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THE INFLUENCE OF BRITISH OPERATIONAL  
INTELLIGENCE ON THE WAR AT SEA IN THE  
MEDITERRANEAN JUNE 1940 - NOVEMBER 1942

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by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy

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Intelligence derived from a number of sources, primarily the decryption of high-level German and Italian communications, provided British forces in the Mediterranean with extraordinary insights into Axis naval operations. This level of intelligence was instrumental to the success of British forces during most of the decisive points during the naval war in the Mediterranean and indirectly had great influence on the ground war in North Africa. Many of the hallmarks of the nature in which operational intelligence was used retains relevance for today's operational commander. These include use of intelligence to identify and attack enemy centers of gravity, the importance of incorporating intelligence into the planning process, use of intelligence as a force multiplier but not as a force substitute, and the dissemination and handling of sensitive intelligence.

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## TABLE OF CONTENTS

CHAPTER	PAGE
ABSTRACT.....	ii
I INTRODUCTION.....	1
II THE BATTLE FOR THE MEDITERRANEAN	
Background.....	2
1940--Opening Moves.....	4
1941--The Germans Intervene.....	5
1942--Malta Holds the Key.....	7
III BRITISH OPERATIONAL INTELLIGENCE	
Sources .....	10
Analysis.....	12
Dissemination.....	13
IV THE ROLE OF BRITISH INTELLIGENCE DURING THE WAR IN THE MEDITERRANEAN.....	16
The Importance of Intelligence in	
Fleet Engagements.....	16
The Battle Against the Sea Lanes.....	19
V CONCLUSIONS.....	24
Modern Parallels.....	25
NOTES.....	34
SELECTED BIBLIOGRAPHY.....	37

THE INFLUENCE OF BRITISH OPERATIONAL INTELLIGENCE  
ON THE WAR AT SEA IN THE MEDITERRANEAN JUNE 1940 - NOVEMBER 1942

CHAPTER I  
INTRODUCTION

The operations of the Royal Navy in the Mediterranean during the Second World War were greatly influenced by the nature of operational intelligence available to British commanders. In a theater where the Royal Navy rarely fought with control of the air and against a numerically superior opponent, the acquisition and use of quality operational intelligence was a force multiplier of great importance. Review of the decisive points in the war for the Mediterranean suggests that the role of intelligence was at times crucial. This paper reviews the availability of operational intelligence to the Royal Navy from the initiation of hostilities in the Mediterranean theater of war to November 1942 and the impact of that intelligence on naval operations. A brief summary of the war in the Mediterranean is included for background purposes, but the bulk of the paper will put the role of intelligence into proper perspective. The conclusion will draw out those lessons from the period which remain relevant today.

## CHAPTER II

### THE BATTLE FOR THE MEDITERRANEAN

#### Background

The war in the Mediterranean began in June 1940 when Italy declared war on France and Britain. What had been a favorable naval situation for the Allies was quickly transformed that same month when the French signed an armistice with the Axis powers.

Even before the fall of France, the British moved to reinforce their naval strength in the Mediterranean. A balanced force was stationed in Gibraltar (known as Force H) and the Mediterranean Fleet, based in Alexandria, Egypt was heavily augmented. These two forces permitted the British to dominate both ends of the Mediterranean. However, the situation in the central Mediterranean was much less favorable. The major naval base on the island of Malta (only some 60 miles from Sicily) was judged to be untenable. Additionally, even after reinforcement, the Royal Navy was distinctively inferior in numbers to the Italian Fleet in all but capital ships.<sup>1</sup> This Italian numerical edge was offset by British superiorities in several important respects; most importantly, the possession and use of radar, the possession of aircraft carriers and extensive training in night-fighting.<sup>2</sup>

Strategically, the British were in a difficult situation in the Mediterranean. Even in 1940, the Royal Navy was already stretched dangerously thin. In the Atlantic, the British were hard-pressed to protect their vital lifelines against the depredations of German submarine and surface raiders. A large part of the

fleet had to be withheld in homewaters as invasion of England itself loomed as a possibility throughout 1940. In the Far East, British interests had to be protected against the possibility of Japanese aggression; in fact, in pre-war planning, the importance of Britain's position in the Far East was placed above that of the Mediterranean.<sup>3</sup> The problem of inadequate resources to meet world-wide commitments compelled some on the naval staff to urge that Britain abandon the Mediterranean in favor of strengthening defenses in the North Atlantic and in the Far East. However, for political, economic and military reasons (and in no small part to Prime Minister Winston Churchill's desire to maintain Britain's Mediterranean position), these sound naval concerns were dismissed and the Royal Navy committed to a perilous campaign to defend Britain's imperial lifeline through the Mediterranean and to a strategy of defeating the weaker Axis partner, Italy.<sup>4</sup>

Though unprepared for war in 1940, Italy, with its large navy and air force, dominated the central Mediterranean. The relatively short distances in the Mediterranean meant virtually the entire length of Britain's lines of communications through the region was within range of Italian air and fleet bases. Each side required the use of central Mediterranean waters to fulfill critical tasks. The British needed to move military convoys through the Mediterranean and keep Malta supplied. The Italians were faced with the task of moving convoys to North Africa, avoiding the attacks of forces based on Malta. Maintenance of bases on Malta to locate and attack Axis shipping would become the focus of British

Mediterranean strategy.

### 1940--Opening Moves

As early as July, the Royal Navy moved to challenge the Italian Fleet in the central Mediterranean. While the Mediterranean Fleet was escorting a convoy from Malta to Alexandria, the Italian Fleet was discovered in the Ionian Sea covering a convoy to Benghazi, Libya. Admiral Andrew Cunningham, Commander of the Mediterranean Fleet, immediately sought to engage the Italians. In the resulting action, the Italians broke off when British heavy units intervened (a pattern often to be repeated). Cunningham pursued the Italians to within 25 miles of the Calabrian coast before withdrawing. Five days of high-level bombing by the Italian Air Force against British forces resulted in only a single cruiser being damaged. In what was to be called the Battle of Punto Stilo, the British established an early moral superiority over the Italian Fleet.<sup>5</sup>

In August, in the first of many such operations, Cunningham executed a major fleet operation to reinforce Malta. Attacks by the Italian Air Force and a sortie by the Italian Fleet were ineffective. Successful operations to escort convoys into Malta were repeated in September and October.

Reinforced with a modern fleet carrier in September, Cunningham used this platform during another complex operation to reinforce Malta to launch a surprise attack on the Italian naval base of Taranto on 11 November. All six Italian battleships were



present; three are sunk, though two were eventually raised and returned to service. Later in November, remaining elements of the Italian Fleet challenged another British convoy operation, this one under escort of Force H from Gibraltar. In the resulting action on 27 November off Cape Spartivento in southern Sardinia, the larger Italian force withdrew after an indecisive gunnery action, and the convoy reached Malta and Alexandria safely.

By the end of the year, the Mediterranean Fleet and Force H had demonstrated an ability to contain the Italian Fleet. Malta had been supplied and reinforced. Elsewhere, in North Africa, a British offensive was underway which threatened the collapse of Italian forces in Libya. The Italian invasion of Greece in October had resulted in another Italian setback.

#### 1941--The Germans Intervene

The deteriorating Italian position forced the Germans to dispatch air and ground forces to the Mediterranean. Their presence was quickly felt in January when, operating from bases in Sicily, units of the Luftwaffe heavily damaged the Mediterranean Fleet's only carrier during a convoy operation to Malta. The appearance of the Luftwaffe ended the Royal Navy's relative freedom of action in the central and eastern Mediterranean.

Just as British ground forces appeared ready to complete the destruction of Italian forces in North Africa, the British government decided to withdraw large numbers of forces from North Africa and send them to Greece, still at war with Italy and now

under threat of German invasion. This movement of forces to Greece prompted the Italians to attempt to intervene and resulted in the largest fleet engagement of the Mediterranean war.

Given prior warning of an impending sortie by the Italian Fleet, the Mediterranean Fleet engaged the Italians off Cape Matapan. With an overall advantage in fleet speed, the Italians attempted to break off when British heavy units arrived on the scene. However, strikes by the accompanying British carrier damaged several Italian ships and permitted the British to catch a portion of the Italian Fleet. On the night of 28 March, the Royal Navy surprised and sank three heavy cruisers and two destroyers. During the battle, both the Royal Air Force (RAF) and the Italian Air Force prove totally ineffective against surface targets. The battle completed British moral ascendancy over the Italians and marked the last attempt by the Italian Fleet to operate in the eastern Mediterranean.<sup>6</sup>

Following the quick defeat of the British Expeditionary Force in Greece and later Crete during the spring of 1941, the Royal Navy was again tasked to extract the British Army from Europe. Unlike the earlier, more well-known evacuation at Dunkirk in 1940, the evacuation of Crete was accomplished in the face of overwhelming air superiority. For over two weeks in May, the Mediterranean Fleet endured concerted German air attacks while conducting nearly nightly runs. Some 17,000 troops were saved, but at a cost of over 2,000 naval casualties, nine ships sunk and another 17 damaged.<sup>7</sup>

During the year three major convoys were run into Malta with

only a single merchant ship lost. Submarines and RAF aircraft based in Malta began to take an increasingly heavy toll of Axis shipping transiting to North Africa. When a small cruiser-destroyer group (Force K) is stationed in Malta to attack shipping, Axis losses rose dramatically. By November, some 60% of Axis cargos were being sunk.<sup>8</sup>

By late 1941, the Axis situation had become so adverse that the German Navy was compelled to send approximately one-third of its operational U-boats from the Atlantic into the Mediterranean. Between September and December, 26 U-boats entered the Mediterranean.<sup>9</sup> Their presence was quickly felt--a British carrier and battleship are both sunk in November. In December, British naval fortunes reached a low ebb when Italian human torpedoes penetrated Alexandria harbor and sank two battleships, eliminating the Mediterranean Fleet's battle squadron (leaving no British carriers and battleships against the Italian Fleet of five battleships backed by a large land-based air force). Also in December, Force K ran into an Italian minefield and was eliminated as an effective force. The reinforced Luftwaffe began a heavy bombing campaign against Malta which further reduced its offensive capability.

#### 1942--Malta Holds the Key

For most of 1942, both Axis and British naval operations and strategy focused on Malta. Through April, the island's situation became increasingly desperate as Axis air forces conducted

extremely heavy attacks to neutralize the island's defenses in preparation for a possible combined sea-airborne attack. In March, the British attempted to run a relief convoy through to the besieged island. Though an out-gunned British escort force fought a larger Italian force to a standstill, the convoy's arrival was delayed enough to let Axis aircraft sink all of the convoy's merchant ships before they completed unloading. In April, Axis bombing of Malta reached a peak and even British submarines were forced to withdraw. Axis shipping to North Africa during this period was practically unhindered.<sup>10</sup>

Pressure against Malta decreased in May as German air units were withdrawn for operations in other areas. However, a major British naval operation in June failed to break the siege. Only two of six merchants in a convoy sent from Gibraltar reached the island; a large convoy from Alexandria of 11 ships under heavy escort was forced back by Axis air attack and the intervention of the Italian Fleet.<sup>11</sup>

In June, Field Marshal Erwin Rommel, Commander of the German-Italian Panzer Army in Africa, gained his greatest triumph when he captured the fortress port of Tobruk. All considerations of capturing Malta were forgotten as Rommel raced into Egypt.

The greatest of all Mediterranean convoy battles took place in August when the British made a supreme effort to relieve Malta. With Malta's survival at stake, 13 heavily escorted merchants departed Gibraltar. Despite constant attacks by Axis air, submarine and light naval units, five merchants reached the

island.<sup>12</sup> This proved enough to sustain Malta in its efforts to attack Axis supply lines during the next critical period--the battles of El Alamein. By October, 44% of Axis supplies never reached their destination.<sup>13</sup>

Between October and November, the situation in North Africa was again transformed -- this time irrevocably. In October, due in no small part to the efforts of forces from Malta striking Axis supply lines, Axis ground forces were decisively defeated at the second battle of El Alamein. In November, the siege of Malta was finally broken. Most importantly, the massive landings of American and British forces in French North Africa in November sealed the fate of Axis forces in North Africa. Unable to challenge the German hold on Europe in 1942, the Anglo-American decision to focus on the Mediterranean theater resulted in the destruction of the last Axis forces in Africa in May 1943, followed by the invasion of Sicily in August, and the surrender of Italy in September. The naval war in the Mediterranean was over.

## CHAPTER III

### BRITISH OPERATIONAL INTELLIGENCE

#### Sources

During the Second World War, the Royal Navy's Naval Intelligence Division (NID) gave the British Admiralty an unprecedented view of Axis naval operations and intentions. In order to reach this level of knowledge, the NID used as many as 17 identifiable sources.<sup>1</sup> These ranged from the interception and deciphering of high-level enemy signals (ultimately what was to become known as Ultra intelligence), to fixes of enemy positions by naval "Y" stations, to prisoner of war interrogations, to agent and attache reporting, to open source analysis of enemy communiques. These sources varied in importance, reliability and operational usefulness.

The most reliable source, and one which became outstanding in its timeliness, was the capability to read high-level German and Italian communications. As early as 1937, the British Government Code and Cipher School (GC&CS) located at Bletchley Park outside London was reading Italian Navy ciphers. This advantage was maintained from the start of the war until 1 October 1940 when the Italians completed a change in cipher tables for all fleet units.<sup>2</sup> Thereafter, until the middle of 1941, the British experienced an intelligence gap regarding Italian naval operations, relying on a combination of direction finding, low grade signals intelligence (SIGINT), traffic analysis, and photo reconnaissance of important Italian bases.<sup>3</sup>

Ironically, the Germans wrongly suspected the security of the Italian codes and prevailed on their allies to adopt a new system using a Swedish machine called the C38. The associated medium grade cipher (called C38m) was quickly broken by GC&CS. By 23 June 1941, Bletchley Park was transmitting useful operational intelligence derived from C38m to command authorities in the Middle East. From that point until the Italian armistice, with few interruptions, the British continued to read Italian C38m traffic with little or no delay.<sup>4</sup> The break into C38m was crucial because of its widespread use by Italian shore and fleet commands. Not only did it provide information concerning Axis shipping movements between Europe and North Africa, but it often provided information on Italian main fleet operations. Thus from July 1941, British commanders had advance notice of almost every convoy and important independent ship that sailed across the Mediterranean.<sup>5</sup>

Following the intervention of the Germans in the theater, new Ultra sources appeared. The primary source was Luftwaffe radio transmissions which were enciphered using the Enigma machine and which were being read by GC&CS in near real time. However, the Luftwaffe traffic only occasionally contained information concerning naval or convoy movements.

Another important source was the British direction finding and "Y" station organization. Despite expansion before the war, by September 1939, there were only three stations in operation in the Mediterranean.<sup>6</sup> Besides providing fixes on enemy radio transmissions, "Y" stations provided intelligence from intercept

and exploitation of plain language and low grade cipher material.

Intercept of enemy transmissions which could not be read still provided another useful source of intelligence. This was gained by traffic analysis of the volume and pattern of enemy radio traffic. Following the change in Italian naval codes, traffic analysis was virtually the only source of advance intelligence regarding Italian Fleet operations.<sup>7</sup> However, this was an inexact science which "was at best inadequate and on occasions led to quite false conclusions."<sup>8</sup>

Another important source was reconnaissance reporting from operating units. Most important among these was RAF reconnaissance aircraft, particularly flying boats used to surveil the waters of the Mediterranean, and specially fitted photo-reconnaissance aircraft. For example, following the change of Italian naval codes, the best and most immediate source on the movements of the Italian Fleet and of the routes and timing of convoys were flying boats from Gibraltar and Alexandria and photo-reconnaissance aircraft from Malta.<sup>9</sup> However, the effectiveness of this source was much reduced by the continual shortage of long range aircraft and the severe shortage of photo-reconnaissance aircraft allocated to the Mediterranean. Difficulties in coordination between the RAF and the Royal Navy were also a continual problem.<sup>10</sup>

### Analysis

Strategic assessments and background intelligence was provided on over 20 countries in the Mediterranean region by a coordinating



body called the Middle East Intelligence Center set up in June 1939 in Cairo. Despite periodic efforts to consolidate the exchange of operational intelligence, the exploitation and assessment of operational intelligence in the Middle East remained in the hands of the three separate services throughout the war.<sup>11</sup>

Within the organization of the NID in London was a section called the Operational Intelligence Center (OIC), responsible for providing day-to-day operational intelligence on enemy maritime forces. The OIC, by virtue of the fact that it was located in the Admiralty with the Operations and Plans sections, had an important role in the formulation of operational orders. A similar structure existed in the Mediterranean where an OIC was set up originally in Malta and then moved to Alexandria in May 1940. All information gained within the theater was passed to OIC for analysis. Pertinent analysis performed in London by various intelligence departments within the NID was also forwarded to the OIC in Alexandria. In order to inject intelligence into the planning process and to keep analysts apprised of friendly operations to assist them in better understanding enemy operations, the OIC worked closely with Mediterranean Fleet operations and plans personnel.

### Dissemination

Dissemination of most intelligence to the OIC in Alexandria was handled via regular communications channels. Treatment of the more sensitive Ultra intelligence was handled differently. All

Enigma decryption was performed at Bletchley Park in Hut 6; most material was then sent to other areas (Hut 3) for translation and analysis. However, Enigma information pertaining to Italian and German naval operations was handled differently. This material was sent in its raw form to the Admiralty for translation, analysis and dissemination. Eventually, Ultra intelligence pertinent to the Mediterranean was passed to the OIC in Alexandria in a paraphrased form, camouflaging the source of the information.

By August 1941, the handling of Ultra intelligence in the Mediterranean was streamlined when a Special Liaison Unit (SLU) dedicated to the transmission and dissemination of such material was created in Cairo. Prior to the creation of SLUs, non-naval Ultra intelligence was handled in two ways. From the start of the war, the gist of Italian and German high-grade SIGINT was passed from the Air Ministry and the War Office to the Middle East. Problems with the delay of information and concerns that the source of the information was not being adequately protected dictated a change in March 1941 when intelligence selected by GC&CS was paraphrased and directly transmitted on a special radio link to the director, Combined Bureau Middle East who distributed it to three major service intelligence headquarters. Finally, in August 1941, a SLU link with Cairo was set up. Each SLU had its own special communications unit (SCU) with dedicated high-speed morse facilities. The SCU/SLU was responsible for deciphering all Ultra signals, their distribution and for supervising security precautions. Additional SLUs were created, including one in

Alexandria and eventually in Malta to handle the Royal Navy's needs.<sup>12</sup>

CHAPTER IV  
THE ROLE OF BRITISH OPERATIONAL INTELLIGENCE  
DURING THE WAR IN THE MEDITERRANEAN

The Royal Navy's campaign in the Mediterranean was costly in terms of losses, was conducted with barely adequate resources, and, more than once, appeared on the edge of disaster. Nevertheless, throughout 1940 and 1941 and for most of 1942, the Royal Navy held its own against usually superior forces and contributed materially, perhaps decisively, to the defeat of Axis forces in North Africa. While a major factor in this success was the superior British leadership (epitomized by the aggressive Admiral Cunningham) and the equally timid leadership of the Italian Navy, combined with the tactical excellence of the Royal Navy, the margin of victory was arguably provided by superior intelligence which permitted the hard-pressed British to maximize the effectiveness of their forces. This intelligence advantage was most pronounced after July 1941 when all Axis shipping movements were known to the British. But even this situation was not as advantageous as it could have been given the paucity of forces available to exploit it. However, when this level of intelligence was combined with the overwhelming air and naval forces committed to the Mediterranean after Operation Torch in November 1942, this advantage became crushing.

The Importance of Intelligence in Fleet Actions

Though the British continually sought to engage the Italian

Fleet in a decisive engagement, such engagements were relatively infrequent and rarely decisive as the Italians were never willing to seek a decision against the Mediterranean Fleet. In the first few months of the war, the British went from near total omniscience regarding the movements of the Italian Fleet to total blindness. The results were telling. In the first engagement with the Italian Fleet in July 1940, Admiral Cunningham was well provided with intelligence on the Italian commander's intent to draw the Mediterranean Fleet into a submarine and aircraft trap and was able to act accordingly.<sup>1</sup> This same ability to read high level Italian Navy signals also permitted the British to destroy 10 Italian submarines between 10 June and 5 July, much reducing the morale and effectiveness of the large Italian submarine force.<sup>2</sup> But the British reliance on this sole source was to prove unfortunate when the Italians changed codes for surface and submarine forces. As a result, from June to December 1940, the Italian Navy, operating on interior lines of communication, was able to achieve its primary task by moving supplies and personnel to Libya unhindered.<sup>3</sup> With only marginal intelligence, the Mediterranean Fleet was unable to bring the Italians to action; between June and October, 16 sweeps were made in search of the Italians, but the enemy was sighted only three times.<sup>4</sup>

The arrival of specially-fitted RAF photo reconnaissance aircraft in the Mediterranean allowed the British to partially fill the gap in signals intelligence by tracking Italian Fleet movements to and from port. Having received a modern fleet carrier, Admiral

Cunningham also had the means available to exploit this intelligence and strike the Italian Fleet in port. The attack on Taranto in November 1940 was made possible by the operations of photo-reconnaissance aircraft which provided planners with a detailed layout of port defenses and tracked the movements of Italian heavy units. The latest photographs of the port were flown out to the British carrier on the afternoon before the night strike was launched. This intelligence allowed the British to avoid most of the port's defenses and maximized the potential of the small strike force (21 aircraft) which dealt a crippling blow to the Italian Navy.<sup>5</sup>

The largest fleet engagement of the Mediterranean war was another intelligence-driven event. In March 1941, the British were in the process of moving forces from Egypt to Greece. Under pressure from the Germans to strike these convoys, the Italian naval staff planned an operation into the eastern Mediterranean (their readiness to so undoubtedly bolstered by a German intelligence assessment that only a single British capital ship was ready for action -- there were in fact three<sup>6</sup>). Admiral Cunningham received from the Admiralty various Ultra decrypts of Luftwaffe and the rarely used Italian Navy Enigma which pointed to a major operation in the Aegean Sea or eastern Mediterranean.<sup>7</sup> Acting on this still ambiguous intelligence, Cunningham took the Mediterranean Fleet to sea. This forewarning permitted Cunningham to intercept the Italians which led to one of the decisive battles of the naval war in the Mediterranean.

## The War Against the Sea Lanes

It was during the campaign against Axis shipping to North Africa that the importance of British operational intelligence can be most clearly demonstrated. However, only rarely in the campaign did the British have the requisite forces to fully exploit what was eventually near perfect intelligence. Perhaps the true importance of this intelligence can be judged by the fact that even with inadequate forces, the British were able to strike Axis supply lines hard enough to affect the ground war in North Africa.

At war's start, the few submarines and only one squadron of strike aircraft based in Malta was unable to effectively attack Axis supply lines. From June to December 1940, 690,000 tons of shipping transited to North Africa with a loss of under two percent.<sup>8</sup>

By early 1941 it was apparent that the Germans were moving large forces into Libya. On 14 April, Churchill ordered that the highest priority be given to operations against enemy supply routes. However, insufficient forces on Malta and sporadic intelligence frustrated British efforts. During the first three months of 1941, only 10 ships were sunk. This total increased to 21 in April and May, but was not enough to disrupt the movement of the German forces to Libya.<sup>9</sup>

The breaking of the Italian C38m code brought a new dimension to the battle in the sea lanes. From July 1941, the British had advance warning of the composition and schedule of convoys bound from Europe to North Africa. In a pattern often repeated,

reconnaissance aircraft were sent from Malta to cover the source of the intelligence which were followed by air attacks. A major success was scored in mid-October when three of five ships in convoy bound for Tripoli were sunk by Malta-based aircraft.<sup>10</sup>

Axis convoys to Libya could only be seriously disrupted by forces operating from Malta. Initially, the few submarines and aircraft based there were unable to have a major effect on the flow of supplies through the Mediterranean. In an effort to increase Malta's striking power, Cunningham dispatched Force K to Malta. The combination of excellent intelligence and a suitable striking force paid immediate dividends, bringing the movement of Axis supplies to Libya to a near complete halt. It also provided a perfect case study in the application and effect of operational intelligence. Italian C38m signals were decrypted by GC&CS and transmitted to Vice Admiral Malta which were then passed in the form of operational orders to the Commander of Force K. Following a sighting by an aircraft from Malta to provide cover, Force K would sortie to intercept the convoy. Confirmation of the results of the operation would be provided by subsequent C38m intercepts.<sup>11</sup> On the night of 9 November, Force K destroyed an entire convoy of seven ships. On 20 November, another convoy of four ships turned back under air attack and fear of interception by Force K. A smaller convoy of two ships was annihilated by Force K on 23 November. Whereas between June-October 1941, 16% of Axis cargos failed to arrive in Libya, in November this total reached 62%.<sup>12</sup>

The desperate nature of the Axis supply situation was clearly



evidenced in December when the Italian naval command was compelled to use two light cruiser as fast fuel transports. An Ultra-derived intercept of these ships resulted in their destruction on 12 December.<sup>13</sup> The cumulative effect of British pressure against Axis lines of communications through the autumn of 1941 prevented the formation of large supply reserves immediately before Operation Crusader, the British offensive launched in November to break the siege of Tobruk. Furthermore, the cumulative effect of the British campaign against the Italian merchant marine was beginning to bite. In 1941 alone, 191 Italian merchants over 500 tons were sunk; taking into account new construction, the result was a 30% reduction in the Italian merchant fleet.<sup>14</sup> At such a rate, the lines of communication to North Africa could not be maintained.

As promising as the situation was for the British in November 1941, a series of setbacks in December and early in 1942 reduced the Mediterranean Fleet to impotence and prevented the British from taking advantage of the continuing flow of high quality intelligence on Axis shipping. On 19 December, Force K ran into an Italian minefield and was eliminated as an effective force (a disaster which may have been averted had existing Ultra information regarding Italian mining operations been passed to Force K or its commander been cleared for dissemination of Ultra intelligence). Other setbacks reduced the entire Mediterranean Fleet to only five light cruisers and some destroyers by year's end.<sup>15</sup> Finally awake to the importance of Malta, the Axis air forces began a concerted campaign against the island, rendering its airfields unusable.

Thus, possession of precise intelligence did nothing to prevent the arrival of a large convoy in Tripoli in early January. Another convoy late in January reached Tripoli with two of four ships sunk. As the bombing of Malta reached a crescendo, a large convoy in February and a simultaneous operation of three convoys in March reached Tripoli unscathed. This uninterrupted flow of supplies permitted Rommel to build up a reserve and was followed by an offensive in May which ultimately took the Axis into Egypt.

Between July and October 1942, the Axis forces in North Africa reached their culminating point primarily due to their ever-lengthening supplies lines into Egypt and the increasingly tenuous link from Italy across the Mediterranean. Rommel's first attempt in early July to break the British defenses at El Alamein was unsuccessful. British efforts intensified between August and October to prevent Rommel from building up sufficient supplies to resume his offensive. These efforts focused on Axis fuel supplies with fuel shipments to the most forward Axis-held port of Tobruk considered most important, as shipments to Benghazi or Tripoli could not easily be moved to the front. In late August, the sinking of two tankers and three cargo ships carrying fuel in barrels left Axis forces with only 100 of the 2400 tons of fuel promised immediately before a last desperate offensive was launched on 31 August.<sup>16</sup> Unable to build up any sort of supply reserve, the attack was launched with inadequate fuel stockpiles. Usually noted for his sweeping maneuvers, fuel constraints limited Rommel's operational freedom to a frontal assault on British positions.

After the failure of the operation, Rommel stated that "the petrol, which was an essential condition for the fulfillment of our plan, had not arrived."<sup>17</sup>

The situation was little better for Axis forces in October when Commonwealth forces launched a massive attack to expel the Axis from Egypt. Lack of fuel prevented the Axis from concentrating or maneuvering their mobile forces<sup>18</sup> and ensured that the Axis forces, already heavily outnumbered, would suffer a decisive defeat--a defeat so crippling that it proved to be the beginning of the end of the war in North Africa.

In any event, had the campaign in North Africa lasted any longer, the cumulative effect of British operations against the Italian merchant marine would have reduced it to irrelevance. From 1940-1943, Italian merchant losses totalled 565 ships, most occurring inside the Mediterranean. These losses represented 64% of the total tonnage available for Axis use.<sup>19</sup> It is not possible to ascertain how many of these losses were attributable to intelligence, but an Italian historian conservatively estimated that the loss of nine warships and 86 merchant ships can be directly traced to the influence of Ultra.<sup>20</sup> There is no doubt that the availability of quality intelligence greatly increased the effectiveness of the relatively small British forces dedicated to antishipping operations. It is also clear that the same level of intelligence could not compensate during the periods when British forces were too weak to mount significant attacks against Axis shipping.

## CHAPTER V

### CONCLUSIONS

Intelligence alone did not prevent an Axis victory in the Mediterranean theater, nor did it ensure that the Allies would be victorious. Yet during the decisive points in the war at sea, intelligence played a central role in British operational planning and can, therefore, be considered as a crucial component to Allied victory. The impact of the war at sea upon the ground campaign was also significant--a significance magnified by the fact that attacks on Axis shipping were most effective during decisive points in the ground campaign. These attacks were orchestrated through an extraordinary level of knowledge regarding Axis shipping.

Throughout the campaign in the Mediterranean, operational intelligence was used by the British to focus their attacks against Axis centers of gravity. Because these were obvious to the Axis, the role of intelligence was instrumental in facilitating British attacks against them, both directly and indirectly.

Perhaps most importantly, operational intelligence allowed British commanders to maximize inadequate resources. In this regard, intelligence acted a true force multiplier allowing the British to bring available forces to bear against at the decisive point and time.

Intelligence also allowed British forces to consistently gain the advantage of surprise over Italian naval forces which was often combined with tactical prowess to afford the British an

overwhelming advantage. During much of the war in the Mediterranean, intelligence was combined with the natural aggressiveness of Admiral Cunningham to maintain the initiative; even during their periods of relative weakness, the British never surrendered the initiative.

### Modern Parallels

Some of the hallmarks of the manner in which operational intelligence was used and influenced operations in the Mediterranean retain relevance for today's operational commander.

Perhaps the most important parallel was how the British employed intelligence to optimize the effectiveness of their forces in attacking Axis centers of gravity. At the operational level of war, between the period mid-1940 to late 1942, the Axis centers of gravity were the Italian Navy which permitted the Axis to support operations in North Africa and to threaten Allied lines of communications through the Mediterranean, and the German-Italian Army in Libya which threatened the Allied base of operations in Egypt. Intelligence played a key role in British efforts to attack both.

The Italian Fleet was quickly recognized by the British as a center of gravity, the destruction of which would have fit nicely with the Royal Navy's Mahanian control of the sea precepts. In turn, the Italians made every effort to protect this center of gravity by avoiding decisive engagement, going as far in mid-1941 to ascribe to a "fleet in being" concept.<sup>1</sup> Such decisive points as

the British were able to achieve against this center of gravity--those which provided them with a marked advantage and helped them maintain the initiative (Taranto, Cape Matapan)--were in a large measure provided by intelligence.

The other Axis center of gravity, the German-Italian Army in the field, defied British attempts at direct attack. Despite a British numerical superiority and more secure (if not much longer) lines of communications, a marked Axis tactical superiority more than balanced those advantages. More effective than the direct attacks by the British 8th Army were the indirect attacks of the Royal Navy. Here intelligence allowed relatively small British forces to effectively attack the lines of communications of the Axis army, eventually weakening this center of gravity until it was smashed by a direct attack. It is no accident that the periods of greatest effectiveness in the British antishipping campaign preceded decisive points in the ground campaign. Axis shipping losses prior to the Battle of El Alamein reflect this correlation. Here also the importance of intelligence was clearly evidenced. Between June to October 1942, 48 Axis ships carrying cargo to North Africa were sunk; all but two were tracked by British intelligence.<sup>2</sup> Many of these were carrying fuel, the availability of which had been identified by intelligence as a critical Axis vulnerability, and which in turn were targeted for special attack.

While the British were attempting to attack Axis centers of gravity, intelligence was also assisting in the defense of British centers of gravity. Use of intelligence prevented elements of the

Mediterranean Fleet or Force H from being surprised and engaged by larger Italian naval forces; intelligence was also used successfully by the RAF to inflict heavy attrition on Axis air forces attacking Malta during 1942.

Use of intelligence in this manner is even more important today as force levels continue to decline, but the ability of these forces to mount deep, precision strikes against enemy centers of gravity or critical vulnerabilities increases. Quality operational intelligence is a prerequisite in order to identify and attack the target sets associated with enemy centers of gravity and is therefore crucial to make the most effective use of available assets. Successful identification of enemy centers of gravity and critical vulnerabilities will dramatically increase the effectiveness of campaign planning and should assist in curtailing the length of future conflicts.

Joint Pub 2-0, Doctrine for Intelligence Support to Joint Operations, defines operational intelligence as "information about the adversary and the environment required for (1) determining the commander's objectives, (2) selecting options, (3) planning operations, (4) conducting operations, and (5) analyzing the effects of operations." To meet these criteria, intelligence must be incorporated as early as possible in the planning stage. The close association of the Mediterranean Fleet's OIC and operational planners ensured this was the case during the war in the Mediterranean. As has been demonstrated, intelligence successfully drove operations on more than one occasion.

While the effect of high quality intelligence as a force multiplier has already been discussed, it is also clear that intelligence itself is not a force substitute. Even detailed foreknowledge of enemy intent will not result in mission accomplishment if not paired with adequate force. The inability of the British to disrupt Axis shipping to North Africa during the first half of 1942 even while reading C38m demonstrates this.

Just as intelligence is not a force substitute, it cannot overcome faulty force structure. For most of the war, the Mediterranean Fleet was forced to operate under a considerable air threat. This condition was ameliorated by local air parity when the fleet possessed a modern carrier. Nevertheless, the weakness of the Fleet Air Arm and of the RAF in the Middle East resulted in heavy losses at the hands of Axis air power. The general weakness of British air forces in the region extended into the area of strike and reconnaissance capabilities. Up until September 1941, a single understrength RAF squadron was assigned to support the operations of the Mediterranean Fleet. Even as late as March 1942, a total of only 119 aircraft were assigned to the Mediterranean to support maritime operations. This total included a mere 40 antishipping aircraft, making good intelligence essential if this small force was to be employed successfully. The presence of only 27 medium and short-range reconnaissance and eight photo-reconnaissance aircraft impacted the ability of the British to confirm Ultra intelligence or to fill other intelligence gaps.<sup>3</sup> The fact that the Fleet Air Arm was able to deal a crippling blow



to the Italian Fleet at Taranto with a handful of antiquated aircraft is testimony to the value of intelligence and raises the question of what a stronger strike force could have achieved.

Intelligence, even excellent intelligence, is no substitute for good leadership. Admiral Cunningham invigorated the Mediterranean Fleet with an intense spirit of attack, believing that moral dominance was fundamental to success.<sup>4</sup> His aggressiveness turned out to be decisive on several occasions (witness the bold attack on Taranto and his decision to close with his heavy units at night and engage an Italian force of unknown size off Cape Matapan). On the other hand, Italian naval leadership was consistently timid, lacked confidence, was hamstrung by interference from above, and was never able to translate numerical superiority into any strategic or even lasting operational success.

The successful commander also has to understand how to use intelligence, taking into account its often ambiguous nature and incorporating it into his operational planning. Cunningham did this at Cape Matapan; the Italian admiral present, despite indications that the Mediterranean Fleet had sailed to engage him, used his intelligence resources poorly.<sup>5</sup> The results were tragic for the Italians. It is ironic that for much of the first half of the war in the Mediterranean that the Italians, through a combination of agents in Gibraltar and Alexandria, by traffic analysis and with a greater number of reconnaissance aircraft, were better able to track the movements of the Mediterranean Fleet than

were the British able to track the main Italian Fleet.<sup>6</sup> However, indecisive leadership prevented the Italians from translating this transitory intelligence advantage into an operational advantage.

Intelligence is also no substitute for a well-trained and equipped force. Even after British forces were guided to their target by accurate intelligence, they still faced an enemy which possessed fine individual ships manned by brave crews. Nevertheless, tactically, it can be argued that the Royal Navy never lost an engagement against the Italian Navy. Usually, the possession of radar and superior night fighting training proved the decisive factor.

The timely dissemination of intelligence is also a prerequisite for success. The availability of intelligence counts for nothing if it is not shared with the appropriate operational forces. A case in point occurred during the introduction of German air forces into the Mediterranean in 1941. Reading Luftwaffe Enigma, British intelligence tracked the movements of Luftwaffe units into Italy and knew in January 1941 that significant numbers of aircraft were based on Sicily. Yet neither the Admiralty nor the Air Ministry in London passed this information on to the Mediterranean Fleet or Force H.<sup>7</sup> The result was the most serious setback to the Mediterranean Fleet up to that point when its only carrier was heavily damaged by air attack--an attack not from the terrifying but ineffective Italian high-level bombers but the accurate dive bombers of the Luftwaffe.

An age-old problem in matters pertaining to intelligence is

the protection of sources. This usually overriding concern has to be balanced with the need to disseminate the intelligence to operational forces where it cannot usually be afforded the same high level of protection.

The handling of Ultra intelligence is a good example of proper safeguards but also of the risks involved in using very sensitive intelligence. The Admiralty took the strictest precautions in handling Ultra information. It was revealed only to key flag and senior officers and a few select members of the cipher staff. All personnel exposed to Ultra were tracked by the NID in London. After being briefed into Ultra, the individual was not permitted to place himself in danger of capture.<sup>8</sup> As has been already described, any action undertaken as a result of Ultra had to have a cover story, usually in form of an air reconnaissance mission.<sup>9</sup> Commands receiving Ultra were under strict instructions to avoid sending signals that might betray the fact that they had learned the content of enemy messages (an instruction which was broken on more than one occasion and which placed the entire Ultra secret at risk<sup>10</sup>). All of these precautions were prudent and but did not detract from the operational utilization of the intelligence. Proper source protection is never an invalid principle, during war or even peace when security conscienceness may be reduced.

It is always wise to keep in mind that intelligence is never perfect. There will always be gaps in the desired knowledge of enemy capabilities and intentions. Furthermore, the information which is available is subject to the prejudices and predilections

of the analysts which turn it into finished, useful intelligence. Least the reader think that British intelligence in the Mediterranean was a story of unvarnished success, it should be pointed out that on several occasions it was unable to provide any warning to operational commanders of major Italian operations. Among these was the battle of Cape Spartivento in November 1940 when Force H was surprised by the Italian Fleet which had been unlocated for 15 days<sup>11</sup>, and again in February 1941 during Force H's bombardment of Genoa, when no warning was received that the Italian Fleet had sortied and had passed close to the British force, and in March 1941 when no warning of an attack on Suda Bay, Crete was provided which sank a heavy cruiser.<sup>12</sup>

Finally, heavy reliance on a sole source of intelligence could have disastrous consequences. Even during times of plentiful intelligence, several and varied sources need to be cultivated and used to form the intelligence situation. The dramatic British loss of intelligence regarding the movements of the Italian Fleet following the Italian code change in mid-1940 is a good example of an intelligence posture over-dependent on a single source. Given the British reliance on the reading of C38m during the later part of the war in the Mediterranean, it is better left up to the imagination what the operational consequences for the British would have been had the Italians discovered that this code had been compromised.

In summation, it can be concluded that quality operational intelligence, disseminated in a timely manner, can make a strong

force stronger and may cover some of the deficiencies of a weak force, but will not cover the shortcomings of an inadequate force.

## NOTES

### Chapter II

1. G. Hummelchen and J. Rohwer, Chronology of the War at Sea 1939-1945 (Annapolis, MD: Naval Institute Press, 1992), p. 22.
2. James Sadkovich, ed., Reevaluating Major Naval Combatants of World War II (New York: Greenwood Press, 1990), p. 130.
3. Correlli Barnett, Engage the Enemy More Closely: The Royal Navy in the Second World War (New York: Norton, 1991), p. 207.
4. Ibid., p. 213.
5. S. W. Roskill, The War at Sea 1939-1945: Vol. I. The Defensive (London: Her Majesty's Stationary Office, 1954), p. 299.
6. Ibid., p. 431.
7. S. W. Pack, The Battle for Crete (London: Ian Allan, 1973), p. 126.
8. I. S. Playfair, The Mediterranean and Middle East: Vol. III. British Fortunes Reach Their Lowest Ebb (London: Her Majesty's Stationary Office, 1960), p. 107.
9. Gordon Smith, The War at Sea: Royal and Dominion Navy Actions in World War 2 (London: Ian Allan, 1989), p. 59.
10. Sadkovich, p. 146.
11. Hummelchen and Rohwer, p. 146.
12. S. W. Roskill, The War at Sea 1939-1945: Vol II. The Period of Balance (London: Her Majesty's Stationary Office, 1956), p. 307.
13. I. S. Playfair, The Mediterranean and Middle East: Vol. IV. The Destruction of the Axis Forces in Africa (London: Her Majesty's Stationary Office, 1966), p. 210.

### Chapter III

1. Donald McLachlan, Room 39: A Study in Naval Intelligence (New York: Atheneum, 1968), p. 20.

2. Barnett, p. 220.
3. F. H. Hinsley et al, British Intelligence in the Second World War, Vol I (London: Her Majesty's Stationary Office, 1979), p. 210.
4. F. H. Hinsley, British Intelligence in the Second World War, Vol II (London: Her Majesty's Stationary Office, 1981), p. 283.
5. Ibid.
6. Patrick Beesley, Very Special Intelligence (London: Hamish Hamilton, 1977; reprint ed., New York: Ballantine Books, 1981), p. 17.
7. John Winton, Ultra at Sea (London: Leo Cooper, 1988), p. 14.
8. Barnett, p. 220.
9. Winton, p. 12.
10. Barnett, p. 220.
11. Hinsley, Vol. I, p. 191.
12. Hinsley, Vol. I, p. 570.

#### Chapter IV

1. Hinsley, Vol. I, p. 209.
2. Barnett, p. 219.
3. Roskill, Vol. I, p. 307.
4. Barnett, p. 220.
5. Ibid., p. 245.
6. Sadkovich, p. 142.
7. Barnett, p. 333.
8. Roskill, Vol. I, p. 307. /
9. Winton, p. 165.
10. Hummelchen and Rohwer, p. 91.

11. Hinsley, Vol. II, p. 320.
12. Winton, p. 169.
13. Ralph Bennett, Ultra and Mediterranean Strategy (New York: Morrow, 1989), p. 92.
14. Roskill, Vol. I, pp. 537-538.
15. Winton, p. 174.
16. Bennett, p. 150.
17. John Ellis, Brute Force: Allied Strategy and Tactics in the Second World War (New York: Viking, 1990). p. 256.
18. Hinsley, Vol. II, p. 427.
19. Marc Bragadin, The Italian Navy in World War II (Annapolis, MD: Naval Institute Press, 1957), p. 365.
20. Sadkovich, p. 134.

#### Chapter V

1. Sadkovich, p. 139.
2. Hinsley, Vol. II, pp. 728-738.
3. Roskill, Vol II, p. 81.
4. Barnett, p. 223.
5. Ibid., p. 342.
6. Ibid., p. 220.
7. Hinsley, Vol. I, p. 385.
8. Winton, pp. 3-4.
9. Winton, p. 4.
10. Hinsley, Vol. II, p. 644.
11. Winton, p. 14.
12. Hinsley, Vol. I, p. 404.



## SELECTED BIBLIOGRAPHY

- Barnett, Correlli. Engage the Enemy More Closely: the Royal Navy in the Second World War. New York: Norton, 1991.
- Beesly, Patrick. Very Special Intelligence. London: Hamish Hamilton, 1977; reprint ed., New York: Ballantine Books, 1981.
- Bennett, Ralph. Ultra and Mediterranean Strategy. New York: William Morrow, 1989.
- Bragadin, Marc. The Italian Navy in World War II. Annapolis, MD: Naval Institute Press, 1957.
- Crevelld, Martin van. Supplying War. Cambridge: Cambridge University Press, 1977.
- Ellis, John. Brute Force: Allied Strategy and Tactics in the Second World War. New York: Viking, 1990.
- Grove, Eric. Sea Battles in Close-up. World War 2. Volume Two. Annapolis, MD: Naval Institute Press, 1993.
- Hinsley, F. H. et al. British Intelligence in the Second World War. Vol. 1. London: Her Majesty's Stationary Office, 1979.
- \_\_\_\_\_, British Intelligence in the Second World War. Vol. 2. London: Her Majesty's Stationary Office, 1981.
- Horwarth, Stephen, ed. Men of War. New York: St. Martins Press, 1992.
- Hummelchen, G. and Rohwer, J. Chronology of the War at Sea 1939-1945. Annapolis, MD: Naval Institute Press, 1992.
- Jacobsen, Hans-Adolf and Rohwer, Jurgen, ed. Decisive Battles of World War II: the German View. London: Andre Deutsch, 1965.
- Lewin, Ronald. Ultra Goes to War. London: Hutchinson, 1977; reprint ed., New York: Pocket Books, 1980.
- Liddel Hart, B. H. The Rommel Papers. New York: Harcourt, Brace and Jovanovich, 1953; reprint ed., New York: Da Capo, no date.
- Mars, Alastair. British Submarines at War 1939-1945. Annapolis, MD: Naval Institute Press, 1971.
- McKee, Alexander. El Alamein: Ultra and the Three Battles. London: Souvenir Press, 1991.

- McLachlan, Donald. Room 39: A Study in Naval Intelligence. New York: Atheneum, 1968.
- Pack, S. W. Night Action off Cape Matapan. London: Ian Allan, 1972.
- \_\_\_\_\_. The Battle of Crete. London: Ian Allan, 1973.
- \_\_\_\_\_. The Battle of Sirte. London: Ian Allan, 1975.
- Piekalkiewicz, Janusz. Rommel and the Secret War in North Africa 1941-1943. West Chester, PA: Schiffer Military History, 1992.
- Playfair, I. S. The Mediterranean and Middle East: Vol. II. The Germans Come to the Help of Their Ally. London: Her Majesty's Stationary Office, 1956.
- \_\_\_\_\_. The Mediterranean and Middle East: Vol. III. British Fortunes Reach their Lowest Ebb. London: Her Majesty's Stationary Office, 1960.
- \_\_\_\_\_. The Mediterranean and Middle East: Vol. IV. The Destruction of the Axis Forces in North Africa. London: Her Majesty's Stationary Office, 1966.
- Roskill, S. W. The War at Sea 1939-1939: Vol. 1. The Defensive. London: Her Majesty's Stationary Office, 1954.
- \_\_\_\_\_. The War at Sea 1939-1945: Vol. 2. The Period of Balance. London: Her Majesty's Stationary Office, 1956.
- Ruge, Friedrich. Der Seekrieg: The German Navy's Story 1939-1945. Translated by M. Saunders. Annapolis, MD: Naval Institute Press, 1957.
- Sadkovich, James, ed. Reevaluating Major Naval Combatants of World War II. New York: Greenwood Press, 1990.
- Schofield, B. B. The Attack on Taranto. London: Ian Allan, 1973.
- Smith, Gordon. The War at Sea: Royal and Dominion Navy Actions in World War 2. London: Ian Allan, 1989.
- Smith, Peter and Walker, Edwin. The Battles of the Malta Striking Forces. Annapolis, MD: Naval Institute Press, 1974.
- Stephen, Martin. Sea Battles in Close-up: World War 2. Annapolis, MD: Naval Institute Press, 1988.
- \_\_\_\_\_. The Fighting Admirals. Annapolis, MD: Naval Institute

Press, 1991.

Terraine, John. A Time for Courage: The Royal Air Force in the European War, 1939-1945. New York: Macmillan, 1985.

Winterbotham, F. W. The Ultra Secret. New York: Dell Publishing, 1974.

Winton, John. Ultra at Sea. London: Leo Cooper, 1988.