THE SHAPE OF FUTURE US MILITARY FORCES

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July 4, 1972

INTRODUCTION

Public discussion over the shape and size of future US military forces calls forth all of the trappings of debate and controversy. Advocates of strong military forces or of larger military budgets (or both) are accused of militarism, while advocates of smaller budgets and even those who propose to phase out an obsolete military system without budget reductions are often accused of selling out their country, wanting to be second best, or worse. More recently, any informed position on military matters leads to the appellation militarist; but we do have military forces and a Defense Department, and the country must decide what it wants to do with them and how best to do it. In this matter, of course, both the Administration and the Congress have a continuing responsibility.

The advance of technology, together with changing relative costs, both permit and impel a new look at the military functions and possible ways to accomplish them. Examples abound of greatly different means of approach. For instance, the United States naval surface force is built around some 16 attack carriers, and its primary tactical offensive and defensive weapon is the manned aircraft. On the other hand, the Soviet naval force is built around the cruise missile, which can be launched from land—based naval air, from large and small ships, and from submarines. Similarly, the US land-based strategic offensive force has only 54 Titan 2 missiles to 1000 Minuteman ICBMs, while the Soviet strategic offensive force has a much larger component of heavy missiles (more than 500 SS-7, SS-8, and SS-9 missiles).

Even should we discern a more advantageous shape for our armed forces, it is necessary to take into account our present position and to chart a careful course from what we have to what we should have. At some point in such a transition, however, one should stop putting funds into the modernization and expansion of obsolete systems, and expend them instead on the new shape of the military forces.

To some extent, our concept of military missions is conditioned by our sense of the possible. I make no claim that the following discussion is unique, or that the proposals are original or the best possible, but I do think that these alternatives deserve a detailed comparison with our present forces and their projection, in order to indicate how much improvement in capability for a similar budget, or reduction in cost for a similar capability, is possible.

The discussion is necessarily condensed, even cryptic, since it is essential to suggest new means to accomplish almost all of the fundamental missions. I judge that work already accomplished by the Department of Defense and by the Armed Services has already established the feasibility and the utility of these alternative programs, although recognition of this fact is far from universal.

STRATEGIC FORCES

The initial SALT agreements concluded in May 1972 endorse officially the utility and necessity of the posture of mutual deterrence between the US and the Soviet Union. Most importantly, the agreements forbid the establishment of a nationwide defense against ballistic missiles and limit severely the effectiveness of any local ABM which might be deployed around the national capital or to protect certain of the ICBM force. The impact of such an agreement on the nature of future strategic forces is an important subject which cannot be treated exhaustively in this paper. Clearly, though, offensive programs which were formerly directed toward the penetration of an expanding and strengthening ABM system will no longer constitute the best expenditure of ongoing effort in the strategic field. Furthermore, the size of the strategic offensive force (and its distribution among land–based missiles, bombers, and some submarine–based missiles) should be looked at on a continuing basis. Replacement of the force as it wears out should not be done prematurely, and the example of the B-52, which has had its life extended by relatively inexpensive wing-strengthening programs and by even less expensive gust-alleviation measures, suggests that a detailed study is in order on the maintenance costs and life of ICBMs and Poseidon boats and missiles.

In view of the SALT Treaty and Executive Agreement, an only partially MIRVed Minuteman force, together with the Poseidon conversion of the Polaris fleet will constitute an adequate deterrent. I personally believe there are far better uses for money within the Defense Department than its expenditure for full–scale development or construction of the B-1 bomber or the Trident submarine. An extended range version of the Poseidon missile (the Poseidon C-4, as the Trident-l missile is designated) might be pursued on a low-cost timescale.

STRATEGIC AIR DEFENSE

Clearly it makes no sense at all to maintain an expensive strategic air defense against a Soviet bomber force whose destructive capability is a very small fraction of the Soviet missile force against which we shall have no defense at all. Air defense of the United States will have a different purpose and presumably a different form from that which was hoped to survive a coordinated attack by Soviet missiles and aircraft delivering

thousands of nuclear weapons. The new kind of air defense could provide much better performance against intruders in peacetime and even against a relatively few nuclear-weapon-carrying aircraft in wartime than can our present high-cost system. It can emphasize improved radar and interceptors rather than redundancy and invulnerability.

On the other hand, although such an air defense system should be able to detect enemy aircraft down to ground level, and must therefore have radars elevated into the air, it is not necessary to use the AWACS ("Airborne Warning and Control System") aircraft. AWACS is more than an elevated radar -- it is an airborne control system as well, untargetable by ICBMs because it is in motion. A modest but effective air defense should rely instead on an airborne radar, whose electrical signals are relayed without human intervention directly to one of a few control centers on the ground. This relay can be done via communication satellite or to a number of ground antennas of modest cost. Furthermore, an approach of lower cost and greater effectiveness than AWACS is probably to use a helicopter-lifted radar, in which a light-weight radar van or pod is lifted by an efficient cargo helicopter and maintained at an altitude of 15,000 feet or so. More specifically-oriented development could result in a helicopter to support such a radar at 40,000 foot altitude, thus giving it a line-of-sight to ground level exceeding 200 miles. Helicopter-lifted radars, held stationary with respect to the ground, have far less difficulty seeing moving aircraft than do AWACS-type radars which are themselves in motion at jet aircraft speeds.

While advanced unmanned ground-launched missiles guided by the elevated radars would probably be the interceptor system of choice in a large strategic defense, and a relatively small number of such long range, supersonic missiles would be useful in the limited air defense system, the maintenance of national sovereignty over US air space in peacetime should involve primarily manned aircraft.

MAINTENANCE OF SEA LINES OF COMMUNICATION

The United States has strong trade ties with the rest of the world. It is worth substantial cost to the United States to protect these sea lanes against possible disruption. There are, of course, political threats to our sea lines of communication, and these must be countered in the political arena, where a strong and effective military capability may be an asset.

The physical threat to the sea lanes should be put in perspective, distinguishing between the nature and the numbers of forces required. Thus, while some small nation could conceivably undertake to harass and disrupt US shipping wherever it could be found, such a clear violation of international law and custom could be countered by attack on the country concerned. Large

forces for maintenance or sea lines of communications are required for the foreseeable future only against the Soviet Union and its allies, where the threats to our ocean shipping are air-launched cruise missiles, surface-launched cruise missiles, submarine-launched cruise missiles, and torpedoes. Protection of merchant shipping, and especially protection of the defending forces, does not appear to be possible in a full-scale nuclear war at sea. The maintenance of sea lines of communication is discussed in some detail in a recent paper[1]. In brief, that paper concludes, in a somewhat different context, that effective defense of merchant shipping in the event of a large-scale war can be achieved by

1. emphasizing the utility of helicopter ASW, with the helicopter used as a truck in deploying active sonars by a leapfrogging tactic along the route, with ASW analysis and processing done in the base ship,
2. self-defense measures aboard merchantmen, such as standard homing torpedoes which would be fired in a random direction if the merchantman were hit by a torpedo, and which would pose a substantial threat to the survivability of the attacking submarine,
3. advanced mine fields which in time of war would exact substantial attrition from submarines attempting repeatedly to move from their ports to the shipping lanes,
4. adequate surveillance and defense against cruise missiles, as well as a general capability in air and ocean surface surveillance to threaten and destroy the launchers of anti-shipping cruise missiles.

Comparing our present naval forces with those advocated above for the defense of merchant shipping, we see little application in this role for fast and maneuverable destroyers, nuclear attack submarines (SSNs), attack carriers, or even for antisubmarine carriers. The ASW carrier, of undoubted substantial local effectiveness, provides excessive defense for a single merchant ship, and we do not have and would not have ASW carriers in sufficient numbers to do the shipping protection job. Furthermore, there is serious question as to survivability of the ASW carrier in the face of a threat against which it would otherwise be desirable to deploy an ASW carrier.

On the other hand, a small fleet of SSNs provides a capability for observation and for attack on a small number of enemy warships and is of considerable value in that role.

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[1] R. L. Garwin, “Antisubmarine Warfare and National Security,” Scientific American (July 1972), pp 14—25.

ATTACK OF GROUND TARGETS

In the course of theater operations, it is often desired to destroy the other side's military airbases, command headquarters, military logistics, and to attack forces in the field, including emplaced guns, tanks, troops, etc. Close to an established front line, such attack can be carried out by artillery, which is itself susceptible of considerable improvement in effectiveness. In a conflict without front lines, much damage can be inflicted against stationary targets by the use of hand-emplaced explosives, and against moving targets by hand-emplaced mines.

Experience shows a considerable desire to attack ground targets well beyond the range of artillery, a function which is now carried out by tactical aviation, either land-based air force or carrier-based navy.

The preponderance of attack has always been against fixed targets. Maps are obtained, photo-reconnaissance missions flown (using either manned aircraft or drones), targets identified on the photo materials which provide better resolution and a longer time to identify such targets than does direct visual reconnaissance, strikes planned, and aircraft sent against these targets. The attack pilot must then acquire the target, visually in good weather, with night vision equipment at night, and via radar in certain aircraft-target combinations. A navigation grid would allow those same targets to be struck blindly by navigation, and with accuracies considerably better than those obtained in gravity bombing of targets in the tactical theater. The accuracies, however, are not so good as can be obtained with homing bombs such as WALLEYE or the laser-guided bomb. Against defined targets, the high accuracy of these latter provide far less probability of peripheral damage to surrounding habitation, personnel, and structures for a given degree of target assurance.

However, optimum attack of targets on a bombing range bears little relation to the best system for attacking ground targets during wartime. The presence of strong air defenses, supplied to both Egypt and to North Vietnam by the Soviet Union, changes the relative cost of different modes of attack. A few fighter bombers may have to be accompanied by many more than their number of supporting aircraft whose purpose is to defend against fighters, to jam ground based radars or to provide some rescue capability. Thus, 4000 pounds of bombs which may cost $4000 might require not one but four aircraft for delivery, at a cost of about $100,000 plus attrition. At a 0.5 per cent attrition rate per sortie, and with an aircraft cost of $4 million, the cost of the aircraft may add another $100,000 to the cost of the mission. Furthermore, the continuing drain of pilots and aircraft requires typically an aircraft in training for every aircraft deployed. Thus $4000 in ordnance may only be the most visible part of a $300,000 expenditure which very probably does not destroy the target. The

fighter bomber force adequate for destruction of targets at a rate of one sortie per aircraft per day and an attrition of 0.2 per cent per sortie would disappear in a month if fully exercised at an attrition rate of 3 per cent per sortie.

The fighter-bomber survivability can be improved and its effectiveness enhanced by wide adoption of the technique of bombing by navigation, relying on LORAN C at present and eventually on the more accurate positioning signals available from a future navigation satellite system. By such techniques, the aircraft can be given greater flexibility for survival, their exposure time to defenses can be reduced, and the accuracy of weapons delivery enhanced.

Still an alternative means of attacking ground targets is by the use of missiles. A cruise missile of 500-mile range, launched from ship or from the ground, could weigh 3000 pounds for a 1000 pound warhead of conventional high explosive. It could have an expendable Turbojet engine delivering 600 pounds of thrust for one hour and would have a high subsonic speed. A missile designed for wide use would put most of the expensive portions of the guidance system back at a direction center. Such a missile might be obtained for costs which break down as follows:

Engine	$ 3,000
Airframe	$ 2,000
Warhead	$ 2,000
Auto pilot and Actuators	$ 3,000
Guidance and Communications	$10,000

Many dozens of such missiles could be flown simultaneously by a single central computer, which could command evasive maneuvers continuously so as to reduce the vulnerability of such vehicles to anti-aircraft fire or to attack by defending fighters. The position of the vehicle could be known to the computer by means of signals received at the vehicle from navigation satellites or LORAN systems and transmitted back to the computer via an airborne monitor which would handle all missiles in flight simultaneously. These missiles could be guided all the way to their point of impact and would therefore have an accuracy better than that which can be obtained in dropping gravity bombs with the help of a navigation system. It seems possible for a total missile cost of $25,000 to include also a terminal homing capability to give such missiles the accuracy of the TV-guided WALLEYE.

In comparison of relative effectiveness of forces, such a missile wins out over aircraft-delivered gravity bombs. It

competes with WALLEYE in low defense environments, but it is substantially superior in heavily defended areas. To the defense planner at the national level, such a capability is much more robust against uncertainty of developments on the other side, and it requires substantially less in support costs and in personnel than does attack with manned aircraft. As will be seen, the use of such missiles has impact far beyond its direct substitution for fighter bombers.

For attack on moving targets, such missiles can be used to deliver mines in the path of the vehicles. They can also be directed by real-time command to strike such moving targets which have been identified by radar surveillance. To discuss this aspect further would require too much detail for the scope of this paper.

CLOSE AIR SUPPORT

Support of troops in combat is obtained from artillery or by aircraft-delivered munitions. Although specialized aircraft are under development for this role, the problem is primarily that of delivering munitions at a specified point, and this can be accomplished by navigational techniques. For use near the battlefield, many alternative navigational methods are immediately available, ranging from LORAN C to various microwave navigation schemes. Not only can the aircraft position itself for weapons release, but weapons can be guided directly to their target. One aspect of specialization of a close support aircraft is low cost, but one must make every effort to see that it does not have a concomitant low effectiveness. In any case, specialized close-support aircraft are in competition with high-flying aircraft dropping laser-guided bombs which are guided to their targets by a laser held by a ground or air observer, with the use of gravity bombs dropped by navigation, with the use of bombs guided to their targets by navigation, and with the use of short-range battle field missiles guided to their targets in any of these ways.

SURVEILLANCE AND RECONNAISSANCE

The need for surveillance ranges from the desire of a commander of a besieged camp to perceive the current location of enemy trenches to the desire to obtain a fine-scale map of an entire country. Much more attention could be paid to low—cost techniques such as balloons or drone helicopters or aircraft to provide a platform on which to mount a TV camera or a film camera. Observation at night can be done with long-wave infrared techniques, and radar seems very well suited to the detection of moving targets on the ground or in the air. More attention to continuity of ground vehicle surveillance using helicopter-lifted moving-target-indicator-radar, as described under AIR DEFENSE above, can provide assurance against surprise and also a better allocation of forces.

AIR SUPERIORITY

This term is usually used in the context of tactical theater warfare, meaning that the side with air superiority can use the skies safely, whereas the other side cannot. It is more and more expensive to obtain air superiority, the farther one goes from one's own base. The preferred means of obtaining air superiority is to destroy the airfields of the other side and his aircraft on the ground. I have noted a means of doing this by use of the missiles described under "ATTACK OF GROUND TARGETS" above. The purpose of air superiority over enemy territory is to obtain safe passage for one's own bombers and reconnaissance aircraft. If there are no manned bombers, air superiority is an unnecessary and perhaps too expensive luxury. Air superiority over one's own territory contributes to the survival of one's airbases, command headquarters, and deployed forces. However, this same function can be performed by a combination of hardening, dispersal of valuable targets, and defense by the use of guns and surface-to-air missiles. In fact, the most valuable and vulnerable targets for enemy air attack are usually one's own airfields and air vehicles. While the need for fighter bombers and fighters and the existence of these valuable and vulnerable targets is thus somewhat circular, there is an undoubted need for cargo aircraft and personnel carriers which must be defended not only against air attack, but also against mortar fire directed toward their landing and sheltering areas, and against sabotage. A force oriented toward such a limited definition of air superiority might be of quite different form and size than our present goals. In particular, air superiority might receive a significant contribution from the use of a modern remote-piloted vehicle (RPV) analogous to the old supersonic BOMARC which served so long in the US air defense forces. Such vehicles can be launched from the ground, from cargo aircraft, or from fighters, and can be given undoubted maneuvering superiority and survivability against enemy manned aircraft, while retaining and enhancing the senses and the intelligence of the remote pilot.

ANTI-TANK WARFARE

Tanks have a useful function in protecting some fraction of the troops against fragments and small arms fire. The existence of tanks provoked the development of anti-tank weapons, some mounted on other tanks, some on field pieces, and some of them hand-held rocket-propelled and in recent years guided. Tanks are also vulnerable to mines emplaced by hand, by artillery, or by aircraft. The race between tank and anti-tank weapon is an old one, and claims of supremacy for one side or the other have been heard many times. It seems now to me that the technological advance in electronics and the recent greatly diminished cost for a given function would allow a proliferation of effective and controllable anti-tank weapons spelling the end of the large and expensive tank.

GENERAL COMMENTS

It is very difficult to evaluate general-purpose forces in terms of specific military functions, just because these force elements do have capabilities for several such functions. Undeniably, small numbers of advanced vehicles, such as YF-l2 airplanes, attack carriers, etc., have some value. However, when adequate forces cannot be procured because of budgetary limitations, we have the worst of both worlds -- a large defense budget and inadequate military capability.

In the discussion above, we have reviewed some feasible near-term technological alternatives to current means of accomplishing certain fundamental military functions. This brief review leads to the conclusion that we need no large forces of

-- fighter bombers

-- attack submarines

-- aircraft carriers

-- AWACS

-- tanks

-- fast destroyers

-- advanced tactical fighter aircraft

-- B-l bombers

-- Trident submarines

We need to establish the route of transition from our present forces to much more effective forces, at significantly lower cost, whose performance is more reliable in the face of achievable enemy options. Our present forces result from a long tradition of organization and behavior. In the numbers which are planned to exist, they are incapable of serving the country’s military needs; and they are too expensive in unit cost and in capital investment to produce in the numbers which might be needed.

In this brief note I have described alternatives to the present force structure. A sequel to this paper should consider more fully the relative merits of our present “high investment-low attrition” forces in comparison with a posture of “low investment-high attrition” forces like those described above, which seem to offer a much more desirable military capability and one which can be maintained and continually modernized at lower cost.

Although the strategy of transition to more effective military forces cannot be laid out in all detail in this paper, I advocate major commitments to the most effective management and development techniques known in order to:

- -- deploy a world—wide, highly accurate defense navigation satellite system
- -- develop the low-cost, high precision, ground and ship launched interdiction missile
- -- develop and procure advanced, lightweight, radar equipment, to be operated while supported from a helicopter for the purpose of air defense and theatre monitoring
- -- develop more efficient helicopter—deployed sonars, together with the tactics of leapfrog deployment of these sonars, with processing in the base ship
- -- develop low cost and effective mines
- -- develop a remote-piloted vehicle against enemy aircraft
- -- commit to wide deployment and corresponding tactics for a hand-held, controllable, anti-tank capability
- -- recognize the wide utility even now of a common navigation grid for the provision of close support, interdiction, and reconnaissance, as contrasted with present visual means.

It seems to me that the main commitment of development and investment should be in these directions, while economies should be made in investment and maintenance of present forces, recognizing the probability that they will be displaced in the near future with more effective and less vulnerable capabilities

SUMMARY
CHART PRESENTATION
TO ACCOMPANY
"THE SHAPE OF FUTURE US MILITARY FORCES"

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JULY 4, 1972

THE SHAPE OF FUTURE US MILITARY FORCES

SOME PROBLEMS

INADEQUATE CIVILIAN KNOWLEDGE

INADEQUATE CIVILIAN CONTROL

INADEQUATE MILITARY KNOWLEDGE

INADEQUATE MILITARY CONTROL

INADEQUATE MILITARY CAPABILITY

CONFUSION BETWEEN LARGER BUDGETS AND GREATER CAPABILITY

VULNERABILITY OF AIRCRAFT ON THE GROUND AND IN THE AIR

VULNERABILITY OF SHIPS, TANKS, AND OTHER HIGH-VALUE ITEMS

DANGER OF CHEMICAL OR NUCLEAR WARFARE

EXCESSIVE STRATEGIC FORCES

STRATEGIC OFFENSIVE FORCES

LAND-BASED MISSILES

1000 Minuteman 1, 2, 3

54 Titan-2

SEA-BASED MISSILES

41 Ballistic Missile submarines (Polaris/Poseidon)

BOMBERS

~ 455 B-52

~ 72 FB-lll

MODERNIZATION PROGRAMS:

Minuteman 3 (MIRV -- multiple, independently-targeted reentry vehicles)

Poseidon (MIRV)

SRAM (Short-range attack missile)

SCAD (Subsonic-cruise armed decoy)

REPLACEMENT PROGRAMS

B-1 (Advanced bomber)

TRIDENT (retrofit missile; new $1B submarine; new missile)

WHY? Vehicles vs. Weapons vs. Navigation, Communication, etc.

STRATEGIC AIR DEFENSE

NOW:

585 manned interceptor

755 surface-to-air missiles

plus radars, command & control

COMING:

AWACS? (airborne warning & control system)

WHY?

SHOULD HAVE:

Helicopter-supported radar

Few manned interceptors

MAINTENANCE OF SEA LINES OF COMMUNICATION

NOW:

- ASW (anti-submarine warfare)
- Aircraft carriers with aircraft and helicopters
- Land-based ASW aircraft
- SSN (nuclear attack submarines)
- Destroyers
- Convoy

COMING:

- Advanced mines

SHOULD MOVE TO:

- Merchant-ship retaliation against submarines
- Helicopter defense of naval formations
- Emphasis on advanced mine barriers
- Recognize vulnerability of carriers

ATTACK ON GROUND TARGETS

NOW:

Visual bombing of pre-selected targets

- poor effectiveness
- much peripheral damage
- vulnerability of aircraft and pilots

WHY HAS MOTION BEEN SO SLOW TOWARD

- Bombing by navigation
- Laser-guided bombs
- TV-guided bombs
- Combined navigation and terminal homing?

AND A CHEAP CRUISE MISSILE WOULD BE BETTER IN ALL RESPECTS!

WHY A TACTICAL CRUISE MISSILE OF 500 MILES RANGE?

PRESENT COST TO DELIVER 4000 LBS OF BOMBS AGAINST MODERATE DEFENSES?

1 attack aircraft sortie

3 fighter and support aircraft sortie

PER-SORTIE cost $20,000

AIRCRAFT cost $4,000,000; ATTRITION 0.5% per sortie

TRAINING AIRCRAFT -- ONE PER AIRCRAFT IN ACTIVE FORCE

COST = (4 x $20,000) + (0.5% x 4 x $4,000,000) + $40,000 + $4,000

~ $200,000 or $50 per pound

But it can be <u>much</u> more costly against more effective defenses.

COST of cheap cruise missile -- 1000 lb warhead; 500 mile range

Engine	$3,000
Airframe	2,000
Warhead	2,000
Autopilot	3,000
Guidance and Communications	<u>10,000</u>
	$20,000

OR $20 per pound, and it cannot be increased very much by defenses.

WHY DON'T WE DO IT THIS WAY?

Better accuracy, no prisoners of war.

CLOSE AIR SUPPORT

NOW:

- Visual bombing
- Some ground-based bomb-directing radar
- A-10 ("AX") aircraft under development for "low cost, low vulnerability"

WHY NOT

- Bomb by navigation
- Terminally-guided bombs
  - LASER
  - TV
  - Navigation ?

AIR SUPERIORITY

NOW:

F-4 fighters armed with missiles and guns

UNDER DEVELOPMENT:

F14 and F-15 fighters

WHY NOT:

Emphasize smarter missiles for our existing aircraft,

Combine ground-supplied missiles with air-direction,

Reconsider need for "air superiority" over enemy territory in view of use of cruise missiles?

GENERAL COMMENTS

DON'T NEED LARGE FORCES OF

- Fighter-bombers
- Attack submarines
- Aircraft carriers
- AWACS
- Tanks
- Fast destroyers
- Advanced tactical fighter aircraft
- B-1 bombers
- Trident submarines

NEED TO ESTABLISH ROUTE OF TRANSITION TO

- More-effective, more-reliable, less-costly forces

HIGH-INVESTMENT, LOW-ATTRITION FORCES should give way to LOW-INVESTMENT, HIGH-ATTRITION FORCES

THESE SYSTEMS WOULD MAKE A DIFFERENCE

WORLD-WIDE DEFENSE NAVIGATION SATELLITE SYSTEM

LOW-COST, HIGH-PRECISION, GROUND-AND-SHIP LAUNCHED TACTICAL CRUISE MISSILE

RADAR TO BE SUPPORTED BY HELICOPTER FOR AIR DEFENSE AND THEATER SURVEILLANCE

MORE EFFICIENT USE OF HELICOPTER-DEPLOYED SONARS

LOW-COST AND EFFECTIVE MINES

WIDELY-DEPLOYED, CONTROLLABLE, HAND-HELD, ANTI-TANK WEAPONS

USE COMMON NAVIGATION GRID FOR RECONNAISSANCE, INTERDICTION, AND CLOSE SUPPORT