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THESIS

THE SOLOMONS NAVAL CAMPAIGN:
A PARADIGM FOR SURFACE WARSHIPS
IN MARITIME STRATEGY

by

T. J. McKearney

September 1985

Thesis Advisor: Wayne P. Hughes, Jr.

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The Solomons Naval Campaign:
A Paradigm for Surface Warships
in Maritime Strategy

by

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Lieutenant Commander, United States Navy
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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

This thesis examines the naval campaign in the Solomons during World War II with an emphasis on the relationship between the campaign strategy and the tactics employed. The strategic background is reviewed within the context of the War in early 1942. A central theme developed is that in the Solomons campaign both sides employed cruisers and DD's as principal naval forces in place of the fully integrated "battle fleets" envisioned as part of pre-war strategy. The role of war gaming in American preparations for the war is shown to explain in part the failure of American commanders to modify existing doctrine in a timely manner during the campaign. Data from the naval battles fought in the Solomons is compiled in an original way and analyzed to explain the factors which consistently influenced the outcome of the eleven battles. Conclusions reached address the nature of modern campaigns undertaken to widen a conflict ("horizontal escalation") and the forces that may be required to pursue such campaigns. The parallels between the use of surface combatant task forces in World War II and their projected employment today are noted and discussed.

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I. INTRODUCTION: THE SOLOMONS CAMPAIGN IN PERSPECTIVE

The naval battles of the Solomons, fought largely with surface combatants supported by land-based air, offer a likely paradigm for evaluating American naval strategy today. The forerunners of today's Surface Combatant Task Groups (SCTGs) and Surface Action Groups (SAGs) were the cruiser-destroyer task groups of the Solomons campaign. The employment developed for these modern surface forces embodies the same principle as the American drive through the Solomons: a campaign of limited scope, off the central axis of strategic concerns and undertaken with the minimum resources necessary. Just as the Solomons campaign saw the substitution of surface task groups for large, carrier-based offensive forces, so do we now ponder the use of modern SCTGs and SAGs in hostile situations where Carrier Battle Groups (CVBGs) may be unavailable. The tactical similarities suggest that an examination of the Solomons effort may be a suitable foil for today's new doctrines. Should this be the case, a first realization must be that such operations will be fundamentally different from those foreseen in current doctrine and the tactics we will need to employ in "off axis" campaigns will be significantly different from those normally envisioned for the fleet. If the Solomons were any indication, our surface combatant tactics must be well coordinated and supported by

non-task group elements to have any chance at power projection in even a limited theatre. They must also be able to engage in a bold war of attrition: the desperation and ad hoc nature of the Solomons campaign made it particularly violent and marked by heavy losses of men and material.

The Solomons campaign suggests other similarities to modern strategy. Taken in the context of the entire war, the campaign was a first attempt by the United States to take the war to the enemy and the impact of Japanese losses in the Solomons was far greater than the value of the territory lost. The United States effort played a key role in diverting irreplaceable Japanese war resources and, perhaps more importantly, interrupting Japanese strategic planning. The American assault on the Solomons in August 1942 was an unwelcome widening of the Pacific conflict. Since a tenet of modern United States strategy remains the use of such escalation as a deterrent to Soviet aggression, an analysis of the strategic foundations of the Solomons campaign should indicate the strengths and weaknesses of such a strategy.

The United States' first offensive move in the Pacific, the Solomons campaign spanned some sixteen months from August 1942 to January 1944. Begun as a counter to Japan's attempt at severing the sea lanes to Australia, the ultimate outcome of this series of violent land and sea actions was the erosion of Japan's southern defensive perimeter and the first Allied toehold in the Japanese empire. The desperation

which marked the onset of the campaign at Guadalcanal hung over the entire American advance up the Solomons chain. While the United States committed forces to the campaign in a piecemeal fashion, the Japanese squandered irreplaceable resources in a futile attempt to save territory of questionable strategic value. Indeed, as will be argued in the following pages, the entire Solomons campaign was a strategic stepchild of both sides, not considered crucial to the war's winning and receiving only the allowance of forces befitting a campaign of secondary importance. This was particularly true in the case of the naval campaign in the Solomons where each side for its own reasons failed to commit those naval forces necessary to achieve a clear cut control of the waters adjacent to the islands in question.

Perhaps ironically, both the United States and the Japanese followed concepts of naval operations unique to their own traditional rules of fleet employment. As the following pages will indicate, this violation of self-set operational standards resulted in a series of defeats for both sides, defeats that were both tactical and strategic disappointments. The Japanese fought brilliantly in the individual naval actions of the campaign, often embarrassing American naval forces. Their eventual loss of the campaign, however, was the result of a strategy which committed forces to a piecemeal, poorly supported effort. Conversely, American naval

tactical doctrine made a poor showing in the Solomons, yet American tenacity in pursuing the campaign overrode these shortcomings to win what eventually amounted to a contest of wills.

The following analysis of the Solomons campaign will emphasize the naval side of the campaign and those features of the struggle that were instrumental in both the successes and failures of the naval campaign. A detached analysis of history is difficult; facts are clouded by both the misperceptions of the present and those contemporary to the events studied. The Solomons campaign has been a particularly frequent victim of these misperceptions. A primary step in providing a dispassionate look at the Solomons campaign is the distillation of those essential elements of the campaign.

For the purposes of this study, the characteristics of the Solomons campaign can be divided into two categories, strategic and tactical.

A. STRATEGIC CHARACTERISTICS OF THE SOLOMONS CAMPAIGN

The strategic role of the Solomons campaign was unique in the Pacific theatre. Strategically the campaign was:

1. A Holding Action- Designed to halt the Japanese rampage through the Southwestern Pacific in mid 1942, the campaign was undertaken to keep the sea lines of communication ("SLOCs" in today's terminology) to Australia open. Strategically, the assault on the Japanese held islands was a defensive measure, not a primary thrust into the Japanese empire.

2. Action Off a Major Axis- American and Allied plans for winning the war did not consider the Solomons a key piece in the overall strategy. Accordingly, the effect of the campaign had a minimal impact on the eventual outcome of the war although the fighting in the Solomons diverted resources precious to both sides.
3. Undertaken on Short Notice- The threat presented by the Japanese-occupied Solomons only became evident in early 1942 and the campaign to retake the islands was planned in earnest only after the Battles of the Coral Sea and Midway in May and June of that year.
4. Undertaken with Limited Resources- With the United States following a policy of "Europe first" in the early days of the war, few assets were available to American Pacific forces to undertake the Solomons campaign. Informally labeled "Operation Shoestring," the move into the Solomons was done with a bare minimum of forces at a time when the United States was in an essentially defensive position.
5. A Coordinated Maritime Campaign- The Solomons campaign was the first attempt to buy the United States Navy to project power ashore in the Pacific theater. This first rollback of Japanese power utilizing Navy and Marine Corps forces was the progenitor of a unique and essentially naval form of warfare where land, air, and sea territory were all seized in a simple coordinated campaign.
6. A Littoral Naval Campaign- Following the dicta of Mahan and other naval theorists, both American and Japanese naval strategists saw sea control as the product of large scale battle fleet engagements on the high seas. The drawn out, violent war of attrition for the waters of the Solomons was anathema to the planning of both fleets and the ultimate victory went to the side that best adapted to the strategic requirements of this type of warfare.
7. Fought With Forces Dictated by Arms Control Agreements- The Washington and London Naval Treaties drove the construction of those forces that clashed in the Solomons, making arms control a principal backdrop for the campaign. The unique method in

which each side approached the limitations and restrictions of these treaties influenced each's ability to successfully undertake required objectives during the campaign.

B. TACTICAL CHARACTERISTICS OF THE SOLOMONS CAMPAIGN

The tactical environment of the Solomons campaign was unique to the experience of the American naval officers, with engagements unforeseen in prewar planning and training. The tactical actions in the waters adjacent to the Solomons were characterized by:

1. Engagements of Forces of Less than Planned Battle Fleet Strength- While the tactical doctrine of both American and Japanese forces of the day called for decisive engagements at sea to be fought by an integrated force of submarine, carrier, battleship, and assorted "light" forces, the employment of such combined fleets was limited to specific instances in the Solomons. In contrast to the doctrine of both sides, cruiser and destroyer forces were employed as the principal naval platforms for sea control. In shifting these units from a supporting to primary role the combatants were forced to employ these previously limited use assets across a spectrum of tactically offensive and defensive missions.
2. Night Actions Fought at Close Quarters- United States Navy doctrine had shied away from night engagements holding long range gunnery in good visibility the key to tactical success. Conversely, the naval actions in the waters of the Solomons were largely duels at close range where the Japanese attempted to employ devastating torpedo attacks under the cover of night. In response, the United States Navy was compelled to engage in a form of warfare it had consciously planned to avoid.
3. Use of Land-based Air in Support of Naval Operations- The development of carrier-based air forces was a significant milestone for World War II naval tactics. The Solomons campaign saw land-based aircraft as the primary air support for the surface units engaged in

sea control operations. This use of external air support provided an added dimension in the tactical planning and command and control of the campaign.

4. Tactics Which the United States Navy Found Itself Ill Prepared For- Japanese night fighting techniques, based on the use of long range torpedoes and quick, decisive attacks were the inverse of American tactics emphasizing long range gunnery. American commanders' ineffective conduct of the close-in engagements forced by the Japanese made control of the waters contiguous to the Solomons tenuous and uncertain.
5. Technology and Tactical Opportunity- In addition, the American ship had an important new sensor, radar, which commanders did not exploit for several months.

As will be shown, these characteristics reflect the broad context of the Solomons campaign. The analysis of the campaign is done with these characteristics in mind.

Although the Solomons campaign was unenvisioned by the prewar plans for the Pacific, it utilized strategic and tactical concepts already in place and well established in the United States Navy prior to the war. Many of these notions were validated in the Solomons. However many failed the ultimate test of peacetime preparations, that of actual engagement with an enemy. We cling to similar preconceptions today, both strategic and tactical. The following pages will attempt to explore notions many of which may also be applicable to modern American naval planning and may have already been tested in the dark violent waters off the Solomon Islands.

II. STRATEGIC ROOTS OF THE SOLOMONS CAMPAIGN

A. CONVERGENT STRATEGIES: HOW EACH SIDE GOT TO THE SUMMER OF '42

An irony of both Japanese and American strategies in the Solomons is that neither country saw these barren islands as central to winning the Pacific war. American plans prior to the war failed to mention the Solomons, placing first priority in the western Pacific on the defense of the Philippines. The confidence of early 1941, however, was supplanted by the desperation of spring 1942. By this time MacArthur was in Australia seriously worried about protecting this final bastion of the Western Alliance while the Japanese had extended their "Co-Prosperity Sphere" as far as the eastern coast of New Guinea. If the American leadership was stunned by Japan's early successes the Japanese leadership was also somewhat dismayed. Having achieved tactical successes at an almost dizzying pace, the Japanese leadership was forced to re-appraise its strategic goals and decide on what next steps would not only solidify these gains but also resolve those issues that drove them to war in the first place.

1. Japan: Struggling Forward

Paradoxically, the Japanese offense that had opened in December, 1941 had been too successful and the roots of the Solomons campaign lie in the sudden stall in Japanese initiative that followed the startling successes of the

war's first months. With the fall of Singapore in February, 1942 the Japanese government saw four general alternatives for the next move in the war:

1. advance into Australia after
2. capturing the islands insulating Australia from the central Pacific and the United States (portions of southeastern New Guinea, the eastern Solomons, the New Hebrides)
3. drive westward across the Indian Ocean and attempt a campaign against the Indian Subcontinent
4. drive across the central Pacific on a thrust aimed at capturing Hawaii [Ref. 1: pp. 40-52].

In retrospect, the ambition of these plans seems to border on hubris; from the perspective of both sides in the spring of 1942, such plans were not wholly unfathomable. The Philippines, Singapore and most of Indoneia had all fallen before Dai Nippon and, as the Kido Butai¹ roamed from Hawaii to the central Indian Ocean, an outbreak of "victory fever" hit the Japanese people and their leadership [Ref. 2: p. 340]. The reasons for the confident mood appeared obvious, as though Japanese "divine destiny was on the verge of fulfillment.

¹Ki Butai was the Japanese designation for the Nagumo force that had launched the attack on Pearl Harbor proceeded westward, engaging the British in the Ind Ocean, raiding Ceylon, and finally returning to Japan April, 1942.

"Victory fever," was not an epidemic, however. Many of Japan's leaders realized the shallow nature of their country's logistic base and the grim prospects for a protracted conflict. Among the most cautious in addressing future strategic plans were the senior officers of the Japanese Combined Fleet, led by the conservative views of Admiral Isokoru Yamamoto himself. These officers, well aware of Japan's weaknesses and America's industrial potential, saw a final alternative to the options outlined above: sue for peace. The "fleet faction" had undertaken its heretofore successful planning based on the premise of a short war. Japan had apparently achieved the relatively limited goals that were assumed prior to Pearl Harbor with the neutralization of Allied power in the western Pacific. The counsel given by Yamamoto--to seek a settlement now--was in keeping with prior plans, based on a realistic grasp of own and enemy limitations, and totally unacceptable to the Japanese leadership. Selecting one of the other options became a process of compromise between factions with widely diverse notions of what Japan's strategic interests actually were.

[Ref. 3: pp. 292-297]

Of the four options, the Army-dominated Imperial General Staff saw the first two as the most desirable. The third, although proposed by some fleet leaders, was quickly seen as too ambitious. The fourth was primarily supported by Yamamoto and his Combined Fleet staff. The factional

nature of this split in opinion must be noted in understanding the Japanese strategic decision making process. The Australian option obviously appealed to the Army, although it remains sketchy as to how much of Australia the Army really wanted to take for Japan. The second option, forwarded largely by the naval members of the General Staff, represented a primary step to the first option and offered the advantage of encircling Australia and severing its lines of communications with the United States. The central Pacific drive, on the other hand, represented the Combined Fleet's--and particularly Yamamoto's--desire to see a massive decisive battle with the United States fleet. Viewing their own limitations and the American fleet's potential for growth, the true Mahanian decisive fleet action fit into the "fleet faction's" plans to fight as short a war as possible.

[Ref. 3: pp. 294-295]

In the end compromise won out. The decision made in early April, 1942 was that the campaign to isolate Australia would be undertaken and then Yamamoto would be allowed to conduct his strike across the central Pacific.

[Ref. 3: p. 297] As part of the plan to surround and isolate Australia, landings were planned at Port Moresby and in the eastern Solomons at Tulagi, a small Australian-held island near Guadalcanal. As part of this complex operation, land-based air strikes were to hit several bases on Australia's northeastern cape and a striking force was to engage the

American naval forces suspected of operating east of New Guinea and south of the Solomons [Ref. 4]. This action, scheduled for early May, would be followed by the even more complex drive across the central Pacific in a thrust to capture Midway and place a diversionary force on the Aleutians [Ref. 2: pp. 134-136].

The first operation, the encirclement of Australia, would become Operation "MO" and would result in the Battle of the Coral Sea, May 3 and 4. The central Pacific drive would become Operation "MI", the Midway/Aleutians assault and the catalyst for the Battle of Midway, June 4-7. The only solid gain from either operation was the seizure of the eastern Solomons; these obscure islands would become Japan's last strategic success in the war as well as the United States' first.

2. American Desperation

The Japanese attack on Pearl Harbor started a war that was no surprise to the United States Navy in the broadest sense. The conclusion of World War I had left the United States and Japan at a strategic stand-off in the Pacific. As early as the twenties, the potential for conflict was realized² and the intense diplomatic negotiations of the

²See Hector Bywater, The Great Pacific War. Writing in 1929, Bywater, an English naval expert, wrote a fictional account of a war between Japan and the United States that, despite its flaws in tactical prediction, was amazingly accurate in the strategic predictions he cast for the future clash.

1930s broke down in 1941 with a sense of inevitability. American naval thought during the interwar period had been developed in large measure towards a Pacific campaign although placing the situation of the United States Navy of early 1942 into perspective requires a more measured look at the problems the service saw pertinent prior to the war's onset.

Underlying the problems of American naval strategy between the World Wars was the fact that America had suddenly become a world power. Although Japan represented an obvious threat from the westward, the United States Navy found plenty of potential enemies lurking at other points of the compass as well. The interwar Navy considered a variety of potential foes, taking on virtually every major naval power in the exercises and games conducted between the wars. The priority for American naval power throughout these years remained defense of the North American continent and the maintenance of the Monroe Doctrine. While actions as far away as the western Pacific and the western coast of Africa were envisioned, the defense of the Caribbean and the continuation of Western Hemisphere's autonomy were given top priority in the formal war plans. This remained true as Navy's first serious plans for fighting the Axis, the "Rainbow" series, was drafted in 1939. [Ref. 5]

After the disintegration of the joint American-British-Dutch-Australian (ABDA) command in February, 1942, Admiral Ernest King, the Commander in Chief of the United States Fleet and the Chief of Naval Operations, realized that maintaining open the sea lanes to Australia was vital and, true to his belligerent reputation, King recommended an immediate counter-offensive against the still advancing Japanese [Ref. 6: pp. 188-189]. King's aggressive proposal flew in the fact of the "Europe first" strategy touted by General George Marshall, the Army Chief of Staff, and blessed by Roosevelt as Commander in Chief of American forces. Additionally, King pressed to have Admiral Chester Nimitz, the Navy's senior commander in the Pacific, take the lead in the Pacific theater as the Allied command fell apart after the fall of Singapore.³ In the end King's recommendations, largely devised on the spot and yet in keeping with the overall thrust of the formally agreed to war plans, became the foundation of the Pacific war's strategy. The sensitive issue of who would control the Pacific theater would emerge repeatedly with a compromise in command structure taking on an important role in the planning for the Solomons campaign. However, the framework for victory in the Pacific was clear

³This recommendation also appeared to slight the growing image of General Douglas MacArthur fighting on in the Philippines. [Ref. 6: p. 158]

in King's mind and had been extensively rehearsed by the Navy between wars since "... for twenty years, the Navy had been preparing to fight a naval war against Japan" [Ref. 6: p. 190]. The Japanese empire, according to Navy strategic plans, would be defeated by a series of naval campaigns aimed at seizing key islands in an advance across the central and southern Pacific towards the Japanese homeland.

The principal problem the Navy faced in its strategic planning for World War II was the paucity of forces available to meet the worldwide role the nation and the Navy had assumed. Desires to limit defense spending, reflected in naval arms treaties, had produced an American fleet long on hopes but short on ships. In evaluating comparative fleet strengths some five months prior to Pearl Harbor, ADM King, then Commander of the Atlantic Fleet, considered the impact of fighting a "two ocean war" and found what he considered deficiencies ranging from 9 to 55 percent in the strength of the projected 1943 American fleet [Ref. 7]. When King took charge of the entire American fleet after Pearl Harbor, it must have been clear to him that no amount of thorough prewar planning could offset a shortfall in raw numbers. The United States Navy needed to build before it could fight and the war's first moves for the Navy were, of necessity, strategically defensive in nature. For the Pacific Fleet, this would require seeking engagements

with the Japanese on a selective basis and with minimum hazarding of forces.

The ravaging of "Battleship Row" on December 7 made the aircraft carrier the most valuable resource in the fleet. When the war started the Pacific fleet had four carriers- Hornet, Lexington, Saratoga, and Enterprise and Yorktown joined the fleet shortly after Christmas. While Wasp would be added to the inventory in mid-1942, programmed additions to the carrier force were scheduled to follow the slow path noted by King; the new Independence and Essex-class carriers would not begin deploying until late 1943 and 1944 [Ref. 1: pp. 172-173]. The plans for the eventual major American thrust across the Pacific would have to be postponed to allow the country's mobilization to catch up with the Navy's plans.

The conflicting needs to conserve resources and still somehow contain the Japanese clashed in the Solomons. In terms of the sparse carrier forces outlined in the preceding paragraph, each battle fought to date had cost the American Pacific Fleet one carrier.⁴ Nonetheless the Japanese foothold in the Solomons represented a threat unforeseen prior

⁴At Coral Sea, Lexington was lost, and Yorktown was sunk at Midway the following month. This attrition rate continued with the loss of the Wasp in an effort to reinforce the Solomons in September and the loss of the Hornet during the Battle of Santa Cruz east of the Solomons in October.

to the war, but of such strategic significance that it could not be ignored. The war's preplanned strategy had focused on the central Pacific islands of the Marshall and Caroline chains, with more than a passing interest in an assault through the Aleutians and Kuriles. The Japanese landings on Tulagi and Guadalcanal changed this for the moment. Nimitz recommended staging an amphibious raid on Tulagi during the final weeks of May, an idea that King found acceptable but that the Army refused to support since MacArthur formally commanded the Solomons region [Ref. 8: p. 89]. After Midway both Nimitz and King turned their attention towards the Solomons. MacArthur and Marshall had proposed an assault on Japanese-held Rabaul, clearly in MacArthur's area of responsibility. King, who realized that such an ambitious attack was too soon for the still strategically defensive Navy, resolved not to allow any major naval forces under MacArthur's control and counter proposed with the idea of a full scale assault on the eastern Solomons with intentions to continue up towards New Guinea and Rabaul via the Solomons chain [Ref. 6: p. 215].

The timing of King's proposal made sense from the point of view of both conserving forces and answering the immediate problem posed by the Japanese in the Solomons. With the potential to stage aircraft on the territory seized in the Solomons, the campaign offered the promise of tactical self sufficiency. This point became more critical

after the campaign started when the American fleet was reduced to a single carrier in October. Nonetheless, the Solomons offered a campaign, tactically offensive, yet essentially in keeping with the strategically defensive approach taken in regards to the first year of the Pacific war.

At this juncture it is important to note the parallel paths of bureaucratic compromise that marked both American and Japanese strategy in regards to the Solomons. As was described in the previous section, elements of the Japanese General Staff and Combined Fleet were forced into a compromise that allowed three parties to get a portion of the strategy they wanted. American intramural bargaining was more subtle and perhaps more effective. In a contest of wills, King seems to have outlasted Marshall both where the southern Pacific offensive would take place and who would direct it. Marshall's support of MacArthur, who admittedly wanted to control the offensive, was undercut by MacArthur's own erratic behavior. On May 28, MacArthur rejected the Nimitz proposal for the Tulagi raid as an adjunct to the Battle of Midway. Three weeks later MacArthur proposed a full-scale frontal assault on Rabaul itself, an idea King considered more foolhardy than bold [Ref. 8: p. 112]. King in the meantime had surreptitiously ordered Nimitz to complete plans for the Solomons campaign, now officially known as Operation WATCHTOWER. King's pressure on Marshall finally

resulted in both service chiefs meeting on June 30 to make a final decision. The compromise agreed to favored the Navy's eastern Solomons plan and made the operation Nimitz' by moving the line of demarcation between Nimitz' SOPAC (Southern Pacific Command, an element of his CINCPAC command) and MacArthur's SOWPAC (Southwestern Pacific Command) westward just far enough to encompass the eastern Solomons Islands to be invaded initially [Ref. 6: p. 117]. This joint move undercut MacArthur whose public image as an aggressive military leader seems to have far exceeded the perception both his military and civilian superiors had of his ability as a commander. The opinion was confirmed on July 8 when MacArthur and Vice Admiral Robert Ghormley, COMSOPAC, sent a joint message voicing doubts as to their respective commands' ability to support WATCHTOWER. King was incensed, partially at one of his naval commanders siding with MacArthur, but also because, "Three weeks ago MacArthur stated that ... he could push right through to Rabaul. He now feels that he cannot only undertake this extended operation (the complete Solomons campaign, planned as described in the following paragraph), but not even the Tulagi operation (WATCHTOWER)." [Ref. 6: p. 219]

The uneven protestations of MacArthur and Ghormley were too late. The Joint Chiefs had formally approved WATCHTOWER on July 2 and King and Nimitz met in San Francisco on July 4 and 5 to approve the final plans for this first

thrust at the Japanese defensive perimeter. The landings were to be under the tactical command of Rear Admiral Richmond Kelly Turner who as King's war plans officer had drawn up the grand strategy for the Solomons campaign. This plan, conceived in early March, called for a three phase operation:

1. Task I- WATCHTOWER, the seizure of the Santa Cruz Islands and Tulagi. This would be under Ghormley's overall command with operations to commence August first.
2. Task II- the seizure of the remaining Solomons and the New Guinea outposts of Lae, Salmuda, and Papua.
3. Task III- the seizure of what had become the vitally strategic Japanese base at Rabaul and neighboring positions in New Guinea and New Ireland. [Ref. 4: pp. 260-262] [Ref. 6: pp. 217-219]

Tasks II and III were to be under MacArthur's control and were ostensibly in preparation for his promised return to the Philippines.

Apparently King and Nimitz did not consider the Solomons offensive overall to be of paramount strategic importance. At the July 1942 conference the two admirals agreed that the priorities for the Pacific war after Task II would shift to the central Pacific-Truk, Saipan, Guam-gradually closing in on the Japanese homelands from the east [Ref. 6: p. 218]. In returning to its favored strategy, the Navy seems to have tacitly omitted the Philippines as a vital strategic objective for winning

the war. It can also be inferred that the Solomons campaign, although vital as a first Pacific offensive and needed to "hold the line" in the Pacific, was viewed as a campaign of limited strategic value.

In hindsight, the long-range goals established for the Solomons campaign were essential to subsiding the inter-service bickering that threatened the operation. The urgency of commencing Task I was reaffirmed on July 5 when cryptanalysis revealed that the Japanese were building an airstrip on Guadalcanal across from the main base at Tulagi. This airfield was substituted for the Santa Cruz Islands in Task I, a last minute decision that delayed the assault one week and launched one of the most famous struggles of the war [Ref. 8: p. 115]. Tasks II and III were never completed as scheduled either. The march up the Solomons chain was done largely by naval forces under Admiral Halsey, Ghormley's successor, while MacArthur concentrated on a land campaign against the Japanese in western New Guinea. Rabaul, the Japanese stronghold in the southern Pacific was never assaulted on land; in the end it was choked and bombed into isolation.

With whatever bluster King conducted his outwards dealings concerning WATCHTOWER, the impending landings made him extremely uneasy. He considered the hurried operations poorly planned and his last minute efforts to get additional

Army and Army Air Force support clashed with Marshall's and Air Chief Arnold's planning for the North African campaign [Ref. 6: p. 221, 224]. The first move of the Solomon campaign had truly become "Operation SHOESTRING," a risky Navy/Marine Corps effort.

Ultimately this apprehension was both justified and unfounded. The landings at Tulagi and Guadalcanal on August 7 were virtually flawless although the fighting on the ground soon became a deadly grind of attrition for the Marines who seized and held the precious Guadalcanal airstrip.⁵ These quick gains on the ground were not to reflect the true nature of the campaign. On the night of August 9 the Battle of Savo took place, handing the Navy a defeat unique in its history. Moreover, this opening engagement was an indication that the Navy did not absolutely control the waters of the Solomons. They would remain highly contested throughout the struggle. The efforts of both sides to secure the islands would depend on and reflect this tenuous and shifting balance of seapower in the Solomons area.

B. STRATEGIC LIMITATIONS AND THE SOLOMONS CAMPAIGN

The day following the Savo disaster, RADM Turner completed what off-loading of supplies his forces could and

⁵ Later named Henderson Field after the Marine Corps major who died leading the Midway-based dive bombers at the Battle of Midway.

retired from the landing area with his amphibious transport forces and what remained of his combatant escort. The departure was not a panicky reaction to the previous night's loss of four cruisers; the withdrawal had been planned before the midnight Japanese cruiser strike. The attack underscored the fundamental problems confronting the Americans at the outset of the Solomons assault. The nature of the campaign that emerged in succeeding months carried the imprint of these problems and are reflected in the strategic characteristics outlined in the previous chapter. The war in the Solomons was carried out much as it began: with limited resources committed piecemeal, always in competition with other campaigns of higher priority. The strategy that evolved was one of improvisation, measured ambition, and tenacity.

1. Naval Power-to Be Used Sparingly

The American Navy of mid-1942 was not equipped with the forces it knew it needed to fight. While the United States had emerged as a world power in the post-World War I era, it lacked the naval forces to adequately defend its interests abroad. The reasons behind this shortage are complex and beyond the scope of the issues dealt with in this work. However, the shortage of naval forces was a pervasive limitation in the early Solomons campaign and the force structure of both the American and Japanese fleets was a key influence on the way both sides conducted the campaign.

Understanding the forces both sides had available for the Solomons must begin with the prewar construction plans of each fleet and the overall balance of naval power these plans represented. Underlying the structure of the world's naval forces between World Wars were the treaty agreements of 1922 and 1930. Within the framework of these agreements nations built their naval forces and these treaties influenced the size of national fleets as well as the capabilities of individual ship types. They also set the stage for the clashing of these forces in the Pacific. For Japan the treaties limitations were a two-edged sword. The 1922 limitations were acceptable for economic reasons; the Japanese realized their fragile economy could not support a naval arms race with the western nations. The 1922 treaty also flattered Japan to a certain extent, treating her as a world power. By the time of the 1930 treaty, the flattery had taken a cynical turn in Japanese eyes: Japan would be recognized as a world power, but a second class one. Japanese leaders, who saw their domination of eastern Asia as a destiny fulfilled, wanted naval parity with the United States, their principal rival in Asia. By 1934 the Japanese had decided to abrogate the treaties, leaving the process of naval arms control a shambles although the process had generated the basic force structures that would square off against each other in World War II.

[Ref. 3: pp. 29-33]

By any standards, the size of the Pacific Fleet at the war's outset was inadequate for offensive action. As described in the previous section, the strength of the fleet was particularly weak in carriers although corresponding shortnesses were evident in all categories of major combatants. As American industry began its struggle to catch up with mobilization plans, the strategy for the war was forced to accommodate the reality of too few ships for too many tasks. The upshot was that the United States would conduct a strategic defense in the Pacific while the European theatre received top priority for American and Allied resources. The American Navy had considered the necessary ratio of forces for a war with Japan to be 5:3.⁶ The order of battle in Table I presents the reality faced by the Pacific theatre: the American fleet barely enjoyed parity with the Japanese fleet and the Pacific was considered a second priority in any event. In considering the ratio of forces in the Pacific, the Japanese enjoyed a 1.5:1 advantage in major combatants overall, with a decisive 7:3 ratio in carriers.

The tally reflected in Table I drove each nation to opposite strategies in regards to force employment. The

⁶See the following chapter on the forces used in the Solomons for a description of how the treaties influenced specific ship construction programs and how ratios for ship force levels were arrived at by American strategists.

TABLE I
American and Japanese Combatants as of Pearl Harbor

<u>SHIP TYPE</u>	<u>TOTAL U.S.</u>	<u>U.S. PACFLT</u>	<u>JAPANESE</u>
BB*	14	9	10
CV	7	3	7
CA	18	13	18
CL	17	11	17
DD	96	80	110

*considering those with guns 14 inch or larger

Source:
[Ref. 9: pp. 2-6, 2-7]

final "RAINBOW" plan in effect at the time hostilities commenced (RAINBOW 5 of May 26, 1941) assumed that the first Japanese strike would involve either the Philippines, Indochina, Malaysia, or the central Pacific islands under American control (Guam, Wake, etc.). The maintenance of the sea lanes to Australia was considered to be a principal Pacific fleet mission and, upon the outbreak of hostilities, American forces were to capture key Japanese positions in the Marshalls and Carolines. [Ref. 10: p. II-14] The forces assumed needed for execution of the plan were 9 battleships, 3 carriers, 13 heavy cruisers, 20 light cruisers, and 63 destroyers, reflecting the realities of Table I⁷ [Ref. 10: Appendix II]. The official plans seem overly ambitious in light of the force ratio that existed and, although the RAINBOW 5 plan was the foundation of the Navy's grand strategy throughout the war, its basic objectives seem contradictory, calling for simultaneous defensive actions and the undertaking of an early major offensive.

Understanding the failure of the plan requires a consideration of how badly it underestimated Japanese strategic plans. While RAINBOW 5 assumed that the Japanese would move against

⁷ Among the destroyers considered were eighteen World War I ships classified as "old" by the official standards of the day. They were used during the war, however and considered here, although their use underscores the shortage that existed in this key category of vessel.

one of the objectives cited, the marginal forces available were not sufficient to deal with the single coordinated sweep of all objectives. Japan trumped Allied war plans by assaulting all of the expected "tripwires" at once, leaving the Allied plans and forces in disarray. The British and Dutch participation in the war ended quickly leaving the Pacific to the United States [Ref. 10: JCS Addend. of April 20, 1942] and with little hope of an early thrust into the defensive perimeter that the Japanese had enlarged so rapidly. Led by King, the United States Navy clung to the first objective, maintaining lines of communication open to Australia, and reconsidered the other strategic options left open in the Pacific.

It was clear that these options would be conservative and the overextended American naval forces would have to be preserved. While Yamamoto craved a single decisive clash with what remained of the American fleet, King and Nimitz settled on a policy of Nimitz' forces only meeting the Japanese in the battles that needed to be fought. The Japanese fleet would be attrited, not devastated, and the official policy of King and Nimitz on the eve of Midway was to avoid action with the Japanese fleet that would further reduce American carrier and cruiser forces [Ref. 11: pp. 162, 176]. The American forces, with superior intelligence afforded through cryptoanalysis, were able to pick the correct occasions for the commitment of forces

prior to WATCHTOWER, Coral Sea and Midway. Similarly, the Solomons campaign was conceived with a conservative view of the RAINBOW philosophy of taking the war to the Japanese. The campaign was, after all, primarily a defensive move to prevent the isolation of Australia. The sparse forces allocated to WATCHTOWER were not so much committed as loaned; Turner's hasty evacuation of the naval elements of the task force on August 9 was caused by the withdrawal of the carrier forces (Saratoga, Enterprise, and Wasp) covering the WATCHTOWER landings [Ref. 12: pp. 27-28]. This controversial move by Fletcher foreshadowed the nature of naval actions in the Solomons: only those major forces necessary would be risked in this campaign and only for as long as necessary.

Japanese strategy in the Solomons reached a parallel conclusion for opposite reasons. Yamamoto, realizing that his decisive battle with the American fleet would not occur in the Solomons, seems to have been ambivalent about the Japanese campaign there and reluctant to commit resources to its prosecution [Ref. 3: p. 328]. In view of the disjointed nature of Japanese planning and the fact that Yamamoto agreed to the original Japanese offensive in the Solomons only under the terms of a compromise, his truculence seems expected. Yamamoto committed Combined Fleet assets, including the post-Midway depleted Japanese carrier force, to the Solomons for only three major engagements, the Battle of the Eastern Solomons on August 24, 1942, the Battle

of the Santa Cruz Islands, October 26-27, 1942, and Operation "I" in April, 1943. The first two were full scale efforts to dislodge the Marine forces at Henderson Field and the final a desperate attempt to slow the American advance in the central Solomons [Ref. 12: Chapt. IV, XI] [Ref. 2: p. 273]: Except for these isolated instances, the burden of naval actions in the Solomons fell on the cruiser-destroyer forces of the Eighth Fleet based at Rabaul. The American commanders mirrored this force employment, with the land campaign in the Solomons command under the protection of United States Navy cruiser-destroyers task forces for routine control of waters contiguous to the islands and a combination of land-based and sparsely allocated carrier-based air cover attempting to maintain control of the air. American carrier forces were deployed in the Battles of the Eastern Solomons and the Santa Cruz Islands. However, the risking of carrier task groups was frowned upon by both navies in the routine prosecution of the war in the Solomons.

The reliance on surface combatants as principal naval forces was not in keeping with either Japanese or American official naval doctrine but the concept was not foreign to Japanese tactical thought. During the first World War the Japanese deployed a destroyer squadron to the Mediterranean, a token force, expendable and willingly spared [Ref. 13, p. 27]. The sacrifice of the Japanese surface forces in the Solomons protected the

Combined Fleet, perhaps saving it for its final defeat in the closing months of the war some three years later. The Japanese could scarcely afford to lose even these forces. Wartime American cruiser production outstripped that of the Japanese by almost 4 to 1 and American destroyer production surpassed that of the Japanese by a margin over 11 to 1. While the Japanese started the war with a numerical superiority over the Americans, the advantage evaporated under the slow but steady hand of American attrition and production. The conservative employment of major naval forces was a strategy shared by both sides but, it served each unequally. In the Solomons this strategy allowed the United States time to build its forces for the determined thrust its naval leaders had long envisioned while it squandered Japanese naval assets that could never be replaced.

C. AMPHIBIOUS WARFARE: TWO VIEWS

The Solomons campaign marked the beginning of the United States' amphibious drive in the Pacific, although it was in many respects distinct from later central Pacific amphibious assaults and remains unique in light of current naval doctrine as well. Underlying this uniqueness are the strategic limitations that drove the campaign itself. Paramount among the prerequisites for a successful amphibious operation, according to World War II doctrine, was secure lines of communication to the objective area and control of the air

and seas around the area [Ref. 14: p. 208]. The United States Navy of August 1942 could insure neither absolutely.

The ability to maintain firm control of air and sea shaped the nature of the struggle for the Solomons on the ground. Initially Henderson Field was seized to keep it from the Japanese; it was held because as an "unsinkable aircraft carrier" [Ref. 2: p. 194] it was needed to maintain air superiority over the area and help thwart Japanese efforts to resupply the battle. In terms of sea control, the American surface combatants which attempted to protect the waters adjacent to the Solomons were based at Tulagi where the comforts and necessary support of larger bases and at sea logistics were duplicated: fuel, stores, repairs, and even limited rest and recreation were all provided locally for the cruiser-destroyer forces employed in the Solomons. These services became indispensable because of the intensity of the at sea clashes in support of the efforts to secure the islands themselves.

While amphibious warfare doctrine assumes a naval force attacking a land-based force entrenched ashore, the strategic anomaly of the Solomons campaign was that both sides engaged in simultaneous seaborne assaults in an effort to control the same territory. The Japanese and Americans faced the same problems of air and sea control in attempting to wage the battle for the Solomons and it is necessary to

evaluate each navy's abilities at this complex type of naval operation.

1. American Amphibious Operations Within the Solomons Context

As has been pointed out, the United States Navy of 1941 had devoted over twenty years of thought to the problems of fighting a war in the Western Pacific. The solidly laid plans for the central Pacific prior to the war had foreseen assaults on the islands of the Marshalls, Carolines, and Marianas and with these plans had come an appreciation of the problems involved in landing and supporting troops in such remote areas. During the interwar period the Gallipoli disaster was studied extensively by the Naval War College at Newport and the theoretical aspects of amphibious warfare became regular parts of the College curriculum [Ref. 14: p. 207]. By 1938 formal tactical doctrine had been established by FTP-167 [Ref. 14: p. 226].

As was observed in the above discussion of major combatant force levels, the budget did not always follow doctrine and the amphibious forces were no exception. In landing craft, the Navy had procured or contracted for sufficient assault boating for three Marine Corps or Army divisions. Missing, however, was the required shipping needed to move amphibious forces to overseas objectives. At the time of Pearl Harbor the Navy had less than half of the troop transports required by existing war plans and all

but two of these ships were stationed in the Atlantic Fleet. As in the case of the combatants, the number of vessels "on order" made up for existing deficiencies and the procurement process was simplified for amphibious ships by the ease with which civilian-built merchant ships could be converted to amphibious "grey bottoms."⁸ Nonetheless Admiral Turner, who was instrumental in designing the amphibious navy as war plans officer, commanded a mixed force that lived up to the SHOESTRING sobriquet on August 7; virtually all of his amphibious task force was converted merchant hulls, some obtained by the Navy as recently as four months earlier. [Ref. 14: Chapter VI] [Ref. 15]

A final factor that must be considered in evaluating the American ability at amphibious warfare in the Solomons was the strength of the command structure the American amphibious forces enjoyed. The potential of interservice squabbling and confusion is obvious in such a combined operation. Admiral Turner's forceful personality and

⁸At the time, the principal types of amphibious ships were troop transports (AP), amphibious cargo ship (AK), and destroyer transport (APD). The LSD (Landing Ship, Dock) and LST (Landing Ship, Tank) would soon follow with their respective abilities to launch waterborne landing craft and disembark vehicles directly on the beach. The APD was a workhorse of the Solomons with its ability to efficiently move small contingents of troops around the islands at night on specific missions. It is interesting to note that Fleet Commander King's letter on major ship construction did not even address the construction of amphibious forces.

understanding of the nature of the problems facing the execution of an amphibious assault did much to establish the effective command and control procedures for amphibious task forces. After WATCHTOWER, Turner recommended all amphibious forces be under the direction of a strengthened chain of command that would allow the amphibious task force commander--a naval officer--control of the various elements of the landing force until the tactical situation in the landing area was secure [Ref. 14: pp. 221-223].

2. Japanese Amphibious Operations

The Japanese efforts to hold the Solomons sparked their own efforts at amphibious reinforcements. The Japanese style of amphibious warfare was markedly different from that of American forces and, on the whole, the Japanese have an uneven record in the conduct of such operations during World War II. The Japanese Navy had an amphibious assault element known as the Special Naval Landing Forces (SNLF) yet little dedicated amphibious shipping. The Japanese Navy constructed only a few "AP" type ships of about 8000 tons, [Ref. 16] relying on civilian marus and destroyers for the bulk of their amphibious assault shipping. The SNLF paid dearly for this narrow concept of operations. Placed in crowded ships, Japanese landing forces remained vulnerable to attack with disastrous results impacting on the success of an entire operation. At Wake, half of the first SNLF landing force was wiped out in a single hit on a

troop-carrying destroyer, presaging the difficult time the Japanese would face in the Solomons [Ref. 2: pp. 24-25]. For its part, the Japanese Army preferred its own barges (daihatsu) for transport. However these Army-owned assets had a limited range of about 100 miles and were primarily for carrying troops, not cargo [Ref. 11: p. 67]. The operation of these and the five or six similar classes of small landing craft operated by the SNLF [Ref. 16] was restricted to island waterways and, although these short-haul methods of landing troops saw extensive use in the Solomons, the Japanese lack of dedicated open ocean amphibious shipping limited their amphibious efforts in the Solomons and other campaigns.

Japanese amphibious tactics seemed to reflect the same split between the Army and Navy evident in the larger strategic issues. The Army apparently had little understanding of the American Marine Corps and its capability to conduct large scale operations after an amphibious landing [Ref. 3: p. 324]. Japanese amphibious tactics in the Solomons were the reverse of the American practice of using a massive assault to build up troop strength ashore as rapidly as possible. After it became apparent that dislodging the Americans at Guadalcanal would not be easy, the Japanese consolidated their position in the Solomons by landing at Munda Point, New Georgia, and Kolombangara in November 1942 and began building airfields. Eventually the

Japanese built up a force of 4000 SNLF and 6500 Army troops in central Solomons [Ref. 14: pp. 488, 492]. The difficulty with which Japanese reinforcement operations and efforts to resupply their troops on Guadalcanal is a reflection of how limited the scope of Japanese amphibious operations were. Troops and supplies were inserted at night via the "Tokyo Express," a makeshift task group usually composed of a group of combatants protecting a contingent of troops embarked on destroyers and small landing craft. American efforts to stop these attempts sparked most of the naval battles around the Solomons.

Although Japanese attempts at reinforcement of the Solomons was in sharp contrast to the efficient, large scale American amphibious landings, the effectiveness of the "Tokyo Express" cannot be discounted. After initially misjudging the scope of the American assault at Guadalcanal, the Japanese began a gradual effort to build up its own forces on that hotly contested island [Ref. 2: pp. 195, 204]. The campaign for control of the island (and the attainment of WATCER goals) was a race between the "Tokyo Express" and the American shuttle of forces from Noumea, New Caledonia (SOPAC quarters) to the embattled island. Table II shows the tenacity of Japanese efforts at amphibious resupply as well as the American problem of operating at the end of a long logistics chain without firm control of the air. In light of these figures Japanese amphibious

TABLE II
Average Troop Reinforcements at Guadalcanal

	Troops landed per week		Total troops ashore	
	<u>Jap.</u>	<u>U.S.</u>	<u>Jap.</u>	<u>U.S.</u>
late August	750	0	3,600	10,000
early September	760	318	6,000	11,000
September/October	2670	2000	22,000	23,000
November	2950	2210	30,000	29,000

Source:
[Ref. 2: p. 228]

techniques cannot be discounted easily despite their relative unsophistication. By October the Japanese land forces engaged in the Solomons had reached parity with American forces, sparking a crisis in the campaign. This crisis resulted in a final Japanese attempt to retake Henderson Field from the Americans, an effort that the Combined Fleet committed what remained of the Kido Butai in support of and led to the Battle of the Santa Cruz Islands. The Combined Fleet effort failed and, after the Naval Battle of Guadalcanal two weeks later, it became apparent that the Japanese would have to abandon Guadalcanal [Ref. 12: Chapter XI, p. 333].

The contrast in American and Japanese amphibious tactics is highlighted by the method in which the Japanese approached the reinforcement of Guadalcanal, a method they repeated throughout the American advance up the Solomons chain. The American strategy saw amphibious warfare as a shock assault using a combination of close air support and naval gunfire support to augment as well as protect landing forces. The concept saw the amphibious assault as a just that, an attempt to seize territory from an entrenched enemy. The Japanese approach seems to have been to consider amphibious operations merely a method of placing troops ashore. As Dull points out, after the Battle of the Eastern Solomons the Japanese had two options in maintaining the campaign ashore in the Solomons--either attempt another full scale

amphibious assault backed by the Combined Fleet or a piecemeal reinforcement via the Tokyo Express. Given the lack of Japanese success at large amphibious operations in the face of stiff opposition, the Express option made sense: The Americans controlled the airspace over the Solomons by day and Midway had deprived them of carrier forces to challenge this control over the battlefield. Moreover, the Japanese effort was far from pedantic. As Table II indicates, it surpassed American efforts to bolster the land campaign for several months. In the end it failed because the Japanese fleet could not control the seas well enough to capitalize on the hard earned success of the Tokyo Express. Yamamoto had fought and lost his decisive fleet engagement in the Battle of the Santa Cruz Islands and the Naval Battle of Guadalcanal; the result was the first contraction of the Japanese defensive perimeter.

D. FORWARD BASING AND LOGISTIC SUPPORT IN THE SOLOMONS

To the American naval strategists considering a war in the western Pacific, the sheer size of the ocean was a primary problem. The Washington Treaty limited American base construction west of Hawaii, [Ref. 17: p. 271] a limitation that probably did not significantly impact on war efforts, but did underscore Japanese nervousness about the United States' ability to conduct a campaign on Japan's doorstep. The United States Navy was keenly aware that the ability

to successfully prosecute a war against Japan would depend upon the ability of its forces to operate at extended ranges from logistic support bases.

In practical terms this realization translated into a question of operating ranges for American warships. Of particular concern were the operational ranges of cruisers. As has been noted the world's cruisers were heavily influenced by treaty limitations and, for the United States, the need to squeeze as much operating range out of the already constrained hull was of a prime consideration. The solution to the problem of maintaining such forces in a strategic position where they could effectively operate against the Japanese was a mixture of three variables: force size, individual warship design, and forward basing available for logistic support. In regards to the first element, a 1930 study by General Board concluded that for the United States to maintain a sufficient cruiser force on station to counter Japanese cruiser strength in that region, the American fleet would need to have 4.47 cruisers to every one of Japan's [Ref. 18]. This figure, far more demanding than the treaty's 5:3 ratio accepted but not met, illustrates the Navy's appreciation of the problems faced in attempting to maintain a deterrent naval posture in the western Pacific. The expense of the forces involved ensured that the strategic presence actually deployed would be less than optimal.

TABLE III

Comparison of American and Japanese Cruiser Ranges

	Ave. Tonnage	Ave. Cruising Radius (NM)	Ratio: Miles per Ton	Ratio: Tons per Gun (Main Bat.)
U.S.				
CA	9465	13000	1.42	1030.4
CL	8500	13375	1.45	505.7
Japan				
CA	7908	8346	0.83	1102.7
CL	5109	8517	1.66	1106.6

(Compiled from JANES and Navy intelligence data. Since the war Japanese numbers have become suspect as Japanese Treaty cheating has come to light. These figures represent what data was available to the Americans at the time.)

The impact of the long distances of the Pacific on warship design is perhaps best illustrated by an examination of how the two navies prioritized range in their respective ship designs. Table III overviews the heavy and light cruisers of each nation that would fight the naval engagements of the Solomons. The Japanese clearly saw less need for "long legs" on their ships while the Americans built larger ships with significantly longer operating ranges. The ratios give some sense of the compromises each navy found best suited to its situation: except for the light cruiser, the American design clearly favored range and even in this ship type, the American design held a considerable overall advantage in average range.⁹ American designs also seem to have packed more gun power on each ship with each gun theoretically supported by proportionately less tonnage.¹⁰ In summary, Table III shows the American cruiser to be geared

⁹It should also be noted that the average for the American light cruisers is skewed by the Omaha-class, designed at the conclusion of World War I before the maturing of United States Pacific strategy during the twenties and thirties.

¹⁰The issue of the gun as main armament will be more thoroughly discussed in the next chapter. It will be argued that the Japanese sought to make up for their lower gun density by the addition of torpedoes to their cruisers, a trade-off that had deadly implications in the Solomons.

towards the projection of maximum firepower at longer distances from logistic support, a scheme consistent with the American problem of fighting a Pacific war.

Because of the limitations on force structure and platform characteristics the United States Navy's emphasis on logistic support takes on a unique importance. The American Navy of the interwar period had developed two principal responses to the strategic problem of fighting the war in Japanese territory. The first was a series of bases and agreements necessary to support the American fleet in the western Pacific. Bases such as those in the Philippines and Guam were critical to the American strategy for fighting a war with Japan, an implication not lost on the Japanese at the treaty conferences. The vital nature of these bases was understood by American planners who realized that maintaining these forward bases in the western Pacific would be critical prior to the outbreak of hostilities as well as after a war had started [Ref. 18]. Complementing this overseas basing was a sea-based logistics force, well integrated into the fleet and capable of sustaining the fleet at sea for extended periods of operating.

The first leg of this dual logistics base did not survive the initial days of the war. The first Japanese strike in the Pacific was a well placed blow that eliminated planned American support facilities. As the General Board study of a decade earlier had predicted, the Asiatic Fleet was

stranded and sacrificed [Ref. 18] and the American fleet would have to fight its way back into Japanese waters, and rebuilding its logistics base as it went along. The Solomons was both a first step in this process and a laboratory to test plans for later moves towards the Japanese homeland.

1. Contrasting Attitudes and Effectiveness

From the onset of the Solomons campaign the Americans had displayed a strong sense of localized integral support for forces engaged. Part of this was born of necessity: the tenuous control of the seas in the SOPAC area made regular resupply impossible and it became necessary for forces in the Solomons to provide much of their own support as well as defense. The airstrip at Henderson Field was augmented by another by the end of 1942 and Tulagi rapidly became a "miniature naval base" [Ref. 12: p. 317] for the support of the surface task groups providing the backbone of the naval defense of the operation. The efforts at establishing local logistic support and as much self sufficiency as possible became a model for other operations. Despite an injunction from Nimitz against "permanent" facilities on Guadalcanal, [Ref. 8: p. 217] by the spring of 1943 the island had lived up to its codename of "MAINBASE" for the forces struggling their way up the Solomons chain. [Ref.19: p. 100] Within the Guadalcanal-Tulagi complex, the American forces established emergency ship repair facilities, fuel storage

areas, headquarters facilities, a hospital, administrative support, and even limited recreational facilities [Ref. 19: pp. 100-106].

The American use of forward basing in the Solomons dwarfed similar Japanese efforts and the disparity in the efforts cannot be underestimated in its impact on the entire campaign. At first glance the Japanese would have seemed to hold a distinct advantage: not only were they operating close to their homeland and within their defensive perimeter, but they occupied a series of airfields and two anchorages along the Solomons chain. As late as June, 1943 the Japanese still maintained five airfields, two seaplane bases and two anchorages along the Solomon chain in contrast to the single naval facility at Tulagi and the airfields at Henderson and Russell Island [Ref. 19: p. 91]. Despite this advantage, Japanese logistic support for the forces in the Solomons was almost non existent beyond Rabaul, some 170 miles from their closest intermediate base in the Solomons at Buka [Ref. 19: p. 91]. A difference in philosophy permeated the Japanese concept of integrating logistics and tactics. The Japanese saw their Solomons bases as either refueling stops or emergency havens. Although American efforts to neutralize these intermediate waypoints with air power were frustrated, the failure of the Japanese to develop them into staging points for more independent operations made their overall value minimal.

Japanese insistence on conducting long range operations made a significant contribution to the eventual failure of the Japanese Solomons campaign. The basing of previously described amphibious reinforcement efforts so remote to the objective area allowed American intelligence efforts time to locate Tokyo Express runs and the opportunity for American cruiser-destroyer task groups to position themselves for interception. While American ships damaged in the violent night encounters with the Tokyo Express had only to return to Tulagi for emergency repairs, the distance from the lower Solomons to Rabaul by sea was over 580 miles.¹¹ Running this gauntlet under American aircraft based locally took its toll on damaged Japanese ships caught with no safe harbor. One Japanese light cruiser and seven destroyers were sacrificed to American forces after being damaged in battle [Ref. 2: Appendix A]. The anchorages in the Shortlands offered no refuge: there were no repair facilities available and the lack of permanent air cover in the area left the anchorages vulnerable to American air strikes.

Perhaps it is one of the great ironies of the Solomons campaign that the Japanese did so poorly at supporting their forces while operating far closer to their home bases than

¹¹Based on the usual track followed by the Japanese up the "slot" through the New Georgia group.

the intruding American forces. In retrospect, the answer seems to coincide with a focus long central to each side's planning for the war. The Japanese saw the Pacific war as their chance to control the areas of the world destiny had told them were theirs; they possessed the internal lines of communication and the supposed advantages they held. The Americans, on the other hand realized that logistics would be the first problem in fighting the Japanese. The American Navy had thought long and hard about logistics and the need to forward base forces in a Pacific war. For the Japanese, the Solomons represented the farthest outpost of their own territory and they coped poorly with the problems of operating at this edge. The American forces who brought the war to this limit of Japanese expansion realized that the projection of power into Japanese territory made logistic support as important an offensive weapon as any other in the arsenal.

E. SYNERGISM IN THE SOLOMONS

The integration of the land, sea and air forces committed to the Solomons makes the campaign an interesting model for study of the modern naval or maritime campaign. The interaction of the forces employed in the Solomons created a sequence of individual combat actions that blended into a pattern of success for American forces. In the Solomons, land forces, embarked from and supported by naval forces, were employed to seize airfields which in turn provided

air superiority which extended over both land and sea. This local superiority allowed the seizure of more islands as the year and a half campaign was extended northward along the Solomons chain. In its purest sense the Solomons campaign was a naval campaign; the primary thrust of the campaign was the control of the sea lanes to Australia. Beyond this genesis, the campaign represented a multidimensional approach to sea control. Actions at sea, in the air, and ashore supported each other, and were dependent upon the individual tactical superiority each provided.

1. The Air Campaign

For the Japanese, U.S. control of the airspace over the Solomons remained the debilitating element that frustrated their attempts to hold the islands. The failure was not one of omission; the Japanese fully realized the critical nature of air control in the Solomons and how drastic its loss would eventually be. By June 1943, the Japanese had established airfields at Buka, Kakilli, Ballale, Vila, and Munda with seaplane anchorages at Rekata Bay and the Sortlands. For their part, the Americans had bases for aircraft at New Caledonia, Espiritu Santu, Fiji, Malaysia, and Russell Island as well as on Guadalcanal. Raw numbers do little to illuminate the different approach of each side in the employment of these airfields: the main Japanese air staging base at Rabaul held an average of about one hundred planes, a figure at rough parity with the force at Henderson

Field from late 1942 to spring 1943 [Ref. 12: pp. 290, 374-375]. However, the Japanese utilized their Solomons fields primarily as fueling stops for their planes enroute the southern Solomons from Rabaul [Ref. 19: p. 90]. In their failure to establish locally controlled and self sufficient air facilities, the Japanese denied their land and sea commanders flexible and responsive air support. The American basing of aircraft literally at the front was in sharp contrast to this philosophy which concentrated on pre-planned long range attacks of the battle area.

Key to the American success in the air over the Solomons was the well integrated command structure that supported the air elements committed to the campaign and the way this structure responded to the total tactical environment within the Solomons area. The air forces in the Solomons were controlled by Commander, Air Forces Solomons (COMAIRSOL) who reported directly to COMSOPAC. This high level coordination of the assets on the fields listed above allowed American air forces, both land and sea based, to work in unison in response to the tactical situation. A most striking example of this was the Battle of The Eastern Solomons in August 1942. In this encounter, seaplanes based in the Santa Cruz Islands sighted elements of the Japanese Combined Fleet and the information formed the basis of an unsuccessful attack by the carrier Saratoga. Although "Sara's" planes were unable to locate their target, they

extended their search to a range of 350 miles by recovering at Henderson Field instead of returning to their home flight deck [Ref. 12: pp. 81-84]. After returning to the Saratoga the next day, the planes were eventually able to engage elements of the Japanese task force which found itself with no air support other than its own carrier forces.

The ability of American forces to rely on interchangeable land and carrier based air support allowed the sparse American forces control of the seas surrounding the Solomons during daylight. This range of control spanned the normal operational range of the American SBD dive bomber--about 250 miles--and enveloped most of the central Solomons from Bouganville to Guadalcanal [Ref. 2: p. 209]. The SBD and the other planes flying out of the fields built by the advancing Americans represented a unique type of naval power. Coming from Marine air squadrons, Army Air Forces, some Allied forces, and carrier airwings temporarily "loaned" to the fields, this constantly fluctuating air force inflicted serious losses on the Japanese, accounting for one Japanese battleship and eleven destroyers during the campaign [Ref. 2: Appendix A]. American air power in the Solomons was the essence of naval power in 1942-43, giving United States' forces not only superiority in the air but at sea as well.¹²

¹²This observation is made after a consideration of the thoughtful insights of LGEN Philip Shutler, USMC, (Ret.)

It seems that the Japanese realized the significance of American air power over the Solomons too late. Their Operation "I" in April 1943 was a last attempt by the Japanese to use their own integrated force of land based and Combined Fleet air asset to wrest control of the air from the United States. The plan called for massive strikes on American air bases at Guadalcanal, Port Moresby, Ara Bay, and Milne Bay in an effort to thwart Allied advances in New Guinea and the corresponding central Solomons thrust. ("Task II" of the original Solomons strategy.) "I" was a failure, its only accomplishment the further attrition of Japan's carrier air forces, which had been in a steady decline since Midway. This final failure of the Japanese to gain air superiority over the United States underscores their larger failure to challenge American naval air power throughout the Solomons campaign. [Ref. 2: p. 273]¹³

2. The Campaign Afloat

The commission of naval vessels to the Solomons was driven by constraints. The scarcity of carriers relegated

¹²who has observed that "naval" aviators come in two varieties, blue and green and that successful employment of both from both sea and land bases requires viewing both with a degree of colorblindness.

¹³In yet another irony of the Solomons campaign, it was during "I" that Yamamoto lost his life to American fighters based at Guadalcanal. Yamamoto had little enthusiasm for the Solomons campaign and committed too little too late to the effort. In a sense he died for his failure to provide adequate resources for the campaign earlier.

the seaward defense of the campaign to surface combatant forces. These forces relied on the air power based on the Solomons for their support in both reconnaissance and as protection against raids from enemy air attacks. In terms of tactical prowess, the American surface forces made a spotty showing until the final months of the campaign; Japanese night tactics for surface combatants were better, yet the American cruiser-destroyer groups doggedly performed a vital task. As the backbone of the "Tokyo Express" interdiction, American combatants were called upon to break up Japanese night reinforcement efforts and deal with the cruiser-destroyer forces the enemy sent down the "Slot" to bombard American forces ashore. On balance the American effort was successful¹⁴ and, despite heavy attrition on both sides, the Japanese never forced a significant withdrawal of American forces from positions ashore.

The concept of sea control in the Solomons was far different from the traditional paradigm. Without large forces of powerful ships available, the Americans had to settle for a more flexible notion of sea control. The use of land based air power was vital to isolating the waters around the Solomons during the day, providing American surface forces with a narrower window to operate in for the night

¹⁴The following chapters will examine the specific tactical problems American naval forces encountered in this effort.

defense of the islands. Geography was also a limitation exploitable by American naval forces: the Tokyo Express was constrained to a narrow track from Rabaul (or, occasionally, the Shortlands anchorage) making the prediction of Japanese movements simpler. The blend of geography, air power, and surface forces was also effectively utilized in a mining campaign in the spring of 1943 that cost the Japanese five destroyers in the waters around Bouganville [Ref. 2: p. 214].

The same integration of command evident in the use of airpower in the Solomons was essential to this combined use of assets for control of the local seas. SOPAC provided intelligence, air support, fuel, and a place to repair the damage of battle for the surface task groups of the Solomons. This integration made up for the shortage of naval forces in the campaign by insuring that the commission of these forces to battle was done as economically as possible.

3. The Campaign Ashore

While the original goals of the campaign were seizure of territory ashore--specifically Henderson Field--the land actions of the Solomons should be treated within the context of the total campaign. After securing Guadalcanal, the next objective for American forces was the Russell Islands, occupied on February 21, 1943. The Russells gave the Americans another precious airfield and all the benefits that ensued: better control of the seas around the Solomons, a base for further operations up the Solomons

chain, dispersion of forces for more flexibility. It was also a vital first step in the realization of the original strategic plans called for in the initial Solomons planning. The realization of "Task II" was somewhat different in execution than had been originally planned. In June 1943 Operation TOENAILS commenced, a move forward into New Georgia, timed to coincide with MacArthur's thrust towards northward in New Guinea. This attempt at a "pincer" movement around the Japanese main base at Rabaul represented a significant expansion of the American offensive inside the Japanese perimeter.

From the campaign's standpoint, the move into the Russells and beyond gave the Americans additional bases to extend their control of the air and seas. From these bases American air power was eventually able to effectively isolate Rabaul and Japanese positions in New Britain and New Ireland, neutralizing Japanese air and sea power in the region. The land battles in the Solomons were battles for additional bases which provided the support--logistic and tactical--to allow the envelopment of Rabaul to continue. The campaign became both tactically and strategically self-sustaining with the gains ashore resulting in bases for the extension of American air and sea power.

F. THE SOLOMONS: WORTH THE EFFORT?

It may be argued that the Solomons campaign resulted in no vital strategic gains by either side. In addressing this challenge from the American point of view, a host of other issues are raised which must be placed in the perspectives of the campaign's strategic goals and their validity within the context of the war effort. The strategic decisions that led to the Solomons were a mixture of prewar planning, political compromise, and the need to conserve forces. As the attrition-oriented campaign wore on, its relative value does seem to have changed: in late 1942, the Solomons represented the sole American drive in the Pacific; a year later the campaign hardly looked as promising despite its success. Rabaul had been bypassed, MacArthur was on his way to the Philippines, and the Navy was impatiently preparing for the long planned central Pacific thrust.

Assessing the ultimate value of the Solomons campaign must be done within the context of its undertaking as described above. The limited value of the campaign was admitted from the start; the Solomons campaign was largely reactive and meant to unhinge an enemy war machine that was moving forward unchecked. The Solomons offensive was meant to widen the war for the Japanese in a way they did not envision. This it did, as the Japanese reluctance to fight in the Solomons was gradually replaced with the steady commitment of irreplaceable forces as the campaign wore on. As Wilmott

frames the strategic question facing the Japanese in the spring of 1942, either the "barrier" or the "javelin" had to be embraced. The American thrust into the Solomons answered the dilemma: the javelin would have to be taken up, stretching Japanese forces to their limit. Defending the Solomons committed the Japanese to a war of attrition they could neither win nor abandon.

The advantage of forcing the Japanese into this choice remains debatable. Morrison, never shy at voicing criticism, contends that the actions undertaken in the Solomons after Guadalcanal were poor from a strategic standpoint because the advance up the Solomons chain touched neither the Japanese Army nor the Combined Fleet [Ref. 19: p. 252]. Considering the merits of this argument from a purely naval aspect, the criticism does not seem valid. The ships and aircraft Japan lost were never replaced and the final decimation of the Imperial Japanese Navy was in large measure due to the attrition suffered in the Solomons. As Dull points out, the tactical successes of the Japanese in the Solomons were at the expense of the Japanese destroyer force without which the remainder of the Japanese fleet was largely unprotected [Ref. 2: p. 295]. Moreover, the first crack in the Japanese defensive perimeter was a serious one that signaled a dramatic shift in the war. "Victory fever" was cured in the Solomons; the bright prospects of spring were dimmed by fall of 1942. The Emperor's New Year's message of 1943 was far different

in tone from that of the previous year and the evacuation of Guadalcanal during the next month underscored the pessimism the Emperor expressed [Ref. 12: p. 317].

The Solomons meant more to both sides than simply the value of the losses and gains. The bureaucratic juggling that marked the campaign's inception was a lesson for all participants; the war would be won through such strategic bargaining. As a holding action, the Solomons allowed the United States time to build its forces for the major drives of the Pacific war, time that was needed to build up a fleet. The lessons of the Solomons were also utilized in the campaigns that followed, particularly amphibious warfare tactics.

The strategic lessons of the Solomons lie in the experience gained in the conduct of lesser important, "off axis" offensive campaigns to disrupt an enemy's planning. A first lesson is that such "less important" efforts are costly. The entire campaign was one of mutual attrition in all phases of the campaign. Concurrent with this observation is that efforts to horizontally escalate a conflict, as was done in the Solomons, may be at odds with the strategy recognized as most effective for winning the conflict. This was the case in the Solomons as the islands were never seen as the "stepping off" point for the decisive thrust at the Japanese homeland. Territory in the Solomons was gained for the purpose of denying it to the enemy and to support sea control in a specific region. The traditional strategic

rationale for amphibious campaigns is the establishment of bases for further incursion into enemy territory [Ref. 14: p. 224]. The Solomons was a twist on this classic paradigm: instead of utilizing sea power to gain leverage in a land theatre, gains ashore were made to support sea control where naval forces were.

This application of land and sea power in the Solomons cuts directly to the heart of the campaign's uniqueness as a naval campaign. American intrusion into the Solomons was based on a total control of the sea and air by forces not designed to perform more than the support of sea control efforts. The reliance on surface combatants and land-based air to secure a main theatre was unique to the plans of the American Navy in World War II. Accordingly, the tactics of the Fleet were largely inappropriate to the campaign and were only refined by a string of serious losses. The integration of the land, sea and air tactics was a hallmark of the Solomons campaign, and a critical factor that must be considered when operations of such limited strategic scope are undertaken.

III. THE PEDIGREE OF THE NAVAL FORCES USED IN THE SOLOMONS

Naval strategy and the tactics a navy employs are inseparably linked in the exercise of naval power. The surface forces the United States Navy put to sea in 1942 were a compromise of many factors, the result of a continual process of self evaluation the Navy undertook during the twenty years preceding the war. Thus planning was done in a constrained environment not unlike today: fiscal considerations were paramount and the need to make justifiable decisions in procurement programs made the leaders of the Navy sensitive to outside criticism. Political pressures were great in those days as well, with the service operating under a president whose personal interest in naval affairs was a mixed blessing. The introspection Navy planners gave the problems of fleet construction was thorough and, giving those involved the benefit of the doubt, largely honest. It was naturally based on preconceived concepts of what naval combat should be like but the analysis undertaken to validate these concepts failed to isolate the factors that would prove critical to the actions in the Solomons.

A. NAVAL TACTICS AND THE FLEET THAT NEVER WAS

The tactical doctrine the United States Navy took to war in 1941 was founded on the principle of an integrated, balanced fleet designed to fight in a coordinated action.

Naturally, construction programs had been geared towards building ships to fit specific tasks within this doctrine; understanding the effectiveness of the forces engaged in the Solomons must be done with the existing doctrine in mind. In the previous chapter it was argued that the strategic background of the Solomons campaign was foreign to the anticipated strategy of the American and Japanese fleets. A parallel observation applies in regards to the tactics employed by the naval forces in the Solomons. Both sides had prepared themselves to fight large scale decisive engagements with fleets of relatively specialized units integrated for mutual support. However, the strategic concerns of the campaign precluded the employment of these large "battle fleets" for the overwhelming burden of the fighting in the Solomons. The foundations of the tactical doctrine for both sides were undermined by the paucity of forces available, leaving each side dependent on its ability to improvise new techniques for employment of its surface task groups. The foundations of this improvisation were the notions each had come to accept concerning the nature of combat between surface warships. The tactical successes of the Japanese and the corresponding failures of the United States forces becomes understandable in light of the tactics each side had prepared for, preconceptions each side held in regards to weapon effectiveness, favorable conditions for battle, and command and control during an engagement.

B. THE EVOLUTION OF AMERICAN TACTICAL DOCTRINE

The genesis of World War II tactical doctrine for the United States Navy was formed in the early 1920s as the Navy began the task of building its post World War I fleet. The influence of the "Great War" was evident in the first formulation of tactical doctrine for this new force and the results of that struggle led to the concept of a "battle fleet" whose employment hinged on three distinct elements:

1. Surface Combatant Tactics- Jutland was refought in American post war tactics with the idea that the "battle line" of powerful battleships would be supported in its offense role by a contingent of smaller forces.
2. Submarine Warfare- The emergence of the submarine in World War I led naval strategists to include the submarine in tactical planning as both a scouting asset and offensive platform in support of the battle line. Such employment, planned for both the United States and Japanese navies, made anti submarine warfare a major concern for battle fleet tactics.
3. The Airplane- By the early twenties it became apparent that the airplane would be a vital element of the battle fleet. However, its actual employment was not anticipated by the tactical doctrine of the period. The need for carrier and seaplane tenders was considered obvious, yet the principal use of the airplane would evolve in time and the carrier would gradually assume a larger role in the engagement plans for the fleet.

The United States naval doctrine that had been developed in the mid twenties concentrated on the employment of a combined battle fleet composed of all of these

elements, bound by a mature system of command and control. This doctrine was officially promulgated in a series of Fleet Tactical Publications (FTPs) which by 1924 included specific platform doctrines as well as fleet operating instructions. These doctrines were largely the result of recommendations of type commanders and training commands, with an attempt to codify and standardize operational procedures. By 1924 the doctrinal approach of the United States Navy called for the battle fleet to maintain itself in a large formation with the heavier elements screened by cruisers and destroyers. Successive layers of this formation were stationed at a distance deemed optimal for both mutual support and communications [Ref. 20: pp. 26-29(C)].

Figure 3.1 outlines the envisioned employment of the battle fleet as it emerged in post World War I doctrine. The concepts set forth in the 1924 FTPs were left largely intact when the series was revised in the mid thirties. The next major revision of tactical doctrine would come with the lessons of the war.

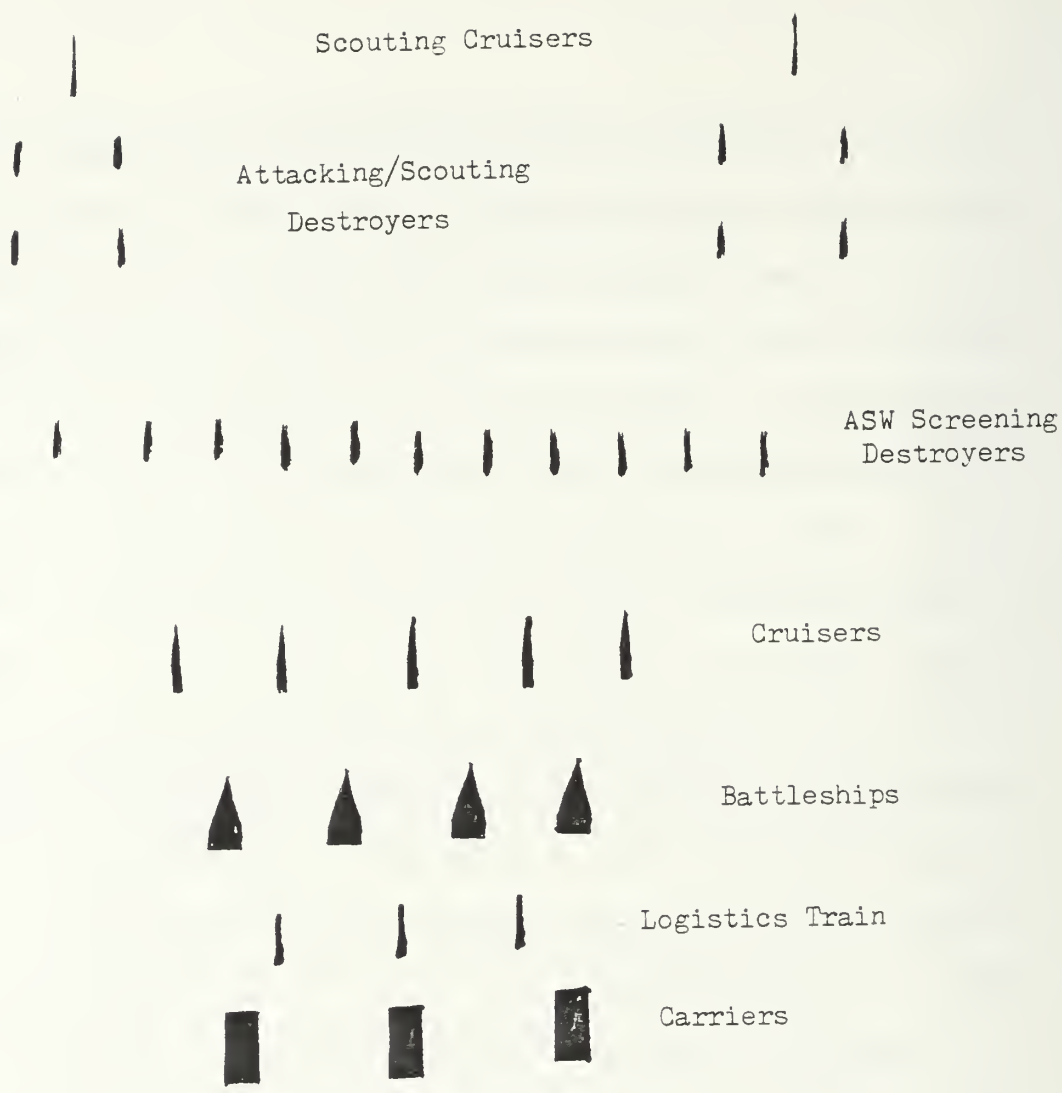


Figure 3.1. Standard Disposition of American Battle Fleet

An immediate observation concerning the paradigm of Figure 3.1 is that the model called for is an expensive one. This is essential to understanding the uniqueness of the Solomons battles. Putting a battle fleet at sea would have required a wealth of resources, more ships than the peacetime Navy of the time would have been capable of furnishing.

The mustering of sufficient assets for a full battle fleet was done only annually in peacetime¹⁵ making this tactical foundation of the American fleet rarely practiced. More significantly, the assets were not there in wartime as so optimistically predicted. While FTP 45 almost wistfully observed that in "... wartime there will be sufficient numbers" [Ref. 21: p. 26], in fact there were not. The Solomons campaign was fought with a mixture of forces envisioned by prewar planners to be merely supporting elements of the larger main battle fleet.

1. The Gun as King of Battle

Underlying the tactical doctrine of the United States Navy up to World War II was an absolute faith in the naval gun. As a static, single indicator of naval power, the gun was as close a measure as any. The size of gun batteries determined the status of navies and nations, particularly in American eyes. Battle fleet tactics were predicated on the ability of the battle line's guns to bring decisiveness to any engagement. The airplane and submarine were for scouting and the torpedo merely a distraction; "... in the last analysis it is the gun which will decide the fate of navies on the high seas." [Ref. 22: p. 3]

¹⁵See chapter on Fleet Exercises and Wargames.

This confidence in the capability of gunfire drove American naval tactics towards a specific, optimal engagement pattern. The ideal scenario would allow American warships to open fire at maximum effective gun range using superior fire control and high rates of fire to neutralize opposing forces. By doctrine, the "close in" engagement of the United States battle fleet was within 17,000 yards with a "moderate" range for engagement around 20,000 yards [Ref. 21: p. 6]. Such doctrine reasoned away the threat posed by the other principal naval surface weapon, the torpedo. Proper use of guns, American naval planners felt, would make torpedo attack almost suicidal by forcing the torpedo firer to come too close to its gunfiring target in the battle line [Ref. 22: p. 12].

The "bigger is better" attitude towards gunpower was not isolated to the battle line. The same logic was applied to the cruiser force supporting the battle fleet as well. In 1928 the Chief of Naval Operations pointed out to the leaders of the Senate that the Japanese had led the post war cruiser development with the Furataka-class and its eight inch guns [Ref. 24: p. A-7-2]. Although the CNO was arguing that the United States could not afford to allow the Japanese cruiser force to surpass that of the American fleet in quality, the value of the torpedoes mounted on Japanese cruisers went unmentioned. It would take the Navy almost a

year of serious losses in the Solomons to realize that the Japanese Navy considered the torpedo, not the gun the principal weapon for non-battleship surface combatants.

The obsession with the gun and the battleship led American surface ship tactical doctrine to a foundation that was never justified in battle. In the case of the cruiser, this fixation led to a doctrine that was proved inefficient and costly during the Solomons campaign. The focus of naval construction on the gun was decried by naval strategists well before the Second World War and the construction of big gun ships was done amid controversy. In 1910, no less an authority on fleet development than Alfred Thayer Mahan observed that the gun had reached its zenith as a naval weapon and basing the fighting strength of a warship on the gun alone reflected a narrow approach to naval tactics. [Ref. 25] Such warnings went unheeded; the major naval powers of the world, the United States and Japan among them, continued to see naval tactical doctrine in terms of capital ships with large guns. The American decision to continue this rationalization for cruiser forces as well represents a key factor in the eventual conduct of the Solomons campaign.

C. CRUISER AND DESTROYER TACTICS: COMPROMISED SUPPORT

While the battle line concept made the battleship the principal offensive weapon of naval power prior to World War II, the role of its supporting surface combatants was a

confusing compromise. The cruisers and destroyers of the battle fleet were meant to scout for and screen the battle line as well as be prepared to conduct offensive attacks on the enemy, also assumed to be in a disposition similar to that of Figure 3.1. The tactical doctrine for the cruiser and destroyer forces of the United States Navy at the onset of World War II was hallmarked by the need to provide these very different elements of support and, although the concept of the battle fleet was never employed in the Solomons, the tactical concepts of the cruiser-destroyer forces utilized in the Solomons reflected the doctrine of the "fighting column" developed for the battle fleet.

The following sections will examine the tactical preconceptions both the cruiser and destroyer forces of the United States held prior to the Solomons by examining the doctrine developed for each platform type prior to the war.

1. Destroyers

In dealing with the complexities of destroyer battle fleet tactics the Pacific Fleet Destroyer Commander attempted to prioritize destroyer missions. Heading his list was scouting and anti submarine screening while the offensive role was relegated to last priority. In establishing the tactical doctrine for these offensive operations, the Pacific Fleet destroyer type commander succinctly outlined the procedures that would form the basis for offensive destroyer operations throughout the second World War: the attacking

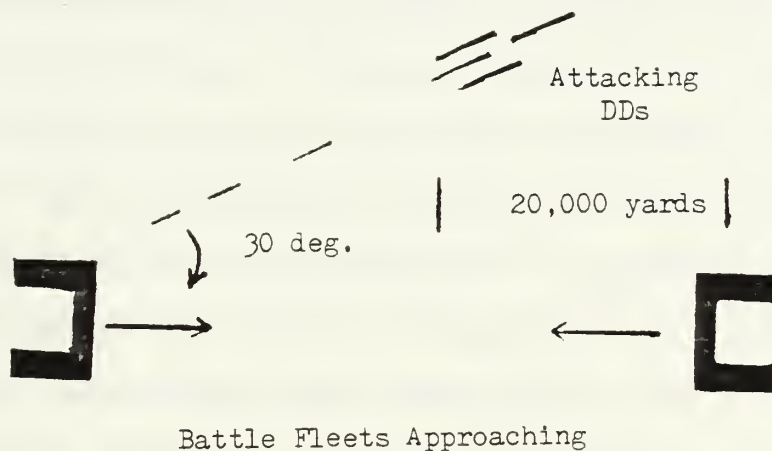


Figure 3.2. Destroyer Attack in Support of the Battle Fleet

DDs would detach from their battle fleet and mount a torpedo assault on the opposing battle fleet's van from a position 10 nautical miles ahead of its own main body and 30 degrees off the line of advance of the enemy main body. (Figure 3.2 illustrates this planned employment.) [Ref. 26]

FTP 38, Destroyer War Instructions, clarified the offensive battle fleet employment of the destroyer in 1923 by specifying the use of smoke for self screening or the conduct of night attacks, hopefully within 1000 yards of the target battle line. By this formal doctrine, DD commanders

were urged to use torpedoes sparingly and withdraw to rejoin their own battle fleet upon launching their attack [Ref. 20: passim].

In retrospect, the tasking outlined for the battle fleet destroyer seems mutually exclusive: the DD was supposed to screen the battle line while taking the battle to the enemy side. The dichotomy was not unrecognized at the time. However, the destroyer was caught in the middle of two of the three critical influences mentioned earlier. The advantage of throwing the opposing battle line into disarray, which is what the destroyer's torpedo attack was intended to do, was clear. Conversely, the threat posed by the submarine grew throughout the interwar period. As will be shown later, holding the destroyer to the defensive screening role weakened the offensive potential of the American task groups in the Solomons, a regrettable loss in light of the absence of a Japanese submarine threat during the campaign. In the initial battles of the campaign, the destroyer was tied to the cruiser column, a formation that offered no real protection for the cruisers but restricted the destroyer's potential for offensive torpedo action.

2. Cruisers: Neither Thrust nor Pary

If the United States destroyer of the pre World War II Navy faced a problem of split personality, then the cruiser of the same era was struck with a severe case of schizophrenia. The cruiser of the battle fleet was assigned

the roles of supporting destroyer attacks, fending off similar attacks from enemy forces, scouting for the battle fleet, and assisting the battle line in engaging its opposite number. The interwar period was marked by an almost unending effort to define the proper role of the cruiser and this analysis takes on a particularly important light in regards to the Solomons campaign. With the construction programs of the period and the Washington/London Treaty limitations as a backdrop, the Navy's leadership attempted to establish tactical priorities for cruiser employment so that technical priorities for construction could be established. Principal participants in the attempt were the Navy's General Board and the Naval War College with some input from fleet commanders.

During the twenties the use of new cruisers was seen as essential for the fire support of destroyer attacks, a function necessary to the battle fleet tactics that had emerged during the early part of the decade [Ref. 27]. By the early thirties the Navy found it necessary to reexamine the tactical role of the cruiser prior to embarking on a new construction program. While much attention was given such technical aspects as gun size and armor protection, the essence of the dialogue was the tactical role the cruiser would fill. By this time annual Fleet Exercises had established the cruiser as a weapon fleet commanders felt indispensable. Translating this operational enthusiasm

into solid reasoning became a primary task of the War College, at the time the Navy's principal analysis group. By 1931 the question of cruiser employment and construction had become the subject of several exchanges between the General Board, the Chief of Naval Operations, and the President of the War College. Through gaming, the War College had concluded that cruisers were particularly adept at holding opposing destroyer attacks on the battle fleet at bay while supporting similar efforts by own forces [Ref. 28: p. 3]. This mission was viewed as particularly important against Japanese forces, where the gaming analysis assumed American gun superiority would be decisive if cruisers, destroyers, and aircraft succeeded in thwarting Japanese attempts to employ "other weapons." [Ref. 28: p. 5]

The gradual shift in cruiser tactics during the twenties and thirties was toward the notion of the cruiser as a supporting unit for both the detached destroyer element and the battle line itself. Cruiser doctrine still spoke of offensive operations, including the conduct of torpedo attacks [Ref. 29]. However, by the mid thirties the United States had begun the construction of light cruisers with multiple six inch guns and removal of torpedo tubes from all American cruisers. A trend towards the defensive in cruisers was evident in the construction of the five inch gun, air defense cruisers of the Atlanta-class in 1937, a program that the General Board even recommended as the

prototype of all light cruiser construction after 1940 [Ref. 30]. As the generation of cruisers which would form the backbone of the cruiser forces of World War II were being built, a final attempt to specify the amorphous nature of the American cruiser was made at the War College. The primary functions of the cruiser, a 1934 lecture outlined, were:

1. exercise control of the sea in areas where battle ships had already established local superiority;
2. conduct raids into areas where own forces lacked positive control of the sea;
3. act as "eyes" of the battle line;
4. screen own battle line from enemy scouting efforts;
5. protect the battle line from enemy destroyer attacks;
6. support own destroyers in attacks on enemy battle line. [Ref. 31]

The problem of the cruiser being all things to all elements of the battle fleet led to what has been termed the cruiser "debate" of the interwar period. As will be subsequently argued, there was little real debate; the value of the cruiser was amply demonstrated by its overburdening. The designs of the cruisers of the United States Navy were compromises in response to the seemingly mutually exclusive tactical doctrines for these warships. Cruisers needed to be heavily armed but fast, with endurance and sustainability as well. Figuratively and literally, Figure 3.1 accurately

depicts the plight of the cruiser prior to World War II-- caught between the capital ship and the support needed for the capital ship. Although the cruiser itself would be forced to assume the role of "capital ship" in the Solomons, the tactical doctrine of the battle fleet drove both the design of the World War II cruiser and the tactical foundations for its employment. In reviewing the above list of intended cruiser employments, none proved applicable to the Solomons.

D. CRUISER CONSTRUCTION AND THE GREAT NON-DEBATE

As was previously mentioned, there was little actual debate in regards to the basic value of, and need for cruisers during the interwar period. To be sure, there was a lively discussion among the Navy's elite as to how the United States should build cruisers, yet there was little disagreement concerning the cruiser's value to the fleet or as to what its weapons system should be.

Understanding the failure of American surface combatant tactics in the Solomons must begin with an understanding of the central position the modern naval gun held in contemporary tactical thought. Because of this attitude, American weapon technology had been focused on the gun and the previously described tactics were formulated accordingly. Since naval power was essentially measured by gun size and number, other offensive weapons, such as the torpedo and aircraft, were considered secondary by leaders of the United States Navy.

While American naval planners, principally the General Board, debated the type of cruisers to be built during the twenties and thirties, the position of the gun as the main battery remained secure. The installation of other systems on the "treaty cruisers" was an ancillary question with the airplane and anti-aircraft batteries and the torpedo as candidates for rounding out the cruiser's weapons suite. The "flying deck" cruiser, with a mixed battery of six or eight inch guns and aircraft, was occasionally studied by the General Board, although its acceptance was apparently never seriously considered; its sacrificing of flight deck for gunpower was toyed with up to the eve of World War II, but more conventionally armed cruisers of all-gun design received a higher priority for construction programs [Ref. 32].¹⁶

The use of torpedoes on American cruisers was a topic more seriously addressed by the General Board and the operational elements of the fleet as well. The issue of the torpedo as a primary weapon for the American cruiser first arose immediately after World War I as the General Board began deliberations aimed at replacing the aging wartime fleet. Board records of the early twenties exhibit an

¹⁶The United States, in signing the London Treaty of 1930 also agreed that any ship carrying aircraft as its primary purpose was an aircraft carrier, making designs such as the "flying deck" cruiser sensitive from the diplomatic point of view.

ambivalence born of economy and disagreement over what tactical missions the next generation of cruiser would be required to accomplish. During these years the Board was preoccupied with the "scout cruiser," a light, fast cruiser that would be a relatively inexpensive scouting asset for the battle fleet. First proposals in 1920 called for the ship to be armed with six eight inch guns and six torpedo tubes. Later that year the Board recommended to the Secretary of the Navy that an additional triple tube mount be installed on the centerline of the proposed class to upgrade the ship's torpedo battery. This enthusiasm for the torpedo was apparently short lived: the following year the Board settled on a recommendation of three tubes per side for the "scout cruiser," leaving it with a torpedo broadside of only three torpedos, a number admittedly small in light of the day's tactics for torpedoes. By the time the Pensacola and Chester classes were authorized in 1924 the gun battery had grown to either nine or ten eight inch guns yet the torpedo battery remained the two triple tubes mounted on opposite sides of the ship. [Ref. 33]

During the twenties the Pensacola, Chester, Portland, and Astoria cruiser classes were designed, all equipped with nine or ten eight inch guns and two triple torpedo tube mounts, one on each side of the ship. During the same period, the Japanese completed the Atago, Nachi, and Kako classes, all

with eight inch guns and either eight or twelve torpedo tubes, plus reloads.

As both navies looked towards the development of smaller cruisers in the early thirties the American naval hierarchy was again forced to deal with the issue of torpedo armament. The starting point for this renewed discussion was the inherent faith in gunpower as the baseline for construction of this next generation of cruiser. The torpedo, most American naval leaders reasoned, was an inappropriate weapon for the cruiser, whose anticipated role in battle fleet tactics would give it limited opportunity to employ torpedoes [Ref. 34]. Supporting this rationale was the accepted belief among the Navy's theoreticians that the torpedo was a destroyer weapon and that the offensive capability it represented was more appropriately based on the DD vice the cruiser. The rigid structure of the battle fleet held the cruiser a supporting element for the destroyer attack making the torpedo an unnecessary addition to the cruiser's armament. [Ref. 35]

This restriction of the cruiser to a less offensive supporting role was not restricted to those elements of the service with a more theoretical slant. As pointed out in a previous section, the operating forces of the late thirties and first two years of the forties had come to accept the role of the cruiser as being more of an escort than an offensive platform and operational commanders were more

than willing to let the torpedo slip from the cruiser's armament.

The fleet had come to see the cruiser as the foundation of the carrier-centered battle fleet's protection against air and surface attacks, making the contemporary generation of cruisers with gun batteries of either eight, six, or five inch guns seem entirely appropriate [Ref. 36]. The offensive potential of the torpedo was considered unneeded by cruiser commanders and as late as one month prior to the commencement of the Solomons campaign, the Commanding Officer of the U.S.S. Marblehead, one of the last old six inch gun cruisers with torpedo tubes remaining, was petitioning Admiral King for permission to remove his torpedo battery [Ref. 37]. Apparently even the enthusiasm of the president could not generate an interest in a cruiser-type platform with torpedoes as its primary armament. Roosevelt personally proposed such a ship in 1940, citing several European navies as having constructed similar "cruiser/destroyers" for offensive operations. Such a design was close to the Japanese Sendai, and Natori classes, all constructed in the early twenties and extensively employed against American cruiser forces in the Solomons¹⁷ [Ref. 38].

¹⁷The request from the President was passed to the General Board by his naval aide, Captain (at the time) Daniel Callaghan. Rear Admiral Callaghan was killed in the Naval Battle of Guadalcanal on November 13, 1942, while commanding Task Group 67.4 from the flag bridge of the cruiser San Francisco.

E. UNSOUND ANALYSIS IN THE CONSTRUCTION OF THE INTERWAR FLEET

The establishment of modern tactical doctrine and the construction of new forces is the subject of intense scrutiny and quantitative analysis. While such study is largely an offshoot of modern technology, the Navy of the thirties was not lacking in state-of-the-art techniques for describing and testing hypothetical forces or scenarios. The leaders of the United States Navy had few illusions about the prospects for their plans seeing the test of combat: the war with Japan was openly predicted and, as was pointed out in the first chapter, the strategic predictions were largely correct. An obvious question, then, is why did the Navy fail to foresee the type of tactical situations that would emerge in the Solomons campaign? It is apparent that at some level, the analysis of our surface combatant posture failed even though it represented the best contemporary effort possible.

In addressing this crucial question, it is necessary to recognize the relationships between those elements of the Navy responsible for the service's long range planning during the interwar period. During this timeframe, the strategic planning for the service rested principally in the hands of the General Board, a group of around a half dozen senior officers whose task it was to study the Navy's potential roles and the forces needed to fill these roles. The purpose of the Board was to think and recommend in an ostensibly

autonomous manner and, as advisors to the Chief of Naval Operations and the Secretary of the Navy, the Board wielded tremendous influence on future naval plans, ship designs, and construction programs. The Navy of World War II was a reflection of the Board's ability and an evaluation of the Board's performance would be beyond the scope of this work. However, in the case of the Solomons, it is important to realize how the Board influenced the tactics as outlined in the preceding pages and note that the perceptions of the fleet's tactical doctrine were largely those of the General Board.

During this period the War College was the primary source for the development of tactical and strategic thought in the Navy and it was to the War College that the General Board turned for validation of tactical and strategic concepts. The War College was drawn into a role that it was ill-suited for. The theoretical approach followed in Newport was not responsive to technical engineering specifics and game models only reflected notional capabilities with an aggregate level of weapons effect modeling. The War College realized its own limitations in this area and the evidence suggests that the War College was reluctant, if not resentful, of the General Board's efforts to solicit specific tactical recommendations. In communicating with the Board in late 1930, the President of the War College, Admiral Laning, pointed out to the Board that "... trying out new and

improved (ship) types in our games is dependent on learning what types of improvements are being considered by the Board" Despite the protests from Newport the General Board used the results of War College gaming and academic research as justification for force procurement. In his reply to ADM Laning, Board President Admiral Bristol stated that "... the College should suggest new and improved types by utilizing them in your games." [Ref. 39]

This exchange ended a month long battle between the two admirals on the War College's role in the building of new ships and, against its wishes, the War College found itself in the business of developing and analyzing the technical aspects of ship construction. The inappropriateness of this utilization of the gaming floor at Newport was readily appreciated by those conducting the games. However, the following year saw an increasing reliance on game results for substantiation of program recommendations by the General Board. The protests of the War College went unheeded by the bureaucracy in Washington, but they do succinctly point out the flaws in the game-based analysis. In responding to the General Board's hurried request for an analysis of cruiser capabilities, the War College report of January 10, 1931 contained the caveats that should have made its own recommendations suspect: the gaming done on the problem was accomplished over a short two week timespan, with a limited number of scenarios played, and the gamers felt that their

technical data on gunpower was largely unproven and further diluted by aggregate modeling. An examination of this key report reveals that the gunfire models, so essential in terms of the assumed importance of the gun in American tactics, were based on aggregate, force-on-force fire effect tables assuming ideal conditions (high rates of fire, good visibility, and precise spotting). Significantly, the damage assessment tables used in the games generated effectiveness curves for American cruisers armed with eight inch guns that displayed pronounced "knees" between 15,000 and 20,000 yards in comparison to similar curves for Japanese cruisers. At shorter ranges the relative power of both Japanese and American cruisers in the games were virtually identical. [Ref. 40]

The importance of these conclusions and the hesitancy with which their authors arrived at them cannot be over-emphasized in light of the subsequent development of American surface combatant tactics and the failure of these tactics some eleven years later in the Solomons. Within the game results of this period lie the genesis of the cruiser doctrine that was practiced and accepted by American commanders as they prepared for the war with Japan. The results of the games at Newport during the early thirties reflect American gun tactics with all its assumptions:

1. engage at maximum range under favorable conditions of visibility;
2. maintain high rates of fire to destroy the target outside torpedo range;
3. concentrate on the arming of treaty-limited cruisers with guns capable of utilizing these tactics.

Subsequent games supported these results, adding additional insights that would be relearned in the bitter experiences of the Solomons; the effectiveness of the cruiser at screening attacking destroyers was noted, as was the damage the destroyers' torpedoes could do if the cruiser failed at this task. American superiority in gunpower appeared decisive against Orange game forces (the Japanese), but it was assumed that the Japanese attack would mirror American doctrine with the torpedo threat coming from destroyers employed as in figure 3.1. [Ref. 28]¹⁸

In light of the specifics of the Solomon actions, it is easy to fault the War College for its analysis and find some fundamental errors in the conclusions presented. The games at Newport assumed that the Japanese would employ their cruisers and destroyers as the United States would, while in reality, each side had approached the same mission--support of the battle fleet--from different perspectives. The Japanese believed the torpedo could be decisive and was

¹⁸The interwar gaming efforts in relation to the Solomons campaign are discussed more extensively in Chapter IV.

worth mounting on cruisers. The American belief was that the torpedo, as potentially devastating as it was, offered such a poor chance of a hit in a long range duel that gun-power would render it ineffective [Ref. 28: p. 5]. In essence, the War College data was correct: cruiser-mounted torpedo could be potentially devastating in a barrage of large numbers and it would be necessary to engage Japanese forces with guns at maximum range to offset this danger. Missing from the analysis was the technical data on the Japanese torpedoes necessary for the realization of how dangerous these weapons were. In assuming that Japanese torpedoes were identical to American, the naval planners of the day engaged in a fatal case of mirror imaging. It was not realized until the Solomons campaign was almost over that the Japanese "Long Lance" surface launched torpedo was bigger than its western counterpart with a range of 25,000 yards, rivaling the effective range of a cruiser's guns.¹⁹ The evidence of Japanese intentions to make massive torpedo attacks was before our eyes, but we failed to see it as a result of preconceived notions and want of an objective examination of the technical data available.

¹⁹The underestimation of the Japanese torpedo was an almost classic case of poor technical intelligence supplemented by nonchalant assumption. Both classified and unclassified contemporary data refer to the Japanese weapons as "21 inch" while in reality the Long Lance was a 24 inch weapon. All sources at the time simply assumed that the Japanese used the same size torpedo as the United States and Royal Navies. See Chapter V.

F. AMERICAN NIGHT TACTICS AND RADAR: LOST OPPORTUNITIES

As indicated in the previous discussion of gunnery tactics, American tactical doctrine was predicated on good visibility for the accurate employment of long range gunfire. This naturally made American tacticians consider the optimal setting for battle as daylight, however, the impression that American doctrine was to avoid night tactics is false. In fact, the problem of night operations was realized and worried about a good deal by operational commanders.²⁰ Unfortunately, the translation of this concern into doctrine produced a set of operating norms that were of marginal value in the Solomons.

Central to the breakdown of American tactical doctrine at night was the battle fleet paradigm for naval engagements. Within the context of the firmly established tactical assignments for each ship assumed by this paradigm, American night tactics take on a particular nature. As the cruiser became the major combatant of the Solomons, it assumed the role of a "capital" ship. It replaced the battleship in the center of a smaller version of the "battle fleet" with attending destroyers covering its van and rear. The cruiser's guns would provide the critical firepower of the surface task force and the destroyer would act as the scout and defending screen of the cruiser. Events proved this condensation of

²⁰See Chapter IV on prewar games and exercises.

the battle line concept false: the confusion of night made control of the screening destroyers difficult and mutual interference a major problem. Moreover, the destroyer was tied to the cruiser main body and unable to effectively utilize its torpedo battery. It would take almost a year for American cruiser commanders to realize that night tactics demanded all units fill an offensive role.

While American gunnery tactics favored the engagement in broad daylight, the opposite was assumed for the torpedo. The torpedo, American commanders realized, could be particularly effective at night when the cover of darkness would allow torpedo firing surface units to close the battle line to within torpedo range [Ref. 41: p. 1]. The first priority of American night tactics was the protection of the battle fleet, not the employment of offensive tactics against the enemy's force. Detailed tactical plans stressed the specific formations, conditions of readiness, and gun employment for protection of the battleship from night torpedo attack. Such tactics emphasized mutual support and the stationing of units so as to simplify identification and reduce the chances of engaging own forces in the confusion of night battles [Ref. 41: pp. 4-6].

This cautious approach was the realization that the potential of the battle line's guns was substantially reduced at night. In its official language, the war instructions of the thirties emphasized that in committing his forces

to night engagements, the commander must consider that a naval force "... risks forfeiture of the superiority of its most valuable asset, its coordinated firepower" and that his force's proficiency in night gunnery may be lacking [Ref. 42: p. 37]. These instructions go on to stress that the provisions made for night encounters are predicated on "chance" night actions [Ref. 42: p. 38]. In other words, American tactical commanders were discouraged from actively seeking battle at night.

The introduction of radar failed to generate a fresh look at night tactics. Instead, American surface task force commanders saw radar as the chance to turn night into day for the gun, a capability beyond the embryonic state of early radar sets. American attempts to utilize radar for long range night engagements resulted in the concentration of fire on one or two targets, allowing the remaining Japanese forces the opportunity to conduct their torpedo strikes. Additionally, the still developing command and control procedures for coordinating radar surveillance and fire control were so inefficient as to allow any advantage gained in initial detection to be whittled away before opening fire.

The defensive emphasis of American pre war night tactics was a tacit admission of the potential danger of night battles. It was openly recognized that the enemy cruiser with torpedoes and employed in an anti battle line offensive

role at night represented a challenge to the American model of daylight gunnery at maximum range. It was realized that "... the torpedo ... might enable a heavy cruiser to engage a battleship under favorable circumstances. But such circumstances would be only at night or in a surprise engagement in low visibility." [Ref. 22: p. 10]

By basing its doctrine on gunnery the United States Navy tied itself to a doctrine where picking the time and setting for battle was a prerequisite and the choice would not be under those tactical conditions that characterized the Solomons actions. American commanders showed a lack of flexibility in the Solomons that was in large measure bred from a prewar mindset. The cruiser-destroyer commanders of the American fleet mistook doctrine, which must allow for exceptions, for dogma.

G. ARMS CONTROL AND THE CRUISER FORCES

A study of the American naval forces available in the early days of World War II must consider the influence of the interwar naval treaties. This is particularly true of cruiser forces, which were directly shaped by the limitations of these treaties.

Table IV summarizes the limitations the Washington Treaty of 1922 and the London Treaty of 1930 placed on the construction of cruisers by signatories. (Table IV is adopted from Ref. 43: pp. 37-40.) Underlying the influence these

TABLE IV
Cruisers and the Washington and London Treaty Agreements

Cruiser Type	Year	Size Limitations	Armament Limitations	Total Tonnage Limitations
CA	1922	10,000 tns	8 inch guns	none
	1930	10,000 tns	8 inch guns	180,000- U.S. 146,800- U.K. 108,400- Jap.
CL	1922	same as CA (all cruisers regarded equally)		
	1930	10,000 tns	6.1 inch guns	143,500- U.S. 192,200- U.K. 100,450- Jap.

limitations actually had on cruiser construction were the treaty provisions dealing with other ship types and total force ratios. The original treaty agreements of 1922 placed limitations on the construction and modification of battleships and aircraft carriers, yet cruiser construction, was left relatively unchecked except for the modest restrictions of Table IV. The next eight years saw the United States build eight new heavy cruisers of two classes while the Japanese completed three classes of heavy cruisers totaling twelve ships.²¹ Both sides abandoned the construction of six and five inch gun cruisers after the completion of those more lightly armed vessels on the ways at the time of the treaty's ratification. The attempt to limit the world's naval power had created a new capital ship, the cruiser, and launched a race in the construction of this new weapons system.

Table V summarizes the details of this competition as it affected the United States and Japan and offers some insights as to the technical details of the cruiser forces that would face each other in the Solomons.

²¹The technical data concerning specific classes cited in this section is, as is similar data throughout this work, taken principally from Jane's Fighting Ships for appropriate years and compared with the then-classified United States Navy's intelligence. Both agree surprisingly well. However in event of conflicting data, the Navy's intelligence is accepted.

TABLE V

Comparison of U. S. and Japanese Cruiser Forces

(numbers in parentheses reflect total tonnage)

	CA		CL	
	1930	1941	1930	1941
U.S.	8 (72900)	18 (180000)	10 (70500)	22 (161425)
Japan- ese	8 (108400)	18* (229800)	17 (81455)	20 (98855)

*JANES lists only 14 Japanese heavy cruisers, calling the Mogami-class light cruisers instead. The six inch armament on these units was converted to eight inch just prior to the war.

By 1930 the Japanese had built up to what that year's conference would limit them to in heavy cruisers. The United States, on the other hand, found itself with just 40% of allowed tonnage for eight inch cruisers. Inasmuch as current authorizations programmed the remainder of the treaty allocations for construction prior to the end of the decade, the Japanese must have seen time and the treaties as conspirators against them. A similar situation existed in the light cruiser category, with Japan virtually at its 1930 limits upon signing the London Treaty while the United States had utilized slightly less than half of its allotment of tonnage. Japan saw itself at the limit of naval power while the American potential to expand its naval forces was unexploited. For the moment, the Japanese had achieved relative superiority, a balance that could not be overlooked in considering their advances in the Pacific basin over the next ten years.²² American footdragging had delayed building a fleet commensurate with international interests and presented the Japanese a window of opportunity.

Japanese popular sentiment was largely against the treaties but the criticism was not uniform among the Japanese leadership. Many Japanese naval officers, familiar with American industrial power, felt that abrogation of the

²²See Chapter on Strategy.

treaty would unleash an arms race that Japan could not win [Ref. 3: p. 34]. These fears were realized. The expansion of the American light cruiser force illustrated in Table V illustrates this expansion. Moreover, the evidence suggests that by the onset of the war in the Pacific the Japanese had exhausted their capability to build cruisers. Between the abrogation of the treaty in 1935 and Pearl Harbor, the Japanese completed six heavy cruisers and three light cruisers. In the meantime, the United States built one heavy cruiser (the last allowed for by the treaties) and thirteen light cruisers. Furthermore, the Japanese had plans for only three more heavy cruisers at the war's commencement while the American Navy had eight heavy and twenty-three light cruisers on the building ways.²³

This situation ultimately resulted in a strange dichotomy in the attitudes of naval leaders from both sides towards the interwar treaties. Despite its abrogation of the treaties, it has been argued that the Japanese wanted and expected another treaty to stave off American fleet expansion [Ref. 3: p. 34]. In contrast, the United States Navy appeared eager to see treaty limitations fall away and by 1935 the discussion of what the post treaty fleet should

²³ Ironically, several of these new cruisers being built at the start of World War II were renamed after some of those lost in the opening battles of the Solomons.

look like was flourishing. In regards to cruisers, the General Board and the War College had anxious eyes pointed westward at Japan with the disturbing parity of Table V seen as a most unsatisfactory posture. In a generally accepted War College recommendation, it was planned that the United States aim for a 5:3 ratio of total cruisers over the Japanese, [Ref. 44: p. 7] a force structure not achieved until well after the Solomons struggle had begun.

IV. FLAWED ORACLES: THE INTERWAR GAMES, AND FLEET EXERCISES

As noted in Chapter II, the Pacific war was keenly studied by American naval leaders throughout the interwar period. The tactical planning for the war and, indeed for any possible exigencies assumed by the Navy during this period, was centered around regular at sea fleet exercises and war games at the Naval War College. The failure of these critical planning vehicles to presage the types of actions the Solomons campaign would entail deprived American commanders of their best opportunity to prepare for the Solomons campaign. Both the games and the exercises were constructed so that the essential factors of the naval combat in the Solomons were either ignored or missed in the conduct of these simulations.

A. THE NAVAL WAR GAMES OF THE INTERWAR PERIOD

The Naval War College games take on a special significance because of the American Navy's system for strategic planning during the interwar period. The influence of the games was two-fold. During the twenties and thirties the games formed the backbone of the College's campaign analysis and the results were utilized to support the naval construction plans of the day.²⁴ Secondly, attendance at the War College

²⁴See Chapter III.

had become a routine part of every senior American naval officer's experience by the late 1930s, and the game floor with its clashes between "Blue" and "Orange" had become a common feature of every high ranking officer's professional training. Within the flag officer community of the 1941 United States Navy, 99 percent of the nation's admirals had attended the War College and participated in the Newport games [Ref. 48: p. 67].

In their ever empty sea theatre ... officers rehearsed the parts they would in future combat, perform. These men, the actors of a yet unwritten war, prepared their scenes on a black stage, with only colored chalk and cast lead tokens as props. "Prologue-like," they prepared, and made "imaginary forces work," to ready themselves for harder tasking. [Ref. 48: p. 131]

The United States Navy got its first chance at the Japanese Imperial Navy on the game floor at Newport. The games became the foundation of the strategy, forces, and tactics that would be employed in the Pacific war. In the case of the Solomons campaign, the ability of the games to provide this three-fold foundation was uneven at best and most share the blame for some of the campaign's most dismal failures at worst.

The failure of the games to adequately support the type of tactical development that would have been meaningful to the campaign hinges on three key elements. The first is that the games themselves lacked the structure that would have allowed the tactical aspects of the campaign to be adequately modeled. The second flaw lies in the specific

assumptions concerning the weapon system performance made by the game play. The final reason for the games' failure to support the type of tactics employed in the Solomons was the inertia of the service that insisted upon interpreting game results in a manner that was inconsistent with the first two reasons cited. This third aspect of the games' dysfunctional effect on planning for the Solomons was discussed in Chapter III. The first two deal specifically with the way the Newport games were structured, and are closely related. Understanding how the Solomons slipped through the otherwise exhaustive gaming efforts at Newport between the wars requires a close examination of how the games were played and upon what assumptions hinged the outcome of battles on the game floor.

1. The Rules of the Game Floor

The official rules of the game floor at Newport during the interwar period were divided into sections for maneuvers and the evaluation of fire control solutions subsequent to these maneuvers. These rules, published in a variety of formats for both students at the War College and gaming efforts elsewhere, remained relatively stable throughout the interwar period, although an increasing sophistication is evident through the thirties. This study will concentrate on the rules as they stood in 1941²⁵ since

²⁵Ref. 49, and Ref. 50.

these represent the most sophisticated level attained by the War College and provide a glimpse of the game as close to the beginning of the war as possible.

Three elements emerge as having been critical to the naval engagements of the Solomons yet not properly addressed by the game rules at Newport. These elements, the command and control of game units (referred to as "C²" hereafter), the simulation of environmental conditions, and the maneuver of units on the game floor, cannot be considered as separately; their interrelationship was a key factor in the failure of the games to simulate conditions as they developed in the Solomons. Keeping this interrelationship in mind, we will start with a survey of how the game rules saw each of these elements:

a. Command and Control

A detailed effort was undertaken by the game rules to simulate the problems unit commanders had with communicating with the other commanders of other game units. Similarly, the games made an extensive effort to limit the information available to the individual commander to that which he would reasonably be exposed to on the bridge of his ship or while strapped in his cockpit. Screens on the game floor were used to limit the view of other players' units and the restriction of inter-player communications. Particular attention was paid to isolating those commanders in charge of submarine or air units. Small game boards

for making moves to be transferred to a main game plot were used to effect this isolation. [Ref. 50: p. 32]

These restrictions did not begin to emulate the actual C² problems encountered by naval forces in the Solomons at the tactical level. At the larger level of planning and preparation, the thorough Estimates of the Situation and operation plans required by students are in sharp contrast to the piecemeal tactical planning with ad hoc forces forced upon both sides during the Solomons. Ship-to-ship tactics on communications under time pressure was a major problem in the Solomons that could not be simulated by the methodical approach to making moves taken by the game rules. Finally, the games' pattern of allowing movement, search, and communications in discrete steps separate from the exchange of weapon fire was in sharp contrast to the rapidly developing situations actually encountered during the campaign. The assimilation of information and the issuing of orders during battle is a fluid, interactive process, as the Solomons graphically showed. The measured approach taken by the games badly prepared the commanders engaged in the Solomons for the pressure of actual combat.

b. Environment

Efforts to simulate environmental conditions--visibility, weather, sea state by the game rules--were

extensive and paralleled those taken to impose the C^2 limitations indicated above. The use of screens during periods of restricted visibility was a prime example of how the umpires of the games at Newport sought to impose conditions similar to actual operations. Considering how important visibility, or the lack of it, was to the night actions of the Solomons, an unforgiving eye must be cast at the simulation of low visibility on the game floor. The method of reduction visibility in the games amounted to a "cookie cutter" model where the chance of detection was ambiguous and assured at a specific range while impossible beyond this range. During the night actions in the Solomons, however, the sighting of opposing units occurred at various ranges under circumstances that varied. In effect detections emerged, sometimes with startling abruptness, sometimes as through a fog.

Detection range was influenced by a variety of factors, prominent among which were night training at which the Japanese excelled and radar which was of course not modeled at all in the games. The effect of the "cookie cutter" range simulation was to cause simultaneous disclosures to both sides masking the profound advantage or potential influence of first detection on the outcome of the lightning-fast engagements in the Solomons. Just as communications was a problem of unforeseen dimensions during the Solomons battles, the detection of enemy units was confused by passing

rain squalls, the proximity of land, and the misidentification of friendly units. Under such circumstances the detection of enemy units was a highly variable occurrence, rarely conforming to the standard model followed at Newport. Also missing from the war game was the relative advantage the Japanese possessed at night visual detection due to their superior night vision optics and training of lookouts. The same observation applies to American radar, which allowed an advantage in initial detections in the Solomons although this advantage was rarely capitalized on. The absence of radar from the game rules as late as 1941 can be attributed to the classification of the system at the time. Regardless of this need for secrecy, some modeling of radar in the later games would have allowed future operational commanders the opportunity to appreciate the significance of this system. Early failure to exploit radar in the Solomons made it clear its use in countering the problems of night and poor weather would require extensive integration into task force command and control procedures.

The games attempted the integration of environmental conditions into the fire control problem. Visibility, sea state, wind, and the relative position of the sun were all considered in the evaluation of gunfire between ships. The players at Newport were kept constantly mindful of the environmental conditions which optimized gunfire effectiveness.

The thoroughness of this modeling of environmental conditions was not complemented by a similarly rigorous simulation of these conditions as they applied to detection, and it is evident that the relationship between first detection and firepower effectiveness was underestimated. [Ref. 51: pp. f-30-f-31]

c. Maneuver

The maneuvering of forces on the game floor was based on a move of three minutes with both unit movement and weapon engagement geared towards this increment. Elaborate procedures attempted to simulate the actual conditions at sea. Units were located by a grid system with blocks of 2000 yards on each side of a square [Ref. 50: p. 26]. Speed and direction took units from block-to-block within the three minute time period. The game rules for maneuvering forces were extensive, and integrated with the restrictions on visibility and communications described above. Maneuvering rules were particularly complex in the case of the "Chart Maneuver" games which were designed to "... express the restrictions imposed upon actual naval operations by material limitations." [Ref. 50: p. 40] The importance of these "limitations" was critical to the employment of weapons in the game: fire power effectiveness tables were entered with the relative position of the engaged units

as well as range.²⁶ While the three minute period seemed a sufficiently small slice of time to reflect a significant level of detail, it was not sufficient to model the tactical problems facing the opposing commanders in the Solomons. At high speed--for example, 20 knots--a ship covered the 2000 yard block in the space of a single turn. In the case of the Solomons, the protagonists were usually approaching on roughly reciprocal courses, approximately doubling the closing speed. The dark nights of the Solomons, poorly modeled in the terms of the C^2 and environmental aspects, allowed little time for decision and effective maneuvering. The games, based on long range gunnery duels of gradual attrition, were fought at a pace that was leisurely relative to the way the actual engagements developed in the Solomons. As indicated in Appendix A, a finer cut of both of these elements would have been necessary to foreshadow the rapidly developing situations of the Solomons and the violent, high speed maneuvering employed and the close quarters of the battles. [Ref. 50]

The interaction of the environmental, C^2 , and maneuvering rules in the interwar games combined in a manner that was the antithesis of the naval actions in the Solomons. Despite their complexity, the rules failed to create a situation similar to the Solomons. The maneuvering of

²⁶The use of these tables will be discussed in the following pages.

ships at close quarters and with little time for elaborate communications was in sharp contrast to the deliberate rules of the game floor. Added to this was the problem of conducting night actions when visibility conditions confused friend from foe and hampered communications. As shown in the realistic time-damage relationships in Appendix A, three minutes was a long time in a night battle at point blank range; information about opposing forces was scant and often confusing. The games at Newport, which stressed thorough planning and the measured engagement of the enemy in gradual attrition at long range, was poor preparation for the mayhem of the close-in clashes of the Solomons where forces rapidly approached each other to point blank ranges, and ships' combat lives were measured in minutes.

A final element in the games which cannot be adequately addressed in hindsight is the extent to which both players and umpires predispositions may have prejudiced the application of the rules and game outcomes. As has been pointed out, the games at Newport were umpired by the staff under a detailed scheme. These officers were among the most experienced in the Navy and included officers of such caliber as Raymond Spruance. These men were not blind to the shortcomings of their own rules or those of gaming in general. As the rules indicated:

Many of the rules may seem to be arbitrary or only approximate truths. So long, however, as the rules furnish substantially correct premises upon which to base strategic decision, and function so as to produce approximately the same effect as would result in an actual war, they fulfill their purpose. (Emphasis added.) [Ref. 50: p. 4]

In general the rules, did a superb job of mapping the strategy of the war in the Pacific. They failed to teach the tactical situation of the Solomons, yet the blame cannot be laid entirely upon the game and its rules; they merely reflected the predilections of the American Navy at the time and sought to frame these inclinations into a tangible form for re-duplication on the game floor. Undoubtedly, if the focus of prewar gaming had been on night engagements between cruiser-destroyer task groups, the games would have been played with a high degree of competence and yielded far better lessons in relation to the Solomons. Gaming's failure in the case of the Solomons was more the failure of tactical conceptualization than of the gaming system.

2. How the Game Saw the Engagement

Although the games at Newport centered on the employment of the battleline in combat,²⁷ the play of the games did indicate the possibility of cruiser versus cruiser action [Ref. 52]. Understanding game results in such actions is critical to evaluating how well the games

²⁷ See Appendix B for a breakdown of game scenarios.

prepared the American Navy for the Solomons. While the previous discussion focused on the general rules of the games, evaluating the games must address the detailed assumptions concerning relative fighting strengths of opposing ships and the ability of shipboard weapons systems to inflict damage during combat. These assumptions represented the American cruiser as a tough, highly effective opponent for its Japanese counterpart in the specific engagement favored by the American Navy, the long range gunnery battle.

a. Game Assumptions Concerning Ship Durability

Essential to evaluating combat results in the Newport games was correct estimation of the ability of a ship in the game to sustain damage. For the purposes of the game, ships were assumed to have "lives" which were equated with the number of 14-inch gun hits that the ship could survive [Ref. 53: p. 1].²⁸ This concept reduced the durability of the world's warships to a standard that made comparison simple and allowed the gradual attrition of a ship's capabilities due to damage. The lifespans also indicate what the American Navy thought about its ships in relation to those of other navies.

Table VI summarizes the Fire Effect Diagrams from the Newport wargames for American and Japanese cruisers for

²⁸The fire effect tables and diagrams to be discussed come from several years as will be indicated. Their rules for employment, however, remained virtually unchanged throughout the thirties and into the forties.

TABLE VI

Comparative Lifespans -- U.S. & Jap. Cruisers

	1934	1941
Blue CA	4.56	4.55
Orange CA	4.3	4.16

Blue CL	4.2	4.0
Orange CL	3.06	3.45

(Note: Expressed in terms of 14 inch gun hits capable of being sustained before total destruction. Numbers given are averages considering all classes listed in game tables.)

the years 1934 and 1941. The game treated American vessels as more robust than comparable Japanese classes. The revision of the heavy cruiser rating is interesting in that the 1934 tables only considered the Japanese cruiser classes of the Nachi and Atago classes while the 1941 game also dealt with the newer, larger, and better protected Mogami and Aoba classes, yet still gave Japanese heavy cruisers less credit for their ability to withstand damage. (Although American cruisers were reevaluated in the later game tables the 1934 and 1941 rules considered the same Blue classes, relying on projections for later classes in the 1934 rules.) The trend in light cruisers is somewhat the reverse: the game planners were impressed with the newer light cruisers built by the Japanese during the late thirties, as they

should have been. However, the same trend remains. Japanese ships are considered less able to sustain damage than American counterparts.²⁹

As the game evolved during the interwar period, the expression of damage on the game floor increased in sophistication. By 1941, the damage to a ship in the game was in terms of percentage of the "lifetime" established by the tables [Ref. 50: p. 48]. As the allotted "life" of a ship was lost, damage was further divided into two categories, above water and underwater damage. Above water damage was caused by bombs and gunfire hits while underwater damage was the result of torpedoes, mines, some bomb hits, rammings, and groundings. Consistent with the "14 inch rule," all damage percentages were based on equivalent hits in the vital areas of the ship from a 14 inch gun. In terms of damage effect, however, separate standards for above and underwater damage were established with the details for the former more extensive. For example, at 50% above water damage, a cruiser-size ship would have lost 20% of its speed, the ability to launch seaplanes, its secondary and anti aircraft batteries and its low frequency communications equipment.

²⁹The game tables considered the American Wichita, Brooklyn, and Baltimore-classes all equal in regards to their ability to withstand damage regardless of the gun battery mounted.

A corresponding 50% underwater damage would only cost the same ship its underwater torpedo tubes which were not mounted on American cruisers. Underwater damage gradually wore away a ship's speed through the water, but it was not until the damage reached 80% that the ship's offensive firepower was affected. [Ref. 50: Section F]

These damage effect rules reflect American tactical thinking that was a key factor in the naval battles of the Solomons campaign. It is obvious now that the games at Newport underemphasized the power of the torpedo, particularly the Japanese "Long Lance." In the games, the average surface launched torpedo had a damage causing equivalent of 2.7 14 inch hits, roughly half the potential to destroy the average cruiser [Ref. 51: p. 6-1]. Added to this damage was a "shock effect" that restricted the target with the inability to use its weapons for three minutes, or one game turn [Ref. 49: p. F-7]. Such restrictions do not reflect the devastation caused by a single hit, for a torpedo generally sank an American cruiser or at least caused a "firepower kill" which excluded it from the remainder of the battle. Adding to this underestimate of what the Japanese considered their primary offensive surface weapon was the understatement of the range capabilities of the torpedo. The game rules considered the effective range of the surface launched torpedo as just under 5 nautical miles [Ref. 51: p. 9-1]. In reality, the Japanese weapon in salvo was

effective at over twice that range.³⁰ The overall impression of the torpedo, as shown in the games, was that of a short range weapon that, while causing significant damage, generally conformed to the attrition rules assumed for the gun. The ability of the torpedo to deal an instantaneous blow that would destroy a cruiser offensive potential in an instant was not seen in the game's imperfect crystal ball.

b. Comparative Offensive Firepower

In their assumption that the gun was the premier naval weapon, the games imitated the attitude of the American Navy as described in the previous chapters. As might be expected, the rules for the employment of gunfire were extensive in the games, accounting for virtually every phase of the fire control problem: range, target size, target relative position, the number of guns used, the spot applied to the gun for correction, and a host of environmental factors. The final output of the game's fire control solution was an equivalent number of 14 inch hits on the enemy per three minute move. In arriving at this value, the basic firepower effectiveness value from the tables was modified by over thirty special rules which combined into three general coefficients. In evaluating the essential elements

³⁰ Japanese night torpedo tactics are discussed in Chapter V.

of this detail as they pertain to the Solomons battles, it is necessary to know the rules concerning the relative effectiveness of Japanese gun systems. Figure 4.1, Figure 4.2, and Figure 4.3 display the ability of both American and Japanese heavy cruisers to inflict damage on each other in battle. (On these graphs, the target "lifespan" as described above was considered as unity to present the effectiveness of the firing platforms in relative terms. One (1) on the vertical axis represents the maximum effective damage the firing platform can inflict on an opposing heavy cruiser at the range indicated.) As the first two figures indicate, the effectiveness of American and Japanese heavy cruisers was at rough parity at ranges less than fifteen thousand yards. However, within the band of sixteen to twenty thousand yards, the American ships had a distinctly greater ability to inflict damage on an opposing number. Figure 4.3 presents an expanded view of this relative strength for both editions of the Fire Effectiveness Tables. Although these figures are aggregates based on standard table values from the game, they display an evident trend towards the assumptions already noted concerning the American Navy's faith in long range gunnery. The game favored the American cruiser commander within the 22,000 to 16,000 yard area in a contest of equals. This key feature of the game is also evident in Figure 4.4. As this figure shows, the American cruiser in a game firing

CA PERCENT MAX DAMAGE-1934

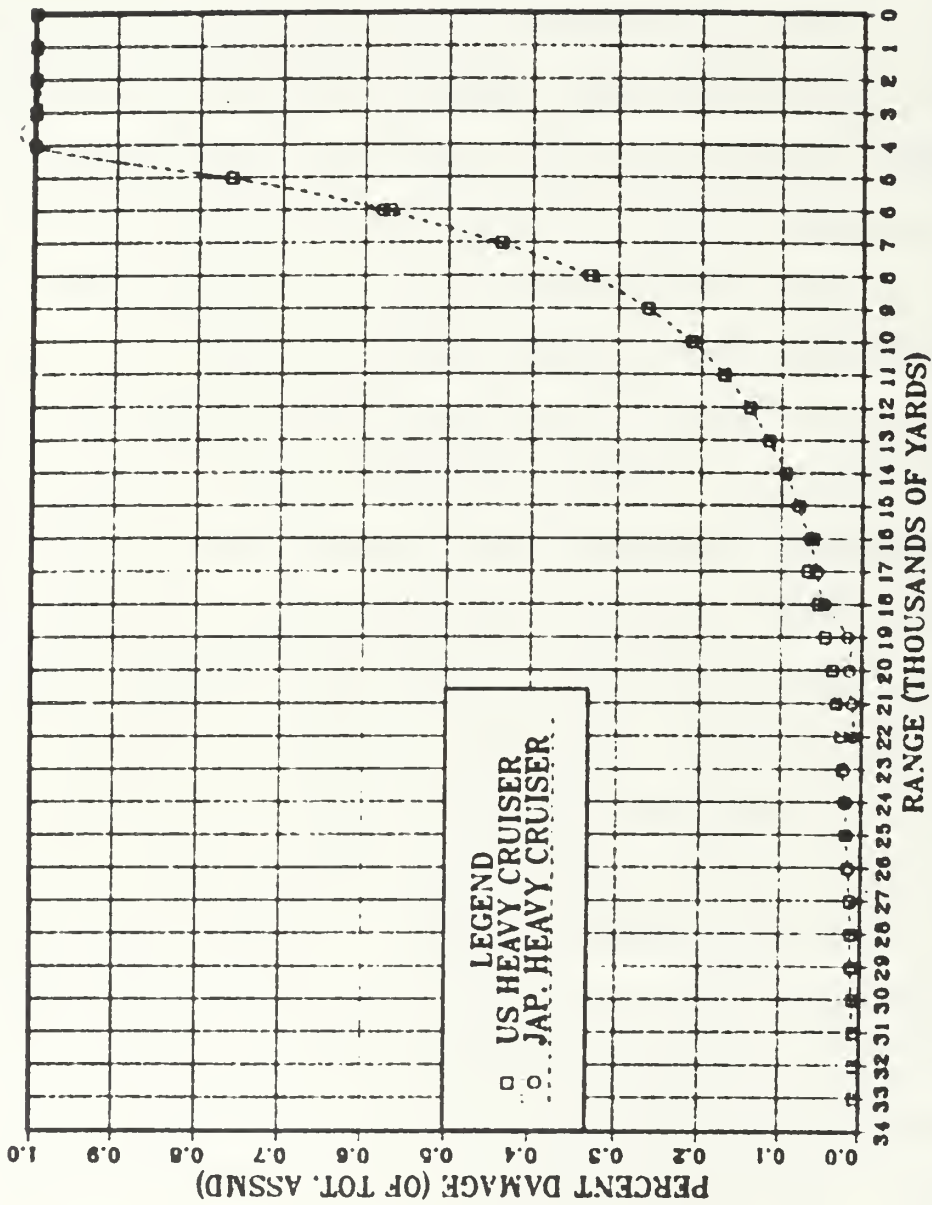


Figure 4.1. Effective Firepower of U.S. and Japanese Cruisers-1934

CA PERCENT MAX DAMAGE - 1940

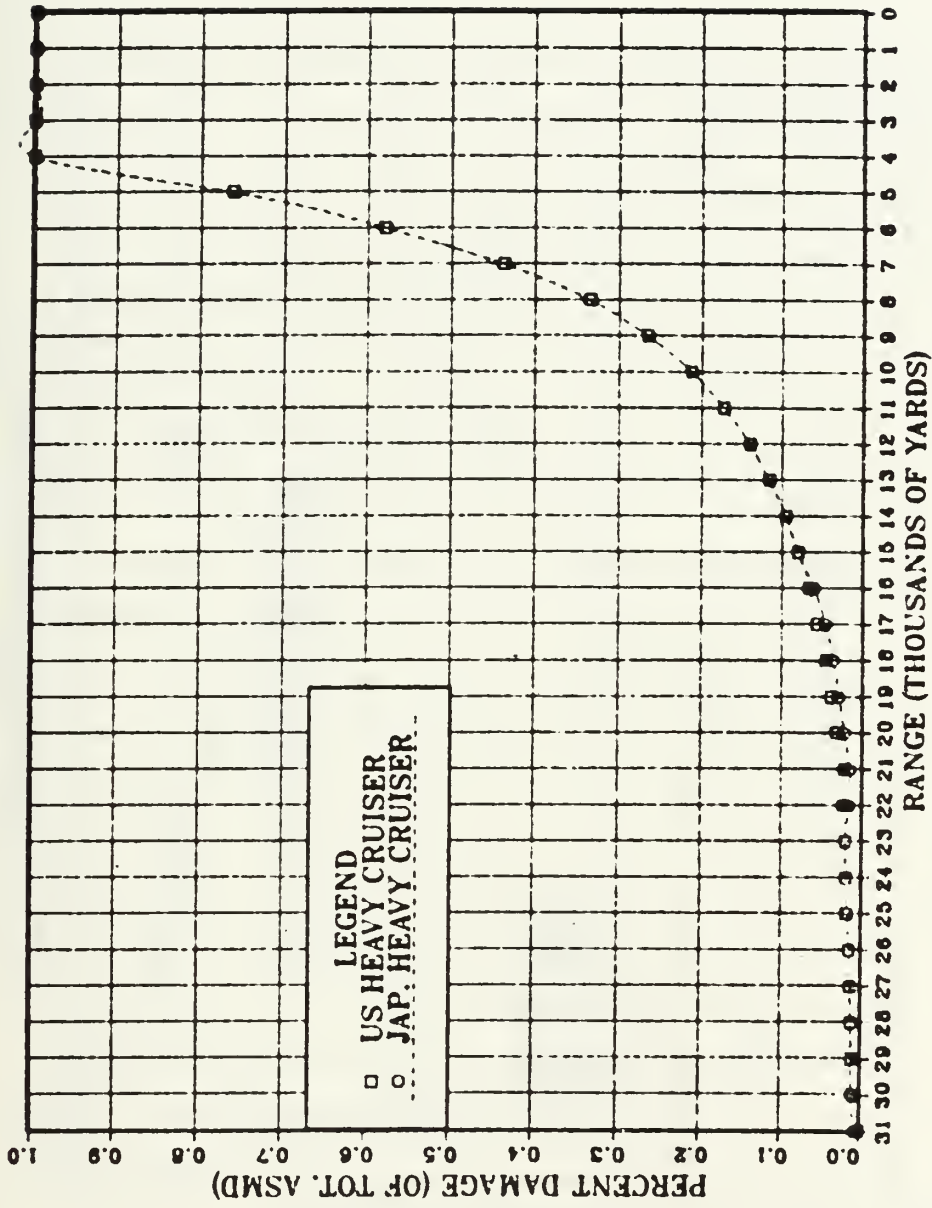


Figure 4.2. Effective Firepower of U.S. and Japanese Cruisers-1941

CA FIREPOWER UNDER 15 KYRD

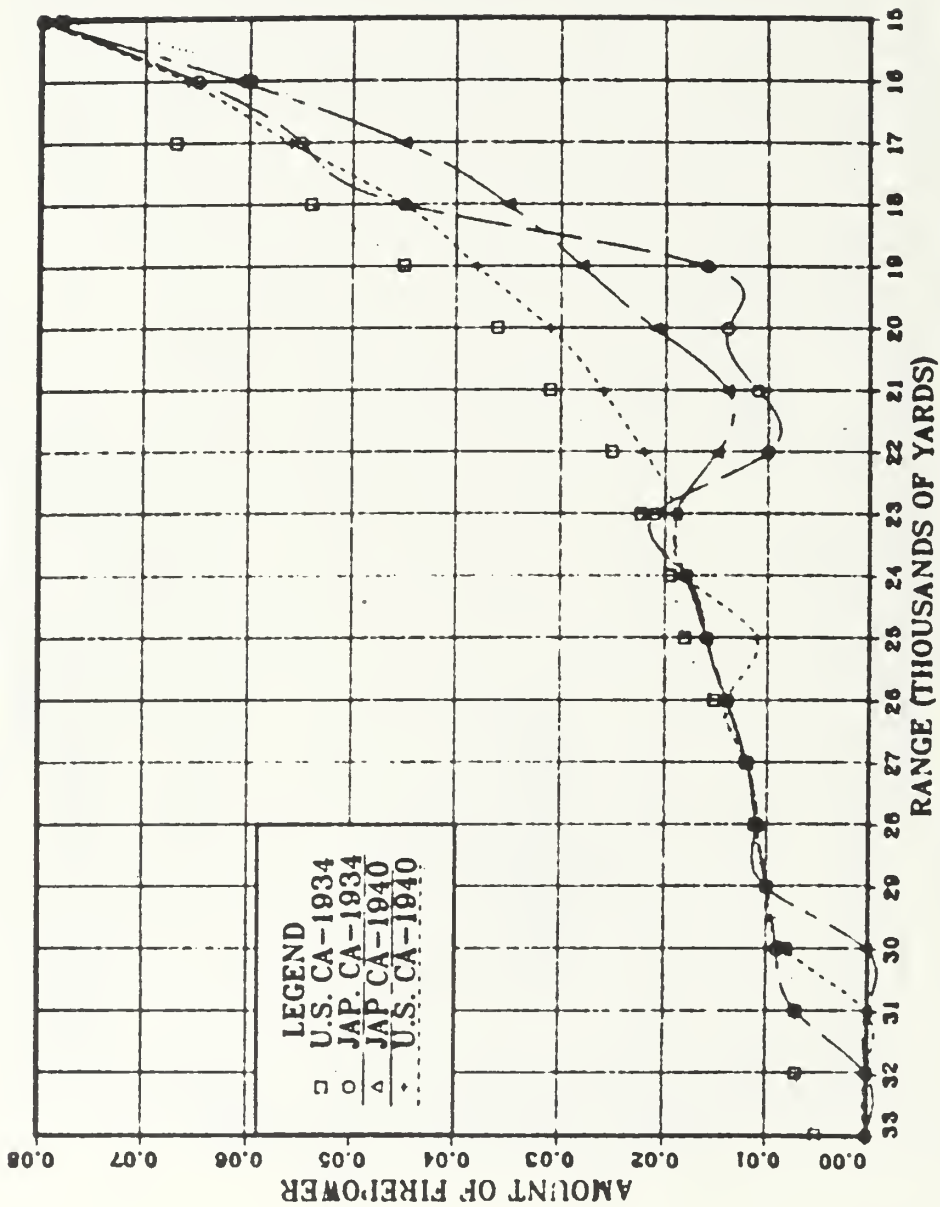


Figure 4.3. Comparison - U.S. & Japanese CA Firepower (> 15 Kyrd)

US VS JAPANESE CRUISERS - 1930

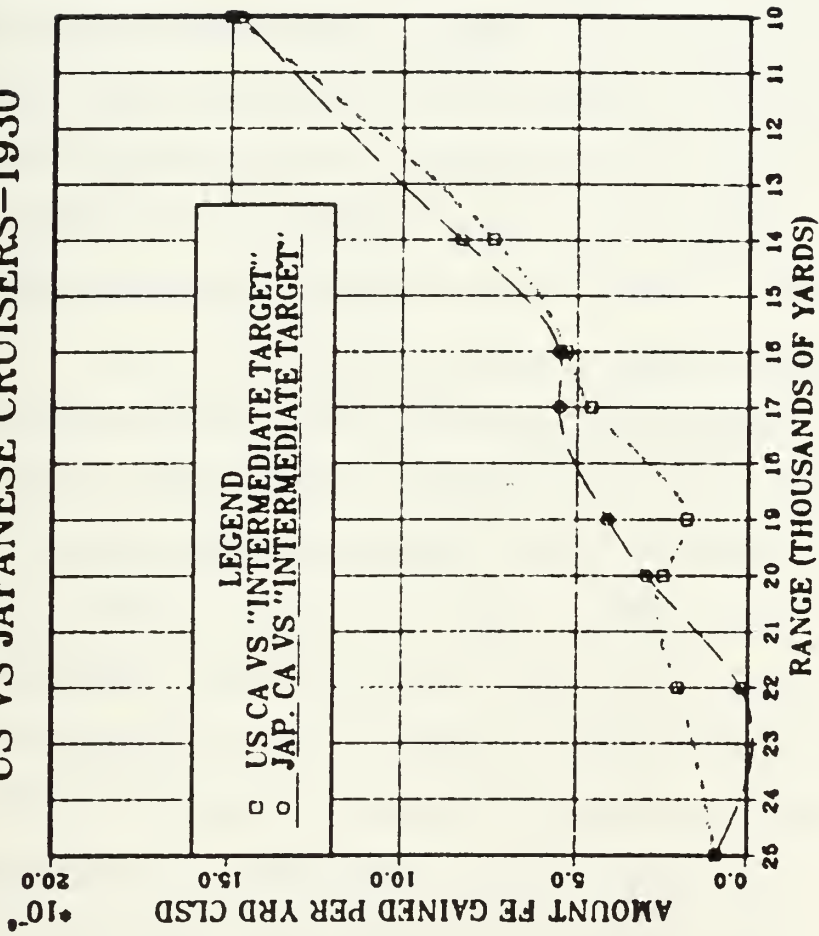


Figure 4.4. Comparison of Gun Firepower Gained by Closing

at 22,000 yards gained little advantage in closing to 19,000 or 18,000 yards. Conversely, the Japanese player would see a need to rapidly close range to match relative firepower effectiveness. Furthermore, the narrow band around twenty thousand yards offered a single glimmer of hope for the American player, as it represented the only ranges in the game where the American cruiser held such a relative advantage. At all other ranges, the Japanese guns were assumed to have a roughly equal relative effectiveness and, in terms of the 14 inch standard, an absolute advantage in firepower. These rules relate directly to the American doctrine which called for the optimal cruiser engagement to occur at twenty thousand yards. [Ref. 21]

Supporting the game's bias towards the long range gunnery duel were technical assumptions that had a significant affect on the firepower values used in the game. These factors included a multiple for penetration of the targets deck and hull sides based on range. Damage was significantly different for American and Japanese cruisers. Thus in the 1934 games, the American cruiser was more effective at 17,000 yards than at 15,000 and at 18,000 yards was 30% more effective in raw firepower than its Japanese counterpart, due to simultaneous deck and hull side penetration from its 8 inch 55 caliber guns. While Japanese 8 inch guns were considered capable of causing more damage

overall, the games did not credit them with the ballistic qualities necessary to achieve this simultaneous penetration. The practical effect on the game floor was to make the American commander see the long range engagement as preferable. This inclination remained despite a considerable upgrade of game rule estimates of Japanese gun effectiveness between 1934 and 1941. Nonetheless, the American heavy cruiser of the 1941 wargame still outgunned the Japanese heavy cruiser by 14% in terms of raw effectiveness at 18,000 yards, a factor made more significant by the game's faith in the American ship to withstand greater punishment discussed above.

Until the spring of 1943, American commanders in the Solomons sought to engage the enemy with tactics that seem a direct outgrowth of the rules of the wargames at Newport. Formations were massed along a line to concentrate gunpower and every effort was made to open fire at the approaching Japanese at as long a range as possible. The torpedo was considered a secondary weapon, limited in range and difficult to employ. While the games may have led to or reinforced these unsuccessful tactics, they also seem to offer an explanation for Japanese tactics. If, as the game rules suggest, the Japanese held a firepower advantage at closer range, it would only seem natural that Japanese commanders bore in as close as possible before opening fire.

Their torpedo, clearly not well modeled in the Newport games, limited the distance they needed to close, making the decision to surreptitiously approach and open fire a viable counter to the American tactics indicated in the games.

Ultimately, the great flaw in the games relative to the Solomons was the false hope they gave to already established doctrine. Those instances in the game where large scale surface encounters occurred at night usually resulted in disastrous results: in 1931 an Orange night destroyer torpedo attack against a Blue light cruiser force cost five cruisers to twenty attacking destroyers. The conclusion at the time was that such an Orange sacrifice was not worth the cost. The same conclusion was reached again under similar circumstances after a Blue destroyer attack in a 1935 game. Although those most responsible for the conduct of the games fully realized the limitations of the game, to those playing and the bureaucracy reading game results, the games confirmed already well ingrained tactical preconceptions: night actions were risky and the promise of superior American gunpower in the daylight engagement was the optimal scheme for American surface combatant tactics.

In the American Navy's resolution of how its forces should be built between the World Wars, the game floor seems to have taken priority over the lessons of the

at sea exercises discussed below. In the resolution of the "cruiser debate," the War College analysis was based on the gaming rules used during these games and the same advantages ascribed the American naval gun in game play became the foundation of American surface force tactical plans.

B. THE AT SEA EXERCISES OF THE INTERWAR PERIOD

Complementing the gaming effort described above were the at sea exercises conducted by the United States Navy during the interwar period. Major fleet exercises were designed to be held annually to conduct underway training for fleet units, and to explore the practical problems presented by scenarios considered most likely in case of war. Although the annual "Fleet Problems" and the games held at Newport were not directly linked on a regular basis, the anticipated campaigns explored in each were based on similar situations. For the most part, the annual Fleet Problems focused on the defense of the Panama Canal, protection of the Caribbean bases, and the sea lanes of communication needed for a large scale offensive into the western Pacific [Ref. 45: p. 2]. Operationally, the fleet problems addressed situations which were analogous to the Solomons: actions undertaken in island waters with the goal of defending the islands with sea control. Moreover, the use of air bases in Central America was particularly important in the exercises since the integration of carrier air power

into the fleet was not completed until the late thirties. Carrying out offensive operations in such an environment would seem to have been proper preparation for the Solomons campaign as well as the entire Pacific theatre. Upon closer examination, however, the foundations of the exercises in the Caribbean and off the Central American Coast were fundamentally different from the Solomons in a strategic sense. The usual enemy was Germany ("Black" in the lexicon of the "Rainbow"), in a situation where American forces held the defensive position against an opponent attempting to sustain an offensive drive at the end of a long logistics chain. In the Solomons the situation was reversed and "Blue" found itself the far-reaching aggressor.

During the interwar exercises, the Battle Force of the Atlantic Fleet usually simulated the "Blue" force while the opponent's role usually fell on the Pacific-based Scouting Force [Ref. 45: p. 2]. The Scouting Force as an opponent could have possibly given an insight into Japanese tactics in the Solomons. In the interwar Navy the Battle Force was mainly comprised of battleships, destroyers, and what cruisers were available. The Scouting Force, on the other hand, was made up of a higher proportion of cruisers [Ref. 45: p. 2]. A frequent comment from exercise participants was the value of the cruiser as demonstrated in offensive missions, particularly the cruisers' ability to

disrupt destroyers attempting to lead the Battle Fleet's thrust. The tactical doctrine of employing the light cruiser's firepower to counter destroyer assaults on the battle line was practiced often and commented upon frequently. Similar comments were also frequently made as regards the cruiser's ability to screen the battle line and provide anti air protection. In large measure the cruiser's transformation into a "capital" ship grew from the enthusiasm for the cruiser shown by tactical commanders during fleet exercises. These observations did not lead the fleet exercises to a precise foretelling of the naval campaign in the Solomons; employment during the exercises still emphasized the supporting role of the cruiser in fleet engagements. However, it is interesting to note the respect tactical commanders in the fleet exercises gained for the cruiser, particularly the light cruiser, and its potential for the offensive mission of the battle fleet. As the official report from Fleet Problem VII noted in 1927, the American Fleet "sorely" needed light cruisers to put it on a par with "any of the First Class Naval Powers." [Ref. 46: p. 4] Missing from this enthusiastic endorsement is a more focused reasoning of why the operational commander needed more cruisers. The "jack of all trades" syndrome so evident in the contemporary doctrine described in Chapter III influenced the employment of the cruiser in the Fleet Problems as well;

the cruiser was utilized for duties as varied as battleship or carrier escort and cover for destroyer torpedo attacks. The cruiser's versatility made it the first to be called on and the last to be categorized. The argument over torpedo tubes and gun size was merely a reflection of how the operating forces wanted the cruiser to fill a variety of roles.

This appreciation of the cruiser's worth did not lead to an immediate concept of the cruiser in the primary role it would assume in the Solomons, but rather paralleled the established notion of the battle fleet instead. As in American tactical doctrine, the offensive role for cruisers opposing the Blue fleet was one of scouting for subsequent attack by the battle line. In Problem VI of 1926 American cruiser forces attempted to conjure up a night offensive against the opposing battle fleet developed a battle plan that came close to duplicating Japanese tactics in the Solomons. In this exercise, the forces playing Black were tasked with interdicting a Blue force attempting to conduct amphibious operations in Black territory. The Black commander, realizing that he faced a numerical disadvantage, saw surprise night attacks as his best chance to slow Blue. His plan was to utilize his cruisers for scouting and to cover the torpedo attacks conducted by his destroyers and submarines [Ref. 47: p. 66]. The exercise's chronology reveals that ensuing actions were conducted at close range

with Black's destroyers unleashing salvos of four torpedoes each while opposing Blue battleships attempted to counter with searchlight guided gunfire. The night action would have been devastating for Blue, according to chief umpire William F. Halsey, who would witness strikingly similar attrition to his command while leading the Solomons campaign [Ref. 47: Umpire's Report].

The difficulty with night operations experienced in Problem VI was a perennial observation of exercise participants. It is evident that Blue forces dealt with this difficulty by emphasizing daylight action in their plans. Whether the difficulty of night "ops" was a function of exercise play or tactical doctrine is a question of the chicken and egg variety. Just as the games slanted results towards a doctrine of superiority through gunfire, the inter-war fleet exercises suggested that such tactics could be only effectively employed during daylight. Although American commanders' experience in the Fleet Problems should have told them differently, they continued to see the long range gunnery duel in daylight as the best application of American gunpower. The official records of the Fleet Problems bear this out: the engagements included in the official records tend to show the longer range maneuvers of the main fleets during daylight hours. Lost in these perfectly kept records was the mayhem of the night encounters. Accordingly, the Navy's leadership ignored the most troublesome encounters

of the exercises, although it was battles such as these which were to prove such tactical setbacks to the United States Navy in the Solomons.

The tactics the Scouting force applied in many of the Fleet Problems anticipated Japanese tactics in the Solomons. The potential of cruisers as offensive weapons was demonstrated frequently. While Scouting Force commanders relied on cruisers to work in consonance with torpedo-equipped destroyers, the Japanese carried the technique one step further by including torpedoes as part of the cruiser's armament as well. This, of course, was no secret to American operational commanders who were well aware of the discussions on cruiser batteries outlined in Chapter III. The advantages such a cruiser-torpedo combination held in a scenario such as the Solomons should have been recognized.

In a broader sense the exercises of the twenties and thirties provided a base of experience that served the Navy well in the conduct of the Solomons campaign in several respects. The experience of conducting fleet operations on a large scale is the most significant example of this. While the exercises of the twenties tended to be in waters relatively close to the United States, the trend in fleet exercises was to conduct operations at increasingly longer distances. The vital logistic support cited previously was an outgrowth of exercise experience. By 1941, the United States Navy had refined its capabilities to refuel

at sea and the "train", the prewar name for the integral logistics force of the battle fleet, was an established part of every major fleet movement. Only the practical experience of the fleet exercises could have led to the well established logistic lines that served the American Navy so well in the Solomons.

The integration of air support into fleet tactics was another vital contribution of the exercises to the World War II fleet. From their start the interwar exercises showed a flexible and innovative approach to the employment of the fledgling fleet air arm. Carrier tactics were developed during the exercises by future leaders such as King, who, as a carrier skipper in several exercises, pioneered the use of carrier-based air strikes. More directly applicable to the daily fighting in the Solomons was the ability to integrate land based air forces in support of the fleet, a frequently practiced aspect of the exercises prior to the war. The air fields and seaplane bases built throughout the SOPAC area were precursored many times in the Caribbean and Central America during the Fleet Problems of the twenties and thirties.

Perhaps more importantly, the fleet exercises prior to the war gave the American Navy the experience of conducting large scale operations and the fleet organization necessary to conduct these operations. The value of this experience showed itself in the planning for the Solomons

campaign as well as the execution of the campaign. While the onset of the Solomons campaign saw the American forces resource poor, those available were wisely utilized. The task organizations of the Solomons were reflections of similar organizations rehearsed many times during fleet exercises and the commitment of American naval leaders to a standard scheme for such organization avoided many of the problems evident in the Japanese conduct of the campaign. The American forces developed a command structure that avoided interservice rivalry at higher levels and provided actions coordinated to a degree the Japanese never achieved. Recognition that such planning and organization was necessary in large maritime campaigns was a direct result of the Fleet Problems which had routinely included land based naval air forces, Fleet Marine Forces, and logistic forces as well as occasional participation by Army and Army Air Corps forces. The lessons in command organization and planning learned in such ambitious exercises were largely responsible for the American success at managing the campaign despite the lack of assets allotted to the initial effort.

C. IN SUMMARY

If the interwar games were false prophets of the Solomons campaign, then the fleet exercises of the same period must be considered unheeded Cassandras. While the exercises showed the dangers of close in night actions, the combat

results tables used on the gaming floor at Newport seductively drew American naval leadership into a sense that gunfire could win anticipated battles at long range. Few of the Solomons battles were conducted in this manner. The Japanese were forced to conduct night operations because American island based airpower dominated the daytime operations. Moreover, the night surface engagement was most in keeping with well rehearsed Japanese night surface tactics.³¹ The Japanese decision to fight in the Solomons at night forced the United States Navy into a situation that it had avoided on the game floor and in peacetime operations. The American Navy paid a high cost for rationalizing away the problems evident from the Fleet Problems during the interwar years.

In perspective, the interwar simulation of the Pacific theatre provided a reasonable foundation for the conduct of the war. The relentless practice at Newport illuminated the key strategic elements that American naval strategy needed to incorporate in fighting such a war: long range logistics, amphibious forces, sufficient numbers of naval vessels. On the other hand, the misuses of game results contributed to American losses in the Solomons by validating tactics that were inadequate. The blame for this misguided influence should not be laid squarely on the shoulders of

³¹See Chapter V.

the War College and its coterie of gamers. Over their protestations, the General Board utilized game results in the design of new cruisers, using these results to prove how effective cruiser gun tactics were. Perhaps of greater impact was the faith operational commanders placed in the results of the games they played at Newport. Attempts to duplicate victories on the game floor in the dark waters of the Solomons resulted in a pattern of defeats sanctioned by official doctrine. The dogged refusal of American surface combatant commanders to abandon these tactics was incongruous with the caveats applied to the games by their originators and the experiences of at sea exercises.

V. DECISIVE ELEMENTS OF THE SOLOMONS NAVAL ENGAGEMENTS

This study has thus far concentrated on the strategic roots Solomons campaign and the background of the naval forces which bore the brunt of the campaign. Just as critical to understanding the uniqueness of the campaign's use of naval power is a consideration of the specific tactical aspects of the campaign. In doing this, it is most important to evaluate the elements in individual engagements which contributed most to the successes or failures of the campaign.

Appendix A summarizes eleven major engagements of the Solomons campaign. This data base is not all inclusive but representative of the naval clashes that marked the campaign. All of these engagements bear the four characteristics identified as typical to the tactics of the Solomons: night actions between surface combatant task groups at close quarters.

A. OVERVIEW

Grasping the nature of the naval combat in the Solomons is difficult. The battles were often violent yet indecisive and the aggregate results suggest almost equal damage inflicted by each side on the other. Lost in an attempt to distill the naval actions of the campaign into succinct facts is a sense of what happened on a larger scale. Despite a

relatively even balance of losses, the Americans successfully achieved campaign goals while the Japanese were in virtual retreat from the first day of the campaign. In considering the campaign's naval battles, neither side achieved absolute control of the seas through destruction of the other side's naval forces. Table VII lists pertinent data from the naval engagements of the Solomons campaign. Victory was not obvious in these battles in either a strategic or tactical sense; both sides often claimed victory in individual engagements yet each side accomplished its primary mission only about half of the time. In damage done, the Japanese outscored American forces, although the tally must be viewed a pyrrhic victory. Japanese industry could not offset losses sustained and successes in battle were at a high cost of attrition. The wearing away of the Imperial Japanese Navy was tantamount to defeat, as its leaders well realized.

Several factors emerge from the battles analyzed in Appendix A which clearly define the tactical characteristics of the campaign. The remainder of this chapter will focus on these elements and examine their role in the naval battles of the campaign.

B. AMERICAN INTELLIGENCE SUPPORT

The ability of American forces to detect and predict Japanese ship movements in the Solomons was a decided

TABLE VII

Overview of Engagement Data from Solomons

DURATION OF BATTLE		84.13		TIME FORCES ENGAGED		18.56		
DAMAGE PER BATTLE (in number of ships)				TIME TO DAMAGE/SINK SHIPS (from commencement of battle)				
BY TORPEDO		BY GUNS		BB	CA/CI	DD		
SUNK								
AMERICAN	1.250	0.575		---	38.90	19.48		
JAPANESE	0.559	.9		117.0	85.33	45.37		
DAMAGED								
AMERICAN	1.11	1.12		117.0	79.03	53.84		
JAPANESE	0.0	1.2		26.0	70.12	58.7		
TORPEDO ATTACKS				RATIOS (Japanese vs americans)				
SUNK	FIRE	P (h)	P (k)	TOTAL GUNS				
AMERICAN	52.72	14.57	.016	1.0	0.949			
JAPANESE	67.71	34.78	.063	0.55	TOTAL TORPEDO TUBES 1.370			
U.S. SHIPS SUNK/DAMAGED BY TORPEDO-2.5				TORPEDOES FIRED 3.028				
JAP. SHIPS SUNK/DAMAGED BY TORPEDO-0.5				TOTAL SHIPS IN TASK GROUP 1.198				
GUNFIRE EFFECTS				SIGNIFICANT EVENTS				
TIME OPENED FIRE P (k) RANGE				INTELLIGENCE	MANEUVER	DAMAGE CAUSING		
AMERICAN	48.35	0.57	4.19	2.0	3.87	4.50		
JAPANESE	50.14	0.53	4.51	3.21	2.5	4.78		
U.S. SHIPS SUNK/DAMAGED BY GUNFIRE-1.20								
JAP. SHIPS SUNK/DAMAGED BY GUNFIRE-1.75								

note-(figures in dam./sunk categories do not total due to data averaging)

advantage in the campaign. Supporting American surface task group commanders in the Solomons was an intelligence system that allowed American forces to position themselves to intercept Japanese forces attempting operations on a regular basis. Beyond the proficiency of the American intelligence effort at providing timely tactical data was the view this effort had of the Japanese Navy and its tactics. The quality of this effort is questionable since it is apparent the American commander had a poor understanding of how his Japanese counterpart thought and how he saw the conduct of a successful engagement.

Three key factors contributed to American tactical naval intelligence. First, the American control of the air and the ability to integrate air reconnaissance into the cruiser-destroyer task group. The "real time" information provided by land based patrol aircraft in the later battles of the campaign allowed American commanders the opportunity to position forces for engagement. A second key input to the American intelligence system supporting the American Solomons task groups was a network of "coastwatchers," usually Australian or New Zealand civilians who had lived in the Solomons prior to the war and stubbornly remained on the islands to assist the Allies in monitoring Japanese movements [Ref. 12: p. 11]. Often surrounded by Japanese troops and dependent on natives for aid in the face of extreme danger, coastwatchers helped track the "Tokyo Express" well

with vital air support. The Japanese realized their disadvantage and structured the campaign accordingly. Support of air cover would be weakened. Making this decision viable was the proficiency the Japanese had developed in night operations and surface torpedo attacks.

Japanese night tactics, conceived well before the war and rooted in a tradition that had started with the modern Japanese Navy during the Russo-Japanese War, were seen by the Japanese as a counter to the inferiority they saw imposed upon them by the interwar treaties [Ref. 59: p. 61]. The Japanese had prepared well for the employment of this offset. They had developed a torpedo with over three times the range of those on American ships, had developed superior optics which allowed visual detection at ranges rivaling radar in the Solomons, and they had disciplined their forces to strike in a coordinated attack that employed massed torpedoes before gunfire [Ref. 2: p. 60]. Such tactics trumped the American concept of long range gunnery duel. American employment of cruiser-destroyer groups in the Solomons remained based on gunnery tactics. Units were deployed in single columns with destroyers in the van and rear of the cruisers in the formation. This formation, though optimal for massive gunfire from the cruisers and maintaining positive control of this miniature "battle line" of pick-up forces, was a target tailor-made for the Japanese who were well aware of the American emphasis

enough to ensure interception at the end of their run down the slot.³² The final key element in American intelligence in the Solomons was cryptanalysis, the American ability to break operation Japanese naval messages via the MAGIC system. MAGIC has become a recent source for historians and the declassification of MAGIC has done much to place American and Japanese actions in the Pacific war into perspective.

In the Solomons, MAGIC performance was not consistent and merits closer examination for the shortcomings it reveals in American intelligence support for the Solomons naval forces. A similar examination is needed for American knowledge of Japanese weapons and tactics, the sort of background data that falls into the category of technical intelligence.

1. MAGIC in the Solomons Engagements

Recent accounts of the war have emphasized the influence of MAGIC in predicting Japanese moves in the Pacific and several key battles, particularly the Battle of Midway. As pointed out in Chapter II, MAGIC information made American naval leaders aware of the Japanese airfield on Guadalcanal, setting the Solomons campaign in motion. In seeing MAGIC within the framework of individual engagements, a different perspective emerges. In the days

³²The "Slot" was the narrow straight that divided the Solomons chain and had to be navigated in passage from the northern to southern Solomons. See the chart of the area in Appendix A.

following the initial assaults, MAGIC provided little specific data for the Americans although general movements of Japanese cruiser-destroyer forces were evident within the Japanese Eighth Fleet area after the WATCHTOWER landings. For example, the messages that would have foretold the attack at Savo on August 9 were not deciphered until August 23 . [Ref. 54: p. 121]. The spottiness of official records indicates that similar problems continued to plague American efforts throughout the campaign, although MAGIC information predicted five "Tokyo Express" runs in January and early February [Ref. 55] [Ref. 56].

The noticeably better intelligence efforts of the spring and summer of 1943 are evidenced by American interception of the Japanese task groups as outlined in Appendix A. It is not evident that MAGIC was solely responsible for these successes since Halsey's SOPAC headquarters aggregated all intelligence reports- MAGIC from Nimitz, plus air and coastwatcher reports- and simply alerted American task group commanders in the Solomons. The overall integration of MAGIC cryptanalysis into the American surface task group tactical picture seems to have been a clumsy process. The majority of the pertinent analysis was concentrated on Japanese communications at Rabaul which gave CINCPAC a reasonable idea of "Tokyo Express" runs [Ref. 57: p. 135]. The handling of the information beyond this point was not uniformly efficient. The security level of the MAGIC

information was such that only a few select officers were allowed to handle it and these officers were posted only to major staffs [Ref. 58]. Moreover, the filtering of the evaluated information to surface combatant task group commanders at a lower level was the result of a process that was not done uniformly well [Ref. 57].

The disjoint application of MAGIC data seems to have been a particular problem for the cruiser-destroyer forces operating in the Solomons. It is evident that the air and torpedo boat ("PT") forces in the Solomons made better use of the MAGIC data on Japanese movements [Ref. 55] as did American submarine forces which were centrally controlled from Pearl Harbor [Ref. 57: passim]. The reasons for the failure of similar support in the case of the surface task groups may lie in the nature of the command structure of the groups themselves. The staffs of the cruiser-destroyer task groups were small and required outside assistance in areas such as intelligence. While most American cruisers of the time were capable of performing duties as a flagship, they lacked the communications equipment and C² resources of ships that usually embarked larger staffs such as battle-ships and carriers. These constraints made American cruiser-destroyer commanders dependent upon intelligence support from outside sources. The fused information passed to the commander of the task group would be a mixture of

synthesized data of varied quality which the commander had little recourse but to believe, since he was unable to evaluate raw inputs such as MAGIC.

2. Technical Intelligence

Failure of American technical intelligence relative to the Solomons was most damaging in two areas. First was the American failure to understand the Japanese night tactics or predict how the Japanese would approach surface combatant battles at night. A closely related but more specific shortcoming in American intelligence was the absence of technical data on the Japanese "Long Lance" torpedo.

The failure of the American Navy to understand Japanese tactics was part of a larger underestimation of the Japanese Navy. Although war with Japan was generally expected, the American Navy did not make itself aware of how the Japanese naval hierarchy thought or operated. At the beginning of the war, the United States Navy had fewer than forty officers who understood the Japanese language well enough to read original Japanese Navy publications [Ref. 57: p. 23]. This ignorance led to misperceptions that were largely underestimations of Japanese ability and intentions. The Japanese were able to enhance these misperceptions to a certain extent. Under the guise of wartime security due to its involvement in China, the Japanese Navy conducted a successful campaign to mask the technical details concerning

its ship construction and exercises that might have provided a clue to their tactics [Ref. 57: p. 23].

The most glaring failure of American technical intelligence on the Japanese Navy involved the "Long Lance." According to the data available to American commanders at the time of the Solomons campaign, the weapon did not exist. Contemporary American intelligence publications assumed that the Japanese surface launched torpedo was a 21 inch diameter weapon similar to the American torpedo [Ref. 16]. With such an assumption came a belief on the part of American commanders that the Japanese torpedo was similar to their own. The cruiser-destroyer commanders during the later stages of the Solomons campaign remained skeptical of the Japanese torpedo capability even after one had been recovered in 1943. In particular RADM Ainsworth regarded reports of the "Long Lance's" potential as unproven rumor. In a triumph of security the Japanese had developed the large torpedo ten years earlier [Ref. 19: pp. 195-196].

Although the Japanese attempted to mask their order of battle and ship construction details during the prewar years, the small effort at resolving these uncertainties is strange in light of the otherwise thorough plans to fight a war in the Pacific; unheeded by the American Navy was Sun Tzu's ancient dictum concerning knowledge of the enemy. The Japanese seem to have done somewhat better at this, with

many of their senior officers having visited the United States, although it is apparent that the Japanese naval officer had some similar misconceptions about the American Navy and the American nation in general [Ref. 3: p. 282].

The roots of Japanese naval strategy and tactics were well established in the history of the Japanese Navy, particularly during the Russo-Japanese war. The concepts of surprise attack and reliance on the torpedo were developed by the Japanese in this conflict and did not change during World War II. Central to the American failure to understand how the Japanese would fight in the Solomons was a tendency for the American Navy to cast the Japanese Navy in its own image.

C. THE SUPERIORITY OF JAPANESE TACTICS

The unquestionable superiority of Japanese night torpedo tactics employed in the Solomons dominated the campaign, influencing far more than the outcomes of warship engagements alone. As has been pointed out, the campaign forced both sides to fight on something of a "least cost" basis; only the bare minimum of naval assets could be spared for the Solomons, a constraint that limited the naval forces involved on both sides to cruiser-destroyer task forces. The Americans with strong logistic support and local air superiority, held a significant advantage by maintaining task groups within the Solomon area and covering these forces

on gunnery. Approaching in loose lines abreast, Japanese task groups approached American groups, fired their "Long Lance" Torpedoes in a coordinated salvo and were free to withdraw rapidly. The Japanese attack was the antithesis of the American concept of engagement; gunfire was to be avoided in order to cover the firing of torpedoes and the duel was to be fought well within the envelope of effective gunfire instead of at its maximum effective range. The Japanese would not have been surprised at the fire effect tables of the Newport games for they apparently held similar beliefs. The close-in night attack was the perfect response to American tactical doctrine.

Most accounts of the Solomons disparage not only American tactics in the Solomons but the slowness with which these tactics were altered in response to Japanese success. This criticism overlooks the difficulty with which American tactical doctrine could have been changed. The American naval commanders' tactical focus on the gun was an ingrained notion that was only gradually changed by the Solomons experience. Frequent shifts of commanders and the virtual parade of new ships into the SOPAC task groups was a necessity of war that slowed the development of a solid base of experience in the Solomons.

American tactical doctrine, as the descriptions of Appendix A indicate, for surface combatants, did shift

between the fall of 1942 and the following spring. By the next major update of American formal doctrine in 1944, the experience of the Solomons was reflected, as was the success both the American and Japanese forces had enjoyed in the Solomons. Radar was singled out as a primary means for long range detection, and the value of surprise was emphasized. So too was the desirability of utilizing torpedoes before opening fire with guns. The danger of such attacks and the resulting confusion from close surface engagements were emphasized, obvious lessons from the Solomons. Moreover, it can be argued that Japanese tactics showed an even greater inertia and demonstrated their shortcomings in those situations where battle was joined on American terms [Ref. 60: Chapter 8].

By the final battles of the campaign, American surface combatant tactics had matured. The use of shore based logistics allowed forces to remain in the vicinity they would be needed while these shore facilities offered the type of intelligence support that was unavailable on the flagships of the task groups. Shore based air power had been integrated with the cruiser-destroyer task groups, offering them protection during the day, timely intelligence on the approach to battle, and offensive support through spotting and bombing. The use of PTs had been also proven feasible adding another asset to the surface task group. Interestingly, the noticeable shift in American tactics was not a radical departure

from the prewar doctrines and their theory. The correct use of long range gunnery was finally developed by Merrill. Most of the successful American destroyer attacks resulted from the use of a destroyer attack element not unlike the schema of Figure 3.2. Most important to the eventual success of American surface combatants was the freedom each ship type was allowed in employing its offensive potential against the enemy and the ability to execute the complex maneuvers this freedom dictated before closing Japanese formations. Radar and voice radio (the "TBS")³³ combined with better signaling made this possible after a painful learning process in the first half of the campaign.

D. THE TORPEDO VERSUS THE GUN

Representing the different approach each navy took towards tactics in the Solomons was the opposite emphasis put on the gun and the torpedo. The theoretical nature of the gun versus torpedo question was the subject of extensive prewar simulation, deliberation, and debate. As previous chapters have pointed out, the test of theory in the Solomons yielded results that were not consistent with American predictions.

³³"Talk Between Ships," The American tactical voice radio system.

Overall, the Japanese lost or had 29 ships severely damaged in the Solomons battles looked at in Appendix A while the American tally was 32 ships. The data from the Solomons battles reveals that 62.5% of the significant damage to American ships was done by Japanese torpedoes while a corresponding 72.5% of the damage inflicted on the Japanese was done by American guns. Paralleling these facts are the respective performance figures for the gun and torpedo as used by each side. The American gun seems to have outshot the Japanese with gun PHs³⁴ 0.785 and 0.384, respectively. The complement of these numbers, the PH of each side's torpedoes, emphasizes the Japanese reliance on the torpedo and the American faith in gunfire. Evaluating the overall effectiveness of each weapon requires a selective examination of how each was employed and how successful each was.

1. Range and Its Importance

Comparison of the tactics of the Solomons must begin with the range of engagement for each battle. Range was important in American doctrine since engagement at sufficiently long range with gunfire would ideally thwart torpedo attacks. Virtually all of the Solomons clashes were done within the effective range of both the torpedo and the gun since both

³⁴Probability of Hit, the chance of either sinking a target or damaging it badly enough to influence its performance in the battle.

sides were forced to commit themselves to battle at relatively close ranges. The average range American commanders opened gunfire was 4.2 nm; that for the Japanese 4.5. This range, less than half of what prewar American doctrine considered a "moderate" range,³⁵ robbed American commanders of what they considered their primary tactical advantage. American tactical plans for the torpedo were also subverted. The Japanese undertook attacks with their torpedoes at a range of 4.3 nm, the American at a range of 3.5. The Japanese were equipped with a much longer ranged torpedo, the "Long Lance." The American attacks at such long range are surprising since the American doctrine had considered the optimal range for torpedo attack to be around 4000 yards. Effective range³⁶ for Japanese gunfire and torpedoes was 5.8 and 3.6 nm, respectively those for American guns and torpedoes 4.6 and 2.8, respectively.

These averages can only be utilized for broad analysis since the battles in the Solomons were marked by wide variances from the mean. However, there are some observations consistent with these data points that are surprising in light of the doctrine of both sides at the time. The most significant is that even with radar control the gun

³⁵See Chapter III.

³⁶Here defined as the range at which damage was actually inflicted on opposing ships.

did not enjoy a clear range advantage over the torpedo in battle. The engagements of the Solomons were fought within an envelope where both weapons were effective. This fact alone was a tactical disadvantage to the American forces who based their tactics on a fight at much longer range. The data also suggests that American torpedo fire was effective at longer ranges than prewar doctrine would have led American commanders to believe. Overshadowing this is the obvious superiority of Japanese torpedo range, a capability that allowed the Japanese to conduct torpedo attacks at approximately the same effective range as American gunfire.

Data from the Solomons battles neither vindicates nor condemns the American doctrine of long range gunnery. There is a sense that American forces did better when allowed to utilize their gunnery tactics at long range and before the Japanese opened fire. The battleship action of the Naval Battle of Guadalcanal and the second phase of the Battle of Kula Gulf are examples of this. In these clashes, American gunfire was effective at relatively long range, as it was at Horaniu and Cape St. George. American gunnery tactics were dependent upon good visibility and "visibility" good enough to successfully employ these tactics only became available as radar was refined and better integrated into the C² structure of the American task groups. As to the central question of whether prewar plans for long range gunnery were feasible, apparently not. In only 14% of the

of the gun engagements were ranges over 15,000 yards employed. In these, the gun did little damage even with radar control. At Empress August Bay, where the cruisers stood off and fired at 16,000 yards, four ships achieved an estimated 20 hits for over 4,600 rounds expended [Ref. 19: p. 321].

2. The Torpedo: THE Decisive Weapon?

The previous discussion indicates that the Japanese tactical concept for night surface engagements was a well conceived counter to American tactical plans for surface engagements. In measuring the effectiveness of the opposing tactical concepts, a review of actual damage data both supports and criticizes the tactics of each side.

A basic question in considering the tactics of the Solomons and the outcomes of battles is which weapon--the gun or the torpedo--did the most damage. On an aggregate level, the total damage among both sides is about evenly split; 46% of the total damage to ships from both sides was caused by torpedo hits, the remainder by gunfire. The gun, with a slight majority of damage to its credit seems to have held its place as the traditional instrument of tactical naval power. Considering the damage from each side's point of view, the particular emphasis of each navy is evident. On the American side, 62.5% of the damage to American ships was caused by Japanese torpedoes. Conversely, only 27.5% of the damage caused by the Americans to Japanese ships was

done by torpedoes and most of this was in the battles of 1943 when American tactics took a decided turn towards the more aggressive use of destroyers.

Americans, once committed to a torpedo attack, were surprisingly slightly superior to the Japanese. The overall American PH³⁷ of American attacks was .076 while that of the Japanese forces in the Solomons was .063. Additionally, American torpedoes had a 100% PK³⁸ against the Japanese as opposed to a Japanese PK of 54%. American torpedo attacks were perhaps individually better than Japanese, but they were more sparsely employed. The aggregate data suggests that the Japanese chance of sinking an opponent with a torpedo attack was about the same as the chance of doing the same with gunfire--.52. American radar supported gunnery should have provided a more conclusive advantage but American tactical success is obvious in those cases where torpedo fire was used to augment gunfire. This combination was only gradually adopted in 1943. Conversely, the Japanese consistently employed two weapons with a fifty percent chance of killing an opponent.

³⁷Probability of Hit.

³⁸Probability of Kill--the chance of actually sinking a target hit.

Indicated by the data is an apparent superiority of American forces to survive a Japanese torpedo attack. Perhaps American shipboard damage control was better, a difficult hypothesis to test. As the games suggested, American ships were assumed more survivable than Japanese and this belief is consistent with data from the Solomons. It appears that the Japanese crews were more willing to abandon a severely damaged ship while American crews were tenacious in their efforts to keep ships afloat. The American advantage in daylight aircover and advance basing may have contributed to this. Japanese commanders realized that daylight would bring American air attacks with Japanese bases at a considerable distance to coax a severely damaged ship. As pointed out in Chapter II, wounded American ships enjoyed the opposite of this situation with well protected support at Tulagi.

A final appraisal of whether guns or torpedoes were more decisive in the Solomons naval engagements should probe the immediate effects each weapon had on the actual course of the battles. While the gun did more damage overall, the introduction of the torpedo into a battle stopped whatever target it hit in a single blow instead of gradually wearing away firepower. Therefore the torpedo was a dominant factor in individual engagements. Supporting this observation is the spectacular results that timely torpedo attacks gained

for both sides in battles where they were most effectively used. Successes such as the Japanese experienced at Savo and the Americans enjoyed at Vella Gulf proved the torpedo's potential to dominate naval battles in proportions greater than the gun.

E. THE INFLUENCE OF TIME AND EXPERIENCE

Several factors were essential to this improved performance of American cruiser-destroyer forces in the later Solomons battles. American commanders had finally learned to employ radar effectively, not simply understanding the technical limitations and capabilities of their systems, but just as importantly integrating radar data into the tactical picture and reacting swiftly to this data. With the advantages of early radar detection and the flexibility it offered, American surface commanders developed bold new tactical plans that enhanced their offensive capabilities. In 1943, American destroyers were allowed to operate independently as offensive consorts for cruiser groups, a scheme made possible by the time and accurate tactical picture radar furnished.

The data clearly indicates that the later battles were longer. The engagements of 1942 averaged 54 minutes while those of 1943 were 106 minutes in length. That each side managed to accomplish less in this additional time is perhaps the clearest indicator of how the battles shifted

in character. In the 1942 battles, American forces averaged 4.8 destructive acts as defined in Appendix A. In the 1943 battles this average was 4.25, essentially the same. In contrast, the Japanese forces fighting the 1942 battles averaged 6.5 destructive or damage causing acts per battle but this average was virtually halved to 3.5 in the 1943 battles. As the battles got longer, the Japanese were able to less damage to American forces while the Americans, with better tactics and use of radar, seemed to have maintained their same relative effectiveness. Part of this shift is attributable to the strategic missions each force found itself doing in the later battles. While the Japanese task groups were almost always tied to a mission of either landing or evacuating troops, the American task groups had no other mission than the interdiction of Japanese efforts. This single purpose allowed American commanders unimpeded offensive action while the Japanese were constrained to courses of action that exposed their forces to attack while limiting their ability to counterattack.

F. FIRST MOVES AND THEIR IMPORTANCE

Naval engagements during the Solomons campaign were often characterized by abrupt, almost simultaneous action on the part of both sides. A general sense emerges that the side which acted first gained the tactical advantage. This was particularly true in the American case where tactical

doctrine was based on long range gun engagement, and radar should have provided an advantage in detection. However as the previous paragraphs have indicated, American attempts at long range engagements were frustrated by inadequate command and control. In several battles, such as Cape Esperance and the cruiser action at the Naval Battle of Guadalcanal, commanders on both sides were startled by the pace of events and forced to open fire on short notice.

Judging which side benefited most from the initiative in the Solomons begins with an evaluation of initial actions taken by commanders. Four factors are considered here. These factors--range at opening of the engagement, ratio of opposing forces, which side held contact with the enemy first, and which side opened fire first--are fairly evenly distributed among the fourteen cases examined by this work. The effects of range on damage caused and suffered are discussed above and it is sufficient to reemphasize that the gunfire ranges typical of the Solomons engagements were far short of what the Americans had considered optimal in pre-war doctrine, but were well suited to the Japanese. The Japanese relied on a barrage of torpedoes launched at as close a range as possible and coupled with less sophisticated gunfire control in the form of simple optical gun laying. It was obviously in Japanese interests to hold fire with guns until at the closest range possible. Complementing

this tactic was the need for quick action once contact was made. Surprisingly, the Japanese held first contact with the enemy in exactly fifty percent of the battles studied and opened fire first with both guns and torpedoes in 43% of these engagements.³⁹ In terms of strength, the American forces held the advantage in gunpower in 8 of the fourteen engagements.

In viewing how these basic details influenced the tactical performance of opposing surface combatant task groups in the Solomons, it is necessary to evaluate the engagements in terms of these factors most associated with either damage done or received.

1. The Influence of First Contact in an Engagement

Despite the advantage of radar, American task group commanders only managed to track opposing Japanese forces earlier in half of the engagements considered. No firm correlation can be made with first sighting an enemy and conducting a successful battle. The Japanese did both at Savo and scored an impressive tactical victory, yet failed to capitalize on early detection during the battleship engagement at the Naval Battle of Guadalcanal. On the

³⁹As specified in Appendix A, "contact" with the enemy in the data base examined means that the commander of the task group held his opponent's force with shipboard sensors (radar, eyes, direction finding equipment) and was able to both positively identify the opponents force and utilize the information in making a tactical decision.

American side, first detection did not help the Americans avert the embarrassment of Tassafaronga nor did it seriously influence the prosecution of Japanese forces at Kula Gulf.

Rough statistics add insight to what initial detection did mean in the Solomons. In term of ships sunk or damaged, the Japanese suffered an average loss of 2.14 ships per battle where the American force had an early detection. In those battles where the Japanese held first contact, they had an average of 1.8 ships sunk or damaged. Since the overwhelming majority of missions assigned to Japanese task groups in the Solomons did not directly call for the engagement of American combatant forces, the Japanese often used their initial detection to avoid damage. This was particularly true in the battles of 1943 when attrition of ships was a serious concern for the Japanese. Balancing out the Japanese losses was the damage Americans suffered when the Japanese held first contact. In such instances, the Americans averaged 3.16 ships sunk or damaged per battle. When holding first contact the Americans lost substantially the same number of ships, 3.25 per battle; American naval forces in the Solomons suffered approximately the same losses at the hands of the Japanese regardless of who saw the opposing side first. Again the mission may account for the damage: in contrast to the Japanese, American forces were almost always assigned the task of engaging the enemy.

However, American commanders failed to take full advantage of early detection on several occasions such as Vella Gulf and Cape St. George.

It is apparent that early detection can be most associated with inflicting damage. The Japanese clearly lost more ships in those battles where they were seen first, but first contact did little to protect American forces. Throughout the Solomons, American task groups sustained relatively constant losses per battle regardless of first contact. For the Americans initial contact with the Japanese resulted in more damage done, but with the prospects for receiving the same.

2. The Effect of Opening the Engagement on Its Outcome

It is natural to assume that the timely opening of fire would have had a significant effect on the battles fought during the Solomons. A key question is whether or not opening fire first could offset the effects of being "out gunned" in an engagement. In eight of the fourteen cases studied the side having the advantage in gun ratio caused more damage with guns regardless of which side opened fire first. However, when outgunned and shooting first, the American side caused more gun damage in two out of three cases while the Japanese were never able to do more damage by shooting first when out gunned. Patterns beyond these general results are not consistent when total battle results

are considered. In those battles where the Japanese opened fire with guns first, the Americans suffered 1.83 ships hit or seriously damaged while 2.2 Japanese ships received similar damage in these same battles. When the Americans opened fire first, they suffered 2.8 ships sunk or damaged per battle while the Japanese only had .75 ships sunk or damaged. No positive correlation can be made, but it is evident that opening fire with guns first in the Solomons did little to minimize losses nor did it clearly lead to larger gains against the enemy force. We know from the narratives of the battles that opening gunfire in column formation invited a devastating torpedo counterattack, yet failed to deter the launch of torpedoes in great numbers.

The effectiveness of opening fire with torpedoes first, shooting first and causing damage seem to be directly related and reflect the Japanese doctrine of utilizing the torpedo as the centerpiece of a sharp initial blow. When Japanese forces opened fire with torpedoes first, the resulting damage to American ships from torpedoes was an average of 2.0 ships per battle sunk or damaged. When the American forces took the initiative with the torpedo attack, Japanese losses were 1.14 ships per battle. Perhaps more illuminating are the actual PHs represented by these figures. The Japanese scored an overall PH on American forces of 9.8 percent when firing torpedoes first. American forces in similar circumstances averaged a slightly higher 11.5%

chance of hitting a Japanese ship with an opening torpedo salvo. When the advantage of the first salvo was lost, the corresponding performance for the Americans was a dismal zero while the Japanese managed to attain a 5% PH when firing second in a battle. In those battles where the Americans took the initiative in firing torpedoes, the Japanese still managed to sink or damage an average of two American ships. American task groups scored no hits on Japanese forces in those battles where they did not fire torpedoes first.

Aggregate battle results parallel these specific cases. In those battles where they took the initiative of first torpedo launch, the Japanese damaged or sank an average of 2.4 American ships while accepting similar damage of 1.2 ships per battle. American forces firing torpedoes first sank or damaged an average of 1.37 Japanese ships per battle and lost only 0.6 ships per engagement. The first firing of torpedoes in the naval actions of the Solomons was relatively more decisive in terms of the battle's outcome.

In summarizing the effectiveness of both gun and torpedo, the ratio of gun power overshadowed first use; the gun battle went to the side with the heavier fire power. Conversely, the torpedo was most effective when employed first, and yielded greater damage in the ratio of 2:1.

G. PATTERNS OF DEFEAT: WHO WON THE BATTLES?

A final question in any analysis of combat is that of who won. While establishing the victor in any engagement can be difficult, this is particularly true of the naval actions in the Solomons. On the tactical level, both sides suffered almost identical losses in the campaign, however it seems clear that the American naval forces accomplished their mission while the Japanese failed; American forces enjoyed the sea control necessary to support the campaign ashore while the Japanese Navy failed its assigned mission of supporting Japanese troops.

In considering how individual naval engagements served the strategic objectives of the Solomons campaign, a preliminary categorization of naval missions is necessary. For both navies and their surface task groups in the Solomons, two general missions were possible. The first was interdiction or opposition of landing operations or other operations ashore. The second was the inverse of this tasking, the support of own forces in their attempts to either land or conduct operations "on the beach." Assignment to either one of these tasks was indicative of the progress of the campaign; American forces at Guadalcanal began by supporting operations ashore while the initial Japanese attack at Savo was clearly in support of the interdiction mission. As the American forces on the ground made advances, the Japanese

Eighth Fleet found itself resupplying Japanese forces while attempting to bombard American troops. This pattern continued throughout the campaign.

Aggregating assignment to these two strategic missions across the data field of the eleven battles looked at in this work,⁴⁰ it can be seen that the American surface forces in the Solomons were assigned a total of eleven missions, one per battle. The Japanese forces were assigned a total of twelve separate missions in the same battles. Japanese task groups were assigned concurrent missions of both support and interdiction of operations ashore at Cape Esperance and the Naval Battle of Guadalcanal. In overall results, the American task groups were successful in six cases, or 54.5% of the time. The Japanese, in reaching their objectives in five instances, had a success rate of 41.6%. Intuitively these averages seem low, particularly for the Americans who were successful in the campaign. Resolving this apparent paradox requires a further breakdown of which of the two general missions were assigned at what times and how well the opposing task groups did.

In interdicting enemy landings or operations ashore, American naval forces in the Solomons were successful in 3 of 8 cases. The Japanese were successful in none of their

⁴⁰Although the automated data base dealt with 14 cases, the base represents only 11 separate battles.

four attempts. American task groups were assigned the mission of supporting landings or operations ashore 3 times in the eleven battles examined and were successful in each attempt. Similar Japanese efforts were successful 5 out of 9 times.

The significance of the tactical actions of each battle emerges when considered in light of the importance of the more general missions each force was supporting. In no instance were the Japanese successful at interdicting American forces ashore while American efforts at supporting land operations were successful in all three attempts. In terms of actual battles, the battles of Savo and Empress August Bay both reflect mission success despite the dramatically opposite American tactical performance. The Solomons campaign was an American offensive and although the three successful instances of American surface task groups supporting operations ashore seems a small sample to base conclusions upon, it is representative of how the campaign went for the American side: the advance up the Solomons succeeded as planned, with American naval forces providing the support for the advance when needed. Japanese naval efforts at supporting their own forces ashore were successful only 55% of the time, committing the Japanese Army to gradual retreat before the American forces.

The Japanese Navy was burdened by the need to both interdict American operations ashore as well as conduct its own.

landings. It was forced to do both without air support, under the cover of night and with combatant forces that were expected to both fight American naval forces and land supplies and men. Despite any tactical successes in battle against opposing American task groups, the Japanese success rate at the primary mission was not good enough to win the campaign ashore. Just as important was the Japanese inability to stop American landings and movements ashore. In the final analysis, the American task groups were able to perform their primary strategic mission at the critical times while the Japanese were frustrated in similar efforts. The tactical record indicates this as well. Cape Esperance, the Naval Battle of Guadalcanal, Vella Gulf, and Empress August Bay were tactical victories for American forces that prevented the Japanese from accomplishing their primary mission when such accomplishment was essential to the Japanese effort.

VI. APPLYING THE LESSONS OF THE SOLOMONS TODAY:
PARADIGMS AND WARNINGS

A. THE SOLOMONS AND MODERN STRATEGY

Because of the reliance the United States still has on the world's oceans, it can be argued that maritime theaters and littoral strategy cannot be allowed to take a second place to a continental strategy. Today's focus for a war-fighting strategy is on Europe much as it was during the opening months of World War II. Just as the United States found it necessary to follow a strategy in the Pacific that was distinct from the major European effort, so should modern strategic plans recognize the potential for conflict in other areas of the world. The Solomons was a struggle for a maritime theater and reflects a capability that must be accounted for in contemporary American strategy, making the Solomons campaign relevant today to today's strategic paradigms.

1. Conflict Escalation and the Solomons: A Viable Concept?

The most obvious of today's strategic models suggested by the Solomons campaign is that of the off-axis escalation. This concept, more commonly referred to as "horizontal escalation," theorizes that the ability to intensify a conflict on a front outside the primary theater can widen a conflict to the point that it is too costly

for the enemy to pursue. Horizontal escalation remains a principal role for the American Navy with today's emphasis on action against the Soviet Union in areas off the European Central Front. Much as in the Solomons in 1942, the Navy has decided to utilize surface combatant task groups as a primary vehicle for such strategy. The rationale is strikingly similar to that of 1942. Just as then, the use of surface combatant forces is considered an alternative to employment of scarcer and more valuable carrier forces.

Today's commitment to such a strategy should be done with the Solomons in mind. The most significant lesson is that the "low priced" campaign is relatively expensive in terms of forces committed. The Solomons was a campaign of naval attrition which the United States was able to win on the basis of sheer numbers. The cost in surface combatants was high, yet the expenditure of these forces was seen as preferable to risking the more valuable carrier forces. Utilizing similar forces in any modern off-axis campaign should be done with the recognition that today's surface combatant forces are as vulnerable as their predecessors of the last war. In a limited conflict this is a questionable assumption since the American industrial base will not be committed to the levels of warship production it was in 1942.

Within the context of the war, the most valuable gain by Americans was the destruction of Japanese naval air and surface forces, and the campaign aided the war effort most by attriting the Imperial Japanese Navy. In terms of strategic maneuver, the campaign did little for the American position in the Pacific. A glance at a map of the Pacific at the campaign's conclusion in November 1943 reveals that the American position in the Solomons was exposed on the northern flank, an advantage that an enemy stronger than Japan could have taken advantage of. The original Pacific strategy of seizing the central Pacific island was still necessary despite the taking of the Solomons.

These considerations lead to several observations about the strategy of horizontal or off-axis escalation. First, regardless of what tactical success such operations achieve, they must be eventually consolidated. "Follow-up actions" may be costly in themselves and must be considered as part of the price for attempting to employ a horizontal escalation strategy.

Horizontal escalation is an expensive strategy even though it may be relegated to forces of less relative worth. Some current military thinking has utilized the categories of "maneuver" and "attrition" to classify two styles of warfare: the dichotomy of "inexpensive" off-axis campaigns, as exemplified by the Solomons, is that the use

of what appears to be maneuver on the enemy's flank is only productive if it can significantly attrite his forces. American success in the Solomons came from the "attrition" aspect of the campaign. The Japanese forces engaged in the Solomons were gradually whittled away in pursuit of strategic goals that many Japanese strategists realized were dubious.

2. The Solomons as A Naval Campaign

The Solomon Islands represented a maritime theater where naval power was utilized to project land power which in turn furnished the air power necessary to extend control of the sea. Necessity, as described in Chapter II, dictated this symbiotic strategy: sea power was needed to sustain the land campaign, air power was needed to control the seas by the Americans, the only avenue open for air power was land based air that required projection of force ashore. The interactive strategy worked, and a consideration of present amphibious forces, surface combatant forces, and the strategy to utilize both in situations similar to the Solomons suggests that the lessons of the campaign are applicable today.

Many of the same general characteristics of our naval forces remain today as they were in 1942 despite advances in technology. Surface combatant forces will find air support as necessary as those of World War II did. The ability to place troops ashore and establish air power is seldom considered by the American Navy of today

which presupposes that air power for naval actions must be carrier based. The capability to forward base air power has withered in today's United States Navy, as has the ability to set up support bases as utilized in the Solomons. The erosion of these concepts limits the American ability to exert influence in remote littoral regions of the world.

B. ON THE STRUCTURING OF NAVAL FORCES

1. Matching Forces and Operational Concept

A lesson the American Navy learned at great expense in the Solomons was that naval forces must be designed around a sound concept of operations and then employed in a consistent manner within this concept. Initial American naval operations in the Solomons attempted to imitate the battle fleet of the interwar period. The first cruiser-destroyer task groups engaged in the campaign seemed to be microcosms of the battle line with the cruiser taking the battleship's central role and destroyers acting as escorts and pickets. The orderly paradigm did not work: the cruiser's guns were unable to deliver the destructive power expected of them, the destroyer was hampered in the employment of its weapons, and the control needed to execute the coordination of the two ship types was rarely achieved. The Japanese concept of operations was markedly different. The Japanese surface combatant force was seen as a holistically offensive unit. Each ship had the primary weapon, the torpedo, and

was expected to contribute to the single purpose of delivering lethal doses of it to the enemy.

Sir Walter Scott tells of the meeting of Richard the Lionhearted and the Moslem leader Saladin. As the two rivals discussed their respective weapons, Richard displayed the brute strength of the English broadsword by crushing a log with a single stroke. Saladin admitted that he was a weak man by comparison and his weapon was a smaller scimitar-type sword that had no chance of duplicating Richard's feat. But, he asked, could the broadsword destroy a satin pillow? Of course not, scoffed the English: no sword could damage such a soft target. At that Saladin drew his sword and split the pillow with a single stroke of the smaller but sharper blade. The legend seems a fitting parable for the Solomons and today. The Japanese admitted that their overall naval strength was inferior to the United States Navy and they sought to effectively organize what assets they had into an effective fighting force. Their solution was the torpedo employed at close range, by a surface combatant force that, like Saladin, realized that the deep cut was as damaging as the pounding blow. The smaller navies of today possess similar tactical capabilities in modern anti ship missiles which seem to parallel the Japanese torpedo's ability to deliver damage in high proportions.

2. Combined Operations and Force Structure

The Japanese Navy lacked a significant "blue water" amphibious capability and their experience shows that dedicated shipping designed to conduct landing operations under hostile conditions has no substitute. The inability to support the campaign ashore in the face of similar American efforts eventually cost the Japanese the entire campaign.

The specific reason for Japanese failure at reinforcement of the Solomons was the lack of sufficient forces to complete the task. Underlying this lack was a more general failing of strategy. It is apparent that the lack of unity within the Japanese military hierarchy left amphibious operations in a strategic "no man's land," the concern of neither the Navy, whose support was needed, nor the Army who did not appreciate the interrelation of sea control and success in a campaign such as the Solomons. The failure to integrate forces and strategy on the highest level led to poor management of those forces that were available. Overburdened Japanese cruiser/destroyer task groups became ineffective at both interdicting American forces and they were concurrently unsuccessful at protecting and supporting their own forces ashore. Lack of strategic priorities for the employment of Japanese forces was compounded by the assignment of forces to roles they were unsuited for.

3. Arms Control on the Building of Weapons Systems

Prewar efforts to limit international naval strength through arms control efforts may hold several modern lessons. The irony of these efforts is that the prewar naval treaties did not control the intended armament programs, but instead redirected them. The Americans saw the naval treaties as an opportunity to minimize the construction of naval arms; the Japanese saw the limitations as the motivation to build a new generation of warships, a generation that, like Saladin's sword, compensated for brute strength with the ability to do incisive damage.

The failure of the treaties has been the subject of extensive research and discussion and is not the principal issue here. What is germane is the impact the treaties had on the forces that were employed in the Solomons. The treaty influences in this area were largely technical: what size the ships were, what armament they carried, how many were available at the commencement of the campaign. However, the most significant impact of the treaties, was in the direction it gave the naval weapons building programs of each nation. For the Japanese, the treaties were both the motivation and the opportunity to redesign their surface combatant forces with new and powerful systems. It can be inferred that arms control treaties are as likely to generate new weapons as limit older ones.

C. THEORIES OF NAVAL COMBAT AND THE SOLOMONS

1. The Influence of Tactical Tradition

The naval battles of the Solomons were marked by two contrasting approaches to naval tactics which are not apparent from aggregate statistics. Both the experience of previous wars and the interwar treaties led the American Navy to rely on gunpower as the centerpiece of tactical thought. The Japanese considered the limitations on their fleet and, remembering their former successes in the Russo-Japanese War, concluded that the torpedo could offset American superiority in gunpower. In its approach to tactics the American Navy was confident of the gun, dubious of the torpedo, and determined to fight on its own terms. These terms included the gradual destruction of the enemy at long range with coordinated gunfire. The opposing Japanese view saw the engagement as the sudden delivery of fire power, delivered with precise timing. A consideration of the results from individual battles in the Solomons indicates that the side able to impress its unique concept of battle on the other fared better in the engagement.

It seems apparent that the Japanese understood the American concept far better than the Americans understood Japanese tactics. At the center of the misunderstanding was the failure of American tactical thought to realize that decisiveness in combat rests in the weapon that most

effectively eliminates an opposing ship's ability to return damage. The gun gradually wore away the opponent's ability to fight, the torpedo destroyed his ability at a stroke.

The tactics of both the Americans and Japanese were strongly influenced by previous trends and modern tactics reflect this same reliance on tradition. The United States surface fleet remains centered around the carrier, a concept that is frequently compared to the pre World War II focus on the gun. However, the reliance on tradition as a foundation for fleet employment should not be haphazardly criticized. As the Solomons data indicates, each side fought best when able to fight according to its principal doctrines. The lesson that must be taken from this realization is that the introduction of newer systems like radar does not immediately change the nature of a navy's capability until the tactics to exploit them are put in hand. In a modern perspective, the developments in the Soviet fleet must be considered in light of previous systems. The evolution of Soviet naval aviation is the most significant development that must be evaluated with this in mind. For its modern history, the Soviet Navy has relied on anti ship missile equipped surface combatants for its primary at sea strike capability. It is unlikely that the deployment of high performance carrier airwings will immediately shift this tactical focus to one mimicking that of the American Navy.

2. The Role of Tactical Doctrine

American reliance on doctrine as a precept for obedience rather than a tool for intelligent application led to a mindset that is apparent from the similar mistakes made repeatedly by successive commanders. American doctrine was thorough yet stilted; it was explicit in its procedures for conducting tactics in its own way but it failed to shape concepts for the commander that would have allowed easy modification for circumstances that were fundamentally different from an accepted standard.

Attendant circumstances must be considered in the discussion of doctrine and the Solomons. In the case of the Americans, groups of ships were hastily assembled to fight with no opportunity for commanders to either discuss tactical variations or agree on any but simple operational procedures. The throwing of forces together is easily criticized, but the more pertinent issue is how doctrine failed to compensate for this unfortunate necessity. Again the flaw can be traced to what doctrine for the American forces did do which was provide specific instructions for maneuvering ships but no general framework for commanders to select as schemes for battle. The planning process for American forces of the day was taught at the War College as an orderly series of steps that included a thorough examination of mission and estimation of enemy strengths and intentions.

General operational concepts were emphasized, but specific tactics were not considered in the planning process.⁴¹ Tactics were taken for granted, perhaps because the doctrine was so extensive as to make any discussion seem redundant. When faced with the test of battle, the doctrine's emphasis on "what" proved inadequate for the situation but failed to provide any principles for alternatives.

3. Alternative Tactics for Alternative Strategies

As argued above, the Solomons campaign was viewed as a secondary theater, with an "offensive-defensive" strategic purpose. The forces assigned to the campaign were a mix designed to conserve more valuable naval assets and represented, in a sense, a "low cost" alternative in the use of naval forces. The use of today's new Surface Combatant Task Groups (SCTGs) and Surface Action Groups (SAGs) for deployment in Third World areas is a concept akin to the strategy followed in the Solomons.

As the preceding pages have indicated, the formal tactics of the day did not make allowance for the task groups forced together for the Solomons and it may be inferred that the need to deploy naval forces for unique strategic

⁴¹See Sound Military Decision published by the War College in several editions prior to and even after the war. This short text outlined planning for naval operations along specific lines that emphasized a rational approach to the integration of force and mission. Its influence is obvious in the game records as well as the actual War Plans of the era.

purposes implies the need for alternate operational concepts and tactics. Modification of existing tactics proved unsuccessful in the Solomons and new tactics had to be developed. Current plans for new strategic uses of American naval forces must include the refinement of alternate tactics, particularly those for our new generation of surface forces.

D. THE NEED FOR GOOD INTELLIGENCE

The surface combatant task forces of the Solomons campaign required specific intelligence for the successful completion of their mission. The modern surface task groups face the same limitations in C² facilities as their counterparts of World War II. Technology makes this appear less of a problem today, but considering the state of the art in communication equipment, many of today's surface combatants lack onboard intelligence terminals in the same relative proportions as those of early World War II. The development of new intelligence systems for today's surface combatant force must acknowledge the unique requirements of such modern weapons as land attack cruise missile and long range anti ship missiles.

The failure of American intelligence to predict the technical aspects of Japanese tactics and weapons is a lesson that remains valid today. No substitute for area experts can be found in the evaluation of potential enemy

systems and the concepts for their employment. The American Navy had much in common with the Japanese Navy at the onset of the war yet the average American commander was literally tricked by Japanese weapons and tactics. The American Navy of today has no shortage of potential enemies; its efforts at understanding likely foes and educating American naval officers as to the capabilities they may face in battle should be geared to avoid the mistakes of 1942.

E. THE ROLE OF GAMING IN STRATEGIC AND TACTICAL ANALYSIS

The reliance of the American Navy on war gaming as a tool for training and conceptualization of operations remains as strong today as it was in the 1930s. The failures of gaming in relation to the Solomons campaign were of both a tactical and strategic nature. In regards to the former, gaming did not lead to any tactics which would have made the American surface forces any more effective in the performance of their mission. As to the latter, the prewar games focused on campaigns of a different scale; the Solomons was a holding action strategically but the Newport games were always played with strategies meant to bring about a decisive battle that would win the war.

Four reasons can be seen for games to fail as valid indications of how a conflict might go:

1. Inadequate modeling of reality- All games assume models which must have validity in their basic

structure. Any of these models is an "abstraction" of reality and "invalid" in some sense [Ref. 61: p. 1]. This inherent limitation must be accepted but, insofar as possible, it is necessary to see that the models utilized in any simulation of conflict have all of the essential elements embedded in them. If the reader believes, as he should, that getting all essential elements built in for all strategic and tactical variations is hard to do, then he is attuned to the limits of war gaming.

2. Poor intelligence- The accurate modeling of a hypothetical conflict with a real or potential enemy must include accurate information on the enemy. This will involve the knowledge of more than technical data; understanding an adversary's tactics, motivations, and concepts of battle are essential in wargaming. It is similarly important to have a reasonable grasp of what enemy national goals are and what the enemy considers the motivation for war and its resolution. Since intelligence is imperfect, the need for tactical adjustments as against the "Long Lance" torpedo, will always arise. Soviet military planning is especially vulnerable to potential exploitation because it is so coherent and structured. But without good intelligence and assimilation of that intelligence when we "play Red" we will forego an opportunity to exploit Soviet proclivity toward orderliness and doctrinal conformity.
3. Certain strategies become fixations- As games are played repeatedly, certain strategies are naturally found to be more successful and players tend to repeat these strategies. In time the same patterns emerge from games, creating something of a false sense of security- of "the way things will be." For obvious reasons, players in games tend to ignore the moves that do not work and concentrate on those that win the game for them. Missing from such a pattern is the confrontation with the unexpected and the disaster that may follow in an actual conflict.
4. Good models must emulate the pace of battle- Commanders in the Solomons were forced to make critical decisions under severe time constraints. The indecision of ten displayed by American commanders suggests that they were not prepared to do this. The games did little to sharpen a player's skill at rapid

tactical decision making: information and the chance to react to it were spaced in three minute increments where the player had the opportunity to sift data and ponder his reaction. Mechanical games such as those played at Newport are further slowed by player/umpire interaction, a problem somewhat alleviated in today's computer monitored games. Nonetheless, simulating the tempo of modern naval warfare remains difficult in view of current weapons and increasingly complex fleet operations. Time, information, and mission still challenge efforts to predicting the pressures commanders will face in naval combat.

In relation to the Solomons campaign, the United States Navy was guilty of all four shortcomings in the prewar games. However, the most costly error made by the gaming effort in relation to the Solomons was the mistaking of games for analysis on the tactical level. The experience of World War II indicates that war gaming is a most appropriate vehicle for the proposal and deliberation of strategy. Today's efforts at war gaming must make sharp distinction between tactical exercises and strategic gaming. The development of tactics requires a more specific and detailed treatment of weapons systems capabilities, realistic simulation of command and control problems, and a flexible means of varying the parameters which characterize the performance of forces in combat. Most importantly, tactical analysis must highlight problems discovered in the analysis in such a manner that they can be studied in greater detail.

Games generate hypotheses, not empirically substantiated facts. While the war games played by the American Navy prior to World War II hinted at tactical problems, alternative

hypotheses were rarely tried and apparently not desired. The games were a poor source of analysis made even poorer by a failure to seek alternate solutions for the problems discovered and a sense among the American naval hierarchy that the results of the games were adequate for the purpose of tactical evaluation. Missing from the study of game results was the realization that the analysis of the outcomes is the beginning of wisdom, not the end product.

APPENDIX A

ANALYSIS OF BATTLES CONSIDERED IN THIS STUDY

A. OUTLINE OF ANALYSIS

As pointed out in Chapter I, the naval engagements of the Solomons were violent, close range encounters of small groups of ships at night. These clashes, marked by confusion and rapid action, were unique to the major fleet encounters of the war. The Japanese had prepared themselves for night torpedo battles at close range prior to the war, while the American tactical doctrine was based on long range gunnery. In order to illustrate and assess the differences in both Japanese and American tactics in the Solomons, eleven separate engagements have been selected for analysis. These engagements are representative of the naval actions of the Solomons campaign and span the length of the campaign from August 1942 to November 1943. They are:

1. The Battle of Savo Island- August 9, 1942, near Guadalcanal.
2. The Battle of Cape Esperance- October 12, 1942, off Cape Esperance, northwestern tip of Guadalcanal.
3. The Naval Battle of Guadalcanal- November 12-15, 1942, vicinity of Savo and Guadalcanal.
4. The Battle of Tassafaronga- November 30, 1942, off the northern coast of Guadalcanal.

5. The Battle of Kula Gulf- July 5, 1943, off the north-eastern coast of Kolombagara.
6. The Battle of Kolombagara- July 12, 1943, off the northeastern coast of Kolombagara.
7. The Battle of Vella Gulf- August 6, 1943, between Vella Lavella and Kolombagara.
8. The Destroyer Action off Horaniu- August 18, 1943, off the northwest coast of Kolombagara.
9. The Battle of Vella Lavella- October 6, 1943, off the northwestern coast of Vella Lavella.
10. The Battle of Empress August Bay- November 2, 1943, at Empress Augusta Bay, off the western coast of Bougainville.
11. The Battle of Cape St. George- November 25, 1943, off the northern tip of Bougainville.

The location of these battles is depicted in Figure A.1.

1. Methodology

For automated analysis 130 separate data points from each engagement were considered to be of significance and required coding. Each of the engagements was chronologically broken down into the significant events of the engagement and these were individually coded. The elements considered necessary for analysis included the number of ships involved, the date of the engagement, the time during the engagement when certain key events took place, details

of damage inflicted and a count of the key events undertaken by either side during the encounter. These actions were considered of three types: a maneuver action, a damage inflicting action, or an intelligence event.

In coding the data from each battle, the "zero" time was when the commander of one task group had sufficient information on his opponent to begin action for joining battle. This presumes the first step in the fire control solution, or tactical contact on the enemy with shipboard sensors. This is a vital distinction since external sources of information (such as aircraft or "coastwatcher" reports) were in effect strategic warning but cannot mark the battles' start for the purposes of time-related analysis. The receipt of such information is recorded in the overall summary of key events for each side, however. The end of the engagement was considered to be when one or the other force withdrew and was not pursued.

For each battle, a brief narrative is given describing the key aspects of the battle. The actual data summarizing the specific details of each battle is given on a table following this narrative. This table also includes results of the engagement that might have been expected by American commanders based on the contemporary standard for battle simulation, the war game from the Naval War College. Since timing was so critical to the battles fought during the Solomons campaign, a time plot is also included which

displays and describes the key events for each battle as defined above.

For the purposes of this analysis, the Battle of Savo, the Naval Battle of Guadalcanal, and the Battle of Kula Gulf are divided into two phases. This division allows a more refined analysis of the critical factors discussed in the text.

2. Sources

In preparing the coding of battle data and the following commentary on each engagement, the primary source consulted was Samuel Eliot Morison's history of the United States Navy during World War II. A second source extensively drawn on was Charles H. Dull's The Imperial Japanese Navy. Other works consulted as a cross check on these sources or to fill gaps in detail are listed in the bibliography or as references. In several instances, battle reports from official Pacific Fleet files were consulted to resolve differences.

During the course of the past forty years, a variety of sources have been made available publicly concerning the war in the Pacific. There is an understandable tendency for these sources to contradict each other, particularly those later ones which reveal information that may have been classified when earlier accounts were prepared. This is a particular problem with Morison, who wrote immediately after

the end of the war. For this reason, other sources, particularly Dull, have been relied on when in conflict with Morison. Despite the flaws in Morison's work, it remains the most extensive overview of the Solomons campaign and is notable for its attributes beyond simple facts. Morison spent several months in the Solomons, witnessed several battles from the bridges of the ships involved, and had a remarkable ability to piece fact into the larger strategic scheme. Official reports are valuable sources for specific details on individual units, but they must be considered with other evidence since initial damage estimates were notoriously bad and almost always overestimated. Commanding officer narratives also have gaps understandable considering the pace of the battles of the Solomons.

B. COMMENTARY ON ENGAGEMENTS ANALYZED

1. The Battle of Savo - August 9, 1942

The volumes written on this first naval engagement of the Solomons campaign underscore the shock this first American defeat caused. This opening of the campaign was a harbinger of the next fifteen months: four Allied of five Allied cruisers sunk, the fifth out of action, with only one Japanese ship receiving any damage. In a five year war with no shortage of bad days, Admiral King considered the day of the Battle of Savo his worst.

Placing Savo into the larger context of the entire campaign, the battle was unique and not representative of the actions that followed. In its differences lie some of the reasons for the enormity of the Japanese tactical success. At Savo, Admiral M. Mikawa's cruiser striking force was completely on the offensive. Contrary to later battles, the Japanese force had no mission other than the destruction of the opposing force's ships. In later encounters this would not be the case: the Japanese would be seeking to protect their own forces attempting to land or trying to conduct raids on American forces ashore. Similarly, the Americans would never be as unprepared again as they were at Savo. Admiral Turner, the American commander on the scene, believed that Mikawa's approaching force was a seaplane tender contingent that would be sending an air attack his way in the morning. This misbelief was fed by poor intelligence and a mindset that expected similar tactics. The Americans did not foresee a night cruiser attack and paid dearly for their narrowmindedness.

American assumptions on August 9 seem reasonable and the preparations made in response do not seem negligent. In fact the American cruiser force was stationed where it should have been to accomplish its mission of protecting the landings at Guadalcanal and Tulagi. By his own admission,

Mikawa was forced to abandon his primary objective of attacking the transports. Had he not, he would have still found a formidable force awaiting him off the beachhead. More importantly, he faced the same limitations that would dog Japanese naval efforts throughout the Solomons campaign: time was critical and lingering too long in the battle area meant the risk of air attack during the morning hours.

The battle must be considered atypical of the engagements of the campaign. Never again would the Americans be so naive nor would the Japanese have such freedom for offensive action. Although this uniqueness does not mitigate the tactical disaster suffered by the American forces, the battle's outcome had no impact on the strategy of the campaign; Turner was withdrawing his amphibious task group with the first landing of the war a success. The precedent for the rest of the naval campaign had been set by Mikawa who realized that the Japanese Eighth Fleet would be forced to operate in a narrow window of time due to the threat of American air power and a long logistics chain back to support bases.

2. The Battle of Cape Esperance - October 12, 1942

The clash of American Task Force 64 with Japanese elements attempting to reinforce Guadalcanal off Cape Esperance in October was the first of what could be called a "typical" Solomons battle. The battle was precipitated

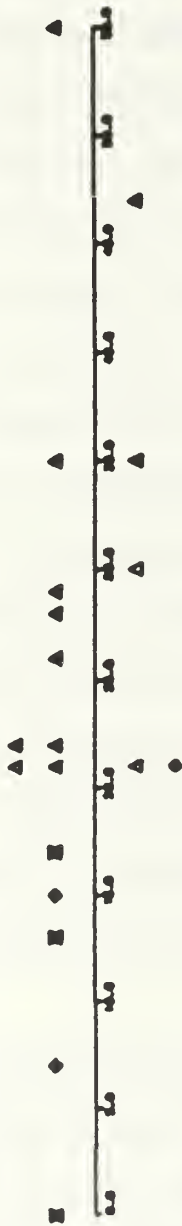
SIGNIFICANT AMERICAN EVENTS

- HELINA - FIRST SABAR CONTACT (UNID-PORTED)
- COUMA REVERSES CONTACT
- HELINA - REPORTS SABAR CONTACT
- BOGOT - REPORTS SABAR CONTACT
- DUNCAN - HEARS FOR JAP. FORMATION
- CONTACT FIRE
- LOGA - HIT
- CEASE FIRE ORDERED
- DUNCAN - FIRES TORPEDOS
- FIRING RESUMED
- TUBUIT - SUNK BY GUMFIRE
- TURAIAGO - HIT BY TORPEDO
- CEASE FIRE ORDERED
- DUNCAN - FIRES TORPEDOS

SIGNIFICANT JAPANESE EVENTS

- CONTACT FIRE
- TORPEDO CONTACT
- CONTACT FIRE
- MAIL LAKE CRT - BEHIND
- "SUNSHINE" HIT; SINKS LAKE
- CEASE FIRE

CAPE ESPERANCE
TIMEPLOT OF SIGNIFICANT EVENTS



▲ - AMERICAN EVENTS
 ◆ - MANOUCHE EVENTS
 ■ - INTL. EVENTS

U.S. EVENTS ABOVE LINE, JAP. BELOW

CAPE ESPERANCE

LOSSES

FORCES		COMMANDERS		AMERICAN		JAPANESE			
AMERICAN	JAPANESE	AMERICAN	JAPANESE	AMERICAN	JAPANESE	AMERICAN	JAPANESE		
BB	0	SCOTT	GOTO	BB	CA/CL	DD	BB	CA/CL	DD
CA	2								
CL	2								
DD	4								
TOTAL GUNS > 14 INCH				SUNK					
	0			GUNFIRE	-	0	1	1	1
TOTAL 8 INCH GUNS				TORPEDO	-	0	0	-	1
	18			DAMAGED					
TOTAL 6 INCH GUNS				GUNFIRE	-	2	2	-	2
	30			TORPEDO	-	0	0	-	0
TOTAL 5 INCH GUNS									
	52								
TOTAL TORPEDO TUBES									
	80								

BATTLE STATISTICS

FIRST CONTACT AMERICAN JAPANESE
 FIRST GUNFIRE AMERICAN
 FIRST TORPEDO FIRE AMERICAN

DURATION OF BATTLE 28 MINUTES FORCES ENGAGED 28

	AMERICAN	JAPANESE
GUNFIRE RANGE	1.75	1.75
TORPEDO RANGE	.5	-
TORPEDOES FIRED	7	0
P(h) TORPEDO	.5	0

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES-- ALL CRUISERS, 1 DD SUNK BY TORPEDO, 1 DD SUNK BY GUNS

"ORANGE" LOSSES-- 2 CA SUNK BY TORPEDO, 1 CA, 1 DD SUNK BY GUN

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

TORPEDOES DECISIVE FOR BOTH SIDES DURING FIRST MOVE
 OF VIRTUAL MELEE. AMERICAN FIRST USE OF TORPEDO AND
 JAPANESE RELUCTANCE MITIGATED EXPECTED RESULTS

by the Japanese running of the "Tokyo Express" in what was to become a standard motif: a bombardment group and reinforcement group would jointly attempt to sneak past American forces guarding the waters around Guadalcanal and both land reinforcement troops and carry out gunfire attacks on American troops ashore. As would normally be the case, the American forces were alerted and Rear Admiral Norman Scott had positioned his eight ship (four cruisers, four destroyers) group in an optimal position for interception of the Japanese.

Although victory can be claimed by the American forces in this battle, the conduct of the battle was clumsy. While radar gave American forces early detection, a delay in reporting the contact whittled the advantage away; it took over twenty minutes for the report to get forwarded to the admiral. A further complication in the C² area was the reversal of the column undertaken just as the closing Japanese force was detected. While this maneuver was in progress, the American van destroyers became disoriented, separated from the cruiser main body, intermingled with the rapidly closing Japanese force, and finally initiated an independent battle with the surrounding Japanese. In the confusion, the American destroyers found themselves targets of both sides and American advantages in radar and voice radar failed to provide any evident pay off. The battle

was finally fought out at a range of under two miles even though aircraft and radar had tracked the Japanese for over an hour.

Despite the shortcomings in American performance at Cape Esperance, several aspects of the battle were noteworthy achievements for the American side. Scott's plan for intercepting the Japanese was reasonably sound, leaving his force in the correct position to thwart Japanese intentions, which he did. American gunnery, particularly rapid fire six inch batteries was shown to be a highly effective weapon when utilized at close range. The Japanese, caught unaware and unable to launch their torpedoes, were faced with a gun battle with the Americans. Although the range was far shorter than prewar doctrine had specified, the battle seemed to vindicate the American reliance on the gun. The bombardment group engaged was equal to the Americans in heavy gunpower but was forced to withdraw.

Regrettably, American success in this battle (one Japanese cruiser and one destroyer sunk, one Japanese cruiser damaged) seems to have blinded the Americans to their tactical deficiencies. The column formation and the resulting confusion it caused in maneuvering was not changed for some time. Radar information would be mishandled again, and the use of a single voice radio circuit for both information and tactical orders would continue. Above all, the notion of "battle line" style engagements would continue, and

the American destroyers would not be allowed to independently maneuver to deliver torpedo attacks until the following year.

3. The Naval Battle of Guadalcanal

In the appended computer analysis the Naval Battle of Guadalcanal is considered as two separate engagements, a cruiser action of November 13 and a battleship action on the night of 14-15 November. This two engagement battle occurred at a critical juncture in the campaign. The Japanese had determined to retake Guadalcanal in November and committed the Combined Fleet to the support of this effort. The Battle of the Santa Cruz Islands in late October resulted in the Combined Fleet's effort being stalled, and the Naval Battle of Guadalcanal put a halt to their efforts to mount an offensive at Guadalcanal with surface combatant support alone.

a. The Cruiser Action- November 13, 1942

The clash between Rear Admiral Callaghan's six cruiser, eight destroyer force and Vice Admiral Abe's raiding group of two battleships, a cruiser and six destroyers was among the most violent of the Solomon's clashes. A simple expression of victory in this engagement is elusive. The American loss of two cruisers, one destroyer, and both American admirals in the task group seems more serious than the Japanese loss of one destroyer and the damage caused to one battleship. Nonetheless, the outgunned Americans stopped Abe from conducting his raids on American positions

SIGNIFICANT AMERICAN EVENTS

- HELIXA REPORTS RADAR CONTACT
 - COLLIER TURNS SUDDENLY TOWARDS JAPANESE
 - COLLIER TURNS HOSTILE, ALMOST CRASHES
 - JAPANESE FIRE SIGHTED
 - COMMUNICATIONS COMA
 - NET INT. SUMMER BY GEARFIRE
 - "ARCADE" DAMAGED
 - "SEARCHER" DAMAGED
 - "CLASH" FIRE ORANGE
 - "BROOKS" - "BARTNER" FIRE TOWNSHIPS

SIGNIFICANT JAPANESE EVENTS

- U.S. FLEET REPORTS
 - COMMUNICATED FROM JAPANESE
 - "MILWAUKEE" DAMAGED BY JAPANESE
 - "LAUREY" - "HOLLY" JAPANESE DAMAGED BY
 - "JUNCO" DAMAGED BY OVER "BARTNER"
 - "SAN FRANCISCO" - "MILWAUKEE" - "LAUREY" - "HOLLY" - "JUNCO"

GUADALCANAL: CRUISER ACTION

TIME-PLLOT OF SIGNIFICANT EVENTS



▲ - JAPANESE
 ■ - U.S. FLEET
 ♦ - FIRE

U.S. EVENTS ABOVE LINE, JAP. BELOW

ashore and set the stage for an air attack on his forces the next day that cost the Japanese the damaged battleship, another destroyer, and severe damage to other units operating in the Solomons north of Guadalcanal.

Analysis of this engagement must point out the mistakes repeated by the Americans. As at Cape Esperance, radar contact with the Japanese was established well in advance, yet confused reporting and Callaghan's attempt to maneuver his unwieldy thirteen ship column wasted 26 minutes. By the time both sides opened fire, both formations were intermingled and the firefight that ensued was a melee. Hesitancy had cost Callaghan his life and three of his ships, yet the delay was less a procrastination than a frantic effort to maneuver his formation into a position for optimal gunfire. The attempt to "cross the T" of the advancing Japanese resulted in the American formation literally cutting through the Japanese formation.

The battle lasted a little more than half an hour with the actual firing taking ten minutes. American and Japanese were both fast with torpedoes, but the Japanese gained the sole benefit from the use of torpedoes. Unlike Cape Esperance, the Japanese held a distinct advantage in the firepower of heavier guns, although the final tally reflects the tactics of each navy: the damage inflicted by the American forces was from gunfire while the more serious Japanese damage resulted from torpedoes.

b. The Battleship Action- November 14-15, 1942

The clash of Rear Admiral Willis Lee's two battleship forces with Vice Admiral Kondo's bombardment force of a single battleship and two heavy cruisers would have been notable for its uniqueness if nothing else. It represented the only occasion during the Solomons campaign that forces approaching the prewar conception of the battle line were matched against each other. Beyond this singularity, the second phase of the Naval Battle of Guadalcanal is noteworthy for what it showed about the tactics of each side. Kondo's group, labelled an "emergency" bombardment group, was assigned the task Abe had failed at during the first phase of the battle, the bombardment of Henderson Field. Lee's force had been assigned as escort to the Enterprise task group, but in an aggressive use of surface combatants, it had broken off to station itself off the northern coast of Guadalcanal. Like Callaghan and Scott, Lee had kept his ships in a single column, destroyers in the van. However, unlike the other American admirals, Lee had issued instructions authorizing more freedom of action for commanders once contact had been made. If Lee sought to simplify his C² during the coming engagement, Kondo had complicated his with a deployment designed to confuse the Americans. Kondo had split his task group into four elements to patrol around Savo Island and screen the main body against the American forces on patrol. The Japanese force (a picket

group, two scouting destroyers, a cruiser-destroyer screen, and the main body) was to sweep past Savo and shell American positions as Japanese reinforcements were landed by another group.

The engagement started well for Kondo because of this division. Despite American radar, the Japanese picket force spotted the American force first and when the American radar detected both the picket group and the cruiser screen, there was understandable confusion. The arrival of the Japanese scout destroyers added to the confused American tactical picture, but Lee's liberal attitude towards opening fire allowed the American destroyers to select their own targets and the American van and rear simultaneously engaged the Japanese scout force and cruiser screen. Lee's battleships held fire until Kondo's main body presented a good target for American gunners. The ensuing exchange saw the Japanese battleship, the Kirishima, sunk and the heavy cruisers accompanying it damaged. The Americans lost two destroyers and experienced a modest amount of damage to one of their battleships, the South Dakota.

This lone battleship encounter was very much an American style duel. Gunfire was opened at long range at the correct target, the Japanese main body. The escorting destroyers opened fire with guns and torpedoes independently and their forcing of the battle helped draw the Japanese

main body into the range of the American battleships. Radar found its place in the American Navy's long range gunfire model. Although it did not provide the edge in detection in this battle, the radar controlled gunfire of the American battleships vindicated the game floor: it took only seven minutes of concentrated fire to disrupt the Japanese main body and end Kondo's mission. Moreover, Lee's approach to battle management stood in contrast to those employed previously. He refused to overmanage his assets, and the independence of his commanding officers countered the confusing picture the Japanese had presented.

4. The Battle of Tassafaronga- November 30, 1942

After the relative success of the final stage of the Naval Battle of Guadalcanal, the Battle of Tassafaronga represents a disappointing showing for the American surface forces attempting to interdict Japanese resupply and reinforcement efforts at Guadalcanal. In this engagement, Rear Admiral Wright's Task Force 67 held a clear advantage over Rear Admiral Tanaka's Destroyer Squadron 2, yet the battle saw one American cruiser sunk and two put out of action at the cost of a single Japanese destroyer and the accomplishment of the mission of landing troops and supplies. In this brief encounter the American forces had been ostensibly well prepared and alert. Wright's plans reflected an apparent understanding of previous shortcomings in night

TASSAFARONGA

FORCES

	AMERICAN		JAPANESE		COMMANDERS		AMERICAN		JAPANESE	
	BB	CA	CL	DD	AMERICAN	JAPANESE	BB	CA/CL	DD	DD
TOTAL GUNS > 14 INCH	0	0	0	0	WRIGHT	TANAKA				
TOTAL 8 INCH GUNS	37	0	0	0						
TOTAL 6 INCH GUNS	15	0	0	0						
TOTAL 5 INCH GUNS	46	0	0	0						
TOTAL TORPEDO TUBES	50	0	0	0						

LOSSES

	AMERICAN		JAPANESE	
	BB	CA/CL	DD	DD
SUNK				
GUNFIRE	-	0	0	1
TORPEDO	-	1	0	0
DAMAGED				
GUNFIRE	-	0	0	0
TORPEDO	-	2	0	0

BATTLE STATISTICS

FIRST CONTACT	FIRST GUNFIRE	FIRST TORPEDO FIRE
AMERICAN	AMERICAN	AMERICAN

DURATION OF BATTLE MINUTES FORCES ENGAGED

34

46

	AMERICAN	JAPANESE
GUNFIRE RANGE	8.5	8
TORPEDO RANGE	4.63	4.33
TORPEDOES FIRED	20	41
P(h) TORPEDO	0	.19

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES - 3 CA SUNK, 1 LIGHT DAMAGE, MODERATE DAMAGE TO CL

"ORANGE" LOSSES - ALL 7 DD SUNK BY GUNFIRE AND TORPEDOES

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

PROJECTION INDICATES JAPANESE COULD HAVE CAUSED DAMAGE ACTUALLY DONE. POOR U. S. COMMAND AND CONTROL PREVENTED AMERICANS FROM STRIKING BACK IN PROPORTION TO CAPABILITY. TORPEDO HITS WERE SIGNIFICANT FACTOR

encounters with the Japanese. Aircraft were on patrol to provide advance warning and illuminate the Japanese for American gunners. Radar contact was made early and Wright made an initial move to close the Japanese who were already close to the beach and should have made an easy target. Perhaps the most critical shortcoming of the American prosecution of the battle was the refusal to open fire in a timely manner. Wright delayed his first torpedo attack for five minutes while he maneuvered closer and, although he managed to open fire first with torpedoes, the Japanese skill at torpedo tactics was a crucial advantage. While the Americans scored no torpedo hits in their two attacks, the three Japanese attacks all drew blood.

The failure of American forces to inflict damage proportional to their relative strength was the result of several factors in this engagement. While Wright opened fire aggressively, he had maneuvered his force alternately from a line of bearing to a column and back, finally presenting Tanaka a beam aspect which enhanced the chance for Japanese torpedoes to strike home. American gunfire quickly removed one Japanese destroyer from the battle, yet the float planes sent to illuminate the Japanese force failed to drop their flares and the majority of the Japanese destroyers were able to withdraw, firing more torpedoes as they retreated. Overall American torpedo tactics were inferior- fired at extreme range and at opening targets- yet the Americans failed to

grasp the uniqueness of the Japanese ability to use this weapon. This battle was conducted at a relatively long range, about five miles, and this longer range should have fit into the American style of fighting far better than it did.

The results of Tassafaronga showed Japanese determination applied with well rehearsed tactics. Conversely, the Americans were still attempting to capitalize on past mistakes and improve on existing tactical conceptions. Wright's maneuvering showed an appreciation of how difficult the column was to manage in battle, yet he failed to unleash his destroyers for independent attacks. Radar's potential was still largely unexploited, with the new system considered good for initial detection but not offering any discernible edge when it came to weapon deployment. American destroyers were eager to get into the battle, yet the belief that their place was with the main body persisted at Tassafaronga. When the struggle for the central Solomons would commence the following summer, the destroyer would be promoted to a new role in the night engagement, that of delivering lethal torpedo strikes.

5. The Battle of Kula Gulf- July 5, 1943

The Battle of Kula Gulf, some nine months after the last major engagement off Guadalcanal, reflects the same pattern. As American forces attempted to secure the central

KULA GULF-PHASE 1

FORCES

	AMERICAN		JAPANESE		COMMANDERS		AMERICAN		JAPANESE		LOSSES	
	BB	CA	CL	DD	AMERICAN	JAPANESE	BB	CA/CL	DD	BB	CA/CL	DD
TOTAL GUNS > 14 INCH	0	0	3	4	AINS WORTH	AKIYAMA	-	0	0	-	-	1
TOTAL 8 INCH GUNS	0	0	0	0			-	0	0	-	-	0
TOTAL 6 INCH GUNS	45	0	0	0			DAMAGED					
TOTAL 5 INCH GUNS	44	0	0	0			GUNFIRE	-	0	-	-	0
TOTAL TORPEDO TUBES	24	0	0	0			TORPEDO	-	1	-	-	0

BATTLE STATISTICS

FIRST CONTACT	FIRST GUNFIRE	FIRST TORPEDO FIRE
JAPANESE	JAPANESE	JAPANESE

DURATION OF BATTLE MINUTES FORCES ENGAGED

58 4

	AMERICAN	JAPANESE
GUNFIRE RANGE	4	4
TORPEDO RANGE	5	3.5
TORPEDOES FIRED	9	16
P(h) TORPEDO	0	.19

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES- TORPEDOES SINK 2 CL, MODERATE GUN DAMAGE TO 3RD
 "ORANGE" LOSSES- 1 SUNK BY GUNFIRE, 2 DAMAGED HEAVILY, 2 MODERATELY

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

AS PREDICTED, U.S. WINS GUN DUEL, JAPANESE RELY
 ON TORPEDOES. U.S. DAMAGE CONTROL MITIGATES TORPEDO
 EFFECTIVENESS, BUT OTHERWISE SIMULATION PREDICTION

KULA GULF--PHASE 2

FORCES

	AMERICAN		JAPANESE		COMMANDERS		AMERICAN		JAPANESE		LOSSES			
	BB	CA	CL	DD	AMERICAN	JAPANESE	AINS WORTH	AKIYAMA	BB	CA/CL	DD	BB	CA/CL	DD
TOTAL GUNS > 14 INCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 8 INCH GUNS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 6 INCH GUNS	30	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 5 INCH GUNS	44	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL TORPEDO TUBES	24	0	0	0	0	0	0	0	0	0	0	0	0	0

BATTLE STATISTICS

FIRST CONTACT	FIRST GUNFIRE	FIRST TORPEDO FIRE
JAPANESE	AMERICAN	AMERICAN

DURATION OF BATTLE MINUTES FORCES ENGAGED

14 9

	AMERICAN	JAPANESE
GUNFIRE RANGE	6	4.3
TORPEDO RANGE	5.75	4.3
TORPEDOES FIRED	10	9
P(h) TORPEDO	0	0

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES-- considered in previous section on kula I

"ORANGE" LOSSES-- considered in previous section on kula I

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

ENTIRE BATTLE WAS SIMULATED IN ONE RUN WITHOUT CONSIDERING JAPANESE FORCE SPLIT. IN THIS PHASE, THE PATTERN OF U.S. RELIANCE ON GUN POWER WAS REEMPHASIZED, HOWEVER, THE JAPANESE SOUTHERN FORCE WITHDREW QUICKLY IN THE FACE OF AMERICAN GUNFIRE. WHICH WAS AS ACCURATE AS EVER EXPECTED BY THE GAME.

Solomons, the Japanese continued piecemeal efforts to resupply their own forces at night. The Japanese task groups attempting this mission faced a dichotomous situation. While these cruiser-destroyer forces were expected to protect themselves from the prowling American cruiser-destroyer groups, they were expected to simultaneously transport and debark troops and supplies. American air superiority, now firmly entrenched in several airfields in the Solomons, forced the Japanese to continue these efforts at night. The need to support the resupply efforts made the Japanese less aggressive and willing to seek battle, a shift that put the United States forces in the area clearly on the offensive. Nonetheless, the Japanese skill at night fighting with surface combatants remained.

During the Battle of Kula Gulf, considered by this analysis in two phases, American Rear Admiral Ainsworth encountered a seven destroyer force under Rear Admiral Akiyama in the process of offloading troops and supplies on Kolomabagra. Ainsworth's force consisted of three light cruisers and four destroyers, setting up something of a representative clash: the new light cruisers, sporting the rapid fire six inch guns with radar guidance, represented American gunnery at its most advanced. Conversely, Akiyama's force now had its own radar as well as the "Long Lance" torpedo. As in the battles of the previous year, the American radar detected the Japanese first, and Ainsworth

immediately turned his force into a line of bearing to approach the Japanese force. The Japanese force was split, attempting to complete landing operations and it started the encounter in a column. The opening shots of the battle were from Americans with gunfire, the Japanese with torpedoes. The Japanese took this first stage of the encounter in terms of damage caused; one American cruiser was sunk by torpedo fire while one Japanese destroyer succumbed to gunfire. At this critical stage the difference in strategic application became evident. The lead Japanese destroyers, the support element of the force, withdrew while Ainsworth detected and pursued the following units of Akiyama's force that had been engaged in landing operations. The Japanese were short of destroyers and cautious. The American force's mission was to seek and engage the enemy and Ainsworth held an opening advantage against the Japanese destroyer-transport force struggling to rejoin. This phase of the battle saw American doctrine as designed. Ainsworth's destroyers launched a torpedo attack while the remaining cruisers opened fire at 12,000 yards. Two of four Japanese destroyers were damaged by gunfire, and, after three minutes of uneven action, all were forced to retire in the opposite direction from the first group.

Kula Gulf was a somewhat costly victory and of questionable strategic significance. It stands in contrast to the previous battles of the Solomons, however. The

American group was able to out maneuver and out shoot the Japanese partly because of respective missions, but also because of superior management of forces. As in later battles, forces were engaged longer and weapons were employed more liberally with the Americans showing an increasing ability at decision maneuvering.

6. The Battle of Kolombangara- July 12, 1943

At first glance the Battle of Kolombangara seems a replay of Kula Gulf. Once again Ainsworth's cruiser-destroyer force attempted to hinder a Japanese resupply effort by a similar force under the command of Rear Admiral Izaki as it rounded the northern tip of Kolombangara. This battle, although in raw results is very similar to the one of the previous week, was not as well conducted by the American forces. An early factor that went against the Americans was detection. The Japanese had developed a system to intercept American radar and tracked the Americans passively for two hours before Ainsworth's force gained contact. Although Ainsworth's planning depended on surprise, he had lost it and the Japanese were aware of what was waiting for them. Independent torpedo attacks by the American van and rear destroyers inflicted an early hit on the Japanese flagship which was supplemented by gunfire damage. A countering strike by the Japanese put one American cruiser out of the battle, and, as the Japanese force reversed course, Ainsworth faced a crucial decision.

SIGNIFICANT AMERICAN EVENTS

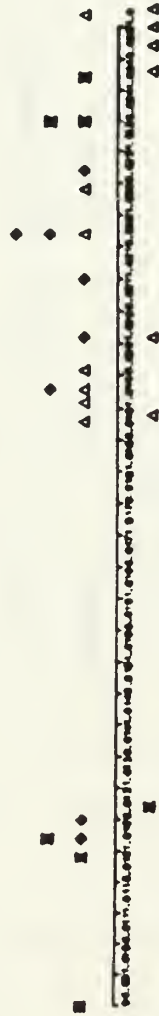
AIR PATROL SPOTS JAPANESE FORCE
 BATTLE FORMATION ASSUMED
 RADAR CONTACT
 VISUAL CONTACT
 DDS ORDERED TO THE VAN
 TURN TO UNMASK BATTERIES
 VAN DDS LAUNCH TORPEDOES
 TURN SOUTH TO PARALLEL JAPANESE
 REAR DDS LAUNCH TORPEDOES
 "JIMTSU" HIT
 FORCE TURNS NORTH
 3 DDS DETACH TO ENGAGE SOUTHERN JAP. FORCE
 FORCE TURNS NORTHWEST
 DDS ORDERED TO REJOIN -- ORDER NOT RECEIVED
 VAN DDS LAUNCH TORPEDOES
 "JIMTSU" SUNK BY TORPEDO
 DETACHED DDS TAKE WRONG DIRECTION IN REJOINING
 RADAR CONTACT ON JAPANESE ELEMENTS TO NORTH
 ROLL CALL OF DDS
 STAR SHELLS ORDERED

SIGNIFICANT JAPANESE EVENTS

U.S. RADAR INTERCEPTED (NOT ON TIMELINE)
 VISUAL CONTACT
 COMMENCE FIRE WITH GUNS AND TORPEDOES
 FORCE REVERSES COURSE
 "LEANDER" DAMAGED BY TORPEDO
 TORPEDOES LAUNCHED
 "ST. LOUIS" DAMAGED BY TORPEDO
 "HONOLULU" DAMAGED BY TORPEDO
 "GWIN" SUNK BY TORPEDO

KOLOMBANGARA

TIMEPLOT OF SIGNIFICANT EVENTS



◆ = Radar Events
 ■ = Intel Events
 ▲ = Events Above Line

U.S. EVENTS ABOVE LINE, JAP. BELOW

KOLOMBANGARA

FORCES

	AMERICAN				COMMANDERS		JAPANESE		AMERICAN		LOSSES		
	BB	CA	CL	DD	AMERICAN	JAPANESE	IZAKI	BB	CA/CL	DD	BB	CA/CL	DD
TOTAL GUNS > 14 INCH	0	0	3	10									
TOTAL 8 INCH GUNS	8	0	0	0									
TOTAL 6 INCH GUNS	38	0	0	0									
TOTAL 5 INCH GUNS	70	0	0	0									
TOTAL TORPEDO TUBES	44	0	0	0									

BATTLE STATISTICS

FIRST CONTACT FIRST GUNFIRE FIRST TORPEDO FIRE

JAPANESE AMERICAN AMERICAN

DURATION OF BATTLE MINUTES FORCES ENGAGED

254

15

	AMERICAN	JAPANESE
GUNFIRE RANGE	5	6
TORPEDO RANGE	5.03	5.25
TORPEDOES FIRED	53	41
P(h) TORPEDO	.09	.06

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES-- HEAVY DAMAGE TO BOTH CA, CL, DD UNTOUCHED
 "ORANGE" LOSSES-- MODERATED DAMAGE TO 2 DD, LIGHT DAMAGE TO ANOTHER 2

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

SKILLFUL USE OF MANUEVER ALLOWED U.S. FORCE TO
 MAXIMIZE FIRE POWER, INCLUDING TORPEDOES WHICH WERE
 INEFFECTIVE IN SIMULATION DUE TO RANGE. HOWEVER
 PREDICTIONS OF JAPANESE TORPEDO EFFECTIVENESS ALL

He had dispatched part of his destroyer force to chase the retiring Japanese and was experiencing communications difficulties. After maintaining his position for almost twenty minutes, he was presented with a confusing picture of the battle and a report from an air spotter that told him he had damaged four Japanese ships. Apparently Ainsworth believed this overly optimistic report and he turned to follow the Japanese as well.

However understandable the American admiral's enthusiasm may have been, his aggressiveness cost him the battle from that point on. The Japanese destroyers had rearmed their torpedo tubes, reversed course towards Ainsworth's force and were able to conduct another torpedo attack which knocked out his remaining two cruisers and sunk one destroyer. The potential of Japanese night torpedo attacks was still largely underestimated by American commanders.

Several peculiarities of this engagement are worth noting. First, American destroyers had finally found their place in the offensive task group mission. In the following battles the "tin cans" would gradually supplant the cruiser as the principal American attack unit. Secondly, despite a growing awareness of the torpedo's potential, the Americans had yet to realize how good the Japanese actually were with this weapon. Part of this is due to the confusion of battle and the misunderstanding of what ranges the Japanese were firing at and what hits on American ships were

solely the result of the "Long Lance." Some of this failure must be attributable to simple disbelief in the Japanese ability to have and use such a weapon. Finally, American damage control had become a significant resource conserver. The engagements of the previous year had shown the torpedo to normally sink a ship it had hit; this was not the case at Kolombangara. Perhaps the newer American cruisers were of heartier construction or their crews had become more proficient at damage control but in any event, the Japanese could no longer exact such damage with their principal weapon.

7. The Battle of Vella Gulf- August 6, 1943

The discussion of the previous battles revealed an increasingly offensive role for American destroyers and with the battle of Vella Gulf, the American destroyer took the final step from escort to principal fighting unit. Task Group 31.2, composed of six American destroyers in two divisions, was under the command of Commander Frederick Moosbrugger, a destroyerman who had supreme confidence in the American destroyer's ability to best the Japanese with torpedo tactics. Moosbrugger's faith ran contrary to the conventional wisdom of long range gunnery but he had drilled his units in night torpedo attacks using radar and felt that he could combine the advantage radar offered into a well coordinated stealthy attack. Moosbrugger planned to employ his two divisions in a line abreast, much as the Japanese

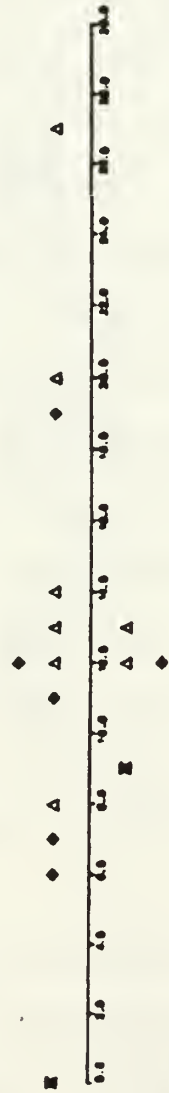
SIGNIFICANT AMERICAN EVENTS

RADAR CONTACT
 TURN TO RECIPROCAL
 1ST DIV. TURNS TO FIRING COURSE
 1ST DIV. LAUNCHES TORPEDOES
 1ST DIV. WITHDRAWS EASTWARD
 3 JAPANESE ODS HIT BY TORPEDOES; SINK
 2ND DIV. TURNS TO CROSS "T"
 2ND DIV. COMMENCES GUNFIRE
 "STACK" (2ND DIV.) LAUNCHES TORPEDOES
 1ST DIV. FORMS COLUMN
 1ST DIV. COMMENCES GUNFIRE
 CEASE FIRE

SIGNIFICANT JAPANESE EVENTS

U.S. FORCE SIGHTED
 "SHIGURE" LAUNCHES TORPEDOES
 "SHIGURE" TURNS NORTH TO WITHDRAW
 "SHIGURE" LAUNCHES TORPEDOES

VELLA GULF
 TIMEPLOT OF SIGNIFICANT EVENTS



KEY
 Δ - DAMAGE EVENTS
 ◇ - MANEUVER EVENTS
 □ - INTEL EVENTS

U.S. EVENTS ABOVE LINE, JAP. BELOW

VELLA GULF

FORCES

	AMERICAN				COMMANDERS		JAPANESE		AMERICAN		JAPANESE	
	BB	CA	CL	DD	AMERICAN	MOOSEBRUGGER	JAPANESE	SUGIURA	BB	CA/CL	DD	DD
TOTAL GUNS > 14 INCH	0	0	0	6	0	0	0	4	0	0	0	0
TOTAL 8 INCH GUNS	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 6 INCH GUNS	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 5 INCH GUNS	25	0	0	0	25	0	0	0	0	0	0	0
TOTAL TORPEDO TUBES	96	0	0	0	96	0	0	0	0	0	0	0

LOSSES

	SUNK		DAMAGED		AMERICAN		JAPANESE			
	GUNFIRE	TORPEDO	GUNFIRE	TORPEDO	BB	CA/CL	DD	BB	CA/CL	DD
TOTAL GUNS > 14 INCH	0	0	0	0	0	0	0	0	0	0
TOTAL 8 INCH GUNS	0	0	0	0	0	0	0	0	0	0
TOTAL 6 INCH GUNS	0	0	0	0	0	0	0	0	0	0
TOTAL 5 INCH GUNS	25	0	0	0	25	0	0	0	0	0
TOTAL TORPEDO TUBES	96	0	0	0	96	0	0	0	0	0

BATTLE STATISTICS

FIRST CONTACT	AMERICAN	FIRST GUNFIRE	AMERICAN	FIRST TORPEDO FIRE	AMERICAN

DURATION OF BATTLE	AMERICAN	MINUTES FORCES ENGAGED	JAPANESE
	27		17

	AMERICAN	JAPANESE
GUNFIRE RANGE	3	-
TORPEDO RANGE	2.5	2.4
TORPEDOES FIRED	28	8
P(h) TORPEDO	.08	0

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES-- MODERATE DAMAGE TO ALL AMERICAN UNITS

"ORANGE" LOSSES-- 2 DD SUNK BY GUNS, 1 DAMAGED HEAVILY, 1 MODERATELY

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

EMERGENCE OF AGGRESSIVE USE OF TORPEDOES BY U.S.

BASIC SHIFT AWAY FROM GAME MODEL AND REASON FOR

VARIANCE IN PREDICTIONS AND ACTUAL OUTCOME OF BATTLE.

USE OF TORPEDOES GAVE U.S. FORCE BETTER RESULTS

had done in their torpedo tactics, but with a coordinated flanking movement by the divisions somewhat akin to a "pincer" trap. Moosbrugger rounded out his planning by conferring with each of his subordinate skippers before departure from Tulagi.

Moosbrugger's scheme to beat the Japanese at their own torpedo game was an excellent combination of American tactical advantages applied to a new scheme. Radar was an advantage that American commanders had been inconsistent in exploiting; Moosbrugger saw the advantage it would lend to coordinated torpedo attacks instead of gunfire. Additionally, American airpower in the form of the "Black Cats" Catalina squadron could give his destroyers a real time intelligence capability superior to that of the Japanese. Finally, Japanese operations had changed in such a way that made Moosbrugger's plan more feasible. The four destroyer Japanese formation that approached Moosbrugger the night of the battle was unescorted by a cruiser, leaving the Japanese destroyers on their own in their run to resupply troops on Kolombangara.

The plan worked almost flawlessly. Japanese were in a single column while the American force employed two short columns of DDs in an open line of bearing. Moosbrugger's first division fired its torpedoes before being spotted by the enemy and the coordinated attack scored kills on the first three Japanese destroyers. While the first American

destroyer division hauled clear, the second maneuvered into position, crossing the "T" of the disrupted Japanese column and forcing the remaining Japanese destroyer to retire. The Japanese, caught by surprise, managed to fire a single torpedo salvo that was ineffective against the American destroyers who had followed a safe course of launching torpedoes and turning away at high speed.

Moosbrugger's victory stopped almost two thousand Japanese troops from landing and cost the Japanese three precious destroyers. More than these tallies, it showed the killing power available to the American surface task groups. American reconnaissance was superior, radar was used to deliver a sudden attack, air cover provided timely intelligence that allowed the commander on scene to maneuver into the position his plan had called for. At this stage in the campaign the Americans had widened their tactical perspective beyond the gun and had seen that the torpedo was far more devastating a weapon than prewar conceptions had held.

8. The Destroyer Action off Horaniu- August 18, 1943

Although the tactical success of the Battle of Vella Gulf was not repeated at this relatively minor skirmish between four American destroyers under Captain T. J. Ryan and a similar force under Rear Admiral Ijuin, the clash is interesting for both the tactical and strategic implications

SIGNIFICANT AMERICAN EVENTS

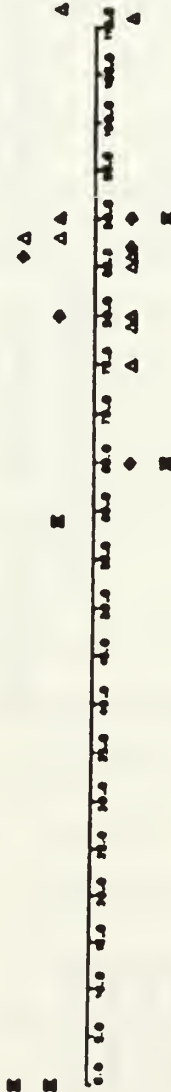
JAPANESE AIR FIRING SIGHTED
 AIR PATROL REPORT ON JAPANESE RECEIVED
 RADAR CONTACT
 FORMED TO LINE AHEAD TO CLOSE JAPANESE
 COLUMN TO COLUMN TO PARALLEL JAPANESE
 COLUMN COURSE REVERSED
 CHEVALIERE LAUNCHES TORPEDOES
 "HAMAKAZI" LAUNCHES TORPEDOES
 "LEOKAZI" DAMAGED BY GUNFIRE

SIGNIFICANT JAPANESE EVENTS

U.S. FORCE SIGHTED
 SOUTHERN FORMATION ORDERED
 COLUMN FORMATION ORDERED
 "SHIGURE" LAUNCHES TORPEDOES
 "HAMAKAZI" LAUNCHES TORPEDOES
 "IZOKAZI" LAUNCHES TORPEDOES
 "SUZAKAMI" LAUNCHES TORPEDOES
 OPEN FIRE WITH GUNS
 FORMATION TURNED TO CROSS "T"
 FALSE RADAR CONTACT OF APPROACHING SHIP
 FORMATION TURNED WEST TO WITHDRAW
 "IZOKAZI" LAUNCHES TORPEDOES

HORANIU

TIMEPLOT OF SIGNIFICANT EVENTS



♦ - DAMAGED EVENT
 □ - LAUNCH EVENT
 △ - INTEL EVENT

U.S. EVENTS ABOVE LINE, JAP. BELOW

illustrated. As American ground forces moved to secure Vella Lavella, the Japanese realized that their forces would have to be evacuated. While the Japanese were a notoriously tenacious opponent, their grudging evacuation of each of the Solomon Islands was a tacit admission that they lacked the forces to both transport and protect reinforcements. The "Tokyo Express" was a bankrupt ploy yet Admiral Ijuin's meager force was assigned the task of supporting a small defensive position the Japanese had established at the northeastern tip of Vella Lavella. Simultaneously, American forces were being ferried around the island to solidify the American hold on the island. As Ijuin's force entered the vicinity of Vella Lavella, it was spotted during the daytime by American air patrols and Ryan's force was hastily sent out to intercept.

Airpower played a significant part in this engagement. For a change, both sides were supported by their respective air cover which attempted to influence the battle with inaccurate night bombing attacks. Neither side's aircraft actually scored a hit, but the bombing runs staged the battle. Ijuin's force was dispersed by the attack while the Japanese aircraft were slow in getting into position to do the same against Ryan. Updated by his air patrol, Ryan closed the Japanese force to radar range. Perhaps the most critical move of the battle was the Japanese decision to open fire

at long range with both guns and torpedoes. Ryan's alert maneuvering evaded all Japanese torpedoes and American long range destroyer gunnery was clearly superior to Japanese.

The Japanese fled after an engagement of only four minutes of contact. Left behind was the transport force being escorted, several units of which fell victim to Ryan's force. The quick abandonment of the primary mission by Ijuin evidences the serious shortage of destroyers the Japanese Navy was confronted with at this stage of the war; the escort force was more valuable in his eyes than the troops assigned his protection. The situation precluded as detailed American plan as Moosbrugger had formulated and Ryan's force was forced to fight on those well established precepts of long range gunnery. Such guidance was not ineffective: by this stage American formations were skillful at high speed night maneuvering in the face of the enemy torpedo threat and, true to American tactical form, Ryan's force had out-gunned the Japanese in what amounted to a long range gun engagement. Also evident was the American ability to coordinate air and radar information into a coherent tactical picture which allowed quick decisions. Americans had become adept at avoiding damage. The next step was to learn how to deliver damage on a consistent basis.

9. The Battle of Vella Lavella- October 6, 1943

The next major encounter of American and Japanese destroyers would be something of a draw. Again Admiral Ijuin found himself in support of a troop force, this time part of the evacuation force from Vella Lavella. This time, however, he had sufficient resources at his disposal, with a separate transport force which was able to retire prior to the battle's commencement. The Americans were operating in two divisions under Captain Frank Walker. Again the Americans held a slight advantage in radar detection range but Walker did not have the air reconnaissance available to him as Moosbrugger and Ryan had. Both task groups started out with their elements separated, a deployment that worked to Japanese advantage. At the battle's onset the American divisions were separated by almost twenty miles and Walker chose to engage both Japanese divisions with the single American division in contact. He had hoped to counter the 2-to-1 odds by aggressiveness and he fired the opening gun and torpedo salvos of the battle.

Both commanders maneuvered boldly towards the other during the opening stages of the encounter. Ijuin's dispersal of forces confused his tactical picture and the American initiative in opening fire with torpedoes cost Japanese one destroyer. Two Japanese torpedo attacks by separate divisions scored hits on two American destroyers,

SIGNIFICANT AMERICAN EVENTS

RADAR CONTACT
 CHANGE COURSE TOWARDS JAPANESE FORMATION
 TURN TO COLUMN FOR TORPEDO ATTACK
 TORPEDOES LAUNCHED
 "YUGUMO" HIT BY TORPEDO; SINKS
 "SELFRIDGE" COMMENCES GUNFIRE

SIGNIFICANT JAPANESE EVENTS

"IZOKAZE" SIGNS U. S. FORMATION; FAILS TO REPORT
 OTC SIGNS U. S. FORMATION
 COURSE REVERSED TOWARDS U.S. FORMATION
 LINE AREA ST. FORMED
 "YUGUMO" (1ST DIVISION) TURNS TOWARDS U. S. FORCE
 1ST DIV. (4 DDS) COMMENCES FIRE
 2ND DIV. (2 DDS) TURNS SOUTH TO DISengage
 "CHEVALIER" HIT BY TORPEDO; SINKS
 "OBANON" "CHEVALIER" COLLIDE
 "SELFRIDGE" DAMAGED BY TORPEDO
 AIR REPORT OF OTHER U. S. DDS APPROACH RECEIVED
 WITHDRAWAL ORDERED

VELLA LAVELLA
 TIMEPLOT OF SIGNIFICANT EVENTS



♦ = DAMAGED EVENTS
 △ = MATERIAL EVENTS
 ■ = INTEL EVENTS

U. S. EVENTS ABOVE LINE, JAP. BELOW

VELLA LAVELLA

FORCES

AMERICAN		JAPANESE		COMMANDERS		JAPANESE		AMERICAN		LOSSES			
BB	CA	CL	DD	AMERICAN	WALKER	IJUIN	BB	CA/CL	DD	BB	CA/CL	DD	
0	0	0	0	0	0	0	0	0	0	-	-	0	
3	0	0	6	3	0	0	0	0	0	-	-	1	
DAMAGED													
TOTAL GUNS > 14 INCH		0		0		0		0		-		0	
TOTAL 8 INCH GUNS		0		0		0		0		-		0	
TOTAL 6 INCH GUNS		0		0		0		0		-		0	
TOTAL 5 INCH GUNS		18		34		0		0		-		0	
TOTAL TORPEDO TUBES		28		48		0		0		-		0	

BATTLE STATISTICS

FIRST CONTACT	FIRST GUNFIRE	FIRST TORPEDO FIRE
JAPANESE	AMERICAN	AMERICAN

DURATION OF BATTLE MINUTES FORCES ENGAGED
43 11

GUNFIRE RANGE	AMERICAN	JAPANESE
TORPEDO RANGE	2	2
TORPEDOES FIRED	3	48
P(h) TORPEDO	14	.08

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES-- ALL THREE UNITS SUNK BY GUNFIRE, TORPEDOES

"ORANGE" LOSSES-- 2 DD SUNK, 4 SUSTAIN HEAVY DAMAGE

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

A 2 TO 1 ROUT OF U.S. AVERTED BY EARLY JAPANESE

WITHDRAWAL AND CONFUSION AMONG BOTH FORCES.

INCREASED U.S. TORPEDO EMPLOYMENT EVIDENT ALTHOUGH

THE GUN REMAINS PRINCIPAL AMERICAN WEAPON.

sinking one. The Americans were further frustrated by a collision between two destroyers that delayed the undamaged O'Bannon just long enough to keep her out of the battle. As in previous encounters, the Japanese did not press their attack: when his air patrol reported the American second destroyer division approaching, Ijuin quickly withdrew.

Vella Lavella could scarcely be termed an American victory, but both American torpedoes and guns were well employed and prevented what should have been a Japanese rout. Most importantly, the Japanese were forced to employ their weapons on American terms. Ijuin was unsuccessful at maneuvering his ships into gunnery position, was hampered in his follow on attack by long range American gunfire, and finally forced to launch his final torpedoes in desperation as he fled the scene. (Note: These final torpedoes were not entered in the accompanying computer analysis as they were scarcely a serious attempt.) Although the Japanese may have a more valid claim to victory at Vella Lavella than the Americans, the battle was an indication that the Japanese were no longer the sole masters of night surface engagements.

10. The Battle of Empress Augusta Bay- November 2, 1943

The Battle at Empress Augusta Bay was the final clash of large cruiser-destroyer task groups in the Solomons. In response to successful American landings on the western coast of Bougainville, the Japanese assembled what remained

SIGNIFICANT AMERICAN EVENTS

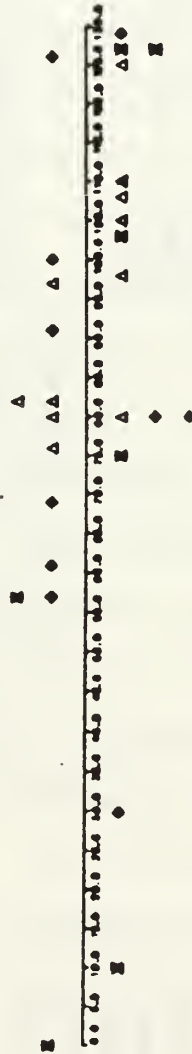
PATROL PLANE SIGHTS JAP. FORMATION
 PATROL PLANE BOMB ATTACK SLOWS JAP. FORMATION
 RADAR CONTACT
 COLUMN FORMED
 500 FT. TORPEDO FOR TORPEDO ATTACK
 TORPEDO FORMED FOR ATTACK
 TORPEDOES COMMENCED BY DO DIV.
 MAIN BODY COMMENCES GUNFIRE
 MAIN BODY TURNS TO OPEN RANGE
 "SENDAI SUTU" - SAIGONAKI'S COLUMN
 MAIN BODY TURNS TO OPEN RANGE
 "YOKO" - MATSUZAKI'S COLUMN
 MAIN BODY REVERSES COURSE
 MAIN BODY TURNS TO OPEN RANGE

SIGNIFICANT JAPANESE EVENTS

FALSE REPORT OF U.S. STRENGTH RECEIVED
 COURSE CHANGED TOWARDS U.S. FORMATION
 U.S. FORCE ILLUMINATED
 SCREEN LAUNCHES TORPEDOES, TURNS AWAY
 MAIN BODY CIRCLES EASTWARD TO GAIN CONTACT
 "FOOTE" - DAMAGED BY TORPEDO
 MAIN BODY SIGHTS U.S. MAIN BODY
 MAIN BODY COMMENCES GUNFIRE
 MAIN BODY LAUNCHES TORPEDOES
 "SPENCE" - DAMAGED BY GUNFIRE
 "DENVER" - DAMAGED BY GUNFIRE
 "OHORI" - OVERESTIMATES AND REPORTS DAMAGE DONE
 WITHDRAWAL ORDERED

EMPRESS AUGUSTA BAY

TIMEPLOT OF SIGNIFICANT EVENTS



△ - DAMAGE EVENTS
 ◆ - MANEUVER EVENTS
 ■ - INTEL EVENTS

U.S. EVENTS ABOVE LINE, JAP. BELOW

EMPERESS AUGUSTA BAY

FORCES

	AMERICAN				COMMANDERS		JAPANESE		LOSSES	
	BB	CA	CL	DD	AMERICAN	JAPANESE	OMORI	AMERICAN	JAPANESE	
TOTAL GUNS > 14 INCH	0	0	4	8	0	3	1	0	0	
TOTAL 8 INCH GUNS	0	0	4	8	0	3	1	0	0	
TOTAL 6 INCH GUNS	36	0	0	0	0	0	0	0	0	
TOTAL 5 INCH GUNS	88	0	0	0	0	0	0	0	0	
TOTAL TORPEDO TUBES	80	0	0	0	0	0	0	0	0	

BATTLE STATISTICS

FIRST CONTACT	AMERICAN	FIRST GUNFIRE	AMERICAN	FIRST TORPEDO FIRE	AMERICAN

DURATION OF BATTLE 129 MINUTES FORCES ENGAGED 31

	AMERICAN	JAPANESE
GUNFIRE RANGE	8	12
TORPEDO RANGE	3	8.5
TORPEDOES FIRED	25	48
P(h) TORPEDO	0	.02

BATTLE PREDICTIONS FROM GAME STANDARDS

"BLUE" LOSSES - MINOR DAMAGE

"ORANGE" LOSSES - MINOR DAMAGE

WHY PREDICTIONS AND ACTUAL RESULTS DIFFER

THE SIMULATION GAVE THE U.S. ONLY A SLIGHT ADVANTAGE

HOWEVER SKILLFUL COORDINATION AND MANUEVER ALLOWED

THE U.S. A CLEAR VICTORY BY SINKING AN IRREPLACABLE

of their Eighth Fleet at Rabaul and sent the four cruiser, six destroyer force southward to hit the American transports at Empress Augusta Bay. Rear Admiral Omori's force presented a fairly even match to American Admiral Merrill's Task Force 39. Although the American force had two more ships, the Japanese had the bigger guns and the advantage that their "Long Lance" torpedoes had given them since the beginning of the campaign. A significant factor was on scene air cover, the Japanese from their cruiser float planes, the Americans from the airfields they had carefully built as they marched their way up the Solomons chain.

As in the skirmish off Horaniu, air power made the first decisive moves in the engagement. Merrill's patrol sighted the Japanese almost an hour before the formations were within radar range of each other (by this time the Japanese had developed their own radar) and this allowed Merrill to slow and prevent his force's detection by the Japanese air patrol. An initial bomb strike by the American patrol plane slowed the Japanese formation by damaging one of the Japanese heavy cruisers. While Merrill's air cover had served him well, Omori's underestimation of the size of Merrill's force and this false intelligence led the Japanese admiral to head his group straight for what he believed was a smaller American force. With the stage for the battle thus set, Merrill's battle plan was put into effect upon his first radar contact.

Merrill had combined both his own and Moosbrugger's experiences of the past several months into a scheme that combined the advantages of both. Merrill intended to detach his destroyers for an independent torpedo attack on the enemy's flank while the rapid fire of his six inch cruiser guns would occupy the Japanese from a stand off position. The plan was a synergism of more traditional American gun tactics and the destroyer tactics developed during the course of the campaign. It allowed Merrill to separate his forces into a disposition that complicated the Japanese torpedo attack while still allowing the American destroyers the use of their torpedo power. The entire concept centered on the Americans' growing ability to utilize radar and voice radio for rapid evaluation of the situation and control of the battle. The plan was aggressive, relying on good intelligence and the ability to manage forces in contact.

The plan left the Japanese confused and the Americans in an excellent position at the start of the battle. The Japanese opened fire early and at extreme range to illuminate the American forces which were split into the destroyer and cruiser attack groups. The two American destroyer forces launched their torpedoes without achieving any hits but the results were still to the Americans' advantage. As the Japanese screen turned to fire its torpedoes, two destroyers collided. Meanwhile Merrill had skillfully maneuvered his cruiser column to maintain an optimal gun range of 8 miles

and within two minutes he had fatally damaged the Japanese cruiser leading one of the two Japanese supporting columns. Omori had no accurate picture of the battle's first six minutes and he erratically maneuvered his two CA main body in an attempt to locate Merrill's main body as it turned to maintain open range. The Japanese maneuvering resulted in another collision, this time between a cruiser and a screening destroyer. Aided by air dropped flares, Omori finally was able to open fire with his main body some twenty minutes after the Americans had, and by this time Merrill had opened to a range where the Japanese guns had minimal effect.

In strategic context, the Battle of Empress Augusta Bay was a repeat of Savo, the first of the Solomons naval engagements. The differences highlight how the tactics of the antagonists had changed in the fourteen intervening months. The American force was again on the defensive, but at Empress Augusta Bay it had the intelligence necessary to support a plan that took the battle to the intruding enemy. Direct air support was critical to this battle yet it was an advantage possessed solely by the Japanese at Savo. Geography was a key difference in the two battles, with Empress Augusta Bay fought in open waters where navigation was not a hinderance. This was again a reflection of how confident the American commanders were as to their ability to intercept the Japanese; Merrill's forward defense of the

transport area allowed him to fight in a most advantageous spot. For their part, the Japanese realized that they needed to commit their combatants to an offensive role in place of the escort mission they had been assigned more recently. Their plan remained centered on an undetected approach to optimal torpedo range and a sudden massive torpedo strike. The splitting of the American forces frustrated this plan, forcing Omori into action where he lost four ships due to confusion among his captains alone. The Americans achieved their success through superior tracking of the enemy, C² that supported the original plan, and the ability to combine these elements and force the battle on their terms. The clash graphically showed the evolution of American tactics since the commencement of the campaign while Japanese tactics had not adapted to this shift.

11. The Battle of Cape St. George- November 25, 1943

The final naval clash of the Solomons off Cape St. George was described as a "classic" by the Naval War College in its review, and seems in retrospect to be a fitting end to the naval campaign for the Solomons. The action pitted an even match of five destroyers for each side. Captain Arleigh Burke was ordered to intercept a "Tokyo Express" run to Buka under Captain Kagawa. Burke, who first devised the concept of splitting destroyer forces into independently operating divisions, had a plan similar to the one used at

SIGNIFICANT AMERICAN EVENTS

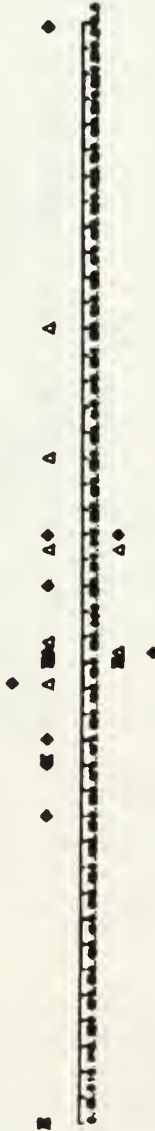
PT BOAT CONTACT WITH JAPANESE SCREEN
FORCE SLOWS TO REDUCE WAKE
FORCE FORMS DIVISIONS, TURNS TOWARDS JAPANESE
800 DIV DIVISIONS TURN TOWARDS JAPANESE SCREEN
800 DIV DIVISIONS TURN TO INTERCEPT
810 DIV LAUNCHES TORPEDOES
810 DIV CONTACT WITH TRANSPORT GROUP
151 DIV CONTACT WITH TRANSPORT GROUP
151 DIV HIT BY TORPEDO; SINKS
2ND DIV INCREASES SPEED TO PURSUE TRANSPORT GROUP
151 DIV CONTACT WITH TRANSPORT GROUP
2ND DIV MANEUVERERS TO AVOID TORPEDOES
2ND DIV COMMENCES GUNFIRE
1ST DIV, RELOINS
1ST DIV, COMMENCES GUNFIRE
"YUGURI" HIT BY GUNFIRE; SINKS
CHASE ABANDONED

SIGNIFICANT JAPANESE EVENTS

U.S. FORCE SIGHTED
TRANSPORT GROUP TURNS NORTH TO EVADE
TRANSPORT GROUP LAUNCHES TORPEDOES
TRANSPORT GROUP COMMENCES GUNFIRE
TRANSPORT GROUP SCATTERS

CAPE ST. GEORGE

TIMEPLOT OF SIGNIFICANT EVENTS



KEY
A - DAMAGE EVENTS
B - INTEL. EVENTS

U.S. EVENTS ABOVE LINE, JAP. BELOW

Vella Gulf. The offensive nature of Burke's mission contrasts with Kagawa's. Three of the latter's destroyers were laden with troops and not there to fight. Burke, on the other hand, had a primary mission of taking on his opponent free of any other tasking. The difference in mission would dictate the course and outcome of the battle.

Assisting Burke were a squadron of torpedo boats ("PTs") which made first contact with the enemy. The combined use of the two forces paid off as the first contact with the Japanese came from the PTs and their information vectored Burke's two divisions towards the enemy. Early radar contact allowed the first American division to get in the first blow with torpedoes, an attack which eliminated the two destroyers of the Japanese screening element. After this first attack, Burke's second division gained radar contact on the Japanese transport destroyers, astern of their now engaged screen. As the first Japanese destroyers were hit, these three destroyers immediately fired their torpedoes and attempted to withdraw. Both of Burke's divisions pursued at high speed and sunk one by gunfire.

The details of this engagement are in stark contrast to those of the earlier battles in the Solomons. The American forces possessed the advantage of surprise and complemented it with an aggressive prosecution of the battle. American command and control was perfect and

American torpedo performance had again beaten the Japanese with what had formerly been their forte.

APPENDIX B

SURVEY OF GAMES AND FLEET EXERCISES CONSIDERED IN THIS STUDY

For the consideration of American Naval interwar wargames and at-sea exercises, the games and "Fleet Problems" of the period were surveyed to select those games and exercises that were typical and those that would have provided lessons most applicable to the Solomons campaign as it developed. A variety of sources were utilized in this survey, the most significant being:

1. The Files at the Naval War College Archives. Records at the Naval War College are the most complete available in regards to the games played between the world wars, and this material contains basic game scenarios, staff solutions, rules for play, and assorted critiques from the games actually played. The majority of the college's game records are filed in the archives under category RG35.
2. National Archives Microfilm Records from the Inter-war Fleet Problems. The most extensive collection of records from the exercises conducted by the American fleet during the 1920s and 1930s is reproduced as Nars Microfilm Publication M494 which includes a summary of annual exercises and their scenarios as well as a useful introduction to the series of records.

3. The Navy Archives in Washington, D.C. The official archives contain a variety of materials pertaining to both the games and exercises from the interwar period. The actual game and exercise records at the Navy Yard do not comprise as complete a file as the two previous sources. However, the Navy archives contain valuable communications from fleet commanders, the General Board, the CNO, and other naval commands pertaining to the lessons learned both during the at-sea exercises and on the game floor at Newport.
4. "The Blue Sword," by Michael Vlahos. This book reviews the role of Naval War College in the preparation of American naval leaders for the war in the Pacific. Vlahos has done a thorough survey of the games and he offers several observations concerning the games' impact on the Navy's planning for World War II.

A. THE INTERWAR GAMES

The United States Navy's war games of the twenties and thirties have been popularly acknowledged for their role in planning the World War II Pacific campaigns. Throughout the interwar period, a total of 316 major games were played at the Naval War College with some 212 of them devoted to likely Pacific campaigns. Table I provides an overview of these games as relating to this study.

TABLE I

SUMMARY OF INTERWAR GAMES

TOTAL GAMES PLAYED	316
TOTAL GAMES PLAYED IN PACIFIC	212
<hr/>	
GAMES WITH GEOGRAPHIC EMPHASIS	
<hr/>	
CENTRAL PACIFIC/CAROLINES	43
PHILIPPINES	11
NORTHERN PACIFIC	6
GAMES WITH SPECIFIC TACTICAL THRUST	
<hr/>	
BATTLE LINE ENGAGEMENTS	60
CRUISER-DESTROYER ACTIONS	29
LOGISTIC/CONVOY OPERATIONS	54

Table I does not provide an all inclusive summary of the games played at Newport but only specifies those games which had a clear focus on the categories noted in the table. These more specialized cases were games devoted to the single purpose specified as opposed to games with several tactical or strategic thrusts. For example, the Pacific games not accounted for in one of the geographic areas specified would have dealt with a more general scenario featuring play in specific theatres only as part of a larger campaign. The singling out of those areas and tactics for certain games emphasizes the situations most focused on at Newport. Battle line and logistic games were obviously important while cruiser-destroyer actions were less frequently the subject of specific games. The Central Pacific drive of the war was the most frequently played of the Pacific scenarios

while actions around the Philippines and in the Northern Pacific were considered less often.

The games at the War College were divided into several categories based on the type of play utilized. Most were divided into the classifications of either "strategic" or "tactical." The former assigned College students the organization of a campaign-level problem and was "played" via a written exercise which required students to complete an "estimate of the situation" and recommended courses of action. The planning model for this exercise, found in Sound Military Decision (SMD), required students to establish campaign goals and general plans for their attainment. Tactical games were centered on simulated engagements between gameboard fleets utilizing the rules described in Chapter IV. "Operational" games were the major gaming events of the War College, with up to five held per year. These large scale games were a combination of the strategic and tactical games and involved the planning and simulated conduct of a theatre campaign.

Regrettably, few actual records of game play remain in the War College archives, so it is impossible to study the actual lessons learned by War College students in many cases. The complete games and the "textbook" solutions from the college staff are still on file and they form the basis for the conclusions reached in Chapter IV.

B. THE INTERWAR FLEET EXERCISES

Regular fleet exercises were carried out by the United States Navy from 1923 through 1940. These large scale exercises, known as "fleet problems" were usually held annually in the spring. As in the games of the period, each exercise focused on specific strategic and tactical objectives which were reflective of the Navy's concerns about potential enemies. In reviewing these exercises, several seem particularly applicable to the problems encountered in the Solomons. The scenarios of all twenty one fleet problems were examined for similarity to the strategic and tactical characteristics of the Solomons campaign. Of these, eight were considered to be of particular value and were most heavily relied upon in arriving at the conclusions made in Chapter IV. These exercises are briefly summarized below:

1. Fleet Problem I- February 1923

A) Objectives: To exercise high level commanders at making estimates of enemy actions and issuing war plans; to exercise the fleet in large scale maneuvers; to evaluate existing war plans and tactical doctrine.

B) Summary: This first attempt to exercise the post war fleet produced few actual results save the impression it made on the Navy's leadership. The post war decline had reached an ebb and the exercise was seen as part of an attempt to revitalize

the service. This exercise's scenario was based on a Blue versus Black (Germany) conflict around the Panama Canal. This convenient scenario would be played many times during the twenties and thirties as it allowed the "new" American Navy the opportunity to develop operational concepts for land and sea based naval air power and fleet mobile logistics.

2. Fleet Problem IV- January 1924

A) Objectives: To simulate the projection of American naval power into the western Pacific in an attempt to establish bases within 500 nm of the Japanese mainland.

B) Summary: This exercise was one of three separate exercises held during the same timeframe, each dealing with some phase of a war in the far east. (Other phases dealt with the transit westward.) Integrated into the operation was the Fleet Marine Force and logistic elements. Tactically, the exercise featured the use of submarines in support of the fleet and the USS Langley participated in one of the earliest attempts at projection of sea based "TACAIR." Many of the concepts attempted during this exercise would become routine in the Solomons.

3. Fleet Problem VII- March 1927

A) Objectives: To exercise the fleet in a variety of wartime operations; to practice scouting, search and attack tactics against convoys under heavy escort.

B) Summary: The tactical emphasis of this exercise was on several factors that would be critical in the Solomons, particularly the protection of own logistic forces and the attack of an enemy's. This exercise was the first where commanders made official note of the light cruiser's ability to coordinate surface attacks. Although the opponent in this exercise was again Black. The exercise featured several violent Solomons-like night actions with extensive torpedo attacks.

4. Fleet Problem VIII- April 1928

A) Objectives: To exercise the fleet in both offensive and defensive operations over extended distances.

B) Summary: This exercise was probably the best rehearsal of the Pacific strategy to date, although the scenario was similar to that of other exercises, the scope of this exercise was far more ambitious than previous fleet problems. In extending the operations area from San Francisco to Hawaii, logistics was a real concern and underway

replenishment was extensively utilized on a large scale. For the first time during the exercises, the principal opponent was orange (Japan). Perhaps foreshadowing the Solomons, the orange fleet made extensive use of light cruisers in its attacks on the Blue fleet.

5. Fleet Problem X- March 1930

- A) Objectives: To practice a scenario where the opposing force was of equal strength; to concentrate on the use of light forces and naval air forces in search operations; to investigate the strategic situations which might face American forces in the Caribbean.
- B) Summary: Although the setting for this exercise was in the Caribbean, several aspects of the exercise pertain directly to operations as carried out in the Solomons campaign. The use of land based air power in support of surface forces was practiced at length during this exercise, and the scenario featured forces evenly matched much as American and Japanese forces would be in the Solomons.

6. Fleet Problem XVI- May 1935

- A) Objectives: To simulate the various elements of a major strategic offensive, including the capture and defense of an advance base.

B) Summary: The exercise area for this problem encompassed the Northern Pacific from Alaska to Hawaii to the west coast of the United States. The scenario developed for this exercise was designed to make use of this wide area in testing strategies for a full scale Pacific war. In addition to the usual fleet operations, the Fleet Marine Force and army troops participated in the power projection phases.

7. Fleet Problem XVII- April/May 1936

A) Objectives: To exercise the fleet in a wide range of operations including submarine and anti submarine operations, replenishment at sea, communications, and combined air and surface tracking.

B) Summary: This problem was a series of high tempo evolutions which rehearsed many of the tactics later employed in the Solomons. Specifically, the exercise emphasized the tracking of opposing surface forces with air and surface ships working in unison. This skill would give the United States a crucial advantage in several instances in the Solomons.

8. Fleet Problem XXI- April 1940

A) Objectives: To conduct separate fleet operations in support of two distinct maritime theatres; to

test the fleet's ability to carry out the full range of operations, both offensive and defensive, while supporting a two ocean war.

B) Summary: This exercise, held on the eve of American involvement in World War II, was as thorough a simulation of the strains the coming conflict would put on the Navy as possible. Command and control was the most practical element exercised by the scenario, as the actual operations undertaken bore little resemblance to those of the war. In relation to the Solomons, the exercise provided an opportunity to concentrate on logistics to a remote theatre. The scope of the exercise also forced the Navy's leadership to prioritize resources when faced with a series of conflicting demands. The exercise was particularly effective in this area since a variety of allies and adversaries were assumed in the scenario.

APPENDIX C

DESCRIPTION OF MODEL UTILIZED TO GENERATE EXPECTED BATTLE RESULTS

For the comparison of actual Solomons battle results and the expected outcomes cited in Appendix A, a computer simulation was employed which was based on the rules of the Naval War College war games. The rules used in this simulation were taken from those used in the 1940 and 1941 games, thus representing the most current data available to the United States Navy at the beginning of the war. In constructing the model, it was desired to simulate the battles of the Solomons under conditions that the commanders involved would have preferred. The simulation therefore assumes that both forces would have had perfect command and control, a precise knowledge of opponent's order of battle and location, and the ability to employ all weapons available at the commencement of battle. However, the simulations were undertaken under the same constraints faced by the actual participants; engagements were at night, at close range, and of limited duration. The structuring of the simulation in this manner provides an estimate of "ideal" battle results for each of the Solomons engagements, the type of results the American commanders during the campaign would have most likely expected or similar to what the outcomes of the battles would have been if played at Newport.

A. MODEL DESCRIPTION

The simulation used was written in Fortran IV (Unstructured) and compiled using the WATFIV Compiler. The program was run on the IBM 360 AP system at the Naval Postgraduate School. The data source for input to the simulation was the data base generated from the analysis done in Chapter V and Appendix A. The coding of the simulation program and the input data are appended.

1. Inputs

Inputs to the simulation model were dictated by the assumptions as outlined above. The parameters for simulation were the range the actual battle was commenced at, the duration of the battle, and the ships which actually participated in the battle. These were assumed to be constraints that the commanders involved would have been forced to accept. For the simulation, variables such as range, and duration of battle were assumed to have been dictated to the commanders involved. This is a reasonable assumption since the geography of the Solomons, the environment, and conflicting tasking often determined these factors in the actual battles. Also input were the number of torpedoes each side could fire, based on the total number of tubes available to each side. In accordance with the game rules, it was assumed that the maximum range for American torpedoes was 8000 yards and 16000 yards for Japanese.

From these basic inputs, the War College "Fire Effect Diagrams" were utilized to determine the life expectancy and fire power potential for each ship in the engagement. (The sequencing of each engagement is described below.) The lifespan of each ship (given in the number of 14 inch hits the ship could withstand) was also transformed and stored for use in the determination of damage in accordance with War College rules.

2. Modeling of Torpedo Attack

Consistent with the assumption of perfect battle management by each commander, it was assumed that each side would fire torpedoes upon first contact and that within the span of the first three minutes move each unit would be able to fire all of its torpedo tubes.

A subroutine called by the main program calculated the effect each side's torpedo fire would have and determined at what time each side's torpedoes would strike the enemy. The game rules determined the number of torpedo hits suffered by a formation based on the number of torpedoes fired in relation to the size of the targeted formation. It was assumed by the model that each side would have the benefit of firing at the enemy's column from the beam, an assumption consistent with the American game's presupposition of a gun engagement as optimal. The model yielded PH of around 0.1, a rate consistent with those experienced in the Solomons. This subroutine also

accounted for the effect of multiple hits as per game instructions. In calculating multiple hits, it was assumed that principal targets would be most likely targeted for additional torpedo hits and the program prioritized the sequencing of second and subsequent hits accordingly.

The torpedo damage subroutine calculated the damage done to each ship and the time in the simulation that the damage would occur. This information was then returned to the main program for integration into the damage caused by gunfire.

3. Gun Engagement and Timestepping

Central to the modeling of naval combat by the interwar games was the concept of attrition to a naval vessel's fighting capabilities and seaworthiness over the course of the battle. Engaged naval units lost their capabilities over the course of each of the three minute moves during the game's play. As the original lifespan of a vessel (as measured by its ability to withstand a certain number of 14 inch gun hits) was diminished, its ability to fight, communicate, and maneuver were attrited until the ship was considered sunk at a loss of 90% of its original lifespan. The fire effect tables and diagrams⁴² gave ideal

⁴²Both the tables and diagrams contained the same data, except the diagrams were condensations of the more general tables which were pre calculated for common ship classes and thus required less calculation by game players.

capabilities for a ship in the game to attrite an opposing unit. This figure, based on range, aspect, and method of spotting, was modified according to a variety of factors as discussed in Chapter IV.

In the computer simulation, the forces which took part in each battle were paired off against each other in the manner most logical and consistent with the noted assumptions concerning command and control. In general this resulted in the heavier or most valuable ships of each force engaging each other, the next most important engaging each other, and so on until all ships of each side were engaged. Utilizing the actual duration the forces were engaged, the simulation program "timestepped" through each of these engagements, checking for damage to each unit at the conclusion of each timestep and degrading ships' capabilities as called for by the game rules.

The most significant modification to the fire power capability of the units in the Solomons simulation was due to the effect of darkness. In the game's maneuver rules, this degradation is obtained from tables and runs from 50 to 80 percent of the original fire power capability of a unit, based on ship type and range. For simplification of the simulation program, a linear function for this degradation based on range was approximated via a single linear regression model. Validation of this regression model indicated

it provided values for the night degradation of fire power consistent with the original game tables at a ninety percent confidence level.

4. Damage Assessment

In the interwar games, the damage to a ship as outlined above impacted upon the unit in two significant ways. First, the unit lost combat and combat support capabilities (maneuverability, communications) until the ship was actually declared sunk. Secondly, the ability to inflict damage was reduced proportionally to the total damage sustained with a further degradation to fire power potential based on range. In the relatively short battles of the Solomons, the effect of speed and communications was considered to have a minimal impact on the battle. However, fire power degradation, which ranged up to 80% in a single move, was modeled by the simulation via logical comparisons of damage sustained in the course of a move.

Data on torpedo hits passed from the torpedo evaluation subroutine was integrated to gun damage for the timestep in which the torpedoes would have struck. The aggregated effect of torpedo and gun damage at the close ranges typical of the Solomons was graphically displayed by the simulation and is consistent with both records of the actual games from the War College and the data from the Solomons battles themselves.

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\$JOB SOLOMONS
C DIMENSION AND INITIALIZATION

C
C
C REAL ALIFE (50),AABIL(50),JLIFE(50),JABIL(50),ADAM,JDAM,NITE,
 &ASLIFE(50),JSLIFE(50),ATDAM(50),JTDAM(50),ABLIFE(50),JBLIFE(50),
 &ABABIL(50),JBABIL(50),ADIF,JDIF
 INTEGER ATOT,TS,E,T,AC,AD,JC,JD,ATH,ATF,JTF,S,SUNK,ATDEG,JTDEG,
 &ATNCT,JTNCT
 COMMON/A/ATOT,ATNCT,JTNCT/B/RNG
 DD 400 L=1,13

C INPUT OF DATA

C
C READ(5,*)AC,JC,AD,JD,DUR,RNG,ATF,JTF
 WRITE(6,2)
2 FORMAT('1'.*FOR THIS BATTLE. INPUTS WEPE:*)
 WRITE(6,3)
3 FORMAT(1X,*(U.S. CRUISERS (OR BB), JAP. CRUISERS (OR BR), U.S DL,
 &JAP. DD. TIME IN CONTACT. RANGE. U.S. TORP FIRED. JAP. TORP FIRED)
 &')
 WRITE(6,*)AC
 WRITE(6,*)JC
 WRITE(6,*)AD
 WRITE(6,*)JD
 WRITE(6,*)DUR
 WRITE(6,*)RNG
 WRITE(6,*)ATF
 WRITE(6,*)JTF
 ATOT=AC+AD
 TS=INT(DUR/3.)
 READ(5,*)(ABLIFE(I),ABABIL(I),JBLIFE(I),JBABIL(I),I=1,ATOT,1)
 DO 1 K=1,ATOT
 ASLIFE(K)=ABLIFE(K)
 JSLIFE(K)=JBLIFE(K)
 CONTINUE

I
C
C CALL TO TORPEDO ASSESSMENT
 CALL TORP(AC,JC,AD,JD,DUR,RNG,TS,ABLIFE,JBLIFE,ATH,ATF,
 &JTF,ATDAM,JTDAM)

C
C SET UP FOR ENTIRE ENGAGEMENT SEQUENCE

C
C DO 200 E=1,ATOT
 WRITE(6,201)E
 WRITE(6,202)
 WRITE(6,*)ABLIFE(E),ABABIL(E),JBLIFE(E),JBABIL(E)

C SET UP FOR PAIRING OF SHIPS AND "BATTLE" BETWEEN THEM

C
C ALIFE(1)=ABLIFE(E)
 JLIFE(1)=JBLIFE(E)
 AABIL(1)=ABABIL(E)
 JABIL(1)=JBABIL(E)
 ADAM=1.0
 JDAM=1.0
 ATDEG=0
 JTDEG=0
 SUNK=0
 DO 210 T=1,TS
 WRITE(6,211)T
 ADIF=ABLIFE(E)-ALIFE(T)
 JDIF=JBLIFE(E)-JLIFE(T)
 IF(ATDEG.NE.1)GO TO 292
 AABIL(T)=0.
 GO TO 293
292 CONTINUE
 AABIL(T)=NITE(AABIL(T))
293 IF(JTDEG.NE.1)GO TO 294

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      JABIL(T)=0.
      GO TO 295
294     CONTINUE
295     JABIL(T)=NITE(JABIL(T))
      WRITE(6,23)
      WRITE(6,*)AABIL(T),JABIL(T)
      ATDEG=0
      JTDEG=0
      IF(.GT.ATNCT)GO TO 220
      IF(T.NE.ATH)GO TO 220
      ALIFE(T+1)=(ATDAM(E)-ADIF)-(JABIL(T)*JDAM)
      WRITE(6,231)
      ATDEG=1
      GO TO 223
220     CONTINUE
223     ALIFE(T+1)=ALIFE(T)-(JABIL(T)*JDAM)
      IF(ALIFE(T+1).GE.0)GO TO 290
      ALIFE(T+1)=0.
290     CONTINUE
      IF(.GT.JTNCT)GO TO 291
      IF(T.NE.ATH)GO TO 291
      JLIFE(T+1)=(JTDAM(E)-JDIF)-(AABIL(T)*JDAM)
      JTDEG=1
      WRITE(6,232)
      GO TO 298
291     CONTINUE
298     JLIFE(T+1)=JLIFE(T)-(AABIL(T)*JDAM)
      IF(JLIFE(T+1).GE.0)GO TO 227
      JLIFE(T+1)=0.
227     CONTINUE
      WRITE(6,234)
      WRITE(6,*)ALIFE(T+1),JLIFE(T+1)
      ADAM=1.-(ALIFE(T+1)/ASLIFE(E))
      JDAM=1.-(JLIFE(T+1)/JSLIFE(E))
      WRITE(6,221)ADAM
      WRITE(6,222)JDAM
C
C   DAMAGE ESTIMATION
C
      IF(ADAM.GE.0.7)GO TO 250
      IF((ADAM.LT.0.9).AND.(ADAM.GE.0.7))GO TO 260
229     AABIL(T+1)=AABIL(T)
      GO TO 230
250     WRITE(6,231)
      SUNK=1
230     IF(JDAM.GE.0.7)GO TO 255
249     IF((JDAM.LT.0.9).AND.(JDAM.GE.0.7))GO TO 265
      JAABIL(T+1)=JAABIL(T)
      GO TO 270
255     WRITE(6,252)
      SUNK=1
      GO TO 270
260     IF(RNG.LT.2.5)GO TO 229
      IF((RNG.GE.2.5).AND.(RNG.LE.5.0))GO TO 261
      IF((RNG.GE.5.0).AND.(RNG.LE.7.5))GO TO 262
      IF((RNG.GE.7.5).AND.(RNG.LE.10.0))GO TO 263
      IF(RNG.GT.10.0)GO TO 264
261     AABIL(T+1)=(AABIL(T)*0.8)
      GO TO 230
262     AABIL(T+1)=(AABIL(T)*0.6)
      GO TO 230
263     AABIL(T+1)=(AABIL(T)*0.4)
      GO TO 230
264     AABIL(T+1)=(AABIL(T)*0.2)
      GO TO 230
265     IF(RNG.LT.2.5)GO TO 249
      IF((RNG.GE.2.5).AND.(RNG.LE.5.0))GO TO 266
      IF((RNG.GE.5.0).AND.(RNG.LE.7.5))GO TO 267
      IF((RNG.GE.7.5).AND.(RNG.LE.10.0))GO TO 268
      IF(RNG.GT.10.0)GO TO 269
266     JABIL(T+1)=(JABIL(T)*0.8)
      GO TO 270
```

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```
267 JABIL(T+1)=(JABIL(T)*0.6)
GO TO 270
268 JABIL(T+1)=(JABIL(T)*0.4)
GO TO 270
269 JABIL(T+1)=(JABIL(T)*0.2)
GO TO 270
270 CONTINUE
IF(SUNK.EQ.1)GO TO 200
210 CONTINUE
200 CONTINUE
201 FORMAT('1','FOR ENGAGEMENT:',I2)
202 FORMAT('4X','U.S. SHIP LIFE SPAN',6X,'U.S. SHIP CAPABILITY',
C 2X,'JAPANESE SHIP LIFE SPAN',1X,'JAPANESE SHIP CAPABILITY')
211 FORMAT('0','FOR MOVE:',I2)
231 FORMAT(1X,'JAPANESE TORPEDOES HIT THIS MOVE')
232 FORMAT(1X,'AMERICAN TORPEDOES HIT THIS MOVE')
221 FORMAT(1X,'AMOUNT OF DAMAGE TO AMERICAN SHIP AFTER THIS MOVE'
C 3X,'6.3)
222 FORMAT(1X,'AMOUNT OF DAMAGE TO JAPANESE SHIP AFTER THIS MOVE'
C 3X,'6.3)
251 FORMAT(1X,'AMERICAN SHIP SUNK THIS MOVE')
252 FORMAT(1X,'JAPANESE SHIP SUNK THIS MOVE')
253 FORMAT(1X,'CAPABILITIES OF SHIPS FOR NIGHT ENGAGEMENTS(U.S.,JAP)')
254 FORMAT(1X,'SHIP CAPABILITIES AFTER DAMAGE(U.S.,JAP)')
C
C
C
C
400 CONTINUE
STOP
END
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C TORPEDO SUBROUTINE
C
SUBROUTINE TORP(AC,JC,AD,JD,DUR,RNG,TS,ABLIFE,JBLIFE,
C ATH,ATF,JTF,ATDAM,JTDAM)
REAL ACL,JCL,RATIO,ATHIT,JTHIT, ABLIFE(50),JBLIFE(50),
C AABIL(50),JABIL(50),APH,JPH,RNG,ATDAM(50),JTDAM(50)
INTEGER ATF,JTF,ATH,JTH,ATOT,ATNCT,JTNCT,AC,JC,AD,JD,TS
COMMON/A/ATOT,ATNCT,JTNCT
C
C FIND LENGTH OF SHIP COLUMNS
ACL=((AC*1000.)+1000.)/((AD*500.)-1000.)+(AC*200.)+(AD*166.)
JCL=((JC*1000.)+1000.)/((JD*500.)-1000.)+(JC*200.)+(JD*166.)
C FIND NUMBER OF TORPEDO HITS FOR EACH SIDE
ATHIT=((ATF*0.5)/((JC*200.)+(JD*166.)))/JCL
JTHIT=((JTF*0.5)/((AC*200.)+(AD*166.)))/ACL
IF(ATF.GT.0)GO TO 197
APH=0
GO TO 198
197 APH=ATHIT/ATF
198 CONTINUE
IF(JTF.GT.0)GO TO 199
JPH=0
GO TO 189
199 CONTINUE
JPH=JTHIT/JTF
189 WRITE(6,180)APH
WRITE(6,181)JPH
C COMPUTE TIME OF TORPEDOES HITTING
ATH=INT(RNG/2.25)
IF(ATH.GE.1)GO TO 101
ATH=1
101 CONTINUE
JTH=ATH
WRITE(6,182)JTH
C DISTRIBUTING TORPEDO HITS
RATIO=ATHIT/(JC+JD)
IF((RATIO.GE.1.).AND.(RATIO.LT.2.))GO TO 120
IF((RATIO.GE.2.).AND.(RATIO.LT.3.))GO TO 130
IF(RATIO.GT.3.)GO TO 140
```

```

120 IF(RATIO.LT.1.)GO TO 150
    ATEF=3.0
    JTNCT=JC+JD
    GO TO 125
130 ATEF=7.0
    JTNCT=JC+JD
    GO TO 125
140 ATEF=13.0
    JTNCT=JC+JD
    GO TO 125
150 ATEF=3.0
    JTNCT=INT(RATIO*(JC+JD))
    GO TO 125
125 RATIO=JTHIT/(AC+AD)
    IF((RATIO.GE.1.).AND.(RATIO.LT.2.))GO TO 121
    IF((RATIO.GE.2.).AND.(RATIO.LT.3.))GO TO 131
    IF(RATIO.GT.3.)GO TO 141
    IF(RATIO.LT.1.)GO TO 151
121 JTEF=3.0
    ATNCT=AC+AD
    GO TO 160
131 JTEF=7.0
    ATNCT=AC+AD
    GO TO 160
141 JTEF=13.0
    ATNCT=AC+AD
    GO TO 160
151 JTEF=3.0
    ATNCT=INT(RATIO*(AC+AD))
    GO TO 160
160 CONTINUE
    WRITE(6,183)JTNCT
    DO 170 K=1,ATOT
        ATDAM(K)=0.
        JTDAM(K)=0.
190 CONTINUE
    IF(JTNCT.GT.0)GO TO 195
    GO TO 175
195 DO 170 K=1,JTNCT
        JTDAM(K)=JBLIFE(K)-ATEF
        IF(JTDAM(K).GT.0.)GO TO 172
        JTDAM(K)=JBLIFE(K)
172 CONTINUE
170 CONTINUE
175 CONTINUE
    WRITE(6,184)ATNCT
    IF(ATNCT.GT.0)GO TO 196
    GO TO 174
196 DO 171 K=1,ATNCT
        ATDAM(K)=ABLIFE(K)-JTEF
        IF(ATDAM(K).GT.0.)GO TO 173
        ATDAM(K)=ABLIFE(K)
173 CONTINUE
171 CONTINUE
174 CONTINUE
180 FORMAT('0','AMERICAN TORPEDO P-SUB-H:',3X,F5.3)
181 FORMAT(1X,'JAPANESE TORPEDO P-SUB-H:',3X,F5.3)
182 FORMAT(1X,'TIME TORPEDDES HIT',12)
183 FORMAT(1X,'JAPANESE SHIPS HIT BY TORPEDDES:',3X,12)
184 FORMAT(1X,'AMERICAN SHIPS HIT BY TORPEDDES:',3X,12)
    RETURN
    END
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C FUNCTION FOR NIGHT GUNFIRE DEGRADATION
C
C
FUNCTION NITE(X)
COMMON/8/RNG
REAL NITE
NITE=((0.6+.0535*RNG)*X)
RETURN

```

END

CC

SENTRY
2 7 2 1 4 3.4 32 120
4.4 4.63 10.415 11.52
4.4 4.23 8.55 9.1
1.6 1.42 3.6 1.47
1.6 2.0 2.0 .70
3 7 2 0 12 4.75 0 109
4.6 1.35 0.45 2.195
4.6 1.18 7.95 2.02
4.6 1.19 5.55 1.515
1.6 0.2 2.2 0.3
1.6 0.2 2.0 0.22
4 3 4 2 28 1.75 40 54
4.4 6.09 1.35 2.395
4.6 5.48 3.7 4.77
4.6 12.9 3.7 4.77
4.6 12.9 1.85 2.3d5
1.6 4.78 .75 2.31
1.6 4.78 .75 2.31
1.6 4.78 .75 2.31
1.6 4.78 .75 2.31
5 3 8 9 10 1 80 21
4.6 14.18 6 11.76
3.7 7.27 6 11.76
4.4 14.19 6 11.76
3.7 7.27 6 11.76
4.6 7.02 3 3.88
1.6 5.98 6.3 7.61
1.6 5.98 6.3 7.61
1.6 5.98 6.3 7.61
1.6 4.78 1.4 6.34
1.6 4.78 1.4 6.34
1.6 4.78 1.4 6.34
1.6 4.78 1.4 6.34
1.6 4.78 1.4 6.34
2 5 4 0 28 9.5 0 0
22.4 3.63 12 1.34
22.4 2.46 9.2 .45
1.6 .03 3.0 .03
1.6 .03 3.0 .03
1.6 .01 5.3 .18
1.6 .01 5.3 .18
5 0 4 7 31 3.5 50 40
4.6 2.07 1.4 2.42
4.6 2.07 1.4 2.42
4.4 1.98 1.4 2.42
4.6 2.07 1.4 2.42
4.6 3.67 1.4 2.42
1.6 .65 .7 .37
1.6 .65 .7 .37
1.6 .65 .7 .37
1.6 .65 .7 .37
3 1 10 5 15 6 0 44
4.6 .93 4.4 .315
4.5 .93 4.4 .315
3.7 .32 2.22 .18
1.6 .1 .28 .012
1.6 .1 .28 .012
1.6 .1 .28 .012
1.6 .1 .28 .012
1.6 .1 .28 .012
1.6 .1 .28 .016
1.6 .09 .28 .016
1.6 .03 .28 .016
1.6 .09 .28 .015
1.6 .08 .28 .016
0 0 4 4 36 0 0 33
1.6 .1 1.4 .15
1.6 .1 1.4 .15
1.6 .1 1.4 .15

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1.5 .1 1.4 .13
0 0 3 6 11 2 28 48
1.6 2.62 2.8 4.17
1.6 1.64 2.8 3.8
1.6 1.64 2.8 3.9
0 0 5 4 17 3 96 32
1.5 .77 .7 .59
1.6 .65 1.4 .74
1.5 .65 1.4 .74
1.5 .65 .7 .44
1.6 .65 .7 .44
1.6 .65 .7 .44
3 0 4 7 13 4 0 24
4.6 1.96 2.1 1.14
4.6 1.96 1.4 .76
4.6 1.96 2.1 1.14
1.6 .33 .7 .2
1.6 .33 1.4 .25
1.6 .33 1.4 .12
1.6 .33 .7 .06
4 4 3 5 31 12 0 0
4.5 .024 2.1 .02
4.6 .024 4.2 .04
4.5 .024 4.2 .04
4.6 .024 2.1 .02
1.6 0 1.5 0
1.6 0 1.5 0
1.6 0 1.5 0
1.6 0 1.5 0
1.5 0 1.5 0
1.6 0 1.5 0
1.5 0 1.5 0
1.5 0 1.5 0
0 0 5 6 24 3.5 50 40
1.6 .46 2.8 .63
1.6 .46 1.4 .46
1.6 .46 1.4 .46
1.6 .46 1.4 .46
1.6 .46 1.4 .46
\$STOP

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