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THE EVOLUTION OF SOVIET STRATEGIC ARMS, 1945-1972

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ABSTRACT

THE EVOLUTION OF
SOVIET STRATEGIC ARMS,
1945-1972

By

Steven Mearl Gorton

This study is a brief history of Soviet strategic arms from World War II to the SALT I treaty of 1972. It is written mainly from secondary material.

Attention is called to the relationship between the XXIII Congress CPSU (1966) and the apparent Soviet drive for strategic parity with the United States. A conscious decision appears to have been made to do so at this Congress. Prior to the Congress, clear preparation was made for a great increase in the size of the Soviet strategic forces, in the form of changes in the system of Party control of the Strategic Rocket Forces and the appointment of Marshal Krylov to the command of the SRF.

Given the great importance of U. S.--Soviet strategic relations, the author suggests that detailed study of the XXIII Congress is needed.

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INTRODUCTION

This study is intended as a general survey of the history of Soviet strategic arms from the end of World War II to the SALT I treaty of 1972. Its purpose is to serve as an introduction to the specific study of the XXIII Congress of the CPSU of 1966. As will be argued, this congress represents a turning point in the history of Soviet strategic arms, and marks the definitive establishment of what has subsequently become known as the "Brezhnev era." Since strategic politics are a central feature of the U. S.--Soviet relationship, approaching recent Soviet history from this viewpoint seems most appropriate. It is also an area of deep emotional concern to the author.

Now, looking back after twenty years, the cold, deadly fear of 1957-62 seems to have faded away into unreality. It is difficult to recall the sense of doom with which people of my generation came to political awareness--the sense that nuclear doomsday was inevitable within the next few months. During the U-2 crisis of 1960, I distinctly remember recognizing and accepting the fact that "I may not get to grow up!"--a most shattering conclusion to come to at age ten. My generation grew up with Soviet missiles replacing and augmenting the traditional childhood hobgoblins and bogeymen.

The unique tenor of those times has passed, in the years since the Cuban missile crisis of 1962. Nuclear arms faded from public

consciousness as the United States became embroiled in the catastrophe of Vietnam, and the social upheavals of the later sixties--closely related to that conflict--turned our eyes inward. Apparent Soviet quiescence, in contrast with the strident diplomacy of the Khrushchev era, permitted us to concentrate upon our fratricidal domestic conflicts and bewildering revolutions in politics, morals, and lifestyle. Strategic politics became an area of interest quite far removed from the mind of the average citizen--even one who was politically active and aware. There was so much more that pressed more insistently--the war, the economy, the black revolution, and so on.

Now, in the era of SALT II, in the era of the Soviet return to an aggressive foreign policy, that has changed. Once more, as in the period of the "missile gap," the adequacy of American strategic arms is a major political issue. Like the election of 1960, the 1980 election promises to include strategic policies as a relevant issue. Once again, it is necessary to emulate Herman Kahn and "think about the unthinkable."

For that reason, there is now an urgent need to understand the historical processes that have brought the great nuclear arsenals of the superpowers into existence. If they are ever to be eliminated, or even reduced, it is first necessary to understand how they have grown.

The great dilemma of the nuclear age is that, despite the terrifying potential of nuclear war, nuclear weapons cannot be renounced without the prior resolution of the conflict between the United States and the Soviet Union. Only the mutual fear of the consequences of taking that conflict to its logical conclusion of war prevents that

war. Yet the complex, uncertain nature of the process of strategic-arms procurement itself produces tension which leads to instability and to the potential for war. The best that "arms control" can hope for is the creation of a complex of strategic weapons which best serve to deter overt war between the superpowers, weapons systems whose qualities are those of unquestionably sufficient destructive power and invulnerability against enemy action. The goal is a system of nuclear arms which will serve best to prevent their use as the Soviet-American conflict proceeds to its unknown resolution--without the catastrophe of nuclear war.

In the furtherance of this goal through the process of strategic arms limitation, it is imperative that the developmental history of the strategic arsenals on both sides be thoroughly understood. There have been far too many instances of misinterpreted intelligence in the nuclear era for comfort. American fears of a "bomber gap" and a "missile gap" in the 1950's led to the creation of a huge bomber and missile force that confronted the Soviet Union with a <u>real</u> bomber/missile gap; Soviet construction of a prototype ABM system provoked the development of MIRV systems which have vastly complicated the strategic problem; the advent of MIRV into the heavy-throw-weight Soviet missile force now seems to threaten a decisive first-strike capability. This is an area where the most honest of mistakes can lead to the most dreadful of consequences--the breakdown of deterrence and the threat of nuclear war--and the "prudent" course of "assuming the worst" may provoke exactly the same fears and responses from the other side.

Now, with the Soviet invasion of Afghanistan as an ominous backdrop to the thorny question of the ratification of the SALT II treaty, the Soviet strategic arsenal presents us with a daunting prospect. Given accurate MIRV warheads, this force clearly poses a potential first-strike threat to much of the American strategic arsenal. Formerly, our possession of MIRV compensated for the larger number of Soviet missiles and their superior throw weight. Now, as the Soviets deploy their own MIRV systems, "essential equivalence of forces" seems to be slipping away. The basic problem of strategic intelligence and decision is before us once again: Do their capabilities represent their intentions?

Soviet deployment of MIRV on the numerical force which was sanctioned by the SALT I treaty appears to have been technologically inevitable, and it is the size of that strategic strike force which causes its MIRVing to engender fears of an intention to attain a first-strike capability. For this reason, it is vital to divine the intentions behind the original construction of this force, which was built during the period 1966-71. To do that, it is necessary to understand the history of the strategic nuclear forces of the Soviet Union.

FROM POTSDAM TO THE SOVIET BOMB, 1945-49

In the four years from 1945 to 1949, the Soviet Union faced the problem of having to deal with a nuclear-armed opponent while lacking such weapons itself. The tasks which confronted Soviet "strategic arms"[1] during this period were those of preventing the United States from making effective political use of its nuclear monopoly in this period of extreme Soviet weakness, accomplishing the political ends set by Stalin,[2] and buying time for the Soviet Union to build its own nuclear industry. All this had to be carried out in an atmosphere of extreme stringency, in the face of the desperate need to rebuild the basic industrial capital of the country as rapidly as possible.

There exists a common belief that the Soviet Union effectively countered the American nuclear monopoly by maintaining the Soviet ground forces at a high level after the end of World War II.[3] The logic of this belief is that the Soviet Army compensated for the threat of American nuclear attack by menacing the prostrate nations of Western Europe with conventional land forces. Russian cities were hostage to American atomic bombers; European cities were hostage to Soviet armored divisions. The precipitous American demobilization of its ground forces and reliance upon the nuclear monopoly enabled the Soviet Union to counter with a force monopoly of its own.

Unfortunately, there is a difficulty with this interpretation. The West's demobilization was matched by a Soviet demobilization which was very nearly as precipitous. From a wartime high of 12 million men in 1945, American forces had declined to 1.7 million three years later. Soviet armed forces over the same period declined from 11,365,000 men to 2,874,000.[4] The Soviet Union thus seems to have had an advantage of upwards of a million men--surely a credible threat with which to hold Western Europe hostage. However, this view ignores the immense internal security problems which the Soviet Army faced in the immediate postwar years, both in Eastern Europe and within the Soviet Union itself.[5] This was, after all, the period in which strict political controls were being re-introduced after the comparative slackness of the war years, and the time of the Ukrainian insurgency. The need to rebuild clearly overshadowed any other consideration, as exemplified by the fact that the Soviet armed forces of 1945 were only two-thirds those of 1941.[6] On the basis of numbers, then, it does not appear that the Soviet Union was really capable of seriously threatening Western Europe, especially since the massive formations used by the Red Army in the last years of World War II were themselves terribly vulnerable to nuclear attack.

Yet if the Soviet Army did not pose a threat in <u>substance</u> to Western Europe, the terror of its name accomplished much the same effect. The long lines of men and machines that streamed into Central Europe in the spring of 1945, to the final defeat of the nation which had itself subjugated most of Western and Central Europe, cast a long shadow. Russia had borne the brunt of the Nazi attack, and unlike the nations of Western Europe had survived and triumphed over

Germany--arguably, largely on her own. Now Germany lay in ruins, the Western Allies were demobilizing, and nothing seemed to lie between the Soviet Army and the Channel except the American nuclear forces and the good intentions of Stalin. As the clash between the former allies widened, the fear of the Soviet Army went far beyond its actual capabilities:

> It is clear, in retrospect, that the Russian military performance and the colossal power of the Red Army blinded many to the very serious economic and political problems that the Soviet regime was to face on the morrow of the victory and that were likely to dampen any overambitious schemes of expansion. (7)

Since the Soviet Union had already won the "western glacis" of protective states as a part of the process of defeating Germany, all its more realistic policy goals had already been accomplished at the end of the war. The West might protest about the conduct of the Soviet government in Eastern Europe, but there was nothing that could be done against it without risking war. For the Western Allies, regardless of which side of the Atlantic they stood on, war was out of the question. Britain was in a state of exhaustion; France and Italy were consumed with domestic political unrest; the United States was far too absorbed by the return to peace and prosperity for war against a recent "gallant ally" to be possible at all. If moral indignation, the cutoff of Lend-Lease, and the denial of a possible American recovery loan failed to move Stalin, that was all that could be done.

One of the reasons for that impossibility resided in the dynamics of what might be termed the "first wave" of nuclear disarmament attempts--the Baruch Plan and its Soviet riposte. The net effect of

this sequence of events was to render the American nuclear monopoly largely useless in real political terms.

The Baruch Plan was a proposal which the United States presented to the United Nations Atomic Energy Commission in June 1946. It was an extremely dramatic proposal--the United States proposed nothing less than the creation of an International Atomic Development Agency to conduct all phases of the development and use of atomic energy for peaceful purposes, and to establish control procedures to preclude the transfer of fissionable material for military purposes. With such an organization established, the United States would dismantle its military nuclear program.[8]

The Baruch Plan was a masterly arrangement for the United States to both have its cake and eat it. If adopted, it would have succeeded in putting nuclear power under firm control before it had a chance to spread. It would also, of course, maintain American nuclear supremacy for the foreseeable future while the IADA was becoming operational. If the Soviet Union rejected it, they would have to bear the onus of having turned down a comprehensive plan for nuclear disarmament. In fact, the Soviets rejected the plan on the grounds that it represented an infringement of national sovereignty. Instead, the Soviets called for immediate destruction of the U. S. atomic stockpile, and demanded that nuclear weapons be forbidden.

Soviet rejection of the Baruch Plan was not unexpected:

> The Soviet Union's rejection of the Baruch Plan came as no great surprise to American officials. Ambassador Walter Bedell Smith had warned from Moscow as early as April 1946, that the Russians had no interest in a workable international control system and were counting on producing their own bombs, relying in the meantime on domestic

> political constraints within the United States to keep the Truman Administration from employing "atomic blackmail." (9)

The Soviet response to the Baruch Plan was a proposal to "ban the bomb", which was the exact opposite of the Baruch Plan. The Baruch Plan proposed controls first, then prohibition of the bomb, while the Soviet counterproposal demanded the prohibition of the bomb first, and only later the imposition of controls over nuclear industry. This proposal was as unacceptable to the United States as the Baruch Plan had been to the Soviet Union, since the Soviet plan would have removed the American trump card of nuclear weapons. A deadlock resulted.

The Soviet proposal, however, and its accompanying propaganda campaign, enabled the Soviet Union to reap a victory of sorts:

> The slogan "Ban the bomb" was shrewdly designed to exploit or reinforce already prevailing attitudes, such as a general war-weariness and the fear of still another war, particularly one fought with the "absolute weapon". To the extent that the Soviets could arouse fears of another war, the pressure for restraint in any international crisis would be brought on the United States. Or, to put it another way, the Russians used psychological warfare to redress the imbalance in military power. The United States might possess an atomic monopoly; but this power could be neutralized by inhibiting American policy-makers from employing this power. (10)

This campaign would mount through the next few years and culminate with the Stockholm Peace Appeal of 1950. The effect was to discount the political utility of the American nuclear monopoly. This marked the beginning of a phenomenon which has become more familiar as the nuclear age has progressed: Nuclear weapons, although they may confer a certain measure of security, do not constitute a form of easily usable power. The supreme weapon <u>may</u> be too terrible to use; it <u>is</u> too clumsy to use.

The goal of the Soviet propaganda offensive against nuclear weapons during this period was to prevent the use of the American nuclear monopoly in order to gain enough time to build a Soviet bomb. In this endeavor, public Soviet statements of policy were totally at variance with actual policy:

> Publicly, Stalin deprecated the bomb. In 1946, he said that "atomic bombs are intended to frighten people with weak nerves, but they cannot decide the outcome of a war since for this atomic bombs are completely insufficient." But the next year, in private, he told Yugoslavia's Milovan Djilas that the bomb "is a powerful thing, pow-er-ful!" What was really in the Soviet mind was more candidly stated in 1945 by Foreign Minister V. M. Molotov, who declared that "it is not possible. . . for a technical secret of any great size to remain the exclusive possession of any one country. . . We will have atomic energy and many other things, too." (11)

Soviet development of nuclear weapons had been under way since 1942, but the destruction of Hiroshima caused the project to be sharply accelerated. The day afterwards, Stalin placed the formidable Lavrenty Beriya in charge of the program.[12] Work proceeded with feverish haste, the first breeder reactor to produce plutonium being brought critical in early 1948.[13] The target date for the test of the first bomb was the official celebration of Stalin's seventieth birthday; this was accomplished, with the first test being carried out in September 1949.

Work on delivery systems had also been in progress during the same period, but here the situation was not as favorable as with the bomb itself. Soviet long-range aviation had stagnated during the war, since the need for tactical aircraft to support the army did not permit the luxury, in Soviet terms, of long-range heavy bombers such as were used by the British and Americans in their strategic bombing offensive against Nazi Germany.

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Fate pure and simple intervened to rectify this deficiency. In 1944, four American B-29 bombers raiding Manchuria from bases in China were forced to land in Siberia. The Soviet aircraft industry thus received examples of a long-range bomber incorporating the latest American design practices in structure, engines, and equipment, enabling years to be cut off the development time. The B-29 was put into Soviet production as the Tupolev Tu-4 in 1946, entering service the following year. Some 1000 were in service by 1953.[14]

Thus, by a stroke of luck, the Soviet Union adopted the same nuclear strike aircraft as equipped the West in the immediate postwar period. However the Tu-4, when the Soviet bomb became available, was nowhere near as effective as its American ancestor, due to geography. American medium bombers (as the B-29 was reclassified upon the advent of the intercontinental-range B-36 heavy bomber) could be based in Europe within range of Soviet targets. The Tu-4 could only reach American targets from bases in the extreme north of the Soviet Union--and then only on one-way missions. Moreover, the progress of aircraft design during this period had given the advantage to the defense, since long range and jet propulsion were mutually incompatible at this time. World War II experience suggested that piston-engined bombers would be easy prey for jet interceptors; this would be amply confirmed by the B-29's encounter with the MiG-15 in Korea.[15]

Still, the Tu-4 gave both Soviet industry and the user arm vital experience, and constituted some sort of a nuclear force to "hold the ring" until more capable and credible systems made their appearance.

INTERIM DETERRENT,
1950-56

The outbreak of the Korean War constituted, in effect, a massive setback for the newly-established Soviet strategic nuclear forces. Korea surely proved to be an embarrassment for the United States, in that it had built for the wrong war. The atomic bombers of the Strategic Air Command were of little use in Korea, and the United States found that conventional forces were required as well.[16] However, an immense expansion took place in the Strategic Air Command as well as in conventional arms, since the successful explosion of the Soviet atomic bomb and the North Korean invasion of South Korea hardly were arguments for a pacific Soviet disposition. The re-equipment of SAC with modern swept-wing jet bombers began at the time of the Korean War, first with B-47 medium bombers using overseas bases, and later (1955) with B-52 heavy bombers of intercontinental range.

Any satisfaction the Soviet Union might have felt about the good showing of its fighters against piston-engined bombers in Korea must have been banished by the re-equipment of SAC, and any satisfaction at having finally attained true nuclear-power status had to be severely tempered by the knowledge that the Soviet Union was still far behind.

The early fifties are the time when the idea that the Soviet Army held Western Europe hostage in compensation for American nuclear superiority was most nearly true. By 1955, the number of Soviet men

under arms stood at double the 1948 figure. At this time, Western Europe was also the place in which the existing Soviet nuclear forces were capable of posing a credible threat. Significantly, the first modern Soviet bomber (the Tu-16 "Badger" in service 1954) was a medium bomber best suited for operations against European targets rather than North American targets.[17]

In the area of nuclear research, the situation was more satisfactory for the Soviets. The Soviet Union had taken four years to catch up to the United States and explode its first atomic bomb. For the next step up the nuclear ladder, much less time was needed. The two nations each detonated their first thermonuclear devices only nine months apart. Although the United States was first (on November 1, 1952), the weapon tested was totally impractical for any military purpose. American H-bomb development had blundered into a technological blind alley, and the Soviet Union was the first to explode a militarily practical H-bomb.[18]

Although the mere detonation of a weapon did not mean having the capability of using it, there were less tangible benefits:

> There were, to be sure, some elements of comfort in the overall situation. Soviet nuclear armament was now sufficiently advanced to offer an effective deterrent. In August 1953 the Soviets would explode a hydrogen bomb. To the military strategists, these achievements were still unconvincing in view of Russia's marked inferiority to America in the means of delivering nuclear weapons, but insofar as the psychological meaning of the weapons was concerned Russia's achievement and the publicity attending them were to endow her rulers with an element of security in an otherwise dangerous and confusing situation. (19)

To this, it might be added that the terrible destructive power of the hydrogen bomb redounded to Soviet advantage, as it reinforced the growing conviction in the West that war with nuclear weapons would

be an act of suicidal madness. The mere possession of such weapons in the Soviet arsenal, regardless of their actual operational effectiveness, was enough to conjure up the most dreadful visions of war. In this respect, the fact that the Western nations were far more familiar with strategic air warfare than was the Soviet Union backfired against the West. For thirty years, Britons and Americans had been subjected to the apocalyptic visions of airpower theorists such as Mitchell and Trenchard, and had conducted a large portion of their World War II effort in the form of strategic bombing. Now, the advent of nuclear weapons had seemingly given air power the destructive capability to fulfill those visions. In the West, the terror of nuclear war fell on ground already prepared by decades of "airpower consciousness", and the connection of nuclear warfare with strategic aerial bombing meant that fear of nuclear war had plenty of scope to spread--inhibiting the possibility that nuclear superiority might be used while it still existed.

It was only toward the end of this period that the Soviet Union first came to have a fully modern--if numerically small--strategic bomber force. In 1955, the first Soviet intercontinental bombers began to go into service--the turbojet-powered Myasishchev Mya-4 "Bison" and the turboprop Tupolev TU-95 "Bear". Both aircraft stemmed from design work which had begun around 1950. Ironically, the more "modern" Myasishchev bomber proved to be the loser and Tupolev's design, which probably was produced as a backup during a period when he was out of favor with Stalin, became the Soviet long-range bomber.[20]

However, it was the "Bison" which, during its short and rather unsuccessful career, had the greatest effect upon the strategic balance--although hardly in a manner satisfactory to the Soviet Union. It was the tool which was used in the beginning of the policy of "strategic bluff" which Khrushchev was later to use so extensively:

> On Aviation day in July 1955 the Soviet Union mustered what appeared to be an impressive "fly-by" of their new Bison heavy long-range bomber. The number of aircraft that flew over the reviewing stand impressed Western observers and created the impression that the Soviet Union had embarked upon large-scale development and production of heavy bombers. Following this Air Show, United States intelligence estimates began to indicate the possibility of a "bomber gap" by 1957. In actual fact, the Soviet Union decided to limit its production of long-range bombers even though American estimates of Russia's capabilities indicated that the Soviet Union had the ability to produce large numbers of these heavy bombers. (21)

In actuality, what had taken place was that the one squadron which was operational with the "Bison" at that time made multiple passes, in the manner of a stage army. The purpose of the ploy was undoubtedly to increase the deterrent effect of the miniscule Soviet bomber force by causing it to appear much larger than it actually was. It certainly produced a great effect on the United States, but the alarm thus generated resulted in consequences which could hardly have been anticipated by the Soviets. The American response was a considerable increase in the number of bombers and the construction of an extensive and expensive network of air-defense radars and supersonic interceptors. The net result of this attempt to redress the strategic balance by means of a ruse was thus a worsening of the strategic balance, from the Soviet point of view. Oddly, the Soviet Union seems to have been blind to this, since the same process was repeated

by Khrushchev with his "missile bluff"--with the result of a full-scale arms race.

Actually, the Soviet Union only deployed about a fifth as many long-range bombers as had been estimated it might during the "bomber gap" hysteria. No more than about 200 Soviet long-range bombers have ever been operational at any one time, with the numbers tending to fall steadily over the years. At its peak, SAC mustered some 1800 bombers,[22] of which about a third were B-52's. Dalniya Aviatsiya (Long-Range Aviation) thus constituted purely a minimum deterrent force--big enough to ensure that at least some of its bombers would stand a chance of penetrating American targets in the event of war and thus threaten nuclear destruction. Deterring American attack seems to have been the sole purpose of the Soviet strategic bomber force.[23] The Soviet Union had recognized more clearly than the United States that the advent of the long-range ballistic missile rendered bomber forces obsolescent, and that bombers should be procured purely as an interim system until missiles became operational.

Soviet long-range rocketry, like that of the United States, began in 1945 with the capture of German personnel and material, although Soviet experimentation with liquid-fuel rockets had gone on before the war. In 1945 the Soviet Army occupied the German rocket development center of Peenemünde and captured a great amount of material and personnel, although the top echelon of German rocket scientists had already fled west. Extensive research was carried on with captured and Soviet-built V-2 rockets, and an improved, longer-ranged rocket called the "Pobeda" was put into production. In 1950-51, the first

Soviet rocket divisions was formed with V-2's and Pobedas.[24] Even before this, however, the initiative for the development of long-range rockets had been set in motion at the highest levels of the Soviet government:

> Accordingly, Stalin personally suggested, and the Council of Ministers agreed immediately, to the formation of a special State Commission for the study of the problems of long-range rockets. It consisted of Col.-Gen. I. A. Serov (First Deputy Minister of NKVD; Chairman), Prof.-Col. G. A. Tokaty-Tokayev (Chief Scientist and Deputy Chairman; from the Soviet Air Forces), Prof. M. V. Keldysh (Ministry of Armaments), Prof. M. A. Kishkin (Ministry of Aircraft Production), and Maj.-Gen. I. V. [sic] Stalin (member). This decree signified a turning point in Soviet rocket research. Toward the end of 1947, everybody wanted to design a transatlantic rocket. (25)

By 1955, the programs began in 1947 were bearing fruit. Soviet engineers had elected to do the best they could with what they had, and had concentrated on the progressive development of the original German V-2 engine, thereby cutting development time. Where a larger thrust was required, beyond that permitted by simply modifying the basic engine, they clustered several of them together. The approach was brute force--the Soviets had opted not to wait, as did the United States, for reduction in the weight and bulk of the early thermonuclear devices. This decision was to pay great propaganda dividends in the rapidly approaching dawn of the Space Age.

Soviet MRBM and IRBM missiles first went into service around 1955.[26] These weapons, which had, respectively, ranges of 700 and 1100 miles, were mainly deployed against NATO targets in Europe, and therefore supplemented the medium bomber force. These were the weapons with which Khrushchev would threaten France and Britain during the

Suez crisis of the following year. Western Europe was now hostage to Soviet nuclear missiles.

The mid-fifties thus marked the real coming-of-age of Soviet strategic nuclear forces as a really credible military arm. A minimal deterrent force of long-range bombers of modern design was available to menace the United States directly, while ballistic missiles and really sizable numbers of medium bombers were available to threaten Europe. The first Soviet ICBM was under development, and with it would come a dramatic attempt to use the Soviet nuclear forces to influence international politics that would ultimately bring the United States and the Soviet Union to the brink of Armageddon.

In the process of developing the Soviet strategic nuclear forces, it is interesting to note the central role which Stalin evidently played. In the development of the modern Soviet armed forces, Stalin is usually dismissed as having been a conservative, stultifying influence. However, this view seems to be inconsistent with the active role he apparently played in the development of the Soviet nuclear and rocket forces. However laggard Stalin may have been about initiating the development of the computer technology that would be the backbone of the military art in the seventies and eighties, he evidently did a quite creditable job on the technology of the fifties and the sixties.

I think that what is necessary here is to distinguish between Stalin and Stalinism to a certain degree. Whatever Stalin's own beliefs--as he expressed them in his policies--about the future of nuclear weapons, heavy bombers, and long-range missiles may have been, it would have been most inexpedient to mention them in the eight years

between the end of the war and his death. While he was alive, the Soviet Union either had no nuclear forces at all or else had very rudimentary ones, and mainly had to rely upon conventional forces and the confusion of Western economics and politics for security. Under those conditions, calling attention to the potential of weapons which only the West had would have led to a problem with morale at a time when it might have been disastrous. Hence the downplaying of the importance of nuclear weapons and an emphasis upon the five "continuously operating factors" of military doctrine--while secretly straining every nerve to acquire nuclear weapons and their delivery systems.

Unfortunately, while Stalin was alive his word was like unto that of God, and any doctrinal point which he made had an inordinate chance of becoming instantly entrenched as Holy Writ. In the case of the military, Stalin's publicly proclaimed military doctrine coincided exactly with the experiences of those officers who had just finished fighting the Great Patriotic War and who would, by the late fifties, be coming into the higher staff positions. At that time, they would be in a position to constitute a "Stalinist/traditionalist" opposition to the new technology and doctrine of warfare which had been set in motion by Stalin's own policies.

BATTLE OF BLUFF,
1956-62

Of the entire period of the Nuclear Age to date, these six years were undisputedly the most dramatic and perilous. This was the period in which Khrushchev conducted his attempt at diplomacy be means of "nuclear bluff," which ultimately brought the world to the brink of nuclear war in the Cuban missile crisis of 1962. Soviet strategic arms had thus evolved to the point where they were capable of being used as an active tool of foreign policy.

The weapons system upon which Khrushchev's great gamble rested was the SS-6 missile, the pioneer Soviet ICBM. Although an extraordinarly clumsy and impractical weapon, this missile had an impact on history far beyond its true military capabilities merited.

The SS-6 can be described as the final development of the original German V-2. S. P. Korolyov's design team clustered together no less than 20 engines derived from the original German model to attain a total thrust of over a million pounds. To this day, only a handful of rockets have surpassed the power of the first Soviet ICBM. Its great power was necessitated by the fact that the design had been initiated before it became apparent that the weight of nuclear warheads could be substantially reduced. The fact that this power level had been attained by clustering well-proven engines made the SS-6 an extremely reliable vehicle.[27]

The great weight-lifting capability of the SS-6 and its excellent reliability gave the Soviet Union its initial advantage in the "space race"--which at that time was regarded as a thinly-veiled display of a nation's missile capability. Heavy weight capacity meant that the Soviet Union could orbit impressively heavy satellites which had no need for the sophisticated miniaturization which the United States preferred. The reliability of the rocket, in combination with strict Soviet secrecy, meant that the Soviet Union was not embarrassed by the well-publicized series of failures which were such a prominent feature of the early American space program. The Soviet space program rapidly gained a reputation for success.[28]

Soviet concentration of resources upon the development of missiles instead of mass production of bombers meant that the true American lead in advanced technology was cancelled out, at least in the short run. A combination of organizational vested interests (i.e., SAC's "bomber generals"), technological caution (awaiting the development of smaller, lighter warheads), and the budgetary stringencies of the Eisenhower years caused the United States to hold off on ICBM development.[29] Convair would not be given the contract for the Atlas until 1955; the missile would not be successfully flight-tested until November 1958. A year earlier, in August, 1957, the SS-6 had been successfully flown as an ICBM, and on October 4, 1957, had ushered in the Space Age with the launch of Sputnik I. Militarily, the United States was not really behind at all; however, it had suffered a serious prestige defeat.

The SS-6, of course, was far from being an "ultimate weapon," and therein lies the key to the whole period. Like its smaller but

similar contemporary, the Atlas, it was fueled with non-storable liquid propellants and required nearly an hour to be prepared for flight. Unlike the Atlas, however, the SS-6 was far too cumbersome and large to be emplaced in a hardened launcher. This meant that the weapon was vulnerable to a first-strike attack, since the time of flight for an ICBM between the two countries is only about a half hour. The SS-6 also had guidance problems, as Khrushchev states in his memoirs:

> The late Comrade Korolyov's Semyorka (SS-6) rocket represented a major scientific and military breakthrough for our country, although Korolyov himself was aware of its limitations. Launching Sputniks into space didn't solve the problem of how to defend our country. First and foremost we had to develop an electronic guidance system. It always sounded good to say in public that we could hit a fly at any distance with our missiles. Despite the wide radius of destruction caused by our nuclear warheads, pinpoint accuracy was still necessary--and it was difficult to achieve.
>
> I remember that in the first days of our Semyorka program, while the missile itself had a range of 7000 kilometers, we could direct it to a target only by placing guidance systems every 500 kilometers along the way. Therefore, the Semyorka was reliable neither as a defensive nor as an offensive weapon. Regardless of its range, it represented only a symbolic counterthreat to the United States. That left us only with France, West Germany, and other European countries in striking distance of our medium range missiles. (30)

Khrushchev thus states the essence of the strategic balance in this period, with which he was probably more familiar than anyone else. The Soviet Union had indeed developed an ICBM ahead of the United States, but this weapon was hardly a practical one. Real strategic firepower still consisted of the MRBM/IRBM weapons aimed at Europe. The same logic that dictated the strategic role of the Soviet bomber force dictated that of the first Soviet ICBMs as well--the role of being a stopgap for the development of "real" Soviet strategic nuclear

forces--fully hardened missiles with second-strike capability. The SS-6 was a far less credible threat than the bomber force, despite the successes scored in the early years of space exploration. It was little more than an engineering test-bed upon which Soviet engineers would solve the basic engineering problems of building a workable ICBM, and upon which the first Soviet ICBM crews would learn their craft.

For these reasons, relatively few of their first ICBMs were built--only about 35 missiles deployed by 1960.[31] As had been done with the bomber force, the SS-6 was intended to provide minimal capability during the interim period before the more practical second-generation missiles, using storable fuels, became available. It was this quite tiny force of SS-6 missiles that was behind Khrushchev's policy of nuclear bluff during this period. The policy of minimal procurement of the first-generation ICBM served his desire to reduce military expenditures, and the policy of bluff was an attempt to secure the maximum political return from a minimal investment in soon-to-be obsolete equipment.[32]

The real development of the Soviet strategic missile forces began with the Seven-Year Plan, announced at the XXI Party Congress in 1959. The economy trend was clearly continued--procurement emphasis was on IRBM/MRBM construction than on ICBMs.[33] Emphasis on shorter-range missiles enhanced the Soviet Union's deterrent power by allowing Europe to be menaced while simultaneously providing nuclear battlefield support for the Soviet Army in the European theater. The Soviet ICBM force grew steadily but slowly until 1962-63, at which time deployment of the second-generation SS-7 and SS-8 missiles began.

The main thrust of Soviet strategic-arms development during the period of Khrushchev's political offensive was not that of hardware procurement so much as organizational and intellectual progress--the integration of the new strategic nuclear missiles into the Soviet armed forces and military doctrine.

The revolutionary impact of nuclear weapons necessitated major modifications in the nature of the military art for both the United States and the Soviet Union, but on the Soviet side, these changes had to be far more sweeping. The central place strategic airpower had long had in Western military theory meant that nuclear weapons could easily be integrated into that theory; indeed, the advent of nuclear weapons enabled airpower at last to fulfill the apocalyptic prophecies of its pioneers. Missiles could be quite easily incorporated into Western theories of warfare, both intellectually and organizationally, as the example of SAC indicates. As soon as ballistic missiles emerged as the coming thing in warfare, SAC took steps to ensure that they were placed under its control.

On the Soviet side, however, the advent of nuclear weapons necessitated a much more fundamental rethinking. The Soviet Union had neither the intellectual nor the operational experience with strategic airpower that the West had. Long-range aviation had been a neglected stepchild in the Great Patriotic War; the necessity of supporting the ground forces had to take precedence over everything else. The war which those ground forces had fought, moreover, had been on such a titanic scale that intellectual consciousness was firmly riveted upon the traditional arms--infantry, armor, artillery, and tactical air. During his lifetime, Stalin's publicly proclaimed military

doctrine, which emphasized the ground forces, had deeply permeated the Soviet armed forces. Deep vested interests had grown up within the traditional arms.

The real battle over the impact of the new weapons was still in the future, after the Cuban missile crisis. At this point it was still in its embryonic stages, but there were already effects visible. The policy of emphasizing MRBM/IRBM construction strongly favored the interests of the ground forces, under whose command they were, since these weapons enhanced the importance of the European theater forces. The vexing question of organizational responsibility would not be solved until the creation of the Strategic Rocket Forces in 1960.[35]

The central issue about Soviet strategic nuclear forces during this period was, however, not their composition or development, but the political strategy which they served--Khrushchev's strategy of bluff. Looking back with the perspective of twenty years, this ploy now seems starkly incredible. It hardly seems believable that a sane man would deliberately embark upon a policy which involved such grievous risks and such potentially dreadful consequences as did Khrushchev.

The solution to this apparent riddle is the recognition of the great political difficulties which Khrushchev faced at home. The defeat of the "anti-Party group" in the June, 1957 crisis may have eliminated the overt threat to his position, but he remained confronted by what might be termed the neo-Stalinist opposition. To gain support for his policy of increased investment in agriculture and consumer goods through a reduction in investment in the military/industrial sector, Khrushchev had to be able to demonstrate that his diplomacy

could succeed without the support of strategic forces actually in being.

Khrushchev had two sorts of victories which he might gain--either through intimidation or conciliation. Either one would serve his domestic political needs. Victory through intimidation would consist of forcing the United States to back down in a crisis by means of nuclear bluff, thus demonstrating to his critics that the only strategic forces needed were an inexpensive, minimum-deterrence force of missiles. Conciliatory victory would consist of finding a common ground of agreement with a Western leader, in which case Khrushchev would be able to demonstrate that Western policy was in the hands of "sober, peace-loving elements," against whom a massive military machine was not needed. Some success was had with both strategies--for example, the threats of missile strikes on France and Britain during the Suez crisis of 1956, and the Austrian State Treaty of 1955, respectively.

However, in the more important policy goal--that of neutralizing the threat of an allegedly revanchist West Germany and the creation of a German peace treaty that would safeguard the security of East Germany--Khrushchev was to be unsuccessful. This was an area in which it was not possible to win through conciliation, since the West saw the Soviet Berlin initiative as aggression pure and simple. Intimidation was the only feasible course.

The strategy of intimidation was based upon a careful calculation--that the United States was safely deterred from launching a first strike by the inhibitions of its own leaders, inhibitions engendered by uncertainty about the true state of the Soviet strategic forces and a concern for humanity. This caution, in turn, could be portrayed

as a fear of Soviet retaliatory power, thus reinforcing the credibility of the Soviet deception.[36]

The problem was that the American U-2 overflights compromised that necessary uncertainty from the start, since, from 1956 onward, the United States had a means of checking on Soviet claims of missile superiority. The U. S. leadership knew that the Soviet Union lacked the strategic wherewithal to back up its aggressive foreign policy, and thus Khrushchev's strategy was nearly insolvent from the beginning. It was not totally bankrupt, however, because the Eisenhower administration did not choose to make its knowledge public, due to the demand for secrecy. American public opinion thus became thoroughly alarmed at an administration that seemed to be allowing the United States to fall behind in the strategic arms race, and alarmist speculation quickly developed into the myth of future Soviet strategic superiority--the "missile gap". This would ultimately lead to the huge American ICBM program of 1961-64, and to a crushing American strategic supremacy.[38]

The dramatic end of the U-2 flights did not eliminate Khrushchev's problems--instead, they expanded to still greater dimensions.[39] Both diplomatic strategies were in ruins. The wreckage of the U-2 revealed the capabilities of the cameras which had been surveying the Soviet Union for the past four years. The United States clearly knew how hollow Khrushchev's boasts about missile superiority really were. On the conciliatory side, Eisenhower's public acceptance of responsibility for the U-2 flights destroyed the image of him that Khrushchev had been carefully developing--that of a responsible statesman instead

of an unreasoning, anti-Communist warmonger. In the eyes of Khrushchev's internal critics, Eisenhower had shown himself to be clearly a part of the "imperialist threat", and the U-2 incident revealed that the West knew just how weak the Soviet Union really was.

From May 1960 onwards, Khrushchev was in an increasingly difficult position. He was under pressure to show some concrete results from his diplomacy. The U-2 crisis had cut the ground from under conciliatory diplomacy, and the armed basis for a belligerent foreign policy did not yet exist. His more hard-line critics forced him to play a hand that was already known to be weak. Worse, the strength of the opposition was such that Khrushchev did not in fact have full control of Soviet policy. Other hands than his were able to grasp the levers of power and commit the Soviet Union to a more militant policy than Khrushchev desired, in an attempt to confront him with a fait accompli.[40] Once committed, Khrushchev would thus be forced to maintain a more militant and aggressive foreign policy.

These internal Soviet political maneuvers were to have far-reaching consequences for the strategic balance. Soviet foreign policy--by which Western leaders commonly meant Khrushchev's policy--appeared to be taking a most alarming turn. The existing American strategic superiority was known to be a fact--a fact well-known to Khrushchev. However, he appeared to take no notice of it! Soviet conduct in the 1961 Berlin crisis led to the frightening conclusion that it was commanded by a man who was capable of precipitating war with little regard for the terrible prospect of a full-scale nuclear exchange. Ignorant of the fact that Soviet actions were not the product of a single will

or even of a consensus, the Kennedy administration was thus moved to a fateful decision: The only way to deter war with such an unstable leader as Khrushchev was thought to be was to have such firepower as to be able to sustain the worst the Soviet Union could do in a first strike and still have enough to retaliate and smash the Soviet Union to ruins.

Khrushchev's political difficulties thus had the ultimate effect of provoking the United States to unleash the nuclear arms race, with the immediate consequence of an even more crushing advantage for the United States. This in turn led to the prospect of a disastrous defeat had the Cuban missile crisis escalated into war. The longer-range effect was to prompt Khrushchev's successors to institutionalize the arms race by building to parity and beyond from 1966 onwards.

The Soviet failure to anticipate the immense American building program which resulted from the image of militance that Khrushchev seemed to be projecting must rank as one of the major weaknesses of Soviet policy. The United States had already indicated, in the "bomber gap" episode, that nuclear superiority was regarded as vital to national security, and that an immense amount of money would be expended to maintain this superiority if necessary. The Soviet Union ought to have taken a large-scale American building program as a foreordained response to such a challenge as the Soviet Union seemed to be making.

Until the Soviet archives are opened, the answer to this question must remain speculative. Perhaps the hope was that the Americans would commit themselves to wasting money on an immense force of first-generation ICBMs--the very course that the Soviet Union was in fact

avoiding.[41] If so, this hope was in vain, for the Eisenhower administration pursued the same technologically cautious course as did Khrushchev--limited procurement of first-generation missiles while developing the much more practical second-generation weapons.[42] The Soviet Union pursued exactly the same course under the Seven-Year Plan, begun in 1959. The only problem was that the Kennedy administration, prompted by the irrational facade that Soviet policy had seemed to show, embarked on a building program which, by 1963, would give the United States a 4-1 superiority in ICBMs. Khrushchev had sown the wind and he reaped the whirlwind.

Also worthy of comment is the restraint which Eisenhower showed in 1960, after the loss of Francis Gary Powers' U-2 ended the period of overflight surveillance. Eisenhower had it within his power to demolish both the "missile gap" and Khrushchev's foreign policy by simply making public the information that had been gained by the overflights. There was no longer any need for secrecy--the proverbial cat was totally out of the bag, and the Soviet Union had to assume that any installation which had been overflown by a U-2 was known to the U. S. Public disclosure of U-2 intelligence would have silenced domestic critics of Eisenhower's supposed inaction, calmed public fears about the Soviet threat, and dealt a serious blow to the Kennedy campaign. Above all, the end result might have been to avoid the huge American strategic-arms program of the early sixties, possibly keeping the arms race under control.

FROM CRISIS TO CONGRESS, 1962-66

The Cuban missile crisis constituted the final wreck of Khrushchev's foreign and military policy. It was a continuation of the earlier strategy of intimidation, but this time there was no bluff. Real weapons were involved--the IRBM and MRBM missiles which were to be emplaced in Cuba to redress the strategic balance. The pattern remained the same: Large gains were to be sought, but they would be abandoned whenever their pursuit seemed likely to significantly increase the risk of war.[43]

The reason for the failure of the Cuban gambit can be reduced to the material level: The United States had vastly more strategic firepower that could be brought to bear upon the Soviet Union than the Soviet Union had in relation to the United States. The United States deployed 156 ICBMs, mostly hardened, against a maximum of 75 "soft" Soviet ICBMs.[44] In bombers, the U. S., with some 1500 aircraft available, had an advantage on the order of 7 to 1. In the category of submarine-launched ballistic missiles, the United States deployed 144 missiles to 107 Soviet.[45] Had the Cuban missile crisis escalated into war, the United States would probably have survived, but the Soviet Union would have been laid waste. From the Soviet point of view, the lesson of the crisis was brutally clear: "Deterrence"

depends upon having the credibility to wage war successfully if it becomes necessary.

The most important feature of the evolution of Soviet strategic arms during this period was the digestion of this lesson. Materially, the Seven-Year Plan bore its fruit, in the form of some 200 second-generation missiles of the SS-7 and SS-8 types. For the first time, Soviet missiles were deployed in hardened silos, capable of withstanding a first strike attack. By 1965, initial deployment of the SS-9 and SS-11 missiles had begun, with some thirty weapons deployed by 1966. Development of submarine-launched ballistic missiles pursued a more dilatory course; no new vessels were built, but about half of the existing forces was refitted with the longer-range SSN-5 missile in place of the earlier SSN-4, doubling the earlier weapon's 350-mile range and permitting Soviet submarines at least to stay off the continental shelf and still credibly menace the east coast of the United States.

In practical terms, the relatively cheap, minimum-deterrent force that Khrushchev had advocated was in being by 1966. The Soviet Union was a credible nuclear power, even though the relative standing of the two nations had become, if anything, wider. In ICBMs, the score stood at 900 to 300; in SLBMs, the United States deployed 528 missiles to 107 for the Soviet Union. But quantity had turned into quality; the nuclear missile forces that the Soviet Union had in 1966 were capable of inflicting serious damage upon the United States in the event of war, as was not the case in 1962.

The problem was that the Cuban missile crisis had decisively indicated the political value of superior nuclear forces, not merely adequate ones. Between the Cuban missile crisis and the XXIII Party Congress, an extensive debate was to proceed within the Soviet military press about strategy and the arms necessary to execute it. The significance of the XXIII Party Congress is simple: It marks the date of the decision, embodied in the 8th Five-Year Plan, to attain parity (at least!) with the United States in strategic weapons. Mass production of the SS-9 and SS-11 began following the XXIII Congress, as did construction of the Y-class submarine armed with the SSN-6 missile, which for the first time brought the Soviet Union within rough qualitative quality with the United States in this category. The missile development program of the Seven-Year Plan had produced the tools; the XXIII Congress marked the decision as to the use of those tools. That decision was to make an all-out effort to catch up to the United States in strategic nuclear arms. The actual decision to do so was apparently made in 1965, as the new leadership concluded that the American strategic superiority and the emerging Chinese nuclear threat required a change in Soviet military policy.[46] But the need to incorporate this change in policy in the new Five-Year Plan for the economy means that the XXIII Congress is more than a symbolic turning point; Soviet military expenditures rose sharply under the 8th Five-Year Plan, adopted at that congress.[47]

The material and economic elements of this policy, however, are less interesting than are those of intellectual and organizational significance. During this period, two major military-intellectual-

political disputes which had been going on for several years came to a head.

The advent of nuclear-armed ballistic missiles confronted both the Party and the military with the need to carry out a fundamental overhaul of much of the Soviet military-political dogma. At the very least, the role of the conventional threater forces that constituted the Soviet Union's "Senior Service" had to be updated. Moreover, the capability of nuclear-armed missiles to strike directly at the enemy's heartland called the very existence of theater forces into question. In many ways, the most fundamental change of all, the all-destroying power of war in the nuclear age, made a mockery of the Leninist principle of the inevitable final Armageddon between capitalism and socialism. Over the ten years between the XX and XXIII Party Congresses, the resolution of these questions entailed a great deal of discussion and argument in the Soviet military press.[48]

Such a dispute would have been vexing enough, had it been that simple. However, the argument over the nature of war in the nuclear age was inextricably tied up in another, broader question, one which went to the heart of the Soviet political order: the relationship between Party and Army. The interaction between these two issues made the updating of Soviet military doctrine a particularly difficult affair, since it spilled over into some very sensitive areas of politics.

Following the ouster of Marshal Zhukov from the post of Minister of Defense in 1957, those officers whom he had appointed to senior posts in the high command were replaced by a group of officers, both

military and political, who were closely associated with Khrushchev from the Battle of Stalingrad.[49] This group can be regarded as having been, at least initially, pro-Party and pro-Khrushchev. They both contributed to and benefited from the developing cult of Khrushchev.

Although the fall of Zhukov and the resultant elimination of the cult of Stalin and the Stavka as the major architects of victory in the Great Patriotic War had brought recognition of the role played by the Party and the Stalingrad Group, his fall also resulted in a split in the ranks of the Stalingrad Group. Following the fall of Zhukov, the Party began to reassert its claim of dominance in the sphere of military affairs. A split developed in 1958-59 between those officers who championed the cause of the professional autonomy of officers--among others, Marshals Malinovskii, Zakharov, and Grechko--and those who championed the cause of Party dominance, including Marshals Konev, Biryuzov, and Moskalenko.[50] Biryuzov and Moskalenko are of especial importance here, as they were to be the commanders of the Strategic Rocket Forces from its formation as a separate service in 1960 until 1963. They were deeply identified with Khrushchev's strategy and with the Party's movement toward closer political control of the military.

With the formation of Strategic Rocket Forces in 1960, the conflict deepened. Khrushchev announced his policy of reliance upon the nuclear deterrent and a sharp reduction in the size of the armed forces. Personal, institutional, and doctrinal vested interests were thus subjected to a frontal attack which added considerable fuel to the already existing debate over military-professional autonomy:

> On January 14, 1960, the formal announcement of a new Soviet strategic doctrine introduced a critical factor into the relations between Party and military. It was to cause a dangerous deterioration of that relationship and to alienate a number of Khrushchev's close supporters in the military. Whatever the merits of the doctrine as such, the new policy was a shock to the military community. Among other things, it involved a reduction of the armed forces by one-third, which meant the release of a quarter-million officers from their secure and comfortable life into an unpromising future and often an undesirable social environment, and constituted a blow to many vested interests and personal careers. Secondly, by stressing the central role of strategic missile forces and the crucial importance of the initial stage of a future war on the one hand, and denigrating the role, size, and mission of the conventional forces on the other, Khrushchev not only radically reversed traditional Soviet military thinking but also forcibly committed the military to a rigid and confining doctrine. It was this aspect of his reforms that aroused particular concern among some ranking members of the Stalingrad Group. (51)

Khrushchev and the Party were thus engaged in a confrontation with the military on two fronts: "professional autonomy versus Party control" and "nuclear deterrence versus combined arms". It ought to be noted that, on the military side, these two areas were not exclusive. Senior officers fighting for greater professional autonomy also tended to have their careers rooted in the more traditional arms, while men like Marshals Biryuzov and Moskalenko, who were identified with the Party and Khrushchev, were also identified with the strategy of the nuclear deterrent.

Matters came to a head in 1962. Between the XXII Party Congress in October 1961 and April 1962, an increasingly rancorous debate took place about defects in the operation of the Main Political Administration of the Army and Navy, a debate which climaxed in April when the MPA bitterly criticized the chief political personnel in the armed forces for their shortcomings.[52] In May, the head of the MPA, Marshal

Golikov, was replaced by General A. A. Yepishev. "A close associate of Khrushchev, with a long career in the security organs and a deep involvement in political control activities, Epishev [Yepishev] was clearly the man to break the officer corps' resistance, and his appointment suggested that a showdown was imminent."[53]

In October came the Cuban defeat. The policy of placing all the military eggs in the minimum-deterrence basket had failed disastrously. Any hope that might have been entertained about attaining nuclear parity on the cheap through the deployment of MRBM/IRBM missiles in Cuba was dead. For the next few years, the Soviet Union would be doomed to decisive strategic inferiority, a deficiency which could not be rectified without a long and costly building program. Such a program would require a massive alternation of national priorities from those espoused by Khrushchev.

The Cuban fiasco, combined with the problems of the Soviet economy (culminating in the crop failure of 1963), was fatal to Khrushchev. Both his domestic and foreign policies were discredited. The belated success of his conciliatory diplomacy, in the form of the nuclear test-ban treaty of 1963, was not able to save him. The treaty, regardless of its great importance in reducing the dangers of both nuclear fallout and nuclear proliferation, smacked too much of having been the result of American "position of strength" negotiation to recommend itself to Khrushchev's critics. Besides, the special relationship which the shared danger of the Cuban crisis had bred in Kennedy and Khrushchev died with Kennedy.

The assassination of Kennedy in November, 1963, and the fall of Khrushchev in October, 1964, marked a fateful turning point in the history of both nations. The nuclear gauntlet that had been flung down by Kennedy was to be picked up by the successors of Khrushchev.

The decision to do so posed a problem for the Party, one which had several different and mutually contradictory aspects. The demands of the international situation required that the Soviet armed forces in general be strengthened, with particular attention given to the strategic nuclear forces. But strengthening the military meant an increase in the importance and position of the officer corps, and hence a need for more effective political control. Expanding the strategic forces meant exacerbating the conflict within the military between the "modernizers" and the "traditionalists" while at the same time promoting the growth of the "military technocrats" of Strategic Rocket Forces, who were proving to be resistant to political motivation.[54] A crucial point, therefore, of the period between the Cuban missile crisis and the XXIII Congress was the political preparation for the future expansion of the strategic forces. This preparation took several forms.

The conflict between strategic nuclear force advocates and conventional-forces people was met by, in essence, giving everyone what they wanted. The period following the XXIII Congress was not only characterized by a great expansion of the Soviet strategic forces but of the more conventional arms as well. Doctrine had evolved so as to afford the ground forces and their supporting air arms a role in nuclear warfare,[55] and the important role of ballistic-missile submarines in the Western deterrent forces was a solid argument for

the expansion of Soviet naval forces to counter them.[56] In the wake of the XXIII Congress, a commentary upon the proceedings of the congress gave equal importance to all arms--strategic, naval, air-defense, ground, and air forces.[57] The growth of the conflict with China gave plenty of scope for the satisfaction of the desire of members of the more traditional branches of the armed forces for a continued role, particularly after the Ussuri River clashes of 1969.[58] Also during this period, the MPA, under Yepishev, began extensively promoting the "mass army" concept, further emphasizing the role of traditional arms.[59] This also presumably served to mend fences between the traditionalists and the MPA in its new, expanded role.

With reference to the Strategic Rocket Forces themselves, some interesting developments took place in 1963. In April of that year, at the same time that Yepishev was well under way in his cleansing of the MPA, the Central Committee created a separate Political Administration for the Strategic Rocket Forces.[60] This was a fairly obvious response to the problem of establishing and maintaining political control over the technical specialist officers who are prominent in such a service. However, taken in conjunction with the "mass army" line that Yepishev and the main MPA were promoting at this time, it has a deeper significance. Splitting the MPA off from the political administration of the Strategic Rocket Forces permitted the right hand not to know what the left was doing. The MPA could thus pursue an ideological path calculated to win favor with the officers of the more traditional services while the political administration for the Strategic Rocket Forces could address itself specifically to the problems of political control in that service. Divide et impera.

The creation of the Political Administration of the Strategic Rocket Forces has still more significance when taken in conjunction with the appointment of Marshal Krylov to the post of Commander-in-Chief of the Strategic Rocket Forces that same year (1963). His appointment to such an immportant post appears surprising, in that he seems to have represented two different oppositions. He was one of the "Stalingrad group renegades" who broke with Khrushchev on the subject of the professional autonomy of the officer corps,[61] and he also apparently was opposed to Khrushchev's emphasis upon the strategic forces.[62] In effect, a known troublemaker was being given an extremely important position in which he would be responsible for executing a strategy about which he had considerable reservations. This, of course, is a well-known Stalinist administrative practice--assigning oppositionists to execute the policy with which they disagree. However, Krylov's assignment does not really appear to have been that negative. In essence, a leader of the opposition was co-opted into the new order and given an extremely powerful and important position in that order, one which gave him a great career stake in the new strategic doctrine. The existence of the newly-created Political Administration of the Strategic Rocket Forces afforded the means to keep Krylov under control if necessary.

In and of itself, Krylov's career is not all that significant. Its significance lies in the indication of the way in which the Party resolved its difficulties with the military in order to carry out the huge expansion that the XXIII Congress was to program. The carrot and the stick were intimately entwined with each other; Krylov both

received an important, responsible post and an organization able to keep him in line while he carried it out. The same pattern seems to have held throughout the Soviet services: great expansion permitting vast personal and career opportunities, along with stiffer political control organs. In order to build the substance of military force that the support of Soviet foreign policy demanded, it was necessary both to discipline and to conciliate the military officer class--discipline it by the expansion in the role and the power of the military-political organs and conciliate it by means of promotions such as Krylov's and the ending of the era of Khrushchev's restraint in military expenditures.

The goal of this complicated process was to ensure that the "gun" which the Party would build under the 8th Five-Year Plan would have full political reliability--that the military would not be able to use their greatly increased role and utility to the state to acquire institutional independence. In order to counter the "military-industrial establishment" which the Party felt it had to construct, the Party sought to strengthen the "military-political establishment" with which it controlled the military. Ironically, in recent years the Political Administration seems to have merged with the military.[63]

TO THE MOSCOW TREATY,
1967-72

Following the XXIII Party Congress, the production facilities for the SS-9 and SS-11, which had been built during the Seven-Year Plan, were put to use in turning out these weapons--as many as 340 of them in 1967-68, when production peaked. Construction of the Y-class ballistic missile submarines, comparable to the early classes of American Polaris vessels, also got under way during this period. By the time of the signing of the SALT I treaty in Moscow in 1972, the Soviet strategic forces stood at 1528 ICBMs, 464 SLBMs (not counting the obsolete earlier weapons), and 140 long-range bombers.

On the American side, the great building program of the Kennedy-Johnson years was completed by 1967. The American arsenal of strategic missiles then stood at 1054 ICBMs and 656 SLBMs, and these numbers have remained constant ever since. The once-huge American bomber force steadily declined as the B-47s and early B-52s were progressively retired, until their numbers stood at 465 by 1972. At that time, the two nations had essentially equivalent strategic forces. The American disadvantage in ICBMs--particularly in heavy ones such as the SS-9--was balanced by the advantage in SLBMs and the heavy throw-weight of the bomber force. The 1972 Moscow Treaty froze these numerical figures, and authorized the Soviet Union to build up to 950 SLBMs,

in compensation for its geographical situation, which is less favorable for the deployment of ballistic-missile submarines. Both nations seemed to have satisfied what they regarded as their own requirements for strategic arms--on the American side, the force levels which had been set during Robert McNamara's tenure as Secretary of Defense, and the ultimate Soviet force levels as 50% more than the American. On the Soviet side, this figure was apparently as conscious a limit as was the American--Soviet ICBM production had halted as abruptly in 1971 as had American in 1967. Significantly, the date of 1971 is that of the XXIV Party Congress.

Both nations thus seemed at that date to have what they wanted in the way of strategic arms. However, these appearances were deceiving. In 1972, the arms race was in the process of exploding with renewed force. Between them, Soviet and American engineers had succeeded in turning loose a literal hydra-headed monster--MIRV.

MIRV and ABM are technological siblings, one of them being the mirror image of the other. The United States had had an ongoing problem of ABM research and development since the beginning of the missile era. One of the consequences of this research was that the problem of penetrating similar defenses had to be considered. The counter to an ABM system was the development of multiple warheads. Since an ABM interceptor missile cost nearly as much as did an ICBM, if the ICBM was equipped with multiple warheads the advantage was entirely on the side of the offense because far more warheads than interceptors could be produced for a given cost.

By 1964, American nuclear strategy was in a state of flux. The earlier "damage limitation" strategy, in which the damage which might be sustained in a nuclear exchange was limited by the destruction of the enemy's weapons either before launch or before impact, was in the process of being replaced by the "assured destruction" strategy. Assured destruction held that the ultimate guarantee that a nuclear exchange would in fact not take place was the certainty that the attacker would suffer annihilation himself. Defense was counterproductive, in that it only served to reduce the enemy's faith in his own weapons, promoted a sense of insecurity, and drove the arms race on further. A massive city-defense ABM system for the United States, which was being discussed at that time, was seen by the assured-destruction fraternity as being worse than useless, since it could be easily overloaded by multiple-warhead missiles and thus, by destroying the credibility of assured destruction, fuel the arms race.

In 1964, satellite photography noticed an alarming development around Moscow. Some 64 missile silos were under construction, along with the large phased-array radars characteristic of an ABM system. On 7 November of that year, the Soviets displayed in Moscow an ABM interceptor missile, code-named "Galosh" by NATO. The arms race had escalated another notch.

Various explanations have been put forward for the existence of the Galosh system. It has been described as a pilot model for a national defense system that proved to be impractical, as a defense of Moscow against a possible Chinese attack, and the result of the application of the dialectical relationship of attack and defense

to the ballistic missile problem--an application which also ensured a continued role for PVO-Strany (the air defense service) in the nuclear missile age. Whatever the reason for the construction of Galosh, it was a fateful decision.

The Moscow Galosh installation threatened a possible nationwide deployment of the system, which would effectively call into question the credibility of the American ICBM/SLBM forces. The counter was the serious development of operational MIRV systems, and planning for the deployment of an extensive ABM system, from early 1964 onward. MIRV would ensure the capability of penetrating the threatened Soviet ABM defense; the American ABM would threaten the credibility of the Soviet ballistic missile forces.

But with the American decision to deploy MIRV, it became necessary to assume that the Soviet Union would do likewise. At this point, the heavy Soviet SS-9 ICBM suddenly came into the limelight. Its great throw-weight meant that, given MIRV, the SS-9 force could deliver enough heavy warheads to saturate an American ABM system and threaten the hardened Minuteman force. American MIRV could similarly defeat any Soviet ABM force, but a Soviet MIRV could effectively negate any technological ABM lead that the United States might possess.

It is well known how both nations were driven to negotiations by fear of an ABM/MIRV race which would destroy strategic stability.[64] Having come within sight of catching the United States by the latter part of the 1960's, the Soviet Union had no interest in starting from behind in yet another technological race. The United States feared being forced into an ABM competition which would cause the Soviet Union

to deploy MIRV. Both McNamara and Johnson feared the consequences of U. S. deployment of ABM, but they were being driven by Congressional support of ABM. The last two years of the Johnson administration were marked by feelers to the Soviet Union on strategic arms limitation. In May 1968, the Soviet Union indicated its willingness to begin negotiations. There was still hope for keeping the arms race from once again going out of control. Had the SALT talks begun that fall, as they conceivably might have, the MIRV genie might have been kept in the bottle. Unfortunately, that chance was to slip away.

The hope of stopping MIRV vanished with the Soviet invasion of Czechoslovakia on 21 August 1968. Five days earlier, the United States had first flight-tested the Minuteman III and Poseidon MIRVs, and on August 28 the Soviet Union flew its first test of an MRV warhead for the SS-9. The invasion of Czechoslovakia poisoned relations between the superpowers long enough for the election of the Nixon administration, which further delayed the opening of negotiations until November 1969. It was too late; MIRV was a reality, and during the next two and a half years of negotiations there was no way to undo that fact. Both sides could agree upon the undesirability of ABM and could agree to freeze the number of strategic nuclear launcher systems at their current numbers, but that was all. With the beginning of MIRV deployment, the United States had seized a technological advantage that the Soviet Union was loath to forego. The Soviet Union was far behind the United States in MIRV and would take years to catch up, but it was determined to do so.

With the Soviet decision to achieve a MIRV capability for the basic force that had been created by the 8th Five-Year Plan and the XXIII Party Congress, there has come the current impasse of the SALT II treaty. The heavy-missile force originally built as "megalopolis-busters," whose great throw-weight served as the Soviet counter-balance to that of the American heavy-bomber force, has destroyed strategic stability with the advent of the MIRV-capable SS-18. The SS-18, with the capability of delivering enough warheads of sufficient size to compensate for possible defects in accuracy, poses a first-strike threat to virtually all land-based American ICBMS. The advent of MIRV effectively destroyed strategic stability.

CONCLUSION

In surveying the unhappy history of military technology in the nuclear age, one verdict immediately jumps to mind: The almost perverse consistency with which the two nations seem to have done exactly the right thing at the right time to bring themselves to the current impasse, and the tendency of presumably carefully considered decisions to be self-defeating.

The Soviet Union has the dubious distinction of having set the arms race loose by means of an ill-starred attempt at psychological warfare. The "bomber bluff" of 1955 could have been excused--deterring the United States from possibly using its strategic superiority by making the Soviet bomber force appear larger than it really was would seem to be a legitimate ruse de guerre. However, attempting to repeat the process with ICBMs two years later is not excusable. The result of the "bomber gap" controversy should have been apparent by then--an immense increase in the American bomber force. It should have been recognized that the American people and government were new to the idea of the United States being vulnerable to direct attack, and that the memory of the attack on Pearl Harbor was far too applicable to the nuclear age to be disregarded.[66] Part of Khrushchev's tragedy was that his own domestic pressures tempted him to undertake the "missile bluff" in conjunction with the prolonged Berlin crisis, the

end result of which was a severe weakening of his own position and a massive American building program which would confront the Soviet Union with a real missile gap of terrifying proportions. His own tragedy very nearly became the world's, when the two nations went to the brink of war in the Cuban missile crisis.

The American side of the "missile gap" debacle consisted of grossly over-reacting to the Soviet rhetorical campaign after the "gap" had been shown to be a myth in 1961.[67] In 1961, the two countries still had essentially equivalent--and small--ICBM forces,[68] and there was still the opportunity to arrest a new arms race before it had a chance to begin. Of course, the bellicose Berlin crisis of that year did not exactly establish an international atmosphere suitable for showing much restraint in the area of arms procurement. Khrushchev's Berlin offensive eliminated any incentive the United States might have had for showing strategic-arms restraint after the missile gap had been shown to be illusory.

Through Soviet bluster and the resultant American "prudence", the United States was thus goaded into embarking upon a massive program of missile construction that would almost immediately establish a severe strategic imbalance between the two nations. Having done that, the Soviet Union shortly exacerbated the situation by deploying the Galosh ABM system around Moscow, thus provoking the advent of MIRV. One is almost tempted to point to a Soviet penchant for making things difiicult for themselves; as they approached parity with the United States in the late sixties, American deployment of MIRV caused the goal to recede away again like a will-o'-the-wisp. However, MIRV

proved to be the undoing of the United States in a manner which would positively bring delight to a dialectician: By bringing MRV into the world as a reaction to the abortive Soviet ABM, the United States destroyed the possibility of stable deterrence that the embodiment of "Mutual Assured Destruction" in SALT was to have accomplished. MIRV, together with the force which the Soviet Union built after the XXIII Congress, has apparently produced nuclear chaos.

The strategic policy adopted at the XXIII Congress CPSU in 1966 thus marks one of the military and diplomatic turning points of the 20th century. The historical analogy which immediately comes to mind is a most ominous one--the German Flottengesetz of 1898. It remains to be seen whether the action of the Party Congress will turn out to have as tragic consequences as did that of the Reichstag.

One thing is clear already. In the light of the great priority which the post-Khrushchev leadership has given to its military effort, a precise and thorough study of the XXIII Congress is imperative for the understanding of the era in Soviet/Russian history which is now drawing to a close, the "Brezhnev era". The buildup of the Soviet war machine was a central priority of that period, and virtually all aspects of Soviet policy during that time--foreign policy, economics, the partial reimposition of Stalinist political controls, military-political relations, and so forth--revolve around that priority. And the great Soviet military buildup of the last fourteen years had its point of origin in the XXIII Party Congress.

NOTES

[1]"Strategic arms," in contemporary usage, usually refers almost exclusively to long-range nuclear weapons. Before the development of Soviet nuclear weapons, their "strategic arms" were the Soviet Army and the other Soviet armed forces.

[2]The complex historiographical question of the "origins of the Cold War" is not relevant to this study, and therefore the Cold War will be considered as "given". Similarly, the unresolved question of the locus of decision-making in late Stalinist Russia will be bypassed, with the assumption being that Stalin ultimately approved all major decisions.

[3]For example, see Edgar M. Bottome, The Balance of Terror, p. 4.

[4]Ibid., p. 170. Data from P. M. S. Blackett, Studies of War, pp. 241-242.

[5]Adam B. Ulam, Expansion and Coexistence, p. 404.

[6]Ibid., p. 403.

[7]Ibid., p. 347.

[8]John W. Spanier and Joseph L. Nogee, The Politics of Disarmament, pp. 60-63.

[9]John Lewis Gaddis, The United States and the Origins of the Cold War, pp. 334-335. Source: Letter from Smith to Secretary of State James Byrnes, April 28, 1946.

[10]Spanier and Nogee, p. 78.

[11]Chalmers M. Roberts, The Nuclear Years, p. 21. Stalin quote from Milovan Djilas, Conversations with Stalin, p. 153.

[12]Nikita S. Khrushchev, Khrushchev Remembers: The Last Testament, pp. 58-59. Placing Beriya in control of the nuclear program has a certain logic about it, since a large number of the scientists involved were under arrest. In addition, the secret police controlled uranium mining operations.

[13]Zhores A. Medvedev, Nuclear Disaster in the Urals, pp. 155-161.

[14]John W. R. Taylor, Combat Aircraft of the World, p. 620.

[15]Robert Jackson, Air War Over Korea, pp. 90, 124-126, 132.

[16]Bottome, Balance of Terror, pp. 16-17.

[17]Taylor, pp. 621-623.

[18]Norman Moss, Men Who Play God, chapter 2.

[19]Ulam, Expansion and Coexistence, p. 545.

[20]Khrushchev, p. 39. The "Bison" had insufficient range and apparently an alarmingly high accident rate.

[21]Edgar M. Bottome, The Missile Gap, p. 74.

[22]Robin Higham and Jacob W. Kipp, eds. Soviet Aviation and Air Power, p. 216.

[23]Khrushchev, p. 34: "I believe an important part of our military doctrine should be that we not try to compete with our adversaries in every area where they are ahead of us; so long as we preserve our nuclear deterrent, we will be defending our country effectively and serving our people as well." Some parts of Khrushchev's memoirs are open to doubt; however, this passage seems to provide a fairly good description of the arms policy he pursued while in power.

[24]Michael Stoiko, Soviet Rocketry, p. 75.

[25]Ibid., p. 73. Source: G. A. Tokaev, Stalin Means War, p. 117. Soviet interest at this point was not directed toward an ICBM as such, but instead at Dr. Eugen Sanger's project for a manned intercontinental rocket bomber somewhat similar to the current space shuttle in general design. ["I. V. Stalin" is a misprint for Stalin's son Vasily.]

[26]Thomas W. Wolfe, Soviet Power and Europe, 1945-1970, pp. 183-184.

[27]Peter Smolders, Soviets in Space, p. 63.

[28]Armold L. Horelick and Myron Rush, Strategic Power and Soviet Foreign Policy, p. 109.

[29]Edmund Beard, Developing the ICBM, passim.

[30]Khrushchev, pp. 47-48. Until his death in 1966, Sergei P. Korolyov was one of the most important figures in the Soviet space/missile program. See Nicholas Daniloff, The Kremlin and the Cosmos, chapters 3 and 4.

[31]Table 1.

[32]Horelick and Rush, p. 29.

[33]Johan J. Holst, "Comparative U. S. and Soviet Deployments, Doctrines, and Arms Limitation," in Morton A. Kaplan, ed., SALT: Problems and Prospects, p. 60.

[34]Graham Allison, Essence of Decision, p. 107.

[35]Karl F. Spielmann, Analyzing Soviet Strategic Arms Decisions, p. 117.

[36]Horelick and Rush, p. 107

[37]Bottome, Missile Gap, chapter 2.

[38]Table 1; Figures 1 and 2.

[39]Carl Linden, Khrushchev and the Soviet Leadership, 1957-64, p. 91.

[40]The Berlin checkpoint incident of October 22, 1961, may have been due to the initiative of Frol Kozlov. See Robert M. Slusser, The Berlin Crisis of 1961, pp. 376-380.

[41]Provoking the Americans to build a force of first-generation ICBMs that were only usable as first-strike weapons would seem to be the height of lunacy.

[42]The Atlas and Titan I were first-generation weapons; the Titan II, Minuteman, and Polaris were second-generation missiles.

[43]Horelick and Rush, p. 141.

[44]Table 1; see also Elie Abel, The Missile Crisis, p. 114.

[45]Jane's Fighting Ships. These numbers are somewhat misleading, however. Eighty of these missiles were deployed aboard diesel submarines, far easier to detect than nuclear boats. Worse, all the missiles were the 350-mile range SSN-4. In order to reach even as far inland as Pittsburgh with these weapons, a Soviet submarine would have to fire from virtually inside New York Harbor. In practical terms, at the time of the Cuban crisis the Soviet SLBM force was negligible.

[46]Avigdor Haselkorn, Evolution of Soviet Security Strategy, chapter 2.

[47]Richard M. Jennings, "U. S./Soviet Arms Competition,1945-72: Aspects of Its Nature, Control, and Results." (Ph.D. dissertation, Georgetown University, 1975, pp. 414-417).

[48]See William R. Kintner and Harriett Fast Scott, The Nuclear Revolution in Soviet Military Affairs for a sampling of such writings; also, the various editions of Marshal V. D. Sokolovskii, ed., Military Strategy.

[49]Roman Kolkowicz, The Soviet Military and the Communist Party, p. 255.

[50]Ibid., pp. 251-258.

[51]Ibid., p. 260.

[52]Michael J. Deane, Political Control of the Soviet Military, p. 84.

[53]Kolkowicz, p. 167.

[54]Deane, p. 122; Kolkowicz, p. 34n.

[55]Sokolovskii, pp. 247-249.

[56]Ibid., pp. 301-302. The strong antisubmarine warfare orientation of Soviet naval construction from 1960 onward should be noted.

[57]General of the Army V. D. Ivanov, General Major A. Ovsyannikov, and Colonel M. I. Galkin, "The XXIII Congress of the CPSU On the Military Threat and the Problems of Strengthening the Defense Potential of the Country," in Kintner and Scott, pp. 336-338.

[58]Jennings, pp. 268-277.

[59]Deane, pp. 108-111. On p. 111, Deane quotes Yepishev: "With the increasing role and significance of technology in contemporary war is also increasing the role and importance of the popular masses and the role of the mass armies." Source: Cited as General of the Army A. A. Yepishev, "The Increasing Role of the CPSU in the Leadership of the Armed Forces," Voprosy Istorii [sic--Voprosy Istorii KPSS], No. 2 (February 1963), p. 10.

[60]Ibid., p. 114n.

[61]Kolkowicz, pp. 159-160.

[62]Deane, p. 145: "Moreover, Marshal Krylov reminded the readers of the trade unions' newspaper Trud that final victory "can only be won as the result of combined actions of all arms of the armed forces."

[63]Edward L. Warner, III, The Military in Contemporary Soviet Politics: An Institutional Analysis, passim.

[64]For the evolution of the SALT process, see John Newhouse, Cold Dawn: The Story of SALT.

[65]Kosta Tsipis, Anne H. Cahn, and Bertram T. Feld, eds., The Future of the Sea-Based Deterrent, chapters 5-7.

[66]Bottome, Missile Gap, p. 67.

[67]Horelick and Rush, chapter 8.

[68]Table 1.

APPENDIX

APPENDIX

ICBM Deployments, 1960-72

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ICBM Deployments, 1960-72

Table 1: ICBM Deployments, 1960-72.

	1960	1961	1962	1963	1964	1965	1966
U. S. ICBMs	18	63	294	424	834	854	904
Soviet ICBMs	35	50	75	100	200	270	300

	1967	1968	1969	1970	1971	1972
U. S. ICBMs	1054	1054	1054	1054	1054	1054
Soviet ICBMs	460	800	1050	1300	1510	1528

Source: J. P. Ruina, "U. S. and Soviet Strategic Arsenals," in Mason Willrich and John B. Rhinelander, eds., SALT: The Moscow Agreements and Beyond.

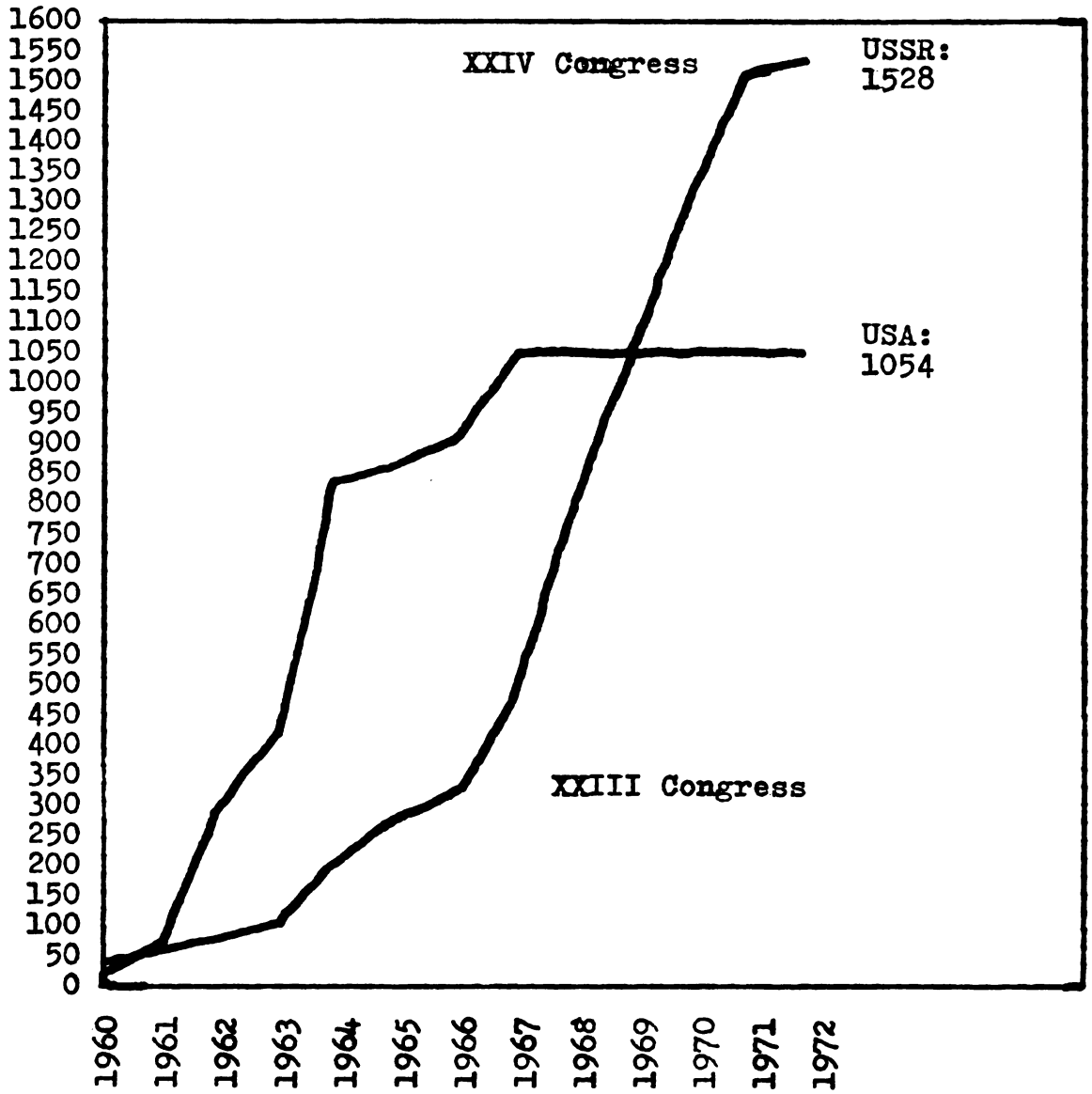

Figure 1: ICBM Deployments, 1960-1972.

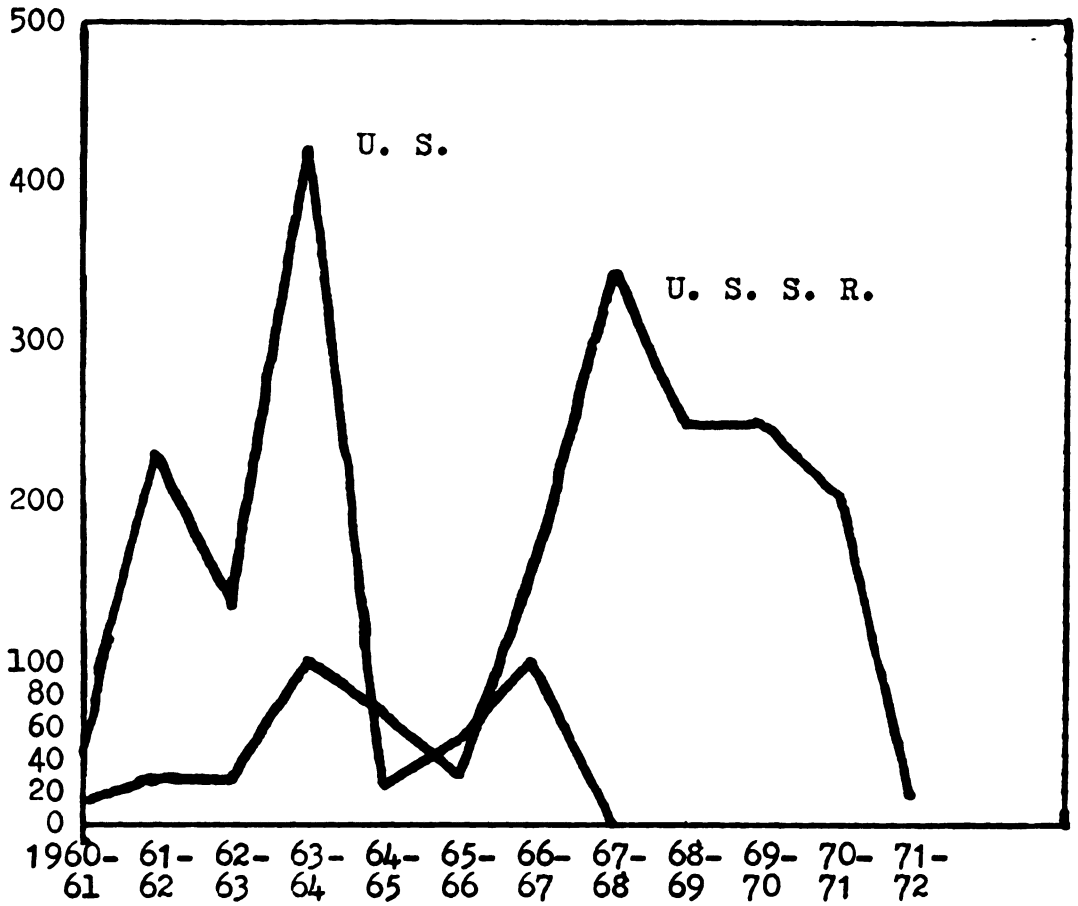

Figure 2: Yearly rates of ICBM deployment.

BIBLIOGRAPHY

BIBLIOGRAPHY

Abel, Elie. The Missile Crisis. (Philadelphia: J. B. Lippincott Co., 1966).

Allison, Graham. Essence of Decision. (Boston: Little, Brown, 1971).

Anderton, David A. Strategic Air Command. (New York: Charles Scribner's Sons, 1975).

Beard, Edmund. Developing the ICBM. (New York: Columbia University Press, 1976).

Blackett, P. M. S. Studies of War. (New York: Hill and Wang, 1962).

Bonds, Roy, ed. The Soviet War Machine. (New York: Chartwell Books, 1976).

Booth, Ken. The Military Instrument in Soviet Foreign Policy, 1917-72. (London: Royal United Service Institute, 1973).

Bottome, Edgar N. The Balance of Terror. (Boston: Beacon Press, 1971).

_____. The Missile Gap. (Cranbury, N. J.: Associated University Presses, Inc., 1971).

Caldwell, Lawrence T. Soviet Attitudes to SALT. (Adelphi Paper #75, London: Institute for Strategic Studies, 1975).

Carlton, David; and Schaerf, Carlo, eds. The Dynamics of the Arms Race. (London: Croom Helm, 1975).

Collins, Edward M. "The Evolution of Soviet Strategy Under Khrushchev." Ph.D. dissertation, Georgetown University, 1966.

Collins, John M. American and Soviet Military Trends Since the Cuban Missile Crisis. (Washington: Georgetown University Center for Strategic and International Studies, 1976).

Cox, Arthur Macy. The Dynamics of Detente. (New York: W. W. Norton & Co., Inc., 1976).

Crane, Robert Dickson, ed. Soviet Nuclear Strategy: A Critical Appraisal. (Washington: Georgetown University Center for Strategic Studies, 1963).

Crankshaw, Edward. Khrushchev. (New York: The Viking Press, 1964).

Dallin, Alexander, et al. The Soviet Union and Disarmament. (New York: Praeger, 1964).

Dallin, Alexander, and Larson, Thomas B., eds. Soviet Politics Since Khrushchev. (Englewood Cliffs, N. J.: Prentice-Hall, 1968).

Daniloff, Nicholas. The Kremlin and the Cosmos. (New York: Alfred A. Knopf, 1972).

Deane, Michael J. Political Control of the Soviet Armed Forces. (New York: Crane, Russak & Company, 1977).

Divine, Robert A. Blowing on the Wind: The Nuclear Test Ban Debate, 1954-1960. (New York: Oxford University Press, 1978).

Djilas, Milovan. Conversations with Stalin. (New York: Harcourt, Brace & World, Inc., 1962).

Gaddis, John Lewis. The United States and the Origins of the Cold War, 1941-47. (New York: Columbia University Press, 1972).

Garthoff, Raymond L. Soviet Strategy in the Nuclear Age. (New York: Praeger, 1958).

Gilbert, Stephen P. Soviet Images of America. (New York: Crane, Russak & Company, 1977).

Goldhamer, Herbert. The Soviet Union in a Period of Strategic Parity. (Santa Monica: RAND, 1971).

Gouré, Leon, Kohler, Foy D., and Harvey, Mose L. The Role of Nuclear Forces in Current Soviet Strategy. (Miami: University of Miami Center for Advanced International Studies, 1974).

Halle, Louis J. The Cold War as History. (London: Chatto & Windus, 1967).

Haselkorn, Avigdor. The Evolution of Soviet Security Strategy, 1965-1975. (New York: Crane, Russak & Co., 1978).

Higham, Robin, and Kipp, Jacob W., eds. Soviet Aviation and Air Power. (Boulder: Westview Press, 1978).

Horelick, Arnold L., and Rush, Myron. Strategic Power and Soviet Foreign Policy. (Chicago: University of Chicago Press, 1965).

Hyland, William, and Shryock, Richard Wallace. The Fall of Khrushchev. (New York: Funk & Wagnalls, 1968).

Jackson, Robert. Air War Over Korea. (New York: Charles Scribner's Sons, 1973).

Jacobsen, C. G. Soviet Strategy--Soviet Foreign Policy. (Glasgow: The University Press, 1972).

Jane's Fighting Ships. (New York: McGraw-Hill, annual).

Jennings, Richard M. "U. S./Soviet Arms Competition, 1945-1972: Aspects of Its Nature, Control, and Results." Ph.D. Dissertation, Georgetown University, 1975.

Kahn, Herman. On Thermonuclear War. (Princeton: Princeton University Press, 1961).

_____. Thinking About the Unthinkable. (New York: Horizon Press, 1962).

Kaplan, Morton A., ed. SALT: Problems and Prospects. (Morristown, N. J.: General Learning Corporation, 1973).

Kintner, William R., and Pfaltzgraff, Robert L., Jr., eds. SALT: Implications for Arms Control in the 1970's. (Pittsburgh: University of Pittsburgh Press, 1973).

Kintner, William R., and Scott, Harriett Fast, eds., and translators. The Nuclear Revolution in Soviet Military Affairs. (Norman, Okla.: University of Oklahoma Press, 1968).

Kolkowicz, Roman. The Soviet Military and the Communist Party. (Princeton: Princeton University Press, 1967).

Kolkowicz, Roman, Gallegher, Matthew P., and Lambeth, Benjamin S. The Soviet Union and Arms Control: A Superpower Dilemma. (Baltimore: Johns Hopkins Press, 1970).

Khrushchev, Nikita S. Khrushchev Remebers: The Last Testament. (Boston: Little, Brown & Co., 1974).

Larson, Thomas B. Disarmament and Soviet Policy. (Englewood Cliffs, N. J.: Prentice-Hall, 1969).

Linden, Carl A. Khrushchev and the Soviet Leadership, 1957-64. (Baltimore: Johns Hopkins Press, 1966).

McNamara, Robert S. The Essence of Security. (New York: Harper & Row, 1968).

Medvedev, Zhores A. Nuclear Disaster in the Urals. (New York: W. W. Norton & Co., 1979).

Moss, Norman. Men Who Play God. (New York: Harper & Row, 1968).

Moynihan, Daniel Patrick. "Reflections (SALT)." New Yorker, November 19, 1979, pp. 104-108.

Newhouse, John. Cold Dawn: The Story of SALT. (New York: Hold, Rinehart, and Winston, 1973).

Penkovskiy, Oleg. The Penkovskiy Papers. (Garden City, N. Y.: Doubleday & Company, Inc., 1965).

Pfaltzgraff, Robert L., Jr., ed. Contrasting Approaches to Strategic Arms Control. (Lexington: Lexington Books, 1974).

Powers, Barry. Strategy Without Slide-Rule. (London: Croom Helm, 1976).

Quester, George H. Deterrence Before Hiroshima. (New York: John Wiley & Sons, 1966).

Roberts, Chalmers M. The Nuclear Years. (New York: Praeger, 1970).

Schick, Jack M. The Berlin Crisis, 1958-1962. (Philadephia: University of Pennsylvania Press, 1971).

Slusser, Robert M. The Berlin Crisis of 1961. (Baltimore: Johns Hopkins Press, 1973).

Smolders, Peter. Soviets in Space. (New York: Taplinger, 1974).

Sokolovskii, Marshal V. D., ed. Soviet Military Strategy. 3rd edition. (Edited by Harriett Fast Scott with notes on changes from earlier editions.) (New York: Crane, Russak & Company, 1975). Originally published as Voyenniya Strategiya (Moscow: Voyenizdat, 1968).

Spanier, John W., and Nogee, Joseph L. The Politics of Disarmament. (New York: Praeger, 1962).

Spielmann, Karl F. Analyzing Soviet Strategic Arms Decisions. (Boulder: Westview Press, 1978).

Stoiko, Michael. Soviet Rocketry. (New York: Holt, Rinehart, and Winston, 1970).

Stonier, Tom. Nuclear Disaster. (Cleveland: World Publishing, 1964).

Tatu, Michael. Power in the Kremlin. (New York: Viking, 1969).

Taylor, John W. R., ed. Combat Aircraft of the World. (New York: G. P. Putnam's Sons, 1969).

Tokaev, G. A. Stalin Means War. (London: George Widenfel & Nicolson, Ltd., 1951).

Tsipis, Kosta, Cahn, Ann M., and Feld, Bernard T., eds. The Future of the Sea-Based Deterrent. (Cambridge: MIT Press, 1973).

Ulam, Adam B. Expansion and Coexistence. 2nd rev. ed. (New York: Praeger, 1974).

Warner, Edward L., III. The Military in Contemporary Soviet Politics: An Institutional Analysis. (New York: Praeger, 1977).

Willrich, Mason, and Rhinelander, John B., eds. SALT: The Moscow Agreements and Beyond. (New York: Macmillan, 1974).

Wolf, Thomas W. Soviet Strategy at the Crossroads. (Cambridge: Harvard University Press, 1964).

_____. Soviet Power and Europe, 1945-1970. (Baltimore: Johns Hopkins Press, 1970).

Zimmerman, William. Soviet Perspectives on International Relations, 1956-1967. (Princeton: Princeton University Press, 1969).