority, in terms of sophistication of hardware, support measures and training.

D. THE CHANGING NATURE OF WAR

In the minds of Russian military experts, the Gulf War represents a watershed in the history of warfare. The salient feature of modern high-technology warfare has become the "fire strike." The concept of the fire strike as a decisive means of combat has its origins in theories of nuclear warfare. However, as precision conventional weaponry increased in effectiveness, the concept was broadened to encompass them as well. Colonel V. V. Krysanov, writing in Voennaya Mysl, describes the nature of the conventional fire strike:

The first strike, which in nuclear war is capable of determining the outcome, should be singled out in particular. With conventional weapons it can also be the chief factor determining success of further military

operations... as a rule, it is a powerful preemptive fire strike with mass employment of missiles, aircraft, missiles, reconnaissance-strike complexes, artillery, [and] electronic warfare equipment.¹¹⁷

I. N. Vorobyev noted that, unlike past wars, it was not the infantry and tank formations which determined the outcome of the conflict but strategic and operational use of air and missile assets in an "electronic-fire engagement."¹¹⁸

1. The Blurring of Traditional Concepts

The ability to wage a long-range "remote" battle has led to a situation where traditional military concepts are becoming less applicable in future conflict. Instead of being able to view conflict as a series of discreet spheres such as air, naval or land, the degree of mutual interaction among remote strike forces requires that the battle space be viewed as a three-dimensional continuum, with both space and the electromagnetic spectrum as integral components.¹¹⁹

Similarly, concepts of tactical, operational and strategic levels of war are becoming less distinct as the capability to strike effectively from the front to the deep

¹¹⁷ Col. V. V. Krysanov, "Features of the Development of Forms of Military Operations," *Voennaya Mysl*, No. 2, Feb 1992, 42-45 (JPRS-UMT-92-007-L, 5 June 1992, 24)

¹¹⁸ Vorobyev, "Lessons," 39

¹¹⁹ *Ibid.*, 41

strategic rear becomes a reality. According to General Slipchenko, concepts of front and rear will be replaced by the concepts of "subject to attack" and "not subject to attack" as the entire depth of the rear becomes an area of conflict.¹²⁰

2. The Information War and Countertargeting

The increasing range and destructive power of strike warfare systems has placed increasing demands on intelligence and detection capabilities. Barry Watts notes that the means of destruction have outpaced both the means of command and control and detection capabilities. "If we know where to aim, we can hit. But knowing where to aim remains difficult."¹²¹ The ability to provide timely targeting data for military targets and identify critical components of economic target sets now comprise the limiting factor in the overall effectiveness of strike warfare.

The implications for intelligence of this "partial revolution" in which weapon range and capability outstrip the means of detection is certainly profound. Col A. N. Zakharov, writing on the subject of the nature of future war in the Russian journal Voennaya Mysl, describes this concept:

¹²⁰ Slipchenko, "Impending Changes", 16

¹²¹ Watts, 11

The... trend is dictated by the ever growing significance of information collected in a timely manner on the target of effect to ensure requisite weapon effectiveness. It signifies that achieving success in operations will largely depend on the effectiveness of combating reconnaissance and information systems... in planning the enemy's defeat commanding generals and staffs must initially give priority to personnel and equipment employed for collection, transmission, processing and storage of information, then to personnel and equipment employed for redistributing it and combat equipment of command and control facilities; and only then to weapons.¹²²

The result of this shift is the increasing necessity to rely on countertargeting strategies such as *maskirovka* and mobility. It was noted that only Iraqi forces which were mobile had any measure of survivability or effectiveness.¹²³ The most famous example of these being the difficulty in detecting the Iraqi force of mobile "SCUD" ballistic missiles. While the fixed missiles and command and control sites of the Iraqi Missile Troops were quickly destroyed by the coalition air offensive during the first week, the effort against mobile

¹²²Col A. N. Zakharov, "Trends in the Development of Warfare", *Voennaya Mysl*, No. 11-12, December 1991, 9-15 (JPRS-UMT-92-005-L, 23 Mar 1992, 8)

¹²³ General-Major Yu. V. Lebedev, "Persian Gulf War: Lessons and Conclusions," *Voennaya Mysl*, No. 11-12, December 1991, 109-117 (JPRS-UMT-92-005-L, 23 Mar 1993, 63)

launchers only achieved partial success after a tremendous expenditure of effort.¹²⁴

In contrast, even hardened fixed sites were proven vulnerable to attack. Like the Iraqis, the Russians had placed considerable emphasis on airfield survivability, including hardened aircraft shelters and easily repairable airfields. The lack of Israeli effectiveness in striking Arab airfields during the Yom Kippur war indicated that these were very effective countermeasures. However, the successful Coalition campaign against the hardened shelters proved otherwise, forcing the Iraqis to attempt to disperse their aircraft in small groups and move them frequently to avoid destruction in a classic countertargeting scheme.¹²⁵

Subsequent Russian commentary highlights the vulnerability of even hardened air bases to advanced conventional munitions. One potential solution is vertical take-off aircraft, such as the YAK-141, which have the ability to operate away from easily targeted airfields.¹²⁶

¹²⁴ Col A. Manachinskiy and Col V. Chumak, "Tactical Anti-Ballistic Missile Defense" *Voyenny Vestnik*, No 12, 1991, 66-69 (JPRS-UMA-92-001-L, 16 Mar 1992, 38)

¹²⁵ Christopher M. Centner, "Ignorance is Risk: The Big Lesson from the Desert Storm Air Base Attacks," *Airpower Journal*, Winter 1992, 31-32

¹²⁶ Col P. Lisitskiy, "Support For VTOL YAK-141 Linked to Gulf War," *Krasnaya Zvezda*, 6 Dec 1992, 1st ed., 2 (JPMS-UMA-91-032, 17 Dec 1991, 40)

The necessity for a countertargeting strategy has also led to the concept of a non-linear battlefield. The effectiveness of such systems as reconnaissance-strike complexes is such that, according to Russian estimates, a division-sized second echelon force could be destroyed in a matter of several hours.¹²⁷ Therefore, concepts of linear warfare based on breakthrough and exploitation will be difficult to implement. Instead, the concept of using small, autonomous and highly mobile groups is becoming the paradigm for future war.¹²⁸ The vital "center of gravity" of a hostile force is now likely to be not ground force groupings but nuclear and conventional strike elements, command and control, and means of air defense and electronic warfare. Therefore, deep penetration forces are necessary to find and destroy these systems.¹²⁹ All these factors lead to a fluid, dynamic battlefield which increasingly resembles the traditional concepts of naval warfare in its decisiveness, non-linearity and the importance of counter detection strategies.

¹²⁷ Skomorokhov, 14

¹²⁸ Vorobyev, "Lessons", 41

¹²⁹ Ibid.

3. THE PRIMACY OF OFFENSE

The conduct of the offensive air campaign in the Gulf War has led to many observers commenting that offensive means have outstripped the means of defense. General Major Yu. V. Lebedev, writing in Voennaya Mysl, makes the following observation:

On the whole, the war showed that conventional offensive weapons surpass defensive weapons with the present technological level... A defense incapable of creating necessary conditions for launching a decisive offensive will not fulfill its mission and will not lead to success in defending the homeland.¹³⁰

Colonel Zakharov echoes this view by noting the increasing numbers of deep strike conventional weaponry, including B-2 bombers, sea-launched cruise missiles and reconnaissance-strike complexes which can attack with little or no warning. Such a strike could be so destructive as to have an irreversible nature for the course of the war. The only viable option for success in conflict would be a preemptive attack.¹³¹ Clearly, this represents a distinct shift away from the traditional view that airpower is a tool of attritional warfare. Unlike the Red Air Force after

¹³⁰ Lebedev, 63

¹³¹ Zakharov, Trends in the Development Of Warfare", 8

Operation Barbarossa, the current Russian military would not be able to recover from a surprise attack.

However, there is reason to believe that a view of future war as totally offense dominant may be overly deterministic. In this regard, the unique factors of the Gulf War and the technological surprise of so many new forms of warfare being employed may provide lessons which are not broadly applicable for future conflict. Specifically, the destruction of the Iraqi integrated air defense system was greatly facilitated by overwhelming quantitative and qualitative superiority, especially in means of electronic warfare. Many of the air defense systems used by the Iraqis were of an older generation, which the Coalition was easily able to defeat electronically.¹³²

While there is consensus that offensive systems have an inherent advantage in strike warfare, the Russian military is attempting to grapple with the threat posed by air offensive weapons. Parallels between nuclear and high-technology conventional weapons may be overdrawn with respect to the dynamics between offense and defense. Sizov and Skokov noted the following, "In contrast to nuclear weapons,

¹³² Col O. Falichev, "Shilka Versus B-52," *Krasnaya Zvezda*, 5 Apr 1992, 4 (FASTC-2660P-92, Spring 1992, 53)

precision weapons and measures of combating them are based on original engineering solutions."¹³³

Mathematical modeling of engagements of suppression and strike packages against air defense systems indicates that a dramatic increase in air defense survivability can be accomplished by measures such as increased mobility, deception, (likely including false emitters as anti-radiation missile targets), reduction in emissions and defensive electronic warfare measures aimed against precision weaponry.¹³⁴

Much effort is also being placed on active defense against offensive air weapons. That the Russians see promise in the concept of defense against offensive air weapons, including ballistic missiles, is underscored by a recent exercise at the Emba Test Range. In the test, simulated ballistic missiles, cruise missiles, submunitions dispensers and salvo-fire rockets were engaged by various air defense systems (SA-8, SA-10, SA-12, SA-15) in an electronic countermeasures environment. The results were encouraging, with most targets being destroyed with a single missile. Overall, it required 64 missiles total to destroy the 34

¹³³ Sizov and Skokov, 26

¹³⁴ Sizov and Skokov, 24-25

targets, all of which were successfully engaged in the air. The Russians noted that overall accuracy was much higher than the PATRIOT missile system displayed in the anti-tactical ballistic missile role in the Gulf War.¹³⁵

Taken together, these developments indicate that the view of the future war as offense dominant based on the Coalition offensive air operation against Iraq may be somewhat misleading.

What does seem clear, however, is that the battle between air offense and defense will likely decide the course of future high intensity conventional conflict and that the failure to effectively defend against modern air offensive weaponry could lead to disaster. Ground forces, therefore, must have highly effective air defense systems to survive on the modern battlefield.¹³⁶ However, air defense systems alone are not viewed as capable of defeating modern air offensive weapons and the combined efforts of all forces are necessary to destroy hostile strike forces, including retaliatory offensive strikes.¹³⁷ This means that modern

¹³⁵ Viktor Litovkin, "New Priorities for Ground Forces Air Defense," *Izvestiya*, 23 Oct 1992, Morning ed., 1-2 (JPRS-UMA-92-040, 11 Nov 1992, 17)

¹³⁶ Ibid.

¹³⁷ Maj Gen Avn N. Kozlov, "Air Defense Versus Air-to-Ground Weapons in the Initial Period of the War," *Vestnik Protivovozdushnoy Oborony*, No 4-5, 1992, 21-22 (JPRS-UMA-92-028, 29 July 1992, 9)

war, in which strike weapons are widely used, must by necessity take on an offensive character.

E. CONCLUSION

There is widespread acceptance among Russian observers that airpower is now increasingly a determining factor in the course and outcome of conflict. However, there has been mixed opinions on whether airpower can independently achieve strategic goals in a conflict.

The Coalition introduction of such weapons as reconnaissance-strike complexes, stealth aircraft and precision-guided weaponry demonstrated a great advance in warfare capability. Russia is currently placing much emphasis on developing ways to combat these systems, many times with asymmetric responses as well as, in some cases, fielding analogous capabilities.

The military technical revolution has profoundly altered the nature of the modern war. The ability of space and airborne sensors to provide a view of the battlefield into the strategic depth of the rear and the ability of long range precision weapons to effectively strike detected forces has caused revolutionary change on the modern battlefield. Now emphasis is placed on mobility and deception for survival as any detection can be swiftly translated into destruction. The

future ground battlefield will no longer have front lines as any unit in prolonged contact with the enemy will likely be a target for devastating strikes. Increasingly, high intensity conventional conflict will be fought as a series of "fire strikes", with contact ground forces playing a supporting rather than a central role.

The nature of modern war also necessitates that offensive strikes be conducted even when on the strategic defensive, as defensive means alone cannot be effective. Thus, offensive air operations must be an essential factor for future airpower employment for Russia.

**V. IMPLICATIONS OF THE MILITARY-TECHNICAL REVOLUTION FOR
OFFENSIVE AIR WARFARE THEORY**

A. THE AEROSPACE WAR AND THE NEW VISIONARIES

In March 1991, Major General V. I. Slipchenko, a professor at the Military Academy of the General Staff, gave a presentation to the U.S. National Defense University on factors affecting the Soviet Armed Forces. In this presentation, he outlined the expected nature of future war. Two factors greatly influenced this vision. The first was the Persian Gulf War, which had then just concluded. The second factor was the development of neutral Eastern Europe as a true buffer between NATO and the Soviet Union. Slipchenko's views, however, are not necessarily mainstream or representative of the eventual direction of Soviet Armed Forces development.

1. Description

Slipchenko's vision of future war is radical in that he forcefully states that airpower alone can be the means of victory. He describes the Persian Gulf air campaign as a model for future war in which airpower alone will determine the course and outcome. The war would include advanced forms of weaponry such as orbital aircraft, ballistic missiles with conventional warheads, unmanned air vehicles, cruise missiles,

widespread use of stealth technology and directed energy weapons.¹³⁸ According to Slipchenko, such a war would begin by a massive conventional strike with "tens of thousands" of cruise missiles which could destroy thousands of targets.¹³⁹ Much application of weaponry based on new physical principles is envisioned, including particle beams and lasers. Space will become not only an environment for reconnaissance but also for conducting strikes.¹⁴⁰

Targets for such strikes would include economic sites, government and military command and control, lines of communication and rear area supply and mobilization. However, the first targets to be hit would be counterforce ones such as airfields, missile launch facilities, naval bases and ground forces command and control.¹⁴¹

Slipchenko noted that such destructive striking power will be able to accomplish not only operational-strategic goals, but strategic ones as well. Ground forces will have a

¹³⁸ Slipchenko, 2

¹³⁹ Ibid., 12

¹⁴⁰ Ibid., 14

¹⁴¹ Ibid., 14

sharply reduced role, and victory may be possible without occupation of the adversary nation.¹⁴²

Col I. V. Yerokhin, writing on military reform, echoes many of Slipchenko's views on the future nature of warfare and future force requirements. He notes the following:

[T]he idea of warfare by invasion of ground forces and its conduct in the frontier and coastal areas to a depth of the front's operational alignment must be replaced by recognition of the global nature of war with a preemptive air (electronic-fire) invasion to the extent of the entire territory of the enemy being attacked.¹⁴³

Yerokhin emphasizes the need for both effective defense against air offensive weapons and means of retaliation that are constantly combat ready. In contrast, general purpose forces could be reduced and maintained in cadre units which could be mobilized after the commencement of hostilities.¹⁴⁴

Related to the concept of aerospace war is the recent proposal for a Strategic Non-Nuclear Force (SNNF). Colonel General A. A. Danilevich, in a recent Voennaya Mysl article, describes the necessity for such a force. He notes that unlike nuclear war, at least a temporary victory in a conventional

¹⁴² Ibid., 16-17

¹⁴³ Col I. V. Yerokhin, "On Developing a Military Reform Concept," Voennaya Mysl, No 11-12, Dec 1991 36-45 (JPRS-UMT-92-005-L, 23 Mar 1992, 24)

¹⁴⁴ Ibid., 25

war is possible and this makes it an attractive option for hostile states.¹⁴⁵ Therefore, the need to deter not only nuclear but conventional attacks is vital. The force Danilevich envisions will not have the capability for achieving victory in a conventional war, but may have a deterrent effect by promising prompt retaliation for attacks by high-technology conventional weapons.¹⁴⁶

A Strategic Non-Nuclear Force would be initially composed of cruise missile carrying bomber aircraft, but later could include both intercontinental and submarine-launched ballistic missiles.¹⁴⁷

Of the potential target sets, the most advantageous according to Danilevich is estimated to be key installations of military production and electrical power and petroleum facilities, due to current limitations on weapon accuracy and intelligence requirements, and the desire not to escalate to nuclear war.¹⁴⁸

Another potential target set are those facilities that can create a significant secondary effect. There is a great

¹⁴⁵ Col Gen A. A. Danilevich, "On Strategic Non-Nuclear Deterrent Forces," *Voennaya Mysl*, No. 1, Jan 1992, 46-54 (JPRS-UMT-006-L, 14 May 1992, 28)

¹⁴⁶ *Ibid.*, 29

¹⁴⁷ *Ibid.*, 30

¹⁴⁸ *Ibid.*, 31

concern, influenced by numerous man-made disasters, that the use of high-precision conventional weaponry against dams, nuclear power plants, chemical plants and other such facilities could cause widespread destruction through secondary effects. Candidate of Military Sciences L. Malyshev states that conventional weapons can have an impact similar to nuclear weapons by careful selection of the most vulnerable targets. The author believes that by developing such a targeting strategy with a force of high-precision conventional weapons, the need for both large amounts of ground forces and strategic nuclear forces would be eliminated.¹⁴⁹

Malyshev notes that such a strike occurred unintentionally during the Gulf War. After a TOMAHAWK cruise missile attack against a Baghdad biological warfare facility, fifty guards at the plant reportedly died and a hundred more were hospitalized from an unknown illness.¹⁵⁰

Malyshev points to the vulnerability of an increasingly complex and interdependent industrial infrastructure as an inevitable byproduct of a technologically

¹⁴⁹ L. Malyshev, "Modern High Precision Weaponry Close to Weapons of Mass Destruction," *Aviatsia i Kosmonavtika*, No. 3-4, Mar-Apr 1992, 10-11 (JPRS-UAC-92-10, 19 Nov 1992, 8-9)

¹⁵⁰ Ibid. 8

advanced society, an achilles heel.¹⁵¹ In this regard, Malyshev parallels the views of airpower theorists such as Algazin who advocated the destruction of critical bottlenecks to cripple an enemy economy. Whether technology has caught up with remains an open question.

2. Analysis

A key factor regarding the Slipchenko's concept of aerospace war is that it is derived as much from geostrategic as from military-technical factors. Now, because of a truly neutral Eastern Europe, it is almost impossible for NATO and Russian forces to fight a large-scale ground war. In many respects, the Russian geostrategic situation is much like that of Italy after the First World War, and therefore it is not surprising that Douhet's concept of air warfare developed with regards to Italy's particular geostrategic position (i.e. isolated from direct ground attack) would be advocated currently in Russia. Institutional interests continue to point to NATO as a threat, despite the collapse of communism. The idea that airpower alone could determine the course and outcome of a war means that a threat from NATO still exists, however, in a very different context. Therefore, the concept of aerospace war can be viewed, not only as a radical new

¹⁵¹ Ibid., 7

vision of war, but a concept which instead attempts to perpetuate a traditional threat perception in light of changing geostrategic factors.

The concept of the aerospace war resembles far more closely previously developed concepts of nuclear war than it does an extension of traditional airpower concepts such as the air offensive. Slipchenko's conception seems to borrow much from Sokolovskii's view of nuclear war.

The aerospace war has a target set which includes strategic forces, command and control and military and economic targets.¹⁵² In fact, this target set is very similar to the one which Sokolovskii describes for nuclear weapons in the April 1963 edition of Soviet Military Strategy. According to Sokolovskii, the objectives of a nuclear missile strike would be destruction of the enemy's means of nuclear attack, military and economic potential, and governmental and military command and control.¹⁵³ The similarity is unmistakable. Moreover, Slipchenko's concept of the blurring of offensive and defensive methods of warfare and the concept of a nation's whole territory being subject to strikes are initially

¹⁵² Slipchenko, 16

¹⁵³ Sokolovskii, 408

expressed by Sokolovskii in the context of a nuclear conflict.¹⁵⁴

Therefore, the aerospace war will most closely resemble a nuclear war in character, but fought with conventional weapons. The consequences of this are significant. Slipchenko notes that strategy and operational art will blend together as high-technology conventional warfare is reduced to a series of strikes. According to Slipchenko, the war could even be begin and end with a single well-planned strike.¹⁵⁵ This brings to mind the U.S. concept of the Single Integrated Operational Plan (SIOP) and implies that such a targeting concept may now be applicable for conventional weaponry as well as nuclear weaponry. Slipchenko states that the Desert Storm Air Campaign is a prototype for the future aerospace war.¹⁵⁶ It is important to note that the Gulf War Air Campaign followed the methodology of strategic targeting plans developed for war against the Soviet Union, and was thus very similar to a SIOP in concept.¹⁵⁷

¹⁵⁴ Ibid., 309, 404

¹⁵⁵ Slipchenko, 16

¹⁵⁶ Ibid., 12

¹⁵⁷ Norman Friedman, Desert Victory: The War For Kuwait (Annapolis: United States Naval Institute Press, 1991), 169

However, proponents of aerospace war take the analogy between precision-guided and nuclear weapons too far and are attempting to reduce warfare to an engineering solution. Slipchenko notes that destruction of 50 percent of vital targets such as energy sources and lines of communication can cripple the largest nation, and the nations "political system will hardly survive."¹⁵⁸ In this regard, his concept resembles those of bomber advocates in the 1930's that V. V. Khripin labeled "mechanistic visionaries."

The extrapolation of offensive capabilities without consideration of the development of countermeasures and an understanding of friction in war can lead to an unrealistic view of future warfare.¹⁵⁹ The Gulf War has spurred the development of countermeasures against such weaponry as reconnaissance-strike complexes, high precision weaponry and stealth technology. Mobility, deception and active measures which may limit the effectiveness of these systems in future war. The disastrous losses to the Soviet Long-Range bomber force in the Spanish Civil War, Winter War and first stage of

¹⁵⁸ Ibid., 14,17

¹⁵⁹ Barry Watts' book The Foundations Of U.S. Air Doctrine: The Problem of Friction in War (Maxwell AFB, Air University Press, 1984) provides an excellent critique of how visionary airpower theories fail to account for conditions endemic to conflict, such as fog and friction. I have incorporated Mr. Watts' ideas in my analysis of current Russian aerospace war theory.

the Second Great Patriotic War were, in part, a result of failing to understand that the duel between offensive and defensive technology had rendered the heavy bomber far more vulnerable than it had been a few years before.

Therefore, the concept of aerospace war, while emphasizing trends that are vital to understand, overstates the role of air striking power in future war. A vulnerable economic center of gravity may simply not exist in many potential conflicts. The effects of countermeasures such as deception and mobility, as well as the inherent fog of war itself, may reduce the effectiveness of the new generation of precision weaponry. Therefore, it is not surprising that the Russian military, while embracing the necessity of being able to wage a "technological war" of deep strikes, does not pursue a strategy solely dependent on them. On the basis of this, it is likely that, for the foreseeable future, traditional concepts of operational art for airpower employment will continue to play a vital role in the conduct of air warfare.

B. THE 1992 DRAFT MILITARY DOCTRINE

In May 1992, Russia published its first post-communist military doctrine. The impact of the recent Persian Gulf War was much in evidence in the documents discussion of potential future war. The document has not yet been adopted and is

currently still under debate. Nevertheless, it provides critical insight into the effects of the military-technical revolution. While the document acknowledges the decreasing likelihood of a nuclear war, it notes that a large scale conventional war could arise out of an escalating local war.¹⁶⁰

In the initial period of conflict, an attack is now most likely to come from the sea and air and not from the land. This attack is described as a mirror image of the Coalition air campaign against Iraq. Such an attack will include air, naval, air defense and highly-mobile ground units. Attacks by precision-guided weaponry are expected on economic and military targets. The doctrine states that ground forces may be introduced in later stages of the conflict under heavy air cover. However, whether this is evidence that the air campaign can by itself achieve the goals of the war or whether ground forces would simply not be committed following an abortive air campaign is not clearly assessed.¹⁶¹ However, a shift in threat perception is notable. Colonel-General I. N. Rodionov, in a Voennaya Mysl article on the draft doctrine, describes the NATO threat not in terms of tank strength or

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¹⁶¹ Ibid., 8

military manpower, but in terms of air offensive weapons.¹⁶²

In response to such the threat, the draft military doctrine describes a new set of military priorities. Emphasis is to be placed on means of detection, means for combating aircraft and missile attacks and systems for conducting retaliatory attacks.¹⁶³ The doctrine is very specific about the necessity to have an effective conventional offensive strike capability:

In military-technical policy, in equipping the forces, the highest priority is on emerging, precision, mobile, highly survivable long-range systems, which allow combat operations to be made without making direct contact with the enemy, as well as on weapons and equipment, intelligence and command and control of such quality to reduce substantially the number of weapon while retaining sufficient combat power in the armed forces.¹⁶⁴

The question remains, given the dissolution of the Soviet Union and the current economic crisis, whether the Russians will be able to keep abreast of the rest of the world in these cutting edge technologies. Major-General I. N. Vorobyev

¹⁶² Col Gen I. N. Radionov, "Approaches to Russian Military Doctrine", *Voennaya Mysl*, July 1992 Special Edition, 6-14 (JPRS-UMT-92-012-L, 30 Sep 1992, 4)

¹⁶³ Military Thought: May 1992 Special Edition, 11

¹⁶⁴ *Ibid.*

agrees with the necessity to try to field such systems, but notes that the technological base cannot currently support their development.¹⁶⁵

Perhaps because of uncertainty over the development of such systems, the draft doctrine calls for nuclear retaliation for conventional strikes against "strategic" targets, of which examples such as Strategic Rocket Forces installations and nuclear power plants are cited.¹⁶⁶

Nevertheless, a distinct shift towards conventional strike capability at the expense of traditional forces is evident from the document.

C. EVIDENCE OF SHIFTING PRIORITIES

Evidence of the shift to conventional precision strike capability is emerging in both official statements and deploying hardware. The Russian Air Force is drastically cutting back on numbers but nevertheless seems to have an impressive plan to develop a predominately offensive air force. Ground and naval forces are also developing a precision strike capability.

¹⁶⁵ I. N. Vorobyev, "Tactics of Long-Range Battle, *Voyennaya Mysl*, No 11, Nov 1992, 39-44 (JPRS-UMT-93-002-L, 3 Mar 1993, 27)

¹⁶⁶ *Ibid.*, 5

The Air Force is planning to drastically change its composition, emphasizing quality over quantity. Firstly, all Su-17, MiG-23 and MiG-27 aircraft will be removed from service and half will be placed in storage, the other half will be destroyed. The MiG-29 and the Su-25 will be taken out of production, while production of low levels of Su-24, Su-27 and Tu-160 aircraft will continue.¹⁶⁷ Development of both a follow-on to the Su-27, the Mikoyan I-42, and a replacement for the aging fleet of Tu-16 and Tu-22 bombers is planned to continue.¹⁶⁸ Emphasis will be placed on the development of multiple versions of the long-range Su-27 fighter for command and control, electronic warfare and deep strike. A new variant of the Su-27 is capable of an unrefuelled range of 4,000 km and a range of 6,500 km with in-flight refuelling.¹⁶⁹

The net result of these planned changes, if implemented, will give a distinctly different character to the Russian Air Force. It is essential to note that Air Force plans to keep in production continue development of long-range deep strike and escort aircraft while short-range fighters, such as the MiG-29

¹⁶⁷ Piotr Butowski, "Flying in the Face of Adversity," Jane's Defence Weekly, 17 Apr 1993, 15

¹⁶⁸ "Air Force to Fund Flanker Follow-on," Jane's Defence Weekly, 10 Apr 1992, 5

¹⁶⁹ Charles Bickers, "SU-35's to Have 'Over the Shoulder' Ability," Jane's Defence Weekly, 20 Feb 1993, 6

and ground support aircraft such as the Su-25 are being taken out of production. General Malyutkov estimates that if these plans are accepted, the overall combat capability of the Air Force will be 50 percent greater than before, despite the drastic reduction in numbers.¹⁷⁰

Qualitative improvements in the ability of ground and naval forces to conduct offensive strike warfare is also evident. The Ground Forces have recently introduced a new version of the SCUD operational-tactical missile, which employs an optical sensor for pin-point guidance capability and a submunition warhead. The SCUD, with a 300 km range, is the longest-ranged ballistic missile that the Ground Forces possess and is therefore a logical candidate for such an upgrade.¹⁷¹

Naval planners are attempting to increase the effectiveness of naval forces in the engagement of land targets. Recently, it was noted that the destroyer, which is to be the backbone of future Russian Navy, will have the

¹⁷⁰ Butowski, "Flying", 15

¹⁷¹ Christopher F. Foss, "Latest Russian 'Scud' has Pinpoint Guidance," Jane's Defence Weekly, 1 May 1993, 7

ability to strike ground targets using missiles with conventional warheads.¹⁷²

There are also indications of defensive weaponry being developed which have significant capability in a war characterized by remote strikes. In particular, the need to destroy airborne elements of reconnaissance-strike complexes has led to the development of weapon systems that can fill this role. Recently, it was announced that Russia is developing a 400 km range air-to-air missile which will be carried by the Su-27.¹⁷³ Such a stand-off capability would make destruction of high value air assets a much easier prospect. Similarly, a new variant of the SA-10 surface-to-air missile system is being developed which can engage aircraft targets at up to 150 km range.¹⁷⁴

However, all the development programs currently under way not achieve fruition unless the political leadership supports them. In this regard, it is important to note that the Air Force budget has not been finalized and the Air Force is

¹⁷² Adm F. Gromov, "The Russian Navy: Yesterday, Today, Tomorrow," *Morskiy Sbornik*, No.1, Jan 93, 3-8 (JPRS-UMA-93-008, 10 Mar 1993, 8)

¹⁷³ Paul Beaver, "Air-to-Air Missile 'has 400 km Range,'" *Jane's Defence Weekly*, 27 Feb 1992, 7

¹⁷⁴ Duncan Lennox, "The Rise and Rise of the ATBM," *Jane's Defence Weekly*, 24 Apr 1992, 20

attempting to help fund its modernization by sales of military hardware abroad.¹⁷⁵

D. JOINT/COMBINED ARMS OR INDEPENDENT STRATEGY?

While the emphasis on development of the means for waging strike warfare with high-technology precision weaponry is evident, the question remains as to whether a revolutionary independent airpower strategy as advocated by proponents of aerospace war concept or an evolutionary employment of airpower within a joint or combined arms framework will be the appropriate model in future conflict. The official statement of Russian Air Force roles, missions and composition which appeared in the July 1992 Special Edition of Voennaya Mysl would indicate the latter.

In this statement, the influence of the Persian Gulf War is unmistakable. In particular, the concept of the air campaign has been accepted as an element of future warfare.¹⁷⁶ However, a tremendous continuity continues to exist with previous concepts of operational art developed before and during the Second Great Patriotic War.

The concept of the air campaign unites the features of the previous air operation and anti-air operation into one

¹⁷⁵ Butowski, 15

¹⁷⁶ Col Gen Avn B. F. Korolkov, "Purpose, Mission, and Makeup of the Air Force Under Present Conditions," Voennaya Mysl, July 1992 Special Edition, 68-70 (JPRS-UMT-92-012-L, 30 Sep 1992, 37)

operation.¹⁷⁷ However, the air campaign is developed within the traditional concepts of joint and combined arms employment and goals. The air campaign is viewed as prerequisite in order for the Ground Troops to achieve success and is no mention of airpower alone attaining victory. Moreover, the discussion of operational and operational-strategic tasks for aviation conducted in support of theater operations would indicate that an independent strategy alone might not achieve the desired result.¹⁷⁸ Nevertheless, an air campaign in which air offensive weapons from all services are employed can be considered an independent strategic operation. An appropriate analogy here is Sokolovskii's view that the SRF was the force which enabled ground forces to culminate victory by occupying territory.

Another fundamental thread of continuity in Russian offensive air theory since the 1930's has been the use of all arms to gain air superiority and wage the air offensive. As the "spheres" of combat meld together in a three-dimensional continuum, the need for joint action by all forces to accomplish objectives is increasingly necessary. In this regard, Russian operational art stressing joint and combined

¹⁷⁷ Ibid.

¹⁷⁸ Ibid.

arms operations seems to be more appropriate now than ever before. The air campaign includes not only Air Force assets, but also elements from other services as well operating as a combined arms force.¹⁷⁹ Stated Air Force missions include the gaining of air superiority and the engaging of the enemy in the full depth of the operational rear.¹⁸⁰ The continuity between present day missions and those of airpower theorists such as Lapchinskiy and Mednis is striking. Despite tremendous technological change, Russian concepts of operational art have changed little.

The traditional concept of the Air Army continues to be seen as an effective organizational structure which allows massing of forces. However, balanced against centralization is the need for decentralized control of airpower in certain circumstances.¹⁸¹ This becomes especially important on a non-linear battlefield as smaller, highly mobile units require air support. However, the down-attaching of air units will occur only after the objectives of the air campaign are met.¹⁸² This reflects the lessons of the final phase of the Great

¹⁷⁹ Ibid.

¹⁸⁰ Ibid., 39

¹⁸¹ Ionov, 43

¹⁸² Korolkov, 37

Patriotic War with regards to flexibility of control, when aircraft were massed under centralized control for air operations, and then attached to lower levels to support ground operations.

E. CONCLUSION

The military-technical revolution has caused a fundamental change in the nature of warfare. The dominant form of warfare is quickly becoming the "remote strike," replacing the traditional Russian model based on massed tank and mechanized armies. As a result of this, airpower is becoming the most critical factor in determining the course and outcome of a conventional war.

In fact, some theorists, such as Slipchenko, have gone so far as to state airpower can now win wars independently, and that Douhet's theory of air warfare can now be practically achieved. However, such theories as the aerospace war provide a mechanistic view of war which doesn't allow for fog and friction. Extrapolating the current trends of warfare to their logical conclusion fails to account for the duel between weapons and countermeasures, and provides a view of warfare which has proven inaccurate many times in the past. Unlike nuclear weapons, conventional high-precision weaponry are more vulnerable to countermeasures and the effects of fog of war.

Therefore, Russian planners have not embraced an independent strategy which relies totally on them.

Therefore, despite futuristic visions such as the aerospace war and an increasing appreciation of a strategic role for airpower, the authoritative view is that airpower cannot be relied upon to win a war by itself. The traditional concepts of operational art for airpower employment remain valid and are reflected in the current Air Force roles and missions along with an emerging strategic role embodied in the air campaign.

VI. CONCLUSION AND IMPLICATIONS FOR THE U.S. NAVY

A. CONCLUSION

The primary objective of this thesis was to trace the development of Russian offensive air warfare theory and to determine whether the current Revolution in Military Affairs will change the traditional Russian emphasis on airpower as one element of a combined arms strategy.

The period between 1930 and 1945 saw the evolution of air power theory from untested concepts to operational art proven in the crucible of battle. However, Russian airpower theory developed upon a significantly different path than Western airpower concepts, driven by geostrategic factors, technological shortcomings and the influence of the Stavka. The Russian heavy bomber force, despite being the largest in the world in the early 1930's, did not subscribe to a concept of independent strategic bombing along the lines advocated by the Italian air theorist Douhet. Instead, a target set which could most effectively influence the conduct of the ground war was chosen.

During the late 1930's, a shift towards tactical employment of airpower became prominent as the heavy bomber was proven increasingly vulnerable to defenses and

technological progress stagnated. The fighter-bomber and ground attack aircraft became the dominant element in Russian air warfare theory. Air theorists such as Lapchinskiy and Mednis defined new concepts of operational employment for airpower which would prove a sound framework for a resurgent Red Air Force. By emphasizing centralization of control and combined arms operations, the Red Air Force waged a series of highly effective air operations, gaining air superiority by attrition and eventually dominating the three-dimensional battlefield. However, because of a lack of an independent strategy, the effectiveness of the Red Air Force in combined arms operations is often underestimated. Given the tremendous opportunity costs of building a strategic bombing force, the Russian concept of air warfare as a combined arms element was a cost effective alternative to an independent strategic force.

Following the end of the Second Great Patriotic War, the new threat to the Soviet Union was no longer massed armored forces, but nuclear attack. This drove Soviet air warfare theory towards an emphasis on strategic offensive and defensive capability. However, Douhet's concept of victory through the independent use of airpower was not fully accepted in Russian thought on nuclear war. The nuclear missile was viewed as long-range artillery which could strike in the

enemy's deep rear but its purpose was to create conditions for success on the battlefield.

However, during the Khrushchev era, traditional concepts of air warfare employment developed during the Second Great Patriotic War seemed anachronistic. The concepts of air superiority meant little because of the inability to effectively intercept missile delivery systems. Warfare would be reduced to a series of overwhelming offensive strikes.

However, the growing realization after Khrushchev's ouster that there might be an initial conventional phase of a conflict led to a reemergence of classical airpower concepts embodied in the air offensive. The Six-Day War demonstrated convincingly the strategic effectiveness of airpower in a conventional war setting. The increasing conventional strike potential of aviation and ground forces missile troops enabled them to fulfill the role previously assigned to nuclear weapons, especially the destruction of enemy strike means such as nuclear weaponry and aviation assets. Thus, the trend towards a duel of strike systems and away from the engagement of traditional ground force elements in a conventional war was being formulated as early as the 1960's.

The development of such systems as recce-strike complexes and precision-guided weaponry has accelerated the trend

towards warfare being waged primarily with "fire strikes" rather than contact between forces.

Following the Persian Gulf War, there is widespread acceptance among Russian observers that airpower is now increasingly a determining factor in the course and outcome of conflict, analagous to the ability of strategic nuclear forces to effect the course and outcome of a nuclear war. However, there has been mixed opinions on whether airpower can independently achieve strategic goals in a conflict.

The Coalition introduction of such weapons as reconnaissance-strike complexes, stealth aircraft and precision-guided weaponry demonstrated such success in the Persian Gulf War that many realized that the predicted revolution in military affairs was occurring. Russia is currently placing much emphasis on developing ways to combat these systems, many times with asymmetric responses as well as, in some cases, fielding analogous capabilities.

Another view for which there is great consensus is that this current military technical revolution has profoundly altered the nature of the modern war. The ability of space and airborne sensors to provide a view of the battlefield into the strategic depth of the rear and the ability of long range precision weapons to effectively strike detected forces has caused revolutionary change on the modern battlefield. Now

emphasis is placed on mobility and deception for survival as any detection can be swiftly translated into destruction. The future ground battlefield will no longer have front lines as any unit in prolonged contact with the enemy will likely be a target for devastating strikes. Increasingly, high intensity conventional conflict will be fought as a series of "fire strikes", with contact ground forces playing a supporting rather than a central role.

The nature of modern war also necessitates that offensive strikes be conducted even when on the strategic defensive, as defensive means alone cannot be effective. Thus, offensive air operations must be an essential factor for future airpower employment for Russia.

As a result of the increased effectiveness of war by "remote strikes", air striking power is becoming the most critical factor in determining the course and outcome of a war. In fact, some theorists such as Slipchenko have gone so far as to state airpower can now win wars independently.

This has led to a vision of future war in which strategic conventional strikes alone can bring victory, and that Douhet's theory of air warfare can now be practically achieved. However, such theories as the aerospace war provide a mechanistic view of war which doesn't allow for fog and friction of war. A conventional war which could be reduced to

a series of strikes on the model of a nuclear conflict extrapolates the trends of warfare to their logical conclusion, but such a deterministic view of warfare also fails to account for the development of countermeasures which may reduce the effectiveness of the new generation of advanced technology such as stealth, reconnaissance-strike complexes and precision-guided weaponry.

Clearly, that airpower has an increasing role in modern war was apparent in the wake of the Persian Gulf War. The 1992 Draft Military Doctrine shifts the emphasis to the means of both high-precision conventional strike capability and air defense from the old paradigm of massed ground forces. A threat perception formerly expressed in numbers of tanks or manpower is being replaced by the quantity of "offensive air weapons." Moreover, there is recognition that, in modern conflict, especially in the initial period of a war, the means of offense have an inherent advantage over the means of defense. Therefore, offensive air operations will be a hallmark of any future high intensity conventional conflict. The concept of the air campaign recently adopted combines both defensive and offensive operation into one integrated campaign.

Such a campaign could be carried out as an independent strategic operation, albeit with the assistance of ground and

naval strike assets. The air campaign would not provide victory itself but create the conditions for successful exploitation by other forces, much in the same manner as Sokolovskii's view of the role of strategic nuclear forces in a nuclear war. In this regard, traditional Russian theory of operational art for air warfare with its emphasis on theater operations and combined arms has continued utility, despite a distinct trend towards independent strategic employment of airpower.

Concepts such as the aerospace war, with warfare reduced to strategic strikes by high-precision conventional weapons, appears at the present to be a vision for the future which has little current impact on service roles and missions. However, like Western airpower visionaries of the past, the current aerospace war proponents play the role of iconoclasts in shattering entrenched views and highlighting vital trends. In Marxian logic, thinkers such as Slipchenko provide the anti-thesis to the established thesis of massed armored forces being the decisive force in modern war. From this, a new synthesis has emerged on the role of airpower, combining new concepts within a traditional framework.

**B. IMPLICATIONS: THE NAVY AND THE MILITARY-TECHNICAL
REVOLUTION**

The military-technical revolution has significant implications for the U.S. Navy, both in regards to the evolution of threat capabilities and the changing nature of warfare.

Russia, despite the current economic situation, has placed priority emphasis on the development of both means of high-precision conventional strike capability and advanced means of air defense. The Russian Air Force, despite downsizing, is emphasizing the development of offensive air warfare potential and is continuing the development of follow-on designs to both the Tu-16 and Su-27. In addition, deep strike and electronic warfare variants of the Su-27 are being developed as well as a new, highly sophisticated fighter variant.

The means of defense against offensive air weaponry are also under intense development, spurred by the debacle the Iraqis suffered in the Gulf War. Advanced air defense systems such as the SA-10, 12 and 15 have demonstrated effectiveness against simulated cruise missiles, ballistic missiles and precision weaponry. Efforts are also underway to develop both surface-to-air and air-to-air missiles which can engage the

airborne elements of reconnaissance-strike complexes at stand-off distances.

Taken together, these efforts show the determined nature by which the Russians are grappling with the changes caused by the military-technical revolution. If Russia does become a resurgent global threat, as is considered a possibility in the U.S. National Military Strategy, it may represent a greater threat than during the Cold War from the standpoint of conventional warfare capability.

While such a resurgent threat seems remote, even in the context of a failure of democracy, the threat of these high-technology weapons systems in regional conflict is very real. Russia is financing the development of this new generation of weaponry primarily by arms sales abroad. This trend of high-technology precision weaponry sales will likely accelerate in the future as the devaluation of the ruble fuels the need for hard currency.

Because of this diffusion of technology to regional actors, an understanding of the new vision of war caused by the military-technical revolution is vital to the U.S. Navy not just in a unlikely event of conflict with the Russians, but within the framework of regional contingencies.

Unlike the Persian Gulf War, a war in which both antagonists have means of effective remote striking ability

would have a very different character. A future opponent may have the ability to conduct deep strikes in the theater of war and conduct operations against high value air assets. Fixed targets such as logistic sites, command and control and intelligence centers, and airfields will likely become targets for precision strikes. The destruction which Saddam Hussein could have accomplished with the new Russian variant of the SCUD missile incorporating precision guidance provides food for thought. In such an environment, both the strategic and tactical mobility of naval vessels would be greatly valued both for rapid reaction and counterdetection.

Moreover, the military-technical revolution provides an opportunity for naval forces to influence events ashore to a degree unknown in the past. Col. A. N. Zakharov writes a major trend in warfare

reflects the steady growth in the number of air force and naval personnel and equipment involved in engaging ground groupings, since the capabilities of ground forces clearly are becoming insufficient to defeat the enemy. The Persian Gulf War is proof of this.¹⁸³

To effectively wage this new form of warfare by remote strikes, the development of an effective strike capability and the fusion of timely and effective intelligence with real-time

¹⁸³ Zakharov, 5

detection capabilities are required. In short, a reconnaissance-strike complex which can operate effectively in an overland power projection scenario.

Recently, there has discussion of doing away with naval strike aviation altogether. A recent Proceedings article stated the following:

[T]he most important and primary function of the aircraft carrier is to establish air superiority in the objective area-its aircraft must subjugate enemy air forces so that the rest of the Navy and Marine Corps can get on with its assignment. The carrier exists for the care and feeding of air-superiority fighters-and everything else is secondary.¹⁸⁴

Such thinking is extremely short-sighted in that it views the threat in the traditional air sphere, whereas the military-technical revolution has rendered such distinctions increasingly counterproductive. For example, highly accurate cruise and ballistic missiles could inflict severe damage on Marine beachheads and logistics areas despite the attainment of "air superiority." Russian operational art has always viewed air superiority as a combined arms effort, with a vital role played by offensive air weapons, including strike aircraft and ballistic missiles. Recent revelations that the

¹⁸⁴ Charles E. Meyers Jr., "Time to Fold 'em," U.S. Naval Institute Proceedings, July 1991, 40

means of air defense alone cannot cope with the threat of modern offensive air weapons indicates that such a strategy of air superiority based on fighter aircraft alone is dangerously flawed. In the Russian view, the offense dominated nature of war makes it necessary to destroy air offensive weapons such as cruise missiles, ballistic missiles and precision guided weaponry before they are launched.

Therefore, a capability for waging effective precision strikes is imperative, not only with cruise missiles but also with manned aircraft. The manned platform offers the flexibility to counter attempts at deception and more effectively engage mobile targets. To be effective, such a platform must have both endurance and survivability. Unfortunately, the current evolutionary development of the F/A-18 E/F does not provide the necessary capability to fully realize the potential offered by the changing nature of warfare. Endurance both reduces dependence on Air Force tanker assets, which are tied to increasingly vulnerable airfields, and enhances carrier survivability by allowing greater sea room to facilitate counterdetection. The Russians have emphasized production of long range strike and escort assets and curtailed production of shorter range aircraft such as the MiG-29, because aircraft range is vital to both mission accomplishment and survivability on the ground. The AF/X has

both the stealth capability, endurance and strike potential to fully take advantage of the opportunities offered by the military-technical revolution.

If the AF/X is cancelled, the Navy could find itself in a similar position to the Royal Navy at the onset of the Second World War. The development of carrier striking power during the Second World War had much common with the current revolution in military affairs. The ability to conduct remote strikes against naval vessels had replaced the concept of contact between men-of-war in a line of battle as the decisive element in naval warfare. However, the Royal Navy, despite having a large carrier force, was unable to fully take advantage of this revolution because its main striking aircraft, the *Swordfish*, did not have the range and effectiveness required. Similarly, the F/A-18 E/F may be suitable as an interim step, but cancellation of the AF/X would not allow the Navy to exploit the potential offered by the military-technical revolution as others surely will do.

Another important lesson of the Gulf War is that while nuclear warfare is inherently offense dominated, a nature of the battle between air offensive weapons and air defense rests primarily on technological sophistication, especially with regards to electronic warfare, rather than any inherent advantage in either ground-based or airborne platforms. The

survivability of the naval air assets must be evaluated in the light of the development of air defense capabilities such as second-generation surface-to-air missile systems, such as the SA-10, 12 and 15, which are now being aggressively marketed to regional actors. Control of the electromagnetic spectrum in the face of these sophisticated threats is essential, and the EA-6B must have the ability to cope with these new systems to ensure success in the power projection mission.

Another trend resulting from the revolution in military affairs has been the vital need for effective and timely intelligence and detection capabilities. Naval forces now have the capability to project power ashore to a degree unmatched in the past. However, intelligence and command and control architecture must be in place to allow a clear view of not only the naval and air picture in a region, but the ground picture as well. As high-precision weaponry have enabled targets to be reliably engaged and destroyed at great distances, the limiting factor increasingly becomes detection and intelligence capability. Fusion of information from such platforms as JSTARS (Joint Surveillance and Targeting Airborne Radar System) will be vital to provide a comprehensive view of the three-dimensional battlefield. Counterdetection strategies such as increased mobility, signature suppression and false targets will likely be an element in any future conflict and

may confound targeting based on an Air Tasking Order (ATO) system. The development of a true reconnaissance-strike complex which can convert a fleeting detection into prompt destruction will allow the U.S. Navy to fully take advantage of the current military-technical revolution.

The importance of understanding the implications of the military-technical revolution is vital for naval planners thinking about future war. The concept of war by "remote strikes" is, however, familiar to those who have studied carrier operations in the Second World War. Conflict is short and sharp as detection is quickly translated into destruction. Therefore, deception and mobility are the key to survival. Warfare is not limited by weapon effectiveness, but by the ability to avoid detection. Intelligence and detection capability are critical to mission success. And lastly, technological superiority is more vital than superiority in numbers. It is logical that, as the spheres of combat blend together, the battlefield ashore will more closely resemble war at sea.

It is important to note that the integration of scouting and reconnaissance capabilities which occurred with the development of the aircraft carrier represented the first true realization of reconnaissance-strike complex. A current carrier battlegroup, with its integration of strike capability

with national and theater intelligence means and a real-time wide area airborne detection capability fully represents the realization of Marshal Ogarkov's vision. As the emphasis shifts from war at sea to power projection ashore, as stated in the "... From the Sea" document, the impressive capabilities of the carrier battlegroup as a maritime reconnaissance-strike complex must be extended to operate with equal effectiveness in the overland environment. In this way, the U.S. Navy can take advantage of the tremendous potential offered by the military-technical revolution.

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