Rand's New Calculus and the Impasse of US Defense Restructuring

Project on Defense Alternatives, Briefing Report #4
Carl Conetta and Charles Knight
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1. US Defense Restructuring at an Impasse

Much of current Pentagon force planning shares the premise that the challenges of the post-Soviet era require the United States to substantially improve on the military capability demonstrated in the 1990 Gulf War. A variety of prescriptions flow from this view: Hold the line on troop reductions as close as possible to the 1991 Base Force goals, put greater emphasis on the active component of America's armed forces, cut short the modernization "holiday" earned during the 1980s, boost strategic lift capacity, and increase readiness levels for a substantial portion of the force. Although seldom stated so succinctly, this program is at the heart of a variety of recent planning documents and studies produced at the behest of the Office of the Secretary of Defense (OSD), Joint Chiefs of Staff (JCS), or the individual services.[1]

Efforts to implement the Pentagon's program, however, are on a collision course with current budget targets. Implementation is feasible only if Congress and the Clinton administration are willing to forego the prospect of annual defense budgets lower than $250 billion (1994 dollars) after 1998.[2] (This level of annual expenditure would be 79 percent as high as the annual average for the years 1975-1989.) Whenever a serious, intractable mismatch develops between force structure and defense budget goals, the "hollowing" of the force becomes a distinct danger. However, the critical, unanswered question remains: Does the United States need as much active force capability in the post-Soviet era as the Chiefs contend? If not, the structure can be reduced and the danger of "hollowing" safely averted.

The controversial Rand Corporation study, *The New Calculus: Analyzing Airpower's Changing Role in Joint Theater Campaigns,* is only the most recent in the series of tracts presenting or supporting service views on defense restructuring. The touchstone documents remain the JCS' 1992 *National Military Strategy* and *Defense Planning Guidance* (DPG) study (which provided an explicit rationale for the 1991 Base Force). Together the 1992 documents define the themes that still dominate the defense policy debate:

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[1] Christopher Bowie, et al., *The New Calculus: Analyzing Airpower's Changing Role in Joint Theater Campaigns* (Santa Monica: Rand, 1993); National Defense Research Institute, *Assessing the Structure and Mix of Future Active and Reserve Forces: Final Report to the Secretary of Defense* (Santa Monica: Rand Corporation, 1992); General Colin Powell, *The National Military Strategy of the United States* (Washington DC: US Government Printing Office, 1992); Secretary of Defense, *Defense Planning Guidance* (Washington DC: Department of Defense, 1992); Joints Chief of Staff, *Mobility Requirements Study* (Washington DC: 1992).

[2] For an analysis of the end-of-the-century budget rebound see Paul Taibl and Steven Kosiak, *An Affordable Long-term Defense* (Washington DC: Defense Budget Project, 1993), especially Chapter 4. Also see Kosiak, "Averting a Return to Hollow Forces: Readiness and the Operations and Maintenance Budget," Defense Budget Project, June 1993.

- A new emphasis on regional conflicts and greater American military activism abroad,
- A need for the capability to conduct major regional conflicts (MRCs) anywhere in the world, at a pace much quicker than Operation Desert Storm (ODS), and on a unilateral basis, if necessary.
- Special attention in planning overall force levels to the requirements of fighting two MRCs concurrently (and on a unilateral basis, if necessary).

The 1992 *DPG* posits the goal of prosecuting a Southwest Asia war in 100 days -- from deployment decision to victory. In the DPG a war on the Korean peninsula requires five months; overlapping wars on the Korean and Arabian peninsulas require eight. Similar guidance surfaces in the 1991 JCS *Mobility Requirements Study* and the multi-volume 1992 Rand study on the future role of America's Reserve armed forces. The first of these studies measures strategic lift capability against a purported requirement to deploy 4 2/3 Army divisions anywhere in the world within *eight* weeks. (In Operation Desert Storm the Army needed 12 weeks to deploy a force this size.)

The 1992 Rand study assesses US Reserve armed forces against an assumed requirement to deploy to Southwest Asia a very large, offense-capable ground force as soon as available lift permits. In this case, US regional command staffs explicitly advised Rand (and Rand concurred) that deployment timelines should not be relaxed to allow reserve participation.[3] Given such guidance it is not surprising that these studies conclude, respectively, that the US must substantially upgrade its strategic lift capability and that the future role of US reserve combat units is quite limited.

These studies and guidance documents project a vision of future regional warfighting that is very different from the reality of Operation Desert Storm (ODS). Whereas ODS had distinct defensive and offensive phases separated by months, future intervention will compress these phases into a seamless operation that moves as quickly as possible from mobilization decision to decisive victory -- a sort of "hyper-Storm." Most important, the documents treat the capacity for this type of intervention as a *baseline* US military requirement -- not simply an option or choice among others. They transpose a European *central front logic* onto regional contingencies, suggesting that a week's delay in deployment or an extra month spent in defensive operations could have catastrophic consequences. Ultimately, this view discounts America's freedom of action in the post-Soviet era and understates its profound strategic advantage over regional powers such as Iraq.

1.1 Innovation Deferred: the short career of "Win-Hold-Win"

Rand's *New Calculus* is cut essentially from the same cloth, although it differs in several respects from its predecessors. Drawing on the experience of the Gulf War, the *New Calculus* provides a basis for air power primacy in the new era. More controversial is Rand's advocacy of the so-called "win-hold-win" formula for fighting two concurrent MRCs. (Although the phrase originated with the OSD and does not appear in the *New Calculus*, the study provides the analytical basis and rationale for the formula.) In its short public life, win-hold-win was first praised as representing a clean break with cold war orthodoxy, then damned as a recipe for military disaster, and finally renounced as too controversial. Renounced, but not abandoned. The idea retains an important position in the Rand study.

Contrary to the assertion of critics, win-hold-win is not a "one war" strategy, but rather a "one victory at a time strategy." Briefly stated, it suggests that in the eventuality of having to fight two overlapping wars, the United States could hold a defensive line in one theater until victory in the other permits redeployment. In a sense the study proposes prosecuting one of the wars at an accelerated rate, while

[3] For a fuller critique of the Rand report on reserves see "Adapting US Armed Forces to the New Era -- Selected Force Size and Modernization Issues," *PDA Briefing Memo 6* (Cambridge: Commonwealth Institute, March 1993), pages 10-13.

the other proceeds in a manner more reminiscent of Desert Storm -- that is, in distinct defensive and offensive phases.

Despite its reputation, the win-hold-win concept is neither bold nor reckless. Instead, it is a sound and well-tested formula for doing more with less.[4] Precisely for this reason it does not sit well with those who will not accept that America can meet its needs and interests with a military smaller than the 1991 Base Force. Although the *New Calculus* initially assumes the availability of the Base Force, it concedes that further reductions are possible -- provided that the United States invests substantially in air power modernization. (This is *half* right; in later sections of this memo we argue that the United States can safely cut the Base Force without having to initiate a major program of compensatory modernization.)

By suggesting that the United States can at least mitigate the two-war dilemma through strategic innovation, the *New Calculus* inadvertently opens a Pandora's box. If US air power (or other elements of military power) can form a robust defensive shield in one theater, then why not in both? If such a shield can play a key role in a two-war scenario, then why not in a single war scenario -- as in Operation Desert Shield/Storm? This approach could buy time for the United States to mobilize and involve its Reserve armed forces.[5] The implications of such an innovation for force planning would be profound: if a significant portion of the requirements associated with the two-war scenario can be met using Reserve combat units, the case for the 1991 Base Force collapses.

Taken as a whole, however, the *New Calculus* does not stray very far from current service orthodoxy. It not only fails to fully pursue the promise of win-hold-win, it also remains fixated on the Base Force -- even as it hints that further reductions are possible. Like the studies and guidance documents that preceded it, the *New Calculus* inflates the power of potential adversaries, ignores or depreciates the contribution of US allies, and relies on "central front logic" when assessing the costs and benefits of competing defense options.

1.2 Two, Three, Many Desert Storms? The Need for Strategic Guidance

Current US conventional force planning also suffers from a lack of clear guidance on national strategic priorities. This lack lifts the ceiling on US security requirements and greatly complicates the assessment of competing defense options. Of course, it is not the job of the armed services and their think tanks to determine when and where the nation will exercise its miliary power. That responsibility falls to the political leadership. Secretary Aspin made a start in a March 1993 speech at the National Defense University when he asserted that the United States had to be "in a position to handle [the] kind of regional threats" represented by Saddam Hussein "and handle them by ourselves, if we must." But how large is the universe of Iraqi-type threats and, more important, does it admit a strict hierarchy from the perspective of US vital interests? Is the defense of Saudi Arabia and South Korea, for instance, more

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[4] Win-hold-win is a contemporary update of an old idea: use the advantage of interior lines to concentrate power first against one foe, then against the other. This concept traces back to the Swiss-born strategist Antoine-Henri Jomini and finds expression in Napoleonic and Prussian practice, in German strategy during the First and Second World Wars, in allied strategy during the Second World War, and in Israeli practice during its multi-front wars. Concerning the application of this concept to America's current situation: the "advantage of interior lines" derives from America's unique global deployment capability and its profound military superiority over its regional adversaries. Given the US capacity to erect robust defensive shields and project overwhelming offensive power to and between theaters, all global lines of communication are effectively interior to American power. Only the emergence (or re-emergence) of a peer global competitor to the United States could alter this assessment.

[5] This approach could be called the "hold-win, hold-win" variation. It would envision the United States fighting all future mid-size wars in phases -- as in Operation Desert Shield/Storm. Aggression would be met first by a "shield" comprised of active combat units. A second active-duty increment -- the decisive edge -- would be held back as a hedge against the outbreak of a second conflict until some Reserve combat units could be brought up to readiness. As the Reserves mobilized they would provide the flexibility for US forces to fully commit to a single war (with mostly active combat units in the field) or conduct a double war (relying on a mix of active and reserve combat units).

important to the United States than the defense of Kashmir or the Spratly Islands? And if so, how much more important?

Instead of specific priorities to guide force planning, generalities dominate. The 1992 *National Military Strategy,* for instance, muses that regional threats are many and varied, and that these can rear-up suddenly and unpredictably to challenge US interests. But this type of statement provides force planners with virtually no guidance at all -- other than "plan for more." Uncertainty has become too common an excuse for lack of clarity. Much of what passes for uncertainty today is, in fact, ambivalence about the role and proper limits of American power in the post-Soviet era. Consider the avowed need to enhance unilateral intervention capabilities. In his National Defense University address, Secretary Aspin asserted that the United States must be prepared to handle regional threats alone "if we must." This seems reasonable enough; allied support is often uncertain. In some cases of regional conflict, however, the United States would not and should not contemplate large-scale intervention unless the burden and responsibility of war is very evenly and broadly shared among our allies. With regard to these cases, at least, "unilateral US action" should not serve as a planning assumption. But unilateral action *has* become a universal assumption in the analysis of force requirements for regional conflicts. So far, the public guidance from the top leadership does not allow for finer distinctions.

A sensible set of strategic priorities would simplify the calculation of US defense requirements and help bring those requirements within reach. The Clinton Administration should affirm that there are only two regional contingencies in which national interest and the needs of local allies would likely prompt a unilateral US involvement on the scale of Desert Storm: a North Korean assault on South Korea or large-scale aggression on the Arabian peninsula. Otherwise the United States would not undertake major interventions except as part of a truly balanced multinational effort. Moreover, the United States would not attempt these secondary interventions at all during periods of heightened conventional threat to Western Europe, South Korea, or the Arabian peninsula.

Such priorities would narrow the prospects for fighting two large-scale regional wars unilaterally to a single case: coincident aggression on the Korean and Arabian peninsulas. The implications for US military requirements would be significant. The instance of power projection requirements provides a good example of the advantages that accrue to clear strategic guidelines. Both of the regions singled out above already have well-developed military base infrastructures -- largely as a consequence of their long-standing strategic importance. And with US concern focused on just a few regions, the land-based prepositioning of war stocks becomes a cost-effective way to further expedite rapid deployment. The net effect would be to reduce the need for future investment in strategic lift while increasing our capacity to respond in a timely fashion to those instances of aggression that would concern us the most.

The remaining sections of this memo closely review Rand's *New Calculus.* Despite some promising suggestions, the Rand report reinforces the impression that the Pentagon and its think tanks have invested too much energy and thought in devising threat scenarios worthy of the Base Force, and too little in finding ways to meet America's needs at significantly lower levels of armed force and military spending. Still, these institutions operate within the strategic parameters set by national political authorities, who should take to heart the proviso that *strategic wisdom begins with the setting of priorities.* Until this happens there is little hope for resolving the current impasse of US defense restructuring.

2. WHY RAND'S *NEW CALCULUS* DOES NOT ADD UP

Rand Corporation's *The New Calculus* sets out to define key US defense modernization requirements for the new era. The study focuses on air power capability, especially that of the USAF. Its method is theater combat simulation involving a US expeditionary force and what the authors consider representative regional threats. Among the *New Calculus* simulations is a two-war scenario in which Rand tests the strategic concept known as "win-hold-win."

Although the study assumes the availability of the Base Force proposed during the Bush Administration, it hints that the United States can meet its needs with a somewhat smaller military -- but only if it proceeds with an ambitious program of air power modernization. This program includes procurement

of the F-22, C-17, Sensor Fused Weapon, Inertially-Guided (IG) weapons, Tactical Munitions Dispenser (TMD), the Tri-Service Standoff Attack Missile (TSSAM) or a similar weapon, and other systems to improve the conventional attack capability of the US bomber force. The study also assumes that the United States will proceed with plans to procure at least 16 B-2s, equip additional tactical aircraft with laser-guided bomb delivery systems, and implement the sealift recommendations of the Mobility Requirements Study. Finally, the study is supportive of additional F-15E procurement.

The *New Calculus* falters in a number of ways. Most critically, the outcome of its war simulations do not provide good reason to proceed with the upgrade program that Rand champions. As a result, one need not challenge the integrity of the simulations in order to cast aside Rand's modernization recommendations. However, the simulations themselves also have serious shortcomings -- principally in overstating the wherewithal of regional threats and understating seriously the defense resources at the disposal of the West and its regional allies. Adjusting the simulations to reflect realistic assumptions produces a surprising result: they offer strong support for a smaller active military and a less ambitious modernization program than those currently favored by the Department of Defense. The following sections of this memo reviews critically the Rand simulations and the modernization program that Rand supports.

2.1 Rand's View of New Era Regional Threats

The *New Calculus* defines the prototypical new era regional threat as possessing 3000-5000 tanks, a similar number of other armored vehicles, and 500-1000 combat aircraft. The aircraft holdings of these powers typically divide between air defense and ground-attack aircraft with few having multirole capability.

Central to Rand's net assessment is the fact that these potential adversaries are principally land powers:

> Nations with modest economic resources and the political will and motivation can field sizable ground forces.... Air forces are more difficult to construct due to the sheer cost of equipment and the sorts of technical skills and training needed to make them effective fighting forces. To effectively employ air forces in offensive operations requires developing and maintaining a costly C3I infrastructure -- something few nations currently (or are likely to) possess. As a result, few countries will have the potential to match the United States in terms of air power, particularly offensive air power. (*NC*, page 9)

Table 1. Selected Weapon Holdings of Potential "Threat States," 1992

	Iraq	Iran	Syria	North Korea	China
Combat Aircraft					
Total	<420	262	639	732	5850
Advanced	<10	30	20	30	28
Main Battle Tanks					
Total	2300	700+	3700	3000	8000
Advanced	-0-	-0-	-0-	-0-	-0-
Lt Tanks, IFVs, & APCs	2900?	800	3750	4750	4000+

Source: IISS, *The Military Balance 1992-1993* (London: Brassey's, 1992)

It is worth noting, however, that except for China none of America's potential regional adversaries have air forces larger than 750 planes. Moreover the tank holdings of the leading potential "threat states" (Iran, Iraq, Syria, North Korea) range between 750 and 3700. Presumably, no more than 80 percent of these totals would be devoted to cross-border offensive action.

2.2 The Rand Conflict Scenarios

The Rand study rests on multiple, complex simulations involving hypothetical conflicts in Southwest Asia (SWA) and on the Korean peninsula during the period 1997-2010. The study found the SWA case to be the most demanding due to the weakness of US allies in the region and the limited US forward presence there. The SWA scenario serves as the centerpiece of the *New Calculus.* Remarkably, when the *New Calculus* turns to consider the challenge of responding to multiple regional conflicts, it does not present a simulation using war on the Korean peninsula as the second conflict. Instead it presents a simulation involving two parallel "runs" of the SWA conflict, treating them as though they were occurring in widely-separated theaters.

Although the Rand study varies the amount of pre-conflict warning time available to the United States, the centerpiece simulation involves very little advance warning: the decision to deploy US forces occurs on the same day as the invasion.[6] In the two conflict scenario, the Rand analysts assume that three weeks separate the onset of the first and second wars. However, in this case as well, the study assumes that the United States has insufficient warning prior to the outbreak of either conflict to deploy its expeditionary force early.

2.3 The Threat in Southwest Asia

In the pivotal SWA war scenario, a "revitalized" Iraq attacks Kuwait and Saudi Arabia with a 20-division force. The invading force includes 4000 tanks, 4000 other armored vehicles, 500-1000 combat aircraft, and presumably 300,000+ troops. Although this adversary presents a useful "target" for testing the relative effectiveness of different types of defense arrays, it is not a reliable prediction of future Iraqi strength. Put simply, Rand's hypothetical Iraqi invasion force is bigger and more competent than any Iraq has fielded or is likely to field.

In the Rand simulations Iraq invades Kuwait and Saudi Arabia with a force approximately twice as large as the one that overran Kuwait in early-August 1990.[7] Although Iraq has demonstrated in past wars a capacity to flood areas with vast numbers of troops and equipment, it has not been able to sustain very large-scale and deep blitz-style operations, such as those envisioned in the Rand scenario. Indeed, even on the more limited scale represented by the 1990 invasion of Kuwait and the 1988 offensive to reclaim

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[6] During the 1990 Gulf crisis, the CIA began warning of Iraqi preparations for invasion in mid-July -- two weeks before the attack -- when about 30,000 Iraqi troops had gathered near the Kuwaiti border.

[7] In the Iraqi invasion of Kuwait, two armored and one mechanized Republican Guard divisions together with one "special operations" division led the way. Behind these were six Republican Guard motorized divisions and three heavy divisions of the regular army. The regular army heavy divisions entered Kuwait to replace the initial Republican Guard mechanized spearhead. The Iraqis required approximately four days to switch from attack to consolidation operations. By 6 August elements of 11 divisions were in, approaching, or exiting Kuwait. Total Iraqi force levels reached about 200,000 soldiers and 2000 tanks in the early weeks of the invasion. Against this the Kuwaitis had a regular military of 18,000 troops, 700 armored vehicles including tanks, and 54 combat aircraft. It is not surprising, therefore, that most of the Iraqi tanks rode into Kuwait on their wheeled transporters, not in tactical formation. This mode of transport allows rapid road progress, but would be too risky in the face of Saudi ground and air forces.

the Faw peninsula from Iran, force ratio advantages of 10:1 or better were key to Iraqi success. Iraq has not yet shown itself able to project a force as large, as far, and as fast as the Rand simulation assumes.[8]

It is of course possible that future Iraqi offensive capabilities will substantially outstrip those of the past, just as it is feasible that Iraq will be able to procure during the next decade the thousands of armored vehicles it would have to add to its arsenal in order to field an army as large as the one the Rand study assumes. Accepting these outcomes as planning assumptions, however, involves a stretch -- especially considering the West's capacity to limit Iraq's access to high-quality military equipment.

2.4 Assumptions regarding the Defense of Saudi Arabia

The Rand study also incorporates assumptions about the defense of Saudi Arabia that serve to inflate the challenge facing the United States. This further limits the usefulness of the simulations as a guide to overall US force *size* requirements. Specifically, the SWA simulations assume that,

- *Kuwait and Saudi Arabia are the only Gulf states to rally against the invasion.* In the Gulf War, Egypt and Syria together contributed three divisions incorporating about 650 tanks, 164 artillery pieces, and 54,000 troops. Several other regional allies who were much closer to the action also contributed: Bahrain, Oman, Qatar, UAE.

- *Among the indigenous militaries only land forces rise to meet the Iraqi invaders* even though the Gulf states have for years relied on air power to balance the ground strength of their more populous neighbors. (Table 2 summarizes the indigenous military power included and excluded in the Rand report.)

- *Among extra-regional powers, only the United States rallies to the defense of Saudi Arabia.* During the Gulf War Great Britain, France, Italy, and Canada together contributed 162 fighters and fighter/attack aircraft. In addition, the United Kingdom and France provided ground forces incorporating 217 tanks, 106 artillery pieces, 88 attack helicopters, and 60,000 troops -- a defense force roughly 10 percent as large as that committed by the United States and perhaps 20 percent as large as that envisioned in the Rand scenario (see below).

Table 2. Local SWA Allied Military Strength Included and Excluded in Rand Simulations

	Troops	Tanks	Combat Aircraft
Saudi Arabia	157,000	700	293
Kuwait	11,700	200	73
Total Included	**168,700**	**900**	**-0-**
Bahrain	6,150	81	24
Qatar	7,500	24	18
UAE	54,500	131	105
Oman	35,700	79	52
Total Excluded	**103,850**	**315**	**565**

Source: IISS, *The Military Balance 1992-1993*

[8] In the 1988 Iraqi offensive to recover territory lost to Iran, 200,000 Iraqi troops fought five major battles and marched 700 miles during a four month period. In these battles, which included the recovery of the Faw peninsula, Iraq typically enjoyed troop advantages of 10:1 and also enjoyed very substantial advantages in numbers and quality of equipment. The Iraqi numerical advantage was not as great in the initial 1980 invasion of Iran. In that case, elements from 12 Iraqi divisions took 10 weeks to capture an area about as large as Kuwait.

2.5 Campaign Objectives, Expeditionary Force, and Plan of Operations

The Rand campaign simulation assumes that the US Joint Forces Commander would have several objectives: establish a lodgement, gain air superiority, stop the invading force on the ground, conduct strategic strikes, and launch an air-land offensive to evict the invader. The Rand analysis focuses on two of these objectives:

- the conduct of strategic strikes, and
- the air attack on ground forces.

At the disposal of Joint Commander is a standard force package:

- Five US Army divisions: the 82nd Airborne, 101st Air Assault, 24th Mechanized Infantry, 1st Cavalry (a standard armored division), and 7th Light Infantry;
- Two US Marine Corps Brigades with associated air wings;
- Three to Four carrier groups with associated air wings; and,
- Six to Ten US Air Force fighter wings and 80 bombers.

Assuming three carriers, two USMC wings, and ten USAF wings, this package includes 1136 tactical combat aircraft and bombers:

Fighters/FGA
- 60 F-14s
- 168 F/A-18C
- 80 AV-8B Harriers
- 115 F-15Cs
- 94 F-15Es
- 36 F-117
- 58 F-111Fs
- 382 F-16Cs

Bombers
- 64 B-1Bs
- 16 B-2s

Electronic Warfare Aircraft
- 27 EA-6B
- 36 EF-111

In its simulations the Rand study employs this air power package (or portions of it) with various weapon mixes to illustrate a range of capabilities in the attack on strategic targets and the attack on ground forces. After assessing various options in each of these subordinate campaigns the study presents a view of the operation-as-a-whole. It concludes by examining a two-war scenario.

2.6 The Conduct of Strategic Strikes

During the Gulf War the US-led coalition identified 700 strategic targets inside Iraq comprising 3000 "aim points." Less than 1000 aim points required precision attack, and less than 250 of these were "time critical" targets -- that is, targets requiring attack early in the campaign. For their base case simulation of a 1997 Gulf War, the Rand analysts assume 3000-5000 strategic aim points of which a full 1000 require precision attack; 250 of these require attack early in the campaign. Hence, the strategic campaign Rand envisions is somewhat more demanding than the one the United States executed as part of ODS.

Rand analyzes two strategic attack packages. The first relies solely on Tomahawk Land Attack Missiles (TLAMs) and ten wings of fighters employing current weapons. The second adds 64 B-1B bombers using new standoff weapons including the Tri-Service Standoff Attack Missile (TSSAM). The second package also includes 16 B-2s which are diverted from attacks on ground forces after the first ten days of combat. The B-2s are equipped with the planned Tactical Munitions Dispenser (TMD) and Inertially-Guided (IG) weapons.

Table 3 summarizes the performance of the two packages using several criteria: destruction of time-critical precision targets, destruction of other precision targets, total strategic aim points attacked in 10 days and 20 days.

Table 3. Effectiveness of Different Strategic Attack Packages in Rand's *New Calculus* Simulations

Objectives	TLAMs, F-15Es, F-117s, F-111s	Add 64 B-1Bs and 16 B-2s with new weapons
Days to Destroy 250 time-critical precision targets	8 days	8 days
Days to Destroy additional 750 precision targets	14 days	14 days
Total "aim-points" attacked w/i 10 days	1000	3500
Total "aim-points" attacked w/i 20 days	2700	9500

Source: New Calculus, pages 44-51, 62-70

Table 3 reveals some interesting features of the Rand simulations:

- The addition to the strategic campaign of 80 bombers equipped with new weapons *does not increase the capacity to destroy time-critical precision targets.* This is because these assets will not have sufficient precision-attack capability in the near future.

- The addition of the bombers does, however, increase the rate at which the strategic target set *as a whole* can be attacked. Whereas fighters with current weapons & TLAMs alone may require 28 days to attack the full set, the addition of bombers with new weapons can accomplish this goal in 12 days.

The Rand study also suggests a less expensive way to expedite strategic attack: devote more airlift capacity to deployment of USAF assets. For its baseline simulations, Rand initially apportions airlift to the services in accord with the ODS standard; the USAF, for instance, receives 25 percent. However, in a subsequent simulation, Rand finds that boosting the share of airlift devoted to the USAF early in the campaign to 40 percent reduces the time required to attack 250 time-critical precision targets from eight to six or even five days. Notably, *the Rand simulations do not include the option of using Saudi stockpiles of precision-attack munitions or prepositioning USAF precision weapons on land.* These options would ease the demand for rapid lift while facilitating a faster pace of strategic attack.

Lacking entirely from the Rand analysis of strategic attack requirements is any reassessment of the USAF proclivity for this type of campaign. Does it make sense to spend so much of our combat resources in the attack on that subset of strategic targets that are not "time-urgent"? Rather than expanding the strategic target sets, should some categories be sensibly cut back? The answers to these questions hinge not only on an assessment of the effectiveness of strategic bombing during ODS, but also on an accounting of the political (and moral) costs associated with some types of strategic bombardment. From an operational perspective an assessment of the opportunity cost of strategic bombing is also due: a little strategic bombing capability costs as much as a lot of battlefield air attack capability. Some strategic bombardment may be worth it; the type of campaign that Rand and the USAF have in mind (3000-5000 aimpoints) may not. These questions should certainly be part of the

current discussion on the future of air power. Unfortunately, they do not receive much attention in *New Calculus*.[9]

2.7 Air Attack on Ground Forces

In assessing air power capability against ground forces the Rand analysis demarcates two goals: (1) the establishment of an "assured defense" and (2) the destruction of the adversary's residual armored strength. In Rand's view, establishing an "assured defense" means creating a "high probability that enemy forces [will] have to stop their advance and assume a defensive posture." Once the invading army has been forced to "go to ground," deliberate air attacks on its defensive positions will gradually deplete most of its remaining armored capability.

The report estimates that "an assured defense could be established somewhere between the time when 30 percent of the invading force had been destroyed and when attacking enemy forces had been reduced to equal combat power compared to friendly forces." (*NC,* page 57). The latter, more conservative criteria requires the destruction of 5000 armored vehicle (tanks and APCs) out of a total of 8500 assumed.

Table 4. Effectiveness of Different Air Power Packages in Rand Simulations of Attack on Enemy Armor

	Fighters Only (10 Wings) Current Weapons	Fighters Only (10 Wings) SFW	Fighters plus B-2, SFW & IG Weapons
Attack on Armor Peaks on Day:	10	8	6
Peak Level, Daily Attrition of ACVs	500?	1100?	1200?
Assured Defense Established on Day:	9-14	5-10	4-7
Destruction of Residual ACVs by Day:	22?	18	14?

Source: New Calculus, pages 51-62

After concluding that the ground forces of local allies (S.Arabia and Kuwait only) could not stop an attack force as large as the one assumed, the study tests three different US air power packages:

(1) USAF, USN, and USMC fighters alone equipped with current weapons,

(2) The same fighter force, but equipped with the Sensor Fused Weapon and other planned munitions upgrades, and

(3) The fighter force equipped with the new weapons and reinforced with 16 B-2 bombers carrying the Tactical Munitions Dispenser and Inertially-guided weapons.

Table 4 shows the results of the simulations for each of these options.

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[9] The 10-volume *Gulf War Air Power Survey*, produced for the Air Force under the direction of Johns Hopkins University professor Eliot Cohen, will provide a good basis for this reassessment. For an early critical look at the strategic bombing campaign see William Arkin, et al., *On Impact: Modern Warfare and the Environment -- A Case Study of the Gulf War* (Washington DC: Greenpeace, 1991). Also see *Reasonable Force: Adapting the US Army and Marine Corps to the New Era, PDA Briefing Report 3* (Cambridge: Commonwealth Institute, March 1992), pages 29-30; and "After Desert Storm: Rethinking US Defense Requirements, *PDA Briefing Report 2* (Cambridge: Commonwealth Institute, June 1991), pages 3-9.

The Rand analysis shows that air attack on surface systems peaks earlier and on a much higher level when SFWs and B-2s with IG weapons are added to the mix. As might be expected, the addition of new weapons and bombers also shortens the time required to establish an assured defense. More remarkable, however, is how fast US air power can stop the hypothetical Iraqi attack *even without the aid of new weapons and bombers:* a 20 division force is forced into defensive positions within 2 weeks or less! The Rand authors are careful to emphasize that they do not consider their simulations predictive of war outcomes. (They are more interested in measuring the *relative* performance of different air power options.) However, they are careful to peg most of their operational, tactical, and technical assumptions to the experience of the Gulf War. The results of the simulated attack on advancing armor units appear consistent with the outcome of ODS -- especially when one takes into account the vulnerability of armor advancing openly across the desert.

Turning to the destruction of the remaining Iraqi armored vehicles once they have dug in, the difference between the fighters-only/current weapons option and the SFW-plus-B2s option narrows further. As the Rand authors note, "Once stopped, dispersed, and dug in, armored vehicles would be far less vulnerable to attacks by area munitions, such as SFW." (*NC,* 54) For attacks against dug-in and dispersed troops, conventional "dumb" bombs dropped by bombers are probably as effective as any weapon. An interesting implication of this analysis left unexplored by Rand is that the addition of SFW and B-2s might not make much difference if the enemy ground force has already assumed defensive positions by the time the US air attack commences, as in the Gulf war! Once again, the most notable of Rand's findings is that US fighters alone equipped with currently programmed weapons can destroy an 8000-ACV invasion in about three weeks of action.

2.8 The Air Campaign as a Whole

After examining the strategic and battlefield attacks separately, the *New Calculus* combines the data to give a picture of the air campaign as a whole. The study measures the campaign results against First and Second Phase objectives:

The *New Calculus* uses this framework to examine the outcome of the combined strategic-battlefield air campaign under several different conditions. Table 6 summarizes several of the significant variations:

- A campaign conducted by the full fighter-plus-bomber force equipped with new weapons (the Base Case);
- A campaign using baseline force with new weapons and additional airlift support to speed deployment (Base Case with Added airlift);
- A campaign using baseline force with new weapons and the benefit of three weeks pre-invasion warning (Base Case with Added Warning);
- A campaign with a smaller force although equipped with new weapons (Base Case minus 4 Fighter Wings);
- A campaign with the smaller force equipped with current weapons and given the benefit of three-weeks pre-invasion warning (Base Case minus 4 Fighter Wings, Minus New Weapons, Plus Added Warning);

Table 5. Principal Air Campaign Objectives in Rand Simulations		
	Phase I Objectives:	**Phase II Objectives:**
Strategic Attack	Destroy 250 time-critical aim points requiring precise attack	Destroy remaining 750 aim points requiring precise attack
Battlefield Attack on Enemy Armor	Establish Assured Defense, Destroy 5000 ACVs	Destroy Remaining 3500 ACVs
Source: New Calculus, pages 62-63		

In order to facilitate comparison we have added the outcome of a campaign by fighters alone (10 wings) using current weapons, which we derived from earlier sections of the *New Calculus.* In all cases the Phases are considered "complete" only when both strategic and tactical objectives have been accomplished.

Table 6. Summary of Air Campaign Simulations: Days to Completion of Phase I & Phase II Objectives		
Air Campaign Variations	**Completion of Phase One Objectives:** • Stall Enemy Offensive (5000 ACVs destroyed) • Destroy 250 critical aim-point w/ precision attack	**Completion of Phase Two Objectives:** • Destroy Remaining ACVs • Destroy Remaining 750 critical aim-points w/ precision attack
1. Base Case (BC)	D-day plus 10	D-day plus 18 days
2. BC with Added Airlift	7	17
3. BC with Added Warning	1	7
4. BC minus Four Fighter Wings	10	26
5. BC minus New Weapons & Bombers (1)	14	22
6. BC minus Four Fighter Wings, minus New Weapons & Bombers, but with Added Warning	8	21
Notes: (1) Derived estimates *Source: New Calculus*, pages 62-70		

The table reveals several important points. *First, increased warning time promises the single most substantial increment to effective combat power.*[10] (Variation 3) Three-weeks warning could permit Rand's baseline force to virtually annihilate a 20-division army in seven days -- that is, 60 percent faster than without warning. This is because US air power would be waiting in the theater for the commencement of hostilities. Three-weeks warning would also permit a smaller, less advanced force (Variation 6) to stall an invasion in 8 days and defeat it in 21. This suggests that additional investment in national intelligence assets, which could help ensure earlier warning, may be a cost-effective alternative to procuring new bombers, weapons, and additional airlift.

Table 6 also shows that allocating more airlift to the deployment of USAF assets (Variation 2) shortens significantly the time required to accomplish campaign objectives. Notably, this variation does not add to the campaign's gross airlift assets; it simply alters their allocation to the benefit of the USAF. An option more acceptable to the US Army (and also less expensive) might be to increase prepositioned USAF war stocks in the most likely theaters of conflict -- the Persian Gulf and Northeast Asia.

Warning time, prepositioning, and airlift capacity are vital in the critical, early days of the campaign because they set an absolute limit to the quantity of air power working to stall the invaders. Once the invaders are forced to dig in the immediate threat facing the defenders is reduced. Viewed in this context, Rand's exclusion of the "on-the-spot" air power of the Gulf states greatly diminishes the value of the simulations as a guide to determining how fast and how close to the border the defense could stop an actual Iraqi attack.

Except for the variations involving increased warning time, the results of the Rand simulations cluster closely together. A comparison of Variations 1 and 5 shows that the upgrade programs favored by Rand cut less than a week from the time required for the achievement of principle campaign objectives. And even this gap would narrow if indigenous air forces are added to the mix.

2.9 The Persistence of "Central Front" Logic

The Rand simulations suggest that a substantial program of tactical aircraft and weapon modernization can shave less than 28 percent from the time required to establish an assured defense in a SWA conflict. Translating this into operational terms the Rand authors warn that "US air power with current munitions could permit establishment of a defense north of Al Jubail, but critical facilities would be in enemy hands and the margin of safety perilously thin." (*NC,* page 58) Jubail lies approximately 140 miles south of the Kuwait-Saudi border. Although important Saudi ports, refineries, and oil fields are to its north, calling these "critical" is an exaggeration. Saudi Arabia's most important urban centers, ports and airfields, and industrial and oil assets of the eastern peninsula begin at Jubail and *run south.*

The Rand authors foresee a 10 wing fighter force equipped with current munitions stopping the hypothetical invasion force about 35 miles north of Jubail. By contrast the combined fighter-B2 bomber force equipped with new munitions could stop the invasion approximately 110 miles north of Jubail "while possibly protecting Kuwait City" (although not the rest of Kuwait). (See map, *NC,* page 59.) As noted above, adding the contribution of indigenous air forces could substantially increase the margins of safety.

A more important issue is deciding the significance of drawing a line at Jubail or any point farther north. The most secure option would be to establish an impenetrable defensive

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[10] *By "warning" Rand means reasonably strong indications that tactical preparations for attack are underway. The simulations assume that US national command authorities respond to this warning by ordering a rapid mobilization and deployment so that some US armed forces can be in position prior to an attack.*

cordon as far north as the Iraqi border, and it is certainly not beyond the means of the United States to do so if Saudi Arabia is willing to accept a permanent US military presence. But the application of such "central front" logic to the situation on the Arabian peninsula violates all sense of proportion. In yesterday's East-West confrontation on the European central front, the loss of 140 miles would have meant the loss of all Germany, including the truly vital North Sea ports and much of the Alliance's continental defense infrastructure. The loss of Germany would have likely led to the fall of continental Europe. In terms of America's strategic interests, such a loss would have been incalculable; the cost of reversing it, unimaginable. There is no comparison in any potential Persian Gulf conflict. The overriding fact is that neither Iraq nor Iran can achieve an irreversible *fait accompli* of real significance in the region. Even if an aggressor drives as far south as the United Arab Emirates -- 350 miles from the Kuwaiti border, the United States and its allies would roll up the invading force in little more than a year and completely extinguish the aggressor's military capabilities. It is this incontestable fact, and not America's ability to defend Jubail, or Kuwait City, or any other site, that is the foundation for deterrence in the region.

In 1990 Saddam Hussein may have misjudged American military capability; more likely, he misjudged America's interest and resolve. Either way, the subsequent Gulf conflict has left no room for doubt. Rand's *New Calculus* confirms what the 1990 Gulf War suggests: Should Iraq or Iran attempt in the future to encroach on Saudi Arabia, the United States and its allies will contain and defeat the incursion in the peninsula's north-eastern corner -- with or without an ambitious program of US air power modernization.

2.10 Whither Ground Forces?

Although the *New Calculus* pays only fleeting attention to friendly ground forces, its conclusions have revolutionary implications for their future role. The study assesses deployment time for a land force of five Army divisions and two Marine brigades. These, they contend, could be deployed to SWA and prepared for a decisive offensive in no less than 60 days. (Fifty-five days are required for deployment, another five for field preparations.) The ground force Rand assumes is small by ODS standards, although it deploys much faster than did a comparable slice of the Desert Storm force. Nevertheless, Rand's assumptions closely reflect Army plans to field a five-division corps "anywhere in the world" within 75 days, and sooner to Southwest Asia. The 1992 Mobility Requirements Study concluded that such a force would be capable of a decisive offensive in an SWA contingency and could deploy to the region within 52 days -- provided that the United States makes substantial new investments in lift capacity (including expansion of the Ready Reserve Fleet, procurement of 20 Large Medium-Speed Roll-on Roll-off ships, and procurement of 120 C-117s).

The Rand study casts a new light on the discussion of ground force requirements. In all the principal campaign variations studied by Rand -- including the one utilizing existing weapons -- US air power stalls the hypothetical enemy offensive in less than two weeks and obliterates the remaining enemy force in another ten days or less. By this time only two brigades of Marines and two brigades of the 82nd airborne division would have arrived in the theater. Another four weeks must pass before the entire ground force can deploy and prepare to mop up the tattered remnants of the invading army. This interval between completion of the air campaign and deployment of the ground force is large enough to absorb a substantial amount of error on the part of Rand's air power enthusiasts.

An alternative left unexplored by the *New Calculus* would be to field a somewhat lighter and smaller ground force -- for instance, two brigades each of the 82nd Airborne, 101st Air Assault, and Marines plus the entire 24th Mechanized Division and extra MLRS and Patriot battalions as well. Such a force could deploy faster than the currently programmed one even if planned and proposed lift improvements do not go forward. Numbering approximately 135,000 troops (including combat support and service support units), this expeditionary corps

would join with US air power and indigenous air and ground forces (which could add as many troops again and perhaps 400 combat aircraft). The allied units would face the remnants of 350,000 Iraqi invaders already stripped by air power of almost all their armored vehicles. Of course, there seems to be no absolute need to rush the deployment of a decisive land force once air power has forced the invaders into defensive positions. There is, however, another good reason to trim the initial ground deployment: doing so gives the United States greater flexibility to respond to other crises, should they arise concurrently.

2.11 How to Fight Two Wars Concurrently: Win-Hold-Win

The *New Calculus* has gained notoriety for providing the analytical basis of the so-called "win-hold-win" strategy. Consistent with the 1992 National Military Strategy of the United States, the study defines the "two-conflict scenario" as one in which conflicts erupt sequentially, but are at times prosecuted simultaneously.

The Rand simulation assumes that the second conflict is the same size as the first and involves a similar line-up of local friends and adversaries. In fact, the multiple conflict scenario that Rand simulates involves two parallel and concurrent runs of the Persian Gulf conflict -- and *not* what would be a more concrete and relevant scenario: overlapping conflicts in the Persian Gulf and on the Korean peninsula. As noted earlier, among the various individual conflicts simulated by Rand, the SWA war was "clearly the more challenging due to severe asymmetry between friendly and enemy ground forces." (*NC,* page 57) In this light, the *New Calculus* two-conflict simulation is substantially more demanding than the scenario that most concerns policy-makers.

Due to airlift and tanker constraints Rand concludes that if less than three weeks separate the onset of the two conflicts, US armed forces would not be able to deploy to the second in a timely fashion. However, given an interval of three weeks or more, the United States could divert airlift to the second conflict as sealift assumes the sustainment burden in the first. Presumably, the problem of competing demand for lift would not be as severe in the real-world case of concurrent wars on the Korean and Arabian peninsulas. In Northeast Asia the United States maintains forward deployed troops and very substantial pre-positioned war stocks -- not to mention the base infrastructure available on Japan and Okinawa. (Indeed, the hub of American power in the Pacific, Hawaii, is only 50 percent farther from Japan than Diego Garcia is from the Straights of Hormuz.)

In Rand's two-war simulation, the standard baseline expeditionary force deploys to the first conflict. However, when the second war erupts, the United States diverts F-117s, B-2s, and two carrier groups from the first to the second theater. In addition, the United States sends six USAF fighter wings, one Marine brigade, and one Army division drawn from among uncommitted units.

The outcome of the simulation suggests a remarkable US capacity to handle the hypothetical "double-Gulf War" contingency. Both tactical and strategic air campaign objectives are completed in the first conflict on the same schedule established in the single-conflict simulations: 10 days for Phase I objectives, 18 days for Phase II. In the second conflict the two phases are completed respectively within ten and 21 days of the outbreak of hostilities. (Without the B-2 bomber it takes somewhat longer to complete campaign objectives in the second theater: two additional days for phase I and one additional day for Phase II.)

The commencement of a ground offensive in the second theater must await the build-up of a decisive force, which takes longer because of the commitment of resources to the first conflict. This delay, however, does not involve a desperate bid to hold the second adversary at bay. In the Rand simulation, air power not only establishes an assured defense in the second theater but proceeds to eliminate the adversary's residual armored assets.

The *New Calculus* does not present a two-conflict simulation that tests the use of fighters equipped only with current munitions, but the likely outcome of this option can be reasonably extrapolated from the other simulations: Phase I objectives in the second theater might be achieved by a fighter-only force using current munitions in 17 days; Phase II objectives might be completed in 23 days or less. Although this suggests the possibility of achieving the principal air campaign objectives in both theaters in seven weeks time, the need to deploy (and re-deploy) ground units would add substantially to the time needed to finish the conflicts. On this time-line, a single-war scenario could be completed in 80 days, but a two-war scenario could require overseas deployments lasting six or more months. As suggested above, the commitment of a smaller, lighter ground force to the first conflict could shorten deployment time and ease the strain on strategic lift. If the Rand simulations are accurate indicators of air power effectiveness, there is good reason to seriously consider this option.

2.12 From Two MRCs to the Base Force...and Below

The Rand study assumes the availability of the 1991 Base Force even though its two-war simulation uses a much smaller force: 16 fighter wings, three carriers, six Army divisions, and three Marine Brigades. Table 7 compares this expeditionary force with the Base Force from which it was drawn.

Table 7. Comparison of Rand Two-War Expeditionary Force and Bush Base Froce Proposal

	1991 Bush Base Force	Rand Baseline Expeditionary Force	Expeditionary Force as Percentage of Bush Base Force
Active Army Divs	12.6	6	48%
Reserve Army Divs	10	0	--
Total Army Divs	22.6	6	27%
Active USMC Bdes	5.3	3	57%
Reserve USMC Bdes	2.6	0	--
Total USMC Bdes	8	3	38%
Active & Reserve USAF Fighter Wings	27	16	59%
USN Carrier Groups	12	3	25%

Source: New Calculus, pages 72-74

Table 7 shows that fighting two concurrent MRCs would require approximately 55 percent of the *active portion* of the Bush Base Force or approximately one-third of the total force (ie. active plus reserve components). Nonetheless the Rand report suggests that something close to the full base force might be required to meet the challenge of a two-war scenario. In the authors' view, reductions below the Base Force, as Secretary Aspin intends, would require a substantial compensatory investment in new air-delivered munitions and conventional upgrades to the planned B-2 bombers fleet.

The authors' conservatism in relating war requirements to the overall US force levels reflect several concerns:

- Although the majority of active Army divisions do not commit to either war, the report assumes that three divisions may be forward deployed outside the relevant regions. More than six divisions still remain available, but almost all combat support and combat service support units are committed.

- Reserve Army and Marine Corps combat units do not figure in the overseas commitments at all. These, the report notes, require too long to mobilize for the short-

war scenarios that the report envisages. Nonetheless, they would remain vital to the conduct of larger, protracted wars.

- Although 11 USAF wings are not committed to either conflict, four of these may be committed elsewhere and several may be in the process of modernization upgrades. Moreover, several "free" wings may not be regarded as appropriate for deployment to either scenario: for instance, the Rand report excludes A-10s from the roster of aircraft sent to fight the MRCs.

- USN carrier assets seem particularly underutilized in the Rand simulations, but USN policy is that as many as five carriers are required in the fleet for each one forward deployed. Although the Navy could surge additional carriers forward in a crisis, the Rand report argues that "such a surge could take months to generate." (*NC,* page 73)

Despite Rand's pessimism, alternative options can address each of these issues and open the way to safely reducing US armed forces to levels substantially below the 1991 Base Force:

- *Reduce peacetime presence outside SWA and the northern Pacific:* The US Army should not forward deploy more than one division outside SWA and the northern Pacific. The USAF presence outside SWA and the Northern Pacific should not exceed 1.5 wings.

- *Increase reliance on reserves:* In the case of having to fight two concurrent wars, the US Army and USMC should plan to make fuller use of available Reserve combat units -- up to six Army brigades and two Marine brigades -- even though this may mean delaying a "final offensive" in one theater for four months. As a matter of course, reserve *combat units* should be mobilized immediately whenever major conflicts occur in *either* Northeast Asia or the Persian Gulf. This will expedite their availability (and flexibility, generally) should a second conflict occur. Moreover, the need for additional units to provide support for two expeditionary corps should also be filled by reservists.[11]

- *Fully utilize available air power assets:* All USAF fighter wings should be configured to play some role in MRCs. For instance, the A-10, which performed very well in the Gulf War, could continue to play an important role given enhanced night fighting capability. Efforts should be made to improve the integration of USN, USMC, and USAF air fleets, both in terms of command and control and sustainment. Finally, no more than one USAF wing-equivalent should be "off line" at any one time for modernization upgrades -- at least not the type of upgrade that precludes emergency recall of the aircraft.[12]

- *Improve Aircraft Carrier utilization by revising operational procedures.* The Navy calculates that on average 4.5 carriers are required for each of three kept on-station.

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[11] US Reserve combat and support units can and should play a bigger role in the US defense posture than ever before. For a fuller exposition see *Reasonable Force: Adapting the US Army and Marine Corps to the New Era, PDA Briefing Report 3* (Cambridge: Commonwealth Institute, March 1992), especially pages 55-79; also see "Adapting US Armed Forces to the New Era -- Selected Force Size and Modernization Issues," *PDA Briefing Memo 6* (Cambridge: Commonwealth Institute, March 1993), pages 10-13.

[12] There is additional flexibility for modernization built into air units: each wing has an allotment of backup or replacement aircraft. If the number of total wing-assigned aircraft undergoing modernization does not exceed one-half the number of available replacements, the wing can fully retain its capacity to respond to regional contingencies.

However, there are a variety of options to improve carrier utilization rate.[13] These include the rotation of crews instead of ships, greater emphasis on underway replenishment, and more overseas home-porting. Such options could allow an eight carrier fleet to support three carriers on station during peacetime and surge five or six forward in emergencies.[14]

These various initiatives would allow a military significantly smaller than that proposed in the 1991 Base Force to fulfill the requirements of a two-MRC scenario. America's roster of peacetime active-duty ground units could shrink to seven Army divisions (or eight including independent brigades) and four USMC brigades. In the case of two MRCs, reserve units would boost this roster to nine Army division equivalents and six Marine brigades. A USN fleet of eight carrier groups could surge forward two or three groups to *each* of the two theaters of war. This would reduce the requirement for USAF aircraft from the 16 fighter wings proposed by Rand to 14 or 15 fighter wings. A base force of 17 active and reserve fighter wings could support a deployment package of this size. (See Table 8, next page)

Table 8. Alternative Expeditionary Force for Two MRCs with Associated Base Force

	MRC I &II	Other	New Base Force
Active Army Divs (1)	6	2	8
Reserve Army Divs	2	8	10
Reconstitution Divs		3.3	3.3
Total Army Divs	8	13.3	21.3
Active USMC Bdes	3	1	4
Reserve USMC Bdes	3	2	5
Total USMC Bdes	6	3	9
Active & Reserve USAF Fighter Wings	14.5	2.5	17
Active & Reserve USN Aircraft Carriers	5-6	2-3	8

Notes: (1) Army strength is given in division equivalents, which includes independent brigades.

[13] See "Navy Carrier Battle Groups: The Structure and Affordability of the Future Force," *GAO Report to Congress* (Washington DC: Government Accounting Office, February 1993); Michael O'Hanlon, *The Art of War in the Age of Peace: US Military Posture for the Post-Cold War World* (Westport: Praeger, 1992) pages 33-40 and 94-97; Ronald O'Rourke, "Naval Forward Deployments and the Size of the Navy," *CRS Report for Congress* (Washington DC: Congressional Research Service, November 1992); O'Rourke, "Aircraft Carrier Forward Homeporting," *CRS Report for Congress* (Washington DC: CRS, October 1992); and O'Rourke, "Aircraft Carrier Force Levels and Deployment Patterns: Issues and Options," *CRS Report for Congress* (Washington DC: CRS, June 1991)

[14] During the Gulf War almost six months passed before six carriers were simultaneously "on-station" in the war zone. Three had deployed to the CENTCOM area in August; two more had deployed by November. *However, two of these five carriers were rotated out of the area well before the beginning of Desert Storm.* Another three carriers entered the area after 1 January, bringing the total on station to six. Overall, eight carriers -- 60 percent of the US fleet -- participated at one time or another in ODS. Had rotation focused on crews rather than ships, the USN could have had five carriers on-station within three months of the Iraqi invasion! In the eventuality of concurrent wars in Southwest Asia and Northeast Asia, a division of labor between Atlantic and Pacific fleets could permit the deployment of two or three carrier groups to each theater within a month of mobilization, thus easing the demand for USAF aircraft.

2.13 Airlift Modernization

The Rand campaign analysis hinges on the rapid deployment of air power, including the ammunition, spare parts, and maintenance units needed to sustain that power. The simulations assume that 110 C-5s, 198 C-141s, and 36 C-17s (excluding backups) will be available in 1997. (Ninety percent of these commit to the SWA campaign.) The report also notes that as more C-141s reach the end of their currently programmed service lives after 2000, the ability of the United States to project power will diminish substantially.[15]

The *New Calculus* examines several options for maintaining or even expanding US airlift capacity after 2000:

- Procure 120 C-17s
- Procure 120 more C-5s
- Enact a Service Life Extension Program (SLEP) for 243 C-141s, or
- Increase reliance on the Civilian Reserve Air Fleet (CRAF) Stage III aircraft.

The study finds that all of these options except for the C-141 SLEP are able to match or exceed America's current capacity to deliver 3100 tons per day to Southwest Asia (using US organic military lift and CRAF II aircraft). However, this level of performance assumes basing constraints no more stringent than those encountered during Desert Storm (which were very stringent in the early part of the campaign).

The CRAF option would improve the US ability to deal with tighter *enroute* base constraints -- but at the expense of diminishing the ability to deal with tighter base constraints *at the point of destination.* This is because countries enroute to a theater of war will more quickly and easily accommodate civilian aircraft.

In Rand's view only the C-17 option promises the ability to deal with tighter base constraints both enroute *and* at the destination point -- while also boosting delivery capacity under Desert Storm conditions from 3100 to 3400 tons per day. Thus, the *New Calculus* concludes that procurement of 120 C-17s is the best of the modernization options it considers -- although the report does suggest that a mix of C-17s and B-747s Series 400 may suffice.

Many of the advantages that the Rand authors attribute to the C-17 option, however, derive from the assumptions underlying their analysis. Rand measures the various airlift modernization options against the current capacity of US organic military airlift and CRAF Stage II aircraft to deliver 3100 tons per day to Southwest Asia. *During Desert Storm, however, the actual delivery rate never exceeded 2600 tons per day.* Measured against this more modest and realistic standard, the SLEP C-141 re-enters the picture as a viable option.

Although a portion of existing airlift capacity would be reserved for use outside the campaign, the amount of organic capacity so diverted need not be as high as the 10 percent assumed in the *New Calculus*. Indeed, using CRAF Stage III aircraft for *non-campaign missions* would free a higher percentage of organic lift aircraft for campaign use. And using CRAF III aircraft for non-campaign missions would circumvent some of their shortcomings.

Finally, the purported advantage of the C-17 in situations of limited destination base access shrinks when the option of greater prepositioning of war stocks is added to the mix. Afloat prepositioning and, especially, land-based prepositioning can lessen the need for fast-deploying airlift. Prior to the Gulf War the USAF had prepositioned on the Arabian peninsula $1 billion worth of fuel, ammunition, and other stores -- in addition to the supplies on its three

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[15] For an alternative view on US strategic lift requirements see "Adapting US Armed Forces to the New Era," *PDA Briefing Memo 6* (Cambridge: Commonwealth Institute, March 1993), pages 17-21.

Afloat Prepositioning Ships. The United States could substantially increase these land-based stocks.[16]

2.14 Tactical Aircraft Modernization

Among the Rand study's prescriptions is a substantial tactical aircraft modernization program, including

- procurement of the F-22 and at least 16 B-2s configured for conventional warfare;
- procurement of standoff weapons such as the Tri-Service Standoff Attack Missile (TSSAM) and adaptation of the B-1 to deliver some of these weapons;
- procurement of the Sensor Fused Weapon (SFW), Tactical Munitions Dispenser (TMD), and Inertially-Guided (IG) weapons; and,
- completion of a program to increase the number of existing aircraft able to fight at night and deliver laser-guided bombs.

Nonetheless, the Rand simulations suggest strongly that the United States already possesses a very substantial capacity to stall armored attacks in MRCs, and do so within an acceptable time frame. As noted earlier, the operational significance of adding several of the capabilities that Rand champions -- SFW for fighters and B-2s armed with inertially-guided weapons -- is quite small. (See Tables 4 and 6.)

The Rand study also reveals other limits to current modernization plans and options:

- New standoff weapons for the B-1, the SFW for fighters, and inertially-guided weapons for the B-2 do very little to expedite the strategic campaign against those time-critical targets requiring precision attack. For this mission, the F-117, F-111, and F-15E delivering laser-guided bombs remain key.
- The prospective role of the B-2 bomber in MRCs is peculiar: the B-2 does not serve to penetrate enemy air space and attack strategic targets until the second week of the campaign, after the enemy air defense system has collapsed. Instead, the stealth bomber initially delivers area weapons against enemy armor units. This might be considered a praiseworthy adaptation of an asset procured for a threat that no longer exists -- except for the fact that most of the B-2 fleet has not yet been built.

On the positive side, it does make sense to give more aircraft the capacity to fight at night and deliver laser-guided bombs -- as Rand suggests. These two technologies are mature and their operational value is well established.

The *New Calculus* also strongly advocates procurement of the F-22 advanced stealth fighter -- although this aircraft does not figure in the report's campaign simulations. To support F-22 procurement, Rand offers a special analysis of the potential erosion of America's edge in air superiority operations. Rand notes that:

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[16] As noted earlier, the Rand analysis assumes that all "preferred USAF munitions" must be airlifted into the theater until prepositioning ships arrive. Only general purpose bombs are assumed available in the theater. However, as the authors also note, in July 1991 the United States sold Saudi Arabia 2000 Mk84s, 2100 CBU-87, 770 Aim-7s, and laser-guidance kits. It is reasonable to assume that the Saudis would make these stocks available to the USAF, and reasonable as well to suggest that the USAF preposition its own preferred munitions.

Several non-US fighters matching the aerodynamic performance of US front-line air superiority aircraft are already available on the market: the Su-27, MiG-29, Mirage 2000. In addition, Rand points out that forthcoming fighters from Europe, France, and Russia could further erode the US edge "should these enter the inventories of potential adversaries."

The US edge in air-to-air munitions may also narrow in the future. Although equipping more US fighters with the AIM-120 Advanced Medium-Range Air-to-air Missile (AMRAAM) will guarantee a US edge through the year 2000, Rand argues that the proliferation of active-radar missiles could give potential adversaries a *comparable* capability next century.

Although the Rand study does not foresee adversaries fielding systems superior to the F-15/AIM-120 combination before 2010, it concludes that only the combination of the F-22 and AIM-120 missile can *guarantee front-line fighter superiority* beyond the year 2000. Fortunately, the *New Calculus* does not provide sufficient reason to accept this disturbing conclusion. The Rand analysis falters on several points:

- Although several non-US combat aircraft can approach the aerodynamic performance of America's advanced fighters, few of these exist in the arsenals of potential regional "threat states." Iran, Iraq, Syria, Libya, North Korea, and China *together* possess fewer than 150 of these planes (Mirage 2000, Su-27, and MiG-29). And, with the exception of China, the capacity of these states to add substantially to their holdings has diminished in recent years, not grown.

- As the Rand authors point out elsewhere, there is more to combat effectiveness than aerodynamic performance -- a point driven home by air-to-air combat during the Gulf War. Iraq entered the Gulf War with at least 18 MiG-29s in its arsenal. F-15Cs destroyed five of these in air-to-air engagements using the AIM-7 Sparrow missile; no coalition aircraft were lost to fire from Iraqi fighters. Interestingly, the Rand analysis found that in the interval between 1985 and the fielding of the AIM-120 (1990), potential threat capabilities equaled those of the United States. Clearly, this finding had little relevance to the Gulf engagements, thus highlighting the difference between the theoretical "availability" of a technology, on the one hand, and its procurement in quantity and effective use, on the other.

Among the factors that contribute to effective combat power other than aerodynamics and munitions are avionics, target acquisition systems, command and control infrastructure (AWACS), maintenance requirements and skilled support, and pilot training. Affecting a nation's ability to field a powerful air force are its economic strength or that of its allies, and the size and general skill level of its population. All things considered, the current air power capability of the Western alliance and its friends is certainly many times greater than that of all potential regional threat states combined. Given current strategic and economic trends, there is no reason to suppose that this balance will change much in the next 10-12 years -- except to the West's favor. Although modest aircraft upgrades should proceed, the United States has little need to begin adding new tactical or bomber aircraft to its fleets until 2005.[17]

[17] For a critique of current aircraft modernization programs and review of alternative options see "Adapting US Armed Forces to the New Era," *PDA Briefing Memo 6* (Cambridge: Commonwealth Institute, March 1993), pages 21-24; also see "After Desert Storm: Rethinking US Defense Requirements, *PDA Briefing Report 2* (Cambridge: Commonwealth Institute, June 1991).