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Arms Control Enters the Gray Area

Robert Metzger and Paul Doty

If a Strategic Arms Limitation Treaty is reached and ratified, ceilings and subceilings will have been placed on the number of launchers from which the U.S. and the U.S.S.R. could attack each other over intercontinental distances. If the SALT process is then to continue, the reductions in such ceilings and subceilings becomes an obvious goal of further negotiations. Since both national leaders have endorsed reductions in numbers on numerous occasions,[1] it is even more likely that this will be a central feature of negotiations when they resume after SALT II.

Yet, progress in reductions could be an illusion if at least a start is not made in bringing weapons of lesser range under control. These are the gray area weapons that can reach targets 400 to 2,000 miles or more distant from the point of launch. For the most part these weapons are concentrated in Europe and the western military districts of the Soviet Union. These gray area weapons unconstrained by either SALT[2] or MBFR[3] consist of a wide array of medium bombers, fighter-

1. A number of quotations from both the U.S. and Soviet leadership are given in P. Doty, *Daedalus*, 104, No. 3 (Summer), pp. 73–4. The U.S. SALT proposals of March 1977 included "deep" cuts in MIRVed ICBMs and moderate overall cuts. Soviet response indicated that such cuts should be negotiated in SALT III.

2. SALT has dealt with U.S. and Soviet central strategic systems including ICBMs of intercontinental range (greater than 5500 km), SLBMs carried on "modern" ballistic missile submarines, "heavy" bombers, and, most recently, air-launched cruise missiles (ALCMs) carried on heavy bombers.

Pursuant to a revised Protocol to the 1972 Interim Accord, dated August 3, 1974, only ballistic missile submarines developed after 1964 are considered "modern" ballistic missile submarines, except that retrofitting new SLMBs on boats developed prior to 1964 causes such boats to qualify as "modern." Twenty diesel-powered *Golf*-class SSBs, which entered service beginning in 1958, are not "modern" and hence are excluded from Interim Accord strictures on SLBM launchers.

3. MBFR has not dealt at all with nuclear- or nuclear-capable systems based in Soviet territory, as the MBFR negotiations affect only active duty air and ground forces deployed in the so-called "agreed reductions area"—Belgium, the Netherlands, Luxembourg, the Federal Republic of Germany (FRG), the German Democratic Republic (GDR), Czechoslovakia and Poland. Other direct participants in the negotiations are the United Kingdom, the United States, Canada and the U.S.S.R.—as their forces are stationed in the reductions area. See U.S. Department of State, Bureau of Public Affairs, *Europe: Mutual and Balanced Force Reduction Talks* (Oct. 1978).

NATO's "Option III" proposal at MBFR has introduced a small fraction of Western theater

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bombers, carrier aircraft, intermediate and medium range ballistic missiles and cruise missiles. With these each side can deliver several thousand nuclear weapons against the other. Although these forces are small compared to the central strategic forces of the U.S. and U.S.S.R., their destructive potential, military relevance and political impact are enormous.[4] Moreover, the further growth of these gray area systems could obviously outrun reductions that might be negotiated in the central balance.[5] Finally, Soviet spokesmen have made it known that the Soviet acceptance of equal ceilings for central strategic weapons at Vladivostok and in the SALT II Draft Treaty—while neglecting limits on forward based NATO aircraft or compensation for the nuclear forces of the United Kingdom and France—was possible only because of the relatively high ceilings involved: subsequent reductions would require agreed upon limits on weapons systems of intermediate range that could reach their homeland.

Meanwhile Western Europeans have become more conscious than before of intermediate range weapons[6] capable of reaching their territories. A major stimu-

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nuclear weapons into the MBFR negotiations. Option III calls for, as a first phase, U.S. withdrawal from the reductions area of 54 nuclear-capable F-4 aircraft, 36 *Pershing* ballistic missiles (with a range estimated at about 440 nm.), 1000 tactical nuclear weapons and 29,000 U.S. ground force personnel. The Soviet Union would be required to withdraw five army divisions (a total of 68,000 troops) and 1700 tanks. *Id; cf.*, N.Y. Times, Oct. 25, 1977, at 1.

4. Gray area systems are of direct importance to the security of the continental United States. Press reports in November, 1978, indicated that the Soviet Union had shipped to Cuba 18–20 MiG-23 tactical aircraft. Whether these aircraft are capable of ground-attack missions with nuclear weapons is not publicly known at the time this article went to press. Two Soviet gray area systems in the U.S.S.R., the *Backfire* bomber and, to a lesser extent, the SS-20 ballistic missile pose at least a theoretical threat to the United States even though outside the limits imposed by SALT. The *Backfire* is a greater potential threat to the United States than the SS-20. The consensus of expert opinion is that the *Backfire* can attack some targets in the U.S. through adjustments to operational variables, including forward basing, flight profile, payload, use of refueling, or use of standoff ballistic or cruise missiles. Collateral restraints, as may be agreed upon by President Carter and Chairman Brezhnev, may alleviate the risk of intercontinental capability to some extent.

Whether the SS-20 threatens U.S. targets is less clear. If off-loaded from three to one re-entry vehicle, some analysts believe the SS-20 acquires intercontinental range. The SS-20 also could reach American targets if fitted with the SS-16 third stage (the SS-20 is the first two stages of the SS-16 ICBM). However, the United States reportedly has insisted that SALT II contain a ban on SS-16 deployment, in part to forestall the risk that the SS-20 could be equipped with the SS-16 "front end."

5. For example, if *Backfire* deployments to the Soviet LRAF reach the level of 400 predicted, and each aircraft is assumed capable of delivering a 1 MT. warhead upon six separate U.S. targets, an increment of 2400 deliverable megatons is added to Soviet forces limited by SALT II.

6. For purposes of this article, "intermediate range" systems have a range between 1950 km. (1050 nm.) and 5500 km. (2950 nm.). "Medium-range" systems are those between 300 km. (160 nm.) and 1950 km.

lant has been the increased capability of recent Soviet deployments: the SS-20 mobile ballistic missile, the new SU-19 *Fencer* and MiG-27 *Flogger* aircraft and the *Backfire* bomber. In some Western European circles this has created a felt need for a visible response in the form of new weaponry, particularly ground launched cruise missiles, as a counter-balance. Such considerations have led to a search for a methodology or framework within which the deployment of nuclear weapons of intermediate range in the European theater (including the Western U.S.S.R.) could be assessed and arms control options defined.

Thus it is that both Soviet concerns and Western fears converge on the gray area systems, the weapons that neither SALT nor MBFR have addressed. Indeed, to the extent that SALT succeeds in stabilizing the central nuclear balance between the U.S. and the U.S.S.R., it can transfer the competition downward to the next level, that of intermediate range systems, if these are left unattended.

The object of this article is to assemble relevant information on these gray area systems in both West and the East, and to examine the means and the extent to which they might be brought under control rather than be left to become the vehicles of an alternative arms race in the twilight zone between intercontinental strategic and short-range tactical nuclear forces. We shall refer to these weapons and their launchers as long-range theater nuclear (LTN) forces with the understanding that the lower range limit is 400 to 1,000 n.m. (nautical miles) and the upper limit is 1,000 to 3,000 n.m. Moreover, despite the reliance on the U.S. strategic forces to deter the U.S.S.R. from resorting to the use of nuclear weapons against Western Europe there is a continuing concern with the extent to which LTN forces in Western Europe should be focused on this same deterrent mission, that is being able to reach significantly into Soviet territory. And, the improved capability of new Soviet weapons to reach all of Western Europe obviously stimulates concern over whether or not the West should seek to match or offset this growing capability.

Before proceeding we should stress our own bias: that the use of even a few percent of the weapons being discussed could devastate Europe and Western U.S.S.R.; that it is the attempt to see if they can be brought under control and reductions negotiated that motivates our preoccupation with numbers; that such an exercise is highly abstract and artificial in that any conclusions that may be reached regarding balance or imbalance could not be put to the test without the involvement of much larger U.S. and Soviet strategic forces which would in turn make the original estimates quite academic. However, if assessments of this type —despite their artificiality—lead to some consensus and then to successful nego-

tiations, the possibility of political exploitation of alleged superiority would be greatly reduced and a cooperative exercise in restraint could be initiated in an area that has bred history's greatest wars.

The Context of Gray Area Systems in Europe

The concern with gray area systems is not new. The Warsaw Pact Organization (WPO) and NATO have feared the threat of nuclear attack from the other side for more than two decades. And in that time the military doctrine on both sides has given nuclear weapons a central role, envisioning use after reverses in a conventional engagement, or in preemption in the expectation that the other side is about to change to nuclear warfare. Once the threshold is crossed, the pressure to expand the role of nuclear weapons to attack targets far behind the battle area will heighten, risking escalation to the use of long-range theater nuclear weapons, from the Atlantic to the Urals, as well as the initiation of general nuclear war between the U.S. and the U.S.S.R. Although the probability of this chain of events occurring remains extremely small, it is increasingly common to ascribe a political advantage of uncertain magnitude to that side which is the better equipped for this hypothetical contest.

It is in this context that several developments in recent years have increased the perceived importance of gray area systems.

For Western Europe the primary stimulant has been the decade-long improvement and modernization of Soviet forces to the East, particularly those gray area systems, capable of attacking Western European population and economic centers. At the conventional level Western technological superiority and the belated NATO decision to accelerate its modernization may counter the increased numbers, readiness and equipment of WPO forces. At the strategic level, essential equivalence may be enforced by SALT treaties. But in the gray area there is little in being to compensate for the high accuracy and reduced vulnerability of the SS-20 or for the wide ranging capability of *Backfire*. With about 50 SS-20 and 80 *Backfire* now on line, about two-thirds of which are assumed directed against Western Europe, a higher level of threat against Western Europe is developing. This trend is reinforced with an improved Soviet naval capability in European waters and continued modernization of Soviet air defenses. In contrast to earlier times, when alleged Soviet theater superiority could be explained as a counterbalance to U.S. advantage in intercontinental strategic capability, today continued Soviet investment in theater-force improvements must be viewed in the context of approximate strategic equilibrium.

The anxieties bred by this steady Soviet military buildup have been further fueled by developments in the SALT II negotiations and by doubts generated by U.S. behavior in alliance-related problems. The concern that SALT may adversely affect the European situation had been clearly stated by Chancellor Schmidt.

> . . . strategic arms limitations confined to the United States and the Soviet Union will inevitably impair the security of the West European members of the Alliance vis-a-vis Soviet military superiority in Europe if we do not succeed in removing the disparities in military power in Europe parallel to the SALT negotiations.[7]

As decisions at SALT II have had increasing significance for the theater military balance, some in Western Europe have expressed doubt that the United States is adequately protecting Alliance interests in the negotiations.[8] These doubts have been reinforced by the reported terms of SALT II. While these terms are not yet known, they may indeed limit the U.S. (as well as Soviet) production of some types of cruise missiles. However, the development and deployment of new intermediate range missiles and medium bombers would not be restricted, thereby allowing adequate flexibility for programmatic responses.

These concerns over SALT eroding European security resonate with the doubts never far below the surface in some quarters over the credibility of the American strategic guarantee.[9] This condition has been aggravated by disputes in the trans-Atlantic relationship which have cast doubt on the certainty of American leadership notwithstanding President Carter's pledge of a three percent annual increase in defense expenditures for NATO.[10] Disagreements between the U.S. and the Federal Republic of Germany over nuclear exports, economic policy, the production of the neutron bomb and American petroleum imports have been particularly troubling.

This anxiety over the American commitment is not without precedent.[11]

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7. 1977 Alastair Buchan Memorial Lecture, delivered by Helmut Schmidt, Chancellor of the Federal Republic of Germany, to the International Institute for Strategic Studies, Oct. 28, 1977, *reprinted in* 20 Survival 2, at 3–4 (Jan.-Feb., 1978).
8. West German Defense Minister Apel, speaking in August, warned the United States that SALT II will leave Europe faced with an overwhelming potential in Soviet "gray area" weapons. *Baltimore Sun*, Aug. 29, 1978, p. A2. Apel said later that solving the "gray area" problem is "one of the most important security tasks confronting the NATO Alliance today." *International Herald Tribune*, Sept. 18, 1975.
9. *Cf.*, M. Wörner, "NATO Defenses and Tactical Nuclear Weapons," *Strategic Review*, *5*, 13 (Fall, 1977).
10. Some Western European analysts are less than enthusiastic about American efforts to bolster conventional forces in the theater, believing such efforts as doomed to failure—because of the great Soviet advantage—and, worse, are likely to accelerate decoupling.
11. For example, during the debate over the proposed multilateral nuclear force (MLF) there was considerable anxiety over Soviet "superiority" in theater nuclear systems and uncertainty

When nations view their security as dependent in large measure on the will of another nation, geographically remote, to defend them—even at the price of the defender's destruction—it is inevitabe that those defended will question the certainty of their protection and seek assurance through independent military strength. This particular problem is exacerbated because those American systems which most exactly counter the Soviet theater nuclear threat—the 48-60 *Poseidon* submarine launched ballistic missiles (SLBMs) under SACEUR command—and which are most survivable and hence most credible as instruments of deterrence, are also the least *visible* manifestations of the American guarantee. The contribution of the SACEUR *Poseidons* to balancing the Soviet threat to Western Europe is also reduced by the operational barriers to employment of these weapons, and by the concern that their use in conflict would encourage escalation. At the least, although a formidable force by any standard, the SACEUR *Poseidons* may fail to satisfy the political and psychological requirement of *demonstrated* American resolve. Thus, there are pressures for the U.S. to field in Western Europe a new ground-based, intermediate-range, nuclear system. Yet, despite American development of the GLCM and the new initiative to field an extended-range (1500 km) version of the *Pershing* SRBM (called the *Pershing IIXR*) by 1983, doubts remain in Western Europe as to the ultimate willingness of the U.S. to deploy these new weapons if they would come at the expense of further progress at SALT.

Taking a longer view the Soviet Union has equal reasons to fear developments in NATO gray area systems. The *Poseidon* submarines have already multiplied by several times the nuclear capability of the *Polaris* SLBMs that they replaced. Substantial improvements in NATO forces are underway supported in part by an increase in U.S. defense funding in the NATO arena: the most thorough modernization of Western air forces since the end of World War II is in progress; NATO

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over U.S. protection. A 1965 article in *Aviation Week & Space Technology* contained the following:

> U.S. North Atlantic Treaty Organization commanders here and West German defense leaders in Bonn still are pressing for an additional nuclear weapon to counter the threat of 700 Soviet medium-range ballistic missiles pointing at Europe.
>
> These top officals argue that the Polaris missiles on submarines and the intercontinental ballistic missiles based in the U.S. are neither as responsive nor as menacing as missiles based in Europe with enough range to hit Russian cities.
>
> . . . West German leaders feel the MLF at last would give them some voice over the deployment and use of nuclear weapons. "We're not 100% convinced that if the Soviets attacked Germany the U.S. would launch its missiles," a West German spokesman said.

"Bonn Seeking Additional Nuclear Weapon," *Aviation Week & Space Technology*, Oct. 18, 1965, pp. 23–24.

deployment of airborne warning and control systems (AWACS) seems imminent; longer range *Pershing* missiles capable of reaching a small portion of Soviet territory seem likely; and research and development proceeds on several types of theater cruise missiles which, if allowed by SALT II, could in time confront the Soviets with very large numbers of conventionally or nuclear armed weapons capable of reaching the western Soviet homeland. Moreover, the Soviet Union faces a slowly growing Chinese threat, a highly modernized but nonnuclear Iranian air force, the likelihood that Israel is nuclear-armed, and the possibility that India and Pakistan may go nuclear within the next decade. Thus, anxieties over unrestrained gray area systems in the 1980s cannot be purely a NATO monopoly.

The Long Range Nuclear Balance in Europe

Simply stated, the concept of a long range theater nuclear balance compares Western European-based nuclear systems capable of attacking targets in the Soviet Union with Soviet nuclear systems directed on Western Europe. As a concept it is not without serious flaws. But it recognizes and provides a means with which to assess a political-military reality: that Western Europe is at the peril of Soviet intermediate- and medium-range nuclear systems, that Western systems based in Western Europe or under NATO control threaten targets in the Soviet Union, and that all but a very small fraction of these weapons are excluded from present arms control restrictions.[12] Moreover, any analysis of this balance must recognize that the gray area problem is derivative in nature. No purely objective assessment of the balance of gray area weapons as such is possible; rather, in counting such weapons, they must be abstracted from the role they might play in a controlled nuclear exchange in Europe or the contribution they may make to general nuclear war.

Even with Western Europe there is no consensus on the existence of a separate Eurostrategic balance. Official French policy squarely opposes the concept. As stated by French Foreign Minister Louis de Guiringaud:

The approach based on the concept of a Euro-strategic balance implies that there can be a separate balance of nuclear capabilities assigned to the European theater,

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12. Certain weapons subject to SALT restrictions can fulfill Eurostrategic missions. A portion of the U.S. *Poseidon* SLBM force is known to be under the command of SACEUR. Similarly, a part of Soviet SLBM or ICBM forces, for example, the SS11, may be directed against theater targets.

isolated from other elements of deterrence. It leads to a "decoupling" which is precisely what we are trying to avoid. In other words, it would be tantamount to recognizing that the United States' central strategic forces do not cover Western Europe.[13]

French opposition to a Eurostrategic calculus reflects many of the arguments against the concept. Methodologically it is extremely difficult to determine exactly which forces should be assigned to a Eurostrategic balance.[14] Inclusion of one *Poseidon* or several Soviet ballistic missile submarines, for example, "would be enough to upset this hypothetical balance."[15] And, the Eurostrategic concept may be challenged for suggesting that U.S. central strategic forces are not aimed at many of the same targets as Eurostrategic weapons.

The utility of a "Eurostrategic" calculus does not require, however, satisfying all political or technical objections. No measurement can fully and accurately assess the complex, dynamic interactions among military systems and the disparate and military significance of opposing forces. Some analysts, recognizing the inherent artificiality of isolated distinctions among different levels of military forces—which, in their view, are unfortunate by-products of the East-West arms control process—advocate a comprehensive framework, a so-called "global balance," in which all manner of military forces would be integrated. If possessing analytic integrity, however, the implementation of this concept is methodologically intractable. The choice, then, is between manageable artificialities and unmanageable realities. A Eurostrategic balance is a useful concept because it provides a framework to assess the political and military implications of nuclear weapons in and targeted at Western Europe in a way that responds to psychological and political concerns. But it is useful only so long as its defects are recognized. To seek mathematical "parity" in the Eurostrategic balance would be a grave error, just as misleading as, for example, it would be to ignore the fact that the Soviet Union faces both geographically remote and geographically proximate threats, dictating systems of distinctly different capability than ours, while the West, in contrast, requires the capability (for deterrence) to destroy a set of targets located in a single geographical area—the Soviet Union. Failure to take this asymmetry into account could lead the West into expensive and pointless

13. Lecture by Louis De Guiringaud, French Minister of Foreign Affairs, *Three Aspects of French Foreign Policy: Defense, Detente, Disarmament,* at the Institute of Advanced National Defense Studies, Feb. 4, 1978, Release 78/35 of the Press & Information Division, French Embassy to the U.S., at 6.
14. *Id.*
15. *Id.*

efforts to "mirror image" specific Soviet peripheral attack systems, increasing the risk that European security would become decoupled from the U.S. strategic guarantee. In a similar way it would be imprudent to react in a mirror image fashion to imbalances that may turn up in assessments of the LTN forces in Europe.

Assessing the Long Range Theater Nuclear Forces

Before undertaking a comparison of LTN forces in Europe a number of considerations which affect the task of measurement must be addressed.

The main parameters of the LTN force assessment are the nuclear weapons delivery systems based in or near Western Europe capable of attacking targets in the Soviet Union and Soviet systems capable of attacking Western Europe. Beyond this enumeration it would be useful if the delivery systems could be weighted in some rough way proportional to the equivalent megatonnage they deliver and their performance factors, but this has not been attempted. The calculation of the balance is further affected by a variety of assumptions and variables difficult to quantify. The capabilities of particular weapons systems are often either ambiguous or highly elastic to operational variables.[16] Finally, the decisive factor in setting the boundaries of the LTN weapons is *range* or, in the case of manned aircraft, *combat radius*.[17]

Here, establishing the boundaries of the balance is complicated by a *geographic asymmetry* between East and West. Weapons systems with a range (or radius) of only 400 nautical miles (n.m.), located in the German Democratic Republic or Western Czechoslovakia, can reach all of the Federal Republic of Germany, Belgium, the Netherlands and as far into France and the United Kingdom as London and Paris. Thus, included in the 400 n.m. arc from these launch points are much of the NATO command structure, key supply areas, ports, nuclear weapons storage sites and bases for NATO nuclear delivery systems. In contrast, NATO weapons based equally close to the East-West border with a 400 n.m. range can reach only as far as Warsaw and Budapest, leaving the Soviet Union untouched and most of the Warsaw Pact command structure, supply areas and intermediate-range nuclear weapons unaffected.

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16. For combat aircraft, for example, important operational variables are ordinance load, flight profile, and speed. The combat radius of a tactical aircraft can be appreciably increased beyond that with a typical tactical weapons load by carrying only a single nuclear warhead, and by minimizing low-altitude and high-speed flight.
17. Range, or radius, are key determinants of a particular system's ability to cover the set of potential targets in the adversary's territory.

To possess approximately equivalent target coverage to Soviet 400 n.m.-range systems based in the G.D.R. or western Czechoslovakia, NATO weapons based in or launched from the F.R.G. require more than twice the range. With a 1,000 n.m. range, NATO systems can reach the Western military districts of the Soviet Union as well as Kiev and Leningrad. However, Moscow, Murmansk and the Black Sea ports lie beyond at a distance of 1,300 to 1,500 n.m.

Accordingly, included in our assessment of the balance are Soviet weapons with a range of 400 n.m. and NATO weapons with a range of 1,000 n.m. if based in the F.R.G. As some British and French independently controlled nuclear weapons are further removed from the East-West border, they are included in our assessment only if capable of 1,500 n.m. missions. In the tables discussed subsequently, we also include certain Western systems (principally tactical aircraft) with a nominal radius of 400-1,000 n.m. While these weapons are not counted in our assessment of the balance, conceivably they could contribute to Western capability if sent on one-way missions, launched from extremely forward sites, or (in a few cases) if lightly loaded while flying fuel-efficient flight profiles.

Of the several indexes that might be used to characterize the potential military usefulness of the LTN forces, we have opted for two: the number of launchers and the number of deliverable warheads. These are not only the most obvious indexes for counting but also provide the most likely approach to defining arms control options. The counting of launchers by categories is, of course, the same approach as used in SALT. But this was itself inadequate: hence, the additional step of separating MIRVed and unMIRVed missiles was taken and further categorization with respect to the number of warheads allowed per missile as the loading limit ALCMs on bombers is likely. The counterpart for our purposes is to provide a separate listing of the number of weapons normally loaded on each launcher (bombs on RVs).

A special problem arises in the gray area due to the deployment of dual purpose aircraft capable of delivering either conventional or nuclear bombs. At this stage it seemed appropriate to include all such aircraft in the nuclear inventory. This exaggerates somewhat the estimates of the number of bombs deliverable but such a bias seems permissible in early considerations and even the first stages of arms control.

It remains to be noted that the 480 weapons on 48 SACEUR commanded *Poseidon* missiles are counted as NATO weapons and deducted from U.S. central strategic forces totals. These weapons are included in the strategic inventory

limited by SALT treaties but this should be no cause for distinction.[18] However, if a number of the Soviet Union's strategic missiles are similarly allocated to use in Western Europe, they cannot be entered in our inventory since such number is unknown. The Soviet LTN forces may be underestimated on this account. But any such reassignment would draw down their central strategic forces accordingly.

We have chosen to base our assessments of LTN forces on both numbers of launchers and numbers of deliverable nuclear warheads subject to the range criteria noted above. We believe it more realistic to give greater attention to warhead numbers, even though arms control may be more conveniently exercised through numbers of launchers. Numbers of warheads do emphasize target coverage while neglecting the differences in warhead yields,[19] and, as is true of all "static" methodologies, this index fails to reflect important operational and doctrinal factors. Among these factors, which in the aggregate may shift the "true" balance from the calculated static balance, are pre-launch survivability, accuracy, reliability, employment doctrine and release procedures, command and control, probability of penetration, and forces held in reserve and reinforcement.

Significantly, our measurement assumes the scenario of an attritional war of escalation. Should either side depart from this assumption and attempt a preemptive attack without warning, the actual results of the battle could be radically shifted to favor the attacker. Soviet capability to destroy western theater-based nuclear assets with little tactical warning, impressive before the SS-20 and *Backfire* programs and not necessarily dependent on the exclusive use of nuclear weapons, is improving with the deployment of these new systems. While the Soviet hard-target, time-urgent capability against theater assets is disturbing,[20]

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18. That these *Poseidon* SLBMs are included in SALT limitations is not material to their effect upon the *military* capabilities of the West at issue in calculations of the Eurostrategic balance. Should gray area weapons become the focus of East-West arms control negotiations, the dual status of SACEUR *Poseidons* will be *politically* significant and may warrant some compensation in Soviet concessions at the bargaining table.

19. An aggregate number of deliverable warheads is not equatable to an identical number of vulnerable targets. To destroy some targets may require a number of warheads (depending on yield). On the other hand, warhead yield is an imprecise gauge of destructiveness as it fails to reflect accuracy of delivery, target hardness, and non-linear blast effects.

20. The preemptive threat may dictate design parameters for future Western systems to increase tactical warning and enhance pre-launch survivability. Introduction of the U.S. AWACS (Airborne Warning and Control System) aircraft will help provide tactical warning of low-altitude penetrating aircraft.

the preemptive threat should not be overstated. The essential weakness of the preemption scenario is the very high probability that *strategic* warning of at least a few days would be received prior to such an attack. Strategic warning of a few days would allow for dispersal of moveable assets, including theater nuclear warheads (from peacetime storage sites), tactical aircraft, and mobile missiles (including, if deployed, GLCMs).[21] General Haig, SACEUR, has stated that recent Soviet improvements have "reduced but not eliminated warning time" and that the minimum expected warning of 48 hours is "at the bottom edge of reality with a more likely warning time being in the neighborhood of one or two weeks."[22] Nor can Soviet planners neglect the possibility, however remote, that if confronted with unambiguous strategic warning, the preemptive initiative might be exercised by the United States.[23] Finally, a successful preemptive attack against Western Europe would leave unscathed U.S. central strategic forces. Even after a coordinated preemptive attack against Western Europe and the United States, significant numbers of U.S., British and French retaliatory forces (principally SLBMs and U.S. heavy bombers) would survive.[24] Soviet leaders can have no assurance these forces would not carry out their second-strike mission in the aftermath of a Soviet preemptive attack.

The comparatively simple counting scheme adopted here does not purport to be the kind of "dynamic" analysis which—in theory at least—takes into account

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21. Some targets, of course, cannot be moved. Fixed "soft" targets include ports, staging areas, and airfields. Fixed "hard" targets—such as command, control and communications (C^3) facilities and nuclear storage sites—will be vulnerable if not already so. And, it is generally acknowledged that further hardening of such facilities is a "dead end street" as no amount of hardening can protect targets located in the crater caused by detonation of a nuclear warhead. *See* "Technology Creep and the Arms Race: ICBM Problem a Sleeper," *Science*, Vol. 201 (Sept. 22, 1978), at 1102. Efforts should thus be made to provide alternate, secure and survivable C^3, and to establish rapid procedures for dispersal of warheads from key depositories.
22. Interview, *U.S. News & World Report*, June 5, 1978, pp. 20–22.
23. Strategic warning minimizes the risk of pre-emption only if the warning is believed and acted upon when received. Moreover, dispersal of vulnerable assets does have the character of a mobilization, and could be interpreted by the Soviets as prefatory to a *NATO* preemptive initiative, or otherwise could induce the Soviets to accelerate the attack timetable. In this context, ironically, the SS-20 *adds* stability because is reduced vulnerability (through mobility) diminish the incentives for NATO to seek to preempt. *See* Richard Burt, "The SS-20 and the Eurostrategic Balance," *The World Today*, (Feb. 1977), pp. 43–51, at 46. Hence, the prospect of strategic warning, while indicating circumspection in evaluating the significance of the preemptive threat, does not render such a contingency meaningless. Operational uncertainties also contribute to restrain the possibility Soviet decision-makers take the pre-emptive gamble.
24. Should the Soviets attempt preemption only in the European theater, the entire U.S. arsenal of "central strategic" forces could be used for "massive retaliation." Should the Soviets contemplate attack against the continental United States as well, the operational credibility of the theoretical vulnerability of U.S. ICBMs also may give pause to Soviet leaders.

the spectrum of operational and doctrinal factors. The temptation to introduce some dynamic modeling is always present, but dynamic analysis in the Eurostrategic context quickly succumbs to enormous scenario dependency and computational imprecision. For example, within each scenario, assumptions about each operational factor must be weighted by doctrinal inputs and various synergisms. The result is that the lure of the realism that attaches to dynamic analysis falls victim to the sensitivity of the results to the chains of assumptions involved. The simple procedure of static analysis has, furthermore, the comparative advantage of being communicable—among analysts, in negotiations and to the public. Thus, our examination of the gray area problem proceeds by means of a static accounting of deliverable weapons over appropriate ranges.

The Comparison of Long Range Theater Nuclear Forces

The relevant data are assembled in Tables I and II for Western forces and Soviet forces, respectively, for 1978 and for two projections to 1985, moderate and high. In both projections it is assumed the limits in SALT I and II are in force and the growth assumed reflects our interpretation of published reports. The first part of each table summarizes the strategic forces of the U.S. and U.S.S.R. so that the context in which the long range theater forces exist is clear.

It should be noted that in Table I 480 *Poseidon* warheads have been deleted from the U.S. strategic systems; they appear as the first entry in the second part of the Table. In Table I, following the inventory of central strategic systems, the LTN forces of the West are presented in two parts: those with ranges greater than 1,000 n.m. (U.S. and dual key) together with British and French systems of greater than 1,500 n.m. and all of those with ranges of 400-1,000 miles. This subdivision is not made on the Soviet side for the reasons stated earlier.

We have chosen low-estimates of bomb-loading for dual-capable aircraft to compensate for the low probability that all these aircraft would actually be used for deep penetration nuclear strike missions, and uncertainties as to the probability of how many of these aircraft (except the F-111 and *Backfire*)[25] can survive air defenses to penetrate to target. Projected force levels for 1985 assume that SALT II ceilings are in effect; "moderate" assumes either unilateral restraint or successful arms control initiatives; "high" growth assumes a period of worsen-

25. The Backfire and the SS-20 (if fitted with the third stage of the SS-16) are the principal such weapons. *See* note 4 and accompanying text, *supra*.

Table 1
Western Central Strategic & Long-Range Theater Nuclear Capability: Deliverable Warheads

	Weapons per vehicle	1978		1985 moderate		1985 high	
		Launchers	RVs	Launchers	RVs	Launchers	RVs
U.S. Central Strategic Systems							
Polaris A-3 SLBM	1	160	160	160	160	160	160
Poseidon C-3 SLBM[a]	10	448	4,480	224	2,240	212	2,120
Trident C-4 SLBM	10	0	–	376	3,760	376	3,760
Titan II ICBM	1	54	54	44	44	44	44
Minuteman II ICBM	1	450	450	450	450	450	450
Minuteman III ICBM	3	550	1,650	550	1,650	450	1,350
M-X ICBM	10	0	–	0	–	100	1,000
B-52[b]	8	316	2,528	210	1,680	210	1,680
B-52 w/ALCM	24	0	–	122	2,928	64	1,536
Cruise Missile Carrier[c]	30	0	–	0	–	58	1,740
FB-111	5	65	325	65	325	65	325
Totals		2,043	9,647	2,201	13,237	2,189	14,165
European Theater Nuclear Delivery Systems with a Range/Radius in Excess of 1000 n.m.							
U.S. SACEUR Poseidon[d]	10 (MIRV)	48	480	48	480	60	600
U.S. F-111 E/F[e]	2	156	312	156	312	156	312
U.S. GLCM	1	0	–	0	–	540	540
U.S. SLCM (land-attack)	1	0	–	0	–	325	325
France SLBM (M-2/M-20)	1	64	64	80	80	64	64
France SLBM (M-4)	3 (MIRV)	0	–	0	–	32	96
France IRBM (S-2/S-3)	1	18	18	18	18	18	18
France LRCM	1	0	–	0	–	100	100
U.K. SLBM (Polaris)[f]	3 (MRV)	64	192	64	192	64	192
U.K. Vulcan B-2	2	48	96	0	–	0	–
U.K. LRCM	1	0	–	0	–	100	100
F.R.G. GLCM (dual key)	1	0	–	0	–	100	100
Totals		398	1,162	366	1,082	1,559	2,447
European Theater Nuclear Delivery Systems with a Range/Radius Between 400 and 1000 n.m.							
U.S. F-4/F-16[g]	1	400	400	600	600	700	700
U.S. Pershing IIXR[h]	1	0	–	108	108	108	108
U.S. Pershing IA SSM	1	108	108	0	–	108	108
U.S. A-6E/A-7E/A-18[i]	1–2	72	100	72	100	72	100
France Mirage IV	1	37	37	37	37	37	37
France VF/2000	1	30	30	60	60	60	60
France Super Eternard	1	0	–	24	24	24	24

Table 1 *(continued)*
Western Central Strategic & Long-Range Theater Nuclear Capability: Deliverable Warheads

	Weapons per vehicle	1978		1985 moderate		1985 high	
		Launchers	RVs	Launchers	RVs	Launchers	RVs
U.K. Buccaneer	1	50	50	0	–	50	50
U.K. F-4	1	14	14	14	14	14	14
U.K. Tornado	1	0	–	220	220	220	220
F.R.G. Pershing IA (dual key)	1	72	72	72	72	72	72
F.R.G. F-4 (dual key)	1	60	60	60	60	60	60
F.R.G. F-104 (" ")	1	144	144	0	–	0	–
F.R.G. Tornado (" ")	1–2	0	–	210	210	210	420
F.R.G. F-18L (" ")	1	0	–	0	–	48	48
Belgium F-104G	1	36	36	0	–	0	–
Belgium F-16	1	0	–	88	88	88	88
Denmark F-16	1	0	–	58	58	58	58
Greece F-4	1	n/a	–	56	56	56	56
Italy F-104 G/S	1	72	72	102	102	102	102
Italy Tornado	1	0	–	100	100	100	100
Netherlands F-104G	1	36	36	0	–	0	–
Netherlands F-16	1	0	–	102	102	102	102
Turkey F-4	1	49	49	71	71	71	71
Turkey F-104S	1	30	30	0	–	0	–
Totals		1,210	1,238	2,054	2,082	2,360	2,598
Grand totals		3,651	12,047	4,621	16,401	6,108	19,210

Notes to Table 1: These figures are all drawn from publicly available data. Relied upon primarily is *The Military Balance 1978–1979* (IISS 1978), although some additional authorities are noted below.

Introductory Definitions and Notes:

RVs: This is the abbreviation for "re-entry vehicles." For purposes of this table it refers to the number of separately targetable warheads carried by a MIRVed ballistic missile (except in the case of the U.K. *Polaris* SLMBs, as noted below) or to the number of nuclear weapons (bombs or air-to-ground missiles) which the authors estimate can be carried by particular aircraft. Estimates of weapons loading for aircraft reflect the authors' own assessment of aircraft size, payload capacity, and other factors. Both aircraft and missile launchers are assumed capable of only one mission (aircraft) or launch (missile). The estimates as to force loading and the assumption of no reloads or second missions must be recognized as introducing a range of error into the calculations. In addition, RV estimates for ballistic missiles assume a SALT II ceiling of 10 RVs for any ICBM (new or old) or new SLBM (i.e., deployed after the date of agreement), and an average of 10 RVs for U.S. *Poseidon* C-3 SLBMs even though this missile has been tested with 14 RVs at reduced range.

Range Classifications: In determining whether an aircraft with a nuclear weapon(s) load falls within a particular range category, the authors' estimates reflect conservative assumptions about the operational combat radius achievable by an aircraft flying in a high-threat environment in wartime. Aircraft range is elastic to many variables, including weapon(s) loading, flight profile, tactics, speed, availability of ECM (electronic countermeasures) protection, and so forth.

1985 Moderate and 1985 High Estimates: Both estimates assume a SALT II Treaty is agreed to, ratified by the United States, and that the Treaty remains in force through 1985. The *1985 Moderate* Estimate, in particular, assumes no GLCM (Ground-Launched Cruise Missile) or SLCM (Sea-Launched, land-attack Cruise Missile) deployment by any Western power. This result could occur should the SALT II Protocol be extended to 1985 (or later), or as a result of political or budgetary decisions within the U.S., France, the U.K., or the F.R.G., or for other reasons. The *1985 High* figure assumes the SALT II restrictions on GLCMs and/or SLCMs lapse and that the U.S. is able to provide some assistance to enable France, the U.K., and the F.R.G. to develop cruise missiles.

European Theater Nuclear Delivery Systems: Included in these tables are only those aircraft or missiles regularly stationed on a day-to-day basis in the European theater (or on board carriers operating off European shores). Hence, available reinforcements (through redeployment of forces stationed in the continental United States) are not counted. Note that the U.S. has announced plans to be able to treble the number of tactical aircraft in the European theater within one week.

a. Figures for *Poseidon* C-3 SLBM launchers assigned to the U.S. Central Strategic Systems category have been reduced by an amount equal to the number of launchers estimated to be assigned to SACEUR.

b. By 1985 a portion of the B-52 force may be replaced with an updated version of the F-111 (tentatively termed the F-111H) which would increase the percentage of the U.S. strategic bomber force capable of low-altitude penetration. As no decision has been taken to proceed with the F-111H, it is not included in the table; in any event its deployment would not affect significantly 1985 total force loadings of bomber-deliverable nuclear weapons (although the F-111H might improve upon the probability of penetration of bomber force mix).

c. Presently the U.S. is considering a number of candidate aircraft to supplement B-52Gs as launch platforms for the Air-Launched Cruise Missile (ALCM). Among the aircraft under study are those of 747 or DC-10 size (which could carry as many as 60 ALCMs) and smaller aircraft, the YC-15 and YC-16, capable of short takeoff but which would carry a far smaller number of missiles. The figure of 30 missiles per Cruise Missile Carrier (CMC) represents a compromise amount, and also reflects the possibility that SALT II may impact upon CMC force-loading.

d. The correct number of SACEUR-assigned *Poseidons* is not publicly known. While the figure of 60 missiles (or about 600 RVs) is often used, we have chosen for the *1978* and *1985 Moderate* figures the lower estimate, also available in published sources, of 48 missiles. *Cf.*, SIPRI, *Tactical Nuclear Weapons: European Perspectives* (1978) 115 (noting the range in estimates). For the *1985 High* Estimate we have used the figure of 60 SLBMs (600 RVs) and reduced correspondingly the total assigned to U.S. Central Strategic Systems.

e. One hundred fifty-six F-111E/F are presently based in the U.K. An additional 22 F-111F and 22 F-111E are based in the United States and could be redeployed rapidly to U.S. Air Force Europe (USAFE). And, there are significant numbers of less-capable, earlier F-111 versions potentially available: 141 F-111A (of which about 40 may be refitted into the EF-111A electronic warfare version) and 96 F-111D.

f. The U.K. *Polaris* SLBMs carry triplet warheads of British design and manufacture. While not independently targetable (hence, MRVs and not true MIRVs), the triplet MRV does increase hypothetical target coverage and lethality.

g. The USAFE presently has deployed in Europe about 400 F-4 and 75 (not nuclear-capable) F-15 aircraft, in addition to the 156 F-111E/F previously noted. Many of the 400 F-4 on station are assigned to missions other than the Quick Reaction Alert role, so the exact number available for nuclear strike missions is difficult to specify. About 800 additional F-4C/D/E could be rapidly deployed to reinforce European deployments if current U.S. efforts to treble USAFE tactical aircraft (to 1900) within one week of mobilization are achieved. Additional F-15 deployments and the entry of the F-16 into service will increase, in theory at least, the number of aircraft available for nuclear delivery missions.

h. The *Pershing IIXR*, according to current plans, would add to the present *Pershing IA* a third stage coupled with a radar area correlation guidance system to enable warhead delivery at

ranges up to 1500 km (800 n.m.) with an accuracy of 120 feet CEP (circular error probability) or less. Initial operating capability might be as early as 1983 with an expedited program.

i. In the Mediterranean the U.S. Navy ordinarily maintains two aircraft carriers on station with the Sixth Fleet, each with 2 squadrons of about 24 F-4 or F-14 aircraft for combat air patrol and fleet air defense. Because of the importance of this mission in the high threat environment, these aircraft probably would not be used for nuclear strike roles. Nor, in all probability, would any of the 24 aircraft in the two squadrons of light-attack planes (A-7D or A-4M), because of insufficient target coverage. One squadron of 12 medium-attack A-6 A/E is also onboard; these do seem to have at least the range and the ordnance delivery capability to serve in deep penetration nuclear strike missions. Hence 24 A-6 aircraft are included in the estimate, one squadron from each of the two carriers in the Sixth Fleet. As for the Second Fleet in the Atlantic, assuming that four of the five carriers assigned to the fleet operate in the North Sea or Baltic areas, and that each of these contributes one squadron of A-6s to deep penetration missions, an additional 48 carrier-borne aircraft are included, for a total of 72. A-7E aircraft might also be used nuclear-strike missions, though with less reach and diminished effectiveness. Carrier-borne capability could be increased quickly with reinforcements. A total of about 240 A-6 aircraft are slated to be upgraded to A-6E variants, with highly sophisticated avionics to allow for long-range precision bombing.

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ing East-West tension, a greater commitment of economic resources devoted to military development and procurement than at present, and efforts by the U.S. (and the Soviet Union, in the case of Table II) to maximize force loadings consistent with SALT strictures. The 1985 High Estimate assumes Western deployment of long range cruise missiles (LRCMs) account for the bulk of Western European-NATO growth during the 1978-1985 period. The 1985 Moderate Estimate, in contrast, includes an estimated 108 U.S. *Pershing* IIXR theater ballistic missiles, but does not include any ground launched cruise missiles (GLCMs) or ship launched cruise missiles (SLCM). An entirely new U.S. mobile medium-range ballistic missile (MMRBM) is possible in the late 1980s.

Table II presents corresponding data on Soviet nuclear forces. Again there are three classes of figures, but these differ from those in Table I. Figures for Soviet central strategic systems do not include any deletions for weapons committed to European targets. Apart from central strategic forces, Soviet LTN forces are separated into two categories: those dual-theater nuclear delivery systems with ranges in excess of 400 miles but deployed outside as well as inside the European theater and those deployed exclusively in the European theater. This distinction allows the first category to be reduced by an estimated factor to obtain the numbers deployed in the European mode. This is a rough estimate at best and does not take into account redeployment. However, it is useful to note that with minor shifts (SS-5 and SS-12) the second and third parts of Table II do become synonomous with those of Table I.

Table 2
Soviet Central Strategic & Long Range Theater Nucelar Capability: Deliverable Warheads

	Weapons per Vehicle	1978		1985 moderate		1985 high	
		Launchers	RVs	Launchers	RVs	Launchers	RVs
Intercontinental (central) strategic							
SS-N-18 SLBM (early)	3	48	144	376	1,128	0	–
SS-N-18 SLBM (late)[a]	10	0	–	0	–	376	3,760
SS-N-17 SLBM	1	12	12	396	396	396	396
SS-N-8 SLBM	1	346	346	180	180	180	180
SS-N-6 SLBM Mod. 3	1	528	528	0	–	0	–
SS-N-5 SLBM	1	21	21	0	–	0	–
SS-X ICBM (SS-19 replacement)	10	0	–	100	1,200	150	1,500
SS-XX ICBM (SS-11 replacement)	1	0	–	200	200	200	200
SS-19 ICBM	6	200	1,200	370	2,220	320	1,920
SS-18 ICBM (lo-MIRV)[b]	8	110	880	240	1,920	0	–
SS-18 ICBM (hi-MIRV)[b]	10	0	–	0	–	240	2,400
SS-17 ICBM	4	60	240	110	440	110	440
SS-16 ICBM[c]	1	0	–	0	–	0	–
SS-13 ICBM	1	60	60	0	–	0	–
SS-11 ICBM[d]	1	780	780	105	105	81	81
SS-9 ICBM	1	190	190	73	73	73	73
Bomber-X (hypothetical, W/ALCM)[e]	24	0	–	0	–	50	1,200
Tu-(26) BACKFIRE w/ALCM[f]	14	0	–	0	–	74	1,036
Tu-95 BEAR	4	100	400	100	400	0	–
Mya-4 BISON	4	35	140	0	–	0	–
Totals		2,490	4,941	2,250	8,262	2,250	13,186
Dual-Theater Nuclear Delivery Systems with a Range/Radius Greater Than 400 n.m. (250 n.m. for SLBM/SLCM)							
SS-20 IRBM[g]	3	50	150	275	825	400	1,200
Tu-(26) BACKFIRE (LRAF)[h]	4	80	320	175	700	350	1,400
GOLF-I SSB w/SS-N-4 SLBM[i]	1	27	27	0	–	0	–
GOLF-II SSB w/SS-N-5[i]	1	33	33	0	–	0	–
SS-N-3/12 SLCM[j]	1	324	324	296	296	384	384
SS-12 SSM[k]	1	72	72	0	–	72	72
SS-4 MRBM	1	500	500	300	300	300	300

Table 2 *(continued)*
Soviet Central Strategic & Long Range Theater Nucelar Capability: Deliverable Warheads

	Weapons per Vehicle	1978		1985 moderate		1985 high	
		Launchers	RVs	Launchers	RVs	Launchers	RVs
SS-5 IRBM	1	90	90	50	50	50	50
Tu-16 BADGER (LRAF)[l]	2	305	610	0	—	305	610
Tu-22 BLINDER (LRAF)[m]	2	136	272	136	272	136	272
Totals		1,617	2,398	1,232	2,443	1,997	4,288
European Theater Nuclear Delivery Systems with a Range/Radius Between 400 and 1000 n.m.							
Su-(19) FENCER A	2	190	380	250	500	250	500
I1-28 BEAGLE	1	100	100	0	—	0	—
MIG-27 FLOGGER B/D/F	1	200	200	300	300	300	300
Su-17/20 FITTER C	1	200	200	300	300	300	300
Totals		690	880	850	1,100	850	1,100
Grand Totals		4,797	8,219	4,332	11,805	5,097	18,574

Notes to Table 2: These figures, which must be regarded as provisional, represent the authors' best estimates drawing from publicly available data. Relied upon primarily is *The Military Balance 1978–1979,* although some additional authorities are noted below.

Introductory Definitions and Notes:

RVs and *Range Classification:* Refer to the first two notes to Table 1. Note, in addition, that in the absence of a SALT II limit on fractionation, the Soviet advantage in ICBM throw-weight theoretically could be exploited to increase beyond 10 the number of MIRVed warheads carried on large missiles such as the SS-18.

1985 Moderate and 1985 High Estimates: Both estimates assume a SALT II Treaty is agreed to, ratified by the United States, and that the Treaty remains in force through 1985. An overall limit of 2250 strategic nuclear delivery vehicles (SNDVs) is thus assumed in this Table, effective in 1980 or 1981. Sublimits of 1200 MIRVed ICBMs and SLBMs (1320 including cruise-missile equipped bombers) are also assumed. And, accordingly, the Soviet Union is assumed to be allowed to deploy one new MIRVed ICBM (referred to as the *SS-X* in the Table) and one new single-RV ICBM (the *SS-XX*). If the *Backfire* is equipped with an air-launched cruise missile (*ALCM),* it is counted as a strategic nuclear delivery vehicle against the SNDV ceiling. Generally, both the *moderate* and *high* projection assume the Soviets will seek to increase sea-based deliverable warheads, by equipping a large portion of its ballistic missile submarine force with MIRVed SLBMs, and both estimates assume a continuing modernization program. The *1985 high* estimate is premised upon proportionately greater development effort and higher expenditures throughout the 1979–1985 period. Thus, for example, while the *1985 moderate* estimate credits the SS-N-18 SLBM with 3 RVs, the *1985 high* estimate allows for 10 warheads per MIRVed SLBM. And, only the latter estimate assumes a Soviet ALCM or a new Soviet bomber (*Bomber-X*).

Dual-Theater Nuclear Delivery Systems: Each of the weapons in this category have peripheral attack capability such as to allow use against targets other than those located in the European theater. Some portion of these forces, in the aggregate, are probably dedicated to countering other potential peripheral threats or otherwise held in reserve. In our analysis in the text, we suggest

that one-third of these dual-theater forces may be considered as directed against non-European targets; this estimate may be wrong in either direction. Note that the SS-20 and *Backfire* may have some potential capability against targets in the continental United States. *See* note 4 to text.

European Theater Nuclear Delivery Systems: These figures for tactical aircraft represent the authors' estimate of the number of such aircraft capable of nuclear-attack missions deployed in either the Western Military Districts of the U.S.S.R. or Eastern Europe. Many uncertainties contribute to the possibility that these estimates are in error in either direction. Among the uncertainties are: wide variation in Western published data concerning deployments; the possibility of redeployment and reinforcement, availability of aircrews trained in nuclear weapons delivery techniques; and the difficulty in estimating future Soviet production plans.

a. The SS-N-18 SLBM has not been tested with ten warheads, but fractionation to ten RVs could be achieved, in theory at least, by 1985. The U.S. *Poseidon C-4* SLBM has been tested with as many as 14 warheads.

b. *The Military Balance 1978–1979* indicates the Mod. 2 warhead for the SS-18 contains eight 2 MT. warheads. While some SS-18 may carry the Mod. 1 re-entry vehicle (a singlet warhead of 18–25 MT. yield), all SS-18s are assumed MIRVed. To the authors' knowledge, the SS-18 has not been tested with ten RVs, but the high throw-weight (16–20,000 lb.) of this "heavy" ICBM is sufficient to carry many more RVs than the ten reportedly allowed by SALT II.

c. The mobile SS-16 ICBM has been produced and is ready for deployment in silos, but reportedly the Soviet Union has agreed at SALT II not to deploy this system. *See* note 4 to text.

d. Some SS-11 ICBMs may be directed towards targets on the periphery of the Soviet Union. In addition, some SS-11 may be equipped with the Mod. 3 re-entry vehicle with a triplet MRV. *The Military Balance 1978–1979* reports the SS-11 force is converting to SS-17 and SS-19, both of which have been tested with MIRVs and hence will be counted as MIRVed delivery vehicles for SALT II purposes.

e. At present there has been no official confirmation of the development or even the existence of either a new Soviet bomber or a Soviet ALCM, although the fiscal 1979 Department of Defense Posture Statement anticipates both and notes a Soviet ALCM is expected within 5–10 years. It is assumed a new bomber with ALCM would fall within SALT II limits on SNDVs and within the 1320 ceiling on MIRVed ICBMs, SLBMs and cruise missile-equipped aircraft.

f. While it is not expected that the *Backfire* will be covered by the SALT II agreement, and instead would be subject to certain "collateral restraints" on basing and refueling (for example), it is assumed that a *Backfire* equipped with (as yet hypothetical) ALCMs would come within SALT II restrictions.

g. The estimate of 50 deployed SS-20 IRBMs represents a compromise figure. *The Military Balance 1978–1979* contains an estimate of 100, a figure which seemed high to the authors as initial deployment was confirmed by the Defense Department only in December, 1977. Another source contained a figure of "20+" deployed as of March 1978. *Air Force Magazine,* at 52 (March, 1978).

h. The estimate of 80 *Backfire* is also a compromise figure, and includes only those aircraft assigned to the Soviet Long Range Air Force (LRAF) but not *Backfire* in service with the Soviet Naval Air Force (NAF). *The Military Balance 1978–1979* estimates 50 *Backfire B* deployed with LRAF, and 30 with NAF. *Air Force Magazine* indicates delivery of about 100 of the aircraft to the LRAF and the NAF (one-third to the latter). The *1985 moderate* figure of 175 assumes *Backfire* production limits of about 2.5 aircraft per month through to mid-1985, with one-third of these aircraft going to the NAF. The *1985 high* figure of 400 assumes production at between 2.5 and 3.0 per month for the duration of the SALT II Protocol period and production at a rate of about 90 per year thereafter. Two-thirds of the aircraft produced are assumed assigned to the LRAF.

i. The SLBMs on these submarines are not considered strategic missiles for purposes of the SALT I limits. *See* note 2 to text. Some *Golf*-class SSBs (diesel-powered ballistic missile submarines) are known to be based in the Baltic. These SSBs are assumed retired by 1985.

j. The SS-N-3 *Shaddock* sea-launched cruise missile is thought to be guidance-limited to a range of about 250 n.m., and can carry a thermonuclear warhead of about 1 MT. yield. Some of these missiles are probably intended for maritime targets rather than land-attack. A successor

missile under development, the SS-N-12, is expected to have slightly better range and accuracy. The figure of 324 launchers assumes 29 *Echo II* SSGNs (nuclear-powered cruise missile submarines) with eight missiles per boat, 16 *Juliett*-class SSGs (diesel-powered) with four missiles per boat, six *W-Long Bin* SSGs with four missiles per boat, and two *W-Twin Cylinder* SSGs with two missiles per boat. The *1985 moderate* figure assumes the older *W*-class boats are retired and not replaced; the *1985 high* figure assumes construction of an additional eleven *Echo II*-type SSGNs, and retirement of the *W*-class boats. Neither estimate includes SS-N-3/12 launchers on surface ships, on the premise that counting *all* of the SLCMs on SSGNs or SSGs balances out that portion of the missiles on Soviet surface ships which might be used to attack land targets.

k. The SS-12 SSM has a maximum range of about 450 n.m., according to published estimates. Forward deployment in Eastern Europe would be required to achieve significant target coverage of Western Europe.

l. Not included in this figure are the approximately 280 TU-16 attached to the Soviet NAF, or 94 configured for electronic countermeasures (ECM) or 22 configured for reconaissance. (These figures are drawn from *The Military Balance 1978–1979*, which estimates 75% of the TU-16s with the LRAF are based in European Russia). Another source indicates that 283 TU-16s are oriented toward the European theater, 203 of these bomber versions (the remainder being tankers, ECM or reconnaissance aircraft), with 144 oriented to China. *See* R. Berman, *Soviet Air Power in Transition* (Brookings, 1978).

m. The 40 TU-22s attached to the NAF are not included in this figure. Also excluded are TU-22s configured for reconnaissance. Berman, *op. cit.*, estimates 98 TU-122s attached to LRAF are oriented towards European targets.

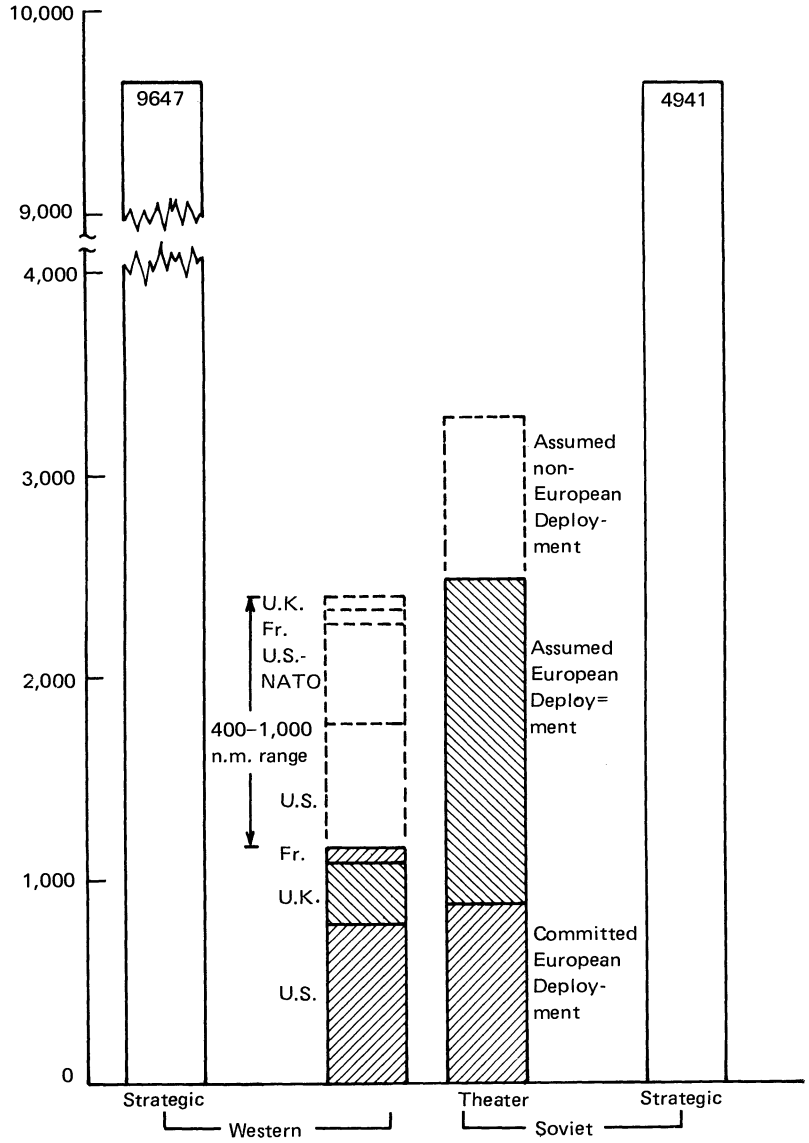
No non-Soviet (i.e., WPO) systems are included, though there is some possibility Pact aircraft could be used on nuclear missions as there have been published reports suggesting some Pact air crews have been trained in nuclear attack delivery techniques. Estimates of Soviet central strategic force loading in 1985 assume a SALT II limit on extensive fractionation of MIRV loadings. We assume no more than ten RVs on any deployed ballistic missile. It is also assumed that SALT II allows the Soviets one new MIRV'd ICBM (the SS-X ICBM in the Table, replacing the SS-19) and one new un-MIRV'd ICBM (the SS-XX ICBM in the Table, replacing the SS-11).

All figures are drawn exclusively from public sources and represent the authors' own estimates, where differences occur. The IISS publication, *The Military Balance—1978-1979*, has been the principal source. Most figures used are approximations of forces in place as of July 1978. See also Notes to Tables.

An attempt to interpret some of the data in Tables I and II is presented in Figures 1-3.

In Figure 1 the 1978 estimates of deliverable warheads are sketched. The outermost bars represent the central strategic inventory of the U.S. and the U.S.S.R. In the center are the LTN forces. On the left is shown the Western deployments: 1,238 (shaded) plus 1,162 of shorter range which we argue should not be included in the LTN comparison because of the geographical asymmetry discussed earlier. On the right is shown the Soviet/Pact deployments. These consist of the

Figure 1
Comparison of Long Range Theater Nuclear Delivery Capability (No. of Weapons)—1978



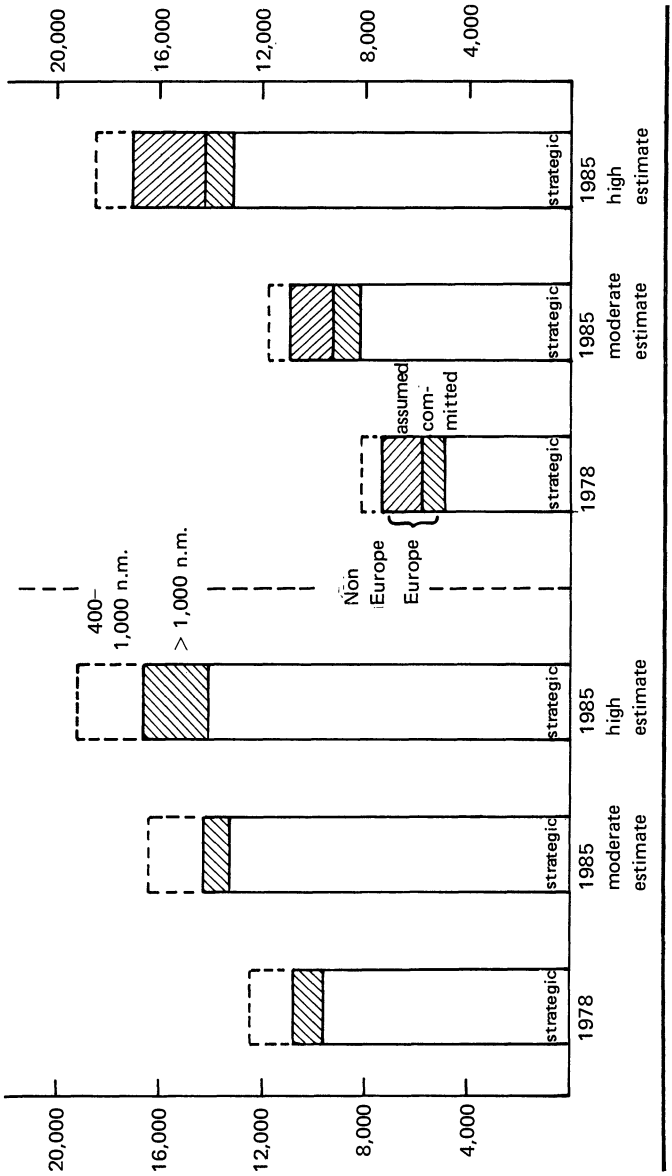
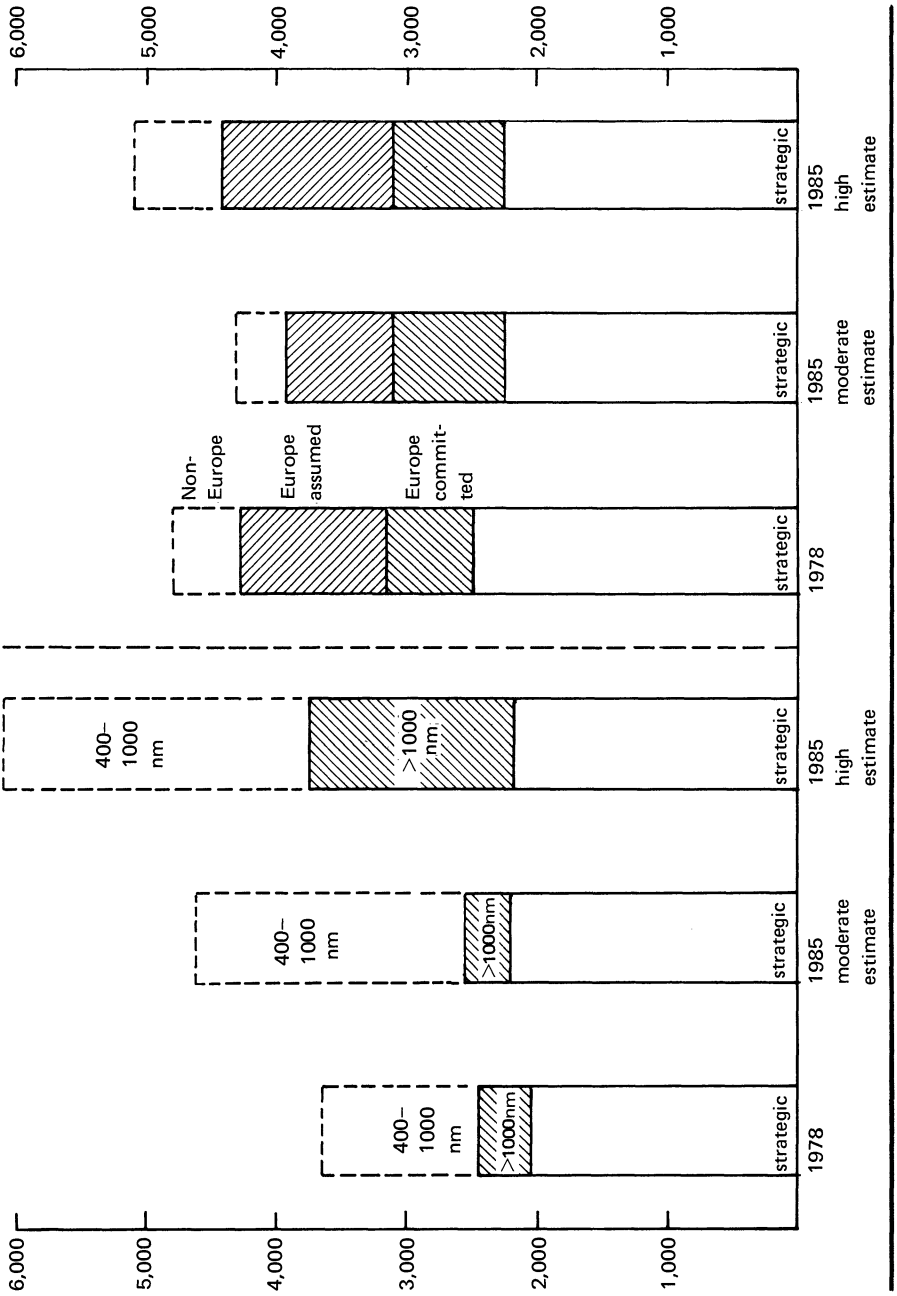


Figure 2
Western strategic and long range European theater nuclear weapons

Figure 3
Western strategic and long range nuclear-capable delivery systems



Soviet strategic and long range theater nuclear-capable delivery systems

warheads deliverable by European committed systems, 880, plus that portion deliverable by the dual-theater systems. Our estimate is that two-thirds of this latter number, i.e., 1,600, are deployed in the European theater, although this is a very rough figure. On this basis the LTN forces could deliver 2,480 warheads, corresponding to the shaded area of the bar. From this perspective the Soviet/Pact LTN forces are clearly dominant. However, if the range difference arising from geographical asymmetry had not been introduced, the number of deliverable warheads would have been comparable.

Figure 2 displays the 1978 data on deliverable warheads from Figure 1 and the two 1985 projections for both sides. The European LTN weapons are added to the central strategic weapons in each case. A substantial growth potential is evident. In 1985 European LTN deliverable warheads would be brought into balance if Western forces met the High Estimate and Soviet forces met the Moderate Estimate or if the West replaced many of its shorter range systems with longer range systems.

Figure 3 presents corresponding data for launchers. Here the central strategic systems are restricted by SALT and remain nearly constant and equal. The Moderate Estimates show a small reduction in the LTN forces (shaded areas) for both sides but a substantial growth in shorter range launchers (400-1,000 for U.S.-NATO. The High Estimate shows a very large growth in LTN delivery systems for U.S.-NATO and only about half as much on the Soviet side.

Before discussing the conclusions that can be drawn from these data it is useful to restate the inherent uncertainties, some of which could be reduced with better intelligence than is publicly available.

1. Some of the 1,238 weapons on the Western side deployed in delivery systems of 400-1,000 n.m. range may be useable in a long-range mode in one-way missions or from basing further forward.
2. Reinforcements from outside the European theater and the reload potential for launchers have not been included.
3. Not all of the national forces (U.S., U.K. and French) may be committed.
4. The assumed division of Soviet forces (two-thirds European oriented) may be wrong in either direction.
5. The U.S.S.R. may have dedicated some of its strategic forces to European theater mission.
6. Either the U.S. or the U.S.S.R. may reassign other portions of their strategic forces to the European theater.
7. Unequal air defense capability may diminish bomber effectiveness more on one side that the other.

8. Preemption, lack of readiness, defensive measures or delay in nuclear weapons release, and other operational or doctrinal factors may diminish the actual wartime delivery capability well below the theoretical maximum.

With the reservations in mind that these uncertainties produce, several tentative conclusions can be drawn concerning the present LTN force balance (figure 1) in Europe:

1. When target asymmetry with respect to the north-south border is taken into account the Soviet-Pact forces have a clear numerical advantage measured in terms of deliverable warheads. This means they have a superior capability, measured in deliverable warheads to reach the major targets relevant to both war fighting and deterrence in Europe.

2. However, if target asymmetry were ignored there is a rough parity with respect to both deliverable warheads and launchers. Thus in terms of deliverable warheads at ranges beyond 1,000 miles the Tables show, after shifting the SS-5 and SS-12, the Soviet-Pact side to have 1,490 and the U.S.-NATO side 1,162. In the 400-1,000 n.m. range the numbers are 988 and 1,238, respectively.

3. The Soviet LTN warheads constitute a much larger fraction of their worldwide deliverable warheads than is the case for the West. Numerically this is due to the larger total number of warheads in the U.S. inventory but it may also reflect the emphasis in Soviet force structure to Western European targets relative to more distant targets.

4. The Soviet preponderance in LTN forces noted in 1) may simply be a consequence of the requirements of NATO's doctrine of flexible response or the Soviet preference for longer range weapons because of their perceived political and deterrent advantage.

5. As mentioned earlier, the numbers of weapons are extremely high for any rational requirement and many thousands of additional weapons with ranges of less than 400 miles have not been included in this inventory. Even with severe attrition in delivery systems a very small fraction of the warhead inventory could decimate Europe and Western U.S.S.R. With this insensitivity of numbers to requirements a variety of reduction schemes would appear possible if arms control could be negotiated.

The projections forward to 1985 (Figure 2), however, indicate a substantial growth in these forces. On the Western side growth may be concentrated in shorter range weapons (Moderate Estimate) or both cagegories could approximately double (High Estimate). The Soviet growth could range from quite small

(Moderate Estimate) to 50 per cent (High Estimate). Thus, restraints in this projected growth are an obvious objective for arms control negotiations if undertaken soon.

A comparison of Figures 2 and 3 show a lack of proportionality between warhead numbers and launcher numbers in the aggregate. Thus if launchers remain the point of control the limits on loadings of launchers will have to be carefully negotiated. With aircraft and cruise missiles this could be a nearly impossible undertaking because of the variable loading of aircraft and the verification problems which cruise missiles present. Thus the possibilities of other means of control deserve early examination.

The Prospect for Arms Control Gray Area Systems

Today there is a rough parity in the central strategic balance. The major decision confronting the Western alliance is whether the asymmetrical situation in long-range theater nuclear target coverage, favoring the Soviet Union, is of such political and military significance as to bar any arms control initiatives until Western programmatic action can redress this imbalance. It is the authors' view that the significance of the Soviet advantage is tempered by the expectation that to a large extent the target sets for United States central strategic forces and Western LPN forces overlap. Moreover, arms control initiatives may be used in conjunction with measured programmatic action. The near-term objective of arms control strategies in the gray area should be to encourage the political and military circumstances which will facilitate achievement of an approximate balance in LTN force as measured by target coverage. In this context the next objective of arms control should be to maintain this balance at a successively lower increment of future growth and thus at lower economic costs, lesser risks of action-reaction acceleration and greater political stability. Whether the present Soviet advantage requires Western programmatic action prior to pursuit of arms control initiatives ultimately will require an alliance decision. It is our view that deployed Western LTN forces, together with the U.S. central strategic arsenal can meet the requirements of deterrence at both the theater and intercontinental levels and that this should be the basis of planning. If this is done, the crucial question to resolve in the early stages of East-West arms control discussions is whether a ceiling and later reductions that would cover Soviet launchers that can target all of Western Europe is negotiable. If not NATO may wish to seek this goal by new programs of its own. Despite the outcome on this issue,

however, negotiations could proceed on constraining growth and subsequent negotiations of ceilings as soon as NATO positions could be agreed upon following a SALT II agreement.

Over the long-term, gray area arms control should seek *reductions* in deployed LTN forces. But, reductions will have to come later not only because growth restraints and ceilings come first logically but because the LTN forces of the West are at present highly stressed since most of NATO's medium- and intermediate-range delivery capability is provided by dual-capable, multi-role tactical aircraft which play important roles, other than that of deep-penetration in interdiction and battlefield support. Thus to negotiate early reductions in existing Soviet forces—particularly the SS-20—might come at too great a cost to Western military capabilities in the theater.

Hence it is abundantly evident that arms control in the gray area will be a formidably complex task. Apart from the asymmetries in currently deployed forces, the difficulty of measuring the LTN balance and verifying what is to be controlled there remain a number of extremely difficult and intricate political and technical impediments to be considered and overome.

Political Impediments to Gray Area Arms Control

WESTERN EUROPEAN INVOLVEMENT

Any serious arms control initiative, whether in negotiations or otherwise, must be preceded by a planning phase in which options are defined and analyzed, and a decision-making phase in which one or more options are selected for action. Prior to either phase it is desirable, if not necessary, to achieve within the West a general consensus on the aim, direction, and limits of the Western arms control strategy. This consensus has been difficult to achieve in the U.S. over the last decade; it will be even more difficult to achieve when Western Europe (and other allies, such as Japan) are involved. Obtaining a consensus within Western Europe will itself be quite difficult because of inherently different outlooks, different assessments of acceptable risks, different attitudes toward and strategies for the employment of nuclear weapons. And, despite its 30-year history, NATO lacks experience in developing a political consensus and in making alliance decisions collectively in the area of East-West negotiations affecting nuclear weapons —an area where grave issues of national security and survival are at stake.

Yet, there is evidence that the planning phase is getting underway in the West. Useful discussions of arms control in the gray area took place in the summer of

1978 (see footnote at the beginning of this article and Aspen Institute Berlin Workshop Report by R. Metzger, 1978). And governmental discussions began in the High Level Group of the NATO Planning Group in October, 1978.

Of course, this represents only a beginning. Further difficulties will arise when Western Europe and the U.S. begin to develop a common position. The much greater military power and military technological advantage of the U.S., the greater and more imminent risk of destruction faced by the Western Europeans and the fluctuating degrees of confidence in the U.S. strategic umbrella will all converge to complicate the later stages of decision making.

THE SPECIAL CIRCUMSTANCES OF THE FEDERAL REPUBLIC OF GERMANY

While consensus building must contend with the French allegiance to an unfettered, independent nuclear policy and the British insularity, it is West Germany that faces the greatest difficulties and constraints in finding an appropriate role in such an enterprise. The Federal Republic bears the greatest burden of NATO's peacetime defense, and in the event of war, it can expect disproportionately heavy devastation. Yet alone among the three great European powers it has no independent nuclear deterrent—only the guarantees of the U.S.[26] and the U.K. and the prospect of French involvement in a common cause. The opposition to West Germany becoming a nuclear power is overwhelming; the U.S.S.R.[27] and France[28] are resolute; the U.K. and the U.S. are of the same mind but less outspoken and, there is no serious, substantial desire that it be otherwise within the Federal Republic, as its adherence to the Non-Proliferation Treaty testifies.

Nevertheless, some in West Germany feel the burden of this asymmetry most

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26. Part of the American guaranty to the Federal Republic is the provision of U.S. tactical nuclear warheads to certain F.R.G. weapon systems on a dual-key basis.

27. A cornerstone of Soviet policy towards NATO has been the limitation of West German military strength. Soviet insistence on "national subceilings" on conventional forces at MBFR is an example of this policy. Historically, Soviet opposition to a NATO multilateral nuclear force, or MLF, was based upon concern MLF would lead to West German nuclear capability. *See generally*, Thomas W. Wolfe, *Soviet Power and Europe 1945–1970* (Johns Hopkins Press) at 113–116 (MLF), 406, 488 (1970).

28. French President Valery Giscard d'Estaing, in an interview broadcast on February 9, 1978, was unequivocal on this point:

> First, one essential point. France is opposed to any direct or indirect possibility of the nuclear arming of Germany. This represents a fundamental concern for us and moreover it's a pledge by West Germany.

Interview of Valery Giscard d'Estaing, President of the French Republic at the Elysee Palace, Broadcast on February 9, 1978, Release 78/12 of the Press & Information Division, French Embassy to the U.S., p. 15.

keenly and there is a yearning that a European land-based deterrent against a Soviet attack be given higher priority and that they be a part of it. Concerns such as those voiced by CDU shadow defense minister, Manfred Wörner, that the Soviet Union not be allowed to remain a sanctuary in a European war, call for a reply.[29] In this situation, the promise of "deep penetration" capabilty inherent in West German-based dual-key nuclear-armed long-range cruise missiles or intermediate-range ballistic missiles, or in their conventionally armed counterparts, have a considerable attraction to many in the Federal Republic.[30] Too many concessions by the U.S. towards satisfying this interest in a deep-penetration capability would risk Soviet alienation and a souring of detente at least. Too small a U.S. response to these interests and anxieties might prompt West Germany to consider pursuit of an independent course toward nuclear armament, or conventionally-armed cruise missiles, or to diplomatic adventurism that would strain the Atlantic Alliance.

The stress inherent in this situation makes any move in the gray area more risky than it would be otherwise and dictates that the Federal Republic, despite its non-nuclear status, be a full partner in the planning—decision-making—negotiating sequence. And this in turn suggests high priority be given to the upgrading of assessment and analysis capability of West Germany as well as other NATO allies, if arms control in the gray area is to be fairly examined as an alternative policy for the West.

INCENTIVES FOR THE U.S.S.R.

A principal reason for the failure of MBFR negotiations in Vienna to achieve any result after five years seems to be the absence of any incentive for the Soviets to negotiate away the substantial numerical advantages they have in several aspects of conventional military force in Central Europe. Before venturing into arms control negotiations affecting gray area systems, the West should be sure to identify incentives sufficiently attractive for the Soviet Union to provide a basis for

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29. *See* M. Wörner, *NATO Defenses and Tactical Weapons, supra* note 9.
30. Among the options available there may be responses to F.R.G. concerns short of an independent West German deep-strike force are: increasing the number of *Poseidon* SLBMs under SACEUR command; deployment of SLCMs on U.S. attack submarines with SLCM employment under SACEUR command; deployment of SLCMs on theater-dedicated submersible platforms under joint U.S.-FRG control (on a dual-key basis); deployment of expanded range versions of the present *Pershing* ballistic missile (the so-called "*Pershing IIXR*") under U.S. or joint U.S.-FRG control; deployment of a new mobile, medium-range ballistic missile (MMRBM) under U.S. or joint control; or deployment of GLCMs in West Germany, again either under sole U.S. control or joint command.

Soviet willingness to make concessions. It would represent a considerable advance if the U.S.S.R. were to find sufficient incentive in the classical benefits ascribed to arms control: greater stability and reduced likelihood that war will break out; lower levels of damage if war occurs, lower military costs and lowered tensions. However, experience tends to show that more is needed to induce genuine Soviet interest in arms control. Gray area arms control might proceed by seeking to trade restrictions on what each side fears most.

In the present situation such a paired set of fears seem to be emerging. With the continued deployment of *Backfire* and SS-20 the Soviet Union is increasing its threat to targets in Western Europe. With the evolution of a practical long-range cruise missile capable of a variety of launch modes from many sites, and the emergence at the planning level of an extended-range *Pershing* or an entirely new mobile theater ballistic missile, the West is on the verge of a major increase in theater-based capability to threaten the western Soviet Union.

It will be unfortunate if this drama is played out to its bitter, expensive and risky end. The costs and risks of a potentially futile competition provide incentives on both sides to test the waters of arms control in the gray area. Chairman Brezhnev, during his state visit to the Federal Republic of Germany in May 1978, reportedly expressed willingness to negotiate with the West over "gray area" weapons, including medium-range missiles as an example.[31] After full discussion with its Western European allies and Japan, the United States should seek to discern the Soviet position in greater detail and devise an appropriate strategy.

THE NEGOTIATING FORUM

The direct impact of gray area weapons on Western European security requires a change in the structure of East-West arms control negotiations. Consultation as it has existed in the past must be replaced with a mechanism which provides for more active and more substantial Western European participation. In recognition of increasing Western European interests, some analysts have recommended treatment of gray area issues in a third arms control forum. These "Theater Arms Limitation Talks," or TALT, would allow for direct Western European participation in a multilateral forum.

However, on balance a multilateral third forum appears undesirable at this time. As borne out from the experience at MBFR, establishing procedures and defining the boundaries for a new multilateral forum could be expected to take

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31. *Washington Post*, May 10, 1978, p. 24.

years. And, TALT would seem to require French participation which is extremely improbable, especially at the outset.[32] Moreover, another potential defect is that it would require the U.K. and France, if participating, to place their entire strategic nuclear forces on the negotiating table, while the Soviet Union would be negotiating only an increment of its much larger nuclear arsenal. Should either Britain or France decline to participate in TALT, the result could be a serious breach in the Alliance. And, even if TALT were convened with full Western participation, the Soviets could be expected to exploit Western differences at TALT to drive a wedge into NATO.

Because Western European nations have little if any margin of excess capability with which to negotiate—but only uncertain *potential* capabilities—it appears probable that the United States will have to bear the initial responsibility for gray area arms control initiatives. Since such initiatives would involve primarily (if not exclusively) American systems, presently deployed and forthcoming, it would be convenient to treat gray area issues as part of a revamped SALT structure. But, the introduction of gray area issues into SALT III has attendant risks. The complexity of the gray area, unless skillfully managed, could lead the entire SALT process into an impenetrable impasse. While some observers propose that gray area systems should be kept out so that SALT III negotiations can address ICBM vulnerability, further delivery system reductions and qualitative restraints on strategic weapons development, the evidence summarized at the beginning of this paper argues that gray area arms control cannot be put aside if the SALT process is to go forward. At the expiration of the SALT II Protocol in the early 1980s, decisions on deployments of long-range cruise missiles may be forced upon the U.S. and Western Europe. The question of further cruise missile deployment will then be decided either as an exercise in arms control or in arms competition. Further, rising political pressures from Western Europe will make it impossible to ignore gray area weapons in SALT III negotiations. And, the

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32. In part, French opposition to SALT reflects the French government's official critique of the Eurostrategic balance concept. *See* text and accompanying notes 15–17, *supra* at —. France has proposed convening a European conference on disarmament from the Atlantic to the Urals—which would deal with conventional weapons only.

Gray area issues conceivably could be treated within MBFR, but this course would require renegotiation of the agreed-on "reductions area" to take into account systems based on Soviet soil. In view of the protracted negotiations which were required to reach agreement on the present "reductions area," to seek to redraw the MBFR boundaries is a prescription for delay, if not deadlock, and would deprive MBFR of whatever chance there is now for agreement. By taking gray area issues entirely out of MBFR there may be an improved opportunity for MBFR to be redirected towards measures to reduce the risk of surprise attack.

Soviet Union may demand inclusion of gray area issues if the East-West nuclear arms control process is to continue.

Therefore, the most attractive alternative would appear to proceed with SALT on two parallel tracks. Should the Soviets concur, one track might address further reductions in or limitations on central strategic forces and steps to limit land-based ICBM vulnerability. The second track could pursue measures designed to restrain future growth of LTN weapons. Initially, with U.S. weapons the only ones on the Western side to be limited the Western European involvement could be in the form of an "antechamber" structure—whereby the U.S. would first negotiate with Western European representatives (in consultation with Japan), and then, as "emissary," present an agreed upon position to the U.S.S.R. and negotiate within agreed upon guidelines with continuous on-the-spot consultation.

Technical Impediments to Gray Area Arms Control

New military technologies can generate new gray area weapons almost without limit. The current contribution, the cruise missile with effective multi-mission, conventional or nuclear, capabilities and a very small physical size has already caused very special problems. The advent of these weapons has resulted in a blurring of distinctions between "theater" and "strategic" weapons which, though always somewhat artificial, have facilitated a separation of issues into different arms control forums.[33] At a two-track SALT III, new military technologies will make it difficult to allocate issues and particular systems to one or the other track. This will almost certainly generate intense disagreements on "counting rules," and ultimately may frustrate verification objectives. The possibility of intractable problems arising in negotiations affecting gray area weapons, however, suggests that these forces should be brought into SALT only if segregation of central strategic issues can be achieved and maintained.

COUNTING RULES, ASSESSMENT AND VERIFICATION

While our analysis, as a point of departure, seeks to evaluate the LTN balance in terms of deliverable weapons, a more sophisticated counting scheme will have to be devised should a comprehensive, negotiated agreement limiting gray area weapons be sought. The multi-mission capabilities of many gray area weapons will have to be taken into account. There will be pressure to insert many variables

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33. *See*, R. Burt, "The Cruise Missile and Arms Control," *Survival*, pp. 14–15 (Jan./Feb., 1976). R. Burt, *New Weapons Technologies: Debate and Directions*, Adelphi Paper No. 126, p. 24 (1976).

into a negotiated gray area counting scheme. While delivery systems might be weighed by the number of warheads assumed carried and to the great diversity of systems involved, the risks and ambiguities inherent in warhead estimation suggest such an approach will be difficult to manage in negotiations. And ths will be further complicated by efforts to accommodate asymmetrical geographic situations and the variable range of many delivery systems so as to move toward more nearly equivalent target coverage. Other difficulties will arise from reinforcements, systems deployed outside the theater but readily introduced into it.

The complexity of counting rules could easily become staggering if all relevant factors were to be taken into consideration. This should not be necessary, however. Initially, a negotiated approach to reducing the growth rate of gray area weapons could involve a baseline figure of systems presently deployed or in production weighed by two or three key factors, for example, range, warheads and whether or not dual-capable. From this baseline ceiling an initial common ceiling could be agreed upon, with defined rates of growth (or no-growth, or reductions). Beyond this, modernization and replacement conventions would have to be established. Even at this level, the procedure presents considerable difficulty and verification will be excruciatingly complex.

By their nature, many weapons in the gray area have ambiguous capabilities, mobile and hence concealable, and may be redeployed rapidly and perhaps covertly. Thus verification of compliance with agreements will be much more difficult than in SALT I and II. Ironclad verification, of the sort the U.S. Congress has insisted upon for SALT may not be possible[34] even with considerable innovation. However, some aspects of the verification problem may not be intractable, as in theory conventions could be reached concerning aircraft and missile basing. Whether or not SALT III includes the gray area, many of the same verification problems will arise since cruise missiles and mobile ballistic missiles are already subject to limitations in SALT II.

Alternatives to Negotiated Gray Area Arms Control

Even the most optimistic observers must doubt whether gray area arms control negotiations, with complexities that seem to exceed those of SALT can keep pace

34. *See generally*, R. Perry, "Verifying SALT In the 1980s, in *Adelphi Paper No. 141*, pp. 15–24 (1978); J. Harris & W. Bajusz, "Arms Control and Gray Area Systems," *Air Force Magazine*, pp. 36–38; R. Perry, *The Faces of Verification: Strategic Arms Control for the 1980s*, RAND Report P-5986 (Aug., 1977).

with the demands imposed by rapid technological change.[35] Therefore, in conclusion, we turn to the oft-recommended, but little used, alternative of non-negotiated arms control initiatives.

If gray area systems cannot be brought into the arena of negotiated arms control some arms control objectives may be met in part, and indeed more promptly, by attempting to limit Soviet deployments of particular systems by coupling the West's deployment of an equivalent system to the rate of Soviet deployment. The reciprocal threats generated by Soviet SS-20 ballistic missiles and a variety of long range cruise missiles deployed in Western Europe illustrate the basis for such a coupling.

Notwithstanding their limitations theater-based long range cruise missiles pose two difficult predicaments to the Soviet Union. First, they threaten to erase for a number of years much of the gains the Soviets have achieved in theater military capability. Second, they confront the Soviets with a choice: either to spend billions of rubles in hopes of developing a sophisticated low-altitude air defense system theoretically capable of destroying cruise missiles, or, admitting the penetrability of NATO cruise missiles and thereby compromising in part, their historic dependence on air defense.[36] Therefore, deployments of U.S. theater-based LRCMs (or IRBMs) could be linked to the size of that portion of the SS-20 force determined to be aimed at Western Europe. By a joint NATO-U.S. communication, for example, the West could declare that each SS-20 deployed beyond a certain baseline figure will be matched by the deployment in Western

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35. Technical and political barriers as well as the mixed results of negotiated arms control in the past suggest consideration of initiatives which do not require formal negotiations, at least initially. Negotiations tend to exaggerate narrow imbalances of forces, bringing into sharp focus the insecurities of the participants. The effect is to encourage a piecemeal appraisal of the military balances at issue. Entering into the negotiations process by itself tends to freeze deployments at existing levels, encourages developments of new systems to redress perceived imbalances in particular capabilities, and leads to development of "bargaining chips" which if credible become non-negotiable. *See,* Jane M. O. Sharp, "Is European Security Negotiable?" in *European Security: Prospects for the 1980s,* ed. D. Leebaert (Lexington: D.C. Heath, in press, 1979).

36. Anticipated U.S. deployment of ALCMs on board B-52s (or other cruise missile carriers) will pose the low-altitude threat to the Soviets regardless of NATO deployment decisions on GLCMs and/or land-attack SLCMs. Deployment of theater cruise missiles, however, increase the magnitude of the problem confronting the Soviets and would require additional investments to protect Eastern European theater assets, as well as greater defense coverage in the U.S.S.R. to account for the multiplication of cruise missile launch points and penetration routes. According to Undersecretary of Defense William Perry, defense against present generation cruise missiles would require the Soviets to spend $30–$50 billion for up to 100 AWACS-type aircraft, several thousand interceptor aircraft and up to 10,000 low-altitude capable surface-to-air missiles (SAMS), such as the SA-10 now under development. *See, Aviation Week & Space Technology,* Nov. 20, 1978, pp. 24–25.

Europe of, say, three long range cruise missiles or a comparable IRBM.[37] Should the Soviet Union fail to demonstrate "restraint by conditioned mutual example," the U.S. and NATO would retain complete flexibility to deploy without limit.

As a first step toward managing gray area competition, conditioned restraint has some advantages. It could be attempted relatively soon—after coordination with Western Europe and consultation with Japan—as it bypasses the structural, substantive and political problems attendant to preparing for and carrying out gray area negotiations. Moreover, if conditioned restraint were successful, it would contribute significantly toward maintaining a LTN force balance, and may foster an improved East-West climate that would favor further non-negotiated arms control initiatives. And, if conditioned restraint had some success but inevitably ran short of closely coupled systems, all parties would be better prepared to enter into negotiations on a broader range of gray area topics, first to codify and define the non-negotiated understanding, eventually to expand upon it.

37. Coupling could be calculated on the basis of deliverable warheads. Since the SS-20 carries a triplet MIRV, three (single warhead) LRCMs would be allowed for each SS-20 beyond the baseline.