

UNCLASSIFIED/LIMITED

DEFENSE TECHNICAL INFORMATION CENTER



UNCLASSIFIED/LIMITED

**DEFENSE INFORMATION SYSTEMS AGENCY
DEFENSE TECHNICAL INFORMATION CENTER
8725 JOHN J. KINGMAN ROAD, SUITE 0944
FORT BELVOIR, VIRGINIA 22060-6218**

UNCLASSIFIED/LIMITED

Policy on the Redistribution of DTIC-Supplied Information

As a condition for obtaining DTIC services, all information received from DTIC that is not clearly marked for public release will be used only to bid or perform work under a U.S. Government contract or grant or for purposes specifically authorized by the U.S. Government agency that is sponsoring access. Further, the information will not be published for profit or in any manner offered for sale.

Non-compliance may result in termination of access and a requirement to return all information obtained from DTIC.

NOTICE

We are pleased to supply this document in response to your request.

The acquisition of technical reports, notes, memorandums, etc. is an active, ongoing program at the **Defense Technical Information Center (DTIC)** that depends, in part, on the efforts and interest of users and contributors.

Therefore, if you know of the existence of any significant reports, etc., that are not in the DTIC collection, we would appreciate receiving copies or information related to their sources and availability.

The appropriate regulations are Department of Defense Directive 3200.12, DoD Scientific and Technical Information Program; Department of Defense Directive 5230.24, Distribution Statements on Technical Documents; National Information Standards Organization (NISO) Standard Z39.18-1995, Scientific and Technical Reports - Elements, Organization and Design; Department of Defense 5200.1-R, Information Security Program Regulation.

Our **Acquisitions Branch, DTIC-OCA** will assist in resolving any questions you may have concerning documents to be submitted. Telephone numbers for the office are (703)767-8040 or DSN427-8040. The **Reference and Retrieval Service Branch, DTIC-BRR**, will assist in document identification, ordering and related questions. Telephone numbers for the office are (703)767-8274 or DSN424-8274.

DO NOT RETURN THIS DOCUMENT TO DTIC

**EACH ACTIVITY IS RESPONSIBLE FOR DESTRUCTION OF
THIS DOCUMENT ACCORDING TO APPLICABLE REGULATIONS.**

UNCLASSIFIED/LIMITED

Dominant Battlespace Awareness III

World War II Information Requirements and the Value of Information



OSD/NA

authorized to U.S. Government agencies only due to
Proprietary Information, (). Other requests for this document shall
be referred to Office Secretary of the Secretary of Defense, Office of Net
Assessments (OSD/NA), 1920 Defense Pentagon, Washington, DC 20301-1920.

Prepared for:
A.W. Marshall
Office of the Secretary of Defense
Net Assessment
The Pentagon, Room 3A930

Presented by:
BOOZ-ALLEN & HAMILTON INC.
8283 Greensboro Drive
McLean, VA 22102
(703) 902-5290

*The views, opinions, and/or findings contained in this report are those of the author(s)
and should not be construed as an official Department of Defense position, policy, or decision.*

Contract Number: DASW01-94-D-0043

DESTRUCTION NOTICE - For classified documents, follow the procedures
in DOD 5220.22-M, National Industrial Security Program Operating Manual
(NISPOM), Chapter 5, Section 7, or DOD 5200.1-R, Information Security
Program Regulation, Chapter IX. For unclassified, limited documents, destroy
by any method that will prevent disclosure of contents or reconstruction of the
document.

Dominant Battlespace Awareness III

Battle of North Africa Case Study Information Requirements

15 May 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (~90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (95%), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- What were the sources/mechanisms of DBA and DBK?
- What were the Commanders' key information requirements?
 - Enemy OB
 - Enemy capability
 - Enemy intent
- What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?
- What happened both tactically and strategically when those sources were denied?
- How perishable is the information from the different sources across the battles?

Campaign Objectives

Allied

- **Attack and secure port facilities at Casablanca, Oran, and Algiers; once secured, march east to Tunisia and capture the Bon Peninsula eliminating the Axis escape route**
- **British to march westward from El Alamein to the Mareth line, forming the southern flank to trap the remaining Axis troops**
- **Rid North Africa of all Axis troops, thus denying submarines and aircraft bases from which to operate**

Axis

- **Hold positions in North Africa at all costs**
- **Deny Allies staging bases in North Africa from which to support shipping in the Mediterranean and operations in Southern Europe**

CONOPS

Allied

- **Conduct a three front assault/landing in Northern Africa to seize control of basing as a precursor for the invasion of Southern Europe**
 - Secure shipping in the western and central Mediterranean
 - Secure air bases to provide air cover in the central and western Mediterranean
- **Drive Axis troops from North Africa**
 - Interdict resupply
 - Close in on enemy from two fronts

Axis

- **Maintain presence in North Africa with Italian and French forces**
 - Maintain air bases from which to interdict Allied shipping throughout the Mediterranean
 - Prevent the Allies from gaining a jumping off point for the eventual and expected invasion of Southern Europe

Overview of Forces

Allied Forces:

- Western Task Force, MG Patton commanding
- Center Task Force, U.S. II Corps, MG Fredendall commanding
- Eastern Task Force, MG Ryder commanding (later LTG Anderson)
- British 8th Army, Field Marshall Montgomery commanding
- French Forces in North Africa, General Giraud commanding
- British and U.S. fighters and bombers from Gibraltar, Air Chief Marshal Tedder commanding

Overview of Forces (cont.)

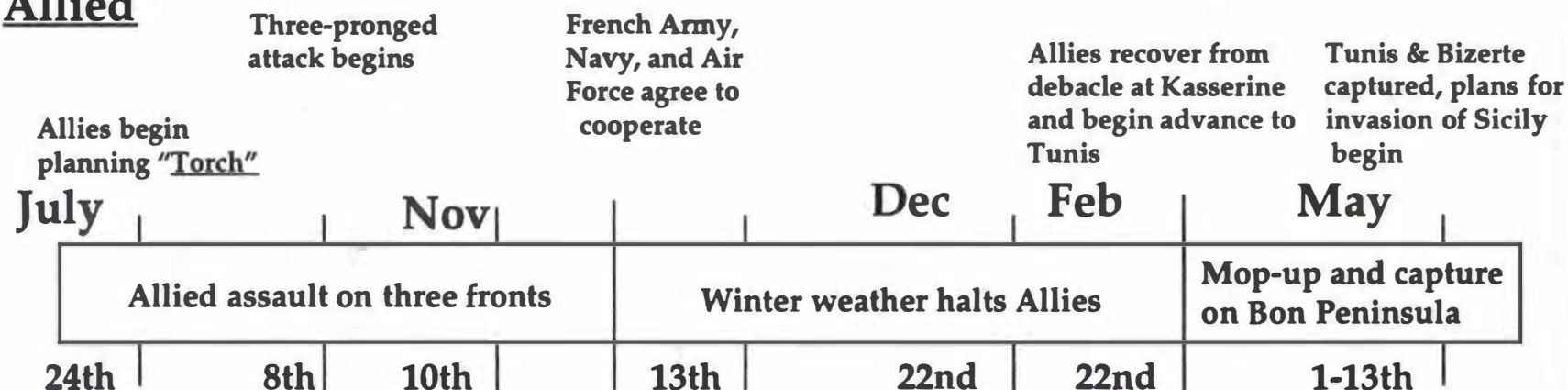
Axis Forces

- **Afrika Korps, Field Marshall Erwin Rommel commanding**
- **German 5th Panzer Army, General Von Arnim commanding**
- **All Italian Forces in Africa, Field Marshal Messe commanding**
- **German Air Forces supported ground operations from bases on Sicily and out of Tunisia**
- **Initially some French ground forces and naval forces**

Sequence Events (U)

November 1942 - May 1943

Allied

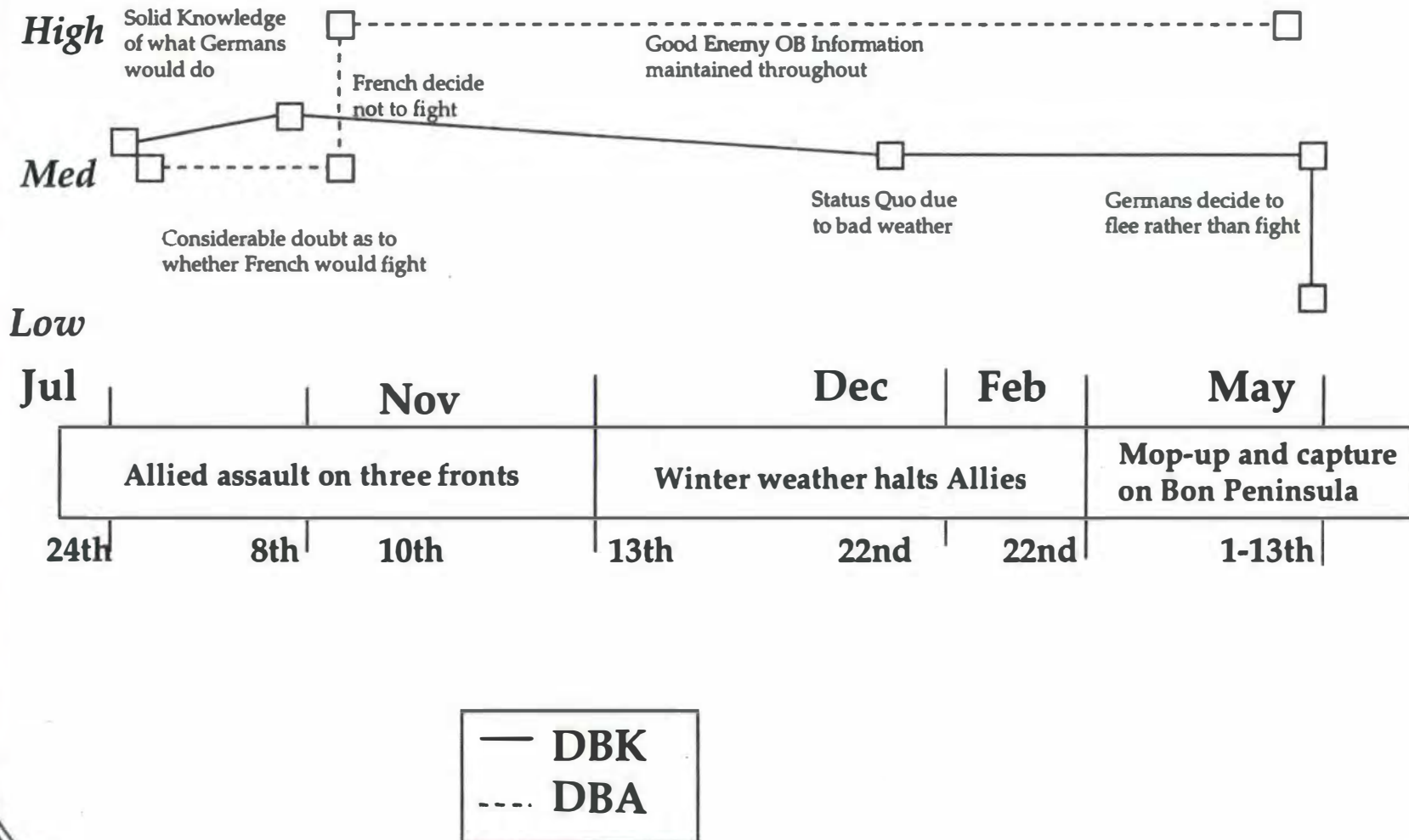


Axis

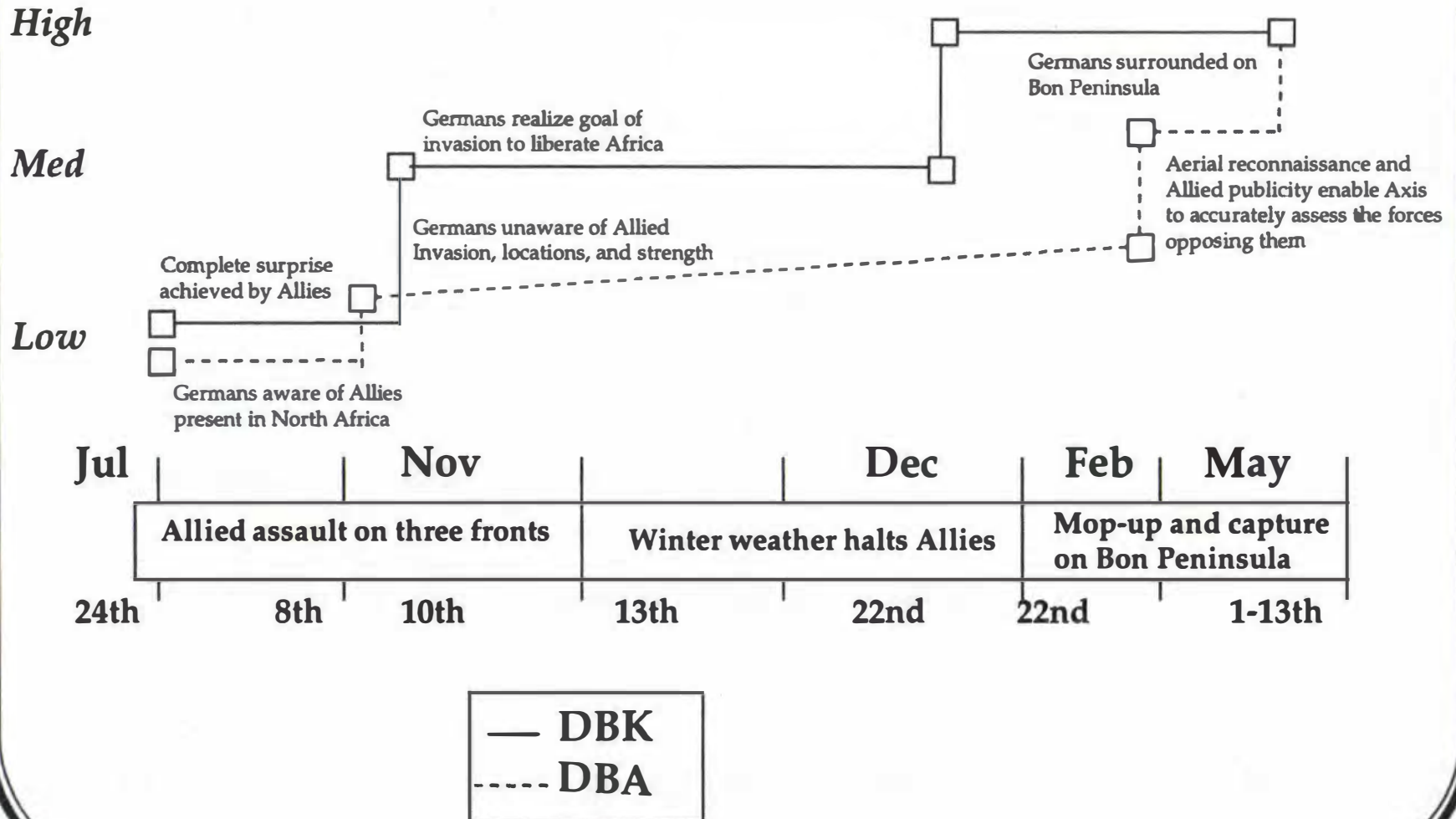
French/Germans offer tough initial opposition
French Resistance ceases-Germans continue fighting
German forces continue to stubbornly defend east of Algiers
German retreat begins in earnest
250k Axis Troops captured on the Bon Peninsula

Level of DBA/DBK -- Allies

November 1942 - May 1943



Level of DBA/DBK -- Germans November 1942 - May 1943



Allied Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & Enemy Order of Battle**
- **Friendly & Enemy Capability**
- **Location and Status of Friendly & Enemy Logistics and Supply Lines**
- **Enemy TTP and historical performance**

Mechanisms

- **Communications intercepts (ULTRA & 'Y' Service)**
- **Aerial reconnaissance**
- **HUMINT (French Resistance) from inside occupied territory**
- **Contact with the enemy**
- **POW Interviews**

Allied Sources & Mechanisms of DBK

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics and supply lines**

Mechanisms

- **Communications intercepts (ULTRA & 'Y' Service)**
- **After-action reports and field observations**
- **HUMINT (French and Tribal sympathetic agents) from inside occupied territory**
- **POW interviews**

Axis Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics and supply lines**

Mechanisms

- **Tactical aerial reconnaissance**
- **'ELINT/SIGINT' units**
- **Contact with the enemy**
- **POW interviews**
- **Captured documents**

Axis Sources & Mechanisms of DBK

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics and supply lines**

Mechanisms

- **Tactical aerial reconnaissance**
- **BBC broadcasts**
- **Contact with the enemy**
- **POW interviews**
- **Captured documents**

Information -- Required

Allies

- Location, status, and number of enemy units
- Logistics capacity of friendly forces (once established, whether airfields in North Africa sustain supply needs)
- The most likely enemy course of action (e.g., intent)
- Location, status, and number of friendly units

Axis

- Location, status, and number of enemy units
- Whether logistic support be sustained with small link through Sicily (British Naval presence in East Med and West Med precluded use of all but a small corridor between Tunisia and Sicily)
- The most likely Allied course of action (e.g., intent)

Information -- Not Sought

Allies

- State of German troops' morale
- Confirmation of ULTRA in the instance of Kasserine Pass

Axis

- Command structure of Allied forces (e.g., Eisenhower autonomous or not)
 - Allied force structure looked American but was not
- Political circumstances affecting Allied decision making (e.g., Obvious strain between French and British)
- Answers as to why the Allies were so effective at cutting supply lines

Allied Information -- Timeliness

- **ULTRA provided the Allies with times and locations for Axis resupply shipments; status of Axis forces' supply and fare warning of their assaults and movements**
- **Eisenhower ordered daily reconnaissance flights which provided excellent DBA**
 - **When he doubted the veracity of this information, he would simply get in a staff car and drive to the front for a personal view**
- **With a coalition of British and American forces, Eisenhower's staff was integrated and provided him with rapid intelligence reporting that had been fused and vetted by both constituents**
- **Once Eisenhower moved his HQ to Algiers, his reports were very rapid**

Allied Information -- Accuracy

- **ULTRA provided the Allies with times and locations for Axis resupply shipments; status of Axis forces' supply and fare warning of of their assaults and movements**
- **As stated previously, if Eisenhower doubted the accuracy of an intelligence report, he would often go to the front to see for himself**
- **Eisenhower had the advantage of fused data from two fronts; the British in the east heading west to complete the pincer movement against the Germans and the American and British heading east from Casablanca, Oran and Algiers toward the envelopment at the Bon Peninsula**
- **Once air superiority was achieved over the theater of operations, no enemy movement went undetected by the Allies**

Axis Information -- Timeliness

- **Emphasis on tactical battlefield intelligence gave the field commander timely information on tactical opportunities**
 - Tactical aerial reconnaissance
 - Battlefield 'ELINT/SIGINT' units
 - Contact with the enemy
- **Operational level information less available, but what they could get was timely**
 - POW interviews
 - Captured Documents
 - Aerial reconnaissance

Axis Information -- Accuracy

- **Major flaw: never figured out how Allies were so effective at cutting supply lines**
- **POW interviews and captured documents were accurate and useful**
- **Battlefield intelligence was accurate and usually near real-time**
 - **This is the kind of information Rommel sought most because of his warfighting style (exploitation of tactical opportunities)**

Allied Elements of IW

- **OPSEC: A definite edge was enjoyed by the Allies at first**
 - The attack at the three sites was a complete surprise to both the Germans and French
 - Battlefield OPSEC was less effective
- **Deception: No explicit use of deception**
- **EW: advantage to the Allies in EW**
 - They knew when the Germans (air assets) were coming, from which direction, and were able to counter it effectively (coastal and battlefield radar sets)
 - British 'Y' Service listened to battlefield signals for direction finding and intelligence
- **Physical Destruction: No explicit use of physical destruction used in the IW context**

Axis Elements of IW

- **OPSEC:** Poor Axis OPSEC was exploited by Allies through both ULTRA and the 'Y' Service
- **PSYOP:** Axis sought to split the Allied coalition by striking hardest against the inexperienced American forces and commanders so that the British would lose faith in them
- **Deception:** Axis forces modified field cars with cardboard and wood to have them appear as if they were heavy tanks
- **EW:** German forces maintained 'SIGINT/ELINT' units to locate the enemy and gather intelligence
- **Physical Destruction:** no explicit use of physical destruction used in the IW context

Impact of Knowledge

- **ULTRA revealed the Axis' central weakness: supply**
 - German maneuver warfare depended greatly on supplies, particularly on POL
 - German supply in the theater was low
 - Axis resupply shipment times and locations for interdiction
- **The Axis never figured out how the Allies could be so effective in countering their supply lines**
- **The Axis forces were completely surprised by the invasion, thinking the assault on Southern Europe would come through France**
- **Allies knew the strength of the Germans, especially in desert warfare and they also knew where specific units were located**
- **Allies' superior early warning radar capability countered Axis air power/bombing attempts**

The Impact of Command

Command Structure

- **Allied**
 - **Unified command structure with much autonomy**
 - **Coordinated inter-service support mechanisms in place**
- **Axis**
 - **The Axis command structure was complex and varied organizationally over time. However, three operational commanders were critical for the North African campaign, these were Rommel, von Arnim, and Messe. These Axis field commanders could receive orders from Hitler, Mussolini, Ambrosio or Kesselring in addition to the ones they believed needed to be carried out, with the additional burden of communicating with each other**
 - **The convoluted command structure actually increased the amount of communication required, which in turn ensured that the information continued to flow**

The Impact of Command (cont.)

Personalities

- **Allied**

- The Allies benefitted from strong leadership from Eisenhower and his joint staff

- **Axis**

- Rommel and von Arnim were long-time rivals who did not like each other personally and had very different warfighting styles
- Italians did not trust Rommel and sent Messe. However, Messe thought highly of Rommel and often defended him

The Impact of Intangibles

Weather

- **Winter weather halted the Allied advance on the Bon Peninsula from December to February**

Unit Morale

- **Allied morale was high because they were taking the initiative and having some success rather than reacting to Axis aggression**
- **German morale was low after being deserted by the French military in North Africa**

Other Factors

- **Inexperience of U.S. troops and commanders**

Why Did the Allied Plan Succeed?

- Landing on North Africa coast achieved with minimal resistance
- ULTRA allowed the Allies to cut the Axis supply lines, making victory just a matter of time
- Adroit diplomacy in handling the leaders of the French forces in North Africa
- Once the weather permitted, the Allies maintained pressure on the Axis until they were driven out

Why Didn't Axis Plan Succeed?

- Inability to supply their forces
- It appears that the Germans did not have a strategic plan other than to hold North Africa. When the French decided to not support the Germans any longer and subsequently actively fought against them, this only served to speed up the departure of the Axis troops from North Africa
- The Germans did not anticipate the scale nor the location of the troop build-up by the Allies to go into North Africa, bringing troops all the way from the United States to invade; something that had never been done before

DBA Conclusions

- **ULTRA provided the key to attacking the Axis at its weakest point**
- **The use of radar, 'Y' Service, and ULTRA frequently gave the Allies a clearer picture of the Axis from the battlefield than their opponents**
- **German desert-fighting capability was well-known and studied, especially by Patton (this provided less of an advantage than would have been expected)**

DBK Conclusions

- **Allies maintained an effective understanding of Axis' forces and capabilities**
- **ULTRA information provided the Allies with the key to defeating the Axis forces: their primary weakness (supply), how to attack it (interdiction of supply shipments) and insight into the commanders' mind-sets**
- **The Germans, clearly, did not know that the Allies were going to attack, did not know the full implications for Allied success of the attack, nor did they know the impact on the course of the war associated with control of North Africa**
- **The Germans' inability to understand how the Allies were so effective in cutting their supply lines was their undoing**

Command Decisions in the Battle of North Africa

8 November 1942 - 12 May 1943

Overview

The battle for North Africa was a protracted, six month campaign during which Allied troops moved over 900 miles eastward from Casablanca, Morocco and hundreds of miles westward from Cairo, Egypt, to the vicinity of Bizerta and Tunis in Tunisia, driving the Axis powers from the African continent and exposing the Axis "soft underbelly."

Between 8 November 1942 and the middle of May 1943, the Allies waged the offensive in two phases. The first phase began in the west in early November, and continued until the onset of winter around Christmas 1942. The second phase started with the end of the harsh winter weather around the end of February in the northern battle area near Tunis and Bizerta. In the east, Montgomery's British Eighth Army continued its advance from a successful battle at El Alamein towards the Mareth line in southeastern Tunisia at the Gulf of Gabes. The final skirmishes were conducted between March and May. Over 240,000 Axis soldiers were captured, killed, or wounded during the last week of fighting alone, and more than 125,000 Germans were taken prisoner.

Command Structure

The Allied command structure was unified under Gen. Eisenhower. Eisenhower, an aide to General MacArthur earlier in his career, was chosen over more senior British generals primarily to maintain the facade of an American operation. The residual bad feelings between the French and British were considered an inducement to the French to resist the Allied landing. Eisenhower's strongest attribute was his ability maintain the coalition between the Americans and the British and subsequently broker active participation by the French. The Allied forces in the battle consisted of a Western Task Force under MG George S. Patton (US), a Center Task Force under MG Fredendall (US), and an Eastern Task Force under MG Ryder (US). The Eastern Task force was turned over to the more experienced British Gen. Anderson after the French forces in North Africa agreed not to oppose the Allies (an agreement reached three days after the landing) and the American facade thus became less important. Meanwhile, Gen. Montgomery's Eighth Army was operating far to the east, in Egypt and Libya.

The Axis command structure consisted of Field Marshalls Rommel and von Arnim as the original field commanders. They were operating in the Mediterranean AOR, which placed them under Field Marshall Kesselring of the German Air Force, the Italian Comando Supremo Ambrosio, and Mussolini (North Africa was an Italian theater, and many Italians were there

fighting for the Axis). When Rommel abandoned Tripoli (the seat of the Italian empire in North Africa), Mussolini demanded Rommel's dismissal and sent Messe (an Italian) to replace him. However, Messe held Rommel in high regard and refused to dismiss him, instead taking over the command of the Italian forces previously under Rommel and allowing Rommel free reign with the two German divisions that remained under his control. Hitler also weighed in on command decisions, though in this time period he was more concerned with events on the Eastern Front. Thus, at any given time, the Axis field commanders could receive orders from Hitler, Mussolini, Ambrosio or Kesselring, in addition to the ones they believed needed to be carried out, with the additional burden of communicating with each other.

Rommel and von Arnim were long-time rivals who did not like each other personally and had very different warfighting styles. Von Arnim was sent to North Africa with a larger force than Rommel's with the intent that he replace Rommel when the latter retired (a period of time much longer than originally intended). Therefore, with such a small force, Rommel was dependent upon von Arnim for assistance. Von Arnim, however, was reluctant to help. Thus, Rommel was regularly appealing to Kesselring and Hitler for more forces and supplies, von Arnim was regularly complaining that he could not help, and Kesselring was shuttling messages back and forth and chiming in with orders from himself, as were Hitler and Mussolini. After Kasserine Pass, Kesselring did unify the command of the armored forces as Army Group Africa and placed them under Rommel, a move that proved to be too little, too late.

Background

The initial planning for the Allied invasion (codenamed Operation Torch) began early in July 1942. The preliminary debate was whether to strike at the Cotentin Peninsula in France (and proceed directly into southern Europe) or to strike at North Africa (and take a circuitous route into southern Europe via Sicily). If the North African campaign were successful, the Allied southern flank would be secure and the march north out of Sicily and Italy could then proceed. At a joint planning conference the North African option was chosen, and the British and Americans agreed that the operation would be a combined arms assault under the command of an American. From the outset, the objectives of the campaign were: (1) the elimination of all German forces in northern Africa, (2) the denial of basing opportunities for the Axis which would allow them to attack Allied shipping into the Mediterranean and (3) the protection of the Allied flank from the south. These objectives were to be accomplished through a coordinated attack from three different jump-off points: the Western Task Force would invade at Casablanca, Morocco, the Center Task Force at Oran, Algeria, and the Eastern Task Force at Algiers, Algeria. After establishing themselves on the African continent, the

troops would drive east toward the German strongholds in Tunisia, joining forces as they advanced.

The three landing sites were chosen because they were in range of land-based fighter cover out of Gibraltar. But there were also significant individual rationales for each landing site. Controlling Casablanca would eliminate the availability of the port to German submarines as a refueling stop and lessen the likelihood that the Moroccan tribes, and subsequently the Spanish, would participate in open hostilities against the Allies. Oran had a suitable port for resupply and nearby airfields which could sustain fighters in support of ground forces pushing east. Algiers also had a usable port and was the center of political activity for the region. Air cover for the convoys entering the Mediterranean could be accomplished from Gibraltar initially, and then subsequently from these three bases. Although Bone was originally considered as one of the three possibilities, it was eliminated because it was too far outside land-based fighter coverage range.

Eisenhower's biggest concern after the planning phase was completed was whether the French troops in North Africa would resist the Allied landings. He simply did not know the answer to that question. Allied planners hoped that the French military forces, local French population, and governmental officials in northern and northwestern Africa would not be hostile toward Allied forces coming ashore, and that resistance would, therefore, be minimal. However, without concrete foreknowledge that this was the case, the Allies had to be prepared to fight the more than 200,000 French troops located in the theater, as well as the Germans. The regional political situation was extremely significant to both the planning and the outcome of the campaign. Most importantly, the allies sought information on whether the French would fight. Although there were elements of the French contingent that were known to be sympathetic to General De Gaulle, in exile in London, the majority would still take their orders from the Vichy French leader, Henri Petain and by extension, his on-site commander Admiral Jean Francois Darlan, the senior French military leader in North Africa.

In addition, the amphibious invasion, as planned for North Africa, was a completely new concept in modern warfare; US naval forces were to carry out an overseas expedition, covering thousands of miles, culminating in an opposed landing. Pre-attack planning was extensive and complicated, and circumstances dictated a number of late modifications. Even as ships were underway to support the landing, plans had to be modified because shipping, carrying specific equipment, was sunk enroute, thus altering the composition of the available forces.

Key Command Decisions

There were three key command decisions for the Allies in the Battle of North Africa: pre-landing contingency planning, the best method to break the Axis forces as they advanced east and west toward the Bon Peninsula, and the final seizure of Tunisia.

The pre-landing contingency planning involved numerous logistical and geographical considerations. The scope and amount of detail required to accomplish a trans-oceanic invasion were phenomenal. The final attack plan had to reflect which ships had been sunk and which had made the voyage successfully. The loss at sea of critical pieces of equipment, such as radar sets, had a serious effect on the conduct of the campaign. When these contingencies occurred, the Allies were prepared with back-up plans. The commanders knew they did not have all the information they needed regarding the conditions they would find and the material they would have on hand when they arrived; still, they believed that strategic surprise and contingency planning were the keys to success.

Quite the opposite from the lack of information the Allies had during the landing operations, the battle against the Axis forces in North Africa was marked by a high degree of information. ULTRA decryptions provided the basis for many of the Allied command decisions. Because of the Axis' convoluted command structure, a great deal of high-level communication was required; with orders coming from several different sources and the forces in the field split among two, and later three field commanders. This large amount of high-level communication was exploited by the Allies via ULTRA. Strategically, the most significant information regarded the Axis low levels of supply and the times and routes by which resupply attempts were to be made. By exploiting this information, the Allies were able to interdict much of the Axis supply ships, which made defeat of the Axis powers largely a matter of time. ULTRA intelligence also betrayed the enemy's order of battle, movements, and indications of the commanders' frame of mind. Combined with aerial reconnaissance, British radar and battlefield ELINT, the Allies had an amazing degree of information about their adversary which they used to drive him toward eventual capitulation.

However, this faith in ULTRA led to some significant difficulties on the battlefield when facing Rommel's opportunistic style of warfare. In the case of Kasserine Pass, Eisenhower's G2 had ULTRA intelligence that indicated Rommel's objective would be to strike the Allied main staging and supply area at Bone. To reach this objective, he was going to move north to Le Kef, which implied he would bypass the Kasserine Pass. Thus, the Allies felt secure in focusing their strength to the north rather than in the area of Kasserine. However, when Rommel engaged the American forces in the area, he found the weakpoint to be Kasserine rather than to the north. Ever

on the lookout for tactical opportunities, Rommel abruptly changed his plan and focused it toward Kasserine. ULTRA had not been incorrect, but it did not take into account the warfighting style of this particular adversary, whose preference was for utmost flexibility and tactical exploitation.

The final seizure of Tunisia and the defeat of the Axis forces in North Africa was the third major command decision made by the Allies in this campaign. The Allies had made solid gains against the Axis forces until they reached the geographic impediment of the Bon Peninsula, which coincided with the onset of horrible winter weather. For two months, the offensive was halted until the weather cleared, the ground hardened (enabling the tracked vehicles to move once again), and aerial reconnaissance could once again provide a more accurate picture of where the enemy was located, and in what strength. The information gathered by aerial reconnaissance enabled the Allies to finally rout the Axis troops from North Africa with a well-planned encircling movement, which left the Axis the choice of either retreating to Sicily (strictly forbidden by Hitler) or surrendering.

The key Axis command decisions were the assessment of the nature of the Allied invasion, the decision to engage in a fighting retreat, and the battle at Kasserine Pass.

The Axis commanders were very much mistaken regarding the nature of the Allied invasion. These commanders all believed that the Americans were simply incapable of crossing the Atlantic and landing a combat-ready force on the shores of North Africa; they felt that an intermediate staging area would be required, and thus the attack would have to come from France. This was a critical misjudgment. The Allies did accomplish the landing, secured their lines of supply, and soon were able to more than match the Axis forces in strength.

The second command decision for the Axis was to engage in a fighting retreat. This was the obvious decision for the German commanders, as they lacked sufficient forces to withstand the Allied assault. It also fit well with Rommel's preferred style of fighting: highly-flexible maneuver warfare. However, this decision also made such considerations as supply and communications all the more important; two factors which, as we have seen, were exploited to great benefit by the Allies.

Amid this fighting retreat was the command decision at Kasserine Pass. As described before, Rommel intended to make a bold thrust against the American portion of the Allied line with an intent to break through to Bone, the Allies primary supply line. In doing so, he would also split the front, likely causing it to collapse in disarray. Rommel's forces were too small to accomplish the entire attack, so he had requested forces from von Arnim to press against the Allies to the North. (The Allies were aware of this

information through ULTRA intercepts.) However, when he actually launched the attack, he found the tactical weakness to be in the area of Kasserine Pass, and sent his forces in that direction instead of North as originally planned. By doing so, he broke through the Allied lines, destroying and driving back the inexperienced American units. After achieving the breakthrough, with Bone lying before him, Rommel stopped. Rommel's intelligence staff informed him that the Allied lines to the North had not moved and that von Arnim's assistance had not been granted (von Arnim later claimed that they were unavailable due to needed repairs). Rommel judged the conditions of the battlefield to be inconducive to further tactical exploitation due to the size of the Allied force to the North, and decided to withdraw. With this decision, Rommel in effect admitted that the Axis forces in North Africa could not win. Although the Axis forces stayed in Tunisia for another two months while the weather precluded movement of heavy forces, they were no longer able to mount a serious defense, and Rommel himself relinquished his command and returned to Germany.

DBA/DBK Conclusions

Through most of the battle, the Allies maintained a relatively high level of DBA and DBK. Their situational awareness was low prior to and during the landing itself, but the information they did have highlighted some of the possible risks, notably regarding French intentions. This comprehension of what they did not know encouraged the Allies to build flexibility into their planning. In this sense, a lack of DBK, because it was recognized, worked to the Allies' advantage. Once on the continent, the Allies used ULTRA intercepts to interdict the Axis supply lines and to determine what actions would be perceived by the Axis as the most threatening, confirming the enemy movements with aerial reconnaissance and contact with the enemy. They were able to narrow the enemy's list of options and force them into a largely responsive position. However, most important was ULTRA intelligence on the state of Axis supplies and identification of resupply efforts. The timeliness and accuracy of these reports was outstanding. Through ULTRA decrypts, the Allies knew of this problem and also knew when resupply attempts were to be made, which allowed them to interdict and destroy the resupply craft. This greatly eroded the Axis ability to operate, particularly in Rommel's case because he relied upon supplies to maintain his style of high-tempo maneuver warfare. ULTRA also gave the Allied commanders important insight into the Axis' national politics and even the personalities of Axis commanders.

The Axis committed a major misjudgment in believing the Americans could not deploy from the US directly to the theater. This assumption prevented them from gathering intelligence on American actions that might have alerted them to the impending attack. Thus, when the Allies arrived on the

beaches, the Axis were forced into simply responding. From that point on, with only brief exceptions, the Allies controlled the initiative.

A final Axis shortcoming was in their prioritization of the type of intelligence they sought. The Axis intelligence units seemed to be primarily concerned with tactical rather than operational-level information. Their collection of battlefield SIGINT, contact with the enemy and aerial reconnaissance was used by Rommel to seek out tactical-level opportunities that he could exploit to produce operational-level effects. Although the Allies also benefited from the use of tactical aerial reconnaissance, ground reconnaissance units, tactical SIGINT/ELINT, the Allied commanders were able to maintain a clearer 'picture' of the battlefield - and thus, maintain a higher level of DBA/DBK - through *combining* these sources with operational-level information, which served to corroborate the data and make command decisions all the more certain. What the Axis forces lacked was sufficient timely and accurate operational-level information. This failure was visible at the campaign's outset when the Allies landed in force on the North African coast, and continued throughout the campaign as the Allies cut the Axis supply-lines (using ULTRA intelligence) and eventually pushed them off the continent.

Dominant Battlespace Awareness III

**Invasion of Normandy Case Study
(D-Day) June 6, 1944**

Information Requirements

IPR With LtCol Paul Selva

25 June 1997

DBA/DBK Definitions

DBA

- A high level of awareness (~90% visibility) of friendly and enemy forces, and the environment.

DBA is fundamentally about location relative to enemy/friendly locations.

DBK

- High confidence in the future (95%), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level.

Critical DBA/DBK Questions

- What were the sources/mechanisms of DBA and DBK?
- What happened both tactically and strategically when those sources were denied?
- What information was available to the commanders during the battle? Conversely, what information was not available?
- What were the Commanders' key information requirements?
 - Enemy Order of Battle including location
 - Enemy capability
 - Enemy intent

Campaign Objectives

Allied

- Establish an Allied foothold in Western Europe
- Land troops on the Cotentin Peninsula and destroy German ground forces.
- Ensure a continuous supply of reinforcements and war materiel.

German

- Deny Allies a foothold in Western Europe.
- Repel Allied amphibious landing in France.
- Maintain German control over Western Europe

CONOPS

Allied

- **Conduct a five element amphibious assault/landing in Western France to create a beachhead to bring ashore the 21 Army Group.**
 - Land on the Normandy Coast
 - Build up the resources needed for a decisive battle in the Normandy-Brittany region and break out of the enemy's encircling positions
 - Pursue on a broad front with two army groups, with emphasis on the left to gain necessary ports in Belgium, Brittany and the Mediterranean
 - Link with invasion from the south of France in Operation Anvil-Dragoon
 - Build up a new base along the western border of Germany and then proceed into the Ruhr (heavy manufacturing)

CONOPS (cont.)

- **Allied**
 - **Complete the destruction of enemy forces west of the Rhine, while constantly seeking bridgeheads across the river**
 - **Launch the final attack as a double envelopment of the Ruhr, one axis coming from the 21st Army Group from the North and the other axis coming from the 12th Army Group from the South**
 - **Defeat/destroy the remainder of Germany's military forces**

CONOPS (cont.)

German

- **Maintain presence in France while denying Allied troops a foothold ashore after crossing the English Channel**
- **Reinforce the “Atlantic Wall” to stop Allied invasion in the Calais region (Allied deception caused this to be the area of focus)**
- **Create man-made impediments to an amphibious invasion across the English Channel**
- **Hold significant armor units in reserve to be able to reinforce on short notice with heavy armor wherever needed**
- **Build a fortified line of artillery defensive positions along the French coastline to repel invasion forces**

Overview of Forces

Allied Forces:

- **21 Army Group - Montgomery**
 - **US First Army - Bradley**
 - » **US VII Corps - Collins**
 - **US 4 Infantry Div - US 82d Airborne Div and US 101st Airborne Div**
 - » **US V Corps - Gerow**
 - **US 1 Infantry Div**
 - **British Second Army - Dempsey**
 - » **British XXX Corps - Bucknall**
 - **British 50 Infantry Div**
 - **British 8 Armored Bde**
 - » **British I Corps - Crocker**
 - **3 Canadian Infantry Div**
 - **2 Canadian Armored Bde**
 - **British 3 Infantry Div - British 6 Airborne Div**
 - **British 27 Armored Bde**

Overview of Forces (cont.)

German Forces

- OKW - von Rundstedt (OPCON - Rommel)
- Fifteenth Army - Salmuth
 - XLVII Panzer Corps
 - » 21 Panzer Div
 - » 716 Infantry Div
 - » 711 Infantry Div
 - » 346 Infantry Div
 - » 12 SS Panzer Div
 - » 1 SS Panzer Div
 - » 116 Panzer Div
 - » 272 Infantry Div

Overview of Forces (cont.)

German Forces

- Seventh Army - Dollmann
 - LXXXIV Corps
 - » 709 Infantry Div
 - » 91 Infantry Div
 - » 352 and 35 Infantry Div
 - » 243 Infantry Div
 - » 17 SS Panzer Group Div
 - » Panzer Lehr
 - » 9 and 10 SS Panzer Div
 - » 53 Infantry Div
 - » 276 and 326 Infantry Div
 - » 2 SS Div
 - » 5 and 3 Parachute Div's

Sequence of Events

6 June 1944 - 26 June 1944

Allied

Allies begin planning "Overlord" and building the deception plan, denying Germans aerial look at real invasion force - good OPSEC

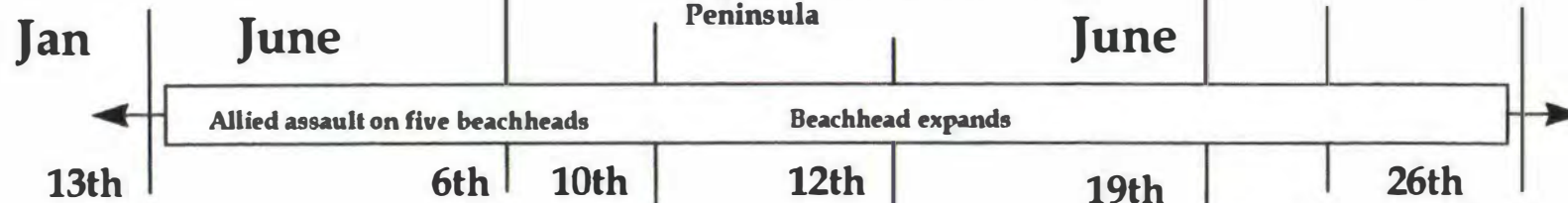
Ships loaded two days prior, and day before -airborne all launched prior to midnight 5 June

Five Division Amphibious landing begins 0200 hrs - Airborne elements drop at 0130 hours

Hurricane destroys Mulberry and delays reinforcements/resupply for four days

Allied forces take hard-fought ten mile wide front, begin to cut off Cotentin Peninsula

Cherbourg Falls, but is heavily damaged



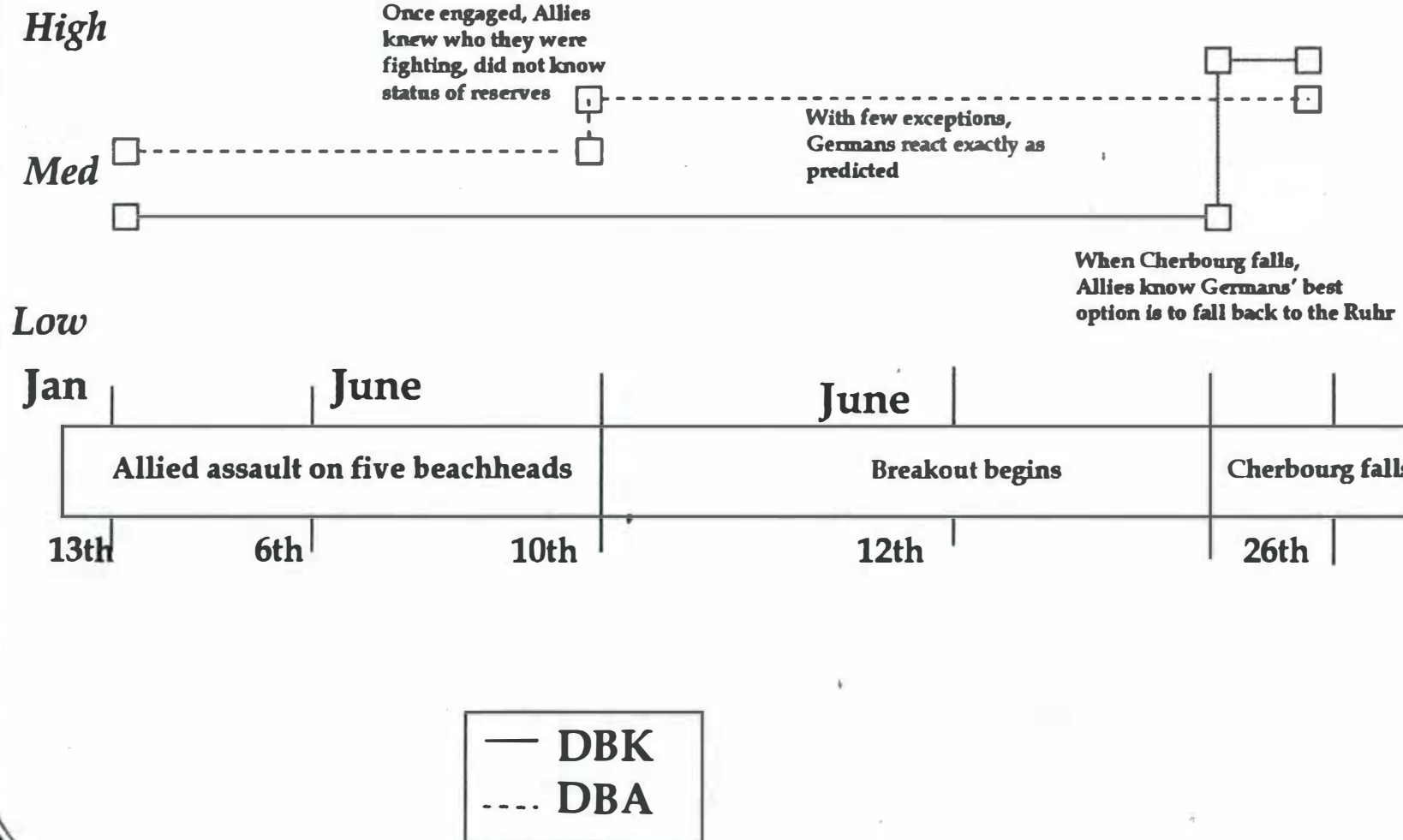
Enemy

Germans caught offguard - looking at Calais as attack point due to Patton's Ghost Army and bombing north of the Seine

German Panzer units blunt advance and cause delaying action to Allies' advance - Germans finally realize Normandy is real invasion point

Level of DBA/DBK -- Allies

6 June 1944 - 26 June 1944



Level of DBA/DBK -- Germans 6 June 1944 - 26 June 1944

High

*Germans realize Allied Intent
to establish a beachhead at Normandy*

*Germans realize - Normandy
is the place*

Med

*Germans know invasion
is coming, not where*

*Germans did not know
point of attack precisely,
nor did they know the
Allied OB, AOB, or state
of readiness*

*Awareness rises dramatically
as Allies come ashore and airborne
troops land behind German positions.
Once beachhead established,
Germans did not understand Allied
axis of advance, Hitler understood
they were going to Germany*

*After Cherbourg falls, Americans
have a wide front and
Germans do not know where
Allies are headed*

Low

Jan

June

June

Allied assault on five beachheads

Breakout begins

Cherbourg falls

13th

6th

10th

12th

26th

— DBK
- - - DBA

Sources & Mechanisms of DBA

Sources

- Friendly & Enemy Order of Battle
- Friendly & Enemy Capability
- Location and Status of Friendly & Enemy Logistics and Supply Lines

Mechanisms

- Communications intercepts (ULTRA/MAGIC)
- Aerial reconnaissance (virtually unchallenged)
- Underground HUMINT (French Resistance) throughout France
- Contact with the enemy

Sources & Mechanisms of DBK

Sources

- Friendly & Enemy Capability
- Friendly & Enemy Intent
- Friendly & Enemy Morale
- Location and Status of Friendly & Enemy Logistics and Supply Lines

Mechanisms

- Communications intercepts (ULTRA/MAGIC), exploiting ENIGMA
- Historical precedents and direct observation
- Underground HUMINT (Free French Forces of the Interior, FFI)

Information -- Required

Allies

- Location, status, and number of enemy units
- Logistics capacity of friendly forces (once established, can captured port facilities and mulberries in France/Belgium sustain supply needs?)
- The most likely enemy course of action (e.g., intent)
- Location, status, and number of friendly units (exacerbated by extensive use of airborne units- three divisions)

Germans

- The most likely Allied course of action (e.g., intent)
 - Where would the Allies attack?
 - When would the Allies attack?
 - Who would attack, with what force and with what goal?
- Location, status, and number of enemy units
- Can logistic support be sustained despite Allied bombing?
(Interdiction prior to D-Day was fairly complete)

Information -- Not Sought

Allies

- State of German troops' morale (Allies predicated the conduct of the invasion on cracking German morale)
- Identity, location, and personality of enemy decision makers - (von Rundstedt, Rommel, and Hitler)
 - Allies could not understand why the Germans refused to concede Caen (Hitler)
- Command Relationships - Allies were not aware that Rommel was controlling the operational tempo
- Location of OKW (Army Headquarters)

Germans

- Command structure of Allied forces (e.g., Eisenhower autonomous or not?)
- Allied Force's capability to move hundreds of thousands of men and machines in a coordinated effort
- Priority of Allied air strike targets and rationale

Information -- Timeliness

Allies

- Through the use of “dicing” aerial reconnaissance missions (flown at 50 feet altitude), Allies had near real-time picture of beachhead
 - Battle Damage Assessment (BDA) was done via aerial photography and available upon mission recovery
- The most detrimental communications situation was immediately after landing at Normandy in the “fog of war”, simply too dispersed and busy fighting

Germans

- No real-time aerial reconnaissance due to Allied air superiority/dominance
- Airborne landings in rear caused communications breakdowns along German front (Allies cut landlines)
- Command structure with Hitler involved, increased response times for tactical decisions

Information -- Accuracy

Allies

- **Although photos existed of the beach, major misinterpretations on the extent of man-made impediments were made - causing severe damage to landing craft (particularly at Omaha)**
- **Allies did not know about the presence of the 352nd Infantry Division, cause for Omaha to be less successful**
- **Inconsistencies between ULTRA reports and actual performance caused the Allies to not have a good sense of the state of the Luftwaffe**
- **Allies did not grasp the technical superiority of the German tanks**
- **Understanding of difficulty of operations in and through the Bocage was completely wrong**
- **Weather observation from the Atlantic provided the Allies with an information advantage over the Germans**

Information -- Accuracy

Germans

- Knew the invasion was coming, but did not know where (*Operation Bodyguard*, Allied deception plan caused them to think Pas de Calais, led by Patton)
- Germans did not know the status of the invading force in England, nor size of the force attacking- no German air reconnaissance allowed to see the real force, only the deception force
- Weather played a significant role - Germans did not believe the Allies could attack because of the weather front
- Germans had no assets in the Atlantic

Elements of IW

Allies

- **Electronic Warfare**
 - Advantage to the Allies in EW; they knew from ULTRA/MAGIC decrypts troop and aircraft strengths, and locations of most ground forces.
- **Deception and OPSEC**
 - Definite edge to the Allies; attack at sites adjacent to Normandy was a complete surprise to Germans (they thought attack would come at Calais)
- **Physical Destruction**
 - Axis logistics support apparatus was vulnerable to attack by Allied air power. Critical resupply routes were known and attacks were conducted successfully (Allies enjoyed complete air superiority throughout the campaign)
 - Allied bombing had done an effective job of interdicting/destroying the German supply and reinforcement system

Elements of IW

German

- **Deception**

- Germans did not conduct a deception plan per se but were able to conceal impediments on the beaches, done at night to conceal actions from aerial reconnaissance (intentional)

- **Electronic Warfare**

- German air search radars told them the Allied air attack, as a precursor to the invasion, was coming but did little to warn them where the beach landing would come

- **OPSEC**

- Luftwaffe terrible at OPSEC and COMSEC
- Good Allied OPSEC prevented Germans advanced knowledge of attack size and location

Impact of Knowledge

Allied

- Allies underestimated the strength of the Germans, especially in armor; they also did not know where some critical units were located causing the beachhead expansion to be delayed by several days in some locations
- Allied knowledge of Germans' intent to draw fighter support from Eastern Front had an impact on the bombing strategy (press the attack and attrit fighters in the air)
- Allied "dicing" missions provided accurate depiction of beach defenses in most cases (exceptions were below-water counter-landing craft obstructions and Omaha)

German

- Germans were completely surprised by the attack at Normandy, thinking the assault on France would come at Calais

The Impact of Command

Command Structure

- **Allied**
 - Strong unified command structure with total autonomy
 - Coordinated inter-service and inter-Ally support mechanisms in place and functioning well
- **German**
 - Command structure linked inextricably back to Hitler, even Rommel and von Rundstedt could not make crucial command decision without permission from Wolf's Lair

Personalities

- **Allied**
 - Strong leadership from Eisenhower and his joint staff
 - Mere presence of Patton (ghost Army) made Allied deception plan more believable to the Germans
- **German**
 - Rommel - strong field leadership, weak leadership from von Rundstedt (conflicting philosophies)
 - Hitler dominated all decision making
 - » Costly and ill-considered defense of Caen
 - » Marching forces from the Eastern Front

The Impact of Intangibles

Weather

- Inclement weather in the three days prior to D-Day prevented aerial reconnaissance of beaches - denied knowledge of water barriers placement at Omaha.
- Hurricane of 19 June halted all landing activity for four days and destroyed the mulberry at Omaha Beach and damaged the mulberry at Gold Beach
- Invasion timed to provide moonlight for airborne troops

Unit Morale

- Germans saw the "Atlantic Wall" as their last line of defense in the West

Terrain

- Allies did not realize difficulty operating in and fighting through the Bocage (hedgerows)

Why Did the U.S. Plan Succeed?

- The Allied plan succeeded, primarily because they were able to conceal the actual location and timing of the invasion
- The Allies had the capability to put large numbers of troops and supplies ashore very rapidly and to maintain that flow for an extended period of time
- The Allies were not able to maintain their battle rhythm, as projected, due to intangibles such as not knowing about the presence of the 352nd ID and the difficulty with which they would advance through the Bocage
- Weather worked to the Allied advantage since the information came from the Atlantic, they could see the front passing

Why Didn't German Plan Succeed?

- Primary reason the German plan did not succeed was because they had a terrible concept of the Allies' OB and AOB
- Germans bought the Allied deception plan completely and therefore, had 18 top-notch divisions at Calais
- Additionally, the Germans did not accurately assess the state of readiness of the Allied invasion force nor did they believe the Allies were coming due to inclement weather

DBA Conclusions

Allies

- Allies had significant difficulty at Omaha because they did not know of the presence of the 352nd Infantry Division
- Allies consistently underestimated the force necessary to take Caen because they did not realize the importance placed on holding Caen by the Germans (two reasons - rail terminus for resupply/reinforcements and the plains south of the city are ideal for armored maneuvering)
- Allies had considerable difficulty traversing the short distance to achieve first day objectives because they did not appreciate how difficult it would be to operate in and through the Bocage
- Did not accurately know the German command structure: they did not know Rommel was in operational control

DBA Conclusions (cont.)

Allies

- **Allies did not know what numbered armies were in Normandy nor the methodology for utilization of the reserves, particularly armor**

Germans

- **Did not have a realistic picture of the state of readiness of the Allied invasion force and were surprised by the enormity of the invasion force**
- **Had a terrible assessment of actual Allied Order of Battle and were completely deceived by Patton's ghost army**
- **Had a poor idea of the Allied Air Order of Battle, not the reality that they were outnumbered by about four to one**

DBK Conclusions

Allies

- Possessed a poor concept of how and when the Germans' armor reserves would be employed and thus influenced the way they fought against armored forces (caused Allies to be too conservative)
- Had a fairly accurate assessment of the relative priority of the Normandy invasion and its defense versus the Eastern Front and the Germans' willingness to pull troops and aircraft from that front (thought threat from Russians and associated distances was less than US/British threat)
- Importance of Caen to Hitler's overall defensive plan was never realized by the Allies (he wanted to fix the enemy at Caen to allow for a massive armored buildup and counter-offensive) and thus we suffered heavier than expected losses and repeatedly underestimated how long it would take to capture it

DBK Conclusions (cont.)

Germans

- **Had fallen for the Allied deception plan completely, thus they had many of their first-rate units at Pas de Calais**
- **Believed, for the first several days, that the invasion force at Normandy was still a feint and the actual invasion would be at Calais - this caused the Germans to miss valuable opportunities to counterattack in the early stages**
- **Suffered from a lack of aerial reconnaissance which caused them to, in essence, be blind as to Allied intent**

Command Decisions in the Invasion of Normandy

June 6, 1944 - July 1, 1944

Background

Early in 1944 the Allies began planning the most complex amphibious landing operation in the European theater of the war. The invasion of Normandy, *Operation Overlord*, was to take place on the Cotentin Peninsula southeast of Cherbourg and southwest of Calais. General Dwight D. Eisenhower, with his Combined Allied staff, planned the invasion around the tides and historical weather patterns for the English Channel, and set a launch date of late May or early June.

The Germans knew an invasion was coming, the only question in their minds was when and where. The Allies conducted an elaborate deception plan, *Operation Bodyguard*, coincident to the actual buildup and prosecution of the real invasion. The deception plan involved the creation of a fictitious "rubber" Army group of forty-five divisions consisting of blow-up tanks and notional radio traffic to be commanded by LTG Leslie J. McNair and an Army commanded by MG George S. Patton. Patton's reputation was well-known by the Germans and this fact, in addition to Allied increased bombing north of the Seine, caused the Germans to deduce that the invasion was destined for the Pas de Calais. The deception was extremely effective and drew off at least fifteen divisions and caused the Germans to build numerous coastal gun emplacements well to the north of the actual invasion site.

As a direct result of the Allied deception plan, there were 18 German divisions near Calais leaving only 14 divisions (7 armored) opposite the British at Caen and 5 divisions opposite the Americans north and east of Carentan. At the outset, OB West commander, General Field Marshal von Rundstedt had under his command, some 55 divisions, comprising 850,000 personnel. Over one fifth of these divisions, however, were either unfit or untrained. Of the total 30 Infantry divisions, six were near the Mediterranean, one was in the Pyrenees, seven were in Brittany and one was effectively prisoner on the Channel Islands. An even dozen lined the Channel near Calais. Of the eleven Panzer divisions, only the three SS divisions (1st, 2nd, 12th) and Panzer Lehr were at full strength with over 100 tanks each. The 2nd, 9th, 11th, 21st, and 116th each had fewer than 100 tanks. Additionally, the 17th SS had only one battalion of Armor and they was equipped with assault guns rather than tanks.

Within the German camp, there was a significant disagreement over how to respond to an Allied landing. Von Rundstedt and General Field Marshal Rommel each had different preferred strategies. Rommel was a proponent of "static defense," arguing that the Allies should be stopped while still on the

beach, without allowing them to establish the necessary supply infrastructure to fortify and strengthen the troops ashore. Von Rundstedt, to the contrary, supported the traditional "mobile defense" strategy that asserted that the army in the west should keep in reserve a strong, armor-based reaction force to reinforce where needed.

The Allies chose to divide the beach into five separate beachheads, each about ten miles wide. From west to east the beaches were code-named Utah, Omaha, Gold, Juno and Sword. The three easternmost beaches, Gold (British), Juno (Canadian) and Sword (British) were assigned to the Canadian and British contingent with an infantry division each and an armored brigade assisting. The two westernmost beaches, Utah and Omaha were the responsibility of the two American infantry divisions (1st and 4th). In addition, three of the four Airborne divisions available were used to parachute into the rear of the German front line on the left and right flanks, fix the German reinforcement elements, and then to secure exit routes off the beach for the infantry. The American 82nd and 101st and the British 6th Airborne divisions were slated to be dropped on D-Day with British 1st remaining in reserve.

To accomplish the feat of landing and covering, with gunfire and bombing, eight divisions in the initial wave, followed by over fifty divisions of subsequent reinforcements, the Allies would utilize over one thousand naval vessels, over one thousand merchant vessels, and three thousand landing-craft. In addition, over 12,000 aircraft were used to drop the airborne divisions, tow the gliders, provide bombing of critical infrastructure (cutting off the Normandy region), and to fly fighter escort sorties.

Intelligence estimates were compiled using Free French underground forces' HUMINT reports, daily aerial reconnaissance, and intercepts and decrypts of both ULTRA and MAGIC. The Free French of the Interior (FFI) passed locating data and unit identities on German forces to the Allies continuously until the actual invasion began.

Daily photo reconnaissance flights provided detailed, low-altitude pictures of all the beachhead areas. "Dicing" missions, photo reconnaissance sorties flown at less than fifty feet altitude, were able to provide excellent pictures of what the beach obstacles looked like and where they were situated for all the beaches, except Omaha. This was one of the significant contributing factors as to why Omaha was the least successful of all the five beachheads. The obstacles at Omaha were not laid until shortly before D-Day and with poor weather conditions in the four days immediately prior to the invasion, the Allies had no clear idea of the obstacles placed there.

Exploitation of the ENIGMA encryption device was more valuable for strategic rather than tactical use since intercepts could take up to a week to decrypt. In

the weeks leading up to D-Day, these decrypts provided the Allies with a very accurate picture of aircraft production decreases due to bombing and, when the bombing priority changed to synthetic fuel production and storage facilities, a very good appreciation of the Germans' inability to move those fuel stores in a timely manner to meet tactical objectives.

Battle Outcome

Initial stages of the battle went largely according to plan. All along the fifty-mile wide front, the lodgment area was established, although very tenuously at Omaha beach. The relative lack of success at Omaha was due to the sinking of tanks as they came ashore due to rough seas and the lack of knowledge on the placement of obstacles near the shoreline. In addition, the Americans at Omaha ran headlong into the veteran German 352nd Infantry division, which had been moved into position during the interval between the most recent reconnaissance missions and D-Day. The depth of beachhead was not as wide as desired early on, but it was at least to a depth that was defensible and allowed some limited maneuverability for the troops involved.

The airborne divisions established flank protection areas and prevented the Germans from reinforcing through the few lines of communication that had not been interdicted by heavy bombing prior to D-Day. The airborne divisions had varying degrees of success based primarily on their assigned drop zone. The 101st suffered, by far, the worst fate. Through no fault of their own, they were dropped in various bad situations, some out at sea over the eastern coastline of the Cotentin, some in the flooded plain behind the coastline, or in the floods of the Douve or Merderet, which were undetectable from the aerial photo missions. Another initial major problem was these units' inability to communicate. Radios were dropped separately from the operators and when they could not be located, commanders were left without means to communicate up or down the chain of command. Until leaders were able to gather enough troop strength to strike out on their assigned missions, the lost parachutists just wandered around in the pre-dawn darkness trying to locate their fellow soldiers. Many units saw their strength at only about 60-70% by mid-day.

The immediate goal of the invasion, to be achieved by 2400 hours on D-day was a front roughly ten miles in depth along a forward line approximately fifty miles wide, running from the Douve River in the west to Isigny, to south of Bayeux, south of Caen, around Bures and on to Cabourg in the east. The American VII Corps was most successful, having breached the marshland at La Madeleine and, with help from the 82nd and 101st Airborne divisions, having progressed inland to their preliminary objectives with very few pockets of German resistance remaining. By contrast the American V Corps at Omaha only held a narrow beachhead barely two miles wide by the end of the first day. British

XXX and I Corps had some success with the exception of a large, swift armored counter-attack by the 21st Panzer division during the afternoon which succeeded in retaking parts of Juno and Sword toward the coast at Douvres. This bold move, the only German counter-offensive to occur on D-Day, almost split the British/Canadian force in two. Only a rapid response by Royal Marine Commandos and the North Nova Scotia Highlanders managed to stop the advance of the Panzers. Subsequently, the 9th Canadian Brigade almost enveloped the 21st Panzers in their march toward Caen.

Once the Allies were ashore at Normandy, the Germans had two immediate goals. First, they sought to press the attack on the Allied western flank to lessen the likelihood that the Allies could take Cherbourg and thus cut off the Cotentin peninsula. Second, they tried to prevent the Allies from enlarging the lodgment area near the beach. Hitler asserted that he did not care if his troops on the peninsula were lost as long as they consumed significant efforts and attention of the Allies. Hitler's rationale was to buy time to allow for the build-up and eventual conduct of a huge armored counteroffensive in the area around Caen. He hoped to cut off the British front line at the beachhead and thus allow for the splitting and slow destruction of the entire front.

Allied air superiority, never more evident than on June 6th, essentially doomed the German response. The Allies flew 12,015 sorties, none of which were interdicted by enemy air action. The Germans flew only 319 sorties and lost many aircraft (German aircraft had flown only 129 missions in the six weeks prior to D-Day). One minor failure of the early bombing on June 6th was that for fear of friendly fire casualties Allied bombers delayed their drop over the coastline. After getting permission to delay their drops by as much as 30 seconds, many of the bomb drops fell three miles inland causing little or no damage to the very narrow German defensive line which was only several hundred yards wide in some places. The only casualties in this action were sheep and cattle in the bocage.

During June and July at or near Normandy, over 2200 German tanks were destroyed. Only 120 tanks were left at the end of July (including only 14 tanks in the elite Panzer Lehr division) and armor reserves sent to the front totaled only 17 replacement tanks. Infantry divisions suffered over 74,000 casualties and received only 10,000 replacements.

By mid-July, the Allies had brought to bear over 34 divisions against the remaining 20 German divisions. German reinforcements had been almost entirely interdicted by Allied air power. German attrition was exacerbated by Hitler's refusal to allow any withdrawal to a defensible line, as suggested by both von Rundstedt, who Hitler relieved of command, and von Kluge. Von Kluge echoed von Rundstedt's earlier assertion that the Germans needed to fall back to the Seine or some other tactically significant line to allow for

reinforcement and resupply. Hitler adamantly refused and further ordered counterattacks at every opportunity.

For all intents the invasion and lodgment at Normandy had been successful and the Allied foothold in Europe was growing. What remained was the Allied plan, *Operation Cobra*, to break out completely and swing in a wheeling motion to the east and south of the Germans, trapping them south of Caen.

Command Decisions

Many critical decisions were made during the planning and execution phases of the invasion of Normandy. A series of decisions coordinated between Montgomery and Eisenhower were crucial to the success of the Normandy invasion and subsequent breakout. The first decision, made in the initial planning phase, was the development of the extremely successful deception plan discussed previously. The second critical decision dealt with where, exactly, and when to invade Europe. Eisenhower decided to plan around the tides, weather and moon conditions of late May-early June. The size of the invading force was also a critical decision. Originally, the Allies were going to go with a four beach amphibious assault but finally decided to go with five divisions on five beaches supported on the flanks by three airborne divisions to secure exit routes off the beachheads and to cut off reinforcements. Eisenhower's decision was tempered primarily by the available sea transport and the width of the front upon which he wanted to attack.

On the German side, a critical factor in their lack of success on the day of the attack was the absence of three crucial leaders from Normandy. Rommel was on leave in his home district of Swabia and was only able to arrive on the scene late on June 6th. By then, the Allies were ashore, and established on the beach and inland. Dollmann, the commander of the Seventh Army was conducting a wargame at Rennes and Sepp Dietrich, the charismatic leader of the 1st SS Panzer Corps was in Brussels. This vacuum of leadership probably delayed to commitment of the formidable 12th SS Panzers and the Panzer Lehr until it was too late.

Once the beachheads were established and supply infrastructure somewhat stabilized, the next decision to be made was when to break out and how. Since the British were very heavily engaged in and around Caen, Eisenhower and Montgomery decided to allow the American VII Corps under Collins and, eventually the newly established Third Army under Patton, to take the Cotentin Peninsula and advance to Brest on the opposite coast. Once Brest and Cherbourg were in Allied hands, resupply became less of an issue with its associated risks and limitations in utilizing the Mulberry (artificial concrete harbors) at Normandy.

Also significant were Allied IW operations. For example, at Ste Mere-Eglise, a communications trunk-line was cut that carried all landline communications from Cherbourg. That one move had a significant detrimental effect on the German attempt to hold the Cotentin Peninsula. Without landline communications, the Germans were made to depend on more exploitable radio systems. In addition, through OKW teleprinter intercepts, the Allies were able to stay informed of Hitler's orders to the front, read von Kluge's reports on the conduct of the day-to-day operations and stay forewarned of the Germans' arrangements for reinforcing Normandy. Knowledge beforehand was so complete that Bradley, Montgomery and Eisenhower had to make concessions in some battle preparations so as to not give away the fact that the German plans were known ahead of time.

DBA/DBK Conclusions

Allies

The Allies did not know that the 352nd Infantry Division was near Omaha Beach nor did they know the importance to the Germans of holding Caen. The Allies did not have an accurate understanding of the command relationships between Rommel and von Rundstedt and definitely did not understand that Rommel was in operational control. Coincidentally, they did not realize that the OKW (Army headquarters) was actually located in France. A major shortcoming with regard to DBA on the part of the Allies was their poor assessment of which German numbered armies were in Normandy on D-Day and their lack of knowledge about the methodology for utilizing the reserves, particularly armor. Based on ULTRA intercepts, the Allies had a good idea of the priority the Normandy invasion would have relative to the Eastern Front. Allied intelligence provided a very accurate inventory of the Luftwaffe (total numbers, location and readiness). The Allies, particularly the British, did not realize how superior the German armor was technologically.

In short, the Allies' DBA/DBK situation was mixed. Air superiority, and the surprise achieved as a result of the success of *Operation Bodyguard* were the most decisive factors in the Allies' ability to get five divisions ashore and secure a defensible bridgehead on D-Day. Thereafter, the fact that German mobility was crippled by infrastructure bombing and strategic attacks on German fuel sources meant that the Allies were able to build up their forces faster than the Germans could respond. In the end, the sheer weight on numbers allowed for the breakout from Normandy and the rout of the German forces in France in July and August.

Germans

The Germans never had a realistic picture of the state of readiness of the Allied invasion force, although they did know an assault was coming. They did not have an accurate order of battle and every preparation for invasion was overshadowed by Patton's ghost army. The Germans thought that Patton had at his disposal 55 divisions poised opposite Pas de Calais. The Allied deception plan, *Operation Bodyguard*, affected both DBA and DBK for the Germans. It not only formed a false order of battle, thus fixing large numbers of divisions near Calais, it also skewed the German thinking as to the Allies' intent. Even after a week of fighting at Normandy, Hitler remained convinced that the "real" invasion would still be at Calais. The Germans were unable to get valid aerial reconnaissance to determine where, when and with how much force the attack would come. German scout planes were allowed to see the notional, "rubber" army but if they strayed too close to the real invasion force, they were shot down. This combination of events kept the Germans off-guard and ill-prepared for D-Day, and paved the way for the Allied victory.

Dominant Battlespace Awareness III

Falaise Gap Case Study

Information Requirements

24 March 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (~90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (~95% confidence), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- **What were the sources/mechanisms of DBA and DBK?**
- **What were the Commanders' key information requirements?**
 - **Enemy OB**
 - **Enemy capability**
 - **Enemy intent**
- **What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?**
- **What happened both tactically and strategically when those sources were denied?**
- **How perishable is the information from the different sources across the battles**

Campaign Objectives

Allies

- **Pocket the Germans at Falaise**
- **Weaken the German forces**
- **End the war**

Germans

- **Deny allied breakout from Normandy**
- **Stop allied advance**
- **Preserve German fighting strength**

CONOPS

Allies

- **Breakthrough to rupture German defense**
 - Employ deception campaign
 - Hold action in British Sector; draw German reinforcements
- **Break-out on Western Flank into deep France using Bradley's 1st Army and 3rd Army**
 - Use Hodge's 1st Army to move South to seize Falaise and move toward Argentan while Patton's 3rd Army drives north toward Argentan
 - Forces should meet to surround German 7th Army and 5th Panzer in pocket west of Argentan (close gap)

Germans

- **Launch a counterattack at Avranches to stop the allied offensive and maintain control over its supply base**
- **After counterattack failed, and situation becomes clear, retreat all forces through shrinking gap at Falaise**

Overview of Forces

- **Allied Forces:**

- 21st Army Group, Montgomery
 - » 2nd British Army, Dempsey
 - » 1st Canadian Army, Crerar
- 12th Army Group, Bradley
 - » 1st US Army, Hodges
 - V Corps, Gerow
 - VII Corps, Collins
 - XIX Corps, Corlett
 - » 3rd US Army, Patton
 - XV Corps, Haislip
 - VII Corps, Middleton
 - XX Corps, Walker
 - XII Corps, Cook

- **German Forces**

- 7th Army, von Kluge
- 5th Panzer Division, Hauser
- Eberbach

Sequence of Events

August 1944

8/3 ULTRA decode-learn of Counter-attack at Avranches

* Haislip's XV Corps reaches Argentan

* Allied Armies meet at Chambois, NE of Argentan

* Bradley orders Patton not to advance to Falaise, believes 19 German Divisions coming through Gap

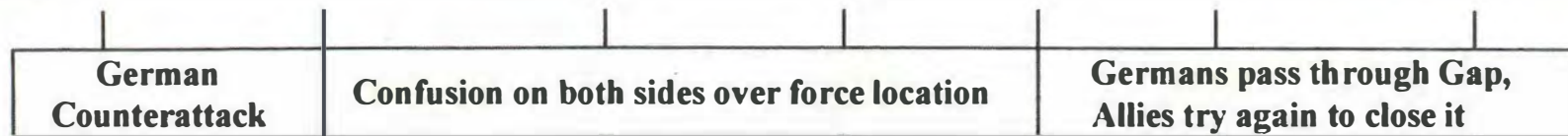
* Bradley's Intel assures large #s of Germans already escaped.

* Bradley's realizes that Germans hadn't fled Gap

* 05:55 Gap closed

* Ongoing Allied bombing campaign intensifies at Falaise Gap

Allies



Germans

11th

* Hitler orders von Kluge to counter-attack at Avranches

* German morale crushed

13th

* von Kluge believes that Gap already closed—battle lost

14th

16th

* Hitler orders Model to take over for von Kluge, afraid he would surrender forces

17th

* Hitler orders von Kluge to withdraw through Gap

19th

* Germans still had 2 mile Gap

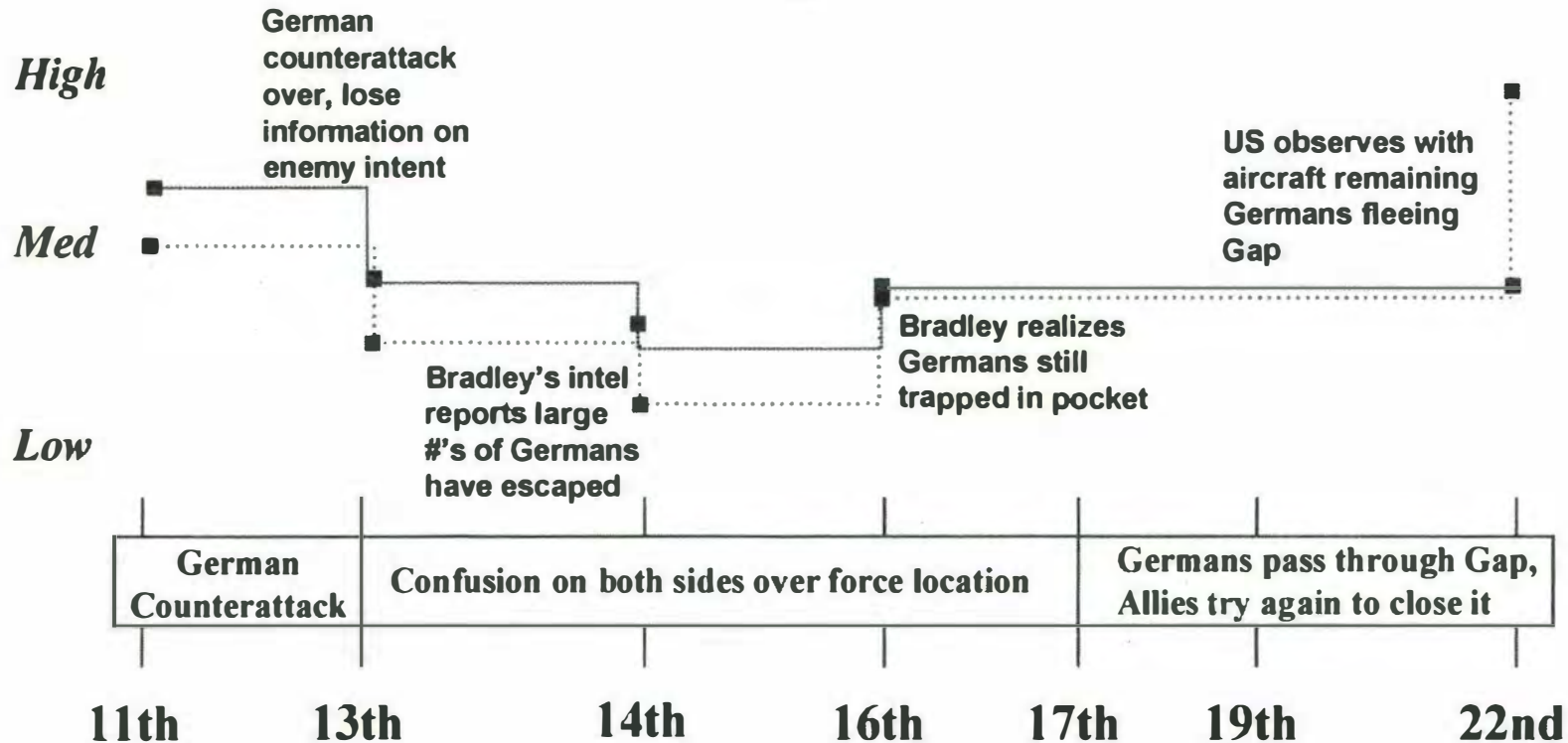
22nd

* Estimated 50,000 Germans escaped through 12 mile Gap

German elite units and officers escaped first

Level of DBA/DBK -- Allies

August 1944



DBK
DBA

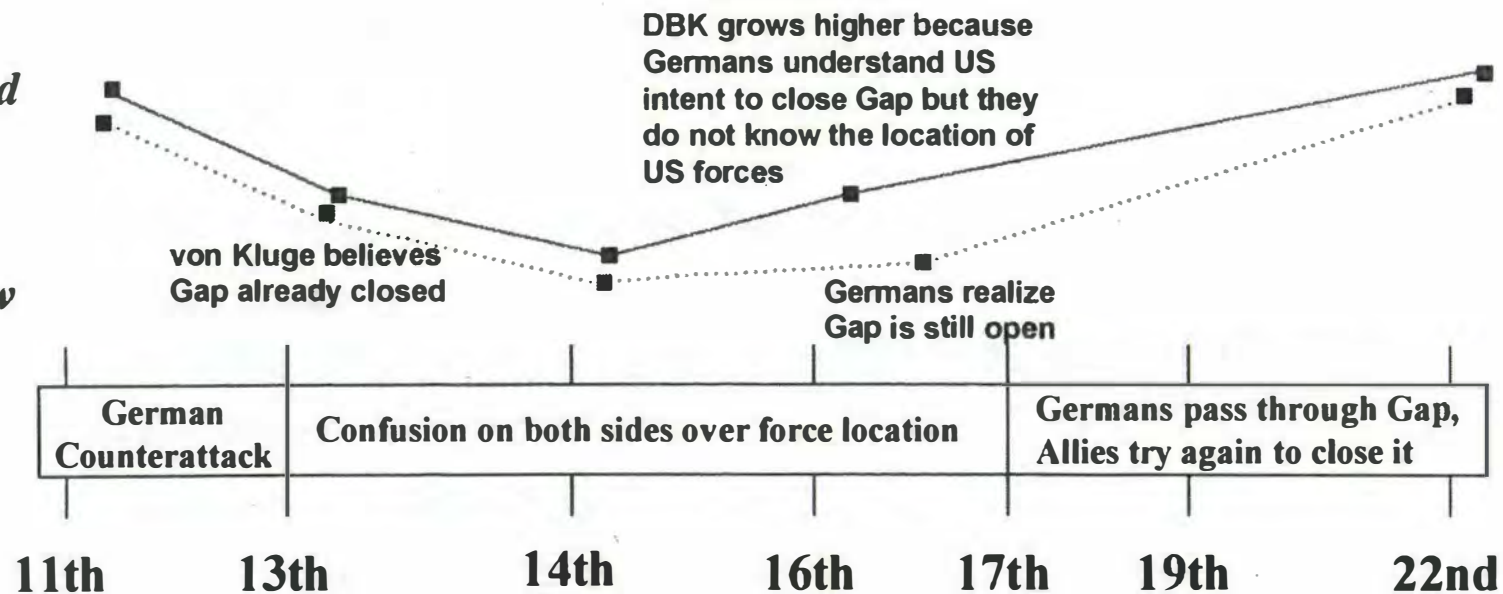
Level of DBA/DBK -- Germans

August 1944

High

Med

Low



— DBK
..... DBA

Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy order of battle**
- **Friendly & enemy capability**
- **Location and status of friendly & enemy logistics nodes and supply lines**
- **Enemy TTP and historical performance**

Mechanisms

- **Communications intercepts (ULTRA)**
- **Aerial reconnaissance**
- **Underground HUMINT from inside occupied territory**
- **Contact with the enemy**
- **POW interviews**

Sources & Mechanisms of DBK

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics nodes and supply lines**

Mechanisms

- **Commander's intuition/experience**
- **Communications intercepts (ULTRA)**
- **Post-battle analysis**
- **Underground HUMINT from inside occupied territory**
- **POW interviews**

Information -- Required

Allies

- **Location, status, and number of enemy units**
- **Logistic capacity of friendly forces (do Allies need Bretton ports)**
- **The most likely enemy course of action (e.g., intent)**
- **Location, status, and number of friendly units**

Germans

- **Location, status, and number of enemy units**
- **The most likely enemy course of action (e.g., intent)**

Information -- Not Sought

Allies

- **State of German troops' morale**
- **Identity, location, and personality of enemy decision maker**

Germans

- **Command structure of Allied forces (e.g., Patton held in check)**
- **Political circumstances affecting Allied decision making (e.g., Patton)**

Information -- Timeliness

Allies

- **Knew through ULTRA that the Germans were planning a counterattack 8 days early (8/3 - 8/11)**
- **Bradley believed that there 19 full divisions arrayed against him which led him to act conservatively (8/13 - 8/16)**
- **Bradley mistakenly thought the Germans had fled the Gap for 4 critical days (8/13 - 8/16)**
- **Did not have accurate information on the weakened status of German forces until battle was over (never got information)**

Germans

- **von Kluge mistakenly believed for 5 days that the gap had already been closed (8/13 - 8/17)**

Information -- Accuracy

Allies

- **Bradley and his intel staff consistently overestimated both the number and capability of the German forces being encircled**
- **Allied also had no information on the enemy's morale**
- **Allies did not have accurate information on when and where the Germans had fled the gap**

Germans

- **von Kluge believed that the gap had been closed and the battle was lost almost a week before it actually happened**

The Impact of Command

Command Structure

- **Allies**
 - Split command between British and US causing conflicts concerning zones and the “right” to capture certain objectives
 - Patton was held back by a more cautious Bradley
- **Germany**
 - Forces launched a doomed counterattack then almost waited too long to retreat because the decision maker was Hitler

The Impact of Command (Cont.)

Personalities

- **Allies**
 - **Montgomery maintained certain objectives for political reasons**
 - **Patton was denied the opportunity to capitalize on his gains by a conservative Bradley**
- **Germany**
 - **Hitler's insistence on commanding from outside the AOR together with his refusal to retreat cost him**

The Impact of Intangibles

Morale

- **Allies**

- Patton and his forces were frustrated when told to wait
 - » In case of a German counterattack at their flank
 - » Waited for Montgomery's force to seize Falaise because it was in his sector

- **Germany**

- Even before the failed counterattack at Avranches, the German troops had “cracked and never recovered” (Eberbach)

The Impact of Intangibles (Cont.)

Weather

- **Allies -- Air campaign's effectiveness (bombing and reconnaissance) were degraded by cloud cover**

Political/Strategic Considerations

- **Allies**
 - **Montgomery forced Patton to wait so his force could capture key objectives**
- **Germany**
 - **Hitler did not trust any of his military leaders and mistakenly commanded the battle from hundreds of miles away**

Elements of IW

Deception

- **Allies**
 - Executed a deception plan to convince Germans that Montgomery's was the main attack, not Bradley's

EW

- **Allies**
 - ULTRA codebreaking allowed allies access to critical information

Physical Destruction

- **Nothing targeted expressly for IW benefit**

Elements of IW (Cont.)

OPSEC

- **Germans**
 - **Their continued poor OPSEC allowed ULTRA decryption to be effective in giving US information concerning upcoming counterattack**

PSYOPS

- **No critical PSYOP planning by either side**

Impact of Knowledge -- Allies

- **Information concerning possible German counterattacks made commanders more conservative**
 - Cost Patton chances to advance more rapidly to envelop German forces
- **Overestimation of German unit strength also added to Allied conservatism**
 - Bradley was worried about Haislip's flank being stretched too thin and its vulnerability to 19 divisions crashing through it so he halted his advance
- **Bradley delayed for several days because of the false impression that Germans had already fled through the gap at Falaise**
 - Cost them their best chance to close the Gap and forced them to rework their battle plans and move the location for the attempted envelopment

Impact of Knowledge -- Germans

- **With Hitler commanding from afar, critical information concerning his troops' morale and unit strength was reported but not considered**
 - **Led directly to Hitler ordering a hopeless counterattack at Avranches that permanently broke the morale and combat capability of his forces**
- **von Kluge wasted several critical days in believing that the Allies had already closed the gap**
 - **This cost the Germans several days head start in fleeing through the gap and allowed Allied bombers to take a greater toll on the retreating forces**

Why Wasn't the Falaise Gap Closed?

- **Felt that Haislip's corps was weak because Flank stretched 65 km; believed could take Gap but not sustain**
- **Falaise was in British/Canadian Sector, Bradley believed that for Britain to save face (morale) Montgomery should capture Falaise**
- **Feared friendly fire**
- **Intelligence concerning number of Germans in pocket often contradicted; even with ULTRA, not sure of true number**

DBA Conclusions

- **Key information on enemy OB and locations was not fully meaningful without accurate knowledge of enemy capabilities**
- **US intelligence continued to show German Offensive potential long after their unit morale and logistics had collapsed**
- **When knowledge of enemy intent was absent, OB and location information drove more conservative decisions**
- **Allied Commanders believed that German forces had already fled Gap; when discovered that the information was wrong, made conservative decisions about envelopment (split Patton's Army--sending toward Seine and halting at Argentan)**

DBK Conclusions

- **US intelligence continued to show German Offensive potential long after their unit morale and logistics had collapsed**
- **When US forces had knowledge of enemy intent, plans were positively impacted despite poor enemy capability assessments and enemy location types of information**
- **When knowledge of enemy intent was absent, OB and location information drove more conservative decisions**
- **Allied forces did not understand that the command decisions were being made by Hitler (in Germany) and executed by forces in France**

Command Decision in The Battle of Falaise Gap—Operation Cobra

In the Summer of 1944, U.S. and Allied forces launched a major ground campaign in Western France. Pre-invasion plans had Allied forces obtaining lodgment through the following maneuver: Patton's Third Army was to go westward from Avranches to take Brittany and its vital ports, while Hodges' First Army protected Patton's flank. The British and Canadian Armies were to move southeast and east, and then move eastward toward the Seine River.¹ However, after June 6, 1944, the Allied forces had successfully established the beachhead at Normandy and the ports at Brittany became less important. At this time, the ground forces were contemplating a breakout and a drive eastward. The commanders were forced to choose between the Bretton ports and a "break-out" because the Allies did not have enough troops or supplies to support both options simultaneously. General Montgomery, under Operation LUCKY STRIKE, envisioned the 2d British Army thrusting across the Seine river in the north, while the 1st U.S. Army would break out from the base of the Cotentin peninsula for an enveloping drive through the Orleans Gap.² Enthusiastic about the potential of a tank "knock-about" toward Falaise, Montgomery pursued the following plan from Normandy: (1) Breakthrough to rupture whatever German defense possible, and (2) Exploit the break-out deep into France.³ Although just it was just one decision, to abandon capturing the Bretton ports, it enabled the Allied forces to envelop the German forces in what later became known as the Battle of Falaise Gap.

The command decisions over the next six weeks would change the course of World War II. Were the commanders' decisions based on valid intelligence or instinct? This paper will analyze the key decisions of both the Allied and German commanders during the summer of 1944. It will outline the factors led to the decision to "pocket the Germans" and why Allied forces were unable to complete the plan as originally envisioned.

Breakthrough

Montgomery decided to abandon Overlord plans to go toward the Bretton Ports, and then turn east and pin the German 7th Army on the Seine. He saw the necessity to move toward successive lines at Laval-Mayenne, Le Mans, and Alencon. The breakthrough was to take place along 7000 yards pummeled by air bombardment along the St. Lo-Perriers road. The plan was to trap the German 7th Army between Allied forces and the bridgeless River Seine. On June 30, 1944, Montgomery issued a

¹ Blumenson, *Command Decisions*, p. 402.

² Ganz, Harding A. *Questionable Objective: The Brittany Ports, 1944*, p. 81.

³ Wiegly, *Eisenhower's Lieutenants*

directive telling the 2nd Army to hold the main enemy forces between Caen and Villers-Bocage and develop operational plans for the capture of Caen. On July 3, the 1st U.S. Army began its advance eastward toward Caumont-Vire and Mortain-Fougeres. "When the base of the Contentin peninsula was reached near Avranches, the VIII US Corps would turn westward toward Brittany. General Bradley would direct a strong -wide-sweep, south of the Bocage country to secure successively the line Laval -Mayenne and Le Mans-Alencon."⁴

The Germans feared the capture of Alencon, because it was their primary supply point for gas and materiel. To prevent the loss of Alencon, they focused on Avranches as the cornerstone of their defensive action. Von Kluge believed that the entire German battle depended on holding Avranches, which he believed to be the key Allied break-out point.⁵

When the Americans, specifically Patton, entered Brittany, they did not have full knowledge of German strength on the peninsula. They also did not know that the Germans had lost most of 25th Corps in defense of Normandy. The Army plan had therefore cautiously emphasized the establishment of blocking positions against possible German counter-attacks from the Southeast along the roads to Brest, Alencon, and Nantes.

Over the next month, efforts to obtain the Montgomery's objectives met with difficulties. Allied forces suffered considerable losses in return for inconsiderable forward progress. However, by early August, the Allied forces had gained an advantage at Avranches.

On August 3, 1944, Allied commanders learned through ULTRA decrypts that von Kluge had been ordered by Hitler to counter-attack with 4 Panzer divisions against the Avranches bottleneck. Von Kluge reported back to Hitler that this would threaten Caen, but Hitler reiterated the order. The decision to counter-attack between Mortain and Avranches and subsequent execution of those orders on August 6-7 was designed to recapture the neck of the Contentin Peninsula and cut off all U.S. forces South of Avranches and in Brittany. The U.S. 50th Infantry Division was able to repulse the counter-attack, leaving the German Army weak, exposed, and in danger of being encircled. Unfortunately Allied commanders, at the time, did not understand the significant opportunity presented by the decrypt and subsequent battle. Additionally, Hitler giving ordering from his headquarters in Berlin and Russia. He could not have had situational awareness of his own troops, Allied forces, or the morale of either side.

⁴ Hinsley, *British Intelligence in the Second World War: Its Influence on Strategy and Operations, Volume III, Part II*, p. 203.

⁵ Florentin, 1965

The German counter-attack at Mortain-Avranches attempted to re-establish the lines to Avranches, cutting off the U.S. 3rd Army. Fighting continued past August 9, threatening 15th Corps' line of communications.

On August 7, while Patton's armor was defending Brest and Lorient, Montgomery launched OPERATION TOTALIZE, a major offensive using his 21 Army Group to attack south and seize Falaise and then Argentan. LTG Crerar's Canadian 1st Army was tasked to capture Falaise while Dempsey's 2nd Army (British) was to provide support in the bocage along the right flank. Patton would pivot toward Le Mans and drive north to meet the Canadians at Argentan, thus surrounding the German 7th Army and 5th Panzer Division in the pocket west of Argentan.

Bradley was convinced that Hodges 1st Army could hold the Germans at Mortain while the other forces forged toward their advance points. Patton dispatched Haislip's 15th Corps east toward Le Mans. By August 8, they had reached Le Mans and turned north. The 20th Corps was responsible for securing the bridgehead at Le Mans and protecting the left flank and rear of Corps while the river Orne was used to protect the west flank.

The Canadians were slow and met much resistance. Montgomery decided not to reinforce Crerar's Polish 1st Armor Division and Canadian 4th Armor Division with elements of the British 2nd Army. This decision resulted in slow preparation and prevented them from pressing toward Falaise resulting in a delay of several days. At that point, Bradley became dependent on American flexibility with mechanized forces.

By August 11, it was evident that the German counter-attack at Avranches had failed. "During a conference, which took place on 11 August in Megnilaume (8 km east of Argentan), between von Kluge (Field Marshal Western Front), Hauser (7th Army CINC), and Eberbach (Gen. Armored Forces), the following and only possible decision was made: to remove all available motorized units from the front and use them in a closed operation, which was to bolster and clear the Army southern flank, and to allow segments of the whole front to move to the east as quickly as possible." However, Hitler would not accept the necessity of a tactical redeployment. "It was their strict order which delayed the Army Group and Army's decision for action during the days that followed. Had a general eastward withdrawal been ordered during the night of August 11-12, the Falaise pocket would never have developed and a still active Army would have reached the other side of the Seine."⁶

In addition, it was clear to the Germans in France at this time that the Allied intent was encirclement and entrapment. As Montgomery's 21st Army Group moved south toward Falaise, they encountered enemy concentrations east and

⁶ From *Counterattack at Avranches to the Falaise Pocket*, POW account, p.2.

southeast of Vire and east of Domfront. Unknown to the Allies, Domfront was a critical German vulnerability because there were few security units in the area. A breakthrough at that point could have destroyed the 7th Army.⁷ At that point, Eberbach realized that "the morale of the German troops had cracked and would never recover."

By August 13, Bradley believed that 19 German divisions were escaping through a the gap between the Allied armies. Yet, he ordered Patton not to advance to Falaise. This is one of the most controversial decisions of the Battle of Falaise. At the time, ULTRA decrypts were contradictory, and intelligence had not confirmed that 19 divisions were fleeing. Bradley assumed that the Germans were fleeing because that is what Allied Commanders would do in a similar situation. Many reasons have been postulated to explain Bradley's order to Patton⁸:

- (1) Haislip's 15th Corps had been advancing fast leaving his left flank exposed to German pressure. A gap of more than 30 km. separated Haislip's Corps from Hodges' Army, and further advance would make Haislip even more vulnerable.
- (2) Bradley thought Falaise was in the British/Canadian sector – and should be a British capture for reasons of pride. Montgomery said this was not the case and never set boundaries.
- (3) Bradley feared a potential head on collision with friendly fire. He wanted to ensure an exact point to rendezvous.
- (4) Intelligence on the numbers of Germans in the pocket was often contradictory; even with ULTRA decrypts, Bradley were not sure of the numbers.

The lack of information on enemy capability, coupled with the belief that the Germans had already fled the gap, caused Allied behavior to become more conservative. By August 14, Bradley's intelligence again confirmed that large numbers of German combat units had already fled the pocket.⁹ At that time he decided that the five divisions holding the East-West boundary were excessive. Bradley did not consult Montgomery when he decided to split the group. The 80th and 90th Infantry Divisions and French 2d Armor Division were ordered to remain at Argentan and block the escape routes, while the 5th Armored, 79th Infantry, with Patton's XX Corps and XII Corps were dispatched to complete the envelopment at the Seine.

While the Allied forces were now spreading their strength toward the Seine, von Kluge through his own (inaccurate) intelligence believed that the gap was closed. It was not until August 16 that the Germans received their order from Hitler to withdraw from the gap. The entire 7th Army and 5th Panzer Division were still vulnerable to encirclement on 12th of August. If Bradley had the intelligence at that

⁷ *Ibid.*, p. 3.

⁸ Florentin

⁹ Breuer

time, he could have reinforced Haislip with additional divisions, instead of weakening his position by dispatching forces toward the Seine.

On August 16, the Allied forces captured Dreux and established a bridgehead east of the Eure. In addition, the Canadians had captured Falaise. However, the Germans were retreating though the 12 mile gap left between Argentan and Falaise. Even at this time, Montgomery and Bradley did not realize the true number of Germans left in Pocket until it was too late to recall Patton.

It took the Allied forces three more days to converge and close the gap at Chambois. They met heavy German resistance on the 18th. On August 19, the U.S. 90th Infantry Division joined with the Polish Armored Division at Chambois northeast of Argentan. However, their forces were still not intertwined; they left a 2 mile gap between their forces, enabling still more Germans to escape death or capture. It was not until 05:55 a.m. on 20 August that the gap was finally closed.

Conclusion

After a significant Allied bombing campaign and heavy fighting, the battle was over. It was estimated that by August 22 nearly 50,000 Germans had escaped through the 12 mile gap between Argentan and Falaise. There were roughly 70,000 Germans captured or killed in the operation, but among the 50,000 who escaped were the best trained and equipped divisions. Would the battle have transpired differently if intelligence had been better? Perhaps not. The Allied forces did not fully understand the morale of the German forces, nor did they understand that the command decisions of the German Army were being made back in Germany. These elements were critical in understanding the enemy's intent. Moreover, Bradley's decision to halt U.S. forces from proceeding north on the 13th was critical in extending the timeline of the war. This case does illustrate that who receives the information, and how and when they act upon it, is at least as critical as the accuracy of the information.

Dominant Battlespace Awareness III

**Operation Market-Garden Case Study
September 2-26, 1944**

Information Requirements

IPR With LtCol Paul Selva

9 June 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (95%), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- **What were the sources/mechanisms of DBA and DBK?**
- **What were the Commanders' key information requirements?**
 - **Enemy OB**
 - **Enemy capability**
 - **Enemy intent**
- **What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?**
- **What happened both tactically and strategically when those sources were denied?**
- **How perishable is the information from the different sources across the battles?**

Campaign Objectives

Allies

- **Secure a Bridgehead across the Rhine.**
- **End the war before Christmas 1944 by provoking a political collapse in Germany.**

Germany

- **Hold out until political tensions split the alliance.**
- **Reconstitute a continuous front.**

CONOPS

Allies

- Drop a “carpet” of airborne troops on a series of bridges between the Holland border and the Rhine in order to allow a rapid armored thrust into Germany.
- Move XXX Corp quickly up the main Eindhoven-Arnhem road to link up with the paratroops and secure a bridgehead across the Rhine.

Germany

- Hold the main river crossing at Nijmegen and Arnhem.
- Cut off and crush the armored spearhead of XXX Corp.
- Eliminate the Allied paratroops behind German lines.

Overview of Forces

Allied Forces (Eisenhower, Montgomery):

- **1st Allied Airborne Army (Brereton, Browning)**
 - U.S. 82nd Airborne Division (Gavin)
 - U.S. 101st Airborne Division (Taylor)
 - British 1st Airborne Division (Urquhart)
 - Polish 1st Parachute Brigade (Sosabowski)
- **British XXX Corps (Horrocks)**

German Forces (Von Rundstedt, Model):

- **II Panzer Corps (Bittrich)**
 - 9th SS Panzer Division (Harzer)
 - 10th SS Panzer Division (Harmel)
- **15th Army (Von Zangen)**
- **1st Parachute Army (Student)**

Sequence of Events

September 2-26, 1944

Background

Allies break out from Normandy during the Summer of 1944 and outrun their supplies.

Allies

Allies capture Antwerp.

Montgomery develops risky Market-Garden plan to jump-start Allied advance after halt. Eisenhower accepts the plan on Sept. 10, and the next week is spent planning the operation.

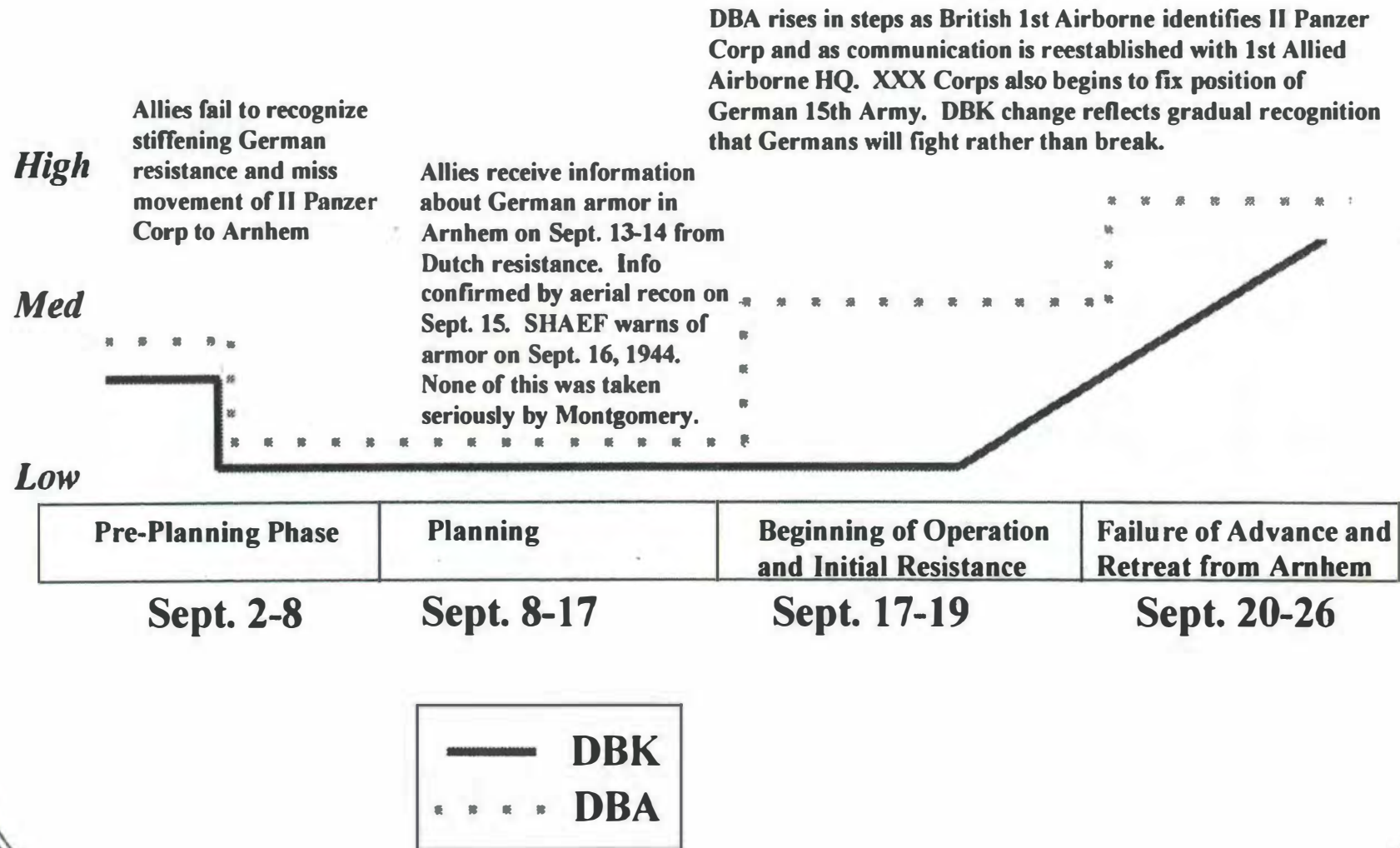
Paratroops land and gain initial success at Grave and Eindhoven. However, Allies only have tenuous foothold and Arnhem, and do not hold Nijmegen bridge at all.

Allies finally take Nijmegen bridge, but too late to advance on Sept. 20. By the time the advance begins again, Arnhem position is critical and the advance is under attack from the flanks.

Pre-Planning Phase	Planning	Beginning of Operation and Initial Resistance	Failure of Advance and Retreat from Arnhem
Sept. 2-8	Sept. 8-17	Sept. 17-19	Sept. 20-26
<i>Germans</i>			
Germans fall back to Holland and gradually reconstitute front. On September 4, II Panzer corp ordered to Arnhem for refit.	Germans begin to plan for Allied assault, but expect blow to come in the south.	Germans concentrate on holding bridges and prepare to counter-attack.	Germans set up blocking position south of Arnhem. Model orders counter-attacks against Allied line of advance. Attacks continue until early November as Allies consolidate gains.
<u>Background</u>			
After near collapse during August 1944, German troops settle in to defend final approaches to Germany			

Level of DBA/DBK -- Allies

September 2-26, 1944



Level of DBA/DBK -- Germans

September 2-26, 1944

High

Germans do not initially know that Allies plan to attack in Holland. Instead, they expect a thrust by U.S. 3rd Army (Patton). Gradually, they see buildup and realize Holland is a target.

Med

.....

Low

Pre-Planning Phase	Planning	Beginning of Operation and Initial Resistance	Failure of Advance and Retreat from Arnhem
Sept. 2-8	Sept. 8-17	Sept. 17-19	Sept. 20-26

Market-Garden plans found by Student's men on Sept. 17, 1944.

DBA surges when Germans identify 1st Airborne Army units. DBK gradually increases as Model realizes target is Arnhem. DBA/DBK fall off when British decide to abandon Rhine bridgehead and evacuate Arnhem.

.....

— DBK
..... DBA

Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy order of battle**
- **Friendly & enemy capability**
- **Location and status of friendly & enemy logistics nodes and supply lines**
- **Enemy TTP and historical performance**

Mechanisms

- **Communications intercepts**
- **Aerial reconnaissance**
- **HUMINT -- Dutch Resistance**
- **Contact with the enemy**
- **POW interviews**

Sources & Mechanisms of DBK

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics nodes and supply lines**

Mechanisms

- **Commander's intuition/experience**
- **Communications intercepts**
- **Post-battle analysis**
- **POW interviews**
- **Capture plans**

Information -- Required

Allies

- **German morale**
- **Location of enemy units around bridge sites**
 - Placement of dual-use flak units
- **Terrain**
 - Raised Nijmegen-Arnhem Road which made Allied armor vulnerable to anti-tank guns.
- **Sustainment Requirements**

Information -- Required (Cont.)

Germans

- **Allied intentions**
 - Focus on Allied efforts
- **Allied Units**
 - Organization and size of Airborne force
 - Composition of XXX Corps
 - Location, goals, and timetable for Allied movements

Information -- Not Sought

Allies

- **Terrain between Nijmegen and Arnhem**
- **Morale of German troops**
- **Location of 15th Army**
- **Status of enemy units**

Germans

- **Political pressures on Eisenhower**
- **Location of U.S. 82nd and 101st Airborne divisions prior to onset of Market-Garden**

Information -- Timeliness

Allies

- **Communication problems**
 - Lack of redundancy (all eggs in same basket)
 - Malfunctions
 - Slow resupply
- **Decrypts often provided information about unit locations after they had already been identified following ground contact. Tactical intelligence usually OBE.**
 - However, Dutch resistance warned about German counter-attack at Veghel.

Information -- Timeliness (Cont.)

- **Assessments of German morale were outdated but never really challenged after resistance stiffened after 5 September.**
- **Aerial reconnaissance and Dutch resistance information was often timely, but usually ignored.**

Germans

- **German radar stations picked up resupply missions and vectored fighters to intercept.**

Information -- Accuracy

Allies

- **Inaccurate assessments of German morale.**
 - Montgomery and Brereton did not pay attention to accurate warnings about German stiffening of resolve.
- **Inaccurate assessments of location and strength of II Panzer Corp.**
 - Montgomery and Brereton did not pay attention to accurate warnings about German armor in Arnhem

Germans

- **Inaccurate assessment by Model of Allied intentions, but Bittrich acts on correct interpretation of Allied aims.**

Elements of IW

- **OPSEC**

- **Allies: Very poor. Market-Garden plans lost. Airborne assault did not maximize surprise. XXX Corp did not conceal concentration.**
- **Germans: Not applicable. German moves were largely responsive. Placement of II Panzer Corp was not deliberate.**

- **PSYOPS**

- **Allies: Whole operation was a form of PSYOP since one goal was to hasten a German political collapse.**
- **Germans: Used PSYOPS tactically, for instance by concentrating armor and using artillery to try to coerce British 1st Airborne into surrendering.**

Elements of IW (Cont.)

- **EW**

- **Allies: EW did not provide timely information.**
- **Germans: Radar provided warning of Allied resupply operations. But confusion between radar warnings and captured plans made it difficult to coordinate attacks on Allies.**

- **Deception**

- **Allies: No deliberate attempts at deception prior to operation. Montgomery cancels diversionary attack in the south prior to operation for supply reasons. There was some inadvertant deception as Allied drop zones were so far from Arnhem bridge that Model thought the bridge was not a target. British 1st Airborne did use fake radio traffic and used wounded in perimeter defense to cover withdrawal.**
- **Germans: No deception attempted.**

Elements of IW (Cont.)

- **Destruction**

- **Allies: Did not especially target German radar sites. Allies at that time were stretched thin in terms of air assets, and also thought they could provide sufficient fighter cover for resupply flights.**
- **Germans: Not attempted.**

Impact of Knowledge -- Allies

- **Lack of knowledge of enemy positions, morale, and terrain lead to heavy losses and ultimately to the failure of the operation.**
 - **Allies ran into heavy forces, fighting with unexpected zeal.**
 - **Bad terrain, especially on the “island highway” between Nijmegen and Arnhem caused significant delays. Germans were able to place anti-tank guns (including 88s) to cover road, and Allied tanks were unable to maneuver on marshy terrain.**

Impact of Knowledge -- Germans

- **German success due more to the ability to interpose armor at key points than any particular knowledge of Allied forces or goals.**

The Impact of Command

Command Structure

- **Allies**

- **Political considerations prevented Eisenhower from intervening in Montgomery's operation although he was overall ground commander in the theater.**
 - » **Eisenhower had recently (Sept. 1) replaced Montgomery as overall theater ground commander and was anxious to deal with Montgomery without making the change seem like a demotion.**
 - » **Montgomery would not listen to information coming from U.S. commands.**
 - » **Command structure broke down completely in Arnhem due to communications failures. Uncoordinated attacks failed, and British missed an opportunity to consolidate a bridgehead around Driel.**
- **Formation of unified Airborne command on June 20 created pressure to employ the new organization.**

The Impact of Command (Cont.)

- **Germans**

- German command structure tended to devolve significantly to local commanders. Bittrich's effective independence was crucial in containing the British at Arnhem and creating a blocking position at Nijmegen.
- Weak command structure was due to Hitler being out of the loop, Von Runstedt's recent return to the Western front, and the lack of physical contact between Model and Student.
- Model was also temporarily out of the loop because British initial landing northwest of Arnhem forced him to flee his HQ.
- The weak command structure was also a result of differing interpretations of Allied goals.

The Impact of Command (Cont.)

Personalities

- **Allies**

- **Montgomery's caution rubs off on subordinate commanders. Horrock tries to micromanage advance, and as a result, British often paused to organize advance rather than seizing opportunities.**
- **Montgomery's personality was also crucial to the development of the initial plan. He wanted to achieve a notable victory and gain credit for ending the war.**

- **Germans**

- **Bittrich's headstrong personality leads him to virtually disregard Model's orders and concentrate on the bridges.**

The Impact of Intangibles

Weather

- **Unexpected and unpredictable fog prevented Allied close air support and delayed or forced cancellation of several landing and resupply missions.**
- **Storm on September 25-26, helped cover Allied evacuation of Arnhem pocket.**

Unit Morale

- **Morale of airborne troops was very high. British 1st Airborne held out for nine days rather than expected four. U.S. 82nd Airborne performed a spectacular river assault to gain Nijmegen bridge.**
- **German morale was higher than expected.**

The Impact of Intangibles (Cont.)

Political/Strategic Considerations

- **Political pressures prevented Eisenhower from interfering in the operational planning despite concerns at his HQ.**

Role of Recent History

- **Recent history of poor intelligence from the French and Belgian resistance led the Allies to discount the Dutch underground both as a source of information and as a fighting force.**

Technology

- **Allies' radios malfunction in Arnhem. The cause of this is still somewhat unclear.**

Why Didn't the Allied Plan Succeed?

- **Timetable was too tight and overly optimistic.**
- **Allies did not understand German morale.**
- **Allies did not pay attention to evidence that there were German armored forces in Arnhem.**
- **Allies did not consult Dutch resistance on terrain, especially on the “island highway” between Nijmegen and Arnhem.**
- **Bad weather delayed follow-on landings and resupply operations as well as prevented close air support.**
- **German after-action reports state that the Allies' problem was failing to get all of the British 1st Airborne division on the ground on day one.**

Why Did German Plan Succeed?

- **Bittrich responded quickly to block Allies at Arnhem and Nijmegen.**
- **Model was able to coordinate effective attacks on the Allied flanks (most notably at Veghel and east of Grave). Model's decision not to destroy the bridge at Arnhem was ultimately crucial to building a solid position south of the Lower Rhine.**

DBA Conclusions

- **Allied failure to identify II Panzer Corp as being in Arnhem was devastating, and probably enough to doom the operation.**
- **Allied failure to correctly account for position of German 15th Army lead to critical delays as the main line of ground advance was repeatedly attacked from the flanks.**
- **Communication problems made it virtually impossible for Urquhart to control the fighting in and around Arnhem**

DBK Conclusions

- **Allied belief that German forces would collapse rather than fight was a significant cause for over-optimism.**
- **German DBK mistakes did not negatively influence the final outcome because regardless of Allied intentions, it was necessary for the Germans to control the choke points at the bridges. In addition, attacking the flanks of the Allied armored column, and concentrating forces were obvious responses regardless of whether the Allies were planning to cross the Rhine, attack directly into the Ruhr from Arnhem, or merely encircle the remaining German forces in Holland.**

Command Decisions in Operation Market-Garden *September 2-26, 1944*

Background

Following the breakout from the Normandy beachhead in July 1944, the Allies advanced rapidly to the German border. By the end of August, German units across the Western front had been routed, and were retreating faster than the Allies could advance. By early September, the Allies' advance stalled for lack of supplies. While the Allies moved materiel to the front, and prepared for a renewal of the advance, the Germans concentrated their reserves and tried to create a continuous front.

The Allies were convinced that one major blow would crumble the shaky German front, and allow them to end the war by Christmas 1944. Both General Patton, operating opposite Lorraine, and Field Marshal Montgomery, massing troops in Belgium, clamored for the opportunity to launch this final offensive. However, while Patton focused on getting sufficient fuel to bludgeon his way into Germany, Montgomery created an elegant and risky plan designed to catapult lead elements of his 21st Army Group across the lower Rhine by combining an armored thrust with an airborne seizure of bridges over five waterways in Holland.

Sequence of Events

On September 4, 1944, the Allies captured Antwerp. But while they took the town, and the port, they failed to clear the Schelde estuary of German troops belonging to General Van Zanger's 15th Army. The result was that while the Allies now had a forward position, virtually on the German frontier, they still lacked a convenient supply route for the advancing armies. For the next week, lack of supply essentially halted Allied ground operations in Belgium and Holland.

Montgomery desperately wanted to jump start the Allied advance. For much of August, he had attempted to make use of the recently created 1st Allied Airborne Army, but in each case weather and the rapidly shifting front lines had rendered the operations either impossible or unnecessary. On September 8, 1944, Montgomery's staff began planning Operation Market-Garden. Operation Market was an expansion of the previously planned Operation Comet which had also envisaged an airborne assault on Dutch bridges. Market was an expanded version of Comet, and was linked with Garden — a rapid armored thrust up the Eindhoven-Arnhem highway — to create the Operation now known as Market-Garden.

On September 10, 1944, Montgomery briefed Eisenhower on Market-Garden and secured his approval. Eisenhower also committed to diverting supplies from other Allied forces -- notably Patton's Third Army -- in order to give Montgomery the fuel and other materiel necessary for the operation. Eisenhower saw Market-Garden as a bold plan which could very well catch the Germans off guard. For both Montgomery and Eisenhower, the main problem was logistics rather than combat. The Germans were seen as broken and under-equipped.

During the week of September 10-17, Montgomery's corps and divisional commanders planned the operation. Given the complexity of coordinating a major 3 1/2 division airborne drop with a corps-sized armored attack, the single week of planning was a significant problem. The drop zones for the British 1st Airborne Division were ill-conceived, and there was a distinct lack of contingency planning throughout the operation.

In addition, the haste with which the operation was planned may have contributed to notable intelligence assessment failures. Between September 12-16, information came into Allied hands from numerous sources which suggested a hardening of German resolve, and ominously, a concentration of German armor in Arnhem which was the ultimate objective of the operation.

The operation was launched on September 17, 1944. Immediately, the Allies ran into problems. The bridge over the canal at Son was destroyed by the Germans, delaying the Allies advance by 36 hours. More troublesome, the British 1st Airborne ran headlong into units of the 9th SS Panzer division, and was unable to gain more than a foothold on the northern end of the Arnhem bridge. The U.S. 82nd Airborne Division was thwarted in its attempt to take the bridge at Nijmegen by elements of the 10th SS Panzer division.

Between September 17 and 20, XXX Corps slowly fought its way toward Nijmegen. In the meantime, a battalion of British paratroops were surrounded in Arnhem and cut off from the rest of their division which was slowly being pressed into an ever-tightening perimeter across the river from Driel several miles west of Arnhem. The situation of the British 1st Airborne was made worse by bad weather alternately over England and Holland which delayed or canceled several resupply and reinforcement missions, and by a breakdown in radio communication within the division which reduced it to a group of uncoordinated battalion strength units.

On September 20, with the help of a daring river crossing by elements of the 82nd Airborne, XXX Corps broke past Nijmegen. But it was too late to advance that day, and on September 21, the beleaguered British on the Arnhem bridge were forced to surrender. By the end of the 21st, the lead units of XXX Corps made contact with the Polish 1st Parachute Brigade directly across the lower

Rhine from the British 1st Airborne. But attempts to reinforce the bridgehead failed in the face of heavy German shelling, and beginning on the 21st, the Germans launched a series of battalion and regiment-sized attacks on the Allies flanks cutting the main Eindhoven-Arnhem highway temporarily several times near Veghel.

By September 25, the situation of the British 1st Airborne was desperate. XXX Corps was unable to reach Arnhem due to heavy resistance by 10th SS Panzer and terrain which made armored operations nearly impossible (the corridor of advance was a narrow, raised road surrounded by soft, marshy ground, and defended by well-sited anti-tank guns). On the night on September 25-6, the 2,000 remaining men of the British 1st Airborne were withdrawn across the river. Until early November, the British were forced to fight merely to hold the salient they had carved into the German lines.

Key Command Decisions

There were four key command decisions in Operation Market-Garden/the Battle of Arnhem. These were: (1) The decision to launch the operation, (2) The decision by British 1st Airborne to try to press on toward the Arnhem bridge rather than consolidate a solid perimeter around the Driel ferry, (3) The decision to respond to German counterattacks on September 21-25 rather than pressing on to Arnhem; and (4) The decision to evacuate the Arnhem pocket on September 25.

The decision to launch Market-Garden was ultimately Eisenhower's. As both Supreme Allied Commander, and overall ground forces commander (since September 1, 1944), it was his decision to proceed with the operation. Eisenhower supported the operation because "(1) the operation would outflank the Siegfried Line defenses; (2) it would be on the line which the enemy would consider least likely for the Allies to use; and (3) the area was the one with the easiest range for Allied airborne forces."¹ In the worst case, Eisenhower expected that the operation would help efforts to clear the Schelde estuary later.² So Eisenhower's decision was based on sound strategic considerations. Furthermore, there has been relatively little criticism about Eisenhower's decision either at the time or since, which suggests that informed observers believe that the concept was generally sound.³ In addition, although the Germans had a lot of troops in the immediate area of the operation (II Panzer

¹ Forrest C. Pogue, *The Supreme Command* (Washington, DC: Department of the Army, 1954), pp. 282.

² Pogue, p. 282.

³ Charles B. McDonald, *Command Decisions: The Decision to Launch Operation MARKET-GARDEN* (Washington, DC: Center of Military History, 1952, 1990), pp. 441-2.

Corps, 15th Army, 1st Parachute Army), Eisenhower and Montgomery were correct in believing that their forces were more mobile and therefore could gain significant superiority along the line of advance despite the roughly 1 to 1 ratio of men overall.

Eisenhower's failure, however, came in his decision to stand above the operational planning, and particularly his unwillingness to intervene when his staff became concerned about Montgomery's failure to consider information about German armor in Arnhem. Eisenhower was concerned to minimize the alliance tensions, and hence did not want to interfere in what was primarily a British operation. Although Eisenhower cannot be faulted for approving the strategic concept, his failure to force Montgomery to pay attention to the information requirements of the operation was significant. At the very least, Eisenhower, having presided over the six month preparation for the Normandy landings should have been very wary of the mere seven days Montgomery had bracketed for planning Market-Garden.

In addition, Montgomery, and 1st Allied Airborne Army chief Brereton and Corps commander Browning, must all be faulted to their unwillingness to listen to contrary information and for their lack of contingency planning. Montgomery had information from multiple sources about II Panzer Corps' location in Arnhem. In addition, he failed to seek out available information on terrain, particular the difficult terrain between Nijmegen and Arnhem. Brereton was overly optimistic about his ability to fly troops and supplies through the fickle English September weather. And Browning must be faulted for accepting landing zones which placed British 1st Airborne several miles away from its objective at Arnhem.

Nevertheless, the operation was a near success. Even with all the troubles that beset British 1st Airborne, XXX Corps nearly managed to link up with the bridgehead across the Rhine.

The second key decision involved the actions of the British 1st Airborne division on September 17 and 18. After the initial landing, the British attempted to move on a wide front toward Arnhem. With communications virtually non-existent, division commander Urquhart attempted to join up with his forward elements and coordinate the battle from the front. Instead, he was trapped behind enemy lines for over a day during which four battalions were battered piecemeal. If not for the failure of communication, it is likely that Urquhart would been able to remain in command, and it is possible that he could have coordinated the attack successfully.⁴ At this point, the British outnumbered the Germans in the area by at least 2 to 1, although they lacked sufficient anti-tank weapons to contain 9th SS Panzer division (actually closer to brigade strength), and Urquhart himself

⁴ R.E. Urquhart, *Arnhem* (New York: W.W. Norton, 1958), pp. 200-1.

has pointed out that he expected German resistance to fade quickly.⁵ Still, in the close combat situation in and around Arnhem, the British paratroops might have been able to nullify the German armor advantage had they been able to coordinate their movements.

Given the lack of communication, it might have been more prudent for the 1st Airborne to consolidate a bridgehead at Driel, where a ferry existed to allow for river crossings.⁶ Unfortunately, pre-operation planning had neglected to consider the ferry as a potential crossing option, and with Urquhart presumed lost, and four battalions engaged, no one at 1st Airborne HQ considered the option. By the time 1st Airborne was forced back into a pocket around Driel, the ferry had been moved and was no longer an option for crossing the river. Lack of communication, and the failure of pre-operation intelligence accounted for the inability of 1st Airborne to respond to the contingency of German armor in Arnhem.

The third key decision occurred between September 21 and 25 when XXX Corps consistently chose to respond to German probes and localized attacks around Veghel and Grave rather than vigorously pressing on toward Arnhem. The Germans managed to cut the main corridor of Allied advance temporarily several times, and both the U.S. 101st and U.S. 82nd Airborne divisions suffered significant losses in trying to hold a wide front on both sides of the main road. The Allies' response was generally to halt the advance, and use tanks from the armored spearhead to clear the road. This forced diversion of effort was significant because the German blocking position south of Arnhem was still weak on the 20th, and even thereafter, the British were able to make contact with the Poles at Driel despite a significant German presence on their flank.

The decision that clearing the road was paramount was based on two factors. First, XXX Corps commander Horrocks did not realize until the last moment (on the 25th) how dire the situation of the 1st Airborne had become. This misperception was due to the communication problems alluded to earlier. Second, Horrocks had no way to know precisely the size of the forces operating on his flanks. The Allies had essentially lost track of 15th Army, and therefore did not know the location of between 65,000 and 80,000 men operating on the western flank of the salient. Similarly, the Allies had little information about the size of forces which were attacking east of Grave and Veghel. In reality, the Germans, at this time, posed little threat. The 15th Army, at this point, could only bring into combat a regiment-size (1,000 men) remnant of the German 59th Infantry division. 10th SS Panzer, effectively brigade-strength, was pinned holding a blocking position south of Arnhem. To the east, the Germans were only able to launch battalion-sized attacks. By contrast, the Allies had two and

⁵ Urquhart, p. 200.

⁶ Cornelius Ryan, *A Bridge Too Far* (New York: Simon and Schuster, 1974), pp. 387-8.

half airborne divisions south of Arnhem, one and half armored divisions, and the better part of two infantry divisions in the salient. The Allies, therefore, probably had an 8 or 10 to 1 advantage in men and armor, and despite that persisted in their cautious response to German attacks. Lack of DBA was crucial because it was the fear of a large German counter-attacks which slowed the British and which caused them to underestimate the urgency of the situation at Arnhem.

The fourth key point was the decision to evacuate the British position north of the lower Rhine. There can be little doubt that the situation of the 1st Airborne was untenable. The Polish attempt to cross the river to reinforce the British on the night of the 24th had shown the difficulty of using the British position as a bridgehead. By this point, the 1st Airborne was probably marginally outnumbered in men, but significantly overmatched in armor and artillery. Although the artillery of XXX Corps was now in range to shell the Germans, the British had little choice but to evacuate.

Intangibles

There are three sets of intangibles which warrant a brief discussion. First, weather had a significant effect on the outcome of the battle. The British were unable to reinforce the 1st Airborne in a timely fashion, and the Allies were unable to use their air superiority in ground support missions because of bad weather.

Second, Montgomery's personality was a significant factor in the failure of the operation. His egotistical desire to be the one who struck the final blow against Germany may have encouraged him to accept an operation with too little time for planning, and to reject information which was counter to his plans. In addition, his general propensity for careful, plodding advances seemed to have rubbed off on subordinates like Horrocks who may have been too cautious in his advance to Arnhem.

Third, technological failure played a major role in the outcome. The breakdown of communication in Arnhem has yet to be explained fully, but the uncertainty over the range and power of British radio equipment led to faulty assumptions about the ability of 1st Airborne to coordinate attacks and airdrops.

DBA/DBK Conclusions

There were many DBA/DBK issues in the Market-Garden case. However, although Allied intelligence failures led to the virtual destruction of the British 1st Airborne at Arnhem, there is some legitimacy to Montgomery's claim that the operation was 90 percent success. Even as late as the 25th, Allied leaders on the

ground thought it was possible to salvage a bridgehead across the Lower Rhine. A better appreciation of the location, strength, and morale of the German units might have induced the Allies to abandon the operation, but it is difficult to see how they could have been more successful. In the final analysis, the ability of the Germans to interpose battered, but still solid, armored units at the chokepoints of Nijmegen and Arnhem was more important to the outcome than any failings on the part of the Allies.

Nevertheless, there were significant DBA/DBK issues in this case. The Allies failed to seek necessary information about German morale, the location and strength of II Panzer Corps and 15th Army, and the way in which bad terrain would serve to magnify static German defenses (most notably dual-use flak south of Arnhem).

Perhaps the biggest problem for the Allies was the breakdown of communication in Arnhem which led the 1st Airborne to fritter away its strength in uncoordinated attacks. Had 1st Airborne been able to fight its way to the Arnhem bridge in large numbers, or had Urquhart been able to consolidate a bridgehead at Driel, the goals of the operation might have been met despite the strong German resistance.

Dominant Battlespace Awareness III

Battle of the Bulge Case Study

Information Requirements

24 March 1997

DBA/DBK Definitions

DBA

- A high level of awareness (~90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations

DBK

- High confidence in the future (~95% confidence), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level

Critical DBA/DBK Questions

- What were the sources/mechanisms of DBA and DBK?
- What happened, both tactically and strategically, when those sources were denied?
- What information was available to the commanders during the battle? Conversely, what information was not available?
- What were the Commanders' key information requirements?
 - Enemy OOB
 - Enemy capability
 - Enemy intent

Campaign Objectives

German

- Drive through Ardennes to recapture Antwerp, thus cutting Allied supply lines.
- Mass 25 divisions along western front to defeat U.S. and British forces, then shifting focus to Russians in east.
- Break Allied coalition by “dividing and conquering”

Allied

- React to massive offensive in the Losheim gap.
- Delay and defend against German push through Ardennes.

CONOPS

German

- Achieve complete surprise through absolute radio silence (OPSEC).
- 6th Panzer - attack through northern sector toward Antwerp.
- 5th Panzer - attack through central sector toward Meuse River.
- 7th Army - protect southern flank of 5th Panzer.

Allied

- This area was considered rear area by Allied forces and therefore had no standing CONOPS.
- Allied actions were primarily reactive/defensive.

Overview of Forces

Allied

- 12th Army Group - Bradley
 - 1st Army - Hodges
 - » V Corps
 - » VII Corps
 - » XVIII Corps -
 - 3d Army - Patton
 - » III Corps
 - » VIII Corps
 - » XII Corps
 - Air Forces

Overview of Forces

German

- Army Group B - Model
 - 5th Panzer Army - Manteuffel
 - » 47th PZ Corps
 - » 66th Corps
 - » 58th PZ Corps
 - » 29th PZ Corps
 - 6th Panzer Army - Dietrich
 - » 1st SS PZ Corps
 - » 2d SS PZ Corps
 - » 67th Corps
 - 7th Army - Brandenberger
 - » 53d Corps
 - » 80th Corps
 - » 85th Corps

Battle of the Bulge: Sequence of Events 16 Dec 44 - 07 Feb 45

*25 DIVs attack
along 60-mile
front*

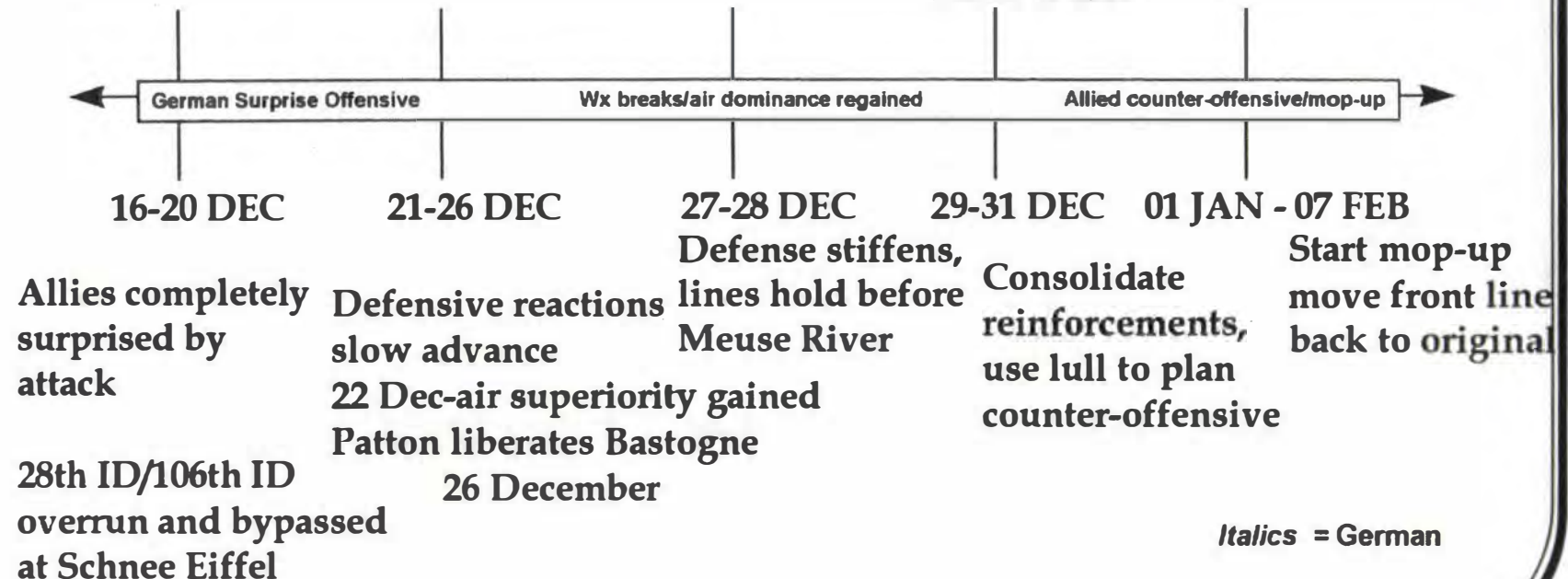
*5th PZ - great
success in central
sector*

*Advance west slows
Bastogne encircled
21 December*

*Germans lose
optempo*

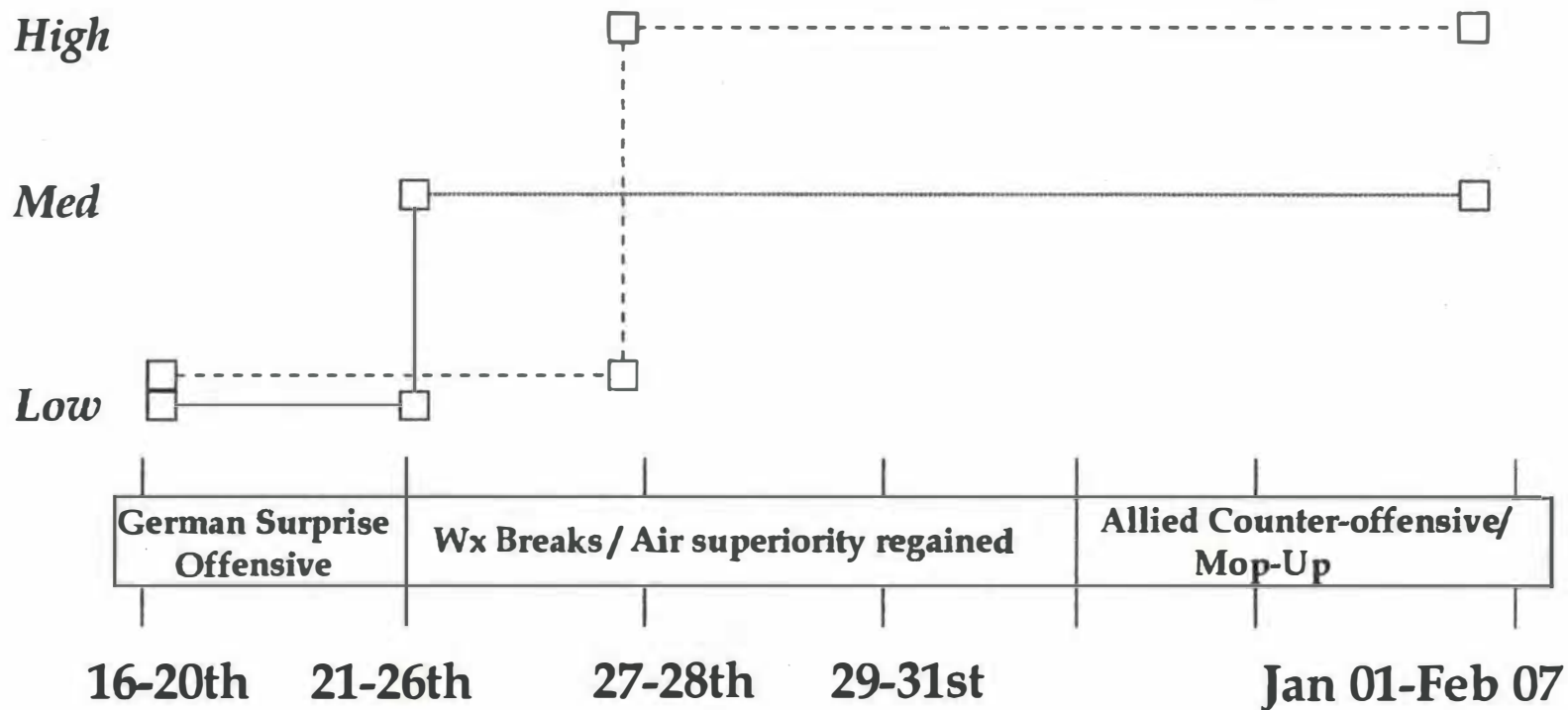
*No fighting,
realization that
battle is lost*

*Germans totally
defensive, begin
retreat behind West
Wall*



Level of DBA/DBK -- Allies

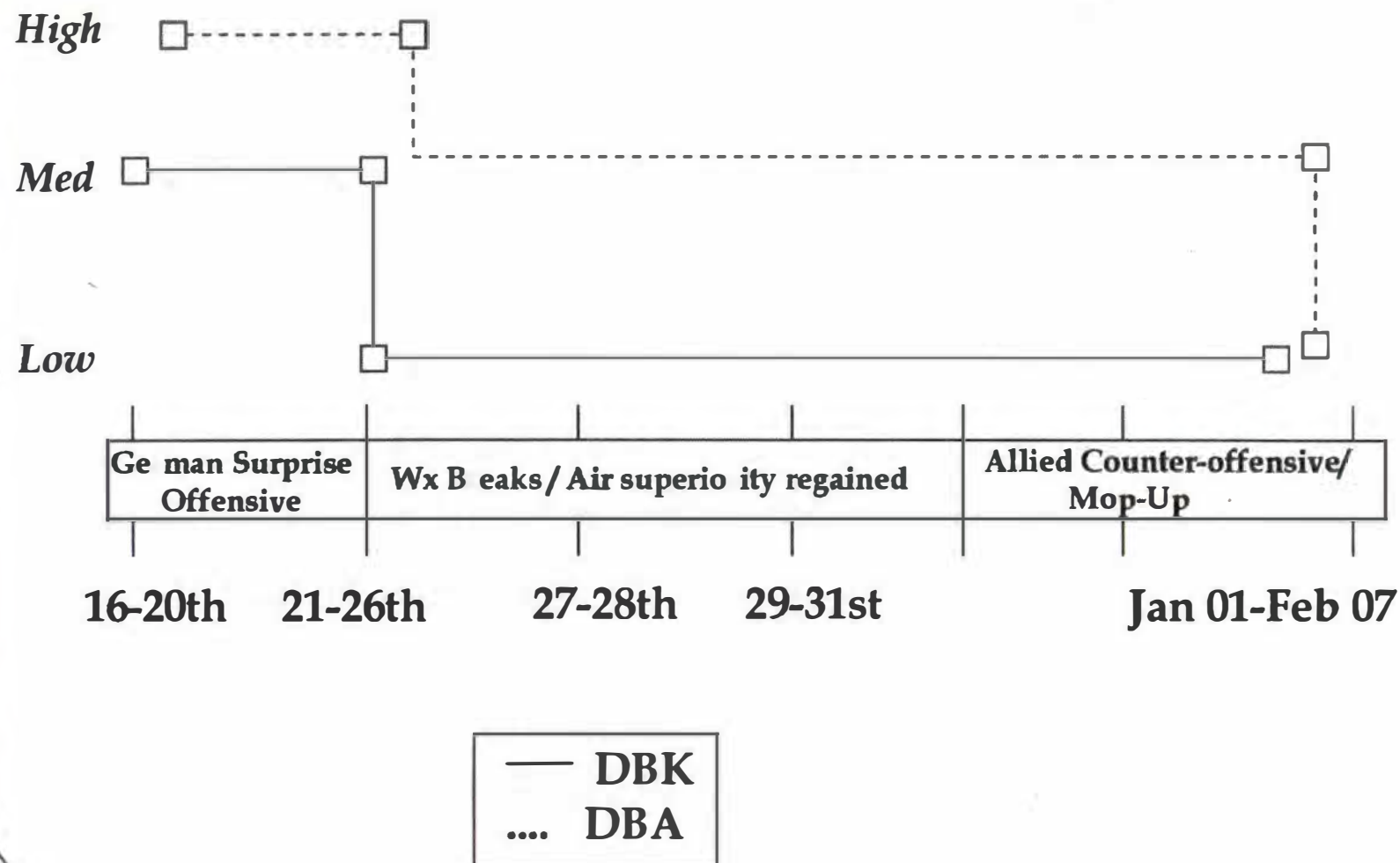
16 December 1944 - 07 February 1945



— DBK
.... DBA

Level of DBA/DBK -- Germans

16 December 1944 - 07 February 1945



Sources & Mechanisms of DBA

Sources

- Friendly & Enemy Order of Battle
- Friendly & Enemy Capability
- Location and Status of Friendly & Enemy Logistics and Supply Lines

Mechanisms

- Communications intercepts (ULTRA)
- Aerial recon
- Underground HUMINT from inside occupied territory
- Contact with the enemy

Sources & Mechanisms of DBK

Sources

- Friendly & Enemy Capability
- Friendly & Enemy Intent
- Friendly & Enemy Morale
- Location and Status of Friendly & Enemy Logistics and Supply Lines

Mechanisms

- Communications intercepts (ULTRA)
- Post-battle analyses and field observations
- Underground HUMINT from inside occupied territory

Information -- Required

Allies

- Location, status, and number of enemy units
- Logistic capacity of friendly forces (can Allies continue to truck supplies from port at Cherbourg)
- The most likely enemy course of action (e.g., intent)
- Location, status, and number of friendly units

Germans

- Location, status, and number of enemy units
- The most likely enemy course of action (e.g., intent)
- Will the Allied coalition crack if divided?

Information -- Not Sought

Allies

- Identity, location, and personality of enemy decision maker
- State of German troops' morale
- Reason for buildup opposite Westwall (large numbers of hospital trains and tanks on trains coming forward)

Germans

- Command structure of Allied forces (e.g., Could Eisenhower act independently)
- Political circumstances affecting Allied decision making (e.g., Saving political/military face for British)

Information -- Timeliness

- Bradley did not know attack had begun even though he was within 20 miles of the front.
- With initial artillery, Germans effectively severed landline communications between the front and command elements.
- With no air cover (or aerial reconnaissance) Bradley had to depend on couriers, suspect radio communications (Germans had intruded in Allied comms nets), or physically drive to the front.

Information -- Accuracy

- Germans had excellent DBA, (one captured intelligence map had every unit except two plotted correctly for the Allied OB).
- Allied DBA was not accurate at all and they had in fact lost contact on major elements of the German 5th Panzer Army.
- Skorzeny's special operatives created much confusion for the Allies through misinformation.

Elements of IW

Electronic Warfare:

- Germans were amazed at speed with which the Allies could DF and bring artillery to bear on their mobile radio stations
- Germans intruded in Allied radio nets from the outset
- Allied ULTRA and MAGIC intercepts provided warning of impending counter-offensive but the information never reached the decision-makers.
- Germans jammed Allied nets successfully

Elements of IW

Deception:

- German deception plan absolutely outstanding: Allies thought buildup was occurring □ some miles to the north near Dusseldorf-Cologne
- Germans used special forces to infiltrate Allied lines and create confusion
- All forward POL and ammunition storage facilities were camouflaged □ from detection from the air

Elements of IW

OPSEC:

- Germans gained and maintained absolute secrecy concerning the operation: only couriers were used, no message traffic, kept on a need-to-know basis only (even own troops were told a deception story - they were headed to Paris)
- Ammunition for the initial barrage was hand-carried to the front, as well as, by horse drawn carts with the horses hooves and the carts' wheels padded
- No vehicular traffic allowed within 10Km of the front - essential motorized traffic (i.e. tank movements) were masked by low-flying aircraft

Elements of IW

PSYOPS:

- Germans utilized agents/provocateurs dressed in U.S. uniforms and driving stolen U.S. vehicles to infiltrate rear areas and misdirect traffic, destroy communications and in general disrupt flow of information to the rear/front
- Germans who had intruded on radio comms nets told the Americans they were there and listening

Elements of IW

Physical Destruction:

- Germans very effectively cut landline communications between front and command elements with the initial artillery barrage
- Covert German units destroyed key comms links and POL storage areas before being captured

Impact of Knowledge

- “Most egregious intelligence failure in the history of American battlefield intelligence”
- Unknown to the Allies, Hitler raised 25 additional divisions by expanding number of eligible conscripts (raised/ lowered draftable age), pulling troops from eastern front and utilizing Navy and Air Force personnel
- Germans knew that the region was used by Allies for R&R, replacement and resupply, therefore unprepared for all-out assault
- Weather, terrain, and Allied preparedness were the most important factors in German decision to attack when and where they did (historical precedent also from Hitler’s success in 1940)

The Impact of Command

Command Structure

- U.S.
 - Unified command structure with autonomy to react and act at will, authority devolved to Eisenhower from British and American Governments
- German
 - All orders originated with Hitler personally and no action taken without his tacit approval.

Personalities

- Allied
 - Patton conducted the longest flanking maneuver in the history of Armor operations in the middle of winter.
- German
 - Hitler personally made every major battlefield decision

The Impact of Intangibles

Weather

- One of the most significant factors of this battle, inclement weather was planned for and expected by the Germans and extremely hard to overcome for the Allies.
- Low cloud cover used to illuminate battlefield.

Unit Morale

- Low German morale, poor food and clothing had negative impact on will to fight.
- After initial setbacks, Allied morale high once tide turned in their favor.

Why Did(n't) the Allied Plan Succeed?

- Allied forces had no real plan at outset because they were caught off-guard.
- Plan did not materialize until German advance was stopped (after first five days), intent was determined, and appropriate counter-measures applied.
- When implemented, the Allied counter-offensive and subsequent double envelopment at Houffalize went well.

Why Did(n't) German Plan Succeed?

- Enemy plan initially successful due to complete surprise. Subsequently, overwhelming superiority of Allied troops, air cover and armor capabilities overcame German surprise.
- Germans outran their supply sustainability and did not stick to plan to advance along a 60-mile long front. When the “bulge” occurred, those troops in it were at risk to capture and being cut off from their avenue of retreat (which is exactly what occurred).
- Germans did not have a true appreciation for the Allied will to fight and win (Americans and British realized the end of the War was near).

DBA/DBK Conclusions

- At the Battle of the Bulge, the Allies did not really know who was opposite them along the front. DBA was low. For all intents and purposes, there was no DBK because we did not know, until attacked, that the Germans had any intentions of advancing to the west.
- German DBA was medium to high because of poor allied comsec. The Germans knew the Allies had no intentions of attacking during inclement weather. High DBK in that respect; but low in knowledge/acceptance of Allied willingness to fight.

Command Decisions in the Battle of the Bulge

Between the 16th of December 1944 and the 7th of February 1945, the German Army attempted its last counter-offensive leading to the largest battle of the Second World War in Western Europe. Hitler took personal command of the combined forces on the Western Front and amassed an army consisting of 43 divisions totaling over 350,000 personnel. Planning for the attack began as early as July when Hitler recalled Field Marshal von Rundstedt from forced retirement. Hitler had relieved him of command in March but chose to reappoint him to be the nominal combined force commander of this offensive. This appointment significant because the Allies placed a low degree of credibility on the likelihood of an offensive with von Rundstedt in command. The Allies believed that he would not be entrusted with any major combat role.

Despite von Rundstedt's resurrection as head of the offensive, it was Hitler himself who personally planned even the most minute details of the counter-offensive. He even decided who would attack where and with what types of troops. Hitler also managed to raise 25 new divisions of Volksgrenadiers by lowering and raising the age of conscription and by activating them into combat units in the three month period immediately prior to the commencement of the attack. Additionally, personnel who had been in traditional rear area support units and Naval and Air Force units were subordinated to the Army, and sent to the front.

Hitler also instituted extreme precautions to protect the secrecy of the impending counter-offensive. He personally briefed the front line commanders in detail on the plan of attack. He also forbade message traffic between the major commands and sub-elements, instead requiring all information to be passed via messenger. The death penalty was ordered for anyone violating these security rules. Absolute radio silence was observed by the ground forces. The same cannot be said for the Air Force (Luftwaffe). In fact, at one point, Allied SIGINT operators had in their possession, from Luftwaffe intercept, the fact that a major counter-offensive was approaching, but they did not even know what they had and they wrongly discounted the information.

The original idea for the attack came from Hitler's love of history. Hitler's idol was Frederick the Great who had faced a similar military situation in the mid-1700's. Frederick faced the enemy on three fronts and chose to marshal his forces to defeat his enemy individually, and then move on to the next. Hitler therefore had, what in his mind, was historical precedent upon which to base some of his tactical and strategic decisions. He chose to attack during terrible weather precisely for the reasons the Allies felt certain that he would not attack: heavy rain and snow; up to one foot of snow on the ground; cold, raw winds; saturated soil making off-road travel difficult; and fog from

early afternoon until late morning. The bad weather served both to put the Allies off their guard and also to limit Allied mobility in response to Hitler's planned thrust. Additionally, Hitler knew from the advance of his forces through the area in 1940 that it could be done; just as it had been done in 1914, also. Irrespective of the end result, the plan was ingenious, albeit risky. The original date for commencement of the counter-offensive, code named "Wacht am Rhein", or "Watch on the Rhine," was the first week of November to coincide with the seasonal start of substantially degraded weather. The attack was postponed twice and eventually kicked off at 0530 hours on the 16th of December.

The availability and accuracy of intelligence information during this battle, which effectively took place in two distinct phases, was key to the Germans' initial successes and the subsequent Allied victory. The first phase of this battle was from December 16, through December 25-26, and the second phase went from December 26, through to the mop-up operations in February. Throughout, lack of knowledge of enemy intent and poor situation awareness influenced the decision making process of commanders on both sides. Elements of Information Warfare (Electronic Warfare, Psychological Warfare, Operations Security, Military Deception, and Physical Destruction) were also critical in shaping the outcome of the battle.

The Battle of the Bulge consisted of two phases which differed vastly in both success enjoyed by the two sides and in the effects information warfare had on the battle outcomes. In the initial phase many German command decisions were made based on incorrect or false assumptions. Hitler mistakenly thought that if attacked, Eisenhower would have to get approval from the Canadian, British and U.S. political authorities to conduct operations. Hitler also thought that he could break the alliance by driving a wedge between the forces and thus breaking their morale.

On the German leader's calculated choice of start date for the offensive, terrible weather prevented the Allies from having any aerial reconnaissance of the battle space. Where the cloud cover hindered the Allies, it helped the Germans because they used spotlights reflecting off the clouds to illuminate the battlefield. This is a prime example of battlespace awareness on the German side, since they were willing to trade off the secrecy which might come from operating under the cover of darkness for the speed of movement which illumination afforded. The Allies, by contrast, although they knew that the 5th and 6th Panzer Armies were no longer located northeast of Aachen, did not have reliable locating data on them, nor were they aware of ten German divisions diverted from the Russia front.

U.S. First Army G-2, Colonel "Monk" Dickson reported an interview with a very intelligent POW who readily stated that "every means possible is being

gathered for the coming all-out counter-offensive".² Other captured POWs had extremely and uncharacteristically high morale and seemed to be very forthcoming with information during interrogation.

As late as December 12, Bradley's G-2 and staff assessment felt, "It is now certain that attrition is steadily sapping the strength of German Forces on the Western Front and that the crust of defenses is thinner, more brittle and more vulnerable than it appears."³ This shows, clearly, that the Allies had no appreciation for the gathering of forces, either in numbers or composition, opposite them. General Bradley had his forces in a relaxed restructuring/replenishment mode at this time because he did not believe that the Germans were preparing to go on the offensive. Many of the troops were on leave in France or in the Belgian forests leaving most of the divisions at reduced strengths. Bradley even told MG Troy Middleton, "Don't worry Troy, they won't come through here."⁴ Middleton commanded the VIII Corps of which the 101st Airborne Division was an element in the Bastogne region.

Before the weather deteriorated on the 15th of December, aerial reconnaissance had revealed numerous hints at what was coming: increased vehicle traffic, long hospital trains heading toward the "Western Wall," many flatcars with newer Tiger tanks, and significantly increased night traffic. Despite these factors, faulty analysis by G-2 contributed to a vacuum in which the Allies had horrible situation awareness. Still, the German efforts at operation security were both extensive and successful, so an assessment of the intelligence failure has to focus both on Allied shortcomings and German successes.

One thing that helped the Allied effort immensely was that Hitler made the erroneous assumption that his troops could win without air cover, a surprising oversight given Hitler's interest in history and his own successful use of tactical air in 1939-40. However, his troops had a very low willingness to fight without air cover. Various German commanders have stated, in hindsight, that lack of air cover caused the counter-offensive to fail, especially at Bastogne. From the 16th of December through the 20th the German attack was largely successful. The ferocity and thoroughness with which the German artillery pounded Allied lines created a complete breakdown in communications that caused the thinly held front line to crumble and break immediately after the commencement of hostilities.

The second phase of the battle came after the bad weather cleared, and Allied air superiority was reestablished. Reconnaissance flights resumed on the 20th of December, and large scale allied air operations began after Christmas. From this point forward, although fighting continued for the next two month, the outcome was no longer in doubt. The surge through the Ardennes had been stopped short of the Meuse River and all that was left was to mop up and

destroy as much of the German force as possible. To accomplish this the Allies conducted an enveloping movement and joined at Houffalize to cut off the retreat of some 60,000 Germans. This was the first indication that the Allies had learned a valuable lesson months before at Falaise Gap. The resumption of Allied air supremacy is, shortly after Christmas, was the turning point in the Battle of the Bulge.

How did the Germans achieve the level of surprise in the first phase?

In addition to their good OPSEC status, the Germans employed an elaborate deception campaign. A major attempt was made to create a false force in the Dusseldorf/Cologne region through the use of notional radio traffic and increased vehicular movement and the addition of anti-aircraft gun emplacements.

Movement near the front (within ten kilometers) was only allowed under cover of darkness and then only on the sides of the roadway, all the horses hooves and wheels on the carts moving supplies to the front were padded to dampen sound. Artillery shells for the initial barrage were hand carried to the front line. When vehicular traffic was essential, low-flying aircraft flew along the front to mask the noise. All fuel and ammunition was stored under camouflage. Charcoal was used to ensure smokeless fires for warmth and cooking. Maneuvering map exercises were conducted to prepare for the attack without the necessity to inform the troops what they actually were doing. Division staffs were still out of the information loop until immediately prior to the offensive's start. To obscure the actual target of the counter-offensive, to retake Antwerp, German troops were told that they would be in Paris in four weeks. German morale was extremely high because they saw the arrival of 25 new divisions and their own units being outfitted with the latest tanks and equipment. The Germans conducted Counter Intelligence (CI) operations against their own troops falsely telling them that they would be supported by "hundreds" of aircraft (1500) including the new jet aircraft the German war machine was manufacturing.

ULTRA intercept was virtually non-existent during the few days prior to the attack. In retrospect, this should have in and of itself served as a warning for impending activity. MAGIC intercepts, in the Pacific, had however, indicated that Hitler had told the Japanese ambassador, Hiroshi Oshima, that the Germans would conduct a large-scale offensive at the beginning of November. This critical intelligence information was in Allied hands as early as October.

German usage of Information Warfare (Military Deception, Psychological Warfare, Physical Destruction and Operational Security (including Comsec)) was

also exceptionally useful in ensuring initial surprise. The Germans started the entire operation under secrecy and it was never compromised. Through the use of false force projection, the Germans had the Allies looking in the wrong direction from the outset. By means of complete radio silence (good comsec), no information was divulged regarding the massive buildup of troops and equipment. By muffling the sounds of equipment and vehicular movement, the Germans demonstrated just how effective OPSEC can be. The Allies were denied essential information about troop strength, location, and most importantly intent. The Allies falsely believed that the forces opposing them were not reinforced, not prone to offensive operations, not prepared for attack in bad weather and most assuredly, not intent on driving west to Paris or Antwerp. Quite the contrary, the Allies thought the Germans were in a purely defensive posture and irrevocably committed to the Eastern Front. The Germans forced the Americans to use exploitable means of communications, wireless radio nets, by physically destroying the telephone lines, which were less exploitable, by the first savage artillery salvo.

On the other hand, Allied IW successes, while not numerous, were significant. The Americans' ability to quickly direction find (DF) German radio signals (EW) and direct fire at those locations (physical destruction), astounded and perplexed the Germans. Additionally, by constantly moving artillery positions (military deception) while conducting extensive shelling, they induced the Germans to greatly overestimated actual artillery strength.

The Allies successfully countered the 2,700 man Special Operating Forces (SOF) of Colonel Skorzeny's 150th Panzer Brigade. Although this German SOF caused some major confusion in the initial stages of the attack, they were caught fairly quickly and summarily executed as spies. Their activities included: transmitting false orders, turning road signs in the opposite direction, acting as Military Policemen at a traffic control point and sending vehicle columns in the wrong direction, removing minefield markers, blowing up bridges and asking different units where they were going and trying to convince them to go to a different location. The Allies had terrible communications security (COMSEC) and readily gave the Germans many crucial bits of information, (e.g. that the 101st Airborne Division was ordered to Bastogne to relieve the 10th Armored Division). These compromises were never recognized by the Allies nor were they corrected during this offensive.

All of these undertakings contributed to the effectiveness of the surprise attack and the Allies initial poor situation awareness.

Does Awareness/Knowledge Equal Success ?

Allied success was based primarily on their ability to react swiftly and decisively to attacking forces, based on imperfect battlespace awareness (DBA) and practically no battlespace knowledge (DBK). During phase one of the counter-offensive, the Allies had not had reliable aerial reconnaissance for a number of days and therefore did not have a good appreciation for the forces opposing them; this translates into bad DBA. They did not regain good situation awareness until after the 20th of December, when the weather cleared. Until this happened, they discovered who was attacking them while it was occurring but not before. And they definitely had no idea that the Germans intended to move toward Antwerp.

German failure was destined from the outset. Although the Germans had a fairly accurate picture of their opposing force structure, they surely underestimated the resolve and decisiveness with which the Allies would react. The German approach to the Battle of the Bulge was an act of final bravado based primarily on Hitler's poor understanding of the Allied will to fight and incorrect assessment of the enemies' ability to fight in less than ideal conditions. He did not have very good Dominant Battlespace Knowledge (DBK), although his situation awareness was very good. For some reason he either underestimated or discounted Allied, especially U.S., resolve behind its intent. Additionally, he imperfectly reasoned that if he could prolong the fight long enough, the Allies would tire, fracture the delicate alliance and go home. Hitler overestimated the political pressure he thought would be brought to bear against Eisenhower.

Dominant Battlespace Awareness III

**Strategic Bombing Campaign Case Study
Operation ARGUMENT ("Big Week")
February 20-26, 1944**

Information Requirements

IPR With LtCol Paul Selva

9 June 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (95%), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- What were the sources/mechanisms of DBA and DBK?
- What were the Commanders' key information requirements?
 - Enemy OB
 - Enemy capability
 - Enemy intent
- What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?
- What happened both tactically and strategically when those sources were denied?
- How perishable is the information from the different sources across the battles

Campaign Objectives

U.S.

- **Destroy German Air Force (GAF) production facilities before massive increase in production of fighters can be accomplished**
 - GAF considered highest priority target at this time
- **Gain air superiority over Europe to facilitate strikes against other strategic targets and to prepare for scheduled ground invasion**
- **Minimize friendly attrition**
- **Order of February 8, 1944: Complete ARGUMENT by March 1, 1944**

Campaign Objectives

Germany (strategy pre-dates Big Week)

- **Minimize damage to production capabilities**
- **Attrit Allied bomber forces**
- **Develop of retaliatory weapons (V-1, V-2)**

CONOPS

U.S.

- **Destroy GAF production facilities deep within Germany**
 - Attack using long-range bombers and long-range fighter escorts (P-51)
 - Bombers applied in great mass
 - Combine strikes against target systems to achieve a synergistically powerful effect on production that would have a significant effect on the battlefield
 - » bombing the airframe production facilities (long-term effect)
 - » bombing the ball-bearing factories (immediate effect)

CONOPS

Germany

- **Defend critical targets from aerial attack**
 - **Make production system robust through dispersion and redundancy (strategy pre-dated Big Week)**
 - **Use long-range early warning and attack coordination system to intercept aerial formations**
 - **Focus counterattack against the bomber formations**
 - » **Attempt to split the bomber formations**
 - » **Ignore Allied fighter escort (newly adopted order)**

Overview of Forces

U.S. Forces:

- **Eighth Air Force (Based in Great Britain)**
 - 16 Combat wings (roughly 1000 operational bombers)
 - Organic fighter escort
- **Fifteenth Air Force (Based in Italy)**
 - Primary AOR the Mediterranean
 - Could sometimes make forces available to operate in conjunction with 8th Air Force strikes
 - Had organic fighters, but lacked long-range P-51
- **Ninth Air Force**
 - Escort Fighters

Overview of Forces

German Forces

- **Early warning system**
 - Long-range ground-based radar and air and ground spotters reporting to a central control facility
- **Roughly 2600 fighters, split between day and night forces**
 - 1,225 assigned specifically to defense of the Reich
 - » Grouped into three divisions, each responsible for one sector (Berlin, Stade or Dalen)
 - 1,410 assigned to the Western Front
 - » Primarily ground support, but could sometimes be used against the bomber fleets
- **Ground-based defenses (Flak, AAA)**
 - Roughly 7000 sites
 - Manned by nearly 1 million men
 - Organized into divisions within six defensive sectors

Sequence of Events

February 1944

U.S.

8th AF: All 16 Wings, 10 directed at Brunswick-Leipzig. 15th AF supporting beachhead at Anzio.

12 bombers lost out of 1000.

Destruction equaled over 1 month's output

8th AF: All 16 Wings; used H2X radar targeting system. 9th and 15th AFs unable to operate due to weather..

19 bombers lost out of 924.

Most bombs missed the factories

One division of the 8th AF. 15th AF sent 118 planes. Only 255 struck targets. Small diversionary force equipped with jammers sent to Aalborg, Denmark.

55 bombers lost out of 548.

Neither of the 8th's primary targets struck, but damage done at other sites.

clear weather	clouds obscured prime targets	clouds over assembly area and some targets
12 targets in the <u>Brunswick-Leipzig*</u> area and Southern Denmark	Targets at <u>Brunswick</u>	<u>Schweinfurt</u> , <u>Gotha</u> , Bernberg, Oschersleben, Aschersleben, Halberstadt, <u>Regensburg</u>

20th

Fighters counter-attack from defensive positions near targets in their assigned sectors

Production resumed in undamaged buildings
Dispersion undertaken in earnest

21st

22nd

GAF flew out from defensive positions to meet bombers before join-up with fighter escorts. Diversion ineffective.

Germany

* Underline indicates primary target(s)

Sequence of Events (cont.)

February 1944

U.S.

Cloudcover prevented operations by the 8th AF. 15th AF sent 102 bombers.

Some damage done to Steyr

8th AF: 13 Wings. 15th AF sent 114 bombers. Timing intended to distract from Poland-bound force. RAF attacked Schweinfurt that night.

61 bombers lost (15th lost 17)

Much destruction, but most important processes untouched; Gotha facility lost 6-7 weeks production

Both 8th and 15th AFs attack the same targets (1300 bombers). Intended to split and confuse the German force.

64 bomber lost (15th lost 33)

High level of destruction of target, but not the most vital parts

cloud cover over most targets	clear weather	clear weather	cloud cover
<u>Steyr</u> (Austria)	<u>Schweinfurt</u> , <u>Gotha</u> , Steyr, Tutow, Kreising, Posen (Poland)	<u>Regensburg</u> , Augsburg, Stuttgart, Furth	

23rd

GAF rethinks tactics, innovates
Reorganization of German Air Ministry. Fighter Staff Formed.

24th

GAF employed unusual tactics, added night fighters to daytime force
Schweinfurt facility already significantly dispersed

25th

GAF focused attack against weaker 15th AF
Regensburg facility already significantly dispersed

26th

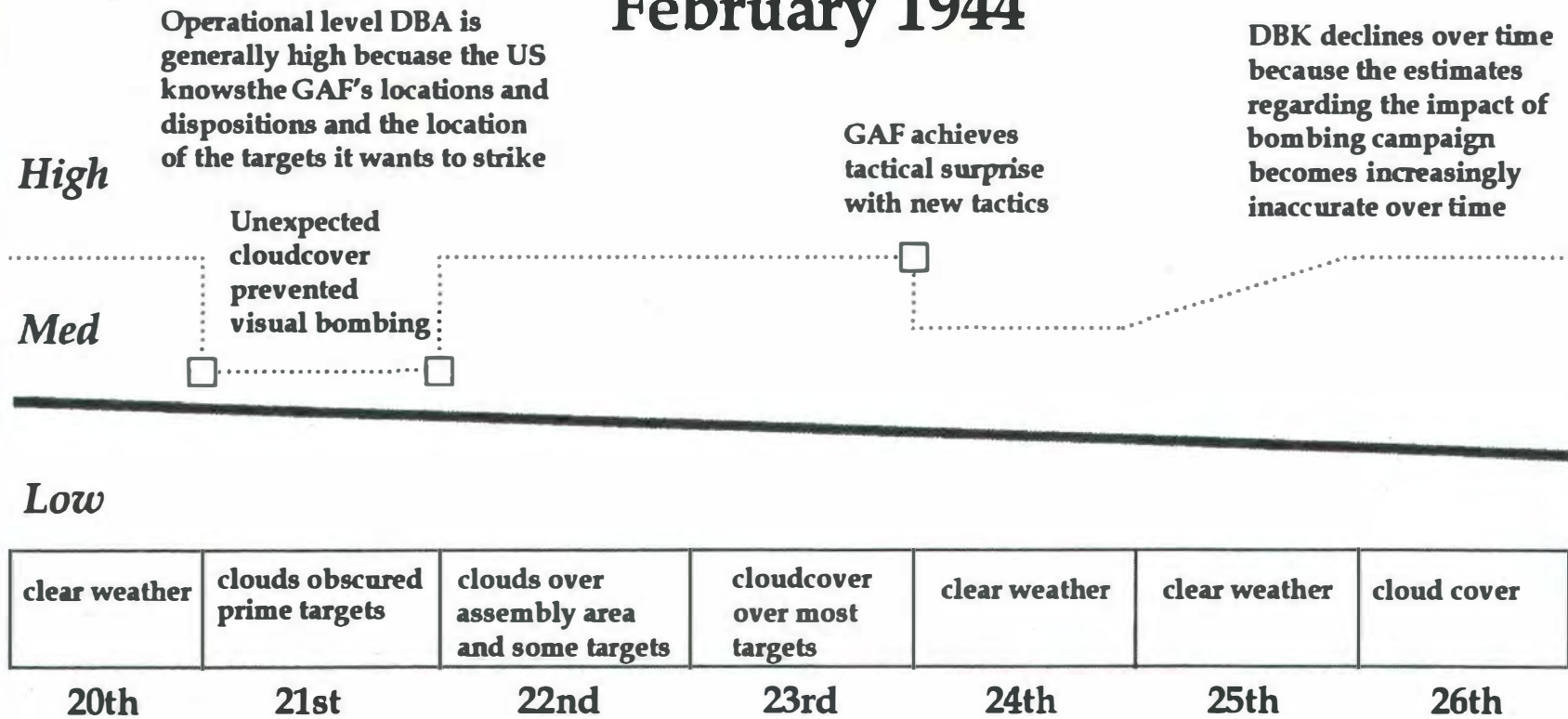
Compulsory dispersion ordered.

Germany

* Underline indicates primary target(s)

Level of DBA/DBK -- U.S.

February 1944

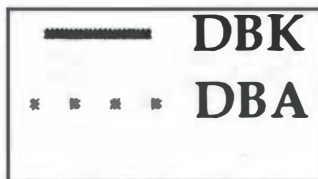
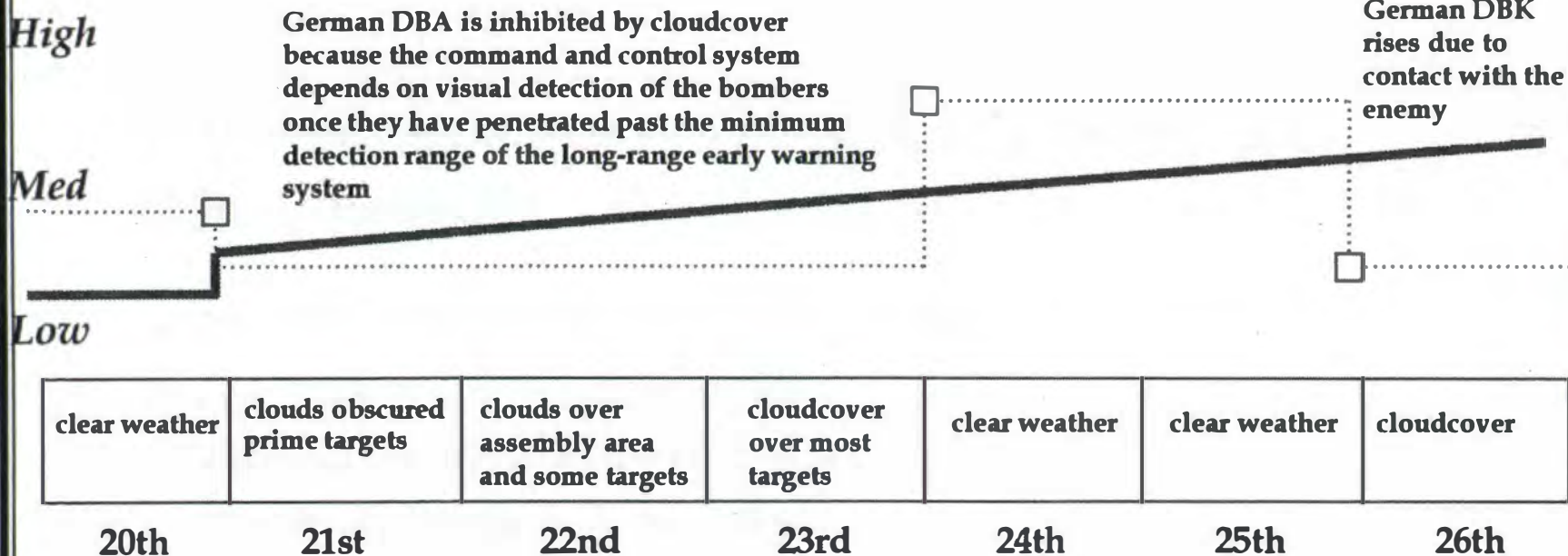


Level of DBA/DBK -- Germany

February 1944

ULTRA decrypts show that the Germans understood the bombers were attempting to destroy the aircraft production facilities (DBK)

GAF realizes the P-51 can provide deep escort



Sources & Mechanisms of DBA

Sources

- Industrial/Economic analysis
- Friendly & enemy order of battle
- Friendly & enemy capability
- Enemy TTP and historical performance

Mechanisms

- Industrial/Economic technical experts, blueprints from British insurance companies
- Photo reconnaissance
- Communications intercepts (Y Service, ULTRA) and other SIGINT
- Contact with the enemy
- HUMINT

Sources & Mechanisms of DBK

Sources

- Friendly & enemy capability
- Enemy priorities--indications of primary targets to attack/protect
- Enemy TTP and historical performance
- Location and status of production facilities

Mechanisms

- Commander's intuition/experience
- Communications intercepts (ULTRA, Y Service)
- Post-battle analysis
- Industrial/Economic analysis

Information -- Required

U.S.

- **Locations of production facilities**
- **Weather reports**
- **Status and location of GAF forces**
- **Feedback on strike effects**
- **Understanding of what is done in the production facilities and its role in overall production**

Germany

- **Early warning of bomber attacks**
- **Identification of bomber targets**
- **Coordination of available fighter resources**

Information -- Not Sought/Not Attainable

U.S.

- **Did not question the following assumptions:**
 - **The German aircraft production is working at full capacity and is thus under great stress**
 - **The destruction of the German air force is best accomplished by destroying the production facilities (i.e., did not at first look at supply of capable GAF pilots)**
 - **Destruction of known production facilities will be adequate to disable German aircraft production system**
- **Feasibility of destroying German early-warning system**
- **The true nature and vulnerabilities of German aircraft engine production**
 - **Determined by the Allies as being too difficult to destroy**

Information -- Not Sought/Not Attainable

Germany

- **Did not question the following assumptions:**
 - Capable long-range fighter escort is technically impossible
 - Defense against air threats is less important than offensive air capabilities (bombers, V-1, V-2)
- **Did not assess American production capacity**
- **Did not know that a major push in the air campaign was imminent**

Information -- Timeliness

U.S.

- **Strategic intelligence--alert that the Germans planned a massive increase in fighter production**
- **Location of major production facilities were known**
- **Disposition of GAF--daily reports intercepted from GAF regarding aircraft available, crews available, locations, supplies, casualties, etc.**
- **Weather reports were difficult to project beyond a day or two**
- **Feedback loop often insufficient for repeat bombings**

Information -- Timeliness

Germany

- **Unable to anticipate the targets of Allied missions**
 - **Caused difficulties in allocating fighter defenses, whose numbers were limited**
 - **Allowed U.S. to exploit the seams in their command structure, which was divided by sector**

Information -- Accuracy

U.S.

- **Significant and accurate information on GAF disposition via Y Service**
- **Good information on locations of many major production facilities**
- **Weather reports inexact at best**
- **Did not understand the extent of dispersion and redundancy in German aircraft production system**
- **Incorrectly assumed the production system was running at maximum capacity and thus under stress**

Information--Accuracy (cont.)

- BDA via PHOTINT and SIGINT sometimes misleading
 - Most PHOTINT was from cameras on the bombers filming the bombs as they struck. Explosions and smoke tended to exaggerate the effects
 - Often photos only showed external damage to the facilities, but gave no indication of the degree of destruction to machine tools inside. Photoanalysts tended to misjudge the degree of destruction.
 - SIGINT sometimes intercepted unintentionally incorrect information
 - » German radio reports from bombed facilities immediately after the strikes often reported damage far in excess to that actually caused. The real degree of damage to the machine tools was not discovered until after workers cleared the debris from off the machines. It was usually less (often much less) than originally assumed.
- Information gathering system, although extensive, was geared toward collecting military information. Industrial/economic information that would have been helpful to the campaign was not often passed via military channels until very late in the war
 - Industrial/economic information passed via land-lines
 - Only sent over Enigma after production capacity was seriously depleted

Information -- Accuracy

German

- **Top echelon of command did not understand airpower, limiting its usefulness and hampering the defense**
- **While the Germans had long-range early warning radar, it could not tell them the intended targets of the bomber assault**
- **Miscalculation on fighter escort range**
- **Miscalculation on Allied production capability**

Elements of IW

U.S.

- **OPSEC**

- U.S. bomber missions conducted under radio silence

- **Deception**

- Deceptive incursions designed to distract, confuse or split the German defensive fighters

- **EW**

- **SIGINT: ULTRA, Y Service (disposition of GAF)**
 - » Air Index--index card database of everything relating to the GAF (unit designations and locations, weapons, equipment, scientific terms, undeciphered words and phrases, etc.)
 - **ELINT: Direction Finding (DF), Traffic Analysis (TA)**
 - **Jamming (Window, Carpet)**

- **Physical Destruction**

- Did not seek to destroy the German's early warning system

Elements of IW

Germany

- **OPSEC**
 - Very poor, particularly with GAF
- **Deception**
 - Smoke/obscurants over targets
 - Dispersion of facilities to forests, caves, etc
- **EW**
 - Early warning radar
 - Y Service
 - Radar-equipped aircraft
 - Jamming (Duppel)
 - EW capabilities sufficient to make night attacks as dangerous for the RAF as daylight attacks were for the AAF (perhaps more dangerous)

Impact of Knowledge -- U.S.

- **Due to the abundance of information, significant damage could be inflicted upon the GAF (though as much due to air-to-air attrition as to destroying production facilities)**
 - **Lack of knowledge about dispersed and redundant facilities blunted effect of bombing**
 - **Misinformed SIGINT intercepts and vague photoreconnaissance mislead Allies regarding extent of the damage**
- **U.S. was able to strike what they wanted to strike, weather permitting**
- **Mass insulated U.S. from the full impact of lack of DBA/DBK**

Impact of Knowledge -- Germany

- **Germans underestimated the production capacity of the Allies, and it cost them the air war**
- **It was simply too late to develop an effective air defense**
- **Early warning radar system did help enable them to intercept U.S. bomber fleets and inflict heavy losses (17% of the force structure used, 6% of all sorties)**
 - **8th AF lost 137 bombers**
 - **15th AF lost 89**

The Impact of Command

Command Structure

- **U.S.**

- Newly formed command structure: USSTAF
- Designed to better facilitate (i.e., unify) command for strategic bombing campaign
- Mission-oriented orders for flexible tactical command

- **Germany**

- Upper echelon:
 - » Hitler, not wanting to hear bad news, tended to ignore it
 - » Luftwaffe leadership (Goering) detached and delusional
 - Tended to blame problems on cowardice of pilots rather than on decisions they had made or could have made
 - » Ignored Speer and Galland's attempts to focus them on the problem
- Lower echelon: Command fractured based on defensive zones; reinforcements could only be sent with Goering's permission

The Impact of Command Personalities

- **U.S.**

- True believers in strategic bombing who wanted to prove the concept
- Chief decision makers had been instrumental in developing the doctrine of strategic bombing and had authored AWPB-1
- Believed losses were justified by damage inflicted, even in most dramatic cases

- **Germany**

- Hitler: did not see value to defensive systems; only offensive
- Goering: unwilling to bear bad news to Hitler and unwilling to listen to the suggestions of subordinates more qualified than himself
- Speer: effective in managing production system under severe attack
- Galland: highly effective and resourceful fighter commander, but his suggestions were ignored by Goering and Hitler (eventually accused of mutiny and dismissed)

The Impact of Intangibles

Political/Strategic Considerations

- **March 1 deadline to prepare for D-Day**
 - **“Now or never”**
- **Allied Air Commanders saw this as a unique opportunity to prove airpower theories**

Weather

- **Significant factor for planning and execution of military operations for both sides**
- **Added high degree of uncertainty as to when visual bombing could be conducted**

The Impact of Intangibles

Other Factors--Beneficial Miscalculation

- **Allies believed early German propaganda about the massive size of the GAF; consequently, they placed themselves on an even more massive production schedule**
 - **Left GAF force levels far behind by 1944**

Unit Morale

- **Germans: Low morale resulted in some problems**
- **Allies: Low morale, but bomber formations mitigated effect**
 - **Although there were cases of fatigue and mental breakdown**

Why Did(n't) the U.S. Plan Succeed?

- **Partial success on bombing campaign**
 - GAF aircrews attrited while defending critical production facilities
 - Destruction of production facilities and completed aircraft not yet delivered seriously undercut German plans for massive increase in fighter force
- **Technological surprise: P-51 Mustang**
- **Sheer mass of bomber force**
- **The key to ultimate success was that the Allies found a critical set of targets that the Germans had to come out and defend, but within range of Allied escort fighters**
 - Attrition of GAF was made inevitable

Why Didn't the German Plan Succeed?

- **Ultimately, there was no plan**
 - The Germans response was reactive, never considering the requirements needed to win at the strategic level
 - The defense consisted of tactical expedients that, however innovative, were far from sufficient
- **Too little, too late**
 - Misjudgments in 1940 on what to produce and what to develop left GAF unprepared
 - GAF doctrine rejected the concept of a strategic air force and deliberately defined the aircraft's role as limited to aerial support of ground operations
- **Serious shortages in equipment and crews available--could not keep pace with Allied production or attrition inflicted**

DBA Conclusions

- **U.S.: Mismatch between information and strike systems resulted in significant problems**
 - Inability to fully exploit information, both in terms of putting bombs on target and assuring that the targets could be destroyed by the bomb used
- **Difficulties with BDA**
 - Photo reconnaissance was relied upon as the best means of BDA. However, post-war analysis found the actual damage to be almost always much less than even the most conservative photointerpreter's analysis.
 - » Bomber cameras filming strike often made destruction appear to be greater than it actually was
 - » Destruction of factory structure often interpreted as destruction of production capability
 - ULTRA could be similarly misleading by transmitting inadvertently incorrect information.

DBA Conclusions (cont.)

- **U.S. was unaware of many of the components of the target systems they wanted to destroy due to the redundancy and dispersion of the system**
- **The mass of data known about the German production capability might have convinced the U.S. that they knew enough**
 - **They did not know how much they did not know**
- **U.S. SIGINT supplied largest quantity of DBA by providing GAF disposition, locations and responses**
- **Germans: Based on poor information, they made bad decisions (R&D, production) years before Big Week which resulted in their inability to effectively counter the attack**

DBK Conclusions

- **Although the U.S. had a significant amount of information on the German economy and industrial base before the war, they seemed to lack the ability to update that information accurately during the war**
 - **What they had was static analysis: an assessment (often inaccurate) of what they had destroyed**
 - **What they needed was a dynamic assessment of how the system would react to attack**
 - » **Even ULTRA could not supply this: post-war analysis led to the conclusion that the target set would not have been effected if ULTRA had not existed**

DBK Conclusions

- **“Strategic bombing” cannot be strategic without the right information**
 - Both in terms of selecting the targets and BDA
- **By applying insufficient force early on in the war, the U.S. taught the Germans how to best survive the attacks**
 - Germans began dispersion of production facilities shortly after the first strategic bombing strikes, which the U.S. launched despite the fact that they had neither sufficient inventory to bring overwhelming mass to bear nor enough strength to maintain a high tempo of operations

Command Decisions During Big Week (Operation ARGUMENT)

February 20-26, 1944

Background

In late 1943, Allied intelligence learned the German Air Force (GAF) was planning a major increase in fighter aircraft production for defense of the Reich. This, combined with Eisenhower's requirement that air superiority be achieved in time for the planned invasion of Normandy, made the destruction of the GAF the highest priority for the U.S. Army Air Force. While the Combined Bomber Offensive had always targeted German fighter production facilities, these new imperatives increased the priority assigned to this target set. The timing of this reemphasis coincided with the long-anticipated delivery to the theater of not only massive numbers of bomber aircraft but also escort fighters (specifically the P-51) with enough range to defend the bomber fleets all the way to their targets deep inside Germany.

To facilitate the execution of these strategic strikes, the 8th Air Force (commanded by Gen. Doolittle) and 15th Air Force (commanded by Gen. Eaker) were placed under the command of Gen. Spaatz. Spaatz was in command of the newly created United States Strategic Air Forces (USSTAF), a unified command intended to give the strategic air planners the assets needed to execute their mission. In addition, the Ninth Air Force, composed entirely of escort fighters, was created to afford the bombers the needed protection.

On February 8, 1944, Gen. Spaatz had directed that Operation ARGUMENT, the destruction of the German aircraft production capability, had to be completed by March 1 in order to allow the bombers to turn their attention to operations in direct preparation for the Normandy invasion. In mid-February, the USSTAF weather bureau determined that a period of clear weather, lasting roughly one week, was about to occur over much of Germany. While other military weather forecasting units disagreed with this assessment, it promised the USSTAF the opportunity they had been looking for to launch visual bombing raids.

On February 19, Gen. Anderson, Deputy Commander of USSTAF, conferred by cable with Eaker to determine whether the 15th AF was prepared to cooperate in Operation ARGUMENT. However, Eaker had been told by the ground commanders at Anzio that the following day would be a critical one on the beachhead, and that they were counting on support from the 15th AF. Eaker feared that if the 15th were instead used for strategic bombing operations at this critical stage of the Italian campaign, the ground commanders might feel compelled to declare an emergency and employ the heavy bombers by direct command. Eaker wished to avoid such a declaration due to the ill-will and bad precedent it would create. Accordingly, he requested that the Fifteenth not be committed by USSTAF on the 20th. Spaatz felt

the bomber campaign promised results so decisive that any diversion of support from the land campaign in Italy would be justified, and took the question to British Air Chief Marshal Portal. Portal said the Prime Minister wanted all available forces used in support of the beachhead. Thus, if the strikes were to be launched on the 20th, they would be by the 8th AF alone.

Battle Outcome

On the morning of the 20th, the weather over the intended targets was reported to be clear, but clouds over the assembly area in Great Britain threatened to create problems for assembling the force. Spaatz decided to launch the attack regardless. The bomber fleets formed up successfully and proceeded across the Channel to Germany.

Twelve targets in the Brunswick-Leipzig area and three in Poland had been chosen, each a part of the German aircraft production system. Ten bomber wings were sent to the former targets, while six were sent to the latter. Since the fleets attacking the Brunswick-Leipzig area were expected to encounter the harshest resistance from the GAF, they were given all the fighter escort (the northern routes to be used by the Poland-bound force lay beyond the area usually defended by the Germans). The main force was to enter German radar range before the Poland-bound force in an attempt to draw fighter attention toward it and away from the unescorted force. This approach worked relatively well, in that the German fighters remained in their defensive positions near the targets in the Brunswick-Leipzig area (which were also near Berlin, an obvious cause for concern to the German commanders).

The bombers of the 8th AF suffered relatively little attrition from the enemy attacks, losing only 21 bombers out of a force of over a thousand (a far smaller percentage than on previous raids). After the war, the destruction done to the targeted German aircraft production facilities on this raid was calculated to equal over one month's output. However, this damage was mostly in the form of destroyed finished product, not destruction of the means of production. Intelligence assessments had concluding that the facilities were operating at high capacity (and thus under great stress); these assessments were mistaken. Production resumed in undamaged buildings and damaged equipment was replaced with available spares. In addition, dispersion, which had previously been done on a minor scale, was undertaken in earnest.

On February 21st, Brunswick was again attacked. All 16 Wings of the 8th AF were deployed, but the 15th AF and 9th AF were unable to operate due to bad weather over their bases. Cloud cover obscured the bombers' targets as well, forcing the them to use the H2X radar targeting system. This system could locate the cities in which the targets were located, but could not locate the targeted facilities themselves. In essence, this type of bombing was similar to British area bombing, and had similar

results. Few of the bombs struck the targeted facilities and those only inflicted minor damage. 19 bombers were lost out of a total of 924.

On February 22nd the weather was predicted to be clear over widely dispersed targets. This presented the danger of spreading the bomber forces too thin if all the targets were attacked at once. In light of this, the news that the 15th AF would be available to join the attack against Regensburg was especially welcome. A small diversionary force, equipped with radar jamming devices was to be sent to strike targets in Aalborg, Denmark. This raid designed to make it hard for the Germans to detect the main force until after it had formed over England,

However, cloud cover over England on the morning of the 22nd led to severe problems. The 3rd Bombardment Division (the Schweinfurt force) was unable to assemble due to unfavorable weather over their bases. Bad conditions resulted in several mid-air collisions, after which the 3rd Division commander, Gen. LeMay, ordered this element of the force to abort. LeMay understood that this would leave the 15th AF to face stronger defenses in their strikes against Regensburg than they would have met had the bombers of the 8th been able to get as far south as Schweinfurt. Meanwhile, the difficulties in orchestrating the bomber formations in such adverse weather caused the B-24s of the 2nd Bombardment Division (assigned to Gotha) to be badly strung out as they crossed the Channel. They found it impossible to organize on the way inland and had to recall. This left only the five combat wings of the 1st Division which had been directed to attack Oschersleben, Halberstadt, Bernburg, and Aschersleben. Oschersleben, the most important of these objectives, was obscured by clouds and was passed over in favor of targets of opportunity. Many planes of the Halberstadt force found the same difficulty and adopted the same alternative. As a result, only 99 bombers out of a force of 466 dispatched by the 8th AF that morning succeeded in bombing their primary targets, and only 255 planes bombed any target at all. The 15th AF did better against Regensburg, though it faced stiffer defenses than expected because the Schweinfurt-bound division of the 8th AF was not present to occupy GAF forces in the south.

German fighters took a larger toll on the bombers of both the 8th AF and the 15th AF than on the preceding days. The Germans successfully tried a new tactic against the 8th AF. Instead of concentrating their efforts in the target area, where fighter escort was now usually provided, or even on the later stages of the flight toward the target, they attacked early in the penetration at a time when fighter cover was either thin or entirely lacking. As a result, of the 548 bombers sortied on the 22nd, 55 were shot down. While some bombers were able to attack secondary targets, none of the primary targets were struck.

The 8th AF did not deploy at all on the 23rd due to cloud cover over the target areas, though the 15th AF was able to send 102 bombers to strike targets in Steyr, Austria. The GAF, meanwhile, took advantage of the lull in operations to rethink its tactics and reorganize the German Air Ministry to begin taking the bomber challenge more

seriously. They created the Fighter Staff, whose job it was to come up with measures to preserve the GAF and the German aircraft production capabilities (though this group was unable to act in time to influence the events or outcome of Big Week). It was during this lull that German fighter commander Adolph Galland pulled together every innovative tactical approach the GAF had used in piecemeal fashion throughout the war and concentrated on presenting the American bombers with as difficult and varied a defense as possible. These tactics included using twin-engine fighters equipped with 21cm mortar tubes to mass long-range fire against the bomber groups, hanging bombs from 800-meter cables attached to German fighters and trolling them through the bomber groups, mounting unmanned Ju-88s filled with explosives on Me-109s and gliding them into the bomber groups, and sneaking captured B-17s into the bomber groups themselves and opening fire in conjunction with attacks by GAF fighters.

On February 24th, the 8th AF launched 13 Wings and the 15th AF sent 114 bombers against various targets. The main thrust was against the aircraft production facilities in Schweinfurt and Gotha, with a smaller force attacking targets in Poland. The commanders wanted to prevent heavy enemy fighter reaction to the northern force dispatched by the Eighth, since the extreme length of its flight path was beyond the range of even the P-51. It was hoped that by carefully timing the flight of the main force the enemy controller would be unable to commit many units to intercepting the Poland-bound force. The actions of the 15th AF against Steyr and the main force of the 8th AF were calculated to be mutually helpful in splitting the German defenses. This approach worked well for the 8th AF in the north, but the 15th AF encountered heavy resistance. In addition, the GAF employed the innovative tactics they had been working on during the lull of the 23rd as well as many of their night-fighter units, and as a result managed to shoot down 61 bombers. The 8th AF managed to inflict a high degree of destruction against the Gotha facility (post-war analysis determined it destroyed 6-7 weeks worth of production), but most of the important production processes survived without significant harm. The Schweinfurt facility was also badly damaged. However, while Schweinfurt was still a valuable target, it had been dispersing its functions since the raid of October 14, 1943. Post-war analysis discovered that by February 1944, it was only about 60% as valuable a target as it had been in October 1943.

On February 25th, USSTAF conducted the first attack using both the 8th AF and the 15th AF striking the same targets (primarily Regensburg) on the same day. USSTAF planners hoped this would split and confuse the German fighter forces. The targets were fairly well concentrated, making it possible for the 8th AF to move its huge force along a single line of penetration under a single comprehensive plan of fighter cover. The 15th AF was not in such a favorable position—it lacked escort of sufficiently long range to provide protection during the most distant phase of the mission, and had a relatively small force. Only 176 of the 400 bombers it dispatched that day were of sufficient range to reach Regensburg; the remainder hit secondary targets. Post-war analysis shows the Regensburg facility's production dropped from

435 planes in January to 135 planes in March, and that production did not return to full capacity for four months. The Augsburg facility was also badly damaged but was back to full production in little over a month. For their part, the GAF focused its response against the weaker 15th AF, hoping to achieve a higher degree of total attrition (and succeeding).

The morning of the 26th was shrouded in clouds that were to remain for a month, bringing to an end the events of Big Week. By this time the newly-created German Fighter Staff had concluded that the best means of preserving the aircraft production capability was to accelerate the dispersion of the production facilities and to camouflage them in forests, mine shafts, and other such obscured places. Up until this point in the war, dispersion was a business decision left to each individual facility; now it became compulsory.

Command Decisions

The command decisions ordered during Big Week revolved around the questions of which targets to strike, routes to fly, and whether or not to launch the bomber forces on the morning of each particular day.

The analysis of which facilities would have to be destroyed in order to force the collapse of the German aircraft production capability was begun long before the AAF even deployed to the theater. The Air Corps Tactical School, which produced the airmen who would command USSTAF forces in Europe, had laid the doctrinal groundwork for the strategic bombing campaign before America even entered the war. AWPB-1, the plan that formed the conceptual basis for the Combined Bomber Offensive, was developed by some of these same air-power thinkers in 1942. The intelligence requirements to fill out that concept and make it an actual plan composed of specific target sets was a challenge the intelligence establishment at the time was not prepared or willing to undertake. As a result, the AAF developed its own intelligence unit and devised its own methods of analysis. Part of this process was the creation of the Committee of Operations Analysis (COA) and similar such organizations whose job was to analyze German economic and industrial systems. Much of the raw data for analysis came from British insurance companies who had inspected the facilities before the war as part of the process of granting them insurance policies. By the time Big Week arrived, these analyses had been in hand for some time, and the target set naturally flowed from them. The only questions left was which targets could be visually bombed on a particular day, largely a question of cloud cover.

The commanders' decisions regarding operational questions -- such as which routes to take to the target to split the GAF fighter force, create uncertainty in the GAF command and control system, or draw attention away from vulnerable forces -- were

based largely on prior contact with enemy forces and knowledge of their TTP and command and control structure (known via Y Service intercepts). When the GAF changed these practices, a higher degree of U.S. bomber attrition usually resulted. However, because bomber missions were conducted in radio silence, there was nothing the American commanders could do in response other than to modify the techniques used in future raids in the hopes that they might be more successful.

The most grave decision left to the commander was whether or not to launch the fleets each day. Again due to radio silence, once the bomber fleets were launched they could not be called back or redirected. There were simply no decisions left for the commanders to make. After the arrival of sufficient bomber and escort forces, the GAF was not the primary factor when considering whether to launch. During Big Week, there were only two overriding considerations: The first was the limited time given the commanders to execute the strategic bombing campaign, and the second was the suitability of the weather.

The requirement to complete Operation ARGUMENT by March 1 undoubtedly affected the commanders' decisions regarding whether to launch. Those in command at this time had been instrumental in the development of bomber doctrine, the concept of the strategic bombing campaign, and many supported the idea of a separate service for air forces. Unless given a chance to prove their theories, all this would be lost. Beyond the political and doctrinal realm, they were true believers in the ability of bombers to bring about, or at least significantly contribute to, the strategic collapse of a nation (as shown by Spaatz's belief that 15th AF bombers would be of greater utility in the strategic bombing offensive than in support for the amphibious operations at Anzio). They firmly believed the greatest contribution the bomber force could make to the success of the Normandy invasion would be the destruction of strategic targets within Germany. In order to strike these strategic targets, they needed first to break the GAF. The resulting air superiority would allow them to operate with the impunity they wanted, and was considered a prerequisite by Eisenhower for the Normandy landings. The commanders knew they had to seize this opportunity, and were willing to take severe losses (pre-campaign estimates placed the losses as high as 200 aircraft per day). They were intent upon attacking, given the fulfillment of two requirements: bombers in the air, and targets visible on the ground.

As Big Week illustrates, even the question of the size of the forces available was not a determining factor. On February 20, the first day of Big Week, 8th AF launched all three divisions with full fighter escort from the 9th AF. However, on February 22, when difficulties due to cloud cover over the assembly areas pared the available forces to one third that size, the commanders still ordered the attack.

DBA/DBK Conclusions

American DBA was most greatly enhanced by the Y Service, which intercepted low-level GAF radio transmissions, and by the economic and industrial analysis that produced the targets sets. The GAF's operations security was very weak, and Y Service intercepts allowed the U.S. planners to know the locations and dispositions of GAF forces in great detail. The economic and industrial analysis was a new development in intelligence gathering and analysis without which the strategic bombing campaign would have been impossible. However, the fact remains that the U.S. was unaware of many of the components of the targets systems they wanted to destroy due to the redundancy and dispersion of the system. The mass of data they did know about the target set might have convinced them that they knew enough.

Equally important, the mismatch between the information the American planners had and the strike systems they had at their disposal resulted in an inability to fully exploit the information, both in terms of putting bombs on targets and assuring that the targets could be destroyed by the bomb used. This problem was exacerbated by difficulties with Battle Damage Assessment (BDA). Photo reconnaissance was relied upon as the best means of assessing the effect of a given strike. However, post-war analysis found the actual damage done to be almost always much less than even the most conservative photo interpreter's analysis. This was because most of the photo reconnaissance of targets deep within Germany was taken by cameras mounted on the bombers conducting the strike (sending in reconnaissance aircraft after the strike was considered too dangerous). The resulting photographs were of the strike itself, where the clouds of smoke and debris tended to obscure the view and amplify the effect. Further, although most of the destruction done was to the factory structures themselves leaving the machine tools inside relatively unharmed, this was often interpreted as destruction of the production capability. Similarly, SIGINT could not solve this problem, as the intercepts most often captured were those immediately following the strike, wherein the facility manager usually inadvertently exaggerated the extent of the damage. Often it was not until the debris was cleared several hours or days later that the factory manager realized that the machine tools underneath were still operable.

Although U.S. analysts had a significant amount of information on the German economy and industrial base before the war, they seemed to lack the ability to update that information accurately during the war. What they had was a static analysis – an assessment (often inaccurate) of what they had destroyed. What they needed was a dynamic assessment of how the system would react to attack. Even ULTRA could not supply this information. Post-war analysis led to the conclusion that the target set would not have been affected if ULTRA had not existed. This problem was exacerbated by the fact that, by applying insufficient force early on in the war, the U.S. taught the Germans how best to survive the bomber attacks. Dispersion of some of the elements of production began shortly after the first strategic bombing strikes, which the U.S. launched despite the fact that they had neither sufficient bomber inventories to bring overwhelming mass to bear nor

enough strength to maintain a high tempo of operations. By the time massive strategic attacks could be executed in early 1944, the Germans had reduced the value of some of their previously most lucrative targets by dispersion and redundancy.

Dominant Battlespace Awareness III

Coral Sea Case Study

Information Requirements

24 March 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (~90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (~95% confidence), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- **What were the sources/mechanisms of DBA and DBK?**
- **What were the Commanders' key information requirements?**
 - **Enemy OB**
 - **Enemy capability**
 - **Enemy intent**
- **What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?**
- **What happened both tactically and strategically when those sources were denied?**
- **How perishable is the information from the different sources across the battles**

Campaign Objectives

Americans

- **Protect Pacific staging areas**
- **Throw Japanese off balance with raiding exercises**
- **Stop Japanese advance**

Japanese

- **Continue expansion through South Pacific**
- **Deny US forward staging areas**
- **Cut US supply lines across Pacific**

CONOPS

Americans

- **Halt Japanese advance in Pacific**
 - Maximize information received through radio decrypts
 - Deny Japanese attack on Port Moresby
- **Use surprise attacks and raids against Japanese**
 - Surprise attack on Tulagi by the Yorktown
 - Carrier task forces in the Coral Sea were in place to meet the expected Japanese Port Moresby invasion force.

Japanese

- **Continue with a methodical advance across the islands of the South Pacific. Use captured islands as staging areas for future operations.**

Overview of Forces

- **American Forces:**

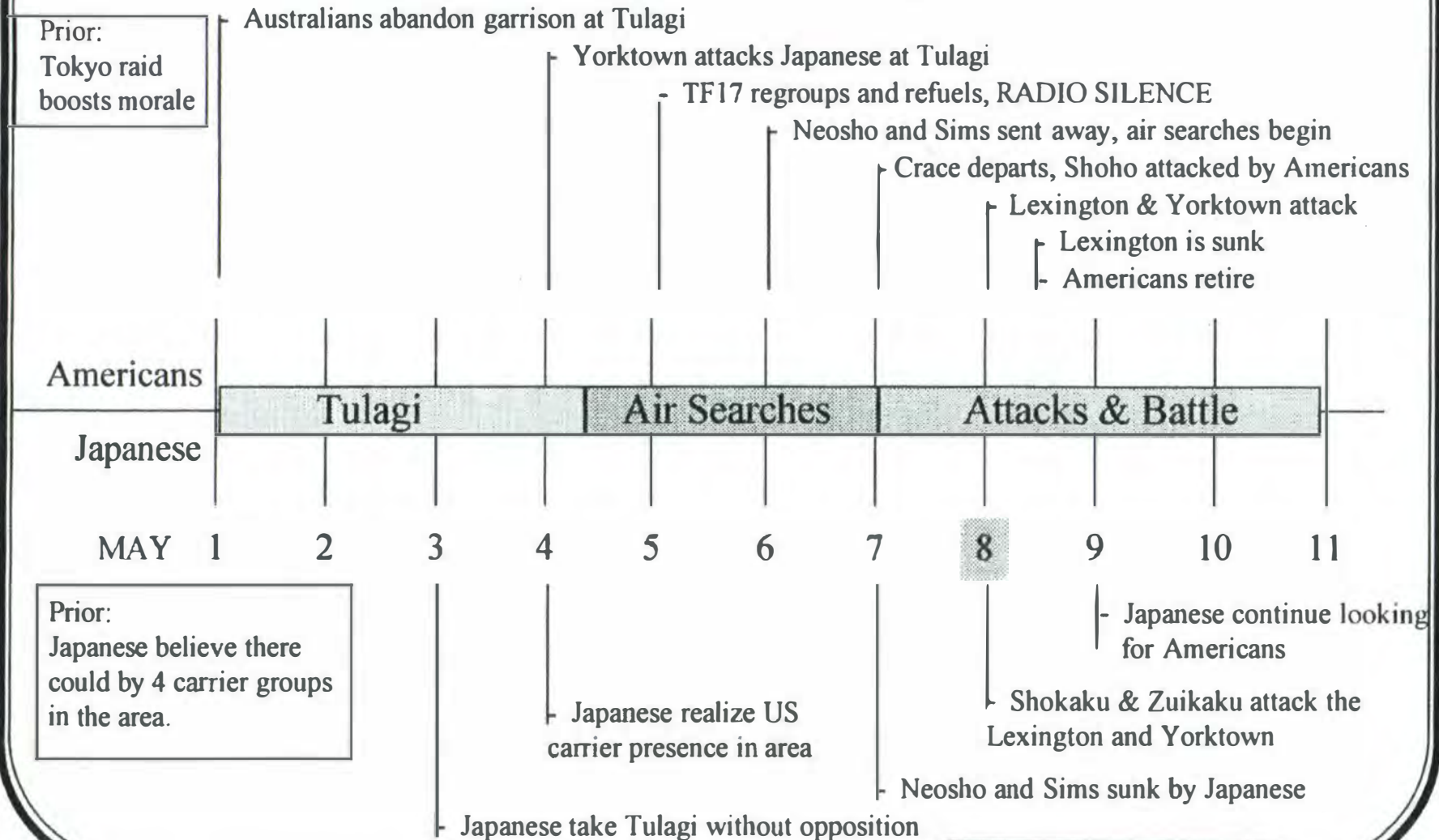
- **Commander in Chief, Pacific Fleet (CINCPAC):** ADM Chester Nimitz
- **Coral Sea Force: Task Force 17**
 - » TF 17: CV Yorktown (flagship) - RADM Jack Fletcher
 - » TF 11: CV Lexington - RADM Aubrey Fitch
 - » TF 44: 3 cruisers/2 destroyers - RADM J.G. Crace (RN)
 - » Fuel, Search, and Support Groups
- **Commander Southwest Pacific Area (COMSOWESPAC):** GEN Douglas MacArthur

- **Japanese Forces**

- **Commander of the 4th Fleet: VADM Shigeyoshi Inouye**
 - » **Strike Group: RADM Tadaichi Hara**
 - » **5th Carrier Division: Shokaku and Zuikaku**
 - » **Forces: Tulagi invasion, Port Moresby invasion, Support, Strike, Submarine, Supply, and Defense.**

Sequence Events

May 1 - 11, 1942



Level of DBA/DBK -- Americans

May 1 - 11, 1942

High

Med

Low

Americans

Japanese

MAY 1 2 3 4 5 6 7 8 9 10 11

Tulagi

Air Searches

Attacks & Battle

Attack at Tulagi exposes
American position, air
searches begin for Japanese

--- DBK
— DBA

Level of DBA/DBK -- Japanese

May 1 - 11, 1942

High

Med

Low

Japanese become aware of American presence at Tulagi, but do not maintain this awareness of American location.

Americans

Japanese

Tulagi

Air Searches

Attacks & Battle

MAY

1

2

3

4

5

6

7

8

9

10

11

-- DBK
— DBA

Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy order of battle**
- **Friendly & enemy capability**
- **Location and status of friendly & enemy logistics nodes and supply lines**
- **Enemy TTP and historical performance**

Mechanisms

- **Communications intercepts (ULTRA)**
- **Aerial reconnaissance**

Sources & Mechanisms of DBK

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics nodes and supply lines**

Mechanisms

- **Communications intercepts (ULTRA)**
- **Commander's intuition/experience**

Information -- Required

Americans

- **Location, status, and number of enemy units**
- **Logistic capacity of friendly forces (what can Army accomplish out of Australia)**
- **The most likely enemy course of action (e.g., intent)**
- **Location, status, and number of friendly units**

Japanese

- **Location, status, and number of enemy units**
- **The most likely enemy course of action (e.g., intent)**

Information -- Not Sought

Americans

- **Japanese route into Coral Sea**
- **State of Japanese troops' morale**

Japanese

- **Presence and location of US carriers in the area**

Information -- Timeliness

Americans

- **Knew through ULTRA that the Japanese were planning an attack on Port Moresby (since March)**
- **Aerial reconnaissance provided available battlespace information**
- **Did not have accurate information on the location of Japanese carriers**

Japanese

- **Relied upon aerial reconnaissance which proved to be unreliable**

Information -- Accuracy

US

- **ULTRA provided very accurate information to the Americans**
- **Americans did not know route Japanese would take into the Coral Sea**
- **Americans relied on aerial reconnaissance during the battle for battlespace information**

Japanese

- **Relied on aerial reconnaissance which proved to be inaccurate**

The Impact of Command

Command Structure

- **Americans**
 - Split command between US forces opened the way for miscommunications concerning the role of aerial support
 - Nimitz' actions in the Pacific did not always complement MacArthur's objectives in the Southwest Pacific
- **Japanese**
 - Forces organized under a single command, but many separate groups required high degree of coordination

Personalities

- **Americans**
 - MacArthur was unwilling to fully support operations that did not directly contribute to his objectives
 - Nimitz fully empowered battle commanders to conduct battle

The Impact of Intangibles

Morale

- **Americans**
 - Despite a series of defeats, American morale was on the rise after the successful raid on Tokyo
- **Japanese**
 - The Japanese were confident of their success after an unbroken string of victories. This led them to underestimate American force strength

Weather

- Provided a valuable surprise advantage through cloud cover that was never sought or exploited by either side.

Political/Strategic Considerations

- **Americans**
 - US needed to stop Japanese advance through the Pacific
- **Japanese**
 - Though the battle was considered a strategic victory by the Americans, the confidence of the Japanese led them to see it of little consequence

The Impact of Intangibles

Carrier-based Battle

- **First naval engagement where neither side saw the other and carrier functionality and coordination was still being discovered by both sides.**

Aviation Advantage

- **Americans**

- **American carriers had radar devices and American planes were better armored and equipped with homing devices.**
- **Americans had an effective pilot recovery to preserve the flight skill that they were cultivating.**

Elements of IW

Deception

- **Nothing targeted expressly for IW benefit**

EW

- **Americans**
 - **ULTRA codebreaking allowed Americans access to critical information about the Japanese attack**

Physical Destruction

- **Nothing targeted expressly for IW benefit**

Elements of IW (Cont.)

OPSEC

- **Japanese**
 - **Their continued poor OPSEC allowed ULTRA decryption to be effective in giving US information concerning upcoming attack**

PSYOPS

- **Americans**
 - **Series of raids, beginning with Tokyo, gave Americans a psychological edge of the Japanese**

Impact of Knowledge -- Americans

- **Available information concerning Japanese attack made US commanders bolder**
 - Fletcher detaches from Task Force to shell Tulagi after he believes his position has been reported
- **Poor information from aerial reconnaissance led to several mistaken attacks**
 - Americans were unable to locate enemy for several days throughout the battle
 - Full-scale attacks were launched against minor targets (i.e., Shoho)

Impact of Knowledge -- Japanese

- **Japanese had a poor knowledge of US presence in the area**
 - **Believed carriers to be unavailable after raid on Tokyo and underestimated force strength and the American ability to respond**
- **Poor information from aerial reconnaissance led to several mistaken attacks**
 - **Japanese were unable to locate enemy for several days throughout the battle**
 - **Full-scale attacks were launched against minor targets (i.e., Neosho and Sims)**

Why Wasn't Port Moresby Taken?

- **Americans had very good information about the attack in advance from the ULTRA decrypts and were prepared to meet Japanese forces**
- **Japanese abandoned the plan after the surprise raid at Tulagi and focused instead attacking the US force**
- **Japanese had a poor understanding of the American forces in the area, which never improved during the battle, due in part to poor aerial reconnaissance**

DBA Conclusions

- **Key information on enemy OB and intent was not fully meaningful without accurate knowledge of enemy location**
- **US intelligence did not provide an accurate location of the enemy, which led to a longer battle as search flights were conducted and false targets were attacked**
- **Japanese Commanders did not believe that American forces could be in the area. After the attack at Tulagi, they were forced to abandon the Port Moresby plan to fight the Americans**

DBK Conclusions

- **American ULTRA intelligence provided very good information about the enemy intent, capability, and order of battle, but missing route information denied Americans a tactical victory**
- **When US forces had knowledge of enemy intent, plans were positively impacted despite poor enemy capability assessments (evidenced in impact of raid at Tulagi)**
- **Japanese forces did not realize that American carriers could be present in the area and had not anticipated an American response when planning the Port Moresby invasion**

Command Decision in the Battle of the Coral Sea

After the surprise Japanese attack at Pearl Harbor on December 7, 1941, the Japanese continued their success with a string of victories in the Pacific. Over the next four months the Japanese conquered Wake Island, Guam, and Rabaul; drove Allied forces out of Burma; and forced the Allied surrender at Bataan. The Japanese objectives in early 1942 were focused on extending the area under Japanese control. By expanding their zone of influence, the Japanese hoped to break the American lines supporting operations in Australia and deny staging areas in the Pacific, eventually driving all American forces from the area. The Japanese plan, thus, had both an offensive expansionist rationale and a defensive one that was focused on preventing an American counter-offensive. The American objectives in the Pacific during early 1942 were to deny Japan continued expansion, to obtain necessary time to build up military strength, and to hold islands between the US and Southwest Pacific area necessary for protecting essential sea and air communications.

The Battle of the Coral Sea, fought from May 1 to May 11, was an American effort to arrest the southward expansion of the Japanese. American forces in the Coral Sea were assigned to the area with the objective of destroying enemy warships, shipping and aircraft at favorable opportunities. The Battle of the Coral Sea was the first true carrier air battle; combat was almost exclusively undertaken by carrier-based aircraft. American forces were concentrated into Task Force 17 under the command of RADM Jack Fletcher. The task force was comprised of Fletcher's carrier Yorktown (flag) and the carrier Lexington, under the command of RADM Aubrey Fitch. Also part of Task Force 17 was an Allied (British and Australian) Support Group of three cruisers and two destroyers, under RADM J. G. Crace, RN as well as Fueling, Search, and Attack Groups. Carrier pilots engaged in aerial combat battle with pilots off the Japanese carriers Shokaku and Zuikaku. While both Japanese and American forces suffered the loss of ships, the Battle of the Coral Sea is considered to be a strategic victory for the Americans because it halted the Japanese plan to invade Port Moresby and thwarted Japanese expansion.

Battle Chronology

The Battle of the Coral Sea can be broken into three distinct segments. The first phase, from May 1 to May 4, was centered around the action at Tulagi. It began with the Australians abandoning the garrison, and ended with the American raid on Japanese forces there. During Phase Two, from May 4 to May 7, the action was centered on aerial searches, as the Japanese and American forces searched the Coral Sea, looking for the each other. This phase culminated in mistaken attacks by each side. The Japanese, thinking they had spotted the enemy carrier group, attacked the oiler Neosho and the attending destroyer Sims, sinking Sims and seriously damaging Neosho, which would later be sunk by U.S. forces. The Americans, thinking they had spotted the Japanese battle group, launched an attack on the light carrier Shoho and sunk her. Phase Three was the final carrier battle, during which Lexington was sunk

and Yorktown and the Japanese carrier Shokaku damaged. Following the battle, both the Japanese and the Americans retreated from the Coral Sea, and survivors from Sims and Neosho were rescued.

PHASE I

May 1: Australian forces, believing themselves unable to mount an effective defense, abandoned the garrison at Tulagi after receiving warning through Allied intelligence channels supplemented by a network of coast watchers that a Japanese invasion was coming.

May 2: An air scout off Yorktown spotted a submarine, which it attacks with depth charges. Yorktown believed her position to have been reported to the Japanese, although later reports suggest that it was not. Task Force 17 continued fueling operations, despite the increased risk of submarine attacks due to its slow pace and the constant criss-crossing of its tracks.

May 3: The Japanese moved ahead with Port Moresby invasion plan. On May 3 Task Force 17 learned that the Japanese had taken Tulagi. This report was greeted enthusiastically as "just the kind of report we have been waiting to receive" and the Japanese forces were seen as a "juicy target." Yorktown moved to raid Tulagi without the second carrier in the Task Force believing that Lexington was still fueling and unaware that the fueling operations were complete. Still assuming her position had been reported by the submarine attacked the day before, Yorktown was trying to act quickly to maximize her position.

May 4: The surprise attack on Tulagi on May 4 succeeded despite a relatively weak American force because the Japanese were unaware of the American presence in the area. American forces also increased the surprise element in their attack by operating under cloud cover in a weather front, which camouflaged their position from Japanese scouting ships. Because she was planning a surprise attack and wanted all fighters available for combat, Yorktown had no fighters preceding it or accompanying it. During combat, air attacks off the carrier were sent in waves with little or no coordination and there was no overall air commander in the attack area to reconnoiter, coordinate, maintain radio discipline, and observe and report the results of the attack. As a result, there was considerable error in pilot reports of hits and much ammunition expended without considerable gain. American forces, though weak, were able to attack and retreat before being caught in a double pincer envelopment attempted by the Japanese. This pincer movement developed for land-based warfare proved to be too detailed and inflexible during a naval engagement. After the raid at Tulagi, morale in Task Force 17 was extremely high.

PHASE II

May 5: As a series of weather fronts crossed the Coral Sea, Yorktown, Lexington, and the Support Group regrouped and were within visual distance of each other as they moved towards Port Moresby under radio silence. Judging the land-based sea searches

conducted by the Army Air Force inadequate, Task Force 17 began conducting searches off the carriers, concentrating in an area on the eastern boundary of the Coral Sea, missing the Japanese force located to the north and northwest. These searches, made with shorter range carrier-based planes were inadequate to locate enemy forces in an area the size of the Coral Sea.

May 6: Task Force 17 began fueling operations in open weather. They were spotted by a Japanese snooper aircraft which incorrectly reported seeing one carrier and one battleship. The American force also received various reports of Japanese ships in the area, though they were unsure of the number of carriers. Information received from CINCPAC, through radio decrypts, indicated that an attack would be made on Port Moresby, coming from Louisiade Archipelago. By now the Japanese knew that American forces were aware of the Port Moresby plan, and judged themselves strong enough to meet and beat the Americans regardless.

May 7: Task Force 17 continued land- and carrier-based searches of the area, hoping to spot the Port Moresby invasion force. Expecting an air duel, the Allied Support Group was detached to prevent it from being damaged by bombing and sent to attack enemy transport ships to the west. With no air cover or support, the Support Group was attacked by Japanese and US Army bombers, but suffered no damage and was available for later action. This detachment of forces confused the Japanese about the strength of the American force.

A scout off Yorktown returned in mid-morning and reported spotting two Japanese carriers. Preparations began for combined air attacks off Yorktown and Lexington, which were launched at 9:30am and 9:45am. However, after the attack planes had been launched, additional search groups returning to Yorktown reported that the Japanese ships were not, in fact, carriers. The Americans maintained an edge over the Japanese during this skirmish because they were operating in a weather front, which made enemy reconnaissance more difficult. In contrast, the Japanese light carrier Shoho was in clear weather and was sunk at 11:35 am. No additional attacks were ordered because enemy targets could not be found, although they remained in the area.

While Americans were launching a mistaken attack against Shoho, Japanese forces attacked Neosho and Sims, believing them to be a carrier and a battleship. Sims was sunk in this attack and some of her personnel were saved by the Neosho. Neosho suffered seven direct hits, filled with water, and drifted for days. Due to an error in her reported position, survivors were not rescued until May 11. The Japanese, now thinking that there were three American carriers in the area, decided to retire the Port Moresby invasion force and gain command of the Coral Sea first.

PHASE III

May 8 - Main Carrier Battle: TF 17 recognized that the Japanese invasion force was retiring, but did not know the locations of the carriers of the Japanese strike force, and

was forced to launch additional searches. A shift in weather fronts put the Japanese force under cloud cover, and left the Americans exposed under clear skies.

Japanese and American forces spotted each other on the morning of May 8 and sent out waves of attacks off their carriers. Japanese forces inflicted serious damage to American ships. Yorktown was hit and caught on fire, but the damage was subsequently brought under control. Lexington was not so lucky. Lexington suffered several direct hits, and a torpedo hit to the boiler rooms flooded one side of the ship, leaving her listing at 8°. Deliberate counter flooding put the ship back on an even keel but gas fumes from the boiler room led to an explosion. The Americans were forced to abandon ship and it was directed that Yorktown be torpedoed. The Japanese believed that they had sunk both Yorktown and Lexington, and burned one battleship and one cruiser. This mistaken damage assessment of American forces may have led them to go ahead with their plans at Midway.

Damage to the Japanese forces also had a effect on the Battle of Midway. The carrier Shokaku was seriously damaged when it suffered direct hits. She was not sunk but was unavailable for service at Midway. The carrier Zuikaku was only lightly harmed, however, in an attempt to accommodate planes from Shokaku, many planes and pilots were lost. These losses left the Zuikaku without a full complement of planes and she too was unavailable at Midway. On the afternoon of May 8, a dispatch from CINCPAC ordered the Task Force to retire from the Coral Sea, and its withdrawal was unopposed by Japanese forces.

May 9 to May 11: On May 9, the Japanese returned to the Coral Sea to “finish the battle” against the damaged American forces, but were unable to locate them. On May 11, survivors from Neosho and Sims were rescued.

Battlespace Awareness and Battlespace Knowledge

Radio decryption of the Japanese naval code, JN-25, in Pearl Harbor, allowed American forces to know of the intended Japanese attack on Port Moresby, a vital staging area on New Guinea. This advance knowledge gave the Americans a valuable advantage over the Japanese. The Americans were aware not only of the goal of Operation MO, as the Port Moresby invasion was named, but also of the Japanese order of battle, the types of ships and aircraft being prepared, training exercises, personnel/pilot status, and expected troop movements. A change of Japanese radio code on April 27 confirmed that the Japanese attack was coming, and Americans were fully aware of the Japanese plans.

Still, this apparent generation of Dominant Battlespace Knowledge was not sufficient to provide the desired outcome. Though American forces knew the Japanese objectives and order of battle, they did not know what route the Japanese would take to Port Moresby. Air searches were focused in the wrong part of the Coral Sea and did not find the Japanese forces. The American edge over the Japanese was further

reduced after the raid on Tulagi, which exposed American forces to the previously unsuspecting Japanese. After this point, with the Japanese aware of the American force in the area, the Americans lost much of their advantage, although the Japanese still did not realize the size of American forces present in the Coral Sea, thinking at one point that they were facing only one American carriers, and on May 7 believing there were three American carriers in the area. The Tulagi raid also made the Japanese aware that the Americans knew of the Port Moresby invasion plan. The remainder of the battle saw each side attempted to gain an advantage in battlespace awareness by trying to locate enemy ships through aerial sorties.

The Japanese were unaware of American forces in the area at the outset, and throughout the battle never gained a strong understanding of the forces opposing them. They did not know how many American carriers were in the area or where they were. Initially, the Japanese thought only one American carrier was present, *Saratoga*, assuming that two carriers had been damaged in Doolittle's Raid on Tokyo.

Key Points for Analysis

Several key factors dominated the decision-making during the Battle of the Coral Sea. These factors -- American raiding exercises, carrier logistics, American edge in the air, weather, enemy recognition, and the American command structure -- are addressed in more detail below.

➤ *American Raiding Exercises*

Action in the Coral Sea followed Doolittle's Raid on Tokyo on April 18. This surprise attack on the Japanese mainland raised American morale and had a damaging psychological effect on the Japanese. Doolittle's Raid also had an effect on American force strength in the Coral Sea; the carriers *Hornet* and *Enterprise* needed repairs and were returning from Pearl Harbor to the South Pacific during the Battle of the Coral Sea. The presence of these two additional carriers during the battle would have given the Americans an overwhelming force.

➤ *Carrier Logistics*

The Battle of the Coral Sea was the first carrier air battle where the enemy forces were never within visual distance of each other. American attitudes about carrier operations were still evolving in the early part of the war as the importance of aerial combat began to grow. The carrier's role shifted from that of an attack ship with planes aboard to an aircraft transporter with attack capabilities. During this battle, the American forces saw logistical weakness in their reliance on oilers. Believing that a free range of motion was critical to success, refueling was conducted whenever possible, which forced the retirement of the entire task group.

Though Yorktown and Lexington were joined as a task force, these carriers often operated independently, as evidenced by Yorktown's raid of Tulagi. The carriers were often out of sight of each other, and radio silence forced them to operate by doctrine. CINCPAC Admiral Chester Nimitz remained in Pearl Harbor, so a great deal of decision-making authority was given to the on-site commanders. While this gave the on-site commanders, who had the greatest situational awareness, the latitude to address a variety of battle options, it made coordination between carriers in the task force difficult. Even though these carriers did act together at times, their actions were never truly coordinated.

➤ *American Edge in the Air*

Americans maintained an edge over the Japanese in aerial combat because of their technological advantage. American forces had radar and homing devices, which allowed the American carriers to spot enemy aircraft before they were in visual distance. Americans could then send up aircraft to engage enemy forces before they the carrier was attacked. U.S. forces could also operate more effectively at night and under poor visibility conditions. American forces had homing devices on the carriers which enabled pilots to return to the carrier more easily. Because the Americans had not had time yet to train a large group of pilots, a premium was placed on those available pilots. As a result, search and rescue mission were conducted after each skirmish to recover all missing pilots and aircraft.

In contrast, Japanese planes had no radar equipment, and the carriers Shokaku and Zuikaku had no homing devices. Japanese pilots, therefore, had to rely on a visual sighting of the carrier to find their way back. Additionally, although the Japanese had adequate and able pilots at the outset of the war, they did not place an emphasis on pilot recovery. Consequently the Japanese lost more planes because of their technological disadvantage, and lost more pilots because search and rescue operations were not conducted.

➤ *Weather*

Weather played an important part during the Battle of the Coral Sea, but was never fully taken advantage of by either side. Operating within weather fronts provided valuable cover from enemy aerial reconnaissance, though it made carrier operations more difficult. The American forces benefited from cloud cover during the early raid at Tulagi and the mistaken attack on Shoho, when American forces were camouflaged in the front. Conversely, the Americans suffered during the main carrier battle on May 8 when the Japanese operated in the front and American were under clear skies. It appears that neither side sought out the advantages afforded under cover of the weather fronts. Instead, weather was regarded as pure chance and was not used to the advantage of either side.

➤ *Enemy Recognition*

Many of the decisions made during the Battle of the Coral Sea were based on pilot sightings from aerial reconnaissance. This information proved to be of poor quality, especially when compared to the communications intelligence coming out of Pearl Harbor. Many of the human errors were due to poor enemy recognition; pilots were unable to accurately identify what they had seen or what had been hit during an attack. This gave on-site commanders a skewed image of the enemy they were facing, leading to the overestimation of damage from the raid at Tulagi and the mistaken attack on the Shoho. Japanese pilots fared little better than their American counterparts in this regard, consistently misidentifying American forces, such as reporting Neosho as a carrier. Reliance on these pilot reports seriously undermined efforts to gain a clear picture of the battlespace. As there was no way to verify or contradict this data, it was generally accepted as reported.

➤ *American Command Structure*

The entire Pacific was designated an area of U.S. strategic responsibility, and was divided into 3 large areas: Southwest, Southeast, and Pacific (later divided into North, Central, and South Pacific). The Battle of the Coral Sea was conducted along the boundary of the Southwest and South Pacific areas. General Douglas MacArthur had been made Supreme Commander of the Southwest on April 18. As commander of forces in Australia, he had no control over Coral Sea operations but was called upon to support them whether or not they contributed to his own plans. South Pacific was under the command of Admiral Nimitz as CINCPAC, who formally assumed that position during the battle on May 8. This divided command structure made co-ordination between naval- and land-based air forces in the Coral Sea very difficult. All land-based aircraft involved in the Coral Sea were those of the Army Air Force of SOWESTPAC located in Australia and Port Moresby. Task Force 17 had no control over supporting Army air forces in the Coral Sea area.

Suffering from unfavorable weather, mental and physical fatigue, a lack of spare parts and coordination with naval forces, the Army Air Force out of Australia was unable to provide the air cover and long-range searches necessary to adequately support a naval operation in the Coral Sea. Carrier-based aircraft had a smaller range and were inefficient in searching an area the size of the Coral Sea and therefore were forced to rely on the ineffective land-based aircraft to provide aerial reconnaissance.

Conclusion

The Battle of the Coral Sea is generally considered to be a turning point in the war in the Pacific because American forces were able to stop Japanese advancement. Although the loss of Lexington was a more serious blow to the Americans than the sinking of Shoho was to the Japanese, the tide had been turned. Because of damage sustained during the Battle of Coral Sea, Shokaku was unavailable at Midway, and the loss of planes off Zuikaku also blocked her participation at Midway. The damage reports received by the Japanese after the battle led them to believe that two American

carriers had been sunk, and they subsequently underestimated the size of the American force that would be available for the Battle of Midway.

Dominant Battlespace Awareness III

Midway Case Study

Information Requirements

15 May 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (~90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations.**
- **DBK**
- **High confidence in the future (~95% confidence), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level.**

Critical DBA/DBK Questions

- **What were the sources/mechanisms of DBA and DBK?**
- **What were the Commanders' key information requirements?**
 - **Enemy OB**
 - **Enemy capability**
 - **Enemy intent**
- **What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?**
- **What happened both tactically and strategically when those sources were denied?**
- **How perishable is the information from the different sources across the battles**

Campaign Objectives

U.S.

- **Meet and defeat the Japanese fleet (Kido Butai)**
- **Maintain American position at Midway**

Japanese

- **Engage in great naval battle that would decimate American fleet, which would lead them to negotiate**
- **Midway would provide advance warning and defense, and allow Japan to take Hawaii**
- **Aleutians islands, though diversionary, could be used to deny a US shuttle to Russia if it entered the war**

CONOPS

U.S.

- **Surprise Japanese forces at Midway**
 - Use information gained through ULTRA decrypts to simultaneously evade and surprise the enemy

Japanese

- **Attack at Midway to draw the American fleet into a naval battle where it would be decimated by submarines, carriers, and battleships**
- **After Midway is captured, use the island as a launch pad to attack Hawaii**

Overview of Forces

- **U.S. Forces**

- **Commander in Chief, Pacific Fleet (CINCPAC): ADM Chester Nimitz**
- **Task Force 17 - RADM Jack Fletcher**
 - » **CV Yorktown - Capt. Elliot Buckmaster**
- **Task Force 16 - RADM Raymond Spruance**
 - » **CV Hornet - RADM Marc Mitscher**
 - » **CV Enterprise - Capt. George Murray**
- **Submarines (19 total) - RADM Robert English (RN)**
- **Midway defenses and shore-based air - Capt. Cyril Simard**
 - » **2nd MAW - LtCol Ira Kimes**
 - » **7th Army Air Force - MG Willis Hale**
- **Aleutians: Task Force 8 - RADM Robert Theobald**

Overview of Forces (Cont.)

- **Japanese Forces**

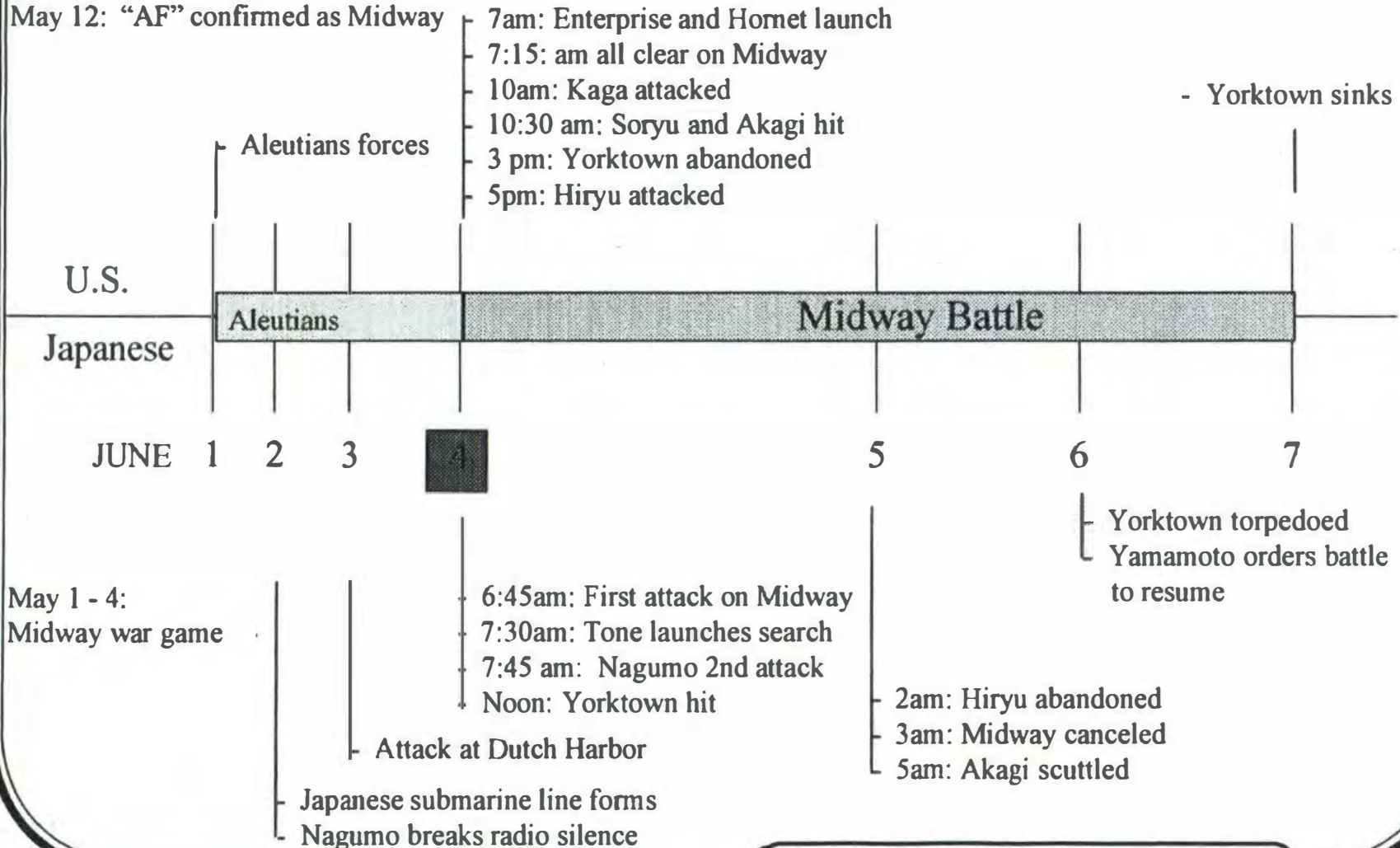
- **Commander of the Combined Fleet: ADM Isoroku Yamamoto**
 - » **Yamato (flagship) with Hosho (CVL)**
- **Carriers Akagi (flagship) and Kaga: VADM Chuichi Nagumo**
- **Carriers Hiryu (flagship) and Soryu: VADM Tamor Yamaguchi**
- **Midway Invasion: 2nd Fleet - VADM Nobutake Kundo**
- **Submarines: 6th Fleet - VADM Teruhisa Komatsu**
- **Aleutians: 5th Fleet - VADM Moshiro Hosogaya**
- **Shore-based air: 11th Air Fleet - VADM Nishizo Tsukahara**

Sequence Events

June 1 - 7, 1942

May 10: Trap message broadcast.

May 12: "AF" confirmed as Midway



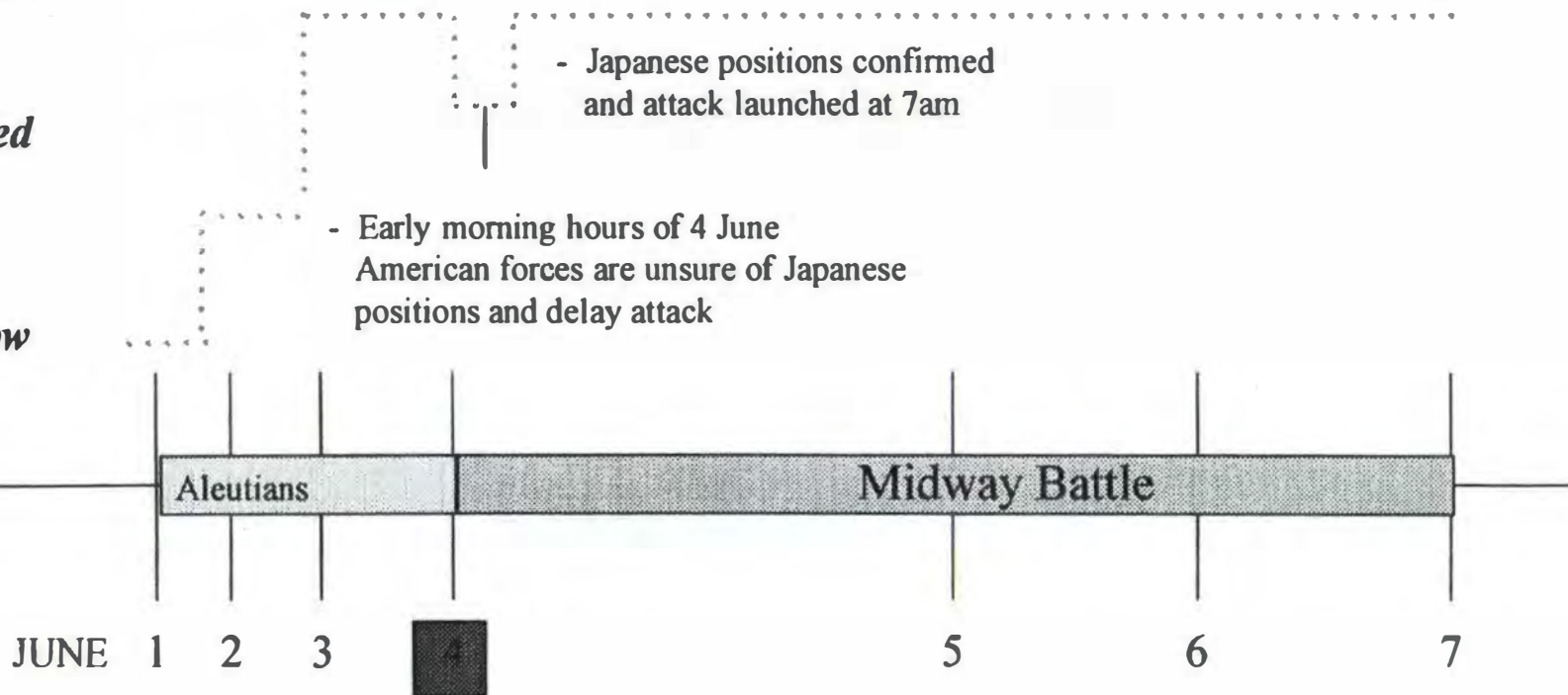
Level of DBA/DBK -- U.S.

June 1942

High

Med

Low



Level of DBA/DBK -- Japanese

June 1942

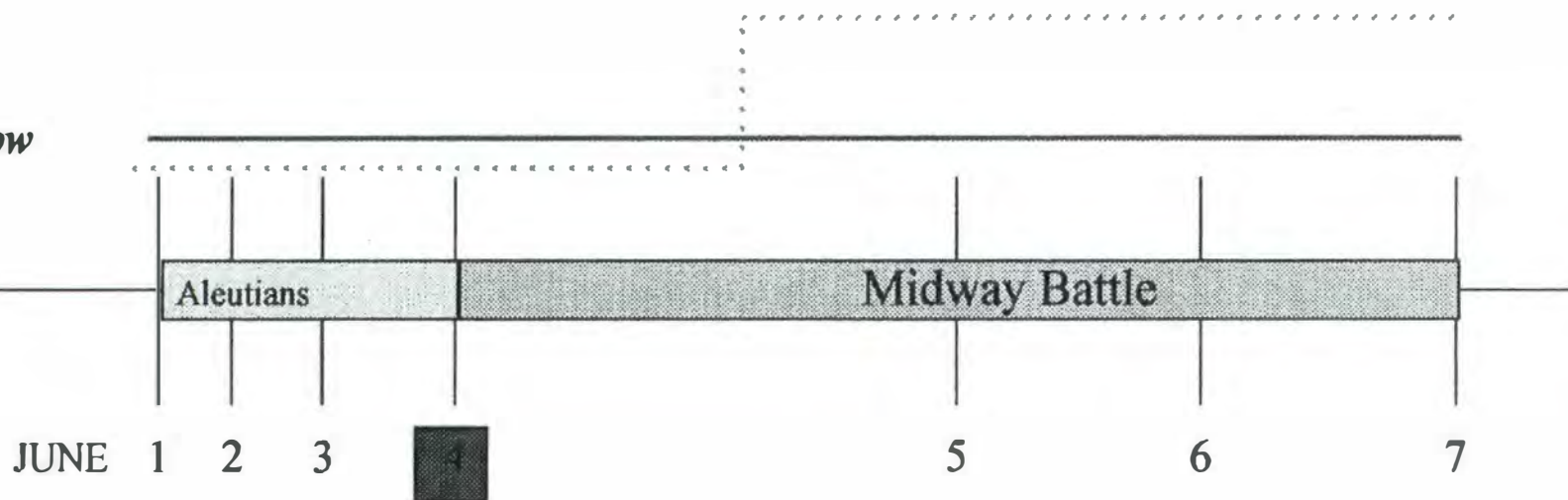
High

Med

Low

- Search planes from the Tone
return locations of American
carriers. Yorktown hit at noon.

- Yamamoto orders battle
to resume



— DBK
..... DBA

Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker (Yamamoto)**
- **Friendly & enemy order of battle**
- **Friendly & enemy capability**
- **Location and status of friendly & enemy logistics nodes and supply lines**
- **Enemy TTP and historical performance**

Mechanisms

- **Communications intercepts (ULTRA)**
- **Aerial reconnaissance**

Sources & Mechanisms of DBK

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics nodes and supply lines**

Mechanisms

- **Communications intercepts (ULTRA)**
- **Commander's intuition/experience**
- **Post-battle analysis**

Information -- Required

U.S.

- **Location, status, and number of enemy units**
- **Logistic capacity of friendly forces**
- **The most likely enemy course of action (e.g., intent)**
- **Location, status, and number of friendly units**

Japanese

- **Location, status, and number of enemy units**
- **The most likely enemy course of action (e.g., intent)**
 - **Japanese based plan on presumed US reaction**

Information -- Not Sought

Japanese

- **US carrier locations**
- **Information concerning the Aleutian defenses**

Information -- Timeliness

U.S.

- **Knew through ULTRA that the Japanese were planning an attack on Midway (AF Trap message 12 May)**
- **Did not need to rely as strongly on pilot reports because of ULTRA information**

Japanese

- **Yamamoto was not in the theater of battle**
- **Decision to launch 2nd strike against Midway based on aerial reconnaissance and pilot reports**

Information -- Accuracy

U.S.

- **ULTRA provided very accurate information to the Americans concerning where and when the Japanese would appear**
- **U.S. performed better aerial reconnaissance during the battle for battlespace information (e.g., DBK acts as Synoptic coverage)**

Japanese

- **Relied on presumed US reaction**
- **Relied upon aerial reconnaissance using doctrinal search, but undertook only a light search because they expected to find nothing**

The Impact of Command

Command Structure

- **U.S.**
 - More unified command than the Coral Sea, less reliance on Army participation
- **Japanese**
 - Forces organized under a single command, but many separate groups required high degree of coordination

Personalities

- **Japanese**
 - Yamamoto envisaged a great naval battle that would annihilate the US Fleet, he was aboard the Yamato during the battle and over from the key decision-making (Nagumo)

The Impact of Intangibles

Morale

- **U.S.**
 - **High morale after strategic victory in Coral Sea**
- **Japanese**
 - **Over-confidence led to a battle plan with little flexibility built-in**

Weather

- **Japanese -- Planned battle to take advantage of the fog, however, battle day was clear**

Elements of IW

Deception

- **Japanese**
 - **Diversiónary Aleutian force**

EW

- **Allies**
 - **ULTRA codebreaking allowed allies access to critical information**

Physical Destruction

- **Nothing targeted expressly for IW benefit**

Elements of IW (Cont.)

OPSEC

- **U.S.**
 - **Midway trap message confirms target**
- **Japanese**
 - **Their continued poor OPSEC allowed ULTRA decryption to be effective in giving US information concerning upcoming counterattack**

PSYOPS

- **No critical PSYOP planning by either side**

Impact of Knowledge -- U.S.

- **Good information concerning Japanese attacks allowed the commanders to make the best of strike opportunities**
 - **Spruance waited until the Japanese attack aircraft returned to the carriers to launch his counterstrike**
- **Better strike coordination led to stronger attack**
 - **Pilots flew better routes, making a faster and quicker determination of the enemy**

Impact of Knowledge -- Japanese

- **With no warning, Japanese were caught totally by surprise and thus were vulnerable to attack**
 - **Presence of carrier ships at Midway attack should have been a stronger sign, and led to a refocused attack against the carriers**

Why Did Japan Lose?

- **Nagumo's indecision**
- **Japan not at full strength, carriers diverted for Aleutian campaign and Shokaku and Zuikaku missing**
- **Lost objective in deciding to launch 2nd attack against Midway**

Why Did the U.S. Win?

- **Radio intelligence -- supplied prior knowledge of Japanese plan**
- **Focused search**
- **Coordinated command plan**
- **Luck**

DBA Conclusions

- **Key information on enemy OB and locations was not fully meaningful without accurate knowledge of enemy capabilities**
- **US intelligence scored a major coup that enabled the opportunity for a precise surprise strike**
- **Delay of Tone in searching set sector enabled the U.S. to make additional advances without detection**
- **Even after the Japanese Commanders knew U.S. carriers were present in the area, they delayed engaging the fleet, losing a valuable edge**

DBK Conclusions

- **When US forces had knowledge of enemy intent and capability, location information allowed better battle operations**
- **When knowledge of actual location was absent, OB and general location information drove more conservative decisions**

Command Decisions in the Battle of Midway

June 1 - June 7, 1942

Background

Coming six months after the Japanese surprise attack at Pearl Harbor, the Battle of Midway was one of America's greatest naval victories. It was a victory won that came as a result of defeating a major Japanese offensive, and was the turning point in Pacific during World War II. The Japanese plan at Midway, known as Operation MI, was intended to engage the American forces in a great naval battle that would finish the American fleet, expose the American mainland, and lead the Americans to negotiate.

Admiral Isoroku Yamamoto, Commander of the Combined Fleet, designed the Japanese attack at Midway to draw the American fleet into a climactic battle, where it would be decimated by the overwhelming combined power of the Japanese submarines, carriers, and battleships. The operation at Midway was undertaken by Yamamoto in effort to meet and defeat American forces before they had time to get stronger and larger. The Japanese plan was to attack the island from the North with battleships and carrier-based air power. A simultaneous attack was also planned on the Aleutian Islands. The Japanese expected that once American forces in Pearl Harbor received word of these attacks, they would sail out to defend these areas, and split their carrier force (which had been underestimated by the Japanese) to meet these two attacks. The Japanese submarine line would be stationed off Hawaii to keep track of the American forces expected in the area. By the time the Americans reached Midway, the Japanese expected that the island would already have been defeated and that the carrier and battleship power of the Japanese would sink the remaining carriers in the American Pacific fleet. The land gains at Midway would give the Japanese a valuable post on the Western end of the Hawaiian chain, providing advance warning and expanding the defense perimeter of the Japanese Empire. The Japanese believed that possession of Midway would serve as a launch pad to facilitate an easy victory in the Hawaiian Islands, allowing a forceful attack the American West coast. The Aleutians islands, though part of a diversionary attack, would also give the Japanese a Northern outpost and could be used to deny an American shuttle to Russia if she entered the war.

The Battle of Midway followed the American halting of the Japanese advance in the Battle of the Coral Sea by less than a month. During this earlier battle, American intelligence, gained through radio decryptions of the Japanese Naval Code (JN-25), allowed American forces to evade an intended Japanese pincer movement and stop the Japanese attack on Port Moresby. Less than one month later, the American objective in the Pacific was not only to shore up the American position at Midway, but also to continue to meet and defeat Japanese forces where possible, while still maintaining a strong carrier force in the Pacific. In surprising the Japanese forces at Midway, the Americans again used radio decryptions to simultaneously evade and surprise the enemy.

The Japanese viewed the actions in the Coral Sea as a temporary setback, and focused instead on planning for the Battle of Midway. The Japanese strategy was so complicated it required a four-day wargame conference to prepare for it. This conference was actually held during the Battle of Coral Sea. The wargame did include an outcome which was very similar to the actual defeat the Japanese suffered, but this was brushed aside by Yamamoto's chief of staff Matome Ugaki.

The Japanese plan was based on a pincer movement (unsuccessful during the Battle of the Coral Sea) and five major forces, including a diversionary decoy. The first line would be a submarine line off of Hawaii (6th Fleet) under VADM Teruhisa Komatsu which would report American ship movements. VADM Chuichi Nagumo commanded the carrier strike force with four carriers: Akagi, Kaga, Hiryu, and Soryu, which would attack Midway in advance of the occupation force and would wait for the arrival of the American carriers. The Midway occupation force of battleships and cruisers was in place under VADM Nobutake Kondo, as was a transport group and freighters to support the Midway invasion. ADM Yamamoto was also at sea, though significantly not in the battle area, aboard the super-battleship Yamato accompanied by the light carrier Hoshu. The Aleutian diversionary force was sent against Adak, Attu, and Kiska under VADM Moshiro Hosogaya with two carriers: Ryujo and Junyo. In retrospect, these two carriers would have been much better used in the main carrier force under Nagumo. The Japanese relied on an *expected* American response to ensure success of their plan. They anticipated that the Americans would rush to defend Midway and would get caught in a triple pincer of Nagumo's carriers, the guns of the Yamato, and Kondo's battleships.

Chain of Events

The intelligence received about the Japanese plans for Midway enabled American forces to pull off what has been called the greatest coup in the history of naval intelligence. American forces in Pearl Harbor intercepted Japanese radio message traffic and were subsequently able to determine that a major Japanese offensive was being planned. The Japanese messages centered on a destination known only as "AF." Codebreakers in Pearl Harbor suspected that AF was Midway. To confirm this suspicion, a trap message, sent out on May 10, was broadcast from Midway on the open airwaves to alert Pearl Harbor that the island's water plant had caught on fire and that there was no fresh water. Two days later, a Japanese message was intercepted saying "AF" was out of water. The Japanese target had been determined. While ADM Chester Nimitz, Commander in Chief of the Pacific Fleet, trusted the decryptions unraveled at Pearl Harbor, Naval intelligence (OP-20-G) in Washington did not. Washington believed that the entire plan was a Japanese trap, and that sailing out to meet the Japanese force would put the entire Pacific fleet at risk. A loss at Midway would devastate American naval power in the Pacific and open up the entire West Coast to attack. Nimitz chose to believe his staff's intelligence assessment.

On 1 May, sailing out of Pearl Harbor with advance knowledge of the Japanese plan,

were Task Force 16 with the carriers Enterprise and Hornet under RADM Raymond Spruance, and Task Force 17 with the carrier Yorktown. The Yorktown, which was repaired in three days after sustaining damage during the Battle of the Coral Sea, was under the command RADM Jack Fletcher, who, as the senior officer, had overall command of the operation. Supporting the carriers were a total of 230 aircraft, 13 cruisers, and 30 destroyers. On Midway there were 150 aircraft including the 2nd Marine Air Wing (MAW) under LTCOL Ira Kimes and the 7th Army Air Force under MG Willis Hale. Task Force Eight, under the command of RADM Robert Theobald, sailed to meet the Japanese diversionary force heading towards the Aleutians, with five cruisers and 13 destroyers.

Battle Outcome

The Battle of Midway can be divided into two major segments: the diversionary campaign in the Aleutians and the Midway strike. On 3 June the carriers Ryujo and Junyo attacked the Aleutians at Dutch Harbor and took Attu and Kiska. The American Army Air Force resisted the Japanese attack but this was limited because American forces knew the attacks on the Aleutians were only a diversion from the main activity at Midway. ADM Theobald, fully aware of the upcoming attack on the Aleutians, joined his main fleet on 1 June, two days before the Japanese Aleutian Guard force broke from Yamamoto's main body and attacked the islands. The Aleutian campaign was unsuccessful for the Japanese because the targets were inappropriate; the effort expended to take them was not worth the territory gained. After taking three small islands, Yamamoto postponed further Aleutian operations on 4 June.

The Midway plan relied on several separate forces to draw the Americans into battle and defeat them. The front line of these forces was a submarine line formed off the Hawaiian Islands. These submarines would report which ships were leaving Pearl Harbor and when they had departed. Because the Americans were aware of the plan at Midway, the battle group had sailed out off Pearl Harbor on 1 June. By the time the submarine line formed on 3 June, the critical American ships had already passed the line, and the submarines were unable to report any ship activity.

The principal combat at the Battle of Midway occurred in the space of a few hours on 4 June. At 0600 the air raid alarm sounded at Midway, and American shore-based fighters took off to meet the Japanese. Nagumo's strike hit Midway, and almost one-third of the American pilots were shot down. However, the American forces at Midway held and at 0700 the Japanese fighters radioed the need for a second attack against Midway. Nagumo felt he needed another attack against Midway to completely subdue American forces there. A full complement of planes had been held back to use against the American carrier force, and at 0715 Nagumo decided to rearm these planes with bombs, replacing the pre-loaded torpedoes. This transferal would take an hour, taking the planes out of service and leaving the carriers undefended and vulnerable.

At the same time that the first Midway strike force was being completed, and Nagumo

was rearming his planes, the Enterprise and Hornet launched their planes against the Japanese carriers. The Japanese had had planes flying off the search ships Akagi, Chikuma, and Tone looking for the American forces since 0400. To the great advantage of the Americans, one ship, Tone, had been delayed until 0500. The sector to be covered by Tone happened to be the precise sector of the American approach and American forces were able to advance without detection until 0700. At 0730 Tone reported ten ships at 240 miles off. Faced with reports of an incoming American force, Nagumo again changed his plans, and decided leave those planes still loaded with torpedoes as they were. At 0810 Tone reported five cruisers and five destroyers, and at 0820 Tone reported the American carrier presence. This Midway air strike force was recovered at 0920 and all four Japanese carriers refueled and rearmed in preparation for the American carrier force.

At this moment of confusion on the Japanese carriers -- when the decks were hampered with the returning Midway strike force, bombs being transferred on and off aircraft, and the carriers refueling -- Spruance decided to launch an all-out effort. Akagi, Soryu, and Kaga were attacked and in flames by 1100. All three of these carriers sank by late afternoon. Hiryu was untouched in this wave of attacks and was able to launch fighters against Yorktown. A successful Japanese strike against Yorktown occurred at 1200, and Hiryu was attacked at 1600. Both carriers were fatally hit. Yorktown was abandoned at 1500, but remained afloat for several more days and was scuttled by the Americans on 7 June. Hiryu was abandoned at 0200 on 5 June and sunk by 9am. Thus, all four Japanese carriers were on the ocean floor within 24 hours.

Command Decisions

The American victory at Midway was based primarily on two key command decisions. That the American forces even entered the battle can be identified as a command decision on the part of ADM Nimitz. He disagreed with Washington HQ's interpretation of the radio decryptions and risked the American Pacific fleet in what might have been a Japanese trap. The Japanese put a great deal of effort into planning the complicated battle plan for Midway, but Nagumo's indecision at one critical moment cost the Japanese four carriers.

American Command Decisions

Through radio decryptions, the Americans knew in advance of the Battle of Midway virtually all of the information required for success: location, status, and number of enemy units, logistic capacity, intent, and the likely enemy course of action. This information enabled the American forces to focus their efforts and make the best attack strikes possible. Spruance waited until the first wave of Midway attack planes had landed and was able to destroy not only the Japanese carriers, but also their complement of aircraft as well. American forces were also starting to show the benefits of battle experience. Better pilot coordination led to stronger attacks as they flew better routes and made faster and more accurate determinations of the enemy.

➤ *Radio Decryptions*

The primary credit for the stunning American victory at Midway belongs to the codebreakers working at Pearl Harbor. This intelligence, known as HYPO, predicted that a major campaign involving a massive Japanese force (Kido Butai) was being organized against Midway. The trap message confirming the target of the Kido Butai was the final piece of the puzzle. Through decrypted message traffic, Nimitz was able to know dates, times, places, ships, rendezvous, plans, and intentions of the Japanese for Midway. With so much of their information known to the enemy, the Japanese chance for success was greatly diminished, although their firepower in the area remained formidable.

➤ *Aerial Reconnaissance*

Because the Americans had such excellent information from the radio decryption, they were not forced to rely solely on aerial reconnaissance to the extent they had in the Battle of the Coral Sea a month before. During that battle, the American forces had been aware of the Japanese intentions and order of battle; however, intelligence was never received to locate adequately the enemy.

➤ *Decision Makers*

The Americans benefited from a single unified command structure at the battle of Midway. Nimitz completely empowered Fletcher and Spruance to manage the operation, and as Army air played a less significant part, a high level of coordination was not required for success. Conversely, during the Battle of the Coral Sea, the American command structure had been divided between Nimitz in Pearl Harbor commanding the Naval forces, and MacArthur in Australia commanding the Army, which was supposed to provide land-based air support. This dual command structure was not able to coordinate satisfactorily air search and cover actions.

Japanese Command Decisions

The Japanese suffered from the absence of critical and timely information. Inaccurate data about American carriers and their condition and location led Yamamoto to underestimate the size of the American force. Yamamoto knew after the Battle of the Coral Sea that he needed better location information for the Americans, but Japanese scout planes could not reach Oahu from Japanese bases. For a time, the Japanese used mobile bases in the French Frigate Shoals, but these were discovered and mined, depriving the Japanese of valuable information about American fleet and troop activities.

The Japanese information concerning the Aleutians was also of very low quality. Japanese objectives during this diversionary attack were small islands with small civilian populations. This was a miscalculation because these islands were not of sufficient strategic importance to induce the American command at Pearl Harbor to

split its force and defend them. Hurried because of the impact of American raids such as Doolittle's on Tokyo and the Battle of the Coral Sea in the previous months, the Japanese moved ahead with a plan that relied on the Americans to respond exactly as the Japanese anticipated. Overconfidence led to a battle plan with little chance for success.

Poor decision-making on the part of the Japanese command, particularly Nagumo left the Japanese totally vulnerable to the American attack. The decisions to launch a second strike against Midway was based on aerial reconnaissance and pilot reports. These reports were incorrect or incomplete, but were acted upon in concert with a plan that was based on a predicted American response. The Japanese reaction to the presence of American carrier planes should have sent a warning to Nagumo to begin preparing his planes for an air battle. Instead he continued to arm his planes for another attack on the island of Midway, one that he thought would completely overwhelm the American troops and allow the Japanese to take the island.

➤ *Aerial Reconnaissance*

Much time and effort was spent on both sides in the Coral Sea looking for and identifying the enemy. This searching was done with only moderate success, and the poor enemy recognition exercised in the Coral Sea negatively influenced the Japanese during the planning and execution of the Midway operation. Yamamoto's strategy at Midway was based on the faulty information gained through aerial reconnaissance during the Coral Sea that both carriers involved in that action, Lexington and Yorktown, were out of service. The Americans in the Coral Sea scuttled Lexington, but Yorktown was able to return to seaworthiness in time for the battle at Midway. The inability of the Tone to conduct its search in the time and area necessary also cost the Japanese and presented the U.S. with a valuable advantage.

➤ *Decision Makers*

The Japanese, as before, remained under the single unified command of Yamamoto, but the complexity of the operation at Midway and the large number of separate groups required a high degree of coordination. This coordination was difficult to accomplish with the diminished communication required when operating under radio silence. Though Yamamoto was in the area during the battle aboard the Yamato, he was removed from the key decision-maker, his carrier admiral Nagumo. The Japanese command structure was more unified than the American's; however, the inflexibility of the plan at Midway and the lack of communication among the Japanese forces effectively reduced the Japanese presence to several smaller forces instead of one focused whole.

DBA/DBK Conclusions

The Battle of Midway was intended by the Japanese to be the final naval battle in the Pacific, a defeat so complete that the Americans would have little choice but to

negotiate. The Japanese battle plan failed for several key reasons. By basing their plan on an *expected* American reaction, the Japanese were reducing the impact of their forces by making them essentially *reactionary*. By only reacting, the flexibility of the large Japanese force was hampered. Japan also was not at full carrier strength. Two carriers had been diverted for the Aleutian campaign, while the Shokaku and Zuikaku were missing from action as both were still being repaired after sustaining damage during the Battle of the Coral Sea. A stronger carrier force might have been enough to overwhelm the best American luck and timing. A third critical element leading to the Japanese defeat was the indecision of the carrier leader Nagumo. His decision to re-arm his aircraft to fly against Midway and not the oncoming carrier force left him wholly vulnerable to the American attack. Knowing that American carriers were present and deciding not to engage cost him a valuable edge.

American forces on Midway, originally in a defensive position, were able to turn the situation to their advantage by knowing the enemy's intentions. Radio intelligence contributed more than any other single factor to the American success at Midway. This intelligence coup enabled the American forces to strike the Japanese forces with a coordinated command plan that smashed the Japanese carrier force. The successful strike relied on excellent communication and better pilot skills that had previously been unavailable. Luck also played a big role in the American victory at Midway. The fact that Tone happened to be responsible for the exact sector from which the Americans were approaching was fortuitous and allowed the American carriers to close on the Japanese forces without early detection. In addition, the successful American strike benefited from the fact that some of the American dive bombers got separated from the main force and only appeared over the Japanese carriers after Japanese combat air patrols (CAP) had been drawn down to lower altitudes to deal with incoming torpedo bombers.

The American victory at Midway relied on a combination of luck and skill. American forces applied lessons learned from the Coral Sea and maximized the impact of advance knowledge gained through radio decryptions. Advance knowledge of the enemy, carefully applied in a specific situation, enabled a smaller American force to meet and defeat the Kido Butai of the Japanese Navy and turn the tide of the Naval battle of the Pacific.

Dominant Battlespace Awareness III

The Battle of Savo Island Case Study 8 - 9 August 1942 Information Requirements

IPR With LtCol Paul Selva

25 June 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (95%), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- **What were the sources/mechanisms of DBA and DBK?**
- **What were the Commanders' key information requirements?**
 - **Enemy OB**
 - **Enemy capability**
 - **Enemy intent**
- **What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?**
- **What happened both tactically and strategically when those sources were denied?**
- **How perishable is the information from the different sources across the battles**

Campaign Objectives

Allied Forces

- Establish presence in the Solomon Islands, capturing the islands of Tulagi and Guadalcanal, in order to maintain Lines of Communication with Australia

Japan

- Maintain presence in Solomon Islands to sever Lines of Communication between US and Australia

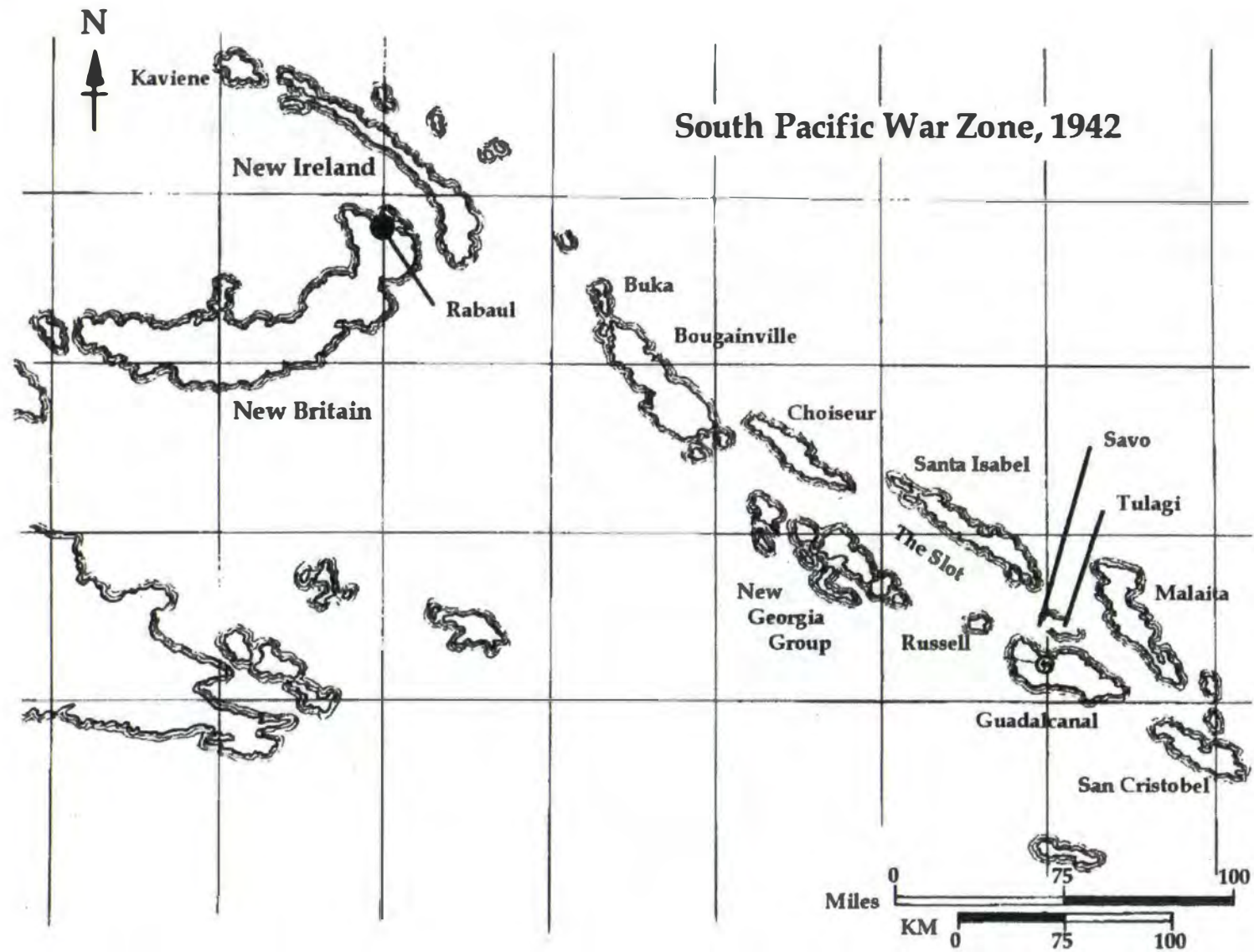
CONOPS

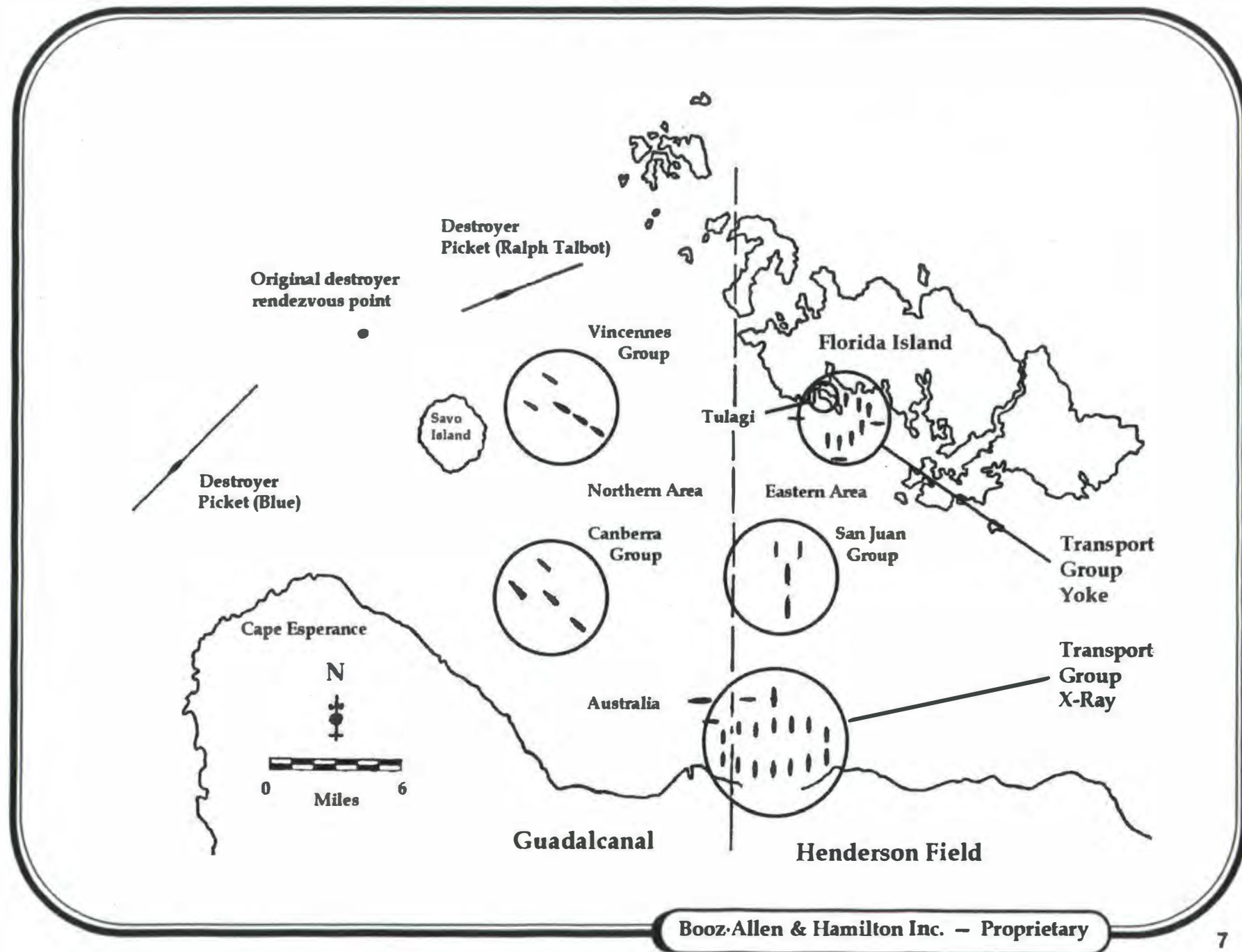
Allied Forces

- **Protect and support landings on Solomon Islands**
 - Fletcher's carriers (Wasp, Saratoga, Enterprise) provide combat air patrols and close air support over Solomon area of responsibility (day)
 - Crutchley's cruisers & destroyers provide Marines with naval gunfire support (day) and screening for transports in anchorage (night and day)

Japan

- **Defeat U.S. landings in Solomons**
 - All available IJN aircraft in the South Pacific attack US transports while unloading and locate US carriers
 - All 8th Fleet submarines proceed to Solomons and attack US shipping and locate US carriers
 - All available 8th Fleet surface combatants proceed to Rabaul, pick up V. Adm. Mikawa and then proceed to Solomons to attack US transports





Overview of Forces

Allied Forces:

- **Vice Adm. Robert L. Ghormley (Commander, South Pacific Area) (Flag in New Zealand)**
 - **Task Force 61: Vice Adm. Frank Jack Fletcher (Expeditionary Force Commander) (3 CVs, 1 BB, 5 CA, 1 CL, 15 DD) but he limited himself to command of the three carrier groups**
 - **Task Force 62: Rear Adm. Richard K. Turner (Amphibious Force Commander)**
 - » **Task Group 62.6 (Western Screen): Rear Adm. Victor A. C. Crutchley RN (VC) (Screening Force Commander)**
 - **Radar Pickets (2 DDs)**
 - **Southern Group: Rear Adm. Crutchley (3 CAs, 2 DDs)**
 - **Northern Group: Capt. F.L. Riefkohl (3 CAs, 2 DDs)**
 - » **Task Group 62.4 (Eastern Screen): Rear Adm. Norman Scott (2 CLs, 2 DDs)**

Overview of Forces (Cont.)

Japanese Forces

- 8th Fleet Striking Force, Vice Adm. Gunichi Mikawa
 - 5 CAs (Chokai & Cruiser Division 6), 2 CLs (Cruiser Division 18), 1 DD

Sequence of Events

Aug. 7-10, 1942

Aug. 7, AM: USMC land on Tulagi (fierce opposition) and Guadalcanal (make headway)

Aug 7-8: 2 Japanese air attacks, 1 US Transport sunk

Allies

Aug. 8: indications and warnings of IJN surface activity

Aug. 8, PM: Fletcher moves the carriers away

Allied invasion of Solomon's & Japan's reaction

Aug. 7 - Aug. 8

Japan

Aug. 7-8: IJN Aircraft attack, subs sent to Guadalcanal area, surface vessels sortie to seek night engagement of transports

Aug. 7, AM: Reports of US landings on Guadalcanal and Tulagi

Aug. 8, 2345-0015: Japanese reconnaissance aircraft misidentified

0144-0800: 1 CA, 2 DDs damaged; 4 CAs sunk/scuttled

Night Naval Battle off Savo Island (early AM)

Aug. 9th

0138-0216: IJN surface force engages the Allied screen

0053-0103: Passing the pickets

Aug. 8, 2300-2313: CAs launch search planes, US force located

Aug. 9, AM: Despite repeated requests for assistance, Fletcher's carriers do not return

Aug. 9, PM: Turner scuttles CA; leaves fearing IJN forces, leaving Marines behind

Aug. 10: Old US submarine, S-38 sinks IJN CA Kako

Aftermath & Getaway

Aug. 9th-10th

Aug. 10: within sight of Rabaul, the Kako is sunk

Aug. 9, 0220: Mikawa sets course for Rabaul

Level of DBA/DBK -- Allies

Aug. 7-10, 1942

High

Med

Low

Landing and battle on Guadalcanal; transports attacked by IJN aircraft

Expected IJN sub attacks fail to come, IJN surface forces were misidentified, but IJN air attacks detected in advance

Surface screen engages

IJN attack cruiser screen; on course to real target (transports)

IJN surface fleet leaves

Allied invasion of Solomon's & Japan's air attacks

Aug. 7 - Aug. 8

Night Naval Battle off Savo Island (early AM)

Aug. 9th

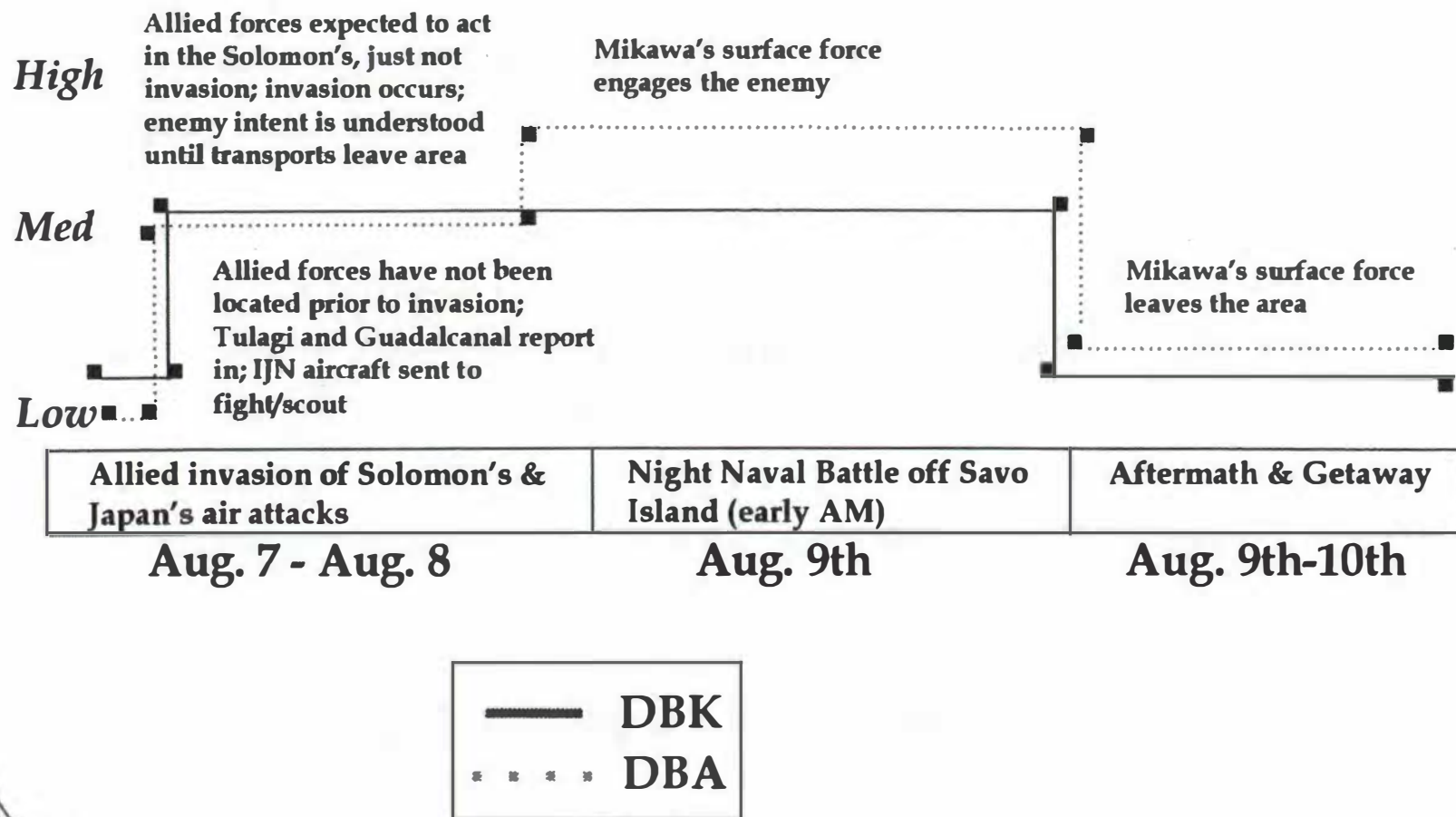
Aftermath & Getaway

Aug. 9th-10th

— DBK
* * * * DBA

Level of DBA/DBK -- Japan

Aug. 7-10, 1942



Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy order of battle**
- **Friendly & enemy capability**
- **Location and status of friendly & enemy logistics nodes and supply lines**
- **Enemy TTP and historical performance**

Mechanisms

- **Communications intercepts**
- **Aerial reconnaissance**
- **Undersea reconnaissance**
- **Contact with the enemy**

Sources & Mechanisms of DBK

Sources

- Identity, personality, and location of decision maker
- Friendly & enemy capability
- Friendly & enemy intent
- Friendly & enemy morale
- Enemy TTP and historical performance
- Location and status of friendly & enemy logistics nodes and supply lines

Mechanisms

- Commander's intuition/experience
- Communications intercepts
- Post-battle analysis
- On-going military operations

Information -- Required

Allies

- Location, capability/identity, and number of enemy forces
 - Where is the Japanese carrier(s)?
- The most likely enemy course of action (e.g., intent)
- Location, status, and number of friendly forces

Japan

- Location, capability/identity, and number of enemy forces
 - Where are the American carriers? Transports?
- The most likely enemy course of action (e.g., intent)
- Location, status, and number of friendly forces
- Accurate and timely BDA from air strikes and naval gunfire/torpedoes

Information -- Not Sought

Allies

- Fletcher did not seek situation report from Turner before leaving with the carriers as he was more concerned with the safety of the carriers than the amphibious operation

Japan

- Confirmations concerning the true identifications of US ships
 - Japanese scout planes and BDA from air attacks of 7th-8th sight escort carrier and battleship in transport area

Information -- Timeliness

Allies

- **Slower than usual ULTRA/MAGIC**
 - JN-25 code change
 - Administrative backlog
- **Poor dissemination of reconnaissance data**
 - Movement of information between commands (MacArthur/Nimitz, Allied forces, and US services)
- **Location, status, or identity of southbound IJN force before and after the Savo naval engagement even though they had been requested**
 - Before: no additional air searches performed on the 8th (day or night) to seek out the southbound IJN force
 - After: no additional air searches performed on the 9th or 10th to seek out IJN raiders
- **Slow communications intra/inter ships**
 - Squadrons were ad-hoc and had not trained together
 - Differing Allied inter-ship method
 - » Flashing light vs. TBS radio
 - Inefficient/abused communication methods
 - » TBS abused/movement of intra-ship messages

Information -- Timeliness (Cont.)

Japan

- Reconnaissance data dissemination limited only by flight time, radio silence, and visible distance
- The striking force was outfitted with a radio intelligence unit which provided valuable and timely information to Mikawa's force as he approached the Solomons

Information -- Accuracy

Allies

- **Poor radar information**
 - Allied naval forces in the Pacific were not optimized for use of radar in 1942
 - » Lack of training
 - » Quirky and marginally effective equipment
 - radar would 'scatter' with land as a background
- **Inaccurate report of IJN OB**
 - Misidentification of Mikawa's force; the use of "seaplane tender or gunboat" vs. "unknown"
 - 'Reidentification' of Mikawa's force by intelligence officer

Japan

- **Japanese pilots and commanders consistently misidentified US ships**
 - Pilots frequently believed they were facing a larger force than they were
- **Sketchy hydrologic information on 'The Slot'**
 - Little information on the depths of the passage between Santa Isabel island and New Georgia

Elements of IW

Deception

- **Allies**
 - No effort was made for military deception
- **Japan**
 - While enroute to the Solomons, Mikawa's Striking Force made a number of feints to throw off Allied search planes and submarines (marginally successful)
 - After passing the American pickets, the Striking Force ensured it was hidden by the 'shadow' of Savo and of a low cloud bank

Elements of IW (Cont.)

EW

- **Allies**

- Without a SIGINT unit they could not hear the Japanese on the night of the 8th/9th even though the Japanese cruiser reconnaissance aircraft aloft had no choice but to use its radio when communicating
- ULTRA/MAGIC decrypts indicate Japanese cruiser fleet as well as Mikawa's change of flag from ashore at Rabaul to Chokai were in the possession of TF61/62 commanders, but the information was not put to use

- **Japan**

- The striking force was outfitted with a radio intelligence unit which provided valuable information to Mikawa's force as he approached the Solomons

Elements of IW (Cont.)

OPSEC

- **Allies**
 - US maintained good OPSEC for initial planning, however, when the Operation commenced, frequent use of radio broadcasting gave away operational and tactical situations
- **Japan**
 - 8th fleet forces practiced good OPSEC through frequent employment of radio silence

Physical Destruction

- **Nothing targeted expressly for IW benefit**

PSYOPs

- **No critical PSYOP planning by either side**

The Impact of Command

Command Structure

- **Allies**

- Coalition of Allied forces (US Navy, Royal Navy, Royal Australian Navy) produced time lags and inconsistencies ship-to-ship, group-to-group
 - » Allied officers often hesitated when approaching an officer of another country
- Non-hierarchical command structure brought about a lack of cohesion among force commanders
 - » Many roles not played properly - Fletcher chose to act as Carrier Group Commander over Allied Expeditionary Force Commander even as he maintained both duties

- **Japan**

- Simple, self-contained command structure allowed IJN commanders to use timely information and make decisions efficiently and effectively

The Impact of Command (Cont.)

Personalities

- **Allies**

- **Ghormley – Despite being chosen for his experience with the Royal Navy and its practices and idiosyncrasies, he chose to remain in New Zealand rather than sailing with Fletcher or Turner in order to complete the planning oversight Operation Watchtower had not been given**
- **As Allied Expeditionary Force Commander and Carrier Group Commander, Fletcher's duties were torn between saving the U.S. few carriers and providing the duly needed ground air support, reconnaissance, and retaliation against the IJN surface forces. Fletcher chose to protect the carriers rather than the Marines**

The Impact of Command (Cont.)

Personalities (Cont.)

- **Allies**

- Rear Adm. Turner proved an able Amphibious Force Commander, however:
 - his interpretation of Japanese intent vs. capability added to the many failures at Savo Island
 - he had to move the transports away on the 9th after Savo lacking both air and naval support, leaving the Marines not fully supplied
- As Screening Force Commander, Crutchley was responsible for the planning of the transports' protection; his decisions that day became critical, but were sound in method

- **Japan**

- Though an intelligent, aggressive, and able commander, Mikawa achieved a tactical victory while losing the operational and strategic advantage by losing sight of his own objective, the US transports

The Impact of Intangibles

Weather

- The 'oppressive' still, hot, and humid Solomon Island weather lowered Allied readiness aboard ships
- On the night of the naval engagement the weather is mostly calm and moonless with sporadic squalls throughout the area. A low cloud bank south of Savo Island gives the Japanese a tactical advantage as their ships outlines were against a totally black background

Unit Morale

- Allies = Low
 - Over 72 hours of continuous high alert status, in addition to over 48 hours of bombardment operations, 3 air raids, numerous false alarms, and oppressive heat dwindled down the Allied morale
- Japanese = High
 - Although radio reports from Tulagi were ominous, and there were known to be US carriers in the area, the Japanese remained highly confident in their ability to engage and defeat the Allies

The Impact of Intangibles (Cont.)

Political/Strategic Considerations

- **US**

- The Solomons had to be taken to maintain a viable SLOC with Australia with special consideration/emphasis given to taking the air field on Guadalcanal

- **Japan**

- Unaware of the full extent of loss which the IJN had suffered at Midway, the Japanese Army felt it would be unable to reinforce its Guadalcanal & Tulagi forces; the Army felt the IJN would have sufficient strength to deal with the Allied forces
- Losing the Solomons was a strategic defeat because it would allow the Allies to strengthen in the South Pacific by maintaining the primary SLOC between Australia and the US

The Impact of Intangibles (Cont.)

Other Factors

- **Phosphorescence -- Algae found in the South Pacific gives off a minimal amount of light -- Mikawa slowed his ships during his approach to the Allied positions so as to minimize his ships' wake, and therefore, the light given off**

Impact of Knowledge -- Allies

- Earlier than expected D-Day led Ghormley to decide to remain in NZ to finish up the planning - his absence from the meeting on the Saratoga led to the lack of command cohesion found throughout the campaign
- Carrier conscious Fletcher learns that there are IJN carrier type fighter aircraft in the area, and moves his carriers away from the AOR to seek shelter in distance; the absence of the carrier reconnaissance capability lowered Allied DBA/K search before and after the Savo battle
- Misidentification of IJN surface forces led Turner to develop his own version of Japanese intentions: Turner assumed intent and discounted capability
- Crutchley designs the night screening force to deal with the expected IJN submarines, the screening force is divided and thus lacked the capability to properly defend itself if there were a surface attack; it is believed that the patrolling radar pickets would give ample time to form a defense

Impact of Knowledge -- Japan

- Reports from the Solomons lead Mikawa to initiate immediate response with all forces available
- Despite inflated reconnaissance and BDA reports of Allied battleships and carriers in Solomons area, Mikawa remains confident of a successful night naval action against transports
- Mikawa's lack of knowledge of where his forces were after the engagement, where the American carriers were, and his concern regarding Japanese heavy cruiser production, lead him to leave the area rather than pursuing the transports into the coming daylight

Why Did(n't) the Allied Plan Succeed?

- **Allies suffered an tactical defeat**
 - Multiple problems varying in scope and severity left a window of opportunity open for the Japanese to pass through:
 - » **Command:** ruled by personalities not organization, no unity of command or mission
 - » **Tactics:** not enough pickets, division of the cruisers
 - » **Communication:** information did not move efficiently among forces
 - » **Intelligence:** administrative and code change backlogs, historical lack of scope in determining adversary capability
 - » **Decision making:** giving assumptions too much credence, carriers leaving
- **Allies achieved an operational and strategic success**
 - The transports remained intact with their equipment
 - Marines remained and succeeded in finishing the air field, dubbing it 'Henderson Field,' the capture of Guadalcanal is a strategic success for the Allies in the South Pacific

Why Did(n't) Japanese Plan Succeed?

- **Japan achieved tactical victory**
 - Mikawa's ship had a communication intelligence unit
 - IJN had a well developed night fighting capability
 - The Japanese had long range torpedoes which they incorporated effectively into their tactics and, differing from the Americans, installed them on their cruiser
 - Mikawa was a commander who was willing to take risks
 - The Japanese command structure was clear cut
- **Japan suffered operational & strategic defeat**
 - Allied transports (the only Allied transport fleet in the Pacific) left intact and allowed Allies to finish mission
 - Could not identify the location and status of American carriers

DBA Conclusions

- On the Allied side, no action was taken to raise DBA by confirming the identity, location, and disposition of the southbound Japanese forces
- The lack of efficient, standardized communications for the Allies greatly degraded their ability to respond in a timely manner to the Japanese attack
- The Japanese consistently misidentified US ships and the order of battle; still, Mikawa's determination to oust the Allies overrode his need to know exactly what kind of force he was facing
- Allied investment in radar proved to be less effective than the Japanese training in night vision and night fighting (in the earlier stages of the war)

DBK Conclusions

- **ULTRA/MAGIC - unpredicted Japanese change of code and US cryptologic administrative backlog had serious consequences for Allied DBK**
- **Allied DBK never achieved a truly high level at Savo due to the compounded problems of command, communications, and intelligence - their existed no central nodes for intelligence fusion**
- **Reconnaissance message error led Turner to incorrectly assess Japanese intent**
- **Japanese DBK achieved its high level as enemy intent was established as soon as the Allies attacked; the Japanese were countering and attempting to block all Allied actions**

Command Decisions in The Battle of Savo Island 9 August 1942

Background

In early summer 1942, Admiral Ernest J. King successfully argued for an alteration of the Allied 'Europe First' strategy. He sought and received permission to begin offensive operations in the Pacific. The first of these was *Operation Watchtower*, which targeted Japanese installations in the South Pacific island group of the Solomons. The offensive was designed to remove Japanese air power from the region, thereby clearing the Allies' Sea Lines Of Communications (SLOC) between Australia and the United States.

Of the islands occupied by the Japanese, the two of greatest concern to the Allies were Tulagi and Guadalcanal. The Imperial Japanese Navy (IJN) had established a seaplane base on Tulagi and was building a large airbase on Guadalcanal. Understanding that the Japanese airbase on Guadalcanal would soon be complete, training and planning for *Watchtower* were cut short and a landing date set for 7 August. Vice Admiral Robert L. Ghormley was given operational command of *Watchtower* because of his experience operating with the Royal Navy.

The Allies hastily threw together a force to perform the first major amphibious operation since World War I's Galipoli. The resulting armada was divided into two task forces: Task Force 61 (composed of 3 carriers, 1 battleship, 5 heavy cruisers, 1 light cruiser, and 15 destroyers) was commanded by the Allied Expeditionary Force Commander and Carrier Task Group Commander, Vice Admiral Frank 'Jack' Fletcher. Task Force 62 (composed of 22 transports, 6 cruisers, 2 light cruisers, and 8 destroyers) was commanded by the Amphibious Force Commander, Rear Admiral Richard Kelly Turner.

The combined forces converged on the Fiji Islands in late July to perform trial landings and let the force's commanders test their troops. Thereafter, the forces would steam to the Solomons where TF 61 would provide air support from a position south of Guadalcanal; TF 62 would divide into two transport anchorages (one north of Guadalcanal and one south of Tulagi) and a screening force. The screening force would be commanded by Rear Admiral Victor A. C. Crutchley RN.

After their defeats at Coral Sea and Midway, the Japanese perceived that the balance of forces had tilted in favor of the Americans and that their only chance for success lay in the south-west Pacific where they could deploy land-based aircraft on island airfields to supplement their diminished naval forces.¹ As part

¹ Loxton, Bruce, *The Shame of Savo*.

of this strategic concept, the completion of the air base on Guadalcanal was of paramount importance. This base would serve as a 'carrier' for the South Pacific area, allowing long-range land-based aircraft to control the area around the Solomons, effectively cutting the SLOC between the US and Australia. The IJN 8th Fleet, also known as the Outer-south Seas Force, was established in July 1942; its task was to defend the area south of the equator and east of 141 East.²

The 8th Fleet's surface sea assets were to be commanded by Vice Admiral Gunichi Mikawa. Acutely concerned with the Allied presence in the Solomons, Mikawa moved his flag to the heavy cruiser Chokai and sortied with his surface striking force of four heavy cruisers, two light cruisers, and one destroyer on 7 August. His targets were the Allied transports at anchorage off Tulagi and Guadalcanal. He hoped IJN night-fighting capabilities would provide him with the advantage necessary for a victory.

Combat began on 7 August when Allied naval gunfire, aerial bombardment, and US Marines pounded the Solomon islands of Guadalcanal, Tulagi, Gavutu, and Tanaubogo. Although caught unaware,³ the Japanese were swift to respond. Prior to any highly accurate intelligence on the Solomon situation, Admiral Mikawa immediately sought to halt the Allies from continuing their amphibious operations. He ordered all available IJN 8th Fleet forces to attack the Allied transports.⁴ IJN 8th Fleet air,⁵ land,⁶ and sea⁷ assets were re-organized and diverted to the Solomons area for this purpose.

Battle Outcome

The situation for the Allies in the late hours of 8 August was dominated by the exhaustion of the airmen, sailors, and marines, and frustration for the commanders. Since their landing on 7 August on Guadalcanal, the Marines had

² Loxton, Bruce, *The Shame of Savo*.

³ Admiral Mikawa and 8th Fleet Commanders had a number of warning signs before Allied invasion, however, they failed to understand their significance.

⁴ By targeting the transports, Mikawa sought to ensure that the invaders would not be able to reach the shore, and if they did, that they would soon run out of supplies.

⁵ 8th Fleet combat air assets were immediately redirected to perform the necessary operations to repel the Allies. Aircraft such as 'Betty' bombers, 'Zero' fighters, and other types of fighter aircraft - including a carrier-type torpedo bomber - were to make altogether 3 air attacks (two attacks on 7 August and one on 8 August) on Allied shipping prior to the Battle of Savo Island. IJN combat aircraft altogether suffered heavy losses and were barely marginally successful in their mission, ultimately sinking only one transport and damaging one destroyer.

⁶ 518 IJN amphibious troops were dispatched in transports and escorted by two destroyers. They were recalled as soon as new information arrived that clearly indicated that 518 troops would not be enough to fend off what appeared to be a full division of Marines.

⁷ Two IJN large submarines were dispatched from patrol duties near Australia, they would not see action until well after the Battle of Savo Island.

continued to pursue the Japanese forces into the jungle. However, they were having a difficult time sorting out and off-loading the materials from the transports.⁸ On Tulagi, the Corps was fighting through jungle and stiff Japanese resistance. The Marines' performance was quite remarkable considering many of them had not previously seen combat nor had they trained together. And their performance after the 9th would be even more remarkable, considering they would lose their air cover, naval support, and equipment as the Naval forces left the area.

At sea, the situation was difficult. In addition to the oppressive Solomon Island heat, the ships had been on their second highest state of readiness for five days and involved in combat operations for over two days. Also, the vessels in the sound north of Guadalcanal had been subject to numerous submarines alarms (all false), 3 air attacks,⁹ and the continuous unloading operations.

Allied vessels north of Guadalcanal on the night of the 8th included: 2 destroyer pickets to the northeast (USS Ralph Talbot) and southwest (USS Blue) of Savo; 3 cruisers and 2 destroyers patrolling to the east of Savo Island (USS Vincennes Group); 2 cruisers and 1 destroyer patrolling to the southeast of Savo (plus one damaged destroyer heading for Australia) (HMAS Canberra Group & USS Patterson); further east, to the south of Tulagi was Transport Group Yoke at anchorage with transports and destroyers; and well to the south of Tulagi and to the north of Guadalcanal was Transport Group X-Ray with transports and destroyers (plus the heavy cruiser HMAS Australia). Finally, 2 cruisers and 2 destroyers (USS San Juan Group) patrolled between the two anchorages.

Despite the additional warning signs of approaching IJN surface forces, Fletcher chose to withdraw his carriers on the 8th based upon misleading information of carrier-type fighter aircraft in the area. Fletcher's departure was an ominous sign for Turner and Crutchley, who could scarcely believe their counterpart's apparent lack of concern for the amphibious situation. Turner, Crutchley, and the Marine commander gathered on the transport McCawley (in Transport Group X-Ray) to discuss Fletcher's withdrawal and the various warning signs of an approaching IJN force. At the same time, Crutchley's screening force was to

⁸ Many of the transports had been commercially loaded in the United States with the expectation that they would be combat loaded in New Zealand or another port. Due to the frequent changes in D-days to earlier dates, there had been no time to reload. Thus, the Marines were unloading commercially loaded equipment from their transports, in a combat zone, further adding to the operation's difficulties.

⁹ Two attacks on the 7th and one early on the 8th. The attacks had all been fended off rather successfully with prior warning of the impending attacks from the Australian Coastwatchers. Allied losses were one damaged destroyer and one transport sunk, and under 10 fighters shot down. Japanese losses were much greater with over 20 fighters and bombers destroyed. Ironically, the gunnery of the cruiser screening force scored more kills than the US fighters!

take up dispersed positioning to provide coverage against IJN submarine attack which intelligence reports had reported as a high probability.

After leaving Rabaul on the 7th, Mikawa's striking force steamed southeast toward the Allied transport anchorages at Guadalcanal and Tulagi. During their trek, they had spotted a B-17 formation and two RAAF Hudsons indicating to Mikawa that surprise would be unlikely. Mikawa's air assets had also been providing him with intelligence on the Allied forces in Solomons. His planes had identified numerous transports, destroyers, cruisers, battleships (they had misidentified a cruiser), and a carrier (they had misidentified a transport). Nevertheless, Mikawa's confidence remained high, and upon nearing the Guadalcanal area at night, he prepared for battle by ordered his force to form a line with 1200 yard spacing, increase speed, launch seaplanes to drop flares over enemy ship positions, eject all top-side flammable material, and maintain radio silence.

Mikawa's force passed the destroyer pickets north and south of Savo undetected, and soon came upon the Canberra Group. With illumination provided by flares from his cruiser seaplanes, the striking force first launched torpedoes and then followed up with salvos of 8", 6", and 4.5" gun fire. Canberra was sinking almost before she was aware that a battle had begun. Chicago fared slightly better, but never managed to engage fully the enemy. To make matters worse, the Canberra Group never alerted the Vincennes Group to the presence of Mikawa's striking force. Fifteen minutes later, curving northward around Savo Island's eastern shore, the Japanese came upon the Vincennes Group, still steaming sedately along in a box pattern. Mikawa's forces had become divided in the earlier exchange, and by chance enveloped the Vincennes. Taken unawares, and caught in a devastating crossfire, the Vincennes Group's cruisers were quickly sunk.¹⁰

At this point, having destroyed most of the Allied screen, Mikawa decided to withdraw rather than taking on his original targets, the transports. Dawn was approaching and with it, Allied air power.¹¹

The early hours of 9 August had proved to be the greatest surface to surface defeat for the US Navy. The result of Japanese perseverance and American intelligence, communication, and command failures was 4 heavy cruisers sunk or scuttled, 1 cruiser damaged, and 2 destroyers damaged (Allied) at the cost of only 2 cruisers moderately damaged for the Japanese. This 'Little Pearl Harbor'¹² lasted but 44 minutes.

¹⁰ From IJN WWW page www.skypoint.com/members/jbp/btl_sav.htm

¹¹ From IJN WWW page www.skypoint.com/members/jbp/btl_sav.htm

¹² Kilpatrick, C.W. *The Naval Night Battles in the Solomons*.

Command Decisions

There are three critical decisions made which shed light on the issue of DBA/DBK in the battle of Savo Island. Two decisions made by Vice Admiral Mikawa and one decision made by Vice Admiral Fletcher had profound effects on the outcome of the Battle, the Guadalcanal Campaign, and perhaps the strategic balance of power in the South Pacific.

Allied Critical Decision

On 8 August at 1807 hours, Vice Admiral Jack Fletcher directed his carrier task force, TF61, to steam southeast, away from Guadalcanal, the Allied AOR, and the Japanese forces. This was perhaps the most significant decision made by commanders on either side. The movement of TF61 meant that Fletcher's forces could no longer provide effective air support and reconnaissance for TF 62 and the Marines.¹³ Nor could Allied carrier air power be used to track and destroy Mikawa's raiders after the battle. The withdrawal of the carriers also forced TF 62 commanders to convene a meeting on transport McCawley which kept the commanders from their preplanned duty stations, and, in particular, kept Rear Admiral Crutchley with the RAN heavy cruiser, Australia, away from the Vincennes patrol group. Finally, after the loss of most of his surface screening force through the action around Savo, Turner felt that he had other option than to move away his transports from the AOR for self preservation. This decision likely could have been postponed had he had the protective cover of TF 61's s air assets.

It is difficult to understand why Fletcher acted as he did, especially in light of the fact that he was the designated Allied Expeditionary Force Commander, responsible for the safety of the *entire* operation, not just the carriers. There are, of course, a number of reasons for his withdrawal: first, during the Japanese aerial attacks on 7 and 8 August, a number of carrier-type aircraft had been involved and identified. Despite other commanders' informed assessments that these aircraft were flying through nearby land bases from Rabaul to assist in the attacks on the transports, Fletcher believed they were from an IJN carrier or carriers, operating somewhere west of the Solomons. This perceived threat, combined with his personal over-concern for the safety of the carriers, was likely the largest single reason for his departure.¹⁴

¹³ A last request: Based on the intelligence reports from the RAAF Hudsons, Turner requested one final sweep of the area to the northwest of Savo. Had this instruction been carried out, had the carriers been in a proper position, they would have likely found the IJN Striking Force.

¹⁴ Fletcher was concerned with the safety of these carriers for two primary reasons: 1) he had lost a carrier at Midway and refused to have that happen again; 2) he was operating with 60% of the entire US carrier force, and had been given orders from Nimitz to make sure they survived the mission.

Second, as Fletcher's told Ghormley, in a message sent at the same time he ordered the withdrawal, the move was necessary because of the low fuel levels of his carriers and excessive loss of combat aircraft in operations over Guadalcanal. After-action analysis of Fletcher's forces at the time the message was sent demonstrated that his forces were at 60% capacity. As for the excessive loss of combat aircraft, fewer than 15 had been downed as a result of the three Japanese air attacks. Fletcher's carriers still had over 90 aircraft; more than he had at Midway. Fletcher, however, was hyper-sensitive to threats to his carriers, and he may have considered the risks of staying close to TF 62 unacceptable, especially since he believed that contact with Japanese carriers may have been imminent.

Third, Fletcher had very low confidence in the success of the landing operation. He, therefore, was not committed to the task at hand, nor did he take as seriously his role as Expeditionary Force Commander.

Whatever the reasoning, or causes of this decision, there remain a number of questions regarding his decision: If his ships were really low on fuel, why could he not have rotated his forces out of the area for refueling rather than taking all of them at once? Why did Fletcher not bother to check the status of the unloading of TF 62's transports before departing? Why did Fletcher not make any effort to direct reconnaissance flights to the northwest of Savo? Why did Fletcher make no effort to hunt down the raiding IJN force?

Japanese Critical Decisions

Mikawa made two critical decisions which are of interest to this study: first, despite reconnaissance reports suggesting numerically superior Allied forces in the Guadalcanal area, he decided to continue seeking a surface engagement; and second, he decided to leave the Guadalcanal area without completing his own assigned operational task of destroy the Allied transports.

Mikawa's drive decision to engage the Allied forces is especially interesting. Prior to having any significant information about the Allied invasion of Tulagi and Guadalcanal, Mikawa ordered an attack utilizing all available 8th Fleet assets. Part of his plan included himself taking charge of the surface striking force and driving toward the anchorages with the intent of sinking transports and other targets of opportunity. He decided to try to force a night action, giving him the advantage by neutralizing Allied air power and by fully utilizing Japanese night fighting capability.

After reports filtered in from the air attacks and reconnaissance searches on the 7th, Mikawa's staff was able to identify a large Allied force with carriers,

battleships, heavy cruisers, and transports. Undeterred by this overwhelming assortment of forces facing him (made worse by the misidentification of a cruiser as a battleship and a transport as a carrier), Mikawa continued toward the landing areas. It is possible that Mikawa discounted the reconnaissance information since he knew that IJN aviators often exaggerated. But more importantly, Mikawa may have believed that regardless of the size of the enemy force, surprise and night-fighting capabilities would be sufficient to turn the tide. When radio intercepts suggested that the Allies were not preparing air operations against him, and when he saw that the Allies' anchorages were still brightly lit as unloading continued, he knew he had the element of surprise in his favor despite having been spotted by Allied aircraft when he was still en route to the Solomons.

After successfully engaging the Allied cruisers, it seems surprising that Mikawa choose to withdrawal from well lit, unaware, and practically defenseless transports, especially given that they were central to his own operational orders. Yet, Mikawa's decision, although puzzling on the surface, was pragmatic. Mikawa and his commanders had to consider the following:

- Their northward turn after engaging the Canberra group to strike the Vincennes Group had taken them away from the transports anchorages. Turning back would have been time consuming and difficult as their group had lost cohesion, and Mikawa did not know precisely where his forces were.
- The engagement had consumed 50% of their gun shells and nearly all of their torpedoes. There certainly would be enough ammunition to sink Allied transports, but what if they encountered as of yet undetected Allied surface warships? Finally, Mikawa needed to keep some ammunition for the trip back to Rabaul in case his ships were engaged by other Allied vessels.
- As dawn approached, so to did the opportunity for the Allies to strike at his force with their air power. Additionally, the dawn would take away his night fighting advantage.
- Mikawa was also cognizant of American production capacity vs. the Japanese. Mikawa understood that the Japanese could hardly afford to lose any more combat vessels. In particular, he was concerned about heavy cruiser construction and the limited availability of IJN heavy cruisers. If the Americans were able to sink these Japanese cruisers, Japan would not be able to replace them as quickly as America would be able to replace hers.

As a result of these factors, Mikawa decided to retire with his striking force more or less intact. After the war ended, Vice Admiral Mikawa became aware of just

how few transports the Allies had in the Pacific. In an interview, he remarked that had he known how important the transports were to the Allies, he would not have withdrawn that morning; rather he would have stayed and sunk the transports regardless of the risks to this command.

DBA/DBK Conclusions

On the Allied side, awareness and knowledge of the enemy never reached high levels. The allies did not seek to improve their awareness by confirming the identity, location, and disposition of the southbound Japanese forces. They had many reports of a cruiser force moving toward Guadalcanal, but Fletcher sent his final search too far south, and retired without spotting Mikawa's force which was in range to deliver an imminent blow the Turner's forces.

Adding to the awareness and knowledge problems of the Allied commanders was the lack of efficient, standardized communications. This greatly degraded their ability to respond in a timely manner to the Japanese attack. This communication problem was all encompassing. The problem included interpersonal communication difficulties, which ranged from Turner's dislike of Fletcher to the XO who failed to relay a sighting of an enemy unit. There were also ship-to-ship communication inefficiencies where TBS radio systems were used for many purposes by American ships from personal chatter to tactical communication. Additionally, TBS sets were not carried by RAN vessels. The RAN and RN vessels used flashing lights to communicate and the USN had ceased to use this method, thus the Allied services had to place RN, RAN officers aboard USN vessels to communicate with one another.

There were also force-to-force communication failures. Both TF 61 and TF 62 were at times out of communication range with one another, beyond TBS range and too close for SW radio.

Inter-command communication between MacArthur and Nimitz were often quite slow. There were a number of reasons for this, however, one of the most prominent, was that much of MacArthur's staff was unaware of the Solomons operations and thus did not recognize the urgency of reporting enemy movements that might affect that area.

Finally, there were inter-Ally communication quirks. For instance, a sighting of an enemy force had to be passed through different intelligence organizations, then radioed from stations thousands of miles apart (at times worded differently) to ships only a few miles apart operating in the same action.

Additionally, in the action off Savo Island, Allied investment in radar proved to be less effective than the Japanese training in night vision and night fighting.

For the Allies, training in night fighting had been pushed aside to make way for the new technology. Unfortunately, Allied radar sets, at that time, were only marginally effective in the closed seas around Savo, and radar was under-utilized by Allied commanders in any case.

ULTRA/MAGIC decrypts also failed to predict the Japanese advance toward the transport anchorages off Guadalcanal and Tulagi. The Japanese changed their codes in early July, and this increased the backlog of the already overburdened US cryptological community. Prior to sailing on 7 August, Mikawa had sent IJN HQ a message indicating his intended targets, his intended strike date, and his order of battle. US intelligence intercepted this message but it remained undecoded until 23 August, some 14 days after the battle.

For the Japanese, aside from their very low levels of awareness and knowledge prior to the landings on 7 August, their knowledge and awareness increased dramatically due to frequent use of reconnaissance aircraft, combat aircraft, ongoing operations, night fighting capabilities, etc. Of these, the Japanese use of night fighting training and techniques added to such a high attrition level on the Allied part. The IJN had invested a great deal in night training prior to WW2. Their organization was such that the IJN developed a rating among enlisted men for Chiefs who were familiar in night search techniques with the Japanese 20cm binoculars. These night spotters gave the Japanese an edge the Allies in 1942 did not have.

However, prior to and after the battle, Japanese awareness was often subject to poor BDA. Evidently, Japanese pilots consistently misidentified US ships and US order of battle, frequently identified cruisers as battleships, transports as carriers, and generally over exaggerated not only how many forces they found, but how many they destroyed. Mikawa's determination to oust the Allies overrode his need to know exactly what kind of force he was facing.

Japanese knowledge was very high as enemy intent was established as soon as the Allies attacked. The Japanese could then work to counter and attempt to block all Allied actions.

Dominant Battlespace Awareness III

**Battle of the Philippine Sea Case Study
19-20 June, 1944**

Information Requirements

IPR With LtCol Paul Selva

25 June 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (95%), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- **What were the sources/mechanisms of DBA and DBK?**
- **What were the Commanders' key information requirements?**
 - Enemy OB
 - Enemy capability
 - Enemy intent
- **What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?**
- **What happened both tactically and strategically when those sources were denied?**
- **How perishable is the information from the different sources across the battles?**

Campaign Objectives

U.S.

- **TF 58 was to carry out the invasion of the Marianas Islands (Operation FORAGER):**
 - **Providing forward base for assault on Japanese home islands**
 - **Providing air bases for new B-29 Bomber to operate against the Japanese homeland**

Japan

- **To counter the U.S. fleet in a “decisive” battle, effectively reversing the Allied position of dominance in the Pacific (Operation A-GO)**
- **To protect the Marianas Islands from invasion, not allowing the U.S. to secure an airfield within range of the Japanese mainland or to be in a position to interrupt communications and shipping**

CONOPS

U.S.

- **TF58 was to launch and support Operation FORAGER:**
 - **Pre-invasion bombardment of the Marianas**
 - **Annihilation of land-based aircraft and facilities in the area (Guam, Saipan, Tinian)**
 - **Protection of landing craft and personnel from attacks from the sea**

Japan

- **Annihilate the U.S. Fleet in the central Pacific by drawing them into battle on their own terms to compensate for shortcomings (ships and aircraft)**
 - **Initiate battle beyond range of U.S. carrier aircraft**
 - **Use Marianas Islands to refuel/reload aircraft for second strike on TF58**
 - **Use land-based planes to compensate for known carrier aircraft numerical deficiency**

Overview of Forces

U.S. Forces:

Commander in Chief Pacific Fleet: Adm Chester Nimitz

Commander, Fifth Fleet: Adm Raymond Spruance

Commander, First Carrier Task Force: VAdm Marc Mitscher

- 7 carriers, 8 light carriers, 6 battleships, 8 heavy cruisers, 13 light cruisers, 69 destroyers

- » 500 fighters, 400 dive bombers

- 26 Submarines (operating in area from the Philippines to Bonin Islands)

Japanese Forces:

Commander in Chief, Combined Fleet: Adm Soemu Toyoda

Commander FMF (First Mobile Fleet): VAdm Jisabuo Ozawa

- 5 carriers, 4 light carriers, 5 battleships, 11 heavy cruisers, 2 light, 28 destroyers

- » 222 fighters, 200 dive bombers

Base Air Force: VAdm Kakuji Kakuta

- 280 fighters, 160 bombers in the region

Sequence of Events

June 13- 20 1944

US

Marines land on Saipan
Sub *Flying Fish* spots main body of FMF in San Bernadino Straights
Sub *Seahorse* spots battleships steaming up to meet them
Now know the FMF is coming

Battleship bombardment of Saipan begins
2000 - U.S. submarine *Redfin* reports FMF leaving harbor

June 15

2200 - *Cavalla* spots 15 ships in PI Sea (a worry to Spruance)

June 17

0321 - Cavalla's report received
2020 - HF/DF report of FMF location arrives - sub report intercepted that showed them closer

18 June

0115-Recon plane locates FMF (message doesn't reach Spruance until 0900)
1000 - radar picks up 1st wave of Japanese air attack at 150 miles out

19 June

Steamed west overnight

1600 Sighted FMF
1630 215 aircraft launched.
1840 Contact w/enemy - one carrier and two oilers sunk

20 June

The Search

The Battle

June 13

0900 Japanese First Mobile Fleet (FMF) leaves Tawitawi
1727 A-GO set into motion

June 16

FMF assembled in PI Sea

18 June

1514 Ozawa locates TF 58

19 June

4 strikes launched throughout day (0830, 0900, 1000, 1100)
330 aircraft lost - only 100 operational aircraft left (75% attrition rate)
2 carriers sunk by US. subs in area (1532 Taiho sunk & 1501 Shokaku)

20 June

Fleet in disarray when enemy made contact at 1840 - Hiyo, 2 oilers sank
FMF returns to Okinawa

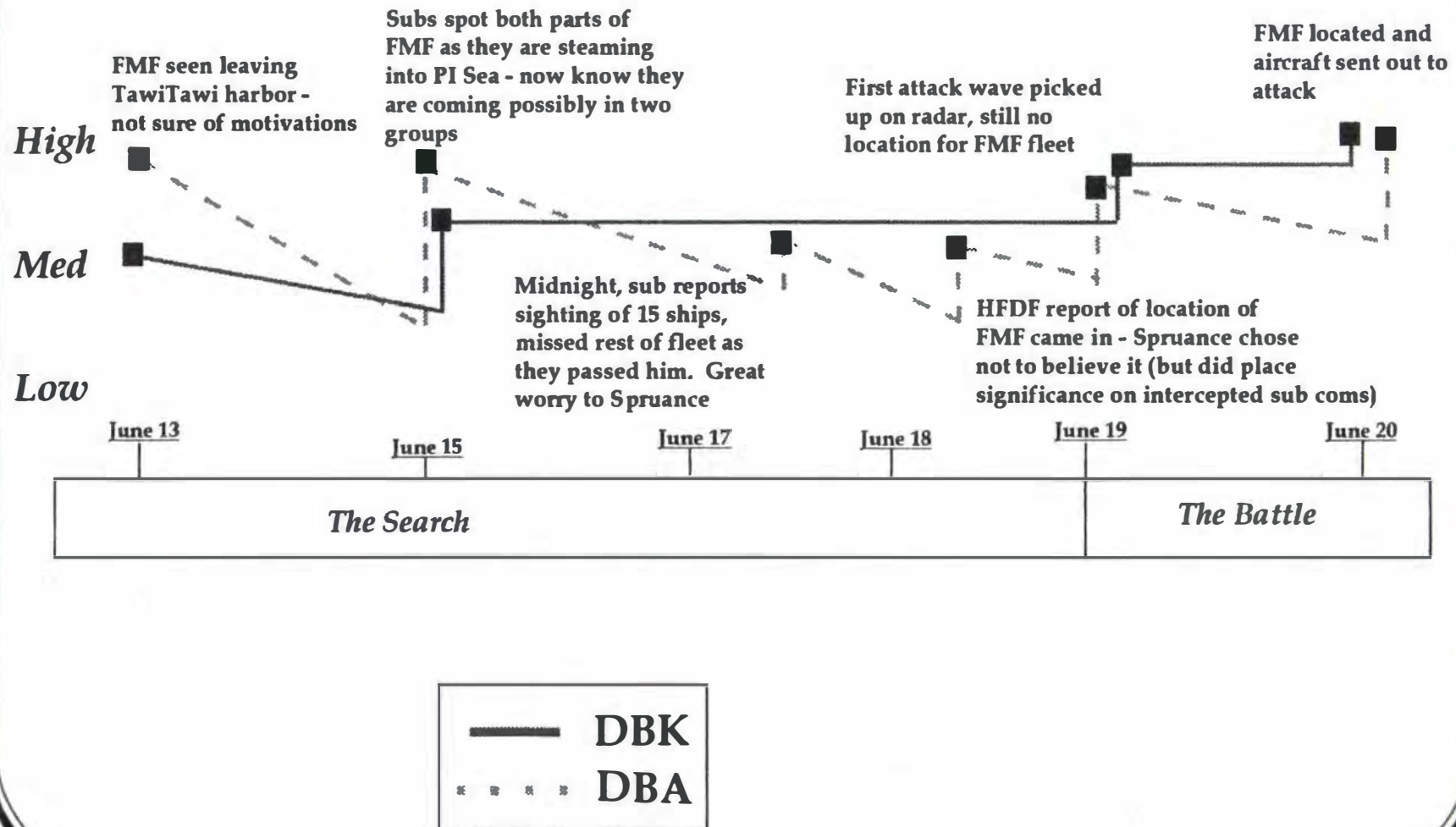
Japan

Note: The U.S. had captured a plan from the Japanese, the Z Plan, which outlined an operation intended to draw the U.S. fleet into a decisive battle.

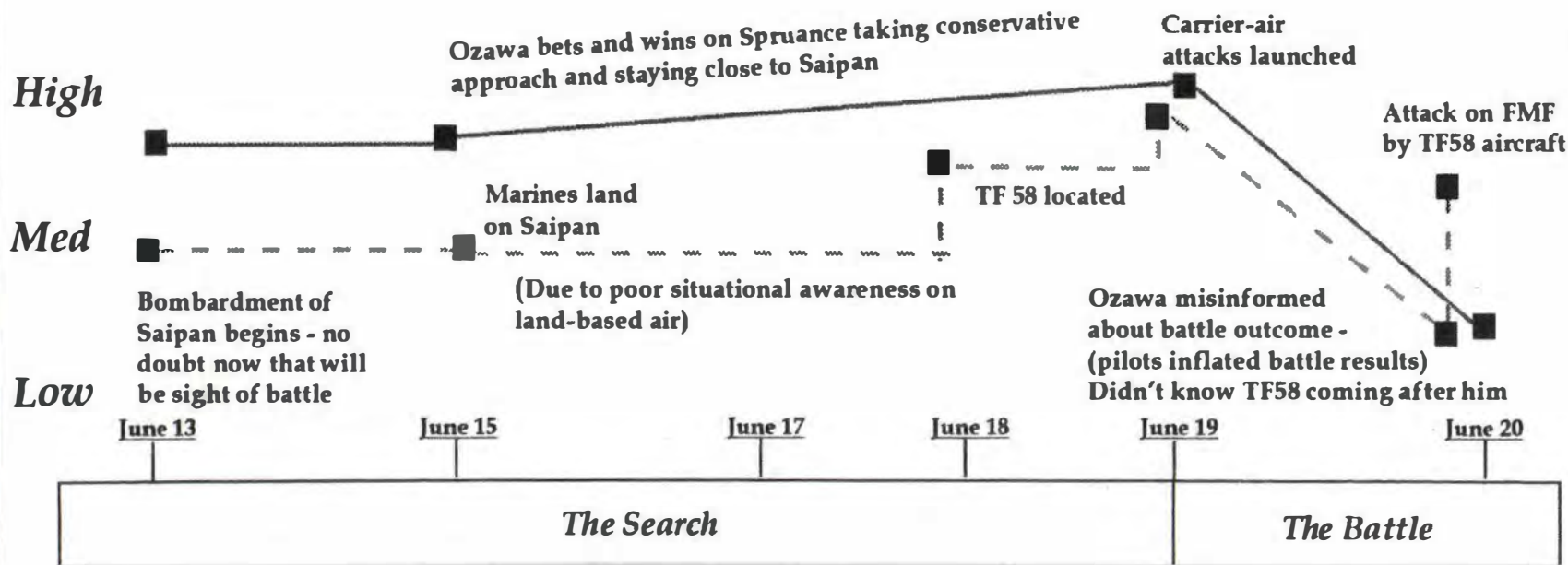
The details of this plan were to influence the decisions of Spruance throughout the week.

Level of DBA/DBK -- US

June 13 - 20 1944



Level of DBA/DBK -- Japanese June 13 - 20 1944



Sources & Mechanisms of DBA

Sources

- Identity, personality, and location of decision maker
- Friendly & enemy location and order of battle
- Friendly & enemy capability
- Enemy TTP and historical performance

Mechanisms

- Communications intercepts
- Aerial reconnaissance
- Undersea reconnaissance
- Radar
- Contact with the enemy

Sources & Mechanisms of DBK

Sources

- Identity, personality, and location of decision maker
- Friendly & enemy capability
- Friendly & enemy intent
- Friendly & enemy morale
- Enemy TTP and historical performance

Mechanisms

- Commander's intuition/experience
 - Captured plans (Z Plan)
- Communications intercepts
- Submarine reports

Information -- Required

U.S.

- Location, status, and number of enemy units
 - First Mobile Fleet
 - Land based aircraft
- Most likely course of action of enemy fleet

Japan

- Location, status, and number of enemy units
- Most likely course of action of U.S. fleet
- Number and status of friendly land-based support (aircraft and facilities)

Information -- Not Sought

U.S.

- Supply and logistics position of the Japanese
 - Had they known how badly U.S. submarine attrition had depleted tankers, would have known Japanese did not have fuel for elaborate attack

Japan

- Verification of reports of air battle results
 - Ozawa relied solely on information provided from pilots who had flown missions
- Determination of U.S. forces to maintain their position
- Degree of impact of lack of proficiency of airmen relative to their experienced enemy
- Growth and development of U.S. radar technology and skills relative to their own
- Location and number of enemy subs in the area

Information -- Timeliness

U.S.

- Did not have firm information on enemy fleet location until after the battle had started (intermittent submarine reports were not concrete enough to convince Mitscher it was safe to take offensive action)
- Isolated trouble with communications between subs, reconnaissance planes, and the fleet, which delayed crucial pieces of information (fog of war)
- Radar provided excellent information on location of incoming attacks from Ozawa's carriers
- Vertical chain of command in air defense networks:
 - ↓ individual ships
 - ↓ task group commanders
 - ↓ Mitscher's flagship

Information --Timeliness (cont.)

Japan

- **Reconnaissance flights located the U.S. fleet in time to give the Japanese the distance advantage they needed**
- **Ozawa did not receive truthful reports about actual losses and BDA until hours after the fact**
 - **When his flagship the Taiho sunk, it prevented him from being able to communicate both with other ships in the FMF and with Japan (communications equipment and code book lost with the ship)**

Information -- Accuracy

U.S.

- Technological advances enabled U.S. to pinpoint incoming waves of Japanese aircraft
 - Each ship had own combat information center with trained radar operators
 - New SM height-finders
 - New VHF radios in F6F's allowing simultaneous communications

Japanese

- Ozawa received inaccurate information about the true status of land-based air power strength and airfield conditions (Kakuta never told Ozawa how badly the U.S. had depleted his forces in the week prior)
- Ozawa received very inaccurate BDA from the the returning pilots, lulling him into a false sense of security

Elements of IW

Deception

- U.S.
 - Used PB4Y aircraft for reconnaissance in order to keep the carrier aircraft from being spotted by the Japanese ("where there's smoke, there's fire")
- Japan
 - Attempted to mask departure from TawiTawi by deceiving Allied listeners: had land stations in Singapore assume fleet call signs and maintain active traffic (not successful because the submarines had spotted them)

EW

- U.S.
 - HF/DF sensor in Hawaii able to pinpoint FMF location from interception of one radio message
- Japanese
 - Tried interfering with U.S. radar by dropping aluminum strips ("Window") to cloud radar (minimal effects)

Elements of IW (cont.)

Physical Destruction

- The Americans chose not to take out the Japanese flight coordinators, rather decided to keep them around to use to their advantage

OPSEC

- Japan
 - Japanese flight coordinators talked green pilots through strikes- U.S. able to listen and hear all plans
 - Ozawa practiced good OPSEC throughout entire week until he broke radio silence on eve of battle allowing U.S. to pinpoint their location

PSYOP

- No critical PSYOP planning by either side

Impact of Knowledge -- U.S.

- **Inability to locate entire Japanese fleet in time made it difficult for Spruance to make decisions or take offensive action**
- **Both radar and ability to listen to Japanese flight coordinator allowed U.S. to effectively defend self against Japanese strikes**

Impact of Knowledge -- Japan

- Not knowing true status of Japanese land-based aircraft or facilities led Ozawa to make the "Go" decision on false information
- Knowing Spruance was commanding TF58 led Ozawa to believe he would be conservative, staying close to Saipan, allowing the FMF to take advantage of the distance advantage of their aircraft
- By being the first to find the enemy, Ozawa was able to start the confrontation on his terms, which gave him the confidence to initiate offensive measures even in light of large discrepancy in force ratio and pilot training

The Impact of Command

Command Structure

- **U.S.**
 - **Very cohesive and organized**
 - » **Spruance in overall control of operation, maintained primary role throughout - overrode Mitscher**
- **Japan**
 - **Very few members of Ozawa's staff had experience in carrier warfare**
 - » **Lack of familiarity very evident as battle unfolded**

Impact of Command (cont.)

Personalities

•U.S.

- Spruance very conscious of maintaining focus on campaign objectives (supporting the landing) - leading to a conservative approach
 - » Also very concerned about Japanese flanking them (past experience at Midway)

•Japan

- Land-air commander, Adm Kakuta was very untruthful, lying throughout the operation both to Ozawa and to Toyoda in Japan

The Impact of Intangibles

Weather

- U.S. Fleet was at a disadvantage because of wind they had to steam east, away from FMF, in order to launch and recover aircraft
- Exceptionally clear skies enabled U.S. pilots and reconnaissance to see incoming waves of aircraft from great distances

Unit Morale

- Japanese were very confident, leading them to engage in a battle where the force ratios were decidedly not in their favor

The Impact of Intangibles (cont.)

Political/Strategic Considerations

- Spruance had responsibility for all aspects of Operation FORAGER - led him to stay close to the islands and support the landings
- Pressure on Ozawa from Japanese military and government was such that he had no choice but to attack regardless of force ratios and lack of training

Other Factors

- U.S. improvements in radar
- Japanese pilots were very unprepared and undertrained
 - Most experienced pilot in fleet had only 6 months training

Why Did the U.S. Plan Succeed?

- The plan was a success, Spruance accomplished the mission that he was tasked to do
 - Ozawa's attack was successfully rebuffed, virtually no damage to TF58 or the troops on Saipan - Operation FORAGER successfully carried out
 - » pilot superiority
 - » advances in Radar technology
 - » aircraft superiority

Why Didn't Japanese Plan Succeed?

- **Misinformation about status of friendly land-based aircraft**
- **Lack of pilot training**
- **Aircraft inferiority**
- **Not aware of U.S. technological advances (radar)**
- **No ability to deal with U.S. subs in the area**
- **Lack of communication between land-based operations and FMF**
- **Force ratios (at the time of the engagement)**
- **Inexperienced planning staff - small strikes sent in that were easily defeated (while the U.S. was just evolving into larger strike packages)**

DBA Conclusions

- Even though the FMF had the benefit of knowing the location of TF58, and were able to exploit it to their benefit, it did not make a difference when it came to sheer numbers, technology disadvantages, and pilot and staff inexperience
- Misinformation about the status of the land-based aircraft and facilities from Kakuta led Ozawa to make the decision to go through with "A-GO" under extremely unfavorable circumstances
- Advances in Radar technology allowed the U.S. to maintain defensive positions in support of Operation FORAGER, while at the same time enabling them to send their aircraft out to intercept incoming attack waves from Ozawa's fleet

DBK Conclusions

- Both sides relied on their intuition to guide their actions:
 - It proved correct for Ozawa (that Spruance would maintain a conservative stance), but didn't provide a victory
 - » Ozawa correctly guessed Spruance's intent, and used that to his advantage to steam to a point just outside of U.S. aircraft range and launch his attack
 - » In this case, although DBK was relatively high throughout, force ratios and technology proved to override the increased advantage gleaned from the commanders intuition
 - Spruance's caution and fear of a flank attack was based on previous experience with Japanese Naval tactics as well as captured plans, but he was mistaken
 - » Spruance maintained a conservative defensive position off of the coast of Saipan, not willing to expose his landing forces to the possibility of a flank attack
 - » His intuition in this instance proved wrong, and although he was able to successfully carry-out his mission, he missed perhaps one of the best opportunities to engage the FMF in a sea battle and deal a decisive blow to Japanese Naval power

Command Decisions in the Battle of the Philippine Sea

June 19-20, 1944

Background

By the end of 1943 the balance in the Pacific War had overwhelmingly turned in favor of the United States. The Japanese were being successfully routed from territory gained earlier in the war, and the U.S. Pacific fleet was advancing at a steady pace towards the Japanese homeland. American resources were growing, while the Japanese were suffering terrible attrition and were increasingly unable to replace their losses. By this point Admiral Nimitz had nearly 20 aircraft carriers at his disposal while the Japanese had lost roughly 8000 carrier aircraft and the majority of their trained pilots. With such a decisive force ratio advantage, the Americans began to vary their strategy.

It was decided to bypass several Japanese strongholds in the South Pacific and to begin a two-pronged leapfrogging campaign towards the Japanese home islands. MacArthur was to head across northern New Guinea towards the Philippines, while Nimitz was to "island-hop" across the central Pacific. Nimitz's campaign began in November of 1943 with assaults on Betio in Tarawa Atoll and then continued north to Makin, Kwajalein, and Eniwetak. In May 1944, the strategically important Marianas were selected as the next target. Gaining control of the Marianas would provide the U.S. with an airfield which would place the new B-29 bomber within range of mainland Japan, as well as provide a forward base for the fleet.

Nimitz entrusted Operation FORAGER, the invasion of the Marianas, to Adm. Raymond Spruance and the Fifth Fleet. With 15 carriers and approximately 900 aircraft at his disposal, Spruance commanded a formidable force. The operational plan was to soften-up the island's defenses and neutralize the local enemy airfields with a steady air bombardment by TF58, headed by Adm. Marc Mitscher. Following this preliminary phase, the troops were to invade Saipan, while the Fifth Fleet remained off-shore to protect the landings.

The aerial bombardment of Saipan began on 11 June 1944, and by the 13th, U.S. forces achieved air superiority over Saipan, Guam, and Tinian. The majority of the Japanese land-based aircraft had been destroyed or disabled, leaving Adm. Kakuta, the Japanese commander of these forces, with very few aircraft to defend against further attacks. At this point battleship bombardment began to soften up the defenses on the islands, and on 15 June, the Marines landed on Saipan.

The bombardment of the islands by Fifth Fleet battleships starting on the 13th alerted the Japanese to the seriousness of this attack. Prior to that point, the Japanese had not expected an invasion that far north, and had deployed much of their heavy defenses to

the south, in the area of the Caroline Islands. They had even sent a portion of their fleet south to Biak to assist in the defense of the island from a U.S. attack which had begun on the 27 May. Upon realizing the Americans planned to assault Saipan, the Japanese First Mobile Force (FMF) left the port of TawiTawi off Borneo on 13 June, and steamed toward Saipan.

Japan too realized the importance of the Marianas to their mainland's defense. They had good intelligence on the B-29 bomber, and recognized that if the U.S. took these islands, Japan would be well within the new aircraft's range. They were also concerned about the Americans interrupting their shipping and communications, making it even more difficult to bring scarce resources into Japan. Thus, for the defense of the Empire, they could not allow the U.S. to take the Marianas Islands, no matter the cost.

The Japanese realized that they were at a considerable disadvantage compared to the Americans in that they were outnumbered approximately two to one in carrier aircraft. Thus, the Japanese plan of attack was to compensate for this ratio by taking advantage of the longer range capability of their aircraft, as well as relying heavily on the land-based aircraft in the area to help make up the numerical deficiency. The plan was to have the land-based aircraft to inflict approximately a 33% attrition rate on TF58, and then for Ozawa's carrier aircraft to attack from beyond the range of the U.S. aircraft. The Japanese planes would then use Guam to refuel and reload, and finish off the American fleet. (Japanese aircraft had an attack range of 350 miles as opposed to the 250 mile range for U.S. carrier aircraft.)

The Japanese tried to disguise their departure from TawiTawi with false radio messages, but a U.S. submarine (*Redfin*) observed the FMF leaving harbor and alerted Spruance that the Japanese were on their way, possibly heading to the Philippine Sea. Two days later, the Japanese fleet was spotted once again by a U.S. submarine as the FMF passed through the San Bernadino Straights. Two powerful Japanese battleships returning from Biak were seen by a second submarine.

Spruance steamed east during the day to try to locate the Japanese fleet, and then turned back west at night in order to remain in a supporting position for the landings. Spruance was exceedingly cautious, fearful of the typical intricate deception/flank attack plans the Japanese had employed during previous battles. (Spruance had been involved in the battle of Midway and had come to learn first hand the potential dangers and opportunities that came with the intricate Japanese plans.)

Admiral Spruance's caution was also influenced by his possession of the so-called Japanese "Z Plan." This plan, drawn up by Admiral Koga before his death, had been captured by the Americans and disseminated to commanders in the area. It detailed how the Japanese would bring the U.S. fleet to action, overcoming their handicap of

aircraft carriers by using their favorite ploy - the decoy. They were to use empty carriers to draw off the U.S. aircraft carriers, allowing their shore-based aircraft and surface fleet to fall upon and destroy the Allied landing and surface forces. Thus, Admiral Spruance had good reason to be cautious, explaining his refusal to leave the landing forces unprotected.

Lack of fuel, however, forced Ozawa to eschew subterfuge and steam directly east. He was hoping to locate the U.S. Fleet in time to allow him the distance advantage he needed in order to initiate his plan.

Battle Outcome

On the afternoon of 18 June, Admiral Ozawa's FMF located Spruance's Fifth Fleet. Deciding it was too late to launch his aircraft that evening (out of concern for his relatively green pilots having to make a night landing on Guam), Ozawa opted to wait until the next morning to launch his initial attack. The next day at 0830, Admiral Ozawa ordered his first attack wave into the air. Conditions appeared perfect: the FMF was out of range of the U.S. carrier aircraft, the wind was in their favor, and as far as Ozawa knew, Kakuta's land-based aircraft would be on hand to compensate for the American superiority in numbers of aircraft.

Although in the days prior to the battle Spruance had received a number of sighting reports from submarines in the area, as well as an HF/DF fix on the FMF on the night of the 18th, he was still hesitant to make an offensive move. He was not willing to risk leaving the landing troops and their extremely valuable transports open to a possible flank attack. His caution led him to doubt the authenticity of the sightings in any case. The Fifth Fleet still did not have a confirmed sighting of the Japanese, and had search planes out early in the morning of the 18th. By 1000, when the first wave of aircraft from Ozawa's carriers was picked up on U.S. radar, the Americans still did not have a confirmed fix on the Japanese fleet.

As dangerous as the situation initially looked for the Americans, this day turned out to be an absolute disaster for the Japanese. On the first day of the battle Ozawa lost approximately 300 out of his total of 450 carrier aircraft. The Americans lost only 30 leading on American pilot to dub the battle the Marianas "Turkey Shoot." Kakuta's land-based aircraft did not turn the tide, largely due to the high rate of attrition the Japanese land-based aircraft had suffered over the previous several days. Ozawa's poorly trained and outnumbered pilots in aging aircraft were easily shot down by U.S. pilots. On this first day, U.S. submarines also sank two Japanese carriers, including *Taiho*, Ozawa's flagship. By the end of the first day of the battle, the FMF had only approximately 100 operational aircraft remaining, and the FMF's ships no way to communicate either with each other or with headquarters in Okinawa.

The Japanese fared no better on the second day of the battle. The Fifth Fleet, still unable to locate the Japanese fleet, steamed west overnight, and had search planes up throughout the following day. Late in the afternoon reconnaissance flights spotted the Japanese fleet attempting to regroup and refuel after having steamed northwest overnight. Within one-half hour, the Americans had launched over 200 aircraft for an all-out strike.

The Japanese were caught completely off guard by this attack. The few pilots that had returned to the carriers the previous day had given grossly exaggerated reports concerning the success of their mission, leading Ozawa to believe that the Fifth Fleet was in no launch an attack. Furthermore, Ozawa was completely out of communication until that afternoon, so he did not learn until it was too late that he only had 100 aircraft at his disposal. The Japanese were able to launch 75 aircraft, but once again, were no match for the Americans. At the end of the second day of battle, the Japanese turned and fled to Okinawa, having lost another carrier, two oilers, and approximately 70 more aircraft.

Command Decisions

There were essentially two critical decisions made during the battle which warrant further explanation and consideration. The first, Spruance's decision not to take the offensive on the night of the 18th, has been a controversial issue for many years within the U.S. Naval community. There are those that have criticized this decision, blaming Spruance for not engaging the First Mobile Fleet in a decisive battle when he had the opportunity. The second critical decision, although not nearly as controversial, was Ozawa's decision on the 19th and 20th to remain in the area and attempt to regroup for a second strike at the Fifth Fleet.

It was personal experience, perception, and intuition, rather than "tangible" information, which mostly influenced Adm. Spruance's decision not to steam west on the night of the 18th to seek out an offensive confrontation. Early in the morning of the 18th, the Fifth Fleet had received a message from a submarine in the area reporting approximately 15 ships in the Philippine Sea. Upon receipt of this information Adm. Mitscher, commander of TF58, calculated the probable time of contact between the two ships, and advised Adm. Spruance to steam west throughout the night in order to meet the FMF in an offensive position. He had determined that this would put them in position to encounter the Japanese fleet at 0100 on the morning of the 19th. Spruance vetoed this suggestion, intent on not making any moves until the whereabouts of the entire fleet could be confirmed. He was very concerned that this portion of the fleet might have been a deception force sent to draw the Americans away from Saipan, leaving the landing troops exposed. A second report was received at 1000 on the evening of the 18th from a listening station in Hawaii, which had intercepted a message from Ozawa, pinpointing the location of the Japanese fleet. At approximately the same

time, Spruance intercepted a radio message that had been sent from submarine headquarters to one of the submarines in the area, referring to a garbled message which had been received, requesting a re-send. Interestingly enough, Spruance placed more emphasis on this message, which was not even directed to him, than he did on the HF/DF report from Hawaii. He chose to believe that the garbled message from the submarine was caused by Japanese jamming, which would have put the Japanese fleet 100 miles closer than the report from Hawaii suggested. Thus, Spruance decided, much to the chagrin of his aviators, that it was too risky to abandon the landing forces for an offensive strike. He was concerned that the fleets would pass in the night, leaving the landing troops completely open to attacks from the sea.

The single most influential factor in Spruance's decision making process was his intuition. Based on his previous experience with the Japanese in battle, Spruance was expecting a complicated double or triple envelopment with a plan involving deception operations. His assessment of the reports he received from local submarines, and even from Hawaii, reflected this bias. He allowed his intuition to cloud tangible information which was being presented to him. For example, rather than thinking it was possible that the submarine simply did not see the rest of the fleet in the dark of the night on the 17th (which was actually the case), he feared that the rest of the fleet was readying to attack either his exposed flank or the transports off Saipan as soon as he took the bait. The same holds true for the HF/DF report from Hawaii. Spruance placed greater weight on the intercepted submarine communications than he did on the report sent directly to him from Hawaii. He was convinced that the HF/DF report was inaccurate, and that the Japanese were really jamming his submarines communications so they could not report back the location of the FMF. Spruance's bias was further enhanced by his possession of the Japanese "Z Plan" which contained provisions for envelopment and diversionary fleet movements.

The final factor explaining Spruance's caution was his military background as a surface warfare officer rather than an aviator. He was not confident in the capabilities of the carrier force, and was not willing to trust the ambitious airgroup commander, Mitscher, claims that they could succeed in a night engagement. He was a "big gun" man, heavily reliant on his battleships during an engagement, and not entirely comfortable in how to use his carriers. When Adm. Lee, commander of the battle group, refused to take any part in a night battle, Spruance's decision was further solidified. It was decided that the possible advantages of radar more than offset the difficulties of communications and the lack of training the fleet had in night tactics; they would wait and let the enemy attack them. Spruance did send up reconnaissance flights the next morning in an attempt to locate the Japanese fleet, but he was resigned to be on the defensive.

For the Japanese, the most critical command decision came when Adm. Ozawa decided, after the disastrous "Turkey Shoot" on the 19th, to remain in the general area to engage the Americans again. He steamed approximately 250 miles over the night of the 19th to a preplanned rendezvous site to meet up with his tankers. He planned to regroup, refuel, and await reinforcements ordered down from Japan. Unfortunately, Ozawa had made this decision in an information vacuum. He suffered both from the fact that he was essentially operating without communications as well as from misjudgments caused by deception and dishonesty on the part of his commanders.

When his flagship, *Taiho*, was sunk on the afternoon of the 19th, Admiral Ozawa's communications had been cut off both from the other ships in the fleet, as well as from Combined Fleet headquarters in Okinawa. Ozawa had had to transfer to the closest available ship, a cruiser, which was not equipped to handle the business of a fleet flagship. In addition, the combined code book used to communicate with headquarters had gone down with the ship, and it was not until much later that this problem was rectified. Thus, it was not until acceptable communications were restored, at 1300 on the afternoon of the 20th, that Ozawa learned that the majority of his aircraft had not made it back to their carriers, and that reinforcements were not en route from Saipan or Japan.

Once he did start receiving information again, Ozawa's decision making capabilities were further impeded by the false information he was receiving from his subordinates. He was given overly optimistic reports by the few returning pilots to make it back to the fleet, leading him to believe that the Fifth Fleet had been sufficiently weakened so that it would be unable to initiate an attack. He had also received word from Adm. Kakuta on Guam that many of his planes had landed there, rather being shot down, and would be returning to the carriers on the 20th. In addition, Adm. Kakuta had been withholding from him the true status of his land-based planes in the area, not telling Ozawa that his force had been decimated. Believing that he was not in imminent danger, Ozawa did not prepare an effective screen around his surviving carriers, and the afternoon of the 20th found the First Mobile Fleet in no position to defend itself from attack.

The primary reason behind Ozawa deciding to stay and fight, in light of his terrible position, can be attributed to his lack of timely and credible information concerning the outcome of the previous engagements. In this situation, Ozawa admitted later, it would have been prudent to quickly retire to Okinawa. Instead however, Ozawa opted to stay and fight. It was this decision which led the Japanese to lose an additional 70 aircraft (leaving only 30 operational in the entire fleet), one carrier, and two oilers.

DBA/DBK Conclusions

For the Americans, lack of consistent and credible DBA in the days leading up to the battle was overshadowed by the technological advantages they held over the Japanese in the form of radar. Even though the Americans had no idea where the Japanese fleet was located throughout the battle, they were able to take the upper-hand in the situation, pinpointing incoming Japanese attack waves on radar. They were not able to move aggressively against the Japanese fleet; however, they were able to exploit their technological advances by devastating the Japanese aircraft.

For the Japanese, although they had a relatively consistent and high DBA throughout (most importantly on the day of the battle), it was not enough to overcome the decisive force ratio disadvantage that they suffered from. Having located the U.S. fleet before having been spotted placed Ozawa in the perfect situation for his plan - he was able to attack from beyond the range of U.S. carrier aircraft. As good as his plan seemed, it was not sufficient to compensate for his poorly trained pilots and numerical deficiency in aircraft.

In the case of both the Americans and the Japanese, DBK played a very significant role in the decision making process of the commanders. It did not however, translate directly to success or failure in the outcome of the battle. In the case of the Americans, even though his intuition proved wrong, Spruance came out the victor. For the Japanese, Adm. Ozawa made a winning bet on being able to find the Americans while staying out of range, yet suffered one of the most egregious defeats in the history of naval aviation.

Dominant Battlespace Awareness III

Leyte Gulf Case Study

Information Requirements

15 May 1997

DBA/DBK Definitions

DBA

- **A high level of awareness (90% visibility) of friendly and enemy forces, and the environment. DBA is fundamentally about location relative to enemy/friendly locations**

DBK

- **High confidence in the future (95%), and an ability to act on it before the enemy can act. DBK enables commanders to predict with confidence where the enemy is going to be, and when they are going to be there. DBK is more subjective, relying heavily on the decision-maker and his/her confidence level**

Critical DBA/DBK Questions

- **What were the sources/mechanisms of DBA and DBK?**
- **What were the Commanders' key information requirements?**
 - Enemy OB
 - Enemy capability
 - Enemy intent
- **What information was available to the commanders during the battle? Conversely, what information was not available? What information was critical but was not sought by the commander?**
- **What happened both tactically and strategically when those sources were denied?**
- **How perishable is the information from the different sources across the battles**

Campaign Objectives

U.S.

- **Protect the landing forces at Leyte**
- **If possibility presents itself, seek out and destroy Japanese naval forces**

Japan

- **Destroy major portions of the U.S. Navy**
- **Damage U.S. landing craft and amphibious capability**
- **Disrupt and defeat the Philippine landing taking place on Leyte**

CONOPS

U.S.

- **Protect landings at Leyte Gulf**
 - Kinkaid's 7th fleet was the primary force in charge of landings and defended the approach from the west
 - Halsey's 3rd fleet, with a huge carrier force, defended to the east and was prepared to attack any Japanese forces threatening the landing

Japan

- **Defeat U.S. landing at Leyte**
 - 3-pronged attack designed to deceive US forces and achieve a simultaneous double envelopment on either side of Leyte Gulf
 - 1 Ozawa's force was a decoy coming from the north, with virtually empty aircraft carriers, was to draw Halsey's force away from the Gulf
 - 2 Kurita's force, the largest and most powerful, was to circle around from the east and enter the gap where Halsey left for the decoy force
 - 3 Two separate forces, led by Shima and Nishimura respectively, attack from the southeast to form the other pincer

Overview of Forces

- **U.S. Forces:**
 - 3rd Fleet, Halsey, 14 CVs w/~1,000 A/C, 7 BBs, 8 HCs, 7 LCs, 57 DDs
 - 7th Fleet, Kinkaid, 18 CVEs w/ ~540 A/C, 6 BBs, 8 Cs, ~20 DDs
- **Japanese Forces**
 - Ozawa, 4 CVs (1 hvy, 3 lt), 2 BBs* (w/landing decks), 3 HCs, 5 DDs but w/only ~100 A/C total
 - Kurita, 5 BBs (including 2 biggest ever - Yamato & Musashi), 12 HCs, 15 DDs
 - Nishimura, 2 BBs, 1 HC, 4 DDs
 - Shima, 3 HCs, 7 DDs

Sequence of Events

October 1944

Background

U.S. has 2 major fleets supporting landings in and around Leyte Gulf

U.S.

0510 - Submarines engage largest of 4 Japanese columns (Kurita's) and sink first ships west of Leyte. Now know Japanese are coming

~0930 - 2 A/C help save U.S. ships against air attack downing 15 A/C

1025 - Halsey's CV A/Cs strike Kurita's ships in Sibuyan Sea, sink Musashi

2230 - Kinkaid's 7th fleet springs trap on Nishimura in Surigao St.

0000- 0400 - Halsey's staff and faulty radio stop message of threat

0700 - Kinkaid's escort CVEs (Taffys 1-3) attacked by Kurita, lose ships

0700 - Halsey sinks 5 of Ozawa's decoys

Halsey tries to move BBs back to Leyte in time but gets caught in "No Man's Land" between Kurita and Ozawa

1st encounter -- U.S. subs attack Kurita	AM -- Major air battle PM -- Kinkaid's trap	Kurita engages CVEs -- Halsey attacks the decoys	Kamikazes strike -- Halsey caught in middle
--	--	---	--

23rd

24th

25th

26th

Japan

Background

Japanese send 4 major fleets to attack U.S. landing forces in and around Leyte Gulf

Japanese lose ships to U.S. subs, including Kurita's flagship, dropping him into the water

0825 - Japanese launch land-based air attack against Halsey's force, sink Princeton

1715 - Kurita reverses self and heads for San Bernadino Strait after US mysteriously halts attacks

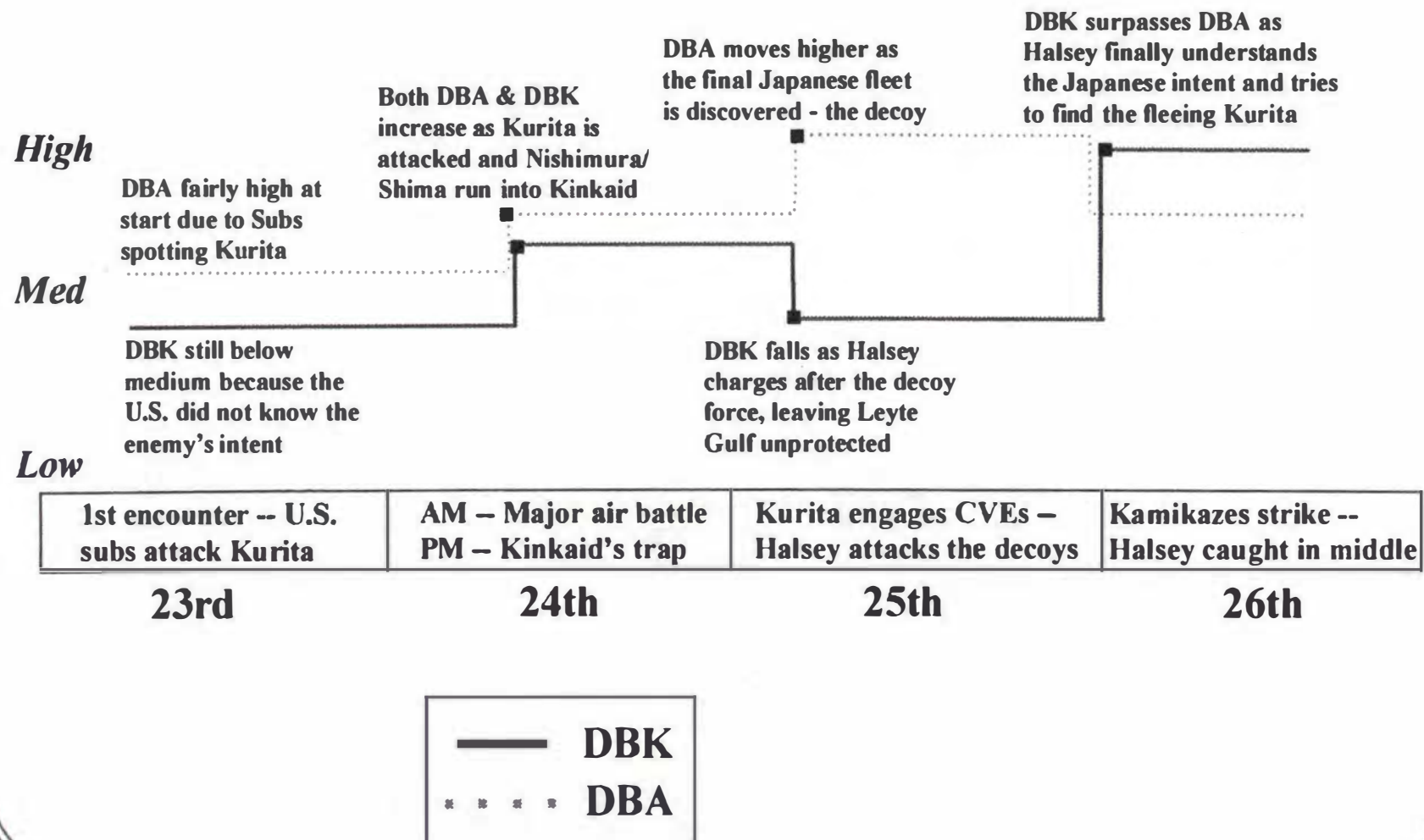
~0400 Nishimura gets his "T" crossed and, combined with Shima, loses 2 BBs, 3 CGs, 4 DDs

0700 - Kurita attacks Kinkaid's light CVE battle groups - Kurita retreats on verge of victory

Japanese launch first Kamikaze attacks of WWII and cause major damage

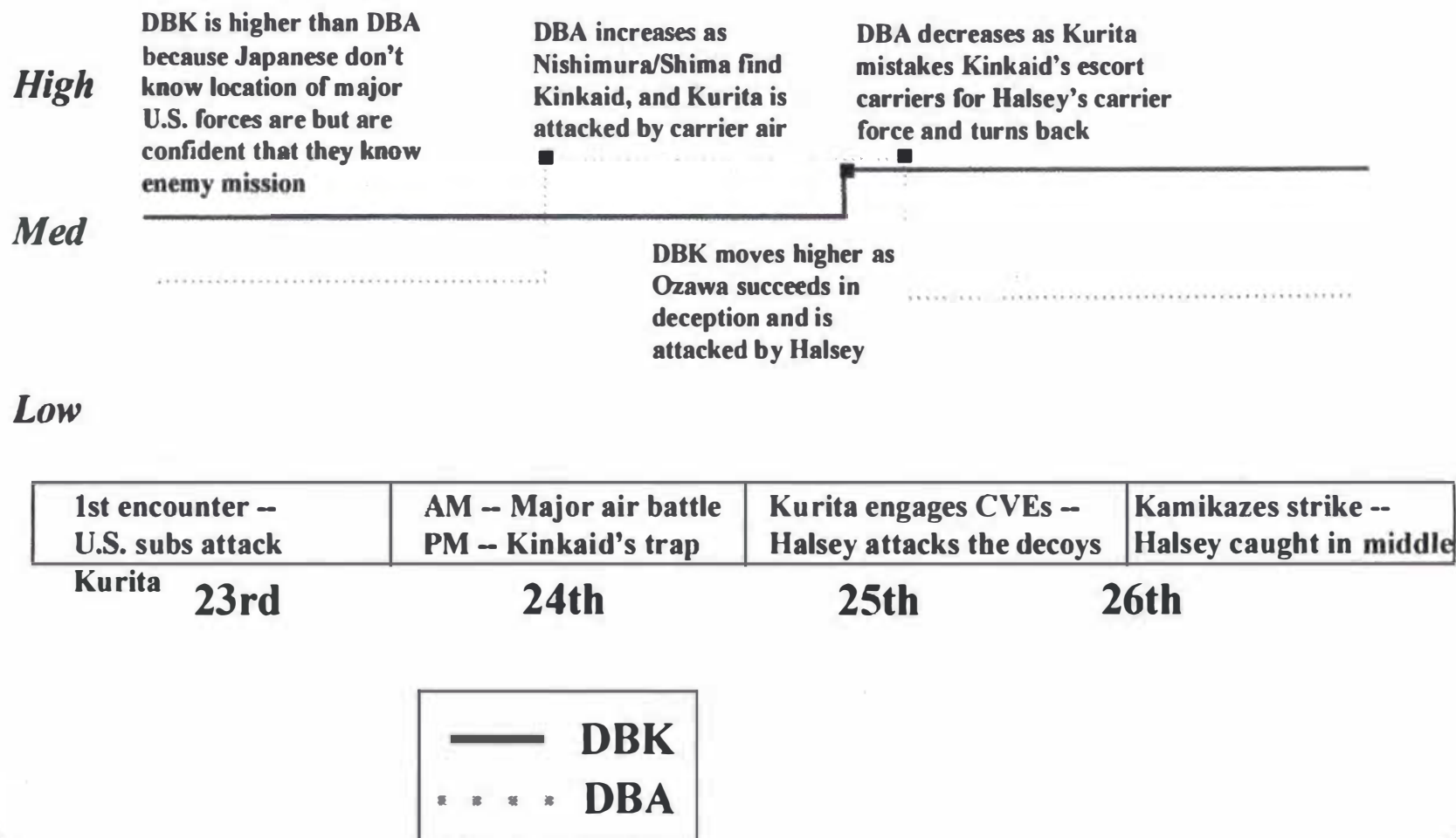
Level of DBA/DBK -- U.S.

October 1944



Level of DBA/DBK -- Japanese

October 1944



Sources & Mechanisms of DBA

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy order of battle**
- **Friendly & enemy capability**
- **Location and status of friendly & enemy logistics nodes and supply lines**
- **Enemy TTP and historical performance**

Mechanisms

- **Communications intercepts**
- **Aerial reconnaissance**
- **Undersea reconnaissance**
- **Contact with the enemy**
- **POW interviews**

Sources & Mechanisms of DBK

Sources

- **Identity, personality, and location of decision maker**
- **Friendly & enemy capability**
- **Friendly & enemy intent**
- **Friendly & enemy morale**
- **Enemy TTP and historical performance**
- **Location and status of friendly & enemy logistics nodes and supply lines**

Mechanisms

- **Commander's intuition/experience**
- **Communications intercepts (Ozawa tried to be heard but wasn't)**
- **Post-battle analysis**
- **POW interviews**

Information -- Required

U.S.

- **Location, capability/identity, and number of enemy forces**
- **The most likely enemy course of action (e.g., intent)**
- **Location, status, and number of friendly forces**
- **Accurate and timely BDA from carrier air strikes**

Japanese

- **Location, capability/identity, and number of enemy forces**
 - **Did the Americans fall for the deception?**
- **Location, status, and number of friendly forces**
- **Accurate and timely BDA from land- and carrier-based air strikes**

Information -- Not Sought

U.S.

- **The status of the Japanese carrier-based air forces**
- **Political circumstances affecting Japanese decision making**
 - **Would the Japanese really turn back after after several US attacks if they viewed this operation as critical to the survival of their empire**

Japanese

- **Confirmations concerning the true identifications of US ships**

Information -- Timeliness

U.S.

- **In early stages, US had all the necessary information concerning Japanese fleet movements and locations, except for Ozawa and his CVs, in sufficient time to prepare for them**
- **Because of communications problems and staff/command idiosyncrasies, critical information concerning Kurita's force did not get to Halsey in time**
- **Accurate BDA for the attack on Kurita's force did not reach commanders in time**
- **Kinkaid did not find out where Halsey's forces were in time**

Japan

- **The deception force was not successful in passing its location to Halsey's forces quickly enough to protect Kurita's force from attack in the Sibuyan Sea**
- **Nishimura did not pass on information concerning trap in Surigao Strait to Shima (Shima didn't ask for it, either)**

Information -- Accuracy

U.S.

- **US had erroneous BDA reports that Kurita's force had been "decimated" in Sibuyan Sea and was no longer a threat**
- **Halsey and staff did not grasp that Ozawa was a decoy**
 - **US never did understand the extent to which Japanese airpower in general, and carrier air in particular, had been attrited leading up to this battle**
- **Neither Kinkaid nor Nimitz had accurate information concerning Halsey's location on the 25th**

Japan

- **Japanese pilots, commanders, and lookouts consistently misidentified US ships -- always felt they were facing larger force than they were**
- **Nishimura did not accurately assess the size of the force he was facing in Surigao Strait**

Elements of IW

Deception

- **Japanese**
 - Ozawa's northern force was an effective decoy, sending out signals in the clear to draw attention, and finally sending out search aircraft to help his carriers be discovered

EW

- **U.S.**
 - Halsey's force did not pick up Ozawa's signals broadcast over open lines

Physical Destruction

- **Nothing targeted expressly for IW benefit**

Elements of IW (Cont.)

OPSEC

- **Japanese**
 - Japanese (Ozawa) intentionally broadcast open messages so they would be discovered
 - When that failed, they sent out carrier aircraft

PSYOPS

- **No critical PSYOP planning by either side**

Other

- **Fog of War -- Misunderstanding concerning the disposition of Halsey's forces -- "Where is Task Force 34?" -- Halsey left his position with all his forces to attack Ozawa's CVs but all others, including Nimitz believe he left major force behind to protect approach to Leyte Gulf**

The Impact of Command

Command Structure

- **U.S.**

- **The 2 fleets were under different commanders (Nimitz and MacArthur), neither of whom were controlling fleet actions or in the area**
 - » **No one person was in charge -- Roosevelt was the only common link in chain**
 - » **Communications were a problem -- not formalized, no direct link between two fleets, did not share information, took too long to send/receive messages**
- **Halsey and Spruance trading off commands had far-reaching effects -- Halsey witnessed criticism of Spruance in Philippine Sea and vowed to attack Japanese CVs at any chance**

- **Japan**

- **Japanese had 4 separate task forces, with only Tokyo overseeing them all**
 - » **Poor communications between/among fleets denied them chance for simultaneous attack on US forces**
 - » **Wrong commanders were placed in charge**

The Impact of Command (Cont.)

Personalities

- Huge impact

- **U.S.**

- Halsey was overly aggressive and left his position to seek out a glorious CV vs. CV victory . Halsey also did not want to repeat Spruance's actions in the Philippine Sea battle where he failed to destroy the wounded Japanese fleet

- **Japan**

- Kurita did not make good judgments throughout the battle -- at least partially due to the fact he had 2 ships shot out from under him and was leading an attack he felt was doomed
 - » Employed the wrong formations in early stages making US sub attack more effective
 - » Pulled back from fight on the verge of victory because he made several incorrect assessments of the situation
 - » Did not approve of attacking defenseless transports ("Cowardly") and left to seek out carriers
- Nishimura and Shima did not like each other and thus did not communicate leading to Shima's running into the same trap as Nishimura did without seeking or receiving any warning

The Impact of Intangibles

Weather

- **No appreciable impact on the battle except for minor squall providing temporary shelter for one escort CV task force**

Morale

- **Japan**
 - **The days-long pressure and duress Kurita felt led him to lose confidence and retreat when at least partial victory was in his grasp**

Strategic/Political Considerations

- **U.S.**
 - **CINCPAC gave Halsey contradictory missions because of flack over Philippine Sea**
- **Japan**
 - **Japanese naval forces had no choice but to continue the fight at all costs because US control of the Philippines would have cut off the Empire from critical supplies**

Recent History

- **U.S.**
 - **Halsey had observed the criticism heaped on Spruance for not chasing down and destroying the Japanese Navy in Philippine Sea and was determined not to repeat the “mistake”**

Impact of Knowledge -- U.S.

- **Concern over the location of Japanese CVs led Halsey to leap after them even though they were decoys**
 - **Nearly leads to incalculable costs as Kurita's massive force had unimpeded path to 3 escort TFs and then the amphibious forces -- escape disaster when Kurita retreats**
- **Lack of shared information and direct communications led Kinkaid and Nimitz to believe that Halsey was still guarding Leyte Gulf**
 - **Kinkaid continued to guard western entry and east is left open to Kurita (see above)**
- **Available information concerning the approach of Nishimura's (and Shima's) force allowed Kinkaid to prepare a defense**
 - **Nishimura lost or had damaged 9 ships**

Impact of Knowledge -- Japanese

- **Kurita did not comprehend the extent of his advantage on the 25th, because of misidentifying the US ships and mistakenly believing Halsey was nearby, and retreated with victory in his grasp**
 - **Kurita's massive force had unimpeded path to 3 escort TFs and then the amphibious forces but he mysteriously retreated and escaped back through the Sibuyan Sea**
- **Because the separate Japanese fleets did not communicate throughout the battle, they were not able to synchronize their various attacks**
 - **Nishimura could have waited and hit Kinkaid after the American would have split his forces to defend against Kurita -- would have certainly saved some of his ships**

Why Didn't the Japanese Plan Succeed?

Small Problems

- **Timing of the Pincer movement was not perfect**
- **Disposition of forces was not equitable or logical**
- **Lack of airpower and air cover for fleets**
- **OB could not match that of US**

Big Problem -- i.e., it still should/could have worked except for:

- **Kurita did not follow through on his attack when he had an overwhelming advantage and his objective in sight**

Why Didn't the U.S. Plan Succeed?

- **Halsey left his position, which was ideal for facing Kurita as he pressed through narrow San Bernadino Strait, and chased after decoy**
- **Miscommunications hurt throughout battle**
 - **Kinkaid thought Halsey was still in position though he was long-gone**
 - **Several staffs could not reach Halsey to tell him of the impending crisis**
 - **Misinterpretation of cable from Nimitz (“... the World Wonders”) set Halsey off on another course of mistaken decisions**

DBA Conclusions

- **On the US side, knowledge of the location and disposition of friendly forces turned out to be more critical than the same information for the enemy's forces**
 - **Halsey's move to the north caused more confusion and problems for the US than any of the Japanese movements or actions**
- **The US did not perform BDA accurately or often enough to present a clear picture of the battlespace**
- **The Japanese consistently misidentified US ships and the OB and it greatly affected their operations**
- **The lack of consistent, dedicated, communications greatly degraded the effectiveness of both sides' operations**
 - **In some cases, commanders on both sides simply did not choose to communicate with their allies, or did so in a manner which only confused the situation**

DBK Conclusions

- **Halsey misunderstood Japanese plan/intent and left major U.S. forces virtually unprotected to chase after a decoy**
- **Japanese had no commander with a comprehensive view of the entire battle. This would have allowed them to see that Ozawa's deception had worked and that Kurita had the advantage**
- **Good communications and logical command structures are critical to gaining and applying DBK**
 - **Without good communications there can be no clear understanding of how the battle is unfolding**
 - **A split command structure like that of the Americans makes it very difficult for a single node to have all the pertinent information, let alone in a timely fashion**

Command Decisions in The Battle of Leyte Gulf

October 23-26, 1944

Background

In the Fall of 1944, the two U.S. commands operating in the Pacific combined their forces and invaded the Philippines, fulfilling General Douglas MacArthur's promise of some three years earlier to return to the islands. The landing was virtually unopposed though the U.S. continued to expect some form of response from the Japanese. The response, when it came, resulted in the largest naval battle in history taking place over four days in and around Leyte Gulf and including 282 ships and over 200,000 sailors and aviators. In the end, it almost cost one side its landing force, and did cost the other side a large number of warships they could ill afford to lose.

The decision to make the Philippines the next step on the American's methodical march towards the Japanese home islands was not an easy one because there were some who believed striking Formosa would have a greater impact. In the end, however, President Roosevelt was persuaded that the Philippines would more the strongest blow against weakening Japanese supply lines. As a result, the U.S. supported the operation with their whole Pacific arsenal.

MacArthur's forces had command of the landing on Leyte, with ADM Kinkaid overseeing the amphibious forces for the CINCSOWESPAC. Kinkaid's Seventh Fleet was comprised of 18 escort aircraft carriers (CVEs) with roughly 540 aircraft (A/C), 6 battleships (BBs), 8 heavy cruisers (HCs), and roughly 20 destroyers (DDs). This force was tasked with protecting the landing forces in Leyte Gulf from potential attacks from the west. Protecting this landing from the east, for CINCPAC ADM Chester Nimitz, was ADM "Bull" Halsey, who had the majority of the U.S. Navy's striking power at his disposal. The Halsey's Third Fleet was the largest in the world, comprised of 14 full-size aircraft carriers (CVs) with over 1,000 A/C, 7 BBs, 8 HCs, 7 light cruisers (LCs) and 57 DDs. In addition to this defensive mission, Halsey also believed he had a secondary tasking to destroy the Japanese carrier force if the opportunity presented itself. This belief would have a major impact as the battle unfolded.

The Japanese, for their part, also realized that a successful Allied recapture of the Philippine islands would stretch their already thin supply lines past their breaking point. The Empire relied heavily on oil from the Dutch East Indies, and this lifeline was in grave peril with a fixed U.S. presence in the Philippines. The Japanese leadership therefore decided to risk the remnants of its navy in a last ditch effort to stop America's Philippine invasion. For the Japanese Navy, a clear secondary objective was to deal a major blow to the U.S. Navy by destroying a majority of its carrier force and regaining a measure of respect and momentum which it had steadily lost since Midway. In either case, it was understood that there could be no

turning back from this mission and that the U.S. landing in Leyte Gulf had to be defeated at all costs.

The attack plan for the Japanese (see map below) was very similar to those employed throughout the war. It was a highly complex pincer movement using four major battle forces, including one critical deception formation. The whole force was to converge simultaneously on the American landing/amphibious forces in Leyte Gulf. The deception force, led by ADM Ozawa, was heading directly south towards Leyte Gulf and Halsey's force with the intention of being discovered as soon as possible. The objective was to entice Halsey into leaving his guardian position and charging after this force, under the (false) assumption that these carriers comprised the main threat to the landing force. In reality, these diversionary carriers could muster only a token air threat due to the attrition of pilots and aircraft suffered during previous campaigns.

The main striking force, under Admiral Kurita, included 5 BBs (including the two largest ever built: Musashi and Yamato), 12 HCs, and 15 DDs and was to make its way through the center of the island chain, move south into the area vacated by Halsey, and attack the lightly defended landing force. At the same time, two converging fleets, commanded by Admirals Shima and Nishimura, were to approach Leyte Gulf from the southeast and envelop the remaining U.S. naval forces under Kinkaid. These two fleets, when combined, would include 2 BBs, 4 HCs and 11 DDs. The concept was to avoid the carrier force by way of deception and then take maximum advantage of their big guns and large numbers against the remaining U.S. forces. However, the planners believed that this intricate maneuver required nearly perfect timing to achieve success. As described later, an opportunity for success did present itself, despite the fact that the execution of the operation did not resemble the original plan.

Battle Outcome

The first two days of the battle were an unmitigated disaster for the Japanese. Kurita's strike force was first spotted by two U.S. submarines more than a 100 miles west of the Philippines. In this engagement, the Japanese lost two ships, including a heavy cruiser acting as Kurita's flagship. This contact also served to warn the U.S. that a major Japanese fleet was approaching the Philippines. The next day, Kurita's force was pummeled from the air by Halsey's carrier aircraft as he passed through the narrow Sibuyan Sea. The Japanese had worried all along about their lack of airpower and only an inexplicable cessation of U.S. sorties saved his fleet from total destruction. One of the losses was the massive battleship the Musashi, again plunging Kurita into the Pacific as he lost his second flagship. Kurita initially turned around to sail home, but changed his mind after U.S. halted its attack. Meanwhile, Ozawa was growing increasingly frustrated as his deception force continued to go unintentionally undetected despite sending messages over open lines.

The third day, 25 October, started out poorly for the Japanese. The forces of Shima and Nishimura, who never did combine their respective fleets out of an intense dislike for one another, sailed directly into an expertly laid trap. Kinkaid's forces crossed the "T" of the Japanese formations on the west side of Leyte Gulf and inflicted serious losses on the Japanese (9 more ships including 2 BBs). In fact, Nishimura failed to warn Shima as the latter sailed ahead along the exact course that had been so disastrous to Nishimura just moments before.

Before daybreak, however, the Japanese luck changed as the decoy force was finally spotted and a controversial day of full of poor decision making, close calls, and blind luck unfolded.

Command Decisions

Though there were a great many decisions throughout the course of this unprecedented naval engagement, there are two critical decisions that are uniquely suited for further analysis, especially in a DBA/DBK context. Both of these decisions occurred on 25 October. ADM Halsey's decision to take his forces north in pursuit of the decoy CVs, and ADM Kurita's decision to break off his attack in Leyte Gulf on the verge of victory were not only critical to the outcome of the battle, but involve most of the key aspects of information requirements and intangibles that are the focus of this study.

The first decision to be assessed is Admiral Halsey's controversial run north to engage the depleted Japanese carrier force. From an information standpoint, Halsey had all he felt he needed concerning this decision. By the third day of the battle, Halsey knew of the general location and heading of the Japanese CVs and, because he viewed them as his gravest threat, decided to engage them in open waters. As it turned out, these were incorrect assumptions built upon both inaccurate and unrequested information. To begin with, Halsey incorrectly believed that Kurita's force had been decimated and forced to turn back, thereby clearing his operating area of secondary threats. Second, the U.S. failed to accurately take into consideration the reduced striking power of the Japanese carriers' airpower, despite a number of previous engagements that illustrated this weakness. This evidence includes the beginning phases of the battle, where the Japanese broke with convention and sent a major fleet of surface combatants (Kurita) through narrow waters without air cover. The U.S. commanders, save for a few staff members who were ignored, did not understand the implications of Kurita's lack of air cover. The resulting false assessment of Japan's naval airpower meant that Halsey was susceptible to the deception operation.

In hindsight, perhaps the most influential reason behind Halsey's rash decision was a factor generally viewed as an intangible – the personality of the commander.

Halsey was aggressive by nature (hence the nickname "Bull") and had been spoiling for a major carrier battle the entire war. Due to the unique nature of the PACFLT command system (i.e., rotating command), Halsey had watched from Hawaii as Admiral Spruance was criticized for not taking the opportunity to destroy the Japanese carrier force in the aftermath of the Battle of the Philippine Sea. Halsey's desire to avoid this sort of criticism was inadvertently inflamed by the final sentence of his orders from Nimitz which stated that "in case opportunity for destruction of major portion of the enemy fleet offers itself or can be created, such destruction becomes the primary task."¹ Nimitz denied ever have written that order, and the identity of the person responsible is not known to this day, but it had a huge impact in reinforcing Halsey's instincts to seek out a defining carrier battle.

The final critical piece in assessing this decision was the command structure employed. As alluded to above, the command of the fleet was changed between Admirals Halsey and Spruance, including different names depending on who was in charge -- 7th Fleet for Spruance and 3rd Fleet for Halsey. Historical chance had, thus far, denied Halsey the battle he wanted, and given the reaction to Spruance's 'missed opportunity,'² Halsey was predisposed to seize any opportunity. In the end, most naval historians believe that the U.S. would have been much better served had the commands been reversed for those two battles, with Halsey chasing down the fleeing carriers in the Philippine Sea, and Spruance remaining in a defensive position protecting the landings in Leyte Gulf.

Another critical aspect of this battle on the U.S. side was the command structure at the CINC level. Because of the nature and size of the Pacific theater, there were two CINCs operating side-by-side during this operation. Because the President or the CJCS was the only common link between Nimitz and MacArthur, there was no institutional link between the CINCs, or between the two fleets involved in the operation. As a result, poor communications were the norm during the course of the battle and they had a major effect on its course.

This shortcoming was demonstrated by the confusion over the whereabouts of Halsey's forces and the famous Task Force 34 controversy. In preparing to embark on his pursuit of Ozawa and his carriers, Halsey created a "new" task force numbered 34. Halsey saw this as simply a restructuring of the forces he was taking north. Nimitz and Kinkaid, however, believed this was a new task force that Halsey had created to stay behind and guard the eastern entrance to Leyte Gulf. Because of the lack of communication, this misunderstanding continued until neither Halsey nor Kinkaid were capable of protecting the landing forces or the escorts. The high point of this confusion was a notorious message from Nimitz reading "Where is Task

¹ Cutler, Thomas J., *The Battle of Leyte Gulf*, p. 60.

² This is another famous controversy within the U.S. Navy, whether Spruance was right in not following the fleeing enemy.

Force 34? The World Wonders". This last part was simply part of the coding but Halsey took it as personal rebuff and it affected the completion of his mission.

On the Japanese side, Halsey's dash north meant that their elaborate plan had actually worked and Admiral Kurita was then presented with a clear path to the amphibious ships with only a screen of three small escort carrier task forces in his way. Admiral Kinkaid's force was still fighting on the western edge of the Gulf and in no position to come to the aid of his screening force.

However, instead of taking advantage of the opportunity, Kurita turned around and fled thereby snatching defeat out of the jaws of victory. There were a two primary reasons for Kurita's. First, the Admiral, his staff, and perhaps most importantly his lookouts consistently misidentified the identity and capabilities of the U.S. forces they were facing. This inaccuracy led him to believe that the escort carriers in front of him were in fact Halsey's fleet carriers, and that the destroyers were actually battleships. Compounding this problem was the fact that Kurita received no confirmation from Ozawa that Halsey's force was otherwise engaged and out of range. Better information on either count might have prevented his costly turnabout.

The intangible factor of personality was also a major factor on the Japanese side. In addition to the Nishimura-Shima hostility, Kurita, and his state of mind, were the critical factor in this battle. Kurita never acted as if the battle were a "win at all costs" endeavor. From the outset, he sent two escorts with a wounded cruiser back to Formosa when a desperate commander would never have spared the combat-ready ships. Thus, out of all the Japanese Admirals involved in the battle, many of whom went down with their ships, Kurita was probably more likely to break off an attack. Another factor in his state of mind was the fact that he had been rescued from two different sinking ships over the course of 48 hours. This understandably may have had an effect upon his predilection for continuing a difficult fight. Finally, he was forced to head into successive battles without any intelligence from his fellow commanders. If he had known that Halsey's forces were not in front of him as he entered Leyte Gulf, he may fought more determinedly. Taken in total, his grave mistake on the 25 October is at least partially understandable based upon the quality and amount of information available to him, as well as the other intangibles affecting his decision-making ability.

DBA/DBK Conclusions

On the U.S. side, the knowledge of the location and disposition of friendly forces turned out to be more critical than the same information concerning the enemy's forces. Given the American superiority in the area, Halsey's move north, and the lack of timely communications concerning this move, was a greater threat than the Japanese force led Admiral Kurita. While it is true that the U.S. was caught in a successful deception effort, Kinkaid, had he been properly notified, would have been

capable of turning back Kurita's force. Thus, the lack of awareness concerning Halsey's U.S. force caused more confusion and problems than any of the Japanese movements or actions. The second major U.S. awareness issue was a lack of accurate or timely DBA. This factor was especially true in the aftermath of Halsey's strike on Kurita's forces, when Japanese losses were overestimated leading Halsey to assume incorrectly that he had a clear picture of the battlespace.

The Japanese had a rather poor level of awareness for both friendly and enemy forces throughout the battle. On their friendly side, none of the fleets were in communication with the others, leading to two costly blunders: Shima sailing into the same trap Nishimura had just escaped, and Ozawa not telling Kurita that Halsey was attacking him and that the deception had worked. Had the various fleet commanders, or better still one combined commander, known this information, the outcome may have been quite different.

In terms of DBA for the enemy, the Japanese consistently misidentified both the type of U.S. ships, their relative capabilities and speeds, and the damage that had been done to them during several of the engagements. The primary example of this is Kurita's decision to turn back when confronted by the escort carrier task forces. Had Kurita known that these were not Halsey's main carrier force, he might have realized that he had a distinct firepower advantage over the U.S. forces. To make matters worse, the Admiral's spotters miscalculated that the escort carriers and destroyers were faster than their own surface combatants and that they were escaping. In reality, the Kurita's massive battleships and heavy cruisers were closing on the fleeing ships just as he chose to break off the attack.

In terms of intent, Halsey misunderstood the Japanese plan and its intent to the extent that his actions left major U.S. forces largely unprotected in the face of the major Japanese force. More importantly, Halsey apparently misunderstood the U.S. intent for the operation, focusing on the offensive task that was anonymously added to the order instead of the defensive mission to which the other commanders were adhering. For his part, Kurita did not understand Halsey's intent and thus did not know he had taken the bait and left in pursuit of Ozawa's decoy force.

A large measure of blame for these misperceptions on both sides can be attributed to the poor communications which applied to both sides for this battle. Leyte Gulf ably illustrates the point that without good communications, there can be no clear understanding of how the battle is unfolding. This factor makes it very difficult for a single node to have all the pertinent information, let alone in a timely fashion.

ANNEX

Dominant Battlespace Awareness III WW II Information Requirements and the Value of Information

The following annex discusses the eleven battles and campaigns that were analyzed as part of the research methodology. Each battle can be categorized into three elements of warfare: ground, naval, and air. The ground battles include: (1) North Africa, November 1942-May 1943; (2) D-Day, June 1944; (3) Falaise Gap, August 1944; (4) Operation Market Garden, September 1944; and (5) The Battle of the Bulge, December 1944-February 1945. The naval battles that were analyzed to support this study all occurred in the Pacific area of operations. They include: (1) Coral Sea, May 1942; (2) Midway, June 1942; (3) Savo Island, August 1942; (4) Philippine Sea, June 1944; and (5) Leyte Gulf, October 1944. Finally, one air operation was studied in order to provide insight toward the value of information in an air campaign. Operation Argument, February 1944, otherwise known as "Big Week," was analyzed to provide that resolution. These eleven battles were decomposed into 24 case studies. Each study analyzed both Allied and Axis information requirements. Furthermore, one battle, Battle of the Bulge, was analyzed as two separate battles, primarily because of the distinct information components that divided it into two 3 week campaigns.

The hypotheses developed to support the overall study conclusions were:



1. Situational awareness (the types and quantity of information available) impacts the commander's ability to gain, maintain, or negate the initiative.
2. Timely information drives the decision cycle and alters the OPTEMPO.
3. Accurate and timely information allows the commander to manipulate and exploit the battlespace (force, space, time) to create force advantages.
4. Commander's prioritization of the sources and mechanisms of information, based upon their past experiences, personality, and doctrine, affects a battle's decisions and outcomes.
5. Split command structures reduce the dissemination of information.

The following pages document why the WWII battles examined, support or do not support each hypothesis.


HYPOTHESES

The hypotheses isolate various information elements to determine if, for example, accuracy of information is more important than timeliness, or simply to determine whether some information is more valuable than other information elements. In analyzing this process, the quantity, quality, and timeliness of the information available to the respective commanders was categorized separately. These issues correspond to the first three hypotheses and can largely be answered with a "yes/no" answer: Did the commander have enough information? If so, was it timely? If so, was it accurate? The fourth and fifth hypotheses assess how the commanders perceived the information and then disseminated and executed the resulting orders. When taken in the aggregate, these hypotheses depict the effect of the information in a given battle and lend insight toward the battle's outcome.

The accompanying chart depicts whether or not the eleven chosen WWII battles support the various hypotheses, or whether they do not apply. For example, when a case is said to **support** the hypothesis, it should not be translated as 100% agreement. Instead, it should be interpreted that the relationship between the battle's critical decisions, the commanders who made them, and the information they required is largely consistent with the tenor of the hypothesis.

There are two distinct types of cases that support a hypothesis. The first type is relatively straightforward in that it coincides with the hypothesis as it is written (depicted as a ). The other illustrates examples that support the hypothesis by proving that the converse of the hypothesis is also true (depicted as a ). For example, the Japanese failure to obtain accurate and timely information on American force locations in the battle for Coral Sea, prevented them from exploiting the battlespace; thus supporting the converse argument in hypothesis three.

Cases that **do not support** the hypothesis (depicted as a ) can have minor agreements with the argument but are considered overall as running contrary to the hypothesis.

Finally, those cases that are assessed as **neutral** imply that the character of the engagement does not lend itself to a legitimate finding, in one direction or the other, with specific respect to that battle. For example, any battle assessed in hypothesis five that did not include a split command structure was neutral (depicted as a ).

HYPOTHESES

Allied Axis

Hypotheses Case Studies	Ho ₁ Situational awareness (the types and quantity of information available) impacts the commander's ability to gain, maintain, or negate the initiative		Ho ₂ Timely information drives the decision cycle and alters the OPTEMPO		Ho ₃ Accurate and timely information allows the commander to manipulate and exploit the battlespace (force, time, space) to create force advantages		Ho ₄ Cdr.'s prioritization of sources and mechanisms of information, based upon their past experiences, personality, & doctrine, affects a battle's decisions and outcomes		Ho ₅ Split command structures reduce the dissemination of information	
North Africa	■	■	■	▲	■	■	■	■	▲	● *
D-Day	■	■	■	■	■	■	▲	■	▲	● *
Falaise Gap	■	■	■	▲	■	▲	■	■	■	● *
Market Garden	■	■	■	■	● *	■	■	▲	▲	■
Battle of Bulge	■	■	▲	■	▲	■	■	■	▲	▲
Big Week	■	■	■	■	■	● *	■	■	▲	▲
Coral Sea	■	■	■	■	■	■	▲	▲	■	▲
Midway	■	● *	■	● *	■	▲	■	■	▲	▲
Savo Island	■	■	■	■	■	■	■	▲	■	▲
Philippine Sea	■	■	■	■	■	■	■	▲	▲	■
Leyte Gulf	■	■	■	■	■	■	■	■	■	■

■ Supports the hypothesis in the positive
■ Supports the hypothesis in the converse

● Refutes the hypothesis
▲ Neutral regarding the hypothesis

1 = Bulge has two separate entries to represent attack & counterattack

* = supports the study's conclusions

Booz Allen & Hamilton Inc.

(I) Situational awareness (the types and quantity of information available) impacts the commander's ability to gain, maintain, or negate the initiative.

The term situational awareness (SA) for the purpose of this study represents the full complement of information the commander has regarding both friendly and enemy forces at the critical decision points. To that end, we must note that our use of SA does not place any qualifiers on the timeliness, quality, or accuracy of the information. SA simply connotes that the commanders had sufficient information to conduct a military action.

In this analytic effort, SA incorporated the categories of information that comprise:

Who: Number of units, unit designation, unit performance history, identity of commander, nature of command structure.

What: Status, readiness, and capability of units.

Where: Location of friendly and enemy units, supply lines and key logistics nodes, direction of approach.

When: All related time data concerning timelines or upcoming operations.

How: Doctrine, method of advance

Why: Intent.

To claim situational awareness, a commander requires sufficient data to be able to take the initiative or blunt the enemy's initiative. The information requirements to accomplish this will vary depending upon the circumstances of each battle, but it typically requires information from the majority of the categories, if not all six. For example, simply knowing which enemy unit is heading to a theater is inadequate if one cannot anticipate when they will arrive, where they are going, or what operations they will undertake upon arrival. However, there are cases where just one or two pieces of information amount to a sufficient level of awareness to act decisively. For example, when information lends insight on the enemy's intent and the circumstances make his battlespace objectives obvious, this enables the commander to take action to contest the operation.

Cases that would support this hypothesis include those where a commander has situational awareness and is able to order and execute a response, whether it is a movement of forces to defend against an enemy movement or simply generating a higher alert status. Conversely, the hypotheses implies that a commander without situational awareness, even the limited definition used in this study, will not be capable of acting in a meaningful way until a minimum level of situational awareness is achieved. The two circumstances under which this hypotheses would be refuted are rare but do have historical precedent. They are: a commander who has situational awareness and is unable or unwilling to act, and a commander without the requisite level of situational awareness who nonetheless conducts military operations.

Case Studies -- Support

North Africa

Allies -- Support: The Allies had approximately three months to plan the landings in North Africa, and had sufficient information prior to the invasion to initiate military action. They knew the forces that they would be up against, their locations, and even the identity of the enemy commander (Field Marshal Rommel, whose book tactics was a valuable intelligence resource for the planners). Once the campaign began, the Allies maintained their level of situational awareness through the use of ULTRA and other sources.

North Africa

Axis -- Support: Initially the Germans were taken completely by surprise by this attack. They had absolutely no forewarning or knowledge that an attack was imminent, and had decided that if an attack against North Africa were ever to occur, it would come through Europe. They had no information about their enemy and were therefore not able to take the initiative. In the second phase of the battle however, after the initial surprise of the attack, the Germans did obtain situational awareness, and had enough information to allow the commander to initiate military action. They knew who they were facing, approximately what they had to defend against, and the intent of their enemy. From this information, they were able to develop plans and conduct responsive/defensive military actions.

D-Day

Allies -- Support: The Allies had sufficient information about their enemy, enabling them to initiate military action in the form of an amphibious landing. They had done a great deal of preparation and reconnaissance prior to the attack, providing them with a wealth of information on the status of the beaches. They were able to choose their landing zones and the time for the attack, had information (from ULTRA decryptions) on enemy troop strength and location, and had built up their forces to the point where they believed they were sufficient for victory.

D-Day

Axis -- Support: The Germans, in the weeks leading up to the attack, compiled enough information to lead them to believe that the Allies were planning an amphibious landing in the near future. They were aware of a large invasion force, which was to be led by General Patton, massed on the shores of Great Britain. Through reconnaissance flights over these forces, the Germans felt confident that they knew the approximate size and capabilities of the landing force. Although they did not know when the attack was to come, the information they had was sufficient to commence a build-up of defensive forces at the

positions where they anticipated the landing would occur. Unfortunately for the Germans, the information they had was based on Allied deception, leading them to place the emphasis on their defenses around Pas de Calais instead of Normandy.

Falaise Gap

Allies – Support: Before Falaise Gap, American forces had successfully repelled the German counterattack at Avranches and had what they thought was good information concerning the forces they were facing, their strength, and their intent. This information dictated General Bradley's plans for the envelopment at Falaise. Although some of the information was contradictory (regarding the strength and location of German units in the Gap), it did enable the Allies to take the initiative and eventually move to envelop the enemy forces left in the Gap.

Falaise Gap

Axis – Support: In the aftermath of the failed counterattack at Avranches, the Germans suffered contradictory information as to the true situation inside the Falaise Gap. They believed that they had attained situational awareness and therefore allowed the faulty information to convince them that they were surrounded and could not retreat. Once they learned the truth—that the Gap had not been closed—they rapidly took the initiative and retreated.

Market Garden

Allies -- Support: Operation Market Garden was a risky attempt by Field Marshal Montgomery to seize the initiative and surprise the Germans in Holland by securing three critical bridges which would enable a thrust into the heart of Germany's industry. The plan called for the use of paratroopers to take and hold the bridges leading to Arnhem and await the forthcoming armored attack that would reunite the Allied forces. Though the information upon which this plan was based had several serious flaws (such as the state of German morale and readiness), it was sufficient to convince Montgomery to take the initiative and commit his forces.

Market Garden

Axis--Support: The Germans were not expecting an attack in Holland, and thus had no information upon which to base a defense. However, upon observation of the airborne landings, the Germans deduced an attack was underway and that the objective was Arnhem. With this information, the German commanders on the scene realized the bridges were the key chokepoints of the offensive, and moved quickly to take the initiative to defend them.

Battle of the Bulge, Part I

Allies--Support in the Converse: At the Battle of the Bulge, the Allies were caught completely by surprise by the German offensive. They had concluded explicitly that such a counteroffensive, were it to come, would not come through the Ardennes. Due to this reasoning, most of the units in this area were at a very low state of readiness. In addition, elaborate and comprehensive German OPSEC helped prevent indications and warnings from coming to the Allies attention. Hence, when the attack was launched, the Allied commander had no understanding of what was happening and insufficient information upon which to base a response. As a result, the Allied lines were driven far back because they were unable to gather information quickly enough to act upon it.

Battle of the Bulge, Part I

Axis -- Support: The German plan in this battle was to take the initiative by launching an unexpected counterattack through the Ardennes, exploiting a weak point in the Allied lines. At the heart of the plan was excellent information on the Allied force dispositions; indeed, in planning the attack the Germans had, by exploiting poor Allied COMSEC and OPSEC, correctly plotted the location of all but one Allied unit. They veiled the buildup of forces by exacting attention to OPSEC, and thus were assured strategic surprise. Information regarding the weather was also an important element of the plan, as they waited until the onset of an extended period of stormy cloud cover to negate the Allies great advantage in airpower. Without this situational awareness, none of these vital elements of the plan could have been executed; with it, the Germans were able to take the initiative.

Battle of the Bulge, Part II

Allies -- Support: In the second phase of the Battle of the Bulge, the Allies developed a good understanding of the extent of the German advance when the skies overhead cleared and they were again able to conduct aerial reconnaissance and attack missions. Allied information increased to the point where it was eventually sufficient to counter the German's initiative, turn the tide of battle in favor of the Allies, and then support an envelopment movement to cut off the retreat of the German forces.

Battle of the Bulge, Part II

Axis--Support: After their offensive was stopped just short of the Meuse River, the German forces were unable to return to the offensive. Although they were still trying to exploit radio intelligence to understand the emerging Allied order of battle, they were unable to gain sufficient information to respond in any way other than reactions to US counterattacks (extensive German jamming also hindered their ability to gain this intelligence). In addition, the lack of German airpower meant they could not gather information via aerial reconnaissance. Because they were deprived of

information, they were unable to put forth anything more than a defensive, reactionary response.

Big Week

Allies -- Support: The information the commanders deemed necessary for the execution of Operation Argument was in their possession at the time the campaign against the German aircraft production system was initiated: (1) The analysis of the German fighter production system had been completed by industry experts who applied their knowledge of production requirements and standards to the mass of information the Allies had collected on known German factories; (2) the locations and dispositions of the German Air Force (GAF) were well known and tracked through Y-Service radio intercepts on a daily basis; and (3) the weather conditions were forecast as favorable. It was based upon this information that the operation was initiated.

Big Week

Axis -- Support: The Germans were highly reliant upon their long-range early-warning radar to alert them of Allied bomber attacks. While this system was unable to determine the targets of the bomber columns, it did provide the GAF with information sufficient to direct the launch of their defensive fighters.

Coral Sea

Allies -- Support: Through MAGIC decryptions, the Americans knew the Japanese intended to attack Port Moresby. MAGIC also provided them with the enemy's order of battle and capabilities. However, they did not know the enemy's location in the Coral Sea or the route they would take to Port Moresby. Nonetheless, the information they had was still sufficient for the Americans to take the initiative by sending forces into the Coral Sea to seek out and meet the expected invasion force.

Coral Sea

Axis -- Support: Although the Japanese were initially surprised when the Allies attacked Tulagi, they managed to regain their composure quickly. As soon as the Japanese were alerted to the fact that a sizable enemy force was operating in the Coral Sea, they initiated military action by undertaking defensive maneuvering and sending out reconnaissance planes in an attempt to locate the Americans.

Midway

Allies -- Support: Through MAGIC decryptions, the Allies knew in great detail the Japanese plan to attack an island in the Pacific, and through the use of a clever trap, they were able to ascertain that the island was Midway. Using this knowledge, the Allies were able to ignore Japanese diversionary attempts (an attack against the Aleutians) and deploy from Hawaii before Japanese

submarines could take up positions to monitor them. Ultimately, the level of awareness enjoyed by the Allies allowed them to align their forces in preparation for the victorious battle at Midway.

Savo Island

Allies -- Support: At Savo Island, the Allied forces received sufficient indications and warnings that a Japanese naval force was en route and that an attack was possible. Despite the fact that this situational awareness was not acted upon appropriately by the various commanders, this case still supports the hypothesis. Admiral Fletcher reacted to this information by moving his carriers away from the island of Guadalcanal. The cruiser groups also responded to the indication of a Japanese fleet by concentrating on ASW, which they felt would be the most likely method of enemy attack.

Savo Island

Axis -- Support: The Japanese knew the Allies were landing at Guadalcanal, but had incomplete and contradictory information about the composition and location of the Allied forces. However, the information about the ongoing Allied operation was sufficient for Admiral Mikawa to take the initiative and order the deployment of his forces. The Japanese fleet arrived in the theater at night, where Mikawa's forces were able to identify the Allied ships easily (COMSEC was poor, some ships had their lights on, and others were backlit against the landing areas), allowing them to drive between the pickets and attack the Allied forces.

Philippine Sea

Allies -- Support: During the days leading up to the actual Battle of the Philippine Sea, the commander of Task Force (TF) 58, US Admiral Spruance, received sufficient information to have situational awareness. Prior to the onset of hostilities, he was aware that the Japanese fleet was in the area and knew its approximate size and capability. Once the Japanese arrived in the vicinity of Saipan and initiated their attack, the radar capabilities of the Allies allowed Admiral Spruance to identify the incoming aircraft within sufficient time to sortie counterattacks. This level of situational awareness was sufficient to blunt the Japanese attack and steal the initiative away from them.

Philippine Sea

Axis -- Support: Prior to the American bombardment and subsequent landing on Saipan, the Japanese naval force, under the command of Admiral Ozawa, was aware that a major US TF was preparing to support the invasion. Japanese reconnaissance planes had spotted the fleet and reported on the number of ships, the types of ships and their potential capabilities. Although unaware of the enemy's exact location, there was sufficient information to enable the Japanese to formulate

plans and initiate deployment from their anchor in Tawi Tawi to respond to this threat.

Leyte Gulf

Allies – Support: Submarine sightings of two of the four approaching Japanese fleets gave the Allied commanders information on the fleet's locations and movements. Though the Allies were not fully aware of who was coming or their exact size, they were able to gauge roughly when they would be arriving in the area. This information allowed Allied planners to lie in wait until the optimal time to initiate action; Adm. Halsey was able to catch one fleet while it passed through the narrow Sibuyan Sea, while Adm. Kinkaid was able to set a trap that enabled him to cross the "T" of two of the other fleets.

Leyte Gulf

Axis – Support: The Japanese knew the Allies were conducting a landing at Leyte Island. They did not know the location of the major US forces, but knew the general area in which they were likely to encounter them. While this information was not particularly useful on a tactical level, it was sufficient to allow the Japanese to deploy their force and move into positions to do battle.

Case Studies – Do Not Support

Midway

Axis--Does not Support: In the attack against Midway, the Japanese did not know the Allies had intercepted their plan and believed they had the initiative. As was typical of Japanese naval campaigns in WWII, the attack on Midway was to be a highly intricate, elaborate maneuver. This attack was executed despite the fact that the provisions for the gathering of vital information (a submarine picket line designed to monitor the fleet in Hawaii) failed, and indications regarding the American response to the Japanese deception plan (an attack against the Aleutians) was not sought. In this regard, the case does not support the hypothesis because the Japanese acted without the benefit of this information. Even after the actual engagement began, the Japanese continued to execute their original plan, prosecuting ground targets on Midway rather than turning their attack against the American carriers. Thus, the Japanese took the initiative, but did so irrespective of their lack of information and general situational awareness.

(II) Timely information drives the decision cycle and alters the OPTEMPO.

When commanders possess timely information, they are able to alter the pace of battle. With superior information gathering and processing networks, commanders can operate within the enemy's OODA loop¹ and gain a time advantage – in Major Robert Leonhard's phrase, commanders are able to turn the time flank.² Operations of this sort effectively preempt enemy actions, and allow commanders to thwart enemy operations before they become a threat. In addition, this sort of information dominance means that one can initiate and execute actions before the other side can respond.

A supporting case would feature a commander who uses timely information to successfully adjust their OPTEMPO. Conversely, this hypothesis is confirmed when commanders with poor information move slowly and hesitantly, or when they are forced to make rash decisions in response to a series of enemy moves they did not anticipate. The hypothesis is refuted when commanders are able and willing to make bold and rapid decisions despite a lack of timely information, or when commanders hesitate despite timely evidence of exploitable enemy weaknesses.

Case Studies -- Support

North Africa

Allies -- Support: The Allies, being on the offensive, gathered enough information prior to and during hostilities to manage their OPTEMPO. For the amphibious landing, they knew that having the element of surprise allowed them to initiate and execute actions before the Germans could respond, and had developed contingency plans for dealing with the French forces. Once on the continent, the Allies used ULTRA intercepts to interdict the Axis' supply lines and to determine what actions would be perceived by the Axis as the most threatening, confirming the enemy movements with aerial reconnaissance and contact with the enemy. They were able to narrow the German's decision cycle and forced them into a largely responsive position.

D-Day

Allies -- Support: Timely assessments of the German ability to respond to the Allied attack allowed the Allies to ramp up their OPTEMPO in preparation for the landing. They had information which prepared them for the types of defenses to expect, the placement and the readiness of the German forces they would face, as well as information on their perceived response. Having this

¹ Col Boyd, USAF, (Ret)

² MAJ Robert Leonhard, USA, Fighting By Minutes, Praeger: Westport, Connecticut, 1994

information prior to the onset of hostilities allowed the Allies to increase their OPTEMPO both prior to and during the landing.

D-Day

Axis -- Support: Through aerial reconnaissance, the Germans had substantiated that an attack was being planned by the Allies. Timely information regarding the massing of troops (actually the decoy force) in Great Britain allowed the Germans to change their OPTEMPO and prepare defenses against this attack. Forces were put in place along the coastline and defenses were laid in the water and along the beaches. The majority of the forces were positioned at Pas de Calais, which was where German intelligence had determined (through COA analysis) the invasion force would land. They also placed troops and defenses along the length of the coast line, hedging against the possibility of an invasion at a different location.

Falaise Gap

Allies -- Support: Prior to the battle at Falaise Gap, the Allies had received information through ULTRA intercepts informing them that the Germans were planning a counterattack at Avranches. Using this information, the Allies were able to blunt the attack and set the Germans into retreat. The Allies then conceived a plan to envelop these retreating forces, encircling them from the north, south, and west, and then closing off the Gap at Falaise. The Allied forces had almost completed this envelopment when they received information indicating the force consisted of a full nineteen divisions, and that a significant amount of this force had already exited the gap. This led Gen. Bradley to decrease his OPTEMPO and proceed with caution out of fear that if he closed the gap he would be exposing a flank to the enemy. The information led him to believe that another envelopment would be necessary to contain the German forces, and thus he sent Patton's forces further east, well beyond Falaise, to accomplish this. At this time, Bradley was informed (again incorrectly) that the Germans had completed their withdrawal from the gap, at which time he increased OPTEMPO in an effort to complete a second envelopment. When information on the actual status of the battle reached Bradley (much of the German force actually still remained in the gap) he quickly reoriented his forces, maintaining his high OPTEMPO, and closed the gap in the lines, thus capturing the German forces that remained there.

Market Garden

Allies -- Support: Gen. Montgomery, seeking to make a bold move against the Germans, decided to embark on a risky operation into Holland using paratroopers to secure key points behind enemy lines until the armored units could move in to support them. In preparing for the operation, Montgomery assessed all the information and concluded that the forces he intended to

send would be sufficient for the mission; OPTEMPO was increased as they were deployed.

Market Garden

Axis -- Support: In this case, even though the Germans were initially surprised by the attack, as soon as the German subordinate commanders on the scene received information on the Allied airborne attack, they realized the Allies' objectives were the bridges to Arnhem, and quickly increased their OPTEMPO to take these bridges themselves.

Battle of the Bulge 1

Axis -- Support: The German attack through the Ardennes was based upon timely information. They had plotted the location and capabilities of all but one Allied unit, and used this information to guide their attack and take the initiative. The actual decision to attack, and the subsequent rapid increase in OPTEMPO was timed to take best advantage of the information, this being when cloudcover prevented the Allies from using their airpower.

Battle of the Bulge, Part 2

Allies -- Support: In the second phase of the Battle of the Bulge, the skies cleared and the Allies began receiving timely information from their aerial reconnaissance. They were able to quickly locate the German troops, pinpoint their locations, and push them back by increasing their aerial strikes and maneuvering their ground units. Thus, the Allies' decision cycle and OPTEMPO was increased as they began to receive timely information about the situation.

Battle of the Bulge, Part 2

Axis -- Support: The Germans continued to have access to timely information during the second phase of the Battle of the Bulge due to poor Allied COMSEC and OPSEC, and this information continued to influence their OPTEMPO. However, many of their responses were restricted by other factors such as terrain and logistics, which seriously impeded their freedom of movement.

Big Week

Allies -- Support: In the case of Big Week, the missions themselves were pre-planned and programmed, and were conducted regardless of information on enemy operations. However, there was still one piece of critical information upon which the command decisions and OPTEMPO were based: the weather. Serious cloudcover over the airbases in Great Britain or over the target sites in Axis territory was the only factor that could cause a mission to be canceled. Therefore, timely information on the weather was a critical information element, determining whether OPTEMPO would be high or low.

Big Week

Axis -- Support: During Big Week, the timeliness of information dictated German Luftwaffe (air) Forces (GAF) OPTEMPO. This information was gathered by means of a long-range early-warning radar system and relayed back to the commander. From that information, the commander determined the targets to be attacked and ordered the fighter aircraft to be scrambled. Thus, GAF OPTEMPO was either very low (during the times when no Allied bomber incursions were detected) or very high (at the time of these incursions) based upon this information.

Coral Sea

Allies -- Support: American increase in OPTEMPO was a direct response to the timely information they had regarding the Japanese plans to invade Port Moresby. MAGIC intercepts alerted the Americans to expect an invasion, allowing them increase their OPTEMPO and immediately send an interception force to the Coral Sea. Once there, the Americans maintained a high OPTEMPO, searching the waters until they were able to find the enemy force.

Coral Sea

Axis -- Support: The Japanese, although initially surprised by the American presence in the Coral Sea, were able to quickly respond to the information they were receiving. As soon as they realized that the Americans were in the area, they increased their OPTEMPO by sending out search planes and maneuvering their warships until they were able to locate the US fleet.

Midway

Allies -- Support: The Americans had intercepted the Japanese plans to attack Midway, and thus knew the enemy's intent, concept of operations, capabilities and order of battle. Because they had this information, and particularly due to its timeliness (they intercepted it well before the Japanese could begin to implement it), they were able to manage their OPTEMPO--in some respects increasing it, in others decreasing it--to tailor their actions against the Japanese. For example, they increased their OPTEMPO by quickly moving the fleet out of its Hawaiian harbor before the Japanese submarines arrived there to monitor it; they refrained from increasing their OPTEMPO in response to the Japanese deception attack against the Aleutians; and they increased their OPTEMPO by moving the main fleet into position near Midway. All these actions meant they were able to meet the Japanese in a high state of readiness, prepared to launch a counterattack at a moments notice.

Savo Island

Allies -- Support in the Converse: Allied Forces 'discovered' Japanese intent, force composition, and future tactical disposition two weeks after the engagement off Savo Island. Prior to sailing for the Guadalcanal region, Admiral Mikawa radioed Tokyo; in the message he included his intent of

halting the Allied invasion force through a decisive night naval engagement. He would accomplish this utilizing his cruisers and destroyers to destroy the Allied transports before they had the chance to land all of their material. This message was received via the American MAGIC cryptological efforts on the very day it was sent. However, there was a cryptological administrative backlog because of the recent Japanese code change. Consequently, the message was not deciphered until well after the battle. Had this information been deciphered earlier, shortly after its transmission, the Allies would have been better prepared to face the Japanese by altering their OPTEMPO.

Savo Island

Axis – Support: Japanese Adm. Mikawa was informed of the Allied landings at Tulagi and Guadalcanal by Japanese forces fighting there. Based on this information alone, he immediately increased OPTEMPO by deploying the fleet. His OPTEMPO remained steady until he neared the theater, at which time he received his second major piece of information, the location of the American forces in the area, via aerial reconnaissance and radio intelligence. At this time, he assessed that his night fighting capability, which the Allies lacked, would be sufficient to give him victory. In closing with his enemy, he found them totally unprepared for his attack; the American ships either had their lights on or were backlit by the landing that was still underway. With this information, Mikawa increased his OPTEMPO to full attack.

Philippine Sea

Allies -- Support: Prior to the invasion of Saipan the US forces in the area were aware that the Japanese were forming a coordinated force in the port of Tawi Tawi. American submarines had for a period of time been patrolling these waters, and were able to monitor ship movements in and out of the port. Thus, when the Japanese fleet began moving toward the Philippine Sea after having received word of the US bombardment of Saipan, the Americans were immediately aware of their actions. US Admiral Spruance, in charge of the landing operation and support mission, was kept up to date on the Japanese progress through periodic submarine and HF/DF reports on their location. These reports provided Spruance timely forewarning regarding when to expect the Japanese fleet. With this information, he was able to alter the fleets OPTEMPO and begin to prepare for a battle. Once the battle had begun, the radar systems on the American ships provided them with timely tactical information on incoming strikes, cueing the launch of American aircraft to combat them.

Philippine Sea

Axis -- Support Prior to the battle, the Japanese were aware that the US fleet was forming in the area. Reconnaissance planes had located the fleet, and had reported back to Adm. Ozawa on the size and relative strength of this formidable force. This sighting led the Japanese to deduce that an invasion was imminent, but they did not know where. With the information they did

have, they developed operational plans for areas which they thought would be the most likely location for the Allies' next move in the Pacific. Upon receiving news that the Americans were landing in Saipan, Adm. Ozawa had the information he needed to immediately increase his OPTEMPO and deploy to the Philippine Sea.

Leyte Gulf

Allies -- Support: US submarines had spotted and engaged the Japanese force as it was steaming towards the Philippines, and had alerted the fleet commanders conducting support operations off Leyte to expect a Japanese attack. This sighting provided the Americans with information on both the Japanese avenue of approach and an estimate as to when they could be expected to arrive in the theater. This information arrived in time for important adjustments to Allied OPTEMPO: Adm. Halsey was able to sortie aircraft to strike the Japanese fleet as it passed through the narrow Sibuyan Sea, and Adm. Kinkaid was able to lay a trap for them, crossing the "T" of two of the Japanese formations. Halsey changed his OPTEMPO again when, on the third day of the battle, he detected what he believed was a Japanese carrier force and steamed away from the landing zone to engage it (unfortunately for Halsey, the force he was pursuing turned out to be a decoy).

Leyte Gulf

Axis -- Support: The Japanese command was informed by Japanese units in the Philippines that the Allies were seeking to retake the islands, which were a vital Japanese supply line. Based on this information alone, the Japanese increased their OPTEMPO by deploying four major fleets to the area to disrupt the mission and attack the American fleet. Information had a dramatic effect on Kurita's OPTEMPO late in the battle when Japanese aerial reconnaissance misidentified three cruisers as Halsey's carrier force (after Halsey had been successfully drawn away from the landing zone by the decoy force), which led Kurita to change his OPTEMPO to retreat instead of attack.

Case Studies -- Neutral

North Africa

Axis -- Neutral: The Germans during the Battle of North Africa were completely surprised by the Allied attack. They had no prior information alerting them to the fact that an attack was coming, and had always expected that if an attack did come, it would come through Europe. Thus, when the Allies arrived on the beaches, the Germans were forced into simply responding. The Germans were never able to turn the situation around, except in isolated cases such as Kasserine Pass, and were essentially fighting a running retreat the entire time. In cases such as Kasserine Pass, Rommel was exploiting tactical-level information as a means of exploiting tactical-level opportunities, in accordance with his style of warfighting. Because this study is examining the value of operational-level information, Rommel's use of

tactical-level information does not fall under the qualifications for this hypothesis.

Falaise Gap

Axis -- Neutral: Timely information was flowing from the front lines at Avranches to Berlin where the German high command was issuing orders. However, Hitler was unwilling to listen to any information or opinions that did not correspond to his preferences. He had ordered the attack at Avranches despite the warnings from his field commander that they lacked sufficient strength to succeed. Hitler was unwilling to permit the German forces to retreat through the Falaise Gap, once defeated at Avranches. Not strong enough to attack and not allowed to retreat, German OPTEMPO ground to a halt. The German field commander had assumed the Allies would move to close the Gap quickly, and was surprised to discover three days later that they had not. At this time, Hitler succumbed to the realization that the German forces had no choice but to retreat, permission was granted, and some of the forces were able to exit the Gap before the Allies sealed it shut.

Battle of the Bulge, Part 1

Allies -- Neutral: As it was determined in the discussion of hypothesis one, the Allies during the first phase of the Battle of the Bulge had no information, it is not possible to analyze the timelines of information as it relates to OPTEMPO.

Case Studies -- Does Not Support

Midway

Axis -- Does Not Support: This is a unique case, where (as demonstrated in Hypothesis 1) the Japanese devised and carried out an intricate plan of attack against Midway that was not supported by information. Thus, the Japanese decision cycle and OPTEMPO were not dictated by timely information.

(III) Accurate and timely information allows the commander to manipulate and exploit the battlespace (force, time, space) to create force advantages.

Building upon the second hypothesis, the presence of timely *and accurate* information allows commanders to gain maximum advantage from available forces. Commanders can also use their forces more efficiently since accurate information allows them to avoid redundant assignments and reduce the logistical requirements of any given mission while also reserving forces for other missions.

Supporting cases for this hypothesis feature instances where command decisions make use of information to achieve a force advantage. Examples of this would be deliberately targeting a perceived weak point in the enemy lines, maneuvering to catch an opponent off guard, or concentrating forces against critical nodes. This hypothesis also implies that operations designed with good information available will be economical, assigning only as many forces as necessarily, but avoiding overkill. The hypothesis is supported in the converse when poor information leads commanders to attack strong positions or misallocate forces.

By contrast, inaccurate information acts as a force divider. Acting on inaccurate information can induce commanders into a number of ill-advised actions like attacking an enemy force where it is the strongest or best defended, or wasting valuable time and resources against non-critical targets. In addition, when commanders have inaccurate information, they are more likely to either over-allocate or under-allocate resources for a specific task. They are more prone to assign either too many or too few units to any given task leading to adverse force ratios somewhere in the battlespace.

Case Studies – Support

North Africa

Allies--Support: The Allied landing on North Africa was based on extensive planning and analysis. This led to an operational plan to execute three landings along the North African coast, with forces moving along an eastward path across the continent, driving the German forces before them. Although the plan was bogged down by severe weather, once the ground became passable the Allies enjoyed accurate and timely information (primarily in the form of aerial reconnaissance) that allowed them to attack the German forces when and where they wanted. However, most important was ULTRA intelligence on the state of Axis supplies and identification of resupply efforts. The timeliness and accuracy of these reports was outstanding. Through ULTRA decryptions, the Allies knew of this problem and also knew when resupply attempts were to be made, which allowed them to interdict and destroy the resupply craft. This greatly eroded the Axis ability

to operate, particularly in Rommel's case because he relied upon supplies to maintain his style of high-tempo maneuver warfare.

North Africa

Axis--Support in the Converse: The Axis forces in North Africa gathered what information they could about the Allies, primarily through battlefield SIGINT, contact with the enemy and aerial reconnaissance. However, most of this information was of a tactical nature (befitting Rommel's warfighting style). What the Axis forces lacked was sufficient timely and accurate operational-level information. This failure was visible at the campaign's outset when the Allies landed in force on the North African coast, and continued throughout the campaign as the Allies cut the Axis supply-lines (using ULTRA intelligence) and eventually pushed them off the continent. In this case, the Axis lacked accurate information as to how the Allies were able to interdict their supply lines; a shortcoming that proved to be their undoing.

D-Day

Allies--Support: The Allies, assisted by their information preparation and the successful deception of Operation Bodyguard, were able to concentrate their forces where the defenses were weaker (Normandy rather than Calais). The Allies had accurate and timely information on enemy troop strengths and locations through ULTRA intercepts (with the exception of the 352nd Infantry Division near Omaha beach, which accounts for why Omaha was the most difficult beach to take). Using this information, the Allies were able to focus their attacks when they landed on the beach despite the significant disruption the units had incurred during the landing itself.

D-Day

Axis--Support in the Converse: The Germans were deceived as to the location of the Allied landing. They were convinced by Operation Bodyguard that the landing would be at Calais, and thus made this area the strongest section of their beach defenses. This represented a significant dislocation of forces, which the Allies could circumvent by landing at Normandy. Furthermore, so convinced were the Germans that the landing would be at Calais, that it was not until five days after the Allies landed at Normandy that the Germans realized they were facing the actual main Allied offensive. Thus, during that period of time, the Germans did not counter the Allied forces with their reserves. All of these information-based mistakes prevented the Germans from creating a force advantage at Normandy.

Falaise Gap

Allies --Support in the Converse: Allied actions during the battle were severely hampered by contradictory information concerning two aspects of the German forces trapped in the Gap. First, intelligence could not determine how many divisions remained in the Gap, leading Gen. Bradley to refuse to

allow Patton to encircle the forces for fear of a major counterattack into his flank. Second, Bradley later believed the Germans had fled the Gap days before they had actually left. This inability to attain timely and accurate information cost the Allies an opportunity to close the Gap to capture an even larger portion of the German military at Falaise.

Market-Garden

Axis--Support: The Germans had the advantage of understanding the terrain in the Arnhem region, information that proved key to this campaign. Upon the first appearance of Allied airborne troops, the Germans knew the objective of the attack would be Arnhem and the key to denying the Allies that objective would be to take the bridges leading into Arnhem. By using this information and focusing their strength at these critical points within the highly restrictive terrain, the Germans were able to create a force advantage and repel the Allied thrust.

Battle of the Bulge, Part 1

Axis--Support: The Germans had accurate and timely information on the Allied order of battle (knowing the location and disposition of all but one Allied unit). The Germans achieved significant early successes by exploiting weak infantry units with heavy armor while bypassing strong American positions. In creating a force multiplier by matching their strength against the Allies' weaknesses, the Germans shattered the Allied front.

Battle of the Bulge, Part 2

Allied--Support: The German advance was stopped by Allied forces when the weather cleared and Allied airpower could be brought to bear. While the Germans were able to continue to fight for some time, the outcome was a foregone conclusion. Ultimately, it was the accurate and timely information provided by aerial reconnaissance that enabled the Allies to create a force advantage by locating the German forces so air and ground units could strike them. It also allowed the Allies to cut the German supply lines through aerial bombing.

Battle of the Bulge, Part 2

Axis--Support in the Converse: Once their offensive was halted and the Allies began driving them back, the Germans' ability to gather information in an accurate and timely manner was seriously hampered. They continued to exploit radio intelligence, but the information gathered did not tell them where, when and what the Allies were going to do, and was highly perishable (i.e., it was not accurate and timely). As a result, the Germans could not create a force advantage, and their responses devolved into reacting to US counterattacks.

Big Week

Allies--Support in the Converse: The US had relatively timely weather reports, comprehensive information on the German Air Force and knew what kind of AAA defenses they were likely to find. This information allowed them to concentrate their attacks against the most lucrative targets in the target set on any particular day. Thus, in the force-on-force competition in the German skies, the Allies' information allowed them to create a force advantage.

However, on the deeper level of achieving the collapse of the aircraft production system, their information, and thus the force advantage they could create, was much more limited. The Allies did not have accurate and timely information (or for that matter, any information) on the many newly-created production sites the Germans had constructed in their effort to make the production system more dispersed and redundant, had incorrectly assumed the production system was at full capacity (and thus under great stress, with little unused capacity or readily available parts), and lacked accurate and timely battle damage assessment (BDA). Because of this, they were unable achieve the effect they desired, and had no method of accurately measuring the effects they were causing. This lack of information, specifically in the area of feedback, prevented them from creating a force multiplier on this level. Because the objective of the Big Week campaign was to effect this systemic collapse (not merely to dominate the skies), this case supports the hypothesis by demonstrating the converse of the argument, that a lack of timely and accurate information prevents the creation of a force advantage.

Coral Sea

Allies--Support in the Converse: Allied information in this case consisted of MAGIC intercepts regarding a planned Japanese attack at Port Moresby. However, because the American commanders did not have accurate and timely information on the positions of the Japanese forces through most of the battle, they were unable to concentrate their forces against them. Much of the battle was spent in search of targets, and misidentification of ships led to decisions to attack marginal targets. Thus, the lack of information did not allow the Americans to create a force multiplier.

Coral Sea

Axis--Support in the Converse: After the first contact with American forces in the region, the Japanese fleet was aware of the presence of a threat but was still unable to gather accurate information about their locations. As with the Americans, this led them to spend most of their time searching for targets or attacking marginal targets. This inability to obtain accurate information had a more profound effect on the Japanese as well; the inability to engage and destroy the threat lead them to abandon their attempt to attack Port Moresby and withdraw from the combat area. Thus, the Japanese failure to obtain

accurate and timely information on American force locations prevented them from exploiting the battlespace.

Midway

Allies--Support: Through accurate and timely MAGIC intercepts, the Americans knew the Japanese plan to attack Midway. Using this information, the American forces were able to create a force advantage. They positioned their forces in such a way as to best prepare for the attack (an ambush at Midway), awaited the most advantageous time to strike (when the aircraft from the Japanese carriers were returning from striking ground targets and were thus unarmed), and concentrated their strength on the most important targets (the carriers). This allowed them to fully utilize their smaller force to defeat the larger Japanese "surprise" attack. Three American carriers crippled a larger Japanese carrier fleet, and effectively turned the tide of the Pacific War in a single day.

Savo Island

Axis--Support: Japanese Adm. Mikawa was informed of the Allied landings at Tulagi and Guadalcanal by Japanese forces fighting there. Upon arriving in the theater, he received accurate and timely information regarding the location of the American forces in the area via aerial reconnaissance and radio intelligence. Another source of accurate and timely information was the poor OPSEC of the forces around Savo; the Japanese were intercepting radio signals revealing the locations of the ships, and many of the ships defending the landing either had their lights on or were backlit against the lights on shore. With this information, Mikawa was able to use his superior night-fighting capability to provide him with the advantage in the battle, slipping past the battleship pickets to defeat the cruiser groups.

Savo Island

Allies--Support in the Converse: The Americans positioned off Savo Island had been receiving timely information by observing aircraft activity in the area. However, because they inaccurately identified Japanese carrier aircraft as US seaplanes, they were caught completely by surprise. It was not until the Japanese fleet was upon them that they reacted to the Japanese threat, at which time it was too late, and they were unable to create a force advantage.

Philippine Sea

Allies--Support: Although Adm. Spruance discounted much of the information he received regarding the approach of the Japanese fleet prior to the battle (his mission was to defend the landing force, and he feared a flank attack if he moved out to engage the Japanese), this case provides clear support for the hypothesis. Once the battle had begun, the radar systems the Americans had aboard their ships were sophisticated enough to provide detailed and timely warning of incoming waves of Japanese aircraft. Even though the Americans were on the defensive, (the Japanese had launched the

first strike), their radar system let them send out the appropriate number of aircraft to the exact location to intercept the incoming Japanese aircraft.

Philippine Sea

Axis--Support in the Converse: Although the Japanese had very accurate information regarding the status of the enemy forces, and had carefully devised plans which took into consideration and compensated for their severe force ratio deficiency, Adm. Ozawa had inaccurate information on the availability of *friendly* forces vital to the plan. Ozawa intended to overcome his weakness in aircraft by relying heavily on friendly land-based aircraft and support facilities. However, in the week prior to the Battle, American forces had severely crippled these land-based forces and facilities. Adm. Kakuta, commander of these forces, never told Adm. Ozawa that he was no longer able to provide the support that was required of him. Thus, Ozawa sailed into the situation under the impression that he had the right forces and the right plan to beat this stronger adversary. Because he lacked timely and accurate information about the friendly forces upon which he depended, he was unable to create the force advantage that was at the heart of his plan.

Leyte Gulf

Allies--Support in the Converse: The Americans had indications of an approaching Japanese fleet via submarine contact (and combat) with the enemy. Through this source, the Americans had some accurate and timely information on the enemy order of battle and its capabilities. This allowed them to blunt the Japanese attack during the first phase of the battle. However, the second phase of the battle supports the hypothesis in the converse by demonstrating how inaccurate information can prevent the creation of a force multiplier. At this time, the Japanese decoy fleet (which had been desperately trying to get the American's attention throughout the battle), finally came to the attention of Adm. Halsey. Halsey, who was eager for a major carrier-on-carrier battle, took the bait and moved his massive carrier fleet out to engage the decoy fleet, leaving the landing forces and escort carriers vulnerable. Not only did this leave these enemy forces vulnerable, but it removed the opportunity for Halsey to strike at the main fleet, which was approaching the landing forces.

Leyte Gulf

Axis--Support in the Converse: When Adm. Halsey left to attack the Japanese decoy fleet, the main Japanese fleet had the opportunity to attack the landing forces at Leyte and thereby achieve their mission objectives. However, due to bad information, Adm. Kurita's intelligence officers mistook a couple of Kinkaid's escort carriers, the Japanese declined to attack. If Kurita had accurate information regarding the forces between him and the landing force, he could have scored a crushing blow against them. As it was, bad information caused him to forgo the opportunity, preventing him from gaining a force advantage.

Case Studies – Do Not Support

Market Garden

Allied--Does not Support: Gen. Montgomery ignored critical timely and accurate information regarding the forces in the Arnhem region (particularly in reference to the Panzers) given to him by the Dutch underground and confirmed by Allied reconnaissance. Even after confronted with the information, he disregarded it on the grounds that German morale and readiness was too low to mount a meaningful defense. The drop zones chosen were too far from their objectives and the forces sent were too light to overwhelm the forces they were to face. Once on the ground, poor communication and lack of knowledge about German forces and dispositions led to the destruction of the British 1st Airborne Division in a series of uncoordinated attacks against elements of the 9th SS Panzer Division. Similar attempts by XXX Corps were unable to overcome the forces they faced. Throughout the operation, the Allies tended to attack entrenched pockets of German strength rather than seeking weak points in the line.

Big Week

Axis--Does not Support: The German's long-range early-warning radar system detected the US bombing raids with sufficient time for them to launch their defenses. This assisted them in understanding where to focus their forces and occasionally enable them to catch the bomber streams before they joined up with their fighter escorts. However, this radar system could not determine the intended target of the strike (particularly at times when the bomber columns were deployed in a deceptive manner), which prevented them from concentrating all their forces (which were split into three sectors responsible for the defense of the targets within those sectors) against the bombers, and thus at times significant portions of their defenses could not be brought to bear against the US incursions.

Case Studies – Neutral

Falaise Gap

Axis – Neutral: The challenge for the Germans at Falaise Gap was to maneuver to escape encirclement. They were outmatched by the Allied forces that nearly surrounded them, and were under orders for several days not to retreat. Therefore, regardless of the accuracy or timeliness of their information, attempting to use it to create a force advantage was not an option.

Battle of the Bulge, Part I

Allied--Neutral: The Allies were caught unawares by the German offensive through the Ardennes. They had discounted the possibility of an attack there,

and had allowed that sector of the front to grow very weak. Because they lacked information, timely, accurate or otherwise, this case does not shed light on the hypothesis.

Midway

Axis--Neutral: Despite the fact that the Japanese took the initiative to press the attack on Midway, in reality they had no information (timely, accurate or otherwise) upon which to base their actions. The plan they were executing depended upon a number of assumptions which they did not question nor try to verify. Thus, this case does not lend itself to analysis under this hypothesis.

(IV) Commander's prioritization of the sources and mechanisms of information, based upon their past experiences, personality, and doctrine, affects a battle's decisions and outcomes.

Rather than assessing the various qualities of the critical information, this hypothesis seeks to assess how commanders prioritize the sources and mechanisms through which the information flows to them. The case studies provided numerous examples where certain commanders chose to interpret the information they received quite differently than might be reasonably expected. Similarly, it became clear that in addition to interpretation, the commanders prioritized the information quite differently, based on the presence of certain identifiable pre-existing cognitive constructs. These constructs originate from a variety of experiences which help shape a commander's beliefs and priorities.

The first contributing factor to these pre-existing cognitive constructs is the doctrine to which the commander is committed to carrying out. A force's doctrine predetermines the conduct of certain missions. Typically, the doctrine is in place and well understood by the commanders of those particular units well in advance of the start of hostilities. Doctrine also informs what kind of information is most critical to that unit's ability to operate at maximum effectiveness, and which sources are the most reliable or capable of providing the ideal types of that information.

Another contributing factor to a pre-existing weighting of these information sources and mechanisms is a commander's previous experiences. If a particular source has consistently provided information that has had a positive effect on the outcome of the battle, the commander will grow to trust that source. Similarly, if a commander consistently was misled by a particular source or mechanism, he will over time choose to ignore or at the least place the information at a very low priority. Past experience from personal contact with the enemy also influences prioritization. This can apply to a number of different variables that we use to judge an enemy's intentions. For example, there may be an enemy commander whose tendencies, no matter their specifics, become known and therefore can help predict his next move. Such observations can also hold for the nature of the enemy as a whole, in that their doctrine, strategic and operational objectives, and tactical proclivities can be understood as patterns begin to emerge over the course of the conflict. For instance, the Japanese penchant for launching complex pincer operations became so well known that US commanders began to expect them even when there was evidence that they were not being attempted.

The final major factor in the prioritization of information is the personality of the commanders themselves, a factor that will continue to play an integral part in the processing of information as long as humans remain a part of the decision loop. This factor has the odd distinction of being the hardest

point to assess yet the easiest to recognize. History is replete with examples of generals making the right decision without anything resembling situational awareness, instead acting appropriately through the power of their own military genius.

Case Studies – Support

North Africa

Allies--Support: For the Allies, the trusted source was ULTRA. It was through ULTRA that the Allies learned of the Axis forces' critical shortage of supplies, and ULTRA that told the Allies when and where the resupply efforts would be made so that they could be cut off. Ultimately, this was the source of the Axis undoing in North Africa. However, this faith in ULTRA led to some significant difficulties on the battlefield when facing Rommel's opportunistic style of warfare. In the case of Kasserine Pass, Rommel had indicated his objective would be to strike the Allied main staging and supply area at Bone. To reach this objective, he was going to move north to Le Kef, which implied he would bypass the Kasserine Pass. Thus, the Allies felt secure in focusing their strength to the north rather than in the area of Kasserine. However, when Rommel engaged the American forces in the area, he found the weak point to be Kasserine rather than to the north. Ever on the lookout for tactical opportunities, Rommel abruptly changed his plan and focused it toward Kasserine. ULTRA had not been incorrect, but it did not take into account the warfighting style of this particular adversary, whose preference was for utmost flexibility and tactical exploitation.

North Africa

Axis -- Support: The Germans were convinced that any Allied invasion of North Africa would come through France because they did not believe the American military could deploy across the Atlantic directly to the battlefield (such a feat had never been accomplished before); they were convinced some interim staging area would be necessary. Thus, they were totally unprepared for the Allied three-pronged landing on the continent. Had they had a better understanding of Allied capabilities and intent, they may have considered the possibility of a cross-ocean landing and may have been able to meet at least one of the invasion forces nearer to the coast. As it was, the Allies gained the necessary footholds and proceeded to press consistently east across North Africa once on land.

D-Day

Axis – Support: Prior to the invasion of Normandy, the Germans were misled by one of the great deception plans in the history of warfare, in no small part because of the way they prioritized what little information they had. The Allies knew months before June that the Germans were convinced that the attack would come at Calais, the shortest point across the channel from Great Britain. Because the Germans had little information about the

operations within Britain and their aerial reconnaissance was inadequate, they had to rely on the information the Allies wanted to give them.

The Allies created a fictitious army that appeared to be positioned to invade Calais. This "paper" army kept up an almost constant stream of message traffic indicating its every move, exercise, and unit designation and status. The Allies played to their German audience by placing General Patton at the head of this army, the man the Germans believed was the obvious and only commander to lead such a force. Meanwhile, the real Army was held silent.

The more subtle information came in several forms. One source was from planted stories in the underground all pointing to Calais. Another was the apparent focus of the Allied bombing campaign on targets and critical nodes in the vicinity of Calais. All told, the information received was interpreted as further confirmation that the attack would come at Calais, the place the Germans would have used if they were in the Allies' position. The results were that the German High Command was taken totally by surprise. This mistake is even more notable because the German leaders held onto the notion that Normandy was just an elaborate feint and that the real attack was still coming to Calais for five days after the initial landings. This miscalculation was exacerbated by the fact that they were also not prepared for the size or strength of the force that was to hit them, as they underestimated the Allies' production capacity.

Falaise Gap

Allies - Support: The Allied objective was to achieve a breakout from the Normandy area and encircle the large, but weakening, German force to their front. The Allies had partially succeeded in their plan to surround the Germans in the vicinity of Falaise when US General Bradley was faced with a decision: to press on with the envelopment or to act with caution. In reaching this decision, Bradley was guilty of ascribing to the German decision-makers the same values and priorities he would have had in a similar situation. Bradley did not realize the extent to which Hitler controlled his forces, and so assumed the Germans were withdrawing because that is what any Allied commander would have done in a similar situation. Were this the case, closing the Gap (as Patton was advocating) would have been a dangerous move because they would have posed a threat to a then-exposed flank. As a result, the Allies waited for two more days before they realized the enemy was still trapped in the Gap, and by that point Bradley's hesitation had allowed the very best divisions to escape before the Allies could finally close it. The source of Bradley's caution, the intelligence assessments reporting as many as 19 fully-capable German divisions in the Gap, turned out to have been inflated.

Falaise Gap

Axis – Support: On the German side, Hitler had a characteristically slanted method for the prioritization of information. In his role as both strategic and operational commander, Hitler routinely did not pay particular attention to information coming from the field, and if it was bad news he refused to hear it. His view in this case was that a retreat was not an option, no matter the status of his troops or the position of the enemy. This led him to two costly mistakes. First, he ordered the ill-advised counterattack at Avranches that sapped the remaining strength from his units in a battle they had no chance of winning. This also served to completely destroy their morale. Second, he refused to let his forces retreat until the last possible moment, despite the advice of his field commanders, missing the opportunity afforded him by Bradley to withdraw through the gap. Instead, approximately 50,000 troops were either captured by the closing ground forces or bombed by the Allied air forces who were able to fly for the first time in days due to a break in the weather.

Ironically, the German commander Van Kluge labored under very similar false assumptions to those of Bradley concerning when the gap was closed. He believed that the Gap was closed because that was what he would have done. After realizing that the Gap was still open, he finally received Hitler's authorization and escaped with part of his force.

Market Garden

Allies – Support: In the overly ambitious airborne operation more popularly known as "A Bridge Too Far," the operational commander, Britain's Field Marshall Montgomery, employed a variety of preconceived cognitive notions. To begin with, he disregarded several sources of information pertaining to the status and location of critical German units. The most persistent source was the Dutch underground (HUMINT) which was providing a variety of information, including identifying the presence of two major armored units. Montgomery chose to assume that these units had ceased to exist after months of punishing battle. In actuality, the Germans had reformed them and they were beginning to approach full strength. Still, Montgomery believed the tanks were useless hulks and would pose no problem. The other reason the commander chose to place such a low priority on information provided by the underground was that Montgomery felt he had been the victim of poor information before, from those in the French Resistance, in previous campaigns. As a result, he was overly reticent of trusting similar sources.

This, however, does not explain why Montgomery also ignored evidence from aerial reconnaissance which he had received in the week prior to the launch of the Operation. The reason behind this prioritization can again be traced to a case where intelligence was coming which did not support his preconceived cognitive constructs towards this operation. Montgomery believed

that the Germans were weak and would not be able to respond to such a broad attack. Contributing to this, Montgomery's personality and ego led him to believe that he needed a dramatic victory to maintain his reputation, and felt that the so-far underutilized airborne forces were the perfect choice to lead the attack. The implications of all this misuse of information was that a plan which should not have been carried out was launched and led several valiant units into unwinnable circumstances.

Battle of the Bulge

Allies –Support: Similar to the Market Garden example, the Allied commander had a preconceived view of the condition of the German forces, and valued that over a variety of information sources. In this case, US General Bradley and his G-2 staff were convinced the Germans would not attack during the harsh winter months, and that the Germans lacked the morale and strength to launch a counteroffensive. Furthermore, even if an attack was expected, they were sure it would not come through the Ardennes, where the Allies had purposely placed the weakest and least experienced units.

Again, there was information available to the commander that indicated otherwise. The majority of the information came from POW interviews that warned of an impending attack. Like the HUMINT in the Market Garden case, previous POW information had proven false and Bradley was not going to go against his assumptions based on it. However, there was also an ULTRA decryption from Hitler to the Japanese ambassador stating that a major counteroffensive would be launched in November. This is a particularly interesting source because previous experience with ULTRA was consistently accurate, and they had no reason to ignore it except for the fact that it ran counter to their reading of the battlefield situation. Finally, the Allies detected an unusual reduction in the amount of radio intercepts, which would have further indicated impending German operations, if they had been looking for such indicators. The implications of this poor judgment, somewhat incorrectly labeled the "greatest intelligence failure" in US history, was that the Allies were caught completely unawares and the Germans made a deep penetration, eventually encircling the 101st airborne at Bastogne.

Battle of the Bulge

Axis – Support: This is another case of Adolph Hitler placing his own beliefs above both factual evidence and the recommendations of his subordinates. His plan was to launch a surprise blitzkrieg through the Ardennes, smash through the Allied lines, and push on to seize the ports at Antwerp (which had to be taken in order to resupply the force). He was convinced that the historical precedent, from his hero Frederick the Great, of shifting resources from one front to another to destroy the enemy in detail was sufficient assurance that the plan would work. He also argued that a German attack

through the Ardennes had worked brilliantly the first time when they were able to surprise the Allies, as German intelligence assured would be this case this time as well. This conviction of Hitler's was undeterred in spite of the strong sentiments of his field commanders that such a gambit would not work. Hitler chose to ignore the German lack of airpower, which had proven essential to blitzkrieg operations in the past, and to rely on a prolonged period of cloudy weather to negate the Allies overwhelming airpower superiority. He also ignored the fact that his planners were unable to plan for or provide logistics if the forces were unable to reach the ports in Antwerp in the overly optimistic allotted time.

While the plan worked very well at first, eventually the skies did clear and Allied airpower was brought to bear, turning the tide in favor of the Allies. The German offensive fell far short of reaching the port in Antwerp, and resupply became a critical problem. Furthermore, unlike the previous attack through the Ardennes, in which German forces crossed through the rough terrain of the Ardennes (which was poorly suited for armored warfare) before engaging the enemy, this time the Germans were stopped amid the rough terrain, and were defeated in detail.

Big Week:

Allies -- Support: The Big Week campaign provided the first real test of the strategic airpower enthusiasts' beliefs. Those who were commanding the operations had been instrumental in developing strategic air doctrine over the years and were now applying it to practice. Some of the flaws in these beliefs (such as the assertion that bomber formations could operate deep within enemy territory without the protection of fighter escort) had been addressed by the time Big Week arrived, but two important flaws had not. They were: the optimal target set, and the need for accurate battle damage assessment.

The destruction of the German Air Force was a requirement before future bombing operations against oil targets could be undertaken, and before the Normandy invasion could be launched. Strategic air campaign planners felt the best way to accomplish this would be to destroy the enemy's aircraft production facilities, specifically the machine tooling with which the aircraft were built. Unfortunately, the commanders did not realize this tooling was difficult to strike and highly resistant to bomb damage. While the strategic bombing campaign did significantly reduce the number of aircraft produced by the Germans, post-war analysis revealed that most of this reduction was due to the destruction of finished product still awaiting shipment from the factory, not due to loss of machine tooling.

The second factor, battle damage assessment, was routinely poor. Airpower enthusiasts assumed the effects of their strikes would be the destruction of the

targets, so when they saw cockpit footage of bombs striking buildings and large clouds of dust and smoke billowing up, they assumed the facility had been destroyed. Unfortunately, what they were actually seeing was often just the destruction of the rooftops of the buildings, with the contents of the facility remaining largely undamaged. Often, once the debris from the roof had been swept away, the machinery beneath could be put back to use. However, being willing to believe the best about the effects of strategic bombing, the commanders were easily convinced that the strike had been a success. Not until after the war was this flaw discovered.

Big Week:

Axis -- Support: The Axis' preconceived notion in this case occurred years before, when the German leadership, especially Hitler and Goering, adopted a completely defensive doctrine because they did not believe in the offensive abilities of bomber attacks. They believed their own efforts in Britain were totally unsuccessful and did not think the Allies would have any more success. They thereby disregarded the warnings of Galland regarding the futility of this approach and were easily overwhelmed when the massive Allied air forces made their presence felt in 1944-45.

Midway

US -- Support: The US victory at the Battle of Midway may never have occurred if US Admiral Nimitz had not followed his preconceived notions about which information to trust. Leading up to the battle, there were two conflicting views, the view of analysts in Washington and that of Nimitz' own staff, as to the most likely next course of action of the Imperial Japanese Navy's attack. Nimitz chose to trust the view of his staff.

Through radio decryptions, the US had learned that Midway was the next target, but the disagreement centered upon the true Japanese intent. The analysts in Washington believed that their maneuvers were simply a trap being laid to entice the still-outnumbered Americans into a battle they could not win. They advised not sailing out to meet the enemy at Midway for fear of losing their last carriers and losing all their presence in the theater for an unspecified time. On the other hand, Nimitz's own G-2 staff in Pearl Harbor believed that this was both a legitimate and important objective for the Japanese and, more importantly, an opportunity for the US to launch a surprise attack against the Japanese to even the balance of power in the Pacific. By choosing the interpretation of his staff, Nimitz was able to deploy his forces prior to the Japanese establishing their submarine screen west of Pearl Harbor, thereby ensuring the critical element of surprise that allowed the US to destroy 4 of the Imperial Japanese Navy's (IJN) carriers and turn the tide of the Pacific war in the Allies' favor.

Midway

Axis -- Support: The Japanese naval commanders' penchant for pre-planned, highly complex operations gave them consistent problems based on pre-conceived ideas on how the Allies would react. The plan often forced the commanders into developing these kinds of assumptions concerning the information they received, and the information was typically rationalized to fit neatly into the unfolding plan. Because they were forced into an inflexible execution of the plan, any benefits that new information might carry with it were mitigated. In the Midway case, Yamamoto disregarded critical information (the presence of US carriers in the area) that did not fit into their prescribed plan of what the American response was to be, both in terms of where the US forces were, and the number of American carriers available. The Japanese thus blundered into a carrier battle which proved so damaging that they lost their ability to control the seas in the Pacific.

Savo Island:

Allies -- Support: The most notable decision in the brief but eventful battle was made by US Admiral Fletcher and involved a unique prioritization of information. Largely based on his previous experiences, Fletcher was inclined to believe the worst case, and interpreted all information accordingly. He was constantly searching for Japanese carriers and when reports of Japanese aircraft in the area reached him, he chose to believe that they were carrier aircraft. Because the airstrip on Guadalcanal was not finished, he believed that there was a carrier group approaching his position. As a result, he chose to disengage instead of staying in his area of responsibility to carry out his mission of providing support to the troops landing on Guadalcanal. Actually, the aircraft were seaplanes that were based well to the north. This misinterpretation of the information was based on his own personal fears of not wanting to lose another carrier, as he had at Midway. This drove both his assessment of the situation and his unfortunate decision.

Philippine Sea

Allies -- Support: US Admiral Spruance, the commander in charge of naval forces during the invasion of Saipan had a number of past experiences, both his own and those of others, helping shape his preconceptions. From his own experience, he believed that the Japanese would advance in an elaborate plan involving an intricate flanking maneuver. This greatly influenced what information he deemed important and what he shelved as a low priority. The information that fell into this second classification, namely those pieces of information which did not support his pre-conceived cognitive construct, indicated that there was only a single Japanese force headed towards his position. His belief that this was not the enemy's likely course of action led him to disregard certain pieces of key information, from sources ranging from aerial reconnaissance to HF/DF intercepts which turned out to be very accurate. Thus, he continued to convince himself that his assumption was

correct and filtered the information accordingly and refused to move forward into what he expected was the jaws of a Japanese trap. Another factor was Fletcher's performance at Savo Island. Because of the controversy surrounding Fletcher's abandonment of the landing forces while they were offloading equipment, Spruance was not willing to leave the landing troops exposed. These reasons led Spruance to resist the opportunity to move west and engage the Japanese force in an offensive posture, as many of his staff advocated. Instead, he patiently waited for the first sign of an attack and sent his aircraft to meet them.

Leyte Gulf

Allies – Support: The critical decision made by US Admiral Halsey during the Battle of Leyte Gulf was also severely impacted by his preconceived notions. One factor in Halsey's formulations was his personal desire for a great Carrier vs. Carrier battle, something he had long anticipated dating back to his days as a student at Newport. The fact that he had missed his opportunity to take part in the Battle of Midway due to illness only added to this desire.

The other major factor was Admiral Spruance's experience at the Battle of the Philippine Sea just a few months before. Spruance and Halsey rotated command so that Halsey was able to observe the reactions of their superiors to Spruance's refusal to leave his position and pursue the Japanese. Halsey was not going to repeat that same mistake, so when evidence that Japanese carriers were headed south towards his force he wasted no time in charging out to meet them. Unfortunately, the Japanese carriers were merely a decoy, thanks in large part to the terrible losses in aircraft they suffered against Spruance's forces, and Halsey's exit cleared the path for the main Japanese striking force to approach the transports. Only through the heroic efforts of the escort task forces and an inexplicable loss of nerve on the part of the Japanese commander was a major disaster avoided.

Leyte Gulf

Axis – Support: The Japanese plan for the attack on the US landing operation at Leyte was a multiple pincer movement with four separate fleets approaching the US forces from three different directions. To complicate matters, the entire operation was conducted in radio silence. This combination had a major impact in Admiral Kurita's decision to halt his attack with victory in his grasp. The Admiral had lost two command centers over the past two days, which made him more likely to call off an attack than someone who had not undergone those hardships.

Kurita, like many of the officers involved in the operation, did not believe the plan would work. When the unlikely happened and Halsey actually moved out to attack the decoy force, Admiral Ozawa (commander of the decoy force) could not tell Kurita that Halsey had taken the bait (due to radio

silence). When Kurita's lookouts and pilots (all of whom were fresh recruits and had never seen an American ship) reported seeing an Allied carrier force and he found himself faced with a task force launching aircraft, he assumed it was Admiral Halsey's carriers. With no other information available, Kurita chose not further assess the nature of the enemy facing him and retreated.

Case Studies – Neutral

D-Day

Allies –Neutral: The information collection and analysis for the Normandy invasion avoided most of these issues due to the fact that it occurred over a relatively long period and was rich and plentiful in its sources and mechanisms that individual issues could not have a major effect. The Allies were guilty of a few intelligence failures (the presence of the 352nd and the scope of the Bocage impediments) but this was not based on any clear preconceived notions or prioritization of sources and mechanisms.

Market Garden

Axis –Support: The German forces in the Arnhem region were taken completely by surprise by the Allied attack. Cut off from higher headquarters, the units in the region had to act on their own initiative to counter the attack. They did so, very successfully, by relying on their preconceived cognitive construct, which in this case was doctrine. With the little information they had—familiarity with the terrain and understanding of Allied intent—each unit individually understood that they needed to take and hold the bridges leading to Arnhem in order to prevent the success of the attackers.

Coral Sea

Allies –Neutral: Though there were small misperceptions on the part of the Allied commanders, especially regarding Japanese intent, none were significant enough to affect the decision-making process. The same rationale for the neutrality ranking applies to the pilots misidentification of enemy ships. Though a continual source of frustration throughout the war, the fact that the aircraft attacked and damaged the wrong targets did not stop the Allies from seeking out and striking the right targets the next several days.

Coral Sea

Axis – Neutral: The majority of the battle was spent looking for the enemy's ships, with brief engagements when they were finally found. The Japanese commanders did discount some of the information concerning the Allied force, incorrectly assuming they had overwhelming superiority, but this did not have a serious impact on their conduct of the battle.

Savo Island

Axis –Neutral: The Japanese commander, Adm. Mikawa, had fairly accurate and timely information in his possession well before he approached the Allied naval forces, but there is no evidence of prioritization as described in this hypothesis. The only interesting preconception from this battle was Mikawa's belief, which was validated by the results of the battle, that his forces would have such an advantage in night fighting that his poor force ratio would be overcome. This case, therefore, is considered neutral.

Philippine Sea

Axis –Neutral: In this case, the Japanese commander, Admiral Ozawa, knew where the US was by virtue of their recent invasion of a neighboring island. Although he did guess, correctly as it turned out, that Spruance would remain in place to protect the landing force, there is no evidence of prioritization as described in this hypothesis.

(V) Split command structures reduce the dissemination of information.

The final hypothesis in this study shifts the primary focus away from individual commanders to the effects of an organizational structure on the dissemination of information. The hypothesis implies that the way a force is organized can have a significant bearing on how and when information is sent throughout the force. Furthermore, it posits that a traditional hierarchical structure with a single commander in charge will be more effective in operationalizing its information than will a structure with more than one commander. This holds true even if both cases involve the same forces, performing the same mission type, and even the same personnel in the command positions.

One potential problem with a split command structure is that formal mechanisms for communications are typically absent when more than one command structure is involved in an operation. Because such forces rarely train or operate together, there tends to be a lack of recognized methods for communicating. Another set of problems which arises in the absence of formal hierarchical relationships is the impact of situations involving personal dislike or service prejudices. Simply put, if commanders are not compelled to communicate with each other, then in some cases they can choose not to take the initiative and share information with a rival.

The implications of this hypothesis are thus fairly clear. When information is not disseminated in a timely manner, or to the commanders who most need it, the chances of a military defeat are increased. This defeat can take many forms: a blunder into an enemy trap, missing a precious opportunity, or being outmaneuvered or overwhelmed by an unknown enemy force.

Case Studies – Support

Falaise Gap

Allies – Support: The command structure, though necessary due to the strategic considerations at play on the continent with respect to the coalition, inhibited information flow at Falaise Gap. One of the problems faced by Gen. Bradley at Falaise Gap was uncertain information regarding the location of friendly forces at the open end of the pocket. Bradley thought Falaise was in the British/Canadian sector and should be a British objective for reasons of coalition strength. However, Gen. Montgomery later said this was not the case and that no such boundaries had been set. While there were other factors confusing the situation at Falaise Gap, the split command structure and its inhibiting effect on information flows contributed to the problem.

Market Garden

Axis – Support: The German forces, though caught by surprise, reacted in a timely and efficient manner to the threat and defeated the Allied offensive. At Arnhem, German forces were laboring under a very inefficient command structure, especially after the opening of the Allied attack. The structural flaws began at the top with the dual commands of von Rundstedt and Model. Von Rundstedt had only recently been reinstated to the Western Front and was just getting reacclimate, while Model was forced to evacuate his headquarters because Allied paratroopers had unintentionally landed under 2 miles from his location. Thus, neither theater commander was active in sharing information, up or down, the first several days. Ironically, without a central node to control the dissemination of the critical data and guidance, the subordinates were forced to rely on their own military judgments, and just as importantly, could commit their forces in a timely manner. Leaders like Bittrich and Student quickly ascertained the Allies' intent, eventually with help from a captured Allied order, chose the correct response to counter it.

Although the split command structure reduced the dissemination of information at the command level and between the commands and the lower echelons, the battle occurred in an information-rich environment where formal mechanisms were not necessary. This is because the tactical-level echelons understood the enemy intent, were familiar with the terrain, and relied upon doctrinal training and education to guide their actions.

Coral Sea

Allies – Support: The Battle of Coral Sea came at roughly the same time as the reorganization of all US forces in the area, which created boundaries that bore a direct affect on the coordination of the engagement. General MacArthur, as CINCSOWESTPAC, commanded all forces in Australia and at Port Moresby while Admiral Nimitz commanded the south Pacific as CINCPAC. This was important because the battle occurred along the boundary between the two, with Nimitz's carriers relying on MacArthur's land-based air for long-range and wide area searches to help locate the approaching Japanese. Unfortunately, the information gathered by the land-based air suffered from reduced timeliness in its dissemination to Nimitz's naval forces, thereby inhibiting the naval forces' ability to locate the enemy. As a result, the US was not able to gain maximum effectiveness from their excellent understanding of enemy intent (from MAGIC decryptions). This eliminated the possibility of the American forces launching a surprise attack against the Japanese naval forces.

Savo Island

Allies – Support: The battle of Savo Island was a disaster for the Allied side. From the standpoint of command structure and information sharing, the list of problems is large and varied. Inter-command communications between MacArthur and Nimitz often were quite slow. There were a number of

reasons for this, one of the most prominent being that MacArthur's staff was unaware of the Solomons operations and thus did not recognize the urgency of reporting enemy movements that might affect that area.

There were also coalition communications quirks. For instance, a sighting of an enemy force had to be passed through different intelligence organizations, then radioed from stations thousands of miles apart (at times worded differently) to ships only a few miles apart and operating in the same action.

There were also problems of cooperation amongst the commands operating in the theater. For example, the expeditionary commander, Admiral Fletcher, left the area with his carriers without sufficiently warning his allies. He did not pass this information in part due to the mutual dislike between himself and Turner, who was commanding the landing operation. This left the landing operation without air support at a time when the enemy's naval forces were closing in. Another case of lack of cooperation occurred during the battle when the Japanese force moved from striking one picket (the Canberra Group) to another (the Vincennes Group) without the first victim ever notifying the other of the danger. This led the second group, the Vincennes, to continue steaming sedately along in their most vulnerable formation as the Japanese forces enveloped them.

Philippine Sea

Axis - Support: The losses suffered by the Japanese in the so-called "Marianas Turkey Shoot" were caused by a number of factors, including a large Allied edge in technology (radar) and pilot experience. Still, the split command between Ozawa (commanding the carriers) and Kakuta (commanding the land-based air) was perhaps most responsible for the battle unfolding in the manner it did. This was especially true because of how heavily Ozawa's plan relied upon support from Kakuta.³ Unfortunately for Ozawa, several pieces of critical information were not shared between the two commands. First, prior to Ozawa's entering the area, Kakuta's land-based aircraft had been almost completely destroyed during a number of failed attacks on Adm. Spruance. Second, while Ozawa's aircraft were shot down at an alarming rate before ever reaching the US fleet, Kakuta never informed Ozawa that none of his aircraft were even reaching Guam. As a result, Ozawa assumed the attack was progressing as planned and remained in the area to recover his aircraft on the second leg of their strike.

³ Ozawa's plan called for a carrier strike against US forces off of Saipan and then for those aircraft to land on Guam and use the island to refuel and reload, and finish off the American fleet on their way back to their carriers. This plan was designed to maximize the benefits of the Japanese aircraft's 100 mile range advantage over their US counterparts

Leyte Gulf

Allies --Support: The invasion of the Philippines, a plan years in the making, employed a split command using the bulk of the forces under both Admiral Nimitz and General MacArthur, with the latter's naval commander Admiral Kinkaid in command of the landing operation and Nimitz's subordinate Admiral Halsey in charge of the 3rd Fleet protecting them. All went according to plan until the inevitable Japanese attack came, and command and control of the US force broke down. In the midst of the battle, Halsey detected what he believed to be a carrier force and steamed north, away from the landing operation, to pursue it. He did not bother to tell Kinkaid that he was leaving; Kinkaid had to find out through a message between Halsey and Nimitz that he *intercepted*. There was no direct line between either MacArthur and Nimitz, or Halsey and Kinkaid, so there was no mechanism or impetus for them to communicate their plans. Kinkaid also was not privy to Halsey's orders, which allowed for him to search out and destroy the enemy's naval forces if the opportunity presented itself (put in place because of Spruance's caution during the Philippine Sea battle). Furthermore, the messages coming from Halsey were unclear, and Kinkaid had no timely way to verify whether or not Halsey left a defensive formation guarding Leyte's eastern approach.

Leyte Gulf

Axis – Support: The Japanese concept of the operation for Leyte Gulf employed a split command (four fleets) using a complex, intricately timed pincer movement, with a major deception plan using aircraft carriers added to the mix. It lacked a single central commander with access to all the necessary information and capable of exercising C2 over the disparate forces. Compounding this problem was the plan's insistence on radio silence between the four fleets throughout the entire operation. Amazingly, this improbable plan could have worked were it not for the lack of a central commander. Admiral Kurita was poised on the verge of victory when Admiral Halsey left the landing zone to chase the decoy carrier fleet, but instead he broke off the attack and fled the theater. The primary reason for this action was that he incorrectly believed he was facing Halsey's main body and thus feared being destroyed. Had a theater commander been receiving the necessary information and exercising C2 over the entire operation, Kurita would have been informed that the deception plan had worked and Halsey's force was hundreds of miles away, as was Kinkaid's main force, and that he was facing only the escort carriers. These makeshift carriers were no match for his powerful surface fleet, even after two days of battle, and Kurita could have pressed his advantage to the fullest effect.

Informally, the lack of a central authority unleashed personality conflicts that would have otherwise been kept under control. The commanders of the two fleets that stumbled into Kinkaid's trap, Nishimura and Shima, were not actually in the same formation. They hated each other and had refused to communicate, leading them both to fall into the same trap. In fact, one of

Nishimura's ships ran into one of Shima's as he fled the US forces, and still neither commander attempted to communicate with the other. A central commander could have overseen the operation and passed on this information.

Case Studies – Does Not Support

North Africa

Axis -- Does Not Support: The Axis forces in North Africa maintained a split command structure which did not inhibit the dissemination of information, ironically due to its elaborate construction.

The command structure consisted of Rommel and von Arnim as the original field commanders. They were operating in the Mediterranean AOR, which placed them under Field Marshall Kesselring of the German Air Force, the Italian Comando Supremo Ambrosio, and Mussolini (North Africa was an Italian theater, and many Italians were there fighting for the Axis). When Rommel abandoned Tripoli (the seat of the Italian empire in North Africa), Mussolini demanded Rommel's dismissal and sent Messe (an Italian) to replace him. However, Messe held Rommel in high regard and refused to dismiss him, instead taking over the command of the Italian forces previously under Rommel and allowing Rommel free reign with the two German divisions that remained under his control. Hitler as well weighed in on command decisions, though in this time period he was more concerned with events on the Eastern Front. Thus, at any given time, the Axis field commanders could receive orders from Hitler, Mussolini, Ambrosio or Kesselring in addition to the ones they believed needed to be carried out, with the additional burden of communicating with each other.

Rommel and von Arnim were long-time rivals who did not like each other personally and had very different warfighting styles. Von Arnim was sent to North Africa with a larger force than Rommel's with the intent that he replace Rommel when the latter retired (a period of time much longer than originally intended). Therefore, with such a small force, Rommel was dependent upon von Arnim for assistance. Von Arnim, however, was reluctant to help. Thus, Rommel was regularly appealing to Kesselring and Hitler for more forces and supplies, von Arnim was regularly complaining that he could not help, and Kesselring was shuttling messages back and forth and chiming in with orders from himself, as were Hitler and Mussolini. Thus, the convoluted command structure actually increased the amount of communication required, which in turn ensured that the information continued to flow.⁴

⁴ After Kasserine Pass, Kesselring did unify the command of the armored forces as Army Group Africa and placed them under Rommel, a move that proved to be too little, too late.

D-Day

Axis --Does not Support: Hitler had created a split command structure for the defense of northern France against the expected Allied invasion. There were information flow problems, but these problems were caused not by the split command but by Hitler's unwillingness to allow his commanders to make certain decisions. Hitler he did not allow his two theater commanders, Rommel and von Rundstedt, complete operational control over the forces in the region, reserving certain decisions for himself alone. When the attack came, Rommel and von Rundstedt required permission from Wolf's Lair to deploy the Panzers, permission that was not granted because Hitler refused to believe the Normandy invasion was the main attack. For several days, Hitler was convinced that the real invasion would come at Calais, and thus refused to allow the reserves to deploy against the forces at Normandy. Despite the fact that information was flowing to Hitler, he disregarded it if it did not confirm his preconceptions. Only after the evidence became overwhelming did Hitler finally realize the Normandy invasion was the main attack, and grant permission for the reinforcements to be deployed. Thus, this was not a case of inhibited information flow due to a split command, but rather incompetent command.

Falaise Gap

Axis -- Does not Support: In this case, the main problem was that Hitler was not interested in collection or analysis of any new information, especially if it was bad news. The difficulties of information dissemination through a split command structure was not the problem; it was that Hitler required of his commanders that they seek his permission on operational level decisions, and he refused to allow them to retreat through the Gap.

Case Studies – Neutral

North Africa

Allies – Neutral: Despite involving multi-national forces, the campaign in North Africa did not employ a split command structure. Gen. Eisenhower had authority to control all aspects of the operation. Therefore, since there was no split command, it is considered neutral under the hypothesis.

D-Day

Allies – Neutral: The Allies had a strong unified command structure under General Eisenhower, and thus this case must be considered neutral under the hypothesis.

Market Garden

Allies – Neutral: Operation Market Garden did not employ a split command structure and is thus neutral under the hypothesis.

Battle of the Bulge

Allies – Neutral: The command structure was not split, so this case is neutral under the hypothesis.

Battle of the Bulge

Axis – Neutral: The German command structure for the attack through the Ardennes was unified under Hitler, who made all the significant command decisions. Because the command structure was not split, this case is considered neutral.

Big Week

Allies – Neutral: The strategic bombing campaign was undertaken by a single unified command under the newly created United States Strategic Air Forces (USSTAF) and thus is considered neutral under this hypothesis.

Big Week

Axis – Neutral: The German air defense system was unified under a single command (although they often had difficulty exerting command over all three sectors of the air defense network simultaneously) and thus this case is considered neutral under the hypothesis.

Coral Sea

Axis – Neutral: The Japanese had a unified command structure during this battle, and thus the case is considered neutral.

Midway

Allies – Neutral: Unlike the awkwardness that surrounded the command structures at Coral Sea, Midway was under the sole control of Nimitz. Therefore this case is considered neutral under the hypothesis.

Midway

Axis – Neutral: Despite employing a plan that was so complicated, intricate, and inflexible that it inhibited the proper dissemination of the critical information as the battle unfolded, the Japanese were using a unified command structure in their attack on Midway, and thus this case is considered neutral under the hypothesis.

Savo Island

Axis – Neutral: Unlike the structure and performance of the Allied naval forces at Savo Island, the Japanese had a unified command structure. Thus this case is considered neutral under the hypothesis.

Philippine Sea

Allies – Neutral: The American command structure during the battle of the Philippine Sea was unified under Admiral Spruance. Therefore, this case is considered neutral under the hypothesis.

BATTLE OUTCOMES

For the purposes of this study, the following definitions for coding battle outcomes were used:

- (1) Decisive victory: An outcome that has a significant positive effect on the course of the war or campaign.
- (2) Victory: An outcome that achieves limited objectives but falls short of altering the course of the war or campaign.
- (3) Decisive defeat: An outcome that has a significant negative effect on the course of the war or campaign.
- (2) Defeat: An outcome that fails to achieve limited objectives but does not alter the course of the war or campaign.

North Africa

The North Africa campaign was a victory for the Allies and a loss for the Germans. The Allies achieved their objective of driving the Germans from the continent, but since Africa was a secondary theater, the victory there cannot be seen as decisive. In addition, the Germans were able to evacuate significant forces; the North Africa campaign did not influence significantly the ability of the Germans to mount an effective defense of the European continent.

D-Day

D-Day represents a decisive victory for the Allies and a decisive loss for the Germans. The establishment of the Allied lodgment in Normandy essentially sealed the fate of Germany by forcing them to fight an active war on two fronts.

Falaise Gap

The battle of the Falaise Gap represents a victory for the Allies and a loss for the Germans. The battle certainly had the potential to be decisive, but the failure of the Allies to capture or destroy the elite formations initially trapped in the pocket severely limited the effect of the battle. By the fall of 1944, German troops were able to re-establish a defensive line at their border.

Market-Garden

The Battle of Arnhem, which marked the culmination of the Market-Garden operation, was a loss for the Allies and a victory for the Germans. Had Market-Garden been a success, it would have been a decisive victory for the Allies. But since they were prevented from establishing a bridgehead across the Rhine, the battle had little effect on the outcome of the war. By the same token, although the Germans prevented a decisive victory by the Allies, their success did not significantly alter the course of the war.

Battle of the Bulge

During the first phase of the Battle of the Bulge, the Germans scored a victory while the Allies suffered a loss. The Germans met their initial goals, but their failure to cross the Meuse and seize Antwerp limited the strategic significance of the initial German successes. In the second phase, the Allies reversed the outcome and achieved a victory while the Germans suffered a loss. By collapsing the German salient, the Allies restored the initial front-line, but the damage they inflicted on German armed forces was significant and must be counted as a victory.

Big Week

Operation Argument represents a decisive victory for the Allies and a decisive defeat for the Germans. By crippling the German air force, and aircraft production, the Allies paved the way for the success at D-Day. In this sense, the battle was a major turning point, and a necessary stage in the Allied victory.

Coral Sea

The Battle of the Coral Sea represents a victory for the Americans and a loss for the Japanese. The Americans were able to halt the Japanese advance, but their inability to inflict upon the Japanese disproportionate costs limited the decisiveness of the battle. Given the relative US weakness in the Pacific, the damage to the American carriers offsets the strategic significance of checking the Japanese advance.

Midway

Midway is a clear decisive victory for the US and a decisive loss for the Japanese. In a few hours, the entire balance of military power in the Pacific theater shifted drastically. The American victory had a decisive impact on the course of the war.

Savo Island

The Japanese victory at Savo, although one-sided, does not represent a decisive victory. The Japanese sank and damaged several cruisers and destroyers, but these were replaceable assets for the Allies. Had the Japanese attacked and sunk the Allied transports and landing craft, they could have prolonged the war significantly. However, given the actual outcome, the battle must be seen as a victory for the Japanese and a loss for the Allies.

Philippine Sea

Although unplanned, the Americans inflicted a decisive defeat on the Japanese in the Battle of the Philippine Sea. By virtually destroying Japan's entire carrier air force, the US assured that future Japanese naval resistance would be largely ineffective. After the Philippine Sea, the ability of the Japanese to counter American actions was drastically reduced.

Leyte Gulf

The Battle of Leyte Gulf largely confirmed the results of the Philippine Sea. Had Halsey stayed in place and finished off the Japanese surface forces, one could argue that the victory was decisive. But given that the Japanese carriers were already crippled by a lack of fighters and aircrews and were actually acting as a decoy force in this battle, the damage they suffered did not represent a decisive alteration in the course of the war. Leyte represents a victory for the Americans and a loss of the Japanese.

BIBLIOGRAPHY

Books:

Ambrose, Steven E. D-Day. NY: Simon & Schuster, 1994.

Ambrose, Steven E. The Supreme Commander: The War Years of General Dwight D. Eisenhower. Doubleday, 1970.

Astor, Gerald. A Blood-Dimmed Tide: The Battle of the Bulge by the Men Who Fought It. New York: D. Fine, 1992.

Babington-Smith, Constance. Air Spy: The Story of Photo Intelligence in World War II. New York: Harper, 1957.

Ballard, Robert D. The lost ships of Guadalcanal. New York : Warner Books, 1993.

Barnett, Correlli. Hitler's Generals. London: Weidenfeld and Nicolson, 1989.

Baudot, Marcel. Liberation de la Normandie. Paris: Hachette, 1974.

Behrendt, Hans-Otto. Rommel's intelligence in the desert campaign, 1941-1943. London: W. Kimber, 1985.

Benis, Frank. Halsey. New York: Ballantine, 1974.

Bennett, Geoffrey. Naval Battles of WWII. London: Batsford, 1975.

Bennett, Ralph. Ultra in the West. New York: Scribner, 1979.

Belfield, E. and Essame, A. The Battle for Normandy. Philadelphia: Dufar, 1965.

Blumenson, Martin. Kasserine Pass. New York: Berkley Pub. Group, 1966.

Blumenson, Martin. The Battle Of The Generals: The Untold Story Of The Falaise Pocket — The Campaign That Should Have Won World War II. NY: Morrow, 1993.

Blumenson, Martin. The Patton Papers, 1940-45. Boston: Houghton Mifflin, 1957.

Blumenson, Martin. The Patton Papers, 1940-45. Vol. 2. Boston: Houghton Mifflin, 1974.

Boog, Horst, Ed. The Conduct of the Air War in The Second World War: An International Comparison. New York: BERG, 1992.

- Bradley, Omar N. A Soldier's Story. NY: Henry Holt, 1951.
- Breuer, William B. Hoodwinking Hitler: The Normandy Deception. Westport, CT: Praeger, 1993.
- Butcher, Harry C. My Three Years With Eisenhower. NY: Simon & Schuster, 1946.
- Carver, Sir Michael. The War Lords: Military Commanders of the Twentieth Century. Boston: Little, Brown, 1976.
- Chandler, Alfred D., ed. The Papers of Dwight David Eisenhower. Baltimore: Johns Hopkins, 1970.
- Childs, David. Germany Since 1918. New York: Harper, 1972.
- Cirillo, Roger. Ardennes - Alsace. Washington, DC: Center of Military History, U.S. Army, 1995.
- Cole, Hugh M. The Ardennes: Battle of the Bulge. Washington: Center of Military History, U.S. Army, 1994.
- Collier, Richard. World War II: the war in the desert. Alexandria, VA: Time-Life, 1977.
- Cooper, Matthew. The German Air Force, 1933-1945: An Anatomy of Failure. New York: Jane's, 1981.
- Costello, John. The Pacific War. New York: Rawson, 1981.
- Cottrell, Major Scott B. From Cobra To The Seine, August 1944: A Microcosm Of The Operational Art. Fort Leavenworth, KS: School of Advanced Military Studies, US Army Command General Staff College, 1986.
- Craven, Wesley Frank and Cate, James Lea. The Army Air Forces in World II. Washington, DC: Office of Air Force History, 1983.
- Cutler, Thomas J., The Battle of Leyte Gulf. New York: Harper Collins, 1994.
- D'Este, Carlo. Falaise: The Trap Not Sprung. Vol. 6, Number 3. Military History Quarterly, Spring 1994.
- D'Este, Carlo. Patton: a genius for war. New York: Harper Collins, 1995.
- Dickson, W.D. The Battle of the Philippine Sea, June 1944. London, England: Ian Allen Ltd., 1975.

- Dull, Paul S. A battle history of the Imperial Japanese Navy, 1941-1945. Annapolis: Naval Institute Press, 1978.
- Dunnigan, James F. Victory at sea: World War II in the Pacific. New York: William Morrow Co., 1995.
- Dupuy, Trevor N. Hitler's Last Gamble: The Battle of the Bulge, December 1944 - January 1945. New York: Harper Collins, 1994.
- Eggenberger, David. A Dictionary of Battles. New York: T. Crowell, 1967.
- Eisenhower, David. Eisenhower at War. NY: Random House, 1986.
- Eisenhower, Dwight D. The Papers of Dwight David Eisenhower: The War Years. 5 Vols., Alfred D. Chandler, Jr. and Stephen E. Ambrose, ed., Baltimore: Johns Hopkins Press, 1970
- Eisenhower, Dwight D. Crusader in Europe. NY: Doubleday, 1948.
- Eisenhower, John S.D. The Bitter Woods. New York: G. P. Putnam's Sons, 1969.
- Elstob, Peter. Hitler's Last Offensive: The Full Story of the Battle of the Ardennes. New York: Macmillan, 1971.
- Esposito, Vincent J. The West Point Atlas of American Wars. New York: Praeger, 1959.
- Evans, David C. ed., 2nd Edition. The Japanese Navy in World War II. Annapolis, MD: Naval Institute Press, 1986.
- Farago, Ladislav. Patton: Ordeal & Triumph. NY: Dell, 1970.
- Farrar-Hockley, Anthony H. Airborne Carpet: Operation Market Garden. New York: Ballantine Books, 1969.
- Forty, George. Desert rats at war. London: Ottenheimer, 1980.
- Frank, Rochard B. Guadalcanal. New York: Random House, 1990.
- Fraser, David. Knight's Cross. New York: Harper Collins, 1993.
- Fuchida, Mitsuo. The Battle that Doomed Japan: Midway. New York: Ballantine, 1993.
- Gailey, Harry. The War in the Pacific: from Pearl Harbor to Tokyo Bay. CA: Presidio Press, 1995.

- Ganz, A. Harding. Questionable Objective: The Brittany Ports, 1944. Lexington, VA: The Journal of Military History, Jan. 1995.
- Goldstein, Donald M. Nuts!: The Battle of the Bulge. Washington: Brassey's, 1994.
- Goolrick, William K. and Ogden Tanner. The Battle of the Bulge. Alexandria, VA: Time-Life, 1979.
- Griffith, Samuel B. The battle for Guadalcanal. Annapolis, MD: Nautical & Aviation Pub. Co. of America, 1979.
- Hammel, Eric M. Guadalcanal: the carrier battles: carrier operations in the Solomons. August-October 1942. New York: Crown, 1987.
- Halsey, William F., and Bryan, J. III. Admiral Halsey's Story. New York: McGraw-Hill, 1947.
- Hansell, Haywood S. The Air Plan that Defeated Hitler. New York: Arno Press, 1980.
- Heaps, Leo. The Evaders. New York: Morrow, 1976.
- Hinsley, F. H. British Intelligence in the Second World War: Its Influence on Strategy and Operations. New York: Cambridge University Press, 1988.
- Holmes, W.J. Double-edged secrets: US naval intelligence operations in the Pacific during World War II. Annapolis: Naval Institute Press, 1969.
- Howard, Michael. Strategic Deception in the Second World War. London: Pimlico, 1992.
- Hoyt, Edwin. Blue Skies and Blood. New York: Jove Publications, 1989.
- Infield, Glenn B. Big Week: The Classic Story of the Crucial Air Battle of WWII. Washington, DC: Brassey's, 1993.
- Ingersoll, Ralph. Top Secret. New York: Harcourt, Brace and Company, 1946.
- Jones, R. V. The Wizard War: British Scientific Intelligence, 1939-1945. New York: Coward, McCann & Geoghegan, 1978.
- Kahn, David. Hitler's Spies: German Military Intelligence in World War II. New York: Macmillan, 1978.

- Karig, Harris, Manson. Battle Report: The End of An Empire. NY: Rinehart and Company, Inc., 1948.
- Keegan, John. Six Armies in Normandy, from D-Day to the Liberation of Paris. NY: Penguin Books, 1982.
- Keegan, John. The Second World War. NY: The Viking Press, 1989.
- Keegan, John. The Times Atlas of the Second World War. NY: Harper & Row, 1989.
- Kershaw, Robert J. It Never Snows in September. The German View of Market Garden and the Battle of Arnhem, September 1944. Marlborough: Crowood, 1990.
- Kilpatrick, C. W. The night naval battles in the Solomons. Pompano Beach, FL: Exposition Press of Florida, 1987.
- Kingseed, Major Cole C. The Falaise-Argetan Encirclement: Operationally Brilliant, Tactically Flawed. Vol. LXIV, Number 12. Fort Leavenworth, KS: Military Review, December 1984.
- Kohn, George C. A Dictionary of Wars. New York: Facts on File, 1986.
- Koch, Oscar W. G-2: Intelligence for Patton. Philadelphia: Whitmore, 1971.
- Kreis, John F. and Cochran, Alexander S. Piercing the Fog: Intelligence and Army Air Forces operation in World War II. Bolling AFB, Washington DC Air Force History and Museums Program, 1996.
- Leckie, Robert. Challenge for the Pacific, the turning point of the war. Garden City, NY: Doubleday, 1965.
- Lee, Asher. The German Air Force. New York: Harper & Brothers, 1946.
- Levine, Alan J. The Pacific War: Japan versus the allies. Westport, CT: Praeger, 1995.
- Lewin, Ronald. Ultra Goes to War. New York: McGraw-Hill, 1978.
- Lewis, Winston B. The battles of Savo Island, 9 August 1942 and the eastern Solomons, 23-25 August 1942. Washington [DC]: Naval Historical Center, Department of the Navy, 1994.
- Liddell-Hart, B.H. The Rommel Papers. New York: Harcourt, 1953.

- Lockwood, Charles & Adamson, Hans Christian. Battles of the Philippine Sea. NY: Thomas Y. Crowell Company, 1967.
- Loxton, Bruce. The shame of Savo : anatomy of a naval disaster. Annapolis, Md.: Naval Institute Press, 1994.
- Lucas, James and Barker, James. The Battle of Normandy: The Falaise Gap. NY: Holmes & Meier, 1978.
- Lucas, James. World War Two Through German Eyes. London: Arms and Armour, 1987.
- Luttichau, Charles V.P. von. The German Counteroffensive in the Ardennes. Command Decisions. Ed. Kent Roberts Greenfield. Washington: Department of the Army, 1960.
- MacDonald, Charles Brown. The Decision to Launch Operation Market-Garden. Washington: Center of Military History, U.S. Army, 1990.
- MacDonald, Charles B. A Time for Trumpets: The Untold Story of the Battle of the Bulge. New York: William Morrow, 1985.
- MacDonald, Charles B. The Mighty Endeavor: American Armed Forces in the European Theater in World War II. NY: Oxford University Press, 1969.
- Macintyre, Donald G. The Battle for the Pacific. New York: W. W. Norton, 1996.
- Marshall, S.L.A. Bastogne: The Story of the First Eight Days. Washington: Infantry Journal Press, 1946.
- Martens, Allard. The Silent War. London: Hodder and Stoughton, 1961.
- Merriam, Robert E. Dark December: The Full Account of the Battle of the Bulge. Chicago: Ziff-Davis, 1947.
- Middlebrook, Martin. Arnhem 1944: The Airborne Battle, 17-26 September. Boulder: Westview Press, 1994.
- Miller, Edward. War Plan Orange: The US Strategy to Defeat Japan. Annapolis, MD: US Naval Institute, 1991.
- Miller, John. Guadalcanal: the first offensive. Washington: Historical Division, Dept. of the Army, 1949.
- Montgomery, Bernard L. The Memoirs of Field-Marshal the Viscount Montgomery of Alamein. Cleveland: World Publishing, 1958.

- Morelock, J.D. Generals of the Ardennes: American Leadership in the Battle of the Bulge. Washington: National Defense University, 1994.
- Morison, Samuel E. History United States Naval Operations in World War II, Volume IV: Coral Sea, Midway and Submarine Actions: May 1942 - August 1942. New York: Little Brown & Co., 1949.
- Murray, Williamson, The Luftwaffe 1939-1945: Strategy for Defeat. Washington, DC: Brassey's, 1983.
- Newcomb, Richard F. Savo: the incredible naval debacle off Guadalcanal. New York: Holt, Rinehart and Winston [1980], 1961.
- Nimitz, Chester W. Sea power: a naval history. Englewood Cliffs, NJ.: Prentice-Hall, 1960.
- Nofi, Albert A. The war against Hitler. New York: Hippocrene Books, 1982.
- Nobecourt, Jacques. Hitler's Last Gamble: The Battle of the Bulge. Trans. R.H. Barry. New York: Schocken, 1969.
- O'Connor, Raymond Gish. The Japanese Navy in World War II: an anthology of articles by former officers of the Imperial Japanese Navy, and Air Defense Force, originally published in the US Naval Institute Proceedings. Annapolis, MD: US Naval Institute, 1969.
- Okumiya, Masatake and Horikoshi, Jiro ZERO!. NY: E.P. Dutton & Co., Inc., 1956.
- Overy, R.J. The Air War 1939 - 1945. London: Europa, 1980.
- Piekalkiewicz, Janusz. Arnhem 1944. New York: Charles Scribner's Sons, 1976.
- Pimlott, John. The Historical Atlas of World War II. New York: H. Holt, 1995.
- Pogue, Forrest C. The Supreme Command. Washington: Office of the Chief of Military History, Department of the Army, 1954.
- Potter, E. B. Nimitz. Annapolis, MD: Naval Institute Press, 1976.
- Powell, Geoffrey. The Devil's Birthday: The Bridges to Arnhem, 1944. London: Buchan & Enright, 1984.
- Prados, John. Combined fleet decoded: the secret history of American intelligence and the Japanese Navy in World War II. New York: Random House, 1995.

- Prange, Gordon. Miracle at Midway. New York: Viking, 1983.
- Price, Alfred. Instruments of Darkness: The History of Electronic Warfare. New York: Charles Scribner's Sons, 1978
- Putney, Diane T., Ed. ULTRA and the Army Air Force in World War II: An Interview with Associate Justice of the U.S. Supreme Court Lewis F. Powell, Jr. Washington, DC: Government Printing Office, 1987.
- Rusiecki, Steven M. The Key to the Bulge: The Battle for Losheimergraben. Westport, CT: Praeger, 1996.
- Ryan, Cornelius. A Bridge Too Far. New York: Touchstone, 1995 [originally published in 1974].
- Schoenbaum, David. Hitler's Social Revolution. New York: Anchor, 1967.
- Sexton, Donal J., Jr. Signals Intelligence in World War II. Westport, CT: Greenwood, 1996.
- Smith, Walter Bedell. Eisenhower's Six Great Decisions. NY: Longmans, 1956.
- Spector, Ronald. Eagle Against the Sun: The American War Against Japan. NY: The Free Press, 1985.
- Speer, Albert. Inside the Third Reich. New York: Budget Books, 1995.
- Speidel, Hans We Defended Normandy. London: Jenkins, 1951.
- Stewart, Adrian. The Battle of Leyte Gulf. New York: Scribner, 1980.
- Sulzberger, C.L. World War II. New York: McGraw-Hill, 1970.
- Tillman, Barrett. The Marianas Turkey Shoot, June 19-20, 1944. St. Paul, MN: Phalanx Publishing Co., 1994.
- Toland, John. Battle: The Story of the Bulge. New York: Random House, 1959.
- Toland, John. The Rising Sun: The Decline and Fall of the Japanese Empire. New York: Bantam, 1971.
- Urquhart, R.E. Arnhem. New York: Norton, 1958.
- Van der Rhoer, Edward. Deadly magic: a personal account of communications intelligence in World War II in the Pacific. New York: Scribner, 1978.

Van der Vat, Dan. The Pacific Campaign: World War II, the US-Japanese naval war, 1941-1945. New York: Simon & Schuster, 1991.

von Luettwitz, Freiherr. Normandy Campaign of 2 Panzer Division: 26 July to 6 September 1944. HQ, US Forces - European Theater, Historical Division, Operational History, 1945.

—. 6th Parachute Division — Combat In Northern France (to 23 August 1944). Historical Division, HQ US Army - Europe, Foreign Military Studies Branch.

—. From Counterattack At Avranches To The Falaise Pocket. Historical Division, HQ US Army - Europe, Foreign Military Studies Branch.

—. Northern France: 15 July to 14 August 1944. Historical Division, HQ US Army - Europe, Foreign Military Studies Branch.

—. Operations of XV Corps in Forming the Argentan-Falaise Pocket. Vol. 25, Number 3. Fort Leavenworth, KS: Military Review, June 1945.

Warner, Denis and Peggy. Disaster in the Pacific : new light on the Battle of Savo Island. Annapolis, Md.: Naval Institute Press, 1992.

Weigley, Russell F. Eisenhower's Lieutenants. Bloomington, Indiana University Press, 1981.

Werrell, Kenneth. ARCHIE, FLAK, AAA, AND SAM: A Short Operational History of Ground-Based Air Defense. Maxwell A.F.B: Air University Press, 1988.

Whiting, Charles. Ardennes: The Secret War. New York: Stein and Day, 1985.

Winterbotham, F.W. The Ultra Secret. New York: Harper and Row, 1974.

Winton, John. ULTRA in the Pacific. London: Leo Cooper, 1993.

Wooldrigde, E.T. Carrier Warfare in the Pacific. Washington, DC: Smithsonian Institute Press, 1993.

Y'Blood, William Red Sun Setting - The Battle of the Philippine Sea. Annapolis, MD: Naval Institute Press, 1981.

Other:

Declassified Radio Message: 24 April 1942; COMINCH to CINCPAC

Declassified Radio Message: 3 May 1942; COMINCH to CINCPAC

Declassified Radio Message: 7 May 1942; CINCPAC to COMINCH

Declassified Radio Message: 8 May 1942; ADM. Nimitz to ALUSNA Wellington, USS Tern, USS Dobbin, USS Tangier

Declassified Radio Message: 8 May 1942; CINCPAC to COMTASKFOR 17

Gay, Hobart R. Oral history interview. Arch. Patton's DSC OPS.

Hansen, Chester B. Personal papers. Arch. Hansen was Bradley's ADC: includes diary, comments by Bradley, reports and histories of WWII.

Harrison, Gordon A. Cross Channel Attack, Office of the Chief of Military History, 1951.

Military Intelligence Division, US War Department. German Military Intelligence, 1939-1945. Frederick, MD: University, 1984.

Publicity and Psychological Warfare: 1943-1945. Twelfth United States Army Group European Theater of Operations. 1945.

The United States Strategic Bombing Survey. Washington, DC: Government Printing Office, 1945

U.S. Department of the Army Utah Beach to Cherbourg, U.S. GPO, 1948.

U.S. Naval War College. The Battle of the Coral Sea: May 1 to May 11, Inclusive: Strategical and Tactical Analysis. Newport, RI: US Naval War College, 1947.

U.S. Naval War College. The Battle of Midway, including the Aleutian Phase: June 3 to June 14, 1942: Strategical and Tactical Analysis. Newport, RI: US Naval War College, 1948.

UNCLASSIFIED/LIMITED

UNCLASSIFIED/LIMITED