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**ROLES AND MISSIONS OF SOVIET NAVAL
GENERAL PURPOSE FORCES IN WARTIME:
PRO-SSEN OPERATIONS**

Bradford Dismukes

**Center for Naval Analyses
Arlington, Virginia**

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The views expressed in this Professional Paper are those of the author. They do not necessarily represent the position of the Department of Defense.

CENTER FOR NAVAL ANALYSES

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ROLES AND MISSIONS OF SOVIET NAVAL
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Introduction

Technology and diplomacy have combined in the 1970's to make the world ocean the main stage of U.S.-Soviet military interaction for the extended future. This interaction now occurs at two levels:

The first is when both sides use naval general purpose forces (GPF)* in their "political presence" missions targeted against each other and against Third World states. Interactions at this level (analyzed elsewhere in this volume) probably offer the most likely contingencies in which combat between the superpowers may erupt in the immediate future.

Secondly, the naval GPF balance almost certainly will have a significant effect on high level strategic relationships between the two countries. At that level in the past, the question has often been asked: what threat do Soviet naval forces pose to the security of the U.S. SSBN force? The official answer appears to be little or none. For example, throughout the debate on the Trident system and its predecessor, ULMS, U.S. naval spokesmen expressed the view that, while no specific ASW threat to Polaris/Poseidon now exists, Trident is a hedge against the possibility of such a threat and (more recently) a "counter" to the Soviets' D-class SSBN.¹

*General purpose force is a term of Western origin referring to all naval forces except ballistic missile launching submarines.

This paper deals with the relationship between GPF force levels and capabilities and the SSBN security issue from the Soviet point of view. Its purpose is to urge students of Soviet naval policy to re-examine the body of available evidence by asking two questions which have thus far been given scant attention: what kind of threat to their own SSBNs do the Soviets perceive in Western ASW systems? What has been their reaction, if any, to this potential threat?

One should say at the outset that these questions do not arise because of explicit U.S. policy. The U.S. has generally (and in the author's opinion, properly) avoided policy statements which imply that its ASW capabilities are targeted against Soviet ballistic missile submarines. At the national level, spokesmen like Admiral Zumwalt do not list ASW defense against SSBNs as one of the four "capabilities" of the U.S. Navy.² However, the U.S. has not yet gone as far as specifically excluding defense against SSBNs as a naval task; the utilization of U.S. ASW capabilities in a damage-limiting role to blunt a possible Soviet SLBM attack is a logical policy option. Indeed during the early years of the McNamara incumbency in the Department of Defense, naval GPF systems were described as a "defense against submarine launched ballistic missiles." This characterization disappeared by February, 1965, at the same time that assured destruction became the dominant objective of U.S. strategic programs.³ At the national level, U.S. policy, based on the requirements of mutually assured destruction, now reflects little desire to threaten the security

of Soviet sea-based strategic systems. However, ASW defenses against SSNs can be brought to bear against SSBNs. For example, a recent public affairs brochure describing the U.S. Pacific Fleet states, in connection with the missions of Commander Third Fleet (ASW forces in the Pacific), "Protection of the United States against the threat of submarine-launched ballistic missiles is the newest and most complex of ASW responsibilities."⁴

U.S. Behavior

Although statements of this kind may be a source of concern to the Soviets, Soviet naval planners probably give equal or greater weight to three other factors in assessing the current and future security of their SSBN force:

- o the possibility of a breakthrough in ASW sensor technology that would permit ASW forces to maintain continuous fire control solutions on SSBNs;
- o patterns in U.S. resource allocation between various types of ASW (area search, convoy defense, etc.) and between ASW and other areas of naval warfare; and
- o observed trends in U.S. naval operations, exercises, and tactical development and evaluation.

What little information is available about Soviet views on these subjects will be described later; it will be useful at this point to review the evidence publicly available in the West on U.S. ASW activities in order to conjecture about its possible

impact on the Soviets. The basic question is: have those activities been of a scale and character which is likely to have produced concern in the USSR with SSBN security?

It is the hypothesis of this paper that, whatever U.S. intentions, the answer is yes. Unofficial arms control advocates in the U.S. have made SSBN security a central theme of recent investigations. Scientists like Herbert Scoville and Richard L. Garwin have proposed measures which would isolate "conventional" ASW for the protection of surface ships from "strategic" ASW, which threatens ballistic missile submarines.⁵ While these technical specialists generally agree that "there is no danger to the invulnerability of the sea-based deterrent either immediately foreseeable or on the horizon," the fact of raising the issue to the level of public discourse could encourage Soviet planners to re-examine their own assessments closely.⁶

The evidence from U.S. resource allocation patterns probably further impels the Soviets toward concern with SSBN security. Soviet writings indicate they estimate that a third of the U.S. Navy's procurement budget goes to anti-submarine warfare. To offset the retirement of specialized anti-submarine carriers, U.S. attack aircraft carriers (CVAs) have recently been programmed to become CV's, embarking ASW aircraft in addition to fighter and tactical strike aircraft. The newly designated CVs have been assigned a "sea control" mission; however the objective for which sea control is sought is left somewhat open-ended.

In general, U.S. ASW programs are justified in U.S. writings by the requirement to defend U.S. naval forces wherever they may operate, especially when they protect military and economic sealift to NATO in the context of a European land war. This latter justification the Soviets may find puzzling, if a short duration general war scenario can properly be imputed to them. In brief, although the wartime missions of the U.S. GPF Navy may be well understood by U.S. officials and analysts, Soviet understanding of those missions may be substantially less clear.

In addition to the development of the CV, "Sea Control" and other ASW ships of more radical design are planned. The United States has invested in large-scale undersea surveillance systems which in some cases may appear to the Soviets to be targeted against the operating areas of their strategic submarines. The U.S. is currently acquiring advanced land- and sea-based ASW aircraft (the P3C and the S3A), whose combined total appropriations had reached nearly \$4 billion dollars by FY-75.⁷ The budget justification for the U.S. nuclear attack submarine program has long characterized SSNs as effective ASW platforms. The mission description of the latest, SSN-688-class, continues that justification. The 688 is being acquired to "destroy enemy ships, primarily submarines, in order to prohibit the employment of such forces in attacks and destruction of U.S. or allied targets."⁸ Which targets are being threatened by which enemy "submarines" is not specifically stated; the ambiguity of the mission description at

least offers the possibility that the SSN-688 and U.S. ASW systems in general may have Soviet SSBNs as targets.

Soviet Views

Senior Soviet spokesmen have not publicly addressed the broad question of the wartime missions of all U.S. ASW forces. However, at the technical level they have discussed the role of Western nuclear attack submarines. These they apparently regard as having primary pro- and anti-SSBN missions. In 1971, a review of Western ASW in the Soviet Naval Digest referred to the primary mission of U.S. nuclear submarines as "combatting other submarines and protecting their own guided missile submarines."⁹ The following year a second naval spokesman observed in the same forum that Western SSN's were intended "to track and destroy nuclear powered guided missile submarines and attack submarines."¹⁰ This discussion of submarine missions is particularly significant, because the Soviets have made quite clear that they regard the submarine itself as the most effective anti-submarine platform.¹¹

Little information is available on the critical question of Soviet assessments of the quality of Western ASW systems. They have publicly articulated an interest in U.S. ASW detection and attack systems, ascribing ranges of tens of kilometers to U.S. sonars.¹² They appear to be attentive students of Western ASW developments, writing in detail (always citing "specialists in the West" as a source) on U.S. fixed ocean surveillance systems, ASW mine developments like Captor, and the organizational structure of U.S. ASW

forces. In general, however, the available evidence only permits one to conclude that the Soviets are aware of the range of U.S. efforts in ASW and, at the technical level at least, perceive these capabilities can be targeted against their SSBNs.

There is a final and important reason to suspect that the Soviets may in fact be more concerned with the SSBN defense problem than they have publicly revealed thus far. This has to do with the effects of uncertainties about an adversary's capabilities that are always inherent in defense planning and the common technique of assessing a threat via the mode of pure capabilities analysis. It seems possible that if the Soviets apply some version of pure capabilities analysis to the body of evidence on U.S. behavior described above, they may already have concluded that the U.S. Navy has adopted, but not announced, (or will soon adopt) a basic mission of ASW defense against Soviet SSBNs.

While we have no direct evidence of the role it plays in Soviet planning, pure capabilities analysis is a familiar tool of defense analysts. In the pure capabilities perspective one of an opponent's principal capabilities--in this case, U.S. ASW systems--is matched against a very high value and potentially vulnerable stake--the Soviet SSBN force--in a scenario involving several worst case assumptions. If the Soviets employ this mode of analysis, their conclusions do not hinge so much on overt U.S. verbal and operational behavior as on potential U.S. actions, which prudent Soviet planners must prepare for.

The Soviet SSBN force is almost certainly the highest value entity which the Soviet Union must maintain in the world ocean; further, its importance is likely to increase as long as mutually assured destruction remains the basic theme of de facto U.S.-Soviet strategic relations. Because of large investments and substantial experience over an extended time period and perhaps because of the organizational emphasis of the U.S. Navy on ASW, the United States may appear to possess a serious capability to threaten that force. It thus appears that Soviet maritime strategists in 1974 have substantial reason to accord significant attention to SSBN defense, particularly in light of the Soviets' historical concern with defensive missions.

The Range of Possible Soviet Responses

If one surveys the record of Soviet naval behavior, is it possible to detect evidence of concern with a Western ASW threat to Soviet SSBNs? The answer to this question is quite uncertain; the evidence is mixed. In theory at least two responses* employed independently or in combination appear open to the Soviets:

- o They can attempt to dilute the effectiveness of any potential U.S. threat by increasing the range of their SLBMs, thus enlarging the area in which their SSBNs can operate while remaining on station;

* Other responses are theoretically possible, including mounting additional self-defense systems on their SSBNs, an alternative which might tend to nullify the SSBN's ability to remain concealed if pre-launch employment of defensive weapons systems were necessary.

- o They can adopt what might be termed a sea control approach with the object of:
 - (1) threatening U.S. SSBNs, or
 - (2) defending their own SSBNs on station.

The Soviets have clearly adopted the first approach. The SS-N-8 missile mounted on the new D-class SSBN has a range publicly announced in the West on the order of 4000 nm. This represents about a three-fold increase in range over the SS-N-6 missile currently carried by the Y-class and permits the D-class to be on station while in or near home waters. This increase in range affords the opportunity to disperse deterrent platforms more widely. It also presents the possibility of concentrating D-class submarines (or other platforms which potentially might carry the SS-N-8) in order to defend them with naval and land-based forces in areas near to the USSR. The Soviets have not publicly described such a possible tactic for their own forces, although it would be quite congruent with the defense-of-the-homeland tasks that make up the primary missions of the Soviet naval GPF in wartime. It is quite noteworthy however that in a recent article Soviet non-naval political analysts have suggested that the U.S. might concentrate its Trident submarines for defensive purposes.¹² Active defense of a unilaterally declared safe area for Soviet SSBNs in the Norwegian Sea or off the Kamchatka coast would appear to be attractive alternatives in a time of severe tension, after SS-N-8 inventories permit. (Declaration of such an area in the Norwegian

Sea before the longer range missiles of the U.S. Trident system are operational in significant numbers might, of course, produce a severe dilemma for U.S. planners if the Atlantic Polaris/Poseidon force operated in the same area.)

In the near term however, until the SS-N-8 is operational in sufficient numbers, the Soviets may be seriously concerned with the second approach--sea control as it relates to the strategic platforms of both sides. A considerable portion of Soviet ASW effort has reportedly focused on the U.S. Polaris/Poseidon force in the last five years. One could expect explicit anti-Polaris/Poseidon operations to intensify as SALT II negotiations proceed. But according to the public statements of the U.S. leadership the Soviets currently lack any significant capability against SSBNs. Indeed in the Gorshkov series in Morskoi sbornik (February 72 - February 73) the possibilities of ASW defense against ballistic missile submarines are not discussed favorably.¹³ On the other hand, it's probably fair to say that the Soviets already possess significant capabilities to contend with at least the surface component of any ASW forces which the U.S. might seek to bring to bear against Soviet SSBNs in transit to or operating on their current launch stations. This reality would appear strongly to encourage the Soviets to place high priority on countering such forces.*

* Advocates of mutual deterrence in the U.S. may have difficulty in imagining the possible contingencies in which the U.S. might choose deliberately to threaten the Soviet SSBN force; however it is doubtful that decision-makers responsible for the development of the D-class (or the Trident) would be similarly troubled.

The Soviets can significantly improve their ability to operate in the high threat environment implied by this mission if they employ a force of large air-capable ships like those currently under construction at Nikolayev on the Black Sea. It is the conjecture of this paper that the Nikolayev ship is being developed principally for the purpose of enhancing Soviet GPF sea control capabilities in the pro- and anti-SSBN mission area. However, alternative missions are clearly possible and a review of the evidence regarding other roles for the ship is required.

Role of the Air-Capable Ship

Although intelligence apparently remains sketchy, the air-capable ship is publicly described in the West as displacing on the order of 40,000 tons and being capable of operating both helicopters and fixed-wing V/STOL aircraft.¹⁴ Two major missions appear possible for this ship:

- o projection of power ashore on the U.S. attack carrier or amphibious helicopter carrier models, and
- o sea control.

Considerable overlap exists among the capabilities required to perform these missions, but, on balance, the evidence seems to support the conjecture that the new air-capable ship will be designed primarily for a sea control mission.

First, sea control is a general prerequisite to projection of power ashore. The ship is not large enough to combine major sea control systems--ASW and AAW--with significant capabilities

to project power ashore--strike aircraft or amphibious helicopter lift. If it is to be exclusively an amphibious helicopter ship (the Soviets described the use of helicopters in the amphibious phase of Maneuver OKEAN),¹⁵ it would appear excessively large for the inter-coastal missions on the Eurasian continent traditionally assigned to Soviet amphibious forces.

It is clearly too early to foreclose on the possibility that the ship is a commando carrier (which also exist in the navies of France, the United Kingdom, and Australia), designed for essentially political missions in the Third World. If so, it would presumably rely on other Soviet units for AAW and ASW support. However, operation of a commando carrier would clearly be the most radical single step the Soviet navy could take and would strongly intensify and accelerate the trend toward political intervention in the operations of the Soviet navy which has emerged since 1967. In this regard, the ship, whatever its primary mission, will no doubt engage in distant deployments and almost certainly will be used for political effect. The ship will be a major symbol of both the global capability of the Soviet navy and its claim to equality with the Western naval power.*

In the final analysis, however, the strategic relationship with the United States has been the governing concern of Soviet naval planners. The MOSKVA-class CHGs' ASW capabilities were

* And equality with other navies as well. For example, the Soviets probably find the lack of sea-based air capability embarrassing when they deploy to the Indian Ocean where the Indian navy operates an attack carrier.

widely interpreted by naval analysts in this perspective (that is, MOSKVA was estimated to be primarily a counter-SSBN platform).¹⁶ It seems therefore likely that the Nikolayev ships will be in this sense a second generation MOSKVA which (presumably) bring fixed-wing, sea-based air to contend with the strategic defensive problems which the Soviets perceive.

If this line of argument is valid, two aspects of the MOSKVA-class CHG are particularly important. First, by providing organic sea-based air in the form of helicopters, the CHG significantly extended the range of sensors in the field of ASW. The Nikolayev ships will extend sensor range in the fields of AAW and anti-surface ship warfare. The latter is particularly important because of the sensor (and to a lesser degree) the attack range advantage which a CVA task force appears to enjoy over Soviet surface units. MOSKVA also represented a quantum improvement in ASW and AAW self-defense capabilities; the Nikolayev ship will almost certainly improve on MOSKVA, especially if air defense fighter aircraft are carried.

A second, and perhaps less obvious aspect of MOSKVA-class operations has been the CHGs' possible role in task force coordination.¹⁷ It is an occasionally controversial tenet of Soviet naval planning, according to Soviet doctrinal writings, that success in combat requires, where possible, the coordinated employment of surface, sub-surface and air units. Soviet descriptions of their exercise activity frequently reflect this concept. In

addition, the Soviets have been particularly forthright in expressing the view that the two major obstacles to be overcome in ASW are submarine detection and coordination of Soviet attack systems.¹⁸ Because of her size and implied capacity to carry major communications and signal processing systems, and because of her potential to communicate reliably with submarine, surface, and air units, the new air-capable ship seems likely to have major responsibilities for coordination of Soviet operations designed to achieve tactical superiority in an ocean area of operations.¹⁹ If this is the case, one might expect to see increasing Soviet attention to tactical data links and communications relay aircraft in addition to the helicopters, early warning and electronic warfare aircraft which that task implies.

However, it cannot be specifically determined at this time whether the Nikolayev ships are to be employed to protect Soviet SSBNs against a possible Western threat or whether they will be used as the nucleus of a force designed to attack the sea-based strategic systems of the West. Because of the great similarity of shipboard sensors and weapons systems necessary to accomplish either task, it may be that the question will remain unanswered for some time to come.

Implications of Current Soviet SSBN Operating Policy

The crucial evidence regarding possible Soviet concern with SSBN security necessarily comes from current SSBN operating policy itself. In 1973 the Soviets apparently maintained only 2 to 3 Yankee-class SSBNs within range of the U.S. ²⁰ Assuming they continue this practice, it would appear to have two obvious implications:

- o the Soviets do not expect a sudden surprise attack by the West that would destroy these forces; and
- o they are apparently confident that they can move the remainder of the SSBN force into launch position when they desire to do so.

It is the latter point which is of direct concern here. There appear to be four possible sources of Soviet confidence:

- (1) They simply do not believe that existing or planned Western naval forces have the capacity to impede their SSBN deployments. For the reasons argued above this is unlikely to be the case.
- (2) They will deploy their SSBN force during the period of increasing tension preceding hostilities and depend on the protection of the peacetime situation for its security. Although Western planners have apparently rejected such a policy for their SSBNs on the grounds of risk and the felt need for immediate retaliation, we do not know enough about Soviet views to reject this alternative as entirely implausible.*

* No evidence is available from Soviet or Western sources regarding Soviet SSBN deployment policies during recent international crises.

(3) The Soviets can withhold a significant portion of their SSBNs from the initial nuclear exchange by deploying it in presumably safe territorial or near-shore waters. It has been argued elsewhere in this volume that Admiral Gorshkov advocates such a "withholding strategy" on the grounds that naval forces in-being are a vital necessity for intra-war or post-war bargaining. This strategy implies that the force could then be deployed at will, if one assumes that some significant portion of Western capabilities to oppose it would have been eliminated.

(4) Finally, the Soviets could employ their GPF naval systems (and other elements of their armed forces) to protect a surge deployment of the force as the war begins. Whatever other benefits existing Soviet SSBN operating policy affords, it probably makes a larger portion of the force available for surge deployment when compared to a policy of maintaining peacetime deployments continuously at a relatively high level.*

The latter two cases imply a range of wartime tasks for the GPF sector of the Soviet navy associated with a pro-SSBN mission. In the case of the "withholding strategy" GPF requirements would vary with the timing of SSBN employment and the size of the remaining Western force. In the last case--in which the force might fight its way to launch position--GPF requirements might be very significant

* Assuming that their SSBN force faces no physical constraints on its deployability--crew availability, system reliability etc.--current Soviet SSBN deployment practice appears to offer the advantages of lower operating costs and reduced risk against accident.

indeed. This is particularly so because the tactical situation would be exactly the reverse of the defense-of-the-homeland role which has long been associated with the Soviet GPF navy. The Soviets would not adopt blocking positions for a defense in depth against an expected Western penetration; instead, the Soviets might be required to penetrate a Western defense in-depth.

Conclusions

It has been argued here that the character and scale of U.S. (and other Western) ASW activities has been such that one could plausibly expect the Soviets to be concerned with the security of their SSBN force; that current technical realities appear to encourage them to increase their capabilities to contend with a potential threat to that force from Western ASW systems; that the air-capable ship is likely to be assigned both pro- and anti-SSBN missions; and that the pro-SSBN task may lie closer to possible achievement.

The evidence from Soviet verbal and operational behavior-- particularly the current peacetime SSBN deployment policy--is difficult to interpret until the question of the wartime role of the SSBN force is resolved. The possible existence of a "withholding strategy" may in itself reflect Soviet concern with the SSBN security problem. The evidence does not permit a conclusive judgment. At this time it would appear useful for analysts to add the pro-SSBN mission to the list of possible wartime tasks of the Soviet navy.

NOTES

1. See Admiral Zumwalt's remarks in Senate Committee on Appropriations Hearings on Department of Defense Appropriations, Fiscal Year 1973, 92nd Cong., 2nd Sess., February 23, 1972, p. 101.
2. These capabilities are: (1) strategic offense, (2) sea control, (3) projection of force ashore, and (4) political "presence." U.S. Congress, Senate Committee on Appropriations, Hearings, Department of Defense Appropriations Fiscal Year 1973, 92nd Cong., 2nd Sess., February 23, 1972, p. 68.
3. See U.S. Congress, Senate Committee on Armed Service, Hearings on Military Procurement, Fiscal Year 1964, 88th Cong., 1st Sess., February 19, 1963, p. 71; Senate Committee on Appropriations, Hearings on Appropriations for the Department of Defense, Fiscal Year 1965, 88th Cong., 2nd Sess., February 5, 1964, p. 109; and Senate Committee on Armed Services, Hearings on Military Procurement Authorization, Fiscal Year 1966, 89th Cong., 1st Sess., February 8, 1965, p. 66.
4. Public Affairs Office, Commander in Chief, U.S. Pacific Fleet, "Fleet Post Office, San Francisco, 90610, no date, p. 12.
5. Herbert Scoville, "Missile Submarines and National Security," Scientific American, Vol. 226 (June, 1972), pp. 15-27; Richard L. Garwin, "Anti-Submarine Warfare and National Security," Scientific American, Vol. 227 (July, 1972), pp. 14-25.
6. Kosta Tsipis, Anne H. Cahn, and Bernard T. Feld, eds., The Future of the Sea-based Deterrent, Cambridge: the M.I.T. Press, 1973, p. ix.
7. U.S. Congress, Senate Committee on Armed Services, Hearings on DoD Authorizations, 93rd Cong., 2nd Sess., March 4, 1974, Part 3, pp. 1149 and 1151. Procurement costs through FY-75 for the P3C and the S3A amounted to \$2075.2 million and \$1819.2 million respectively.
8. U.S. Congress, Senate Committee on Appropriations, Subcommittee on Defense Appropriations, Hearings, 93rd Cong., 1st Sess., Part 3, p. 1153.
9. Captain First Rank D. P. Sokha, "The Past and Present of Submarine Forces," Morskoy sbornik, No. 9, 1971.

10. Captain First Rank N. Aleshkin, "Some Trends in the Development of Naval Forces," Morskoy sbornik, No. 1, 1972. In addition VADM A. Sorokin and Captain First Rank V. Krasnov, "Anti-Submarine Defense Reviewed," Nauka i Zhizn', No. 1 (January 1972), signed to press 7 December 1971, pp. 48-55. JPRS 55386, Translations in USSR Military Affairs No. 788, 8 March 1972.
11. Among other works see N. I. Suzdalev, Submarines vs. Submarines (Podvodniye Lodki Protiv Podvodnikh Lodok) Moscow: Military Publishing House, November 1970.
12. G. Svyatov and A. Kokoshin, "Sea Power in the Plans of the American Strategists," Mezhdunarodnaya Zhizn', No. 3, 1973 signed to press 21 February 1973, pp. 77-86, JPRS 58538, Translations on USSR Political and Sociological Affairs, No. 350, 22 March 1973.
13. The evidence on this point tends to be of a negative character. This interpretation is based primarily on an inference comparing Gorshkov's treatment of the anti-SSBN ASW with that of Sokolovskiy. See James McConnell, "Admiral Gorshkov on the Soviet Navy in War and Peace," Center for Naval Analyses Working Paper, mimeo, 20 July 1973.
14. New York Times, 17 October and 27 February 1973.
15. N. I. Shablikov, "Ocean" Maneuvers of the USSR Navy Conducted in April-May, 1970," JPRS translation, 19 April 1971.
16. See, inter alia, Michael McGwire, "Soviet Naval Capabilities and Intentions," paper presented at conference on the Soviet Union in Europe and the Near East, Milford-on-Sea, England, 1970, Royal United Service Institution.
17. MOSKVA'S massive and complex array of visible electronic and communications equipment has been widely commented on. See for example Sigfried Breyer, Guide to the Soviet Navy, Annapolis: U.S. Naval Institute, 1970, p. 77.
18. See particularly Captain First Rank V. G. Yefremenko, "Development and Perfection of ASW Forces and their Tactics," Morskoy sbornik, No. 10, 1970, who intensifies in a narrower context the basic principles expressed in Suzdalev, op. cit., chapter III.
19. As Yefremenko reports, "modern surface ships as a rule carry helicopters and aircraft and have everything necessary to organize the control of various types of ASW forces and means. loc cit.
20. Washington Star-News, 20 April 1973.

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Rose, Marshall, "A Decomposed Network Computation for End-Product Repair Curves," 24 pp., 18 Feb 1970, AD 702 455
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Brown, George F.; Corcoran, Timothy M. and Lloyd, Richmond M., "Inventory Models with a Type of Dependent Demand and Forecasting, with an Application to Repair," 4 pp., 10 Feb 1970, (Published in Management Science: Theory Section, Vol. 17, No. 7, Mar 1971) AD 702 456
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Silverman, Lester P., "Resource Allocation in a Sequential Flow Process," 21 pp., 5 Mar 1970, AD 702 457
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Gorlin, Jacques, "Israeli Reprisal Policy and the Limits of U.S. Influence," 27 pp., 23 Mar 1970, AD 703 534
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Rose, Marshall, "An Aircraft Rework Cost-Benefit Model," 13 pp., 12 Mar 1970, (Published in the 5th Annual DoD Cost Research Symposium Proceedings, Mar 1970) AD 702 514
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Lloyd, Richmond and Sutton, S. Scott, "An Application of Network Analysis to the Determination of Minimum Cost Aircraft Pipeline Factors," 51 pp., 31 Mar 1970, (Presented at NATO Conference on Problems in the Organization and Introduction of Large Logistic Support Systems, May 1970, Luxembourg) AD 703 536
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Saperstone, Stephen, "An Approach to Semi-Markov Processes," 38 pp., 23 Mar 1970, AD 703 537
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Brown, George F. and Corcoran, Timothy M., "The Reliability of a Complex System with Spares, Repair, and Cannibalization," 45 pp., 23 Mar 1970, AD 703 538
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Fain, Janice B.; Fain, William W.; Feldman, Leon and Simon, Susan, "Validation of Combat Models Against Historical Data," 18 pp., 14 Apr 1970, (Published in 9th Symposium of the National Gaming Council Proceedings, Apr 1970) AD 704 744
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Friedheim, Robert L. and Kadane, Joseph B., "Quantitative Content Analysis of the United Nations Seabed Debates: Methodology and a Continental Shelf Case Study," 32 pp., 24 Mar 1970, (Published in International Organization, Vol. XXIV, No. 3, 1970) AD 703 539
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Saperstone, Stephen H., "Controllability of Linear Oscillatory Systems Using Positive Controls," 27 pp., Apr 1970, AD 704 745
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**Department of Economics, Massachusetts Institute of Technology.*

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Lando, Mordechai E., "Full Employment and the New Economics--A Comment," 4 pp., 14 May 1970, (Published in the Scottish Journal of Political Economy, Vol. XVII, Feb 1969) AD 706 420
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DeVany, Arthur S., "Time in the Budget of the Consumer: The Theory of Consumer Demand and Labor Supply Under a Time Constraint," 151 pp., 15 Jun 1970, AD 708 348
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Kadane, Joseph B., "Testing a Subset of the Over-identifying Restrictions," 7 pp., 19 Jun 1970, (Published in *Econometrica*) AD 708 349
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Saperstone, Stephen H., "The Eigenvectors of a Real Symmetric Matrix are Asymptotically Stable for Some Differential Equation," 19 pp., Jul 1970, AD 708 502
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**Mathematical Institute, University of St. Andrew.*
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Silverman, Lester P. and Forst, Brian E., "Evaluating Changes in the Health Care Delivery System: An Application to Intensive Care Monitoring," 19 pp., Jul 1970, AD 710 631
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**Mathematical Institute, University of St. Andrew.*
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Silverman, Lester, P., "Resource Allocation in a Sequential Flow Process with an Application to the Naval Resupply System," 18 pp., Oct 1970, (Presented at the 11th American Meeting of the Institute of Management Sciences, Oct 1970; Presented at the 26th Meeting of the Military Operations Research Society, Nov 1970) AD 713 028
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Gray, Burton C., "Writeup for B34TCNA--A Step-Wise Multiple Regression Program" 15 pp., Oct 1970, AD 713 029
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Friedheim, Robert L., "International Organizations and the Uses of the Ocean," 88 pp., Oct 1970, (Published in Multinational Cooperation, Oxford University Press, 1972) AD 714 387
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Friedheim, Robert L. and Kadane, Joseph B., "Ocean Science in the United Nations Political Arena," 45 pp., Jun 1971, (Published in the Journal of Maritime Law and Commerce, Vol. 3, No. 3, Apr 1972) AD 731 865
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CNA Professional Papers

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*School of Electrical Engineering, Purdue University.

PP 65

O'Neill, David M.; Gray, Burton C. and Horowitz, Stanley, "Educational Equality and Expenditure Equalization Orders: The Case of Hobson V. Hansen," 43 pp., Feb 1971, (Published in the Journal of Human Resources, Vol. 7, No. 3, Summer 1972) AD 720 362

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Schwartz, Arnold N.; Sheler, James A. (LCdr) and Cooper, Carl R. (Cdr), "Dynamic Programming Approach to the Optimization of Naval Aircraft Rework and Replacement Policies," 39 pp., Mar 1971, (Published in the Naval Research Logistics Quarterly 18, 395/1971) AD 720 363

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Kuzmack, Richard A., "Measures of the Potential Loss from Oil Pollution," 16 pp., Mar 1971, (Published as Chapter 13 in Legal, Economic, and Technical Aspects of Liability and Financial Responsibility as Related to Oil Pollution, The George Washington University, Dec 1970) AD 722 378

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Blechman, Barry M. and Holt, James, T., "Cost/Effectiveness Analysis of Foreign Policy Alternatives: Need, Approach, and Prospects," 41 pp., Mar 1971, (Presented at the 1971 Western Regional Meeting of the International Studies Association, Mar 1971) AD 722 379

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Rogers, Warren F. (Cdr), "On A Theorem of Weyl," 17 pp., Mar 1971, AD 722 381

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*University of Michigan.

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*School of Electrical Engineering, Purdue University.

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Brown, Jr. George F.; Silverman, Lester P. and Perlman, Bernard L. (AWF3), "Optimal Positioning of Inventory Stock in a Multi-Echelon System," 37 pp., May 1971, (Presented at the 39th Annual Meeting, Operations Research Society of America, May 1971) AD 723 852

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CNA Professional Papers

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Harrison, Robert A., "Multivariate Regression Analysis and Slaughter Livestock," 33 pp., Dec 1971, AD 736 356
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Piersall, Jr. Charles H. and Borgstrom, Robert E., "Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal," 23 pp., Apr 1972, (Presented at the Annual Northeast Regional Anti-Pollution Conference at the University of Rhode Island, Jul 1972) AD 744 192
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Forst, Brian E., "Decision Analysis and Medical Malpractice," 30 pp., May 1972, (Presented at the 41st National Meeting, Operations Research Society of America, 27 Apr 1972; Published in ORSA Journal, Vol. 22, No. 1, Jan-Feb 1974) AD 744 193
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Zedlewski, Edwin W., "Estimation and Inference in Binary Response Regressions," 52 pp., May 1972, AD 744 194
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Powers, Bruce F. and Goldberg, Martin*, "Simulation of Rapid Ship Unloading by Helicopter," 12 pp., Jul 1972, (Presented at the 5th Conference on the Applications of Simulation, New York, N.Y., Dec 1971) AD 748 791
**Industrial Engineering Department, Northwestern University.*
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Friedheim, Robert L., "A Law of the Sea Conference - Who Needs It?," 31 pp., Aug 1972, (Presented at the Symposium on International Relations and the Future of Ocean Space, Columbia, S.C., 12 Apr 1972; Published in SAIS Review, Fall 1971; Reprinted in The Development Digest, Agency for International Development, Apr 1973) AD 748 792
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Brown, Jr. George F., "Structural Estimation by K-Class Methods and Reduced Form Forecasting," 215 pp., Aug 1972, AD 748 793
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Heider, Charles H., "A Decomposition Procedure for the Quadratic Assignment Problem," 23 pp., Nov 1972, (Presented at the 42nd National Meeting, Operations Research Society of America, Nov 1972) AD 751 215
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Heider, Charles H., "A Computationally Simplified Pair-Exchange Algorithm for the Quadratic Assignment Problem," 21 pp., Nov 1972, AD 756 703

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Friedheim, Robert L., "Political Aspects of Ocean Ecology," 48 pp., Feb 1973, (To be published as a chapter of "Who Protects the Oceans?" published by the American Society of International Law) AD 757 936
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Schick, Jack M., "A Review of James Cable, Gunboat Diplomacy Political Applications of Limited Naval Forces," 5 pp., Feb 1973, (Reviewed in the American Political Science Review, Vol. LXVI, Dec 1972)
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Corn, Robert J. and Phillips, Gary R., "On Optimal Correction of Gunfire Errors," 22 pp., Mar 1973, AD 761 674
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Stoloff, Peter H., "Relating Factor Analytically Derived Measures to Exogenous Variables," 17 pp., Mar 1973, AD 758 820
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Augusta, Joseph, "A Critique of Cost Analysis," 9 pp., Jul 1973, AD 766 376
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Herrick, Robert W., "The USSR's 'Blue Belt of Defense' Concept: A Unified Military Plan for Defense Against Seaborne Nuclear Attack by Strike Carriers and Polaris/Poseidon SSBN," 18 pp., May 1973, AD 766 375
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- PP 113 - In preparation.
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Rehm, Allan S., "An Assessment of Military Operations Research in the USSR," 19 pp., Sep 1973, (Reprinted from Proceedings, 30th Military Operations Research Symposium (U), Secret Dec 1972) AD 770 116
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Stoloff, Peter and Lockman, Robert F., "Development of Navy Human Relations Questionnaire," 2 pp., May 1974, (Published in APA Proceedings 81st Annual Convention, 1973) AD 779 240
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Smith, Michael W. and Schrimper Ronald A.*, "Economic Analysis of the Intracity Dispersion of Criminal Activity," 30 pp., Jun 1974, (Presented at the Econometric Society Meetings, 30 Dec 1973) *Economics, North Carolina State University.
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CNA Professional Papers

PP 121 (Continued)

Navy Physicians," 21 pp., Jun 1974, (Presented at the 49th Annual Conference, Western Economic Association, Las Vegas, Nev., 10 Jun 1974)

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Friedheim, Robert L. and Jehn, Mary E., "Anticipating Soviet Behavior at the Third U.N. Law of the Sea Conference: USSR Positions and Dilemmas," 37 pp., 10 Apr 1974, (To be published in Soviet Naval Policy, ed. Michael MccGwire; New York: Praeger)

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Weinland, Robert G., "Soviet Naval Operations—Ten Years of Change," 17 pp., Aug 1974, (To be published in Soviet Naval Policy, ed. Michael MccGwire; New York: Praeger)

PP 126 – Classified.

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PP 128

Stoloff, Peter and Lockman, Robert F., "Evaluation of Naval Officer Performance," 11 pp., Aug 1974

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PP 130

Dismukes, Bradford, "Roles and Missions of Soviet Naval General Purpose Forces in Wartime: Pro-SSBN Operations?," 20 pp., Aug 1974